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Peter Olafson

GUNSHIP 2000

Ah, *Gunship*. If you've flown your IBM long, that name is bound to take you back. In 1986, when XTs and EGA still ruled the MS-DOS world and sound meant only that poor, nasal-voiced speaker, MicroProse brought out the helicopter simulation and quickly made the computer-game skies its own.

By today's standards, that Apache gunship simulation seems quaint—a rather unadorned world of pyramidlike mountains and amorphous targets. But that hardly mattered back then. It felt real. The air was always thick with threat, and the game was absolutely riveting until you limped back to base for your medal (or so you hoped).

In the last few years, MicroProse has been upgrading its classic meat-and-potatoes games to filet-mignon level: *F-15*, *Silent Service*, and, just recently, *F-19 Stealth Fighter*. It was only a matter of time before the company returned to its five-year-old *Gunship*. It's surprising that it took as long as it did.

The result is *Gunship 2000*, and it's just what the title suggests: a leap forward. It's the best helicopter simulation around. While *Gunship* fans will find some elements broadly and happily familiar—the target-camera view, the in-flight map, the primary and secondary missions—the heart of the game has been retooled. Guess what. It's still absolutely riveting.

What's new? Well, for starters, *Gunship 2000* has spread its wings. Included are no fewer than seven types of helicopters—from the Apache to the Blackhawk, the Comanche to



the Kiowa Warrior. Once you've advanced to the rank of second lieutenant, you can command a packet of five helicopters. (And you thought it was tough enough controlling just one!) These small-unit operations are the heart of game, its reason for being. Computer gaming is traditionally a rather solitary activity, but with these folks on your wing, you won't feel alone for long.

A fascinating array of missions complements this mode. You may find yourself running recon, finding and picking up troops, hauling in supplies, or hitting targets far behind enemy lines. And then there's a full campaign option as well, with an arduous schedule of combat missions. You're going to be busy, friend. When you start to play, though, you'll be able to choose only between training and single-chopper combat missions. There's so much to take in here that it's hard to know where to start. On that score, hats off to MicroProse for another superior manual.

Let's try the air over central

Europe—one of two combat theaters included with the game—at 75 feet up and 125 miles per hour, fresh out of ammo, and with Soviet Hind choppers circling like mechanical vultures. (Toto, I don't think we're on traffic patrol anymore!) With greater control over the machine comes a much more vivid impression of speed. *Gunship 2000* takes off when flying close to the surface on a fast machine, and if that's still not speedy enough, you can use time compression to get to the target area with dispatch. (The autopilot also comes in handy here.)

VGA definitely has worked its charms on the program. This is a beautiful game in flight and out of it. In Europe, the ground below is an enchanting patchwork of hills and dales; in the Gulf, make that palm trees and boulders. Roads have acquired telephone poles. Bullet holes may pockmark your windshield if you get careless. Explosions have texture, and hits have your enemy smoking. Enemy targets sometimes aren't just

a single vehicle, but a full unit that will require a few hits to take out. Get the picture? There's a lot more game here.

All this is choreographed by digitized speech reporting on the direction of targets, the approach of incoming fire, and the success of your own salvos. On machines using Roland or IBM sound, the speech comes through the PC's internal speaker. It's actually a nice, crusty effect, as though heard over an intercom, but on those systems—and systems equipped with the Ad Lib sound card—the game pauses when speech is heard. Not exactly a blow for realism. However, delivery was crisp and delay-free on my Sound Blaster.

When flying flight sims, I've often cursed myself for not shifting to an outside view quickly enough to watch my weapons do their nasty business. That's a good deal of the fun, after all, and *Gunship 2000* has several handsome exterior views.

But suppose you forget to look in the heat of battle. It's all been taken care of. After you've landed, you'll have an opportunity to see a post-mortem—I mean, a replay—of your flight from any position you care to adopt. There's no reason to miss a thing and no need to invoke a replay mode first. The files generated can be traded with other *Gunship 2000* pilots.

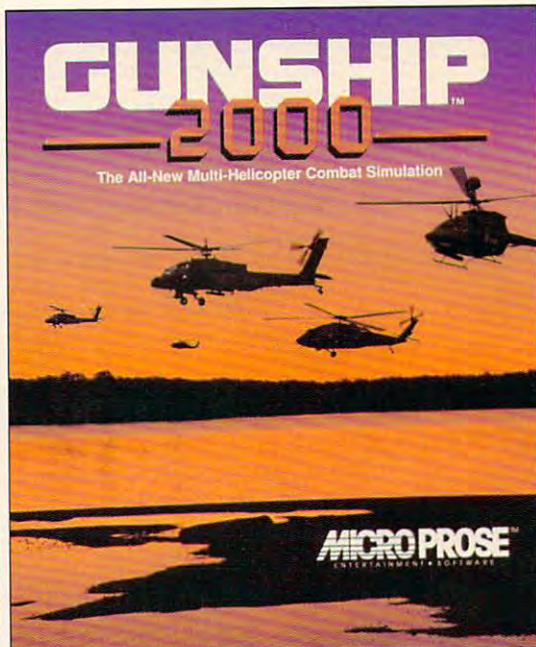
Indeed, there's not a part of *Gunship 2000* that doesn't make a mark. As you leaf through the briefing, you can hear the soft scrape of paper on paper. If you're still finding your way in the game, there's an option to have the computer take care of firing weapons and defensive countermea-

asures. Even the countersign required by the copy protection feels like part of the game.

You may find it hard to resist *Gunship 2000*'s more casual charms, as well. The selection screen back at Brigade HQ—where you pick the active pilot, theater of duty, and mission type—just barely looks like a selection screen. The desk officer really seems to be writing. Watch those fingers and dig the curt little nod he gives you when you click on him for an assignment. (Try clicking on the computer screen at the back of the room a few times for some undocumented fun.) None of this has much to do with how well you fly, but it's charming and immensely satisfying in some way. It makes you feel as if you're really in *Gunship 2000*, not just a visitor with \$69.95 plus tax.

That's not the end of it, either. MicroProse has never been a company just to boot the baby birds out of the nest to fly or fall, and *Gunship 2000* proves no exception. MicroProse is upgrading the program on a regular basis—incorporating user suggestions, fixing bugs, adding features. The most recent upgrade (as of mid November) is 469.05, and *Gunship* devotees will want to make it a point to download the file from an electronic bulletin board where the company provides customer support or obtain it directly from MicroProse.

The game's not quite perfect; no game is. As you might guess, with all this good stuff going on, *Gunship 2000* can be rather stodgy at 12 MHz. (A minimum speed of 10 MHz is recommended, and you can always chop away some of the detail to improve perform-



ance.) Even at 33 MHz, while speedy and smooth, the game doesn't have quite the raucous, branches-slapping-your-face speed I'd associate with seat-of-the-pants chopper flying.

While add-on theaters are promised, the two included don't seem to be nearly enough, and overtaken by recent events, central Europe isn't as inviting a hunting zone these days (unless BMWs are legitimate targets). The digitized voice also seemed a mite too loud on my Sound Blaster.

OK, I'm being picky. But I don't mind picking a little, because the rest of *Gunship 2000* is so good. None of the minor problems make much difference when you're out-bound at treetop level, *Primary Target* finally pops up on the target-camera screen, a Hellfire under your wing ignites, and the night sky blossoms with its impact. Home, James, and step on it. □

IBM AT and compatibles running at 10 MHz or faster; 640K RAM; EGA, MCGA, or VGA; hard disk; IBM, Tandy, Roland, Ad Lib, Sound Blaster, or ATI Stereo F/X sound card; joystick recommended—\$69.95

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GAMEPLAY

Orson Scott Card

STACKING STONE ON STONE

While I'm no expert on the medieval era, it's a fascinating period of history, from *Beowulf* to *Canterbury Tales*, from Arthur to Alfred the Great, from Edward the Confessor to William the Conqueror. It was a time when wars were fought with a relative handful of men and international crises were handled like spiteful family quarrels. Somewhere between *Lion in Winter* and *Robin and Marian* it became the period of history most often in my dreams.

Now there are two games that bring it to life with amazing realism and—best of all—lots of fast-moving fun.

Castles, by Interplay, in some ways resembles the old task-management game *Kingdom* in that you have to balance your resources and deploy them wisely, or you risk disaster. But unlike *Kingdom*, it has an achievable goal: building enough castles to secure the Kingdom of Albion from the depredations of the Celts. Once you have all eight castles built and garrisoned to withstand all attackers, you've won. (Shorter games can start with the goal of three castles—or even one.)

Building castles in the air: Take on the role of a medieval ruler with these fortification-building simulations.



But to tell you that much is to tell you nothing. First, the interface isn't one of those loathsome simulations that's harder work than your day job. It takes almost no time to master the push-button commands to keep your castles well defended, your people well fed, and the masons and carters putting up walls and towers.

The game feels deliciously real. From the moment construction begins, a dog and cat frolic and fight around the castle. Then you get to see the walls slowly rise, with workmen bustling away. And when the Celts attack, you get a rousing little battle that can end either in their ignominious defeat or, if you didn't prepare well, in the collapse of your walls and towers.

I can't tell you how much fun it is to design a castle and then see how it holds up to attack. There are some absurdities—you're almost forced to leave your infantry *outside* the walls, for instance—and at times it's a little frustrating that once you've deployed your soldiers, you have so little control over them. But, in truth, that's one of the most realistic aspects of the game—medieval warfare was like that, with commanders having relatively little control over the events of battle once it had been joined.

Castles isn't a war game, anyway; in fact, much of your time is spent dealing (in well-written, often funny scenes) with a mad abbess, an ill-tempered bishop, an insolent poacher, and worried masons. You get to make real choices in your dealings with them, and Interplay did a fine job of keeping the choices realistic, yet simple and clear.

Then, just to show that there are many ways to do it right, we come to *Warlords*, from Strategic Studies Group. This is a map-oriented war game in which you capture cas-

tles and build up your empire and resources until you're able to overcome the seven other players (human or computer) and conquer the medieval fantasy world of Illuria.

You get to choose what kind of army each castle is going to produce. No two castles give you just the same choices. You can pump out light infantry every turn, for instance; devote a castle to creating powerful griffin armies every 7 turns; or even, with some coastal cities, spend 15 or 20 turns producing a fleet. From time to time, if you keep enough gold handy, heroes offer their services to you, and you can send them in search of magical artifacts in ruins scattered here and there.

The interface is superb, and the game moves swiftly.

The graphics communicate clearly what your relative strength is likely to be. My only quibble is that the map itself is absurd, with rivers that have two mouths and no source, for instance. Yet even at that I must say that the map is well designed for play, with enough obstacles to keep you from having to deal with everybody at once.

I'll bet that if you had heard the designers of *Castles* and the designers of *Warlords* talking about their plans early on, you might have thought they were setting out to make the same game. And yet the result of their work is two completely different games of extraordinarily high quality.

This leads me to conclude that when we see games that are clearly derivative of some other company's hit, we don't need to pay the slightest attention to the copycat designers who whine, "Of course they're similar—we're simulating the same situation." Truly creative programmers will *never* end up with identical games by accident. □

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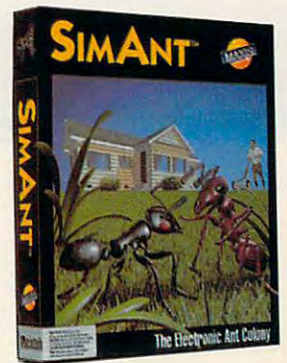
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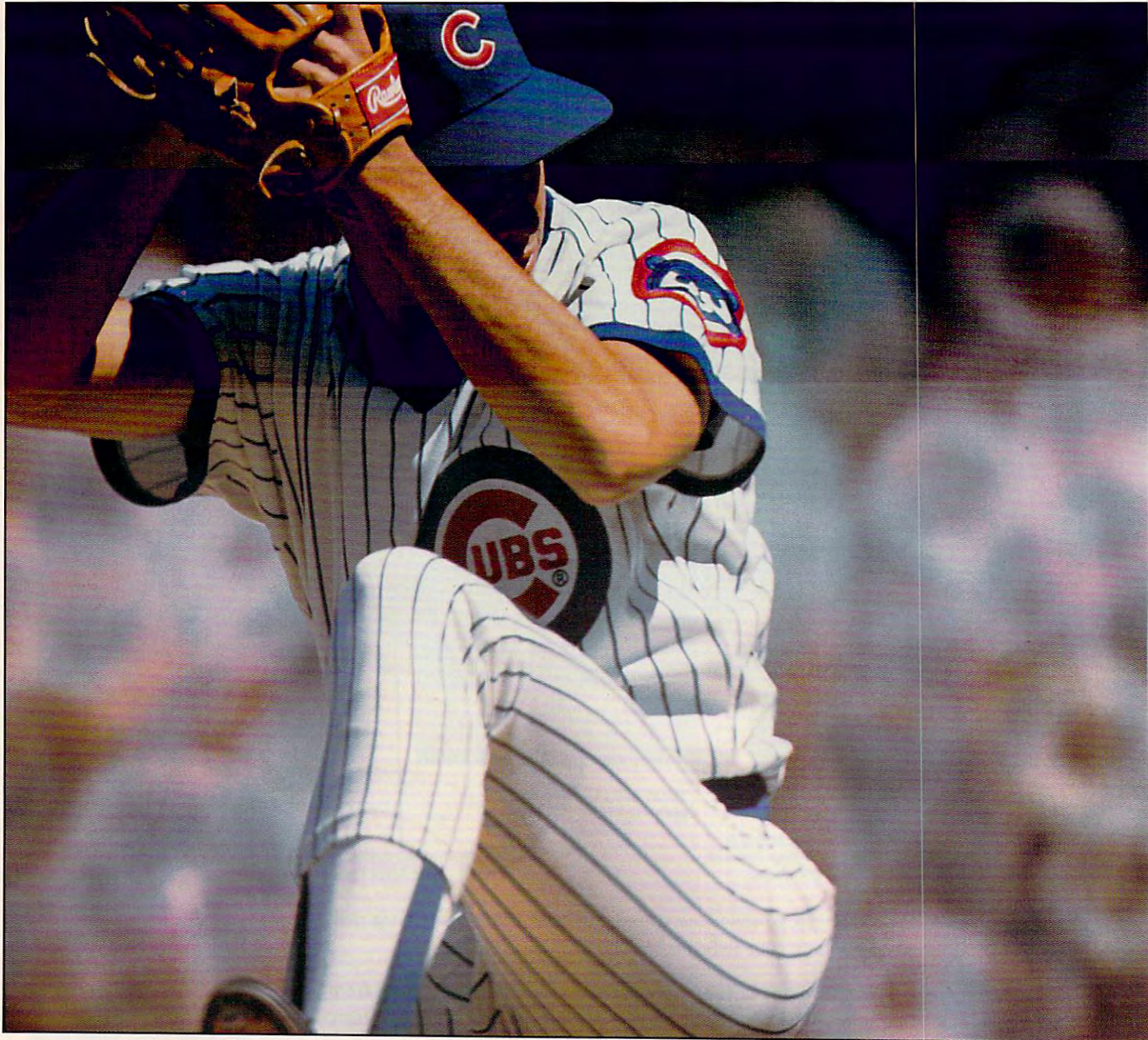


Macintosh and VGA screens shown. Available for Macintosh. DOS version available soon. SimAnt, SimCity and SimEarth are trademarks of MAXIS. © 1991, MAXIS. All rights reserved worldwide. And then some. CMP292



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Forget the cold: Winter is the perfect time to oil that glove and sharpen those spikes. Baseball season is just around the corner.

Spring Training

By Peter Scisco

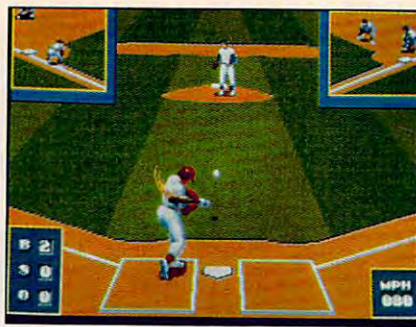
Finally, the Super Bowl is over. It's time to think green fields and diamonds in the sun. Think America's pastime. Never mind the snow and cold; think PC baseball games—and hold your own spring training season without leaving your home office.

Bo Knows Baseball

Following the lead of the popular TV Sports titles, *Bo Jackson Baseball* brings televisionlike graphics and animation to the most American of sports. By blending defense and offense, arcade action and strategic play, this baseball game will be welcomed by computer sports fans of every stripe—including pinstripe.

Stand on the mound and hurl. Stand at the plate and swing. On defense, you've got to field quickly; on offense, you have to know when to hold or run, when to lay down the bunt, when to swing away.

The game's outstanding graphics will keep you riveted to the action. The main perspective—from behind the plate—gives you a clear view of the pitcher and batter. Small windows display base runners, and another small window shows the ball in relation to the defenders, should the ball be hit. Even in the outfield, where many baseball games switch to small, ill-defined char-



Bo Jackson Baseball from Data East

acters, *Bo Jackson Baseball* maintains excellent animation and clarity. The graphics are enhanced by excellent sound support, with digitized calls from the ump and play-by-play.

You can change the names of teams and individual players—even a player's skill ratings. Up to 26 people can compete in league play. The statistical grounding of the game is very solid (provided, of course, you can hit and pitch well enough to earn your players some good stats).

Bo Jackson Baseball successfully bridges the gap between arcade and strategy, with an emphasis on arcade action. Whether you're a stats freak or an arcade junkie, *Bo Jackson Baseball* covers all the bases.

Weaver's Complete Makeover

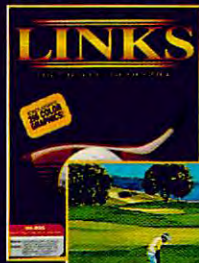
Earl Weaver Baseball II gets a complete graphic makeover in this latest version. The nondescript players in the earlier version are replaced by larger, digitized players. The split screen is gone, replaced by a view of the field that faithfully re-creates the view of major-league baseball as seen on television. And, in order to capture the instant replays and filmed highlights that are popular in today's most advanced computer games, you can set TV angles to anywhere in the park and replay the highlights.

The number of players you can have on your roster has been increased from 25 to 40. One of the most innovative features to be added, however, is the ability to download stats from online sources like Stats Inc. for use in the game. That's a real boon for fantasy players who use *Earl Weaver* to run their leagues.

Playing *Earl Weaver Baseball II* is tougher than playing the other games reviewed here. The interface, like the arcane language of baseball insiders, proves difficult for novice players. *Earl Weaver Baseball II* offers full support to players who want to edit team rosters and play on the league level. Team editing is part and parcel of the game; the statistical detail and team modifica-

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tion options put *Earl Weaver Baseball II* at the top.

Other smaller improvements include better playing from the computer opponent, a bigger selection of pitches to choose from, and access to topnotch commissioner options. All of this means a brighter spring training for all PC baseball players.

Easy-to-Like *HardBall II*

HardBall II brings baseball action to the PC in a skillful blend of performance stats and joystick slugging.

None of the players in *HardBall II* are based on actual athletes. The stats compiled in the game reflect their performance as you play. None of the teams are named after actual teams, either, but you can create teams with the Team Editor and give them whatever names you want. You can also create players and edit some of their characteristics, though some of their stats will be automatically figured as you play them.

The action on the field is tough to control; it takes practice to learn how to cover plays and to move your base runners effectively. Pitching is the easiest part to learn; fielding a ball takes some time to pick up. Likewise, hitting is very difficult at first, but with plenty of time behind the plate, you can learn.



Earl Weaver Baseball II from Electronic Arts

HardBall II is a treat for the eyes, though it lacks full VGA support. The players on the mound and at the plate are large animated characters that move realistically. Out on the field, the game uses the small, nondetailed players used by other PC baseball games.

You can use the game's Team Editor module to build ball clubs consisting of up to 30 players. The first 9 players you enter are your starting lineup; the remaining 21 sit on the bench as subs. You can also build a league by placing the players you create in a draft pool, from which all league participants can draw.

As you play game after game, you'll enjoy watching the performance of the players change according to their his-

tory. You can see players slump and rise, rookies flash and burn, and old-timers come back for one final moment of glory. *HardBall II* promises hours of fun. It's hard to imagine not keeping this game around for a long time.

Maximum Challenge

If you think you have what it takes to manage a major-league team and win the pennant, then *MicroLeague Baseball: The Manager's Challenge* can help take you there. *The Manager's Challenge* is the third generation of the *MicroLeague Baseball* series, and it's as rich in stats as its predecessors. In fact, stats make up the heart and soul of the game, as they do with real-life baseball.

Here are some figures you'll uncover playing *The Manager's Challenge*: all the usual numbers on hits, RBIs, at bats, errors, and the like, plus ratings for stealing bases. Pitchers' performances are rated according to number of games completed, number of saved games, ERAs, walks surrendered, and number of strikeouts. This version even adds right- and left-handed statistical breakdowns for hitters and pitchers, more offensive and defensive ratings, and seasonal factors that affect a player's performance over time.

What makes *The Manager's Chal-*

you'll think you're there.



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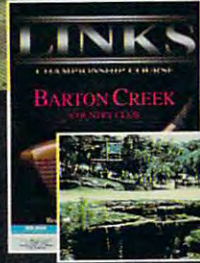
Bay Hill Club & Lodge
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Pinehurst Country Club
Pinehurst, NC



Dorado Beach Resort
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Barton Creek Country Club
Austin, TX

lenge so realistic is just that—real playing. The actual numbers and the sanction of the Major League Baseball Players Association guarantee that the simulation that you coach is about as real as it can get.

The most glaring sacrifice is the game's one-pitch cycle. If you're playing against a friend, you may elect to go to a full count three times per game, per team. Using this option, the pitch will be called ball or strike. It's only a small improvement over the one-throw-one-hit method employed by *MicroLeague Baseball II*. *The Manager's Challenge* also lacks in graphical detail. There isn't any visible difference between stadiums. The animated players are small and used only as stand-ins for the statistical information that drives the game.

The game's realism is enhanced, however, by the inclusion of injuries, arguments, ejections, and rain delays or power outages (in domes). These small details, though randomly placed, add an element to the game beyond the statistics of athletic performance. Add to these qualities an excellent stat compiler, and you have a quick, clean path toward producing the season-long performances that go into making major-league careers.

The A's Have It

Tony LaRussa's Ultimate Baseball has just about everything you'd get from a real game on the tube—even the commercial messages.

But the real action is on the field and in the dugout. Programming the baseball smarts of the great Oakland Athletics manager into a computer game couldn't have been easy, but SSI (known mainly for dungeon fantasies and war games) has made a pretty fair hit of it.

With three difficulty levels, *Tony LaRussa's Ultimate Baseball* will appeal to a variety of players at many different skill levels. The pitching, hitting, and fielding are easier in this game than in *HardBall II* or *Bo Jackson Baseball*, but not without challenges. On the Rookie level, it's easy to get a hit; when you're playing on the All Star level, everything is up to you. If you're more into strategy than arcade performance, you can manage a team and let the computer control the players.

The game includes all of the necessary features for managing a league, editing players and teams, and creating a schedule. It also boasts some idiosyncrasies—like having to move the joystick to the right to advance a base runner (who, by definition, is moving to the left). Despite small irregularities like this, *Tony LaRussa's Ultimate Baseball*



HardBall II from Accolade



MicroLeague Baseball: The Manager's Challenge from MicroLeague Sports

NEW YORK				U.S.				LOS ANGELES					
PITCHER	LI	ERA	IP	PITCHER	LI	ERA	IP	PITCHER	LI	ERA	IP		
FORD, LUMLEY	L	2.74	8	KULFAY, ZANEV	L	2.04	12	LEATHING, ORGER	R	1.83	10		
LEATHING, ORGER	L	1.83	10	RF	FEELER, ULLIE	L	1.68	10	RF	FEELER, ULLIE	L	1.68	
2B	LAPAZER, TONY	R	1.35	10	RF	FEELER, ULLIE	L	1.68	10	RF	FEELER, ULLIE	L	1.68
CF	DIMAGGIO, JOE	R	1.08	11	LF	DAVIS, TOMMY	R	1.04	9	LF	DAVIS, TOMMY	R	1.04
1B	DEBRISS, LOU	L	1.07	12	2B	ROBINSON, JACKIE	R	1.04	7	2B	ROBINSON, JACKIE	R	1.04
RF	RUTH, ERBIE	L	1.05	12	1B	HODGES, GEORGE	R	1.04	11	1B	HODGES, GEORGE	R	1.04
OH	FRANTLE, MICKY	S	1.00	12	OF	ZINGER, DUKE	L	1.04	11	OF	ZINGER, DUKE	L	1.04
C	RODRIGO, ELTON	R	1.00	20	OH	SMARLEY, STEVE	R	1.01	8	OH	SMARLEY, STEVE	R	1.01
LF	KOHNEN, EARLE	L	1.04	10	O	CAMPANELLA, ROY	R	1.01	11	O	CAMPANELLA, ROY	R	1.01
SS	PIZZUTO, PHIL	R	1.02	9	SS	KEY, RON	R	1.01	9	SS	KEY, RON	R	1.01
OF	POLTE, RED	L	1.02	9	SS	PERE, PEE WEE	R	1.01	8	SS	PERE, PEE WEE	R	1.01

Tony LaRussa's Ultimate Baseball from Strategic Simulations

is terribly addictive. If you're looking for your first computer baseball game, this one will get you to the bag.

Batter Up

So it's *HardBall II*, *Tony LaRussa's Ultimate Baseball*, and *Bo Jackson Baseball* for the "gotta have the action" fans, and it's *Earl Weaver Baseball II* and *MicroLeague Baseball: The Manager's Challenge* for the strategy and statistics hounds. No matter which way you approach it, baseball on the PC has finally come around. What used to be a simple exercise for the joystick jockey or a course in probability for the statistics nut is now full-fledged fun for any PC user. The best of this spring's new lineup draw on the strengths of the past (detailed statistical bookkeeping and great arcade action) and mix in the latest technology (sound cards and VGA graphics) for a whole new look to the old ball game. □

TIPS, TOOLS, AND TACTICS

Here are some winning strategies from *The Big Book of PC Sports* by Peter Scisco and Keith Ferrell (COMPUTE Books).

HardBall II

The editor allows you to enter the stats for real teams. Since each computer player performs according to his stats, your teams should reflect the abilities of real players. You can set up your own custom infield and outfield, positioning your players where you want them, and then save the setup for future use. With the Levels of Play feature in the game, you can tailor play to match abilities of different people at the computer: Beginners can choose an easier level than more advanced players to even out the score between otherwise mismatched players.

Earl Weaver Baseball II

Use Earl's advice when you're in Earl's kind of ballpark—grass and short fences. If you're playing in action mode, hang back on breaking balls. Hit them off your front foot. Act as if you're going to hit a fastball every time, but react to breaking balls and changeups. Watch your guys in the bullpen. Three consecutive innings in the pen will burn up a player.

The Manager's Challenge

Pay very close attention to your pitchers. Make sure they're not tired. Use your lineup, especially in the later innings. Don't be afraid to make substitutions. When you have a slim lead late in the game, put in your better fielders.

THE ON-DECK CIRCLE

Bo Jackson Baseball—\$49.95

Data East
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(408) 286-7074

Earl Weaver Baseball II—\$49.95

Electronic Arts
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(800) 334-6572

HardBall II—\$49.95

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64/128 VIEW

Our view of how other people around the world use their 64s and 128s continues with a look at Sweden.

Tom Netsel

In our December issue, we introduced a new column called "World View," which takes a look at how people around the world use their 64s and 128s. Steve Jarratt told readers about the Commodore scene in the United Kingdom. In this issue, we cross the North Sea from England and take a look at what's happening in Sweden.

Four years ago, Anders Reuterswärd started writing game reviews for a Commodore magazine in Sweden. From there he graduated to reviewing other products for the 64 and 128. His knowledge and interest in this area convinced the editors that he was the person to write a regular column about the 128. Now his work appears in every issue of *DatorMagazin*, although the magazine itself focuses primarily on the Amiga.

"Of all the writers for *DatorMagazin*, staff and freelancers alike," Reuterswärd says, "I still cling desperately to my trusty 128 and stubbornly refuse to abandon it in favor of the Amiga."

Reuterswärd, who works for a security company in Stockholm, says new software for the 64 and 128 is scarce in Sweden (sound familiar?), so he often imports products from the U.S., the U.K., and other countries. He says that the 8-bit machines have been abandoned in Sweden but many people still own them.

"I am what you call a Commodore user," Reuterswärd says. "I do not program very much, and my technical ability is not very good, but I am a great GEOS fan." He says

he's so impressed with GEOS that he imports and distributes public domain and shareware programs so other Commodore owners can put the Berkeley operating system to better use.

With the computer system that Reuterswärd has assembled, he can certainly put GEOS to use. He owns a 128, a 1901 monitor, one 1581 and two 1571 disk drives, a CMD HD-100 hard drive, an MPS-1250 printer, an HP LaserJet printer, RAM-Link, and a 1200-bps modem. In this issue, we're putting his expertise and unique qualities to use to inform readers about the Commodore view from Sweden.

In future issues we'll take a look at the 64/128 scene in other countries. Since *COMPUTE* is distributed around the world, we encourage other freelance writers to share with us the Commodore view from their countries. To submit a 1000-word column for possible publication, send it on disk, along with some biographical information, to Gazette Editor, *COMPUTE* Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We pay \$250 for each published column.

This next item is designed to nip any rumors before they even think about budding. You may notice that this issue is called the February/March issue. No—we have not gone bimonthly. It's just a one-time adjustment of our internal publishing calendar. The next issue will be April's. *COMPUTE* subscribers will not be affected. They will get the correct number of issues. □

GAZETTE

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COMMODORE CLIPS

Tom Netsel

Gobs of Graphics

Clip Art Cupboard (P.O. Box 31774, Cincinnati, Ohio 45231) announces *Graphix Galore*, a disk chock-full with more than 80 pieces of clip art to add sparkle to your desktop publishing projects.

Sports, holidays, and special occasions are well represented on the disk. There's everything from skateboards to Santa and pirates to pizza. *Graphix Galore* (\$9.95, plus \$2.00 shipping and handling) includes art for both versions of *The Print Shop*.

and 2 of Form 1040 that must be transferred to the official IRS form.

The program is menu-driven and comes with a detailed manual. The cost is \$49.95. Updates for 1992 will be available for \$18.00.

Tennis, Anyone?

DigiTek Software (1916 Twisting Lane, Wesley Chapel, Florida 33543) has released *Tie Break Tennis* (\$29.95) for the 64 and 128.

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Break Tennis offers precise ball control, a wide range of tennis techniques and international tournaments. Select the racket weight and tension you prefer; then choose a grass, clay, or asphalt playing surface for your games.

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For more serious play, sign up for a major tournament: Wimbledon, U.S. Open, French Open, Australian Open, Masters, and Davis Cup. The game keeps track of rankings as you compete against as many as 15 human or 15 computer players that you select from a wide range of profiles.

The Doctor Is Out

Dr. Evil Laboratories has announced that it has ceased all operations as of January 1, 1992. Creative Micro Design

(P.O. Box 646, East Longview, Massachusetts 01028) will handle sales and support for the SID Stereo Symphony cartridge and SwiftLink-232 serial interface.

The general manager of Dr. Evil Labs, Kent Sullivan (16611 NE 26th Street, Bellevue, Washington 98008), is taking over distribution of the public domain telecommunications program *C-64/128 Kermit 2.2* (\$5.00) and its related products. These include a laser-printed User's Guide (\$7.50) and a replacement character ROM for BI-80 80-column card (VT-100 graphics) (\$7.50). Add \$2.50 for all orders shipped outside the United States.

32K EPROM

Antigrav Toolkit (P.O. Box 1074, Cambridge, Massachusetts 02142) has released KeyDOS ROM (\$32.50), a 32K EPROM (Erasable Programmable Read Only Memory) chip that contains new function key definitions and utilities for the 64.

Its 20 new function keys simplify disk operation on multi-drive systems, and the chip is compatible with most hardware and software, including JiffyDOS, *The Quick Brown Box*, and most REUs. Load files and programs with one keypress, and select multiple files from a directory for printing, scratching, and copying. Create 1581 partitions and subdirectories, reboot GEOS quickly, and convert text files between ASCII and PETSCII. It offers a screen clock, and supports dual 80-column screens, screen editor, screen dumps, and more.

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February's
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Month in
"Gazette Gallery" is
Springtime by
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Tax Time Again

TaxAid Software (P.O. Box 340, La Pointe, Wisconsin 54850) has released an all-new version of its TaxAid series of income tax preparation programs for the 64, 128, and Plus/4. This tax year marks the 11th for the TaxAid series.

The new edition of *TaxAid* includes all the current changes in the tax laws for tax year 1991. *TaxAid* prepares IRS Form 1040; Schedules A, B, C, D, E, and SE; and Form 2441 (Child Care). Calculations are automatic, and all tax tables are built in.

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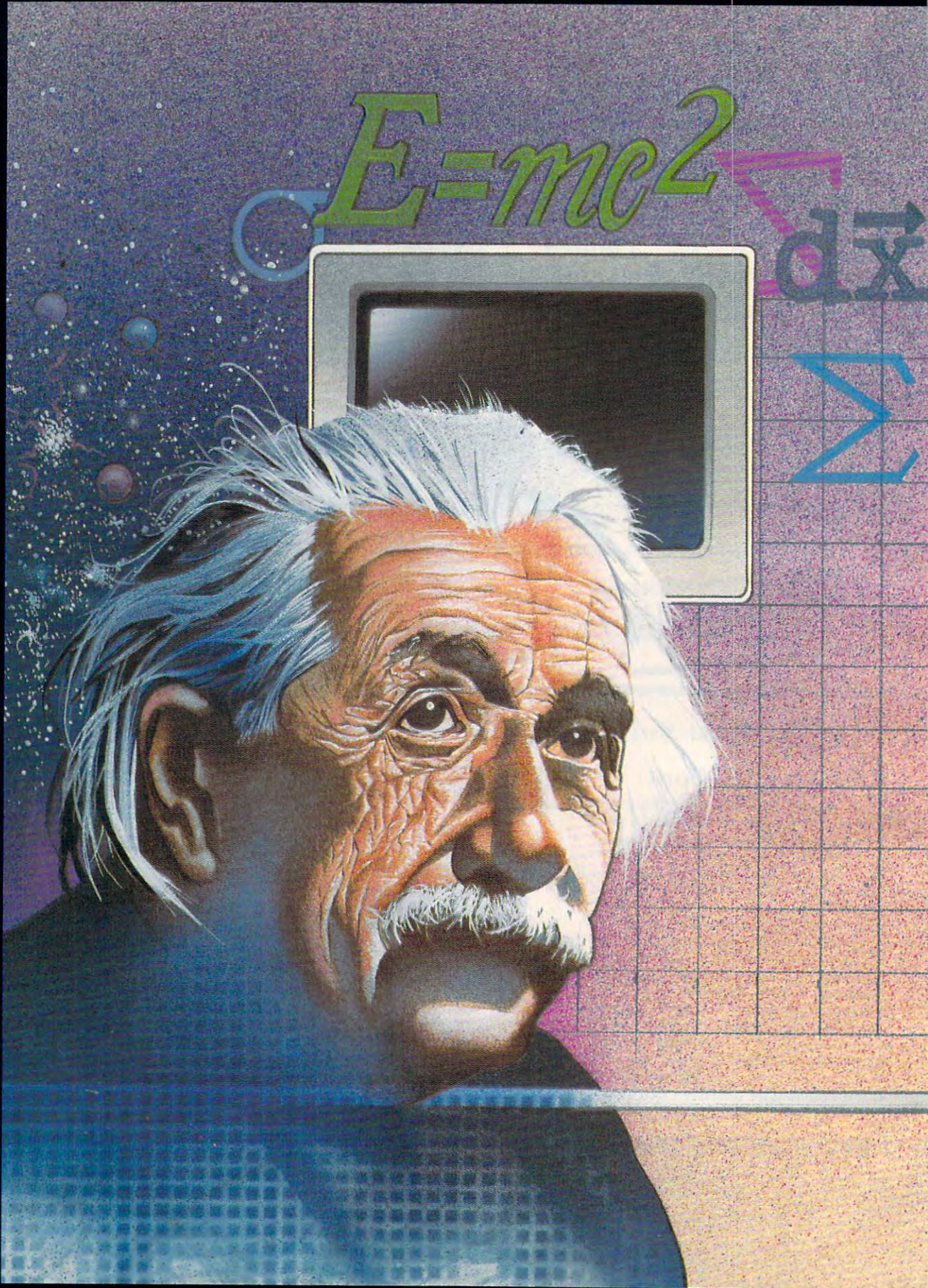
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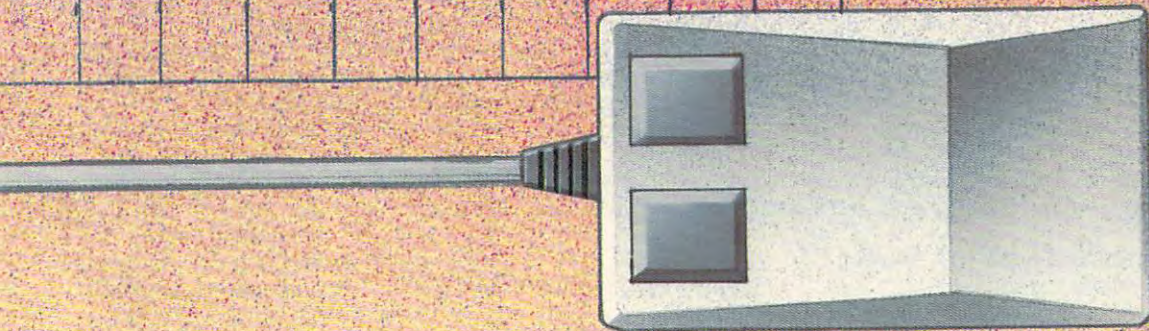
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GETTING TECHNICAL WITH A 128

BY SHAHIN SHABANIAN



One of the least emphasized and advertised capabilities of a 128 is its ability to produce scientific or technical papers with their associated fonts. This article reveals how I used my 128 in this capacity. Science and math students who type their papers or theses and even secretaries who do this kind of typing professionally may find this article helpful.

In 1986, I used a 128 to write my thesis for a master's degree in physics. At that time, word processing packages with the special mathematical and Greek fonts so often used in math literature were scarce. Even IBM software had only one or two packages on the market with those capabilities. It wasn't until *WordPerfect 5.1* was released that there was a readily available package capable of producing mathematical and scientific papers.

Printing the required fonts was an even bigger problem. Laser printers were not common, and 24-pin printers were unavailable. Therefore, you might imagine that attempting such an undertaking with an 8-bit Commodore would have been a waste of time.

A Capable Combo

When I finished my research and computations (on a mainframe), I was ready to write the thesis. I owned a 128 and *Fontmaster 128*, an excellent word processing package from Xetec that has a font-creating capability. After getting better acquainted with the functions of my computer and word processor, I decided that I could use the two to create the necessary fonts and characters for my thesis and to print the final paper.

A thesis is not a casual paper. Care goes into its preparation, and printing must be of high quality, and students normally hire a professional typist to produce the final copy. At large universities such a thesis with specialized mathematical fonts may cost \$500-\$900 for a professional to type 50-100 pages.

Create the Fonts

My project started with creating the necessary fonts. Although *Fontmaster 128* software has Greek and mathematical fonts, most of the physics-related characters and other fonts that I needed were not included. I had to redesign some of them and build new ones to suit my requirements.

For instance, a tall mathematical font must satisfy certain criteria in order to be acceptable to the school. Although *Fontmaster 128* has provisions for larger-than-normal and microfonts, this taller version was not suitable. This tall character extended more than a line space above the base line,

Figure 1

$$\int f(x)dx$$

[a]

$$\int f(x)dx$$

[b]

$$\int f(x)dx$$

[c]

$$\int_a^b f(x)dx$$

[d]

Figure 2

$$(x_i, x_{i+1}) = \frac{\sum_{j=1}^n [g x_j^2 - x_j x_{j+1} + F x_j^4]}{\sum_{j=1}^n \pi_{dx, c} [g x_j^2 - x_j x_{j+1} + F x_j^4]}$$

but not below it. When this character is used in mathematical equations with regular fonts, the regular fonts are not centered as they should be. For example, an integral symbol in math, when used as a tall character, looks like figure 1a, but it should look like figure 1b.

A Solution

Fontmaster's function keys can be used as macros to define large symbols such as integral signs. This relieves you of having to rebuild the same character or font each time it's needed. This process is explained in detail in the *Fontmaster* manual. Other

word processors and font-making utilities can also create custom fonts. While the actual steps may vary, the general process is the same.

To create a proper integral sign that extended equally above and below the line space, I had to do it on a three-line basis, with each part of the symbol occupying one line. Although such a large character actually occupies three lines, its spacing is reduced so the individual parts are connected. This process is shown in figure 1c.

This capability of making symbols on a three-line or more basis is particularly helpful when typing an expression with exponents, such as in figure 1d. It's also particularly useful when dealing with double and triple exponents, such as in figure 2.

Of course, not all special characters occupy three lines. A few examples of other fonts often used in physics, mathematics, or technical papers of other disciplines are shown enlarged in figure 3. These were designed by the author and from the left are partial derivative sign, h bar, and Kronecker delta.

Essential Factors

The experience of writing technical papers has shown me that there are three essential factors for successful typesetting. One, you have to be able to create the necessary fonts not normally found in conventional word processors. Two, you have to be able to adjust the spacing between lines. Three, you must be able to use superscripts and subscripts in a micro (smaller than normal) format.

Double Printing

My graduate school requires that the English text of a thesis be printed by a letter quality typewriter or laser printer. Mathematical equations or symbols, however, may be produced by a near letter quality printer or by the use of rub-on characters (usually sold in university bookstores).

After printing the thesis in full in near letter quality and having it approved by the thesis committee for content, it was time to satisfy the university requirement for letter quality text. On a typical page of my thesis I would have several lines of mathematical formula followed by explanatory text and then another portion of a formula and more text. For this final printing I divided my thesis into two files. One file contained only the equations and mathematical symbols, which were to be printed in near letter quality; the other file contained only the English text, which required letter quality printing.

The formatting and spacing of the formulas and accompanying text on

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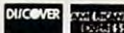
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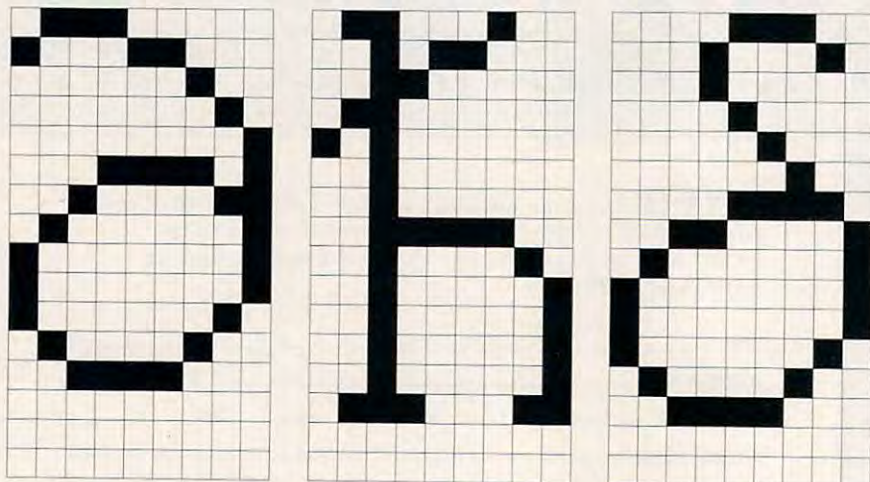
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Figure 3



each page were maintained precisely as they had been in the original file. The plan was to load the equations file and print it first in near letter quality. Then the same paper would be reprinted with the file that contained the English text, but this time on a letter quality printer. Since proper spacing was maintained, the letter quality text was inserted in its proper place between the mathematical equations and formulas. It was almost like using a merge feature to create form letters. Margins

were carefully chosen so there would be no disruption of either file. These days, with the introduction of 24-pin printers, there is no need for such a procedure. The purpose of this article is to emphasize that a 128 can perform high-level tasks that are usually reserved for more powerful PCs. The only limitations are those of the software and the patience, expertise, and ingenuity of the operator. Although I have an IBM in my lab and office at the university, most of the

physics exams I prepare for my classes are written on my 128 at home. With the aid of *Fontmaster 128* and *GEOS 128*, I save a lot of time. Since the exams are kept on file, I can easily change them or transfer them from one file to another. Furthermore, for low-scale numerical computations, *BASIC 7.0* on my 128 is perfectly suitable.

Shahin Shabanian is an instructor in physics at Louisiana State University at Eunice. He extends his deep appreciation to Dr. Mohammad Kiani (University of Rochester) for his suggestions. □

SHARE THE KNOWLEDGE

A few months ago, while discussing a numerical solution to a physics problem with one of my students, this student informed me that he had solved the assigned problem using *BASIC* on his 128. When I mentioned that I also own a 128 and had used it to write my thesis with all the necessary mathematical and physics equations and the associated fonts, he became interested in seeing my work. He said he hoped to utilize this less-publicized capability of a 128. After I showed him a few pages of my thesis, the student suggested that I let other 128 owners who may be interested in technical publishing know what an 8-bit Commodore can do. His suggestion prompted me to write this article.

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was just forgetting things.



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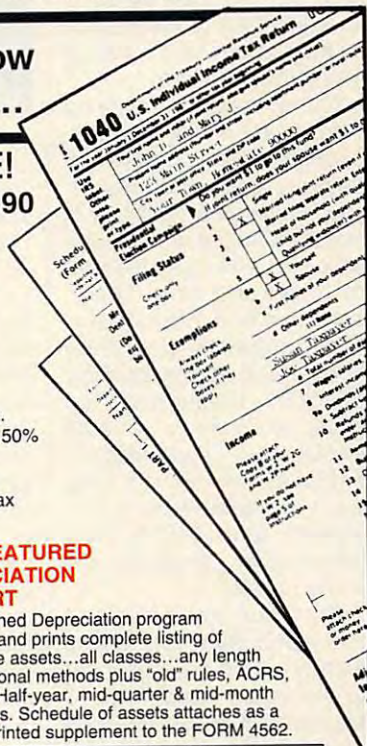
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WORD WRITER 6

Software companies like to improve their products. They fiddle with a program until it can accomplish more and more astonishing feats, then they reissue it under a new version number. Sometimes changes are less than major, yet they still can be significant. A case in point is *Word Writer 6* from Timeworks.

The word processor and outlining features of *Word Writer 6* are the same as those in version 5. Significant changes revolve around features added and deleted. Gone is the calculator; added is Cardfile Builder, which allows you to create and save data records with up to 23 fields. The card file can then be used for addresses or other data. It can also be used to merge files for form letters.

Other enhancements to *Word Writer 6* include a feature that will let you go to any desired page number in your document, justification status indicated on the Font/Style status line, and the ability to set and save tabs in both Text and Font Modes. The program's other features, such as the spelling checker, thesaurus, ten fonts, two macros, variable text layout, and graphics capabilities remain as they were in *Word Writer 5* (reviewed June 1991). They have neither gained nor lost in the revision.

So much has remained the same that Timeworks merely added a supplement to the basic *Word Writer 5* Manual and Art Library Supplement. The supplement documents all the changes, making the upgrade from *Word Writer 5* easy. Dividing up the manuals can benefit a newcomer, too.

The Cardfile Builder is sim-

ple to learn and use. I like the versatility of having from 3 to 23 fields available. Many of the people I write to have position titles and company names in their addresses in addition to the usual street addresses. This makes four-line label programs less than adequate for me. With

fields or not print a line if its field is blank. This cleans up the appearance and lets you produce exactly the letter you want.

There are limitations. Your letter can be no more than four pages long. Apparently, no *WW6* document can be longer than that—a fact not

tings can be changed within the Printer Codes window and used with a particular document, or they can be saved as the new default settings. They are extremely easy to set, save, and use.

There were some faults with *Word Writer 5*, however, that *Word Writer 6* retains. You can only skip lines by inserting carriage returns, and you can't string formatting commands together on a single line. When using graphics, you're limited to one per line, and you can't place text on both sides of a graphic.

I wish the program had a bridge back to the Install program. Too often, when laying out a document, you suddenly decide to add a picture or change to a font that you haven't installed on your work disk. You have to exit *Word Writer 6* and reload the Install program to copy a picture, convert a piece of text or graphic, or install a font. It would be much more convenient if you could make additions or changes without actually turning things off and reloading completely.

My other complaint, briefly mentioned earlier, is not being able to make multiple copies of linked files. As a writer, most of my documents are more than four pages long. I don't like being limited to printing one copy at a time of a lengthy piece. However, this is not uncommon in programs that manage both text and pictures, so I guess I'll have to cope.

Overall, I like the program. Cardfile Builder is a real plus, something more useful to me than the calculator it replaced. The other new features, Tabs, Go to (a page number), and a status indicator for justification, are welcome additions also. Timeworks makes good use of the 64's memory and capa-



Cardfile, I can make as many entries as I need, and I doubt if I'll need more than 23 of them.

You can have up to 255 cards in a card file, and you can sort them on any field. When you create your first card, you have the choice of entering prompts for each field. This makes entering future data quite simple. Cardfiles can be sorted and edited, saved and loaded. They can be printed as they appear onscreen, allowing you to print your file on tractor-fed cards, or simply listed on plain paper. You can also control which cards print.

The other way to print a file is to merge it with text to create form letters. The letter is loaded into *Word Writer*. Field markers are added to represent the fields you wish to use. Various markers can be inserted so you can skip

mentioned anywhere else in the documentation. While you can create linked files, you cannot merge or make multiple copies of a linked file, so that doesn't help here.

Your form letter can be printed only in Text Mode, not Font Mode. However, enhancements such as bold, underlining, and italics are still available if your printer will support them.

A new Tab format allows you to set tabs in both Text and Font Modes where previously they were only available in Text Mode. They can only be used with left-justified text. Having the tab work in both modes eliminates one problem I'd found with *Word Writer 5*: the lack of a definable way to indent paragraphs.

The program starts with six default settings. These set-

bilities, and it's nice to see good things get even better.

ROBIN MINNICK

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There is a great deal of satisfaction in watching a fine *geoWrite* document roll off of your printer. If it happens to use one of your very own creations, this satisfaction is bound to be mixed with justifiable pride.

Jim Collette has written this outstanding font editor, which not only rivals *geoFont* but also adds several exciting new capabilities. *GEOS Font Editor* supports up to three disk drives, depending on the *GEOS* version you are using.

Want to create a new point size of your favorite font? Just select Scale from the File menu and *Font Editor* will scale the entire font to the designated size, usually in four to six minutes. Of course, some editing of the new size is often required. Experience will help you choose the optimum threshold to minimize editing. You can also scale individual characters to a different width. An Undo option is always available if what you see isn't what you want.

How would you like to have up to 49 fonts available

for every document without ever leaving *geoWrite*? It's possible with *Font Editor*. To accomplish this, the documentation explains how to create combination files in which each point size can represent a different font. Using this method, you could have as many as seven different fonts in each of seven different combination files on a single disk.

The Editor screen itself is quite similar to one in the latest version of *geoFont*. The Edit menu and Stash/Fetch options are present, as are all the editing icons. *Font Editor* adds options to reverse and mirror the character you are working on.

Other unique features include Left Justify and Steal Character options; the latter lets you grab the current character from any font on the disk. You can even insert or delete any selected vertical column within the edit box. For those who desire it, the editor also has a separate Mega Font mode for use with *geoPublish*.

Another feature that I like very much is Preview. This option eliminates returning to deskTop and then entering *geoWrite* to check your font creation in its entirety.

If all these features aren't enough, there is a Font Grabber that will convert many non-*GEOS* fonts to *GEOS* format. Last, but not least, a Font Changer is included that will scan your *geoWrite* files and replace all occurrences of a selected font with any other font.

Be careful not to quit the editor without first selecting Save from the File menu. Saving is not automatic as it is in *geoFont*. However, in most cases, the program will warn you of this if you forget.

Version 2.5 of this excellent program is part of

GEOS Font Collection 2 which includes an informative manual and a collection of over 20 new fonts. Version 2.2, which lacks some of the features described above, can be downloaded from QuantumLink. The shareware fee is \$10.

ROBERT NELLIST

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GEOSTAMP

Talk about conflicting emotions! I've always wanted to get my preschooler interested in using the computer. So after I'd spent a half-hour playing around with this new *geoPaint* utility called *geoStamp*, I called her away from the television.

I loaded up Stamp Collection for her, a file that comes with the program and contains 30 assorted graphics, such as cartoon faces, cars, and so on. I then showed her how to scroll through the images in a window at the bottom of the *geoPaint* screen and choose one to stamp.

She took to it instantly, choosing the goofiest faces. ("A clown, Dad. Look at the clown!") I turned her loose, and she started clicking the mouse and stamping herself a screen full of pictures.

She hadn't a clue about the more advanced details of the program. She didn't care that she could position the graphics image with extreme precision using the cursor keys. Nor was she impressed with the fact that seeing a graphic as she placed it allowed for the perfect juxtaposition of images.

I immediately saw that these features would be

great for making borders, something *geoPaint* is not very good at. I suggested that she try it, but she paid no attention—she just kept choosing pictures and stamping them all over the page.

Since the computer was occupied, I read through the documentation that I had printed from the *geoWrite* file on disk. It explained one or two of the features that I hadn't been able to figure out for myself, as well as cluing me in to the fact that everything is keyboard activated. Everything, even the Quit option, is controlled by a single keypress, which makes operation easy.

The documentation also suggested an interesting trick called painting, which would happen if you held the button down while moving the mouse. The stamp function repeats, so if you slowly move the image as it repeatedly stamps, the image will smear across the screen.

I glanced up and saw that my daughter had discovered this on her own. The screen was beginning to fill with a jumble of images. So I used the key command that turned off the transparent layering and set *geoStamp* to replace the image below it when it stamped. This suited her haphazard style and kept everything identifiable. She still wasn't interested in doing borders.

Later, I let a ten-year-old neighbor kid have a try, and she chose a border stamp file and proceeded to prove my suppositions correct. The fact that you can see exactly what you're doing when you position the image makes it a breeze to line up the pieces. She used several of the cartoonlike graphics along with the normal *geoPaint* drawing tools to create a nice card for her mother. I

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printed it for her on pink construction paper. This program wins converts fast!

I wanted to try the other utilities on the *geoStamp* disk, so I bullied my way to the keyboard. I spent a little time in Stamp Edit and made a small file of my own artwork. I was delighted to discover that the cursor draws only while the button is held down, a natural way for me to work. Even so, my artwork wasn't much to look at.

To come up with some better stamps, I opened Stamp Collect, a function which grabs stamp-sized chunks of bitmap to fill a stamp file. This nifty desk accessory, working along with *geoStamp* itself, provides a precise cut-and-paste routine for *geoPaint*. The size of a stamp image is limited to 48 x 32 pixels, however, much less than the size of, say, a graphic from *The Print Shop*. Fortunately, stamps can be placed so precisely that you can cut sections of bitmap and accurately paste them back together to create larger images.

This utility isn't just a great way for kids to create instant masterpieces; it's a first-rate graphics tool any *geoArtist* won't want to be without. I was using it with 80-column *geoPaint* on my 128, but it also works elegantly on the 64.

David Ferguson, the creator of *geoStamp*, is no stranger to the world of *GEOS*. He has worked on making *geo-*

Stamp as compatible as possible with the latest *GEOS* software, from *geoWizard* to the yet-to-be-released *geoCanvas*. Where *geoStamp* isn't compatible, Ferguson warns and explains why.

Some potential pitfalls are unavoidable. There is no way, for instance, for *geoStamp* to know if you're actually in *geoPaint* when you select it from the desk accessory menu. If you're somewhere else in *GEOS*, on the deskTop for example, the *geoStamp* windows appear on the screen, but attempts to use the tools will be ineffectual at best and catastrophic at worst. This eventuality is clearly warned against in the program's documentation.

I finally closed *geoPaint* and headed into *geoWrite* to start this review. I had barely begun when I felt a tug at my sleeve. My daughter was standing there holding the printout from the last time she'd been stamping. She grabbed the mouse and said brightly, "I wanna stamp the clowns, Dad!"

I may have to write this review with paper and pencil.

STEVE VANDER ARK

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WORLD VIEW

Anders Reuterswård

VIEW FROM SWEDEN

Greetings from faroff Sweden, the land where the sun never sets, polar bears roam the streets, and no one has ever heard of computers. Jokes aside, for those of you who don't know, Sweden—not to be confused with Switzerland—is a small democratic country in northern Europe.

There are some 8 million people in Sweden, and during the years that Commodores have been on sale in the Swedish market, around 230,000 people have bought 64s and 25,000 have purchased 128s. How many of these are still in use is not known, but about 23 percent of the readers of the largest (and only) Commodore-specific magazine in the country are 64 users, which amounts to 45,000. An educated guess would be that at least 50,000 people still use 64s and another 10,000 use 128s in one way or other.

The 64 dominated the home computer world in Sweden for many years. There used to be several Commodore magazines, and every home computer publication devoted some of its pages to the 64 and 128. Real hackers, of course, used the 64.

Computer shops and mail-order houses all over the country sold Commodore machines, peripherals, games, and productivity software. Most of these products were imported; very little was produced in Sweden. The home market bloomed, and every kid wanted a 64 for Christmas. Of course, other computers were represented, but none of them had anywhere near the success of the Commodore.

Since the introduction of the Amiga, however, that computer has almost taken over the Commodore market. Sales of

Commodore 8-bit peripherals and software have dwindled to almost nothing. The 64 and 1541-II disk drive can still be found in larger toy stores in the major cities, and they still sell. But no computer store that wants to keep its reputation and good name will touch them with a ten-foot joystick.

Commodore mounted a stand against the game consoles with its 64-GS, but has not been successful. The 64-GS is just a 64 with a stripped circuit board, a cartridge port on top, and no keyboard. Less than 30,000 of these consoles have been sold in all of Europe, and now production has been discontinued. It did bring about one good thing, though. Quite a few 64 games have appeared on cartridge.

Today, there's only one Commodore-dedicated magazine in Sweden, *DatorMagazin*. (*Dator* means computer in Swedish.) Even this magazine is mostly Amiga, with no more than a fifth of its contents dedicated to 8-bit material. Foreign magazines can still be found, the German *64'er*, some British magazines, and two American magazines, of which *COMPUTE* is one.

The mail-order houses, which owe much of their success to the 64, hardly mention it now. Some still market the more successful game titles, and their advertisements for used equipment are filled with trusty old 64s and 128s.

These are sad times for us enthusiasts who stubbornly refuse to give up our old computers. Then who are the diehards? The trend seems to indicate that the people sticking to the 8-bit machines are serious users who fall into two categories: people who have found that the 64/128 is all they need in a home computer or machine language programmers who think that 6502 code is the height of creation.

The former are most often users without much knowledge of programming, and the latter most certainly have other computers as well.

Also, I think the average age of Commodore 8-bit users has risen. The game-playing youngsters all have Amigas or Nintendos. This theory is supported by the fact that I get a lot of correspondence on my favorite subject, *GEOS*, from people who are 30 years old and up; the oldest are well past retirement age.

Until recently, the only way to obtain good hardware and software was to import it directly from foreign companies. Sources are available in nearby Germany, in Britain, and, of course, in the United States. I myself have purchased CMD's hard drive, RAMLink, and various pieces of software in this way. But the procedure is complicated. It involves transferring money and dealing with customs, and additional costs such as freight charges, fees, taxes and customs duties can be quite high. This turns less energetic people off, leaving them simply to read and dream about Commodore products advertised in foreign magazines.

Lately, however, help has arrived in the form of small dedicated companies run by enthusiasts out of their own homes. These little mail-order firms all seem to have appeared at about the same time, probably stemming from a feeling of necessity on the part of their owners to provide for their fellow Commodore 8-biters—and maybe to make a little money at the same time.

So, there you have the situation in short. It's not yet desperate, but it could soon be. After all, we're using a machine that has long been proclaimed dead. But, as for many of us, we know that eight bits are enough! □

Commodore owners in Sweden who stick to their 8-bit machines tend to be serious users.

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MACHINE LANGUAGE

Jim Butterfield

BAGELS: A MACHINE LANGUAGE GAME

BAGELS is a simple code-guessing game. The object is to guess a secret combination of four items, each of which might be any of six choices—one of six colors, for example, or a character in the range from A to F. After each guess you are told how many items matched exactly and how many others matched but were in the wrong place.

We will go over the contents of the machine language part of the game and then write the game in BASIC. BASIC will generate the secret code, poke it into memory, and then call the machine language program that will accept guesses and report results. The ML program won't count guesses; that option would be easy to add, though, as would a "give up" option for use when the player is stuck. The machine language code is poked into the area starting at hexadecimal 2000 (decimal 8192).

The program assumes that the secret key has been poked into addresses \$2200 to \$2203 in ASCII format. The assembler names this area KEY and sets aside the next four bytes for CKEY, an extra copy of the secret key. Another four bytes are allocated for GUESS, the user's guess. From that point on, three single-byte work addresses are set aside: XSAVE, a temporary save area; EXACT, the counter for exact matches; and MATCH, the counter for other matches. The assembler code looks like this:

```
KEY    = $2200
CKEY   = KEY+4
GUESS  = CKEY+4
XSAVE  = GUESS+4
EXACT  = XSAVE+1
```

MATCH = EXACT+1

Now you want to print the prompt to the user on the computer monitor.

```
TOP    LDX #0
PLOOP  LDA PROMPT,X
        JSR $FFD2
        INX
        CPX #PRLN
        BNE PLOOP
```

The next branch is curious: It will never be taken by the code passing through here! If the Z flag were clear, the previous instruction (BNE PLOOP) would have branched. Why is it there? To allow the program to branch back to the top for another guess. Branch instructions have a limited reach, so I've set up a double hop.

MID BNE TOP

Now you input a guess from the user. The GET call, \$FFE4, allows us to read the character directly from the keyboard. Only if it's in the right range—from A to F—will you accept it and echo it to the screen. As you set up the X register to count the input characters, you also clear the EXACT and MATCH counters.

```
LDX #0
STX EXACT
STX MATCH
```

Here comes our input loop. You must save X before a call to \$FFE4 and bring it back afterward. Then you confirm that you have a character from A (ASCII \$41, 65 decimal) to F (ASCII \$46, 70 decimal).

```
INLOOP STX XSAVE
        JSR $FFE4
        LDX XSAVE
        CMP #$41
        BCC INLOOP
```

**CMP #\$47
BCS INLOOP**

Echo the character; then do the EXACT test right away. If you find a match, throw away the guess (it's counted); otherwise, store the guess and copy the corresponding secret character to area CKEY for further testing.

```
JSR $FFD2
LDY KEY,X
CMP KEY,X
BNE NOTEX
INC EXACT
LDA #0
LDY #1
NOTEX  STA GUESS,X
        TYA
        STA CKEY,X
```

Now test how far you've gone. If you haven't received four characters yet, loop back and go through the routine again.

```
INX
CPX #4
BNE INLOOP
```

Now you must look for the other matches. For this you need a nested loop: one loop to scan the guesses and the other loop to scan the CKEY text.

```
LDX #0
SCANGS LDA GUESS,X
        LDY #0
SCANCK  CMP CKEY,Y
        BNE NOMATCH
```

If you find a match, count it. You must destroy the key item so that you don't count it again and then skip directly to the next guess character.

```
INC MATCH
LDA #1
STA CKEY,Y
BPL NEXTX
NOMATCH INY
        CPY #4
        BNE SCANCK
NEXTX
```

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INX
CPX #4
BNE SCANGS

Our counting is complete. Print the results with a leading space for the sake of neatness. Values for EXACT and MATCH need to be converted to ASCII for printing, and you keep a copy of EXACT in Y for a later test.

```
LDA #S0D
JSR $FFD2
LDY EXACT
TYA
ORA #S30
JSR $FFD2
LDA MATCH
ORA #S30
JSR $FFD2
```

Print a carriage return to complete the line. Then test to see if EXACT has a value of 4. If so, you have correctly guessed the secret combination and may exit to BASIC. Otherwise, you loop back (via MID) for another guess.

LDA #S0D

JSR \$FFD2
CPY #4
BNE MID
RTS

To complete the code, here's our prompt and a calculation of its length.

```
PROMPT .ASC "GUESS: "
PRLEN = *-PROMPT
```

Here's the BASIC driver for program BAGELS.

```
90 REM: HEX 2200 IS DECIMAL
08704
100 DATA 162,0,189,134,32,32
110 DATA 210,255,232,224,7
120 DATA 208,245,208,241
130 DATA 162,0,142,13,34
140 DATA 142,14,34,142,12
150 DATA 34,32,228,255,174
160 DATA 12,34,201,65,144
170 DATA 243,201,71,176
180 DATA 239,32,210,255
190 DATA 188,0,34,221,0
200 DATA 34,208,7,238,13
210 DATA 34,169,0,160,1,157
220 DATA 8,34,152,157,4,34
230 DATA 232,224,4,208,209
240 DATA 162,0,189,8,34,160,0
250 DATA 217,4,34,208,10,238
```

```
260 DATA 14,34,169,1,153,4,34
270 DATA 16,5,200,192,4,208
280 DATA 236,232,224,4,208
290 DATA 226,169,32,32,210
300 DATA 255,172,13,34,152
310 DATA 9,48,32,210,255,173
320 DATA 14,34,9,48,32,210
330 DATA 255,169,13,32,210
340 DATA 255,192,4,208,136,96
350 DATA 71,85,69,83,83,58,32
400 FOR J=8192 TO 8332
410 READ X:T=T+X
420 POKE J,X
430 NEXT J
440 IF T<>16032 THEN STOP
500 X=RND(0)
```

```
510 PRINT
520 PRINT CHR$(32)+"GUESS 4
SECRET LETTERS, A TO F"
600 REM PUT RANDOM
LETTERS INTO 8704-7
(HEX 2200-2203)
610 FOR J=8704 TO 8707
620 POKE J,65+RND(0)*6
630 NEXT J
640 PRINT ". . . . .
"+CHR$(32)+" . . . . "+CHR$(
(32)+"EM"
650 SYS 8192
660 INPUT "PLAY AGAIN";Z$
670 IF Z$="Y" OR Z$="YES"
GOTO 510
```

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.

CREATE THE VERY BEST

Happy Valentine's Day. Time to think about buying a few cards, but at this time of year, there's no such thing as a few cards. Once you get rolling, you could spend enough on valentines to finance a small war. They sell cards for anyone and everyone: kids, parents, grandparents, friends, coworkers—you name it. If you try to buy cards for everybody, you can kiss that RAM-Link you've been saving for good-bye.

Valentine's Day is an occasion where *The Print Shop* can pay for itself. *Print Shop* graphics may be humdrum, and its font selection sparse, but it does know how to make a card. *Print Shop* controls your choices to the point where it's almost impossible for you to fail. It limits how many graphics you can use and where you can put them, the location of text and the possible sizes and styles, and so on. As a result, your cards will pretty much look like they were, well, made with *Print Shop*. This is desktop publishing for the masses; it's so user-friendly that any semiambitious seven-year-old can do it.

That's OK, but I'd rather work on a more adult level. I'm used to putting text and graphics where I want them, not where my software wants them. I don't like using graphics that are all the same size or can be sized in just a few limited ways. If I publish something from my desktop, I want the freedom that *GEOS* gives me to put what I want wherever and however I want it—in patterns, in boxes, piled up, stretched out. And I want the whole thing to run smoothly and easily. *The Print Shop* was designed for making cards, but *geoPublish* and *geoPaint*

weren't. As we've all learned in *Print Shop* 101, you take a single sheet of printer paper and fold it into quarters to create a greeting card format. In order for each panel on the card to be right side up when folded, two panels have to be printed upside down on the page, and as Shakespeare sort of says, there lies the rub. With *Print Shop*, this is all in a day's work; for *GEOS*, it's a lot of fuss and bother.

Everything you place in those inverted panels has to be flipped and clipped in *geoPaint*, since you can't invert in *geoPublish*. Even working from RAM, all this cutting and pasting takes time. Also, if you lay out your designs in *geoPaint*, you lose all the creative benefits of the object-oriented graphics in *geoPublish*.

There are a few tips worth noting when making cards with *GEOS*. If you can feed single sheets of paper into your printer, for instance, you can invert the pages manually instead of trying to convince *geoPublish* and *geoPaint* to flip the images for you. The four panels that make up a card are printed on the same side of a single sheet of paper, with the top two panels inverted in relation to the bottom two panels. You simply create a card as two *geoPublish* pages printed on the same sheet of paper, with each page consisting of two panels in the lower half of the page. The panels on the first page would be the front cover and the back cover; the second page would consist of the inside left and the inside right panels. Feed a sheet of paper into your printer, set the *GEOS* print dialog box for single-page printing, and when *GEOS* finishes page 1 and asks for the next sheet, invert the same sheet of paper and feed it back into the printer. You may have to experiment

to get the placement right.

As long as you're using single-sheet mode, you may want to consider using construction paper. I know this won't make flipping graphics any easier, but it will improve the appearance of the final printout. When the ink hits the porous surface, it soaks in and blurs just a little, which helps to hide the jaggies. Construction paper also has the advantage of being available in a wide variety of colors. You may be pleasantly surprised by how nice your printout will look this way.

It's still a hassle to do all the fussing around. Sometimes it's nice to have some of the work done for you, which is why *The Print Shop* is so handy. There's also a program called *geoPrint*, by Roger Lawhorn (\$19.50 from Geoprinters, P.O. Box 792, New Albany, Indiana 47150), which combines the convenience of *The Print Shop* with the versatility of *geoPaint*. This program takes the graphics you create within specified areas of a *geoPaint* template and prints them, enlarged and in the proper places, to make a card.

You can even leave the card making to someone else if you like. Susan Lamb (*geoStore*, 3575 East County 18th Street, Yuma, Arizona 85365), whose excellent graphics packages were discussed in this column in December, has two *Card Maker* disks available which include ready-made cards, files of graphics, and an assortment of decorative fonts. The templates and graphic bits and pieces on these disks let you *geoPublish* a card rapidly, especially since some of her clip art comes already flipped.

So why bore everyone with the same old *Print Shop* cards? When you care enough to create the very best—create it with *GEOS!* □

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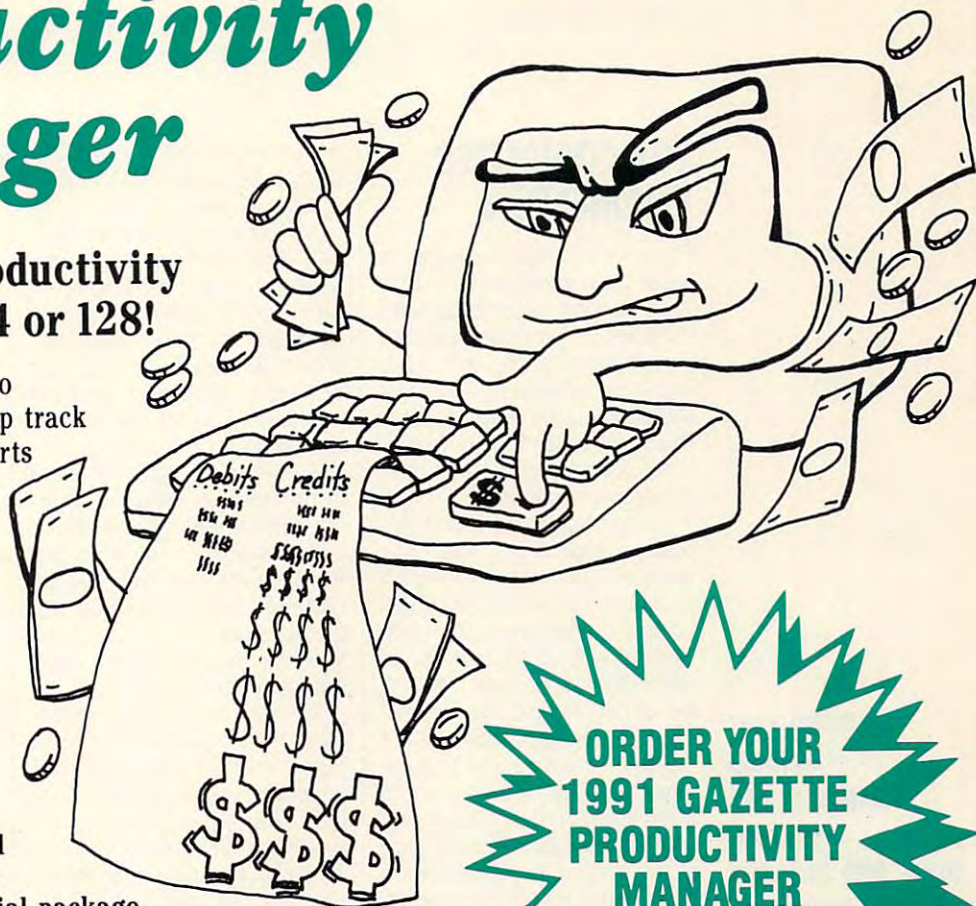
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D'IVERSIONS

Fred D'Ignazio

THE COMPUTER CHAMELEON

Forty years ago, computers were barn-sized behemoths. They ran on electromagnetic switches that sounded like knitting needles clicking and clacking. A decade later, they were still gargantuan machines, latticed with tens of thousands of hot, glowing vacuum tubes the size of pickles.

Early computers didn't just occupy a room or a floor; they were stories high. To visit a computer, you walked down corridors lined with incandescent tube racks that stretched from floor to ceiling. You felt like Jonah in the pulsating, fluorescent belly of a whale.

Then came transistors. They took over the crucial job of switching digital bits on and off. The evolution accelerated at the end of the 1950s when engineers invented the integrated circuit and squeezed dozens of transistors onto a cornflake-sized chip.

Transistors began to shrink. More and more of them could be packed, sardinelike, onto a single chip: hundreds, thousands, eventually millions of them. As transistors shrank, so did computers. They have diminished from the size of a room to that of a desk, to a notebook, to a credit card, and now a watch.

Recently, IBM demonstrated the world's smallest transistor: two atoms. This transistor works only in a laboratory, inside a tank whose temperature approaches absolute zero, but the idea of a two-atom transistor has electrified the imagination of computer designers. They dream of computers the size of molecules.

There's a name for this Lilliputian wizardry: nanotechnology. To comprehend the impact of nanotechnology, imagine a world where computers

are everywhere, yet smaller than a snowflake, a mote of dust, or a grain of sand.

Unfortunately, nanotechnology won't become part of our everyday world until the twenty-first century. Meanwhile, I'm at work in my multimedia classroom at East Lansing High School in Michigan, and the computers in my classroom are anything but tiny.

Desktop computers were conceived as data-processing appliances—streamlined successors to typewriters and file cabinets. But their size (or footprint) has always been an embarrassment. In today's offices they don't occupy a desktop; they monopolize it.

In my multimedia classroom, it's even worse. My "computer" there is comprised of a keyboard, monitor, CPU, hard disk, circuit-card chassis, laser disc player, CD-ROM player, backup tape drive, television set, camcorder, VCR, tripod, switcher box, digital sound box, amplified speaker, scanner, still-image camera, paint-jet printer, and millions of cables—black cables, red cables, skinny cables, fat cables, python and boa constrictor cables that snake across my desk and cascade across the floor in a labyrinthine mess of coaxial spaghetti.

Welcome to the world of computer multimedia. Welcome, too, to a world that's got to change. Teachers who see my "classroom of the future" suddenly get the urge to climb out the window, quit teaching, or throw up.

Nanotechnology, we're ready. Please come and save us. Now!

We need computers and their hodgepodge of multimedia peripherals to shrink drastically, or else desktops are going to have to grow. Perhaps it's time to rethink what computers should look like and how people might use them.

Scientists at Xerox's Palo Alto Research Center are doing just that, and they've decided to abandon the desktop PC and replace it with invisible computers embedded in the walls, floors, and ceilings of future buildings, classrooms, and homes. If we can think beyond desktops, scientists say, we can make the switch now, with today's technology.

In place of the desktop, our rooms will contain meeting tables only. Office workers or students, with clipboard-sized portable computers that accept spoken and pen input, will sit around tables, attend meetings, and work on common projects. Their clipboards will all have radios to communicate with each other and with central computers hidden in the walls. When a person needs to make a presentation or convey a message, he or she will press a button or issue a verbal command, the room will darken, and the walls in the room will become giant video screens to display text, diagrams, photographs, animations, and motion video.

A person's need for a desktop will disappear because the desktop will travel with him, via the clipboard. The clipboard will function as a remote controller, or key, to retrieve all of the person's ideas, memos, papers, diagrams, or records stored in hidden central computers. At any time, in any room in the building (or in the world!), a person can recall anything from his or her virtual desktop and display it on any of the room's walls. Similarly, a person can sit down and compose something new, using the clipboard as a form of configurable touchscreen tablet, yellow pad, keyboard, or drawing surface. The person's work can appear on the wall of any room, with sound being output from stereo speakers embedded in the furniture. □

Abandon your desktop computers and replace them with invisible ones embedded in walls and floors.

BEGINNER BASIC

Larry Cotton

FINISHING UP RND

This month we'll wind up our study of RND by finishing the *Music Patterns* program, which we left at line 170.

```
170 B=T(FND(X))
180 K=FNE(X)
190 P=FNC(X): H(1)=FNA(X)
200 Q=FNC(X): H(2)=FNA(X)
210 R=FNC(X): H(3)=FNA(X)
220 S=FNC(X): H(4)=FNA(X)
230 T=FNB(X): U=FNB(X):
      V=FNB(X): W=FNB(X)
```

These seven lines generate 14 random numbers in the ranges shown, which are then assigned to the 14 variables B, K, H(1), and so on. It's important to note that although the functions are de-

```
390 FORX=1TOS: POKEK,B:
      POKEK+C,W: POKEFR,H(4):
      POKEVC,VN: K=K+LO
```

The chart above may help explain what's going on.

LI and LO were defined as 41 and 39, respectively, in line 100 last month. The value +41 will move the character poked to the screen one full screen row down and one character to the right. Likewise, -39 will move the character one full screen row up and one character to the right. And so forth. Each of the above lines in turn executes a FOR-NEXT loop a random number of times, puts character B in screen position K, adds a color, pokes a frequency to register FR, turns on

Line	Characters Per Move	Color	Frequency	Moves (toward)
240	P	T	H(1)	+LI (lower right)
290	Q	U	H(2)	-LO (upper right)
340	R	V	H(3)	-LI (upper left)
390	S	W	H(4)	+LO (lower left)

fined in lines 20-60 (last month), they are executed in lines 170-230.

The pattern always starts in random position K with random character B. It then moves in four sequential diagonal directions, in four random colors, and beeps in four random pitches.

Since the character always moves four ways, we'll study groups of four lines which do similar tasks. They aren't sequential in the program. Here's the first group.

```
240 FORX=1TOP: POKEK,B:
      POKEK+C,T: POKEFR,H(1):
      POKEVC,VN: K=K+LI
290 FORX=1TOQ: POKEK,B:
      POKEK+C,U: POKEFR,H(2):
      POKEVC,VN: K=K-LO
340 FORX=1TOR: POKEK,B:
      POKEK+C,V: POKEFR,H(3):
      POKEVC,VN: K=K-LI
```

Voice 1 with a square wave, and, finally, increments or decrements the character's screen position.

The second task-oriented group of four lines, which follow the above four, simply checks to be sure the pattern isn't going offscreen (a sure-fire program crasher).

```
250 IFK>MATHEN280
300 IFK<MOTHEN240
350 IFK<MOTHEN380
400 IFK>MATHEN330
```

The four lines following those are somewhat more complicated. They must each make a quick calculation to be sure that the planned diagonal row of characters will not go offscreen.

```
260 IF(K-MN)/CO-INT((K-MN)/
      CO)=0THEN380
```

```
310 IF(K-MN)/CO-INT((K-MN)/
      CO)=0THEN330
360 IF(K-SC)/CO-INT((K-SC)/
      CO)=0THEN280
410 IF(K-SC)/CO-INT((K-SC)/
      CO)=0THEN240
```

MA, MO, MN, and SC were determined experimentally for the most part, not only to keep characters onscreen, but also to make the patterns interesting when they do hit the borders. Notice that these last eight lines are safety valves which interrupt the FOR-NEXT loops if particular conditions are met. It's not normally a good idea to break out of FOR-NEXT loops, but in this short a program, we can get away with it.

The next group of four lines turns off Voice 1's quick beep and continues the FOR-NEXT loop.

```
270 POKEVC,VO: NEXT
320 POKEVC,VO: NEXT
370 POKEVC,VO: NEXT
420 POKEVC,VO: NEXT:
      GOTO190
```

The GOTO190 is necessary to begin a new pattern.

The last group of lines looks at the keyboard for a press of the space bar, which indicates that the user is ready to see (and hear) a new pattern.

```
280 GETA$: IFA$="" THEN
      160
330 GETA$: IFA$="" THEN
      160
380 GETA$: IFA$="" THEN
      160
```

The customary fourth line isn't needed because the pattern is finished, and line 420 has sent program control back to line 190. Lines 430 and 440 contained the CHR\$ data that was shown last month. You can run the program now. Press the space bar for a new pattern. □

This month we conclude our study of RND by completing a program of sound and graphics.

PROGRAMMER'S PAGE

Randy Thompson

"FEEDBACK" FLASHBACKS

What's your favorite Gazette column? Be truthful now; don't answer "Programmer's Page" just to be diplomatic.

If you're like the majority of our readers, your favorite column is "Feedback," our letters section. A lot of work goes into producing "Feedback" and researching answers. It's been a part of the magazine since the very first issue of the old *COMPUTE!'s Gazette*.

In tribute to this venerable department, I've chosen to highlight a few of my favorite "Feedback" programming tips in this month's "Programmer's Page." These tips were all written by current or former *COMPUTE!* staff members, namely Todd Heimarck, Rhett Anderson, Patrick Parish, Dale McBane, Troy Tucker, and me—just a few of the unsung heroes of "Feedback."

Short Format Recovery

If you include an ID in your format command, all files on a disk are erased. Formatting a disk without an ID (short formatting) doesn't actually erase any files, so if you accidentally format a disk in this fashion, it's possible to recover most of your programs.

Unfortunately, the short format command does erase sector 1 of track 18, which contains information on where the first eight files are located on the disk. If you have a disk editor, you may be able to search through every track and sector and find these eight files. Commodore DOS generally saves files closer to the center of the disk, so start by checking tracks 17 and 19, then 16 and 20, and so on.

The reason the directory is apparently wiped out is that the pointer to the next sector

of the directory has been erased. The following program fixes this link, thereby restoring all but the first eight programs on the disk. It's possible that the first program on the disk may also be restored and will appear on the directory under the name ZZ. Load it and see if it works.

This is only a temporary fix, however. Once the directory has been partially restored, you should copy any programs you may need to another disk and then reformat the original disk.

The program should only be used on disks which have been accidentally short formatted. It does not work on a disk which has been fully formatted (with an ID).

```
10 FOR A=1 TO 10: READB:
   A$=A$+CHR$(B): NEXT: FOR A
= 1 TO 14: A$=A$+CHR$(160):
   NEXT
20 DATA 0,3,21,18,4,130,17,0,90,
   90
30 OPEN 1,8,15: OPEN2,8,2,"#0"
40 PRINT#1, "U1 2 0 18 1"
50 PRINT#1, "M-W" A$
60 PRINT#1, "U2 2 0 18 1"
70 CLOSE2:CLOSE1
```

Noisy Random Numbers

Did you know that you can use Voice 3 of the SID chip as a random number generator? The idea behind this is that since we can set voice 3 to make noise and since noise as produced by the computer is simply a succession of random frequencies, then the computer must be producing random numbers somewhere. Fortunately, we can read the register which holds these random numbers. Here's an example of how it can be done.

```
10 POKE 54287,255: POKE
   54290,128: POKE
   54296,128
20 PRINT PEEK(54299)
30 GOTO 20
```

This program prints random numbers until you press Stop. You may notice that all the random numbers lie between 0 and 255. That's because we're looking at random bytes, and bytes can only hold values between 0 and 255. To get a random integer between 0 and 9, try this line of code instead.

```
20 PRINT INT(PEEK(54299)*10/
   256)
```

Reading the noise register is a technique sometimes used in machine language programming, but it's rarely seen in BASIC programs because BASIC has the more commonly used RND function for generating random numbers.

Undocumented 128 Command

You won't find BASIC 7.0's RREG command documented within Commodore's manuals. It's not mentioned in either *System Guide* or *Programmer's Reference Guide*, but this command does exist.

RREG is followed by one or more variable names. (A, B, C, and D are suitable.) It puts the values of the accumulator and the X, Y, and processor status (P) registers into the variables. You can thus pass values from an ML program back to a BASIC program via RREG. You can also send values in the other direction by adding up to four variables or values after a SYS statement.

SYS 3072,A1,A2,15,Z(5), for example, would put the value of A1 into the accumulator, A2 into the X register, 15 into the Y register, and Z(5) into the processor status register. The equivalent procedure on the 64 can be accomplished by poking values into memory locations 780-783 before you enter the SYS command and then peeking locations 780-783 after the machine language subroutine returns. □

"Feedback" has long been a favorite with readers. It's also a source of some great programming tips.

PROGRAMS

BALLOON CRAZY

Ligia Latino

You've always wanted to run away and join a circus, haven't you? Now here's your chance. You've been hired to assist a clown with his act. The object of *Balloon Crazy* is to help the clown burst all the balloons on the screen and advance to the next level. The only problem is that the magnets and green monsters will do all they can to stop you.

Getting Started

Balloon Crazy is written entirely in machine language, but it loads and runs like a BASIC program. Use *MLX*, our machine language entry program to enter *Balloon Crazy*. See "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following.

Starting address: 0801

Ending address: 1998

Playing the Game

Put a joystick in port two to play, and use the stick to move the clown's arm in all four directions. You may be surprised at how far his arm can stretch. Press the fire button to pull his arm back. He holds a knife that breaks the balloons, and it's also handy for deflating any green monsters. Be careful, though. If a monster grabs your arm, you'll lose one life. You'll also lose a life if a magnet pulls the knife out of your hand. If a magnet approaches, you should move the knife to another row of balloons until it passes, or better yet, maneuver the knife around so you can touch the magnet on its back. This will cause it to disappear for about eight seconds.

Scoring

Each balloon you pop is worth 25 points, a dead monster is worth 50 points, and each magnet is worth 100 points. If you break all the balloons and move to another level, you'll receive an extra life. It's tough to finish off all the balloons, but not impossible.

Tips

When a magnet appears on the bottom row, touch its back and send it away as soon as possible. If you ignore it, it may catch up with a monster

making it impossible to stop them, or it may get you when you press the fire button to retrieve the clown's arm. The magnet always reappears in the row where the knife is located.

Beware of the second magnet that appears only when you move the knife to the top row. It moves very fast and will keep appearing until you move the knife out of that row. The best strategy here is to burst only one or two balloons at a time. The balloons at the corners are the toughest to reach. To get them, you'll have to keep a close eye on the magnet.

Sometimes it's best to let the green monsters pass rather than killing them, especially if they move slowly. They always take about two seconds to reappear. Which means that if you kill one, it will be replaced in two seconds. If you let it go, however, it will cross the screen and disappear for two seconds before it comes back. This can give you much more time to break balloons at the top of the screen.

BALLOON CRAZY

```

0801:0A 08 00 00 0E 32 30 36 6C
0809:31 00 00 00 20 C1 0F 20 F7
0811:5B 17 20 5D 11 A9 00 A2 40
0819:03 95 A3 95 AA CA 10 F9 78
0821:A2 0D 9D 90 42 CA 10 FA DA
0829:A9 8F 8D 18 D4 78 A9 28 29
0831:8D 12 D0 AD 11 D0 29 7F 1F
0839:8D 11 D0 A9 81 8D 1A D0 50
0841:A9 41 8D 14 03 A9 0B 8D CB
0849:15 03 A9 00 8D 0E DC 58 90
0851:78 A9 41 8D 14 03 A9 0B 14
0859:8D 15 03 58 A9 00 8D 08 CB
0861:0E 8D 00 17 8D 01 17 A9 95
0869:03 8D 02 17 A9 93 20 D2 BE
0871:FF A0 04 B9 1C 0B 99 2B 31
0879:0B 88 10 F7 AD 30 0B 8D 84
0881:33 0B 0E 34 0B A9 13 A2 BA
0889:00 A0 0F 20 93 17 20 29 08
0891:0F A9 32 8D 35 0B A9 0E E9
0899:8D 16 18 A9 13 A2 13 A0 7D
08A1:00 20 95 0F A9 0E 8D 16 14
08A9:18 A9 14 A2 13 A0 14 20 40
08B1:95 0F A9 0A 8D 16 18 A2 BD
08B9:03 8E 36 0B A9 09 AE 36 6B
08C1:0B 20 67 0F EE 16 18 AD EA
08C9:36 0B 18 69 04 8D 36 0B 1F
08D1:C9 13 30 E8 20 A0 16 A2 72
08D9:14 A0 00 A9 13 99 80 40 F6
08E1:8A 99 80 41 CA C8 C0 03 BF
08E9:D0 F1 8C 22 0F 20 93 0E C0
08F1:0E D7 0D 90 3B A2 78 20 1F
08F9:64 0A 20 44 0C CE 02 17 BD
0901:20 AC 16 AD 02 17 D0 06 FF
0909:20 4D 0C 4C 5D 08 AE 22 4F
0911:0F E0 04 90 15 BD 7F 40 4B
0919:A8 BD 7F 41 AA 20 18 18 11

```

```

0921:A9 20 91 26 CE 22 0F 4C 0E
0929:0F 09 20 93 0E 0E 34 0B 5E
0931:AE 22 0F AD 00 DC 29 10 B5
0939:F0 3A 20 1E 17 C9 00 D0 E8
0941:03 4C 5C 0A A8 AE 22 0F 67
0949:BD 7F 40 18 79 37 0B C9 2C
0951:28 B0 0E 9D 80 40 BD 7F 3F
0959:41 18 79 3C 0B C9 19 90 47
0961:03 4C 5C 0A 9D 80 41 DD 83
0969:7E 41 D0 3C BD 80 40 DD 37
0971:7E 40 D0 34 E0 04 90 E9 52
0979:BD 7F 40 A8 BD 7F 41 AA F5
0981:20 18 18 A9 20 91 26 CE A9
0989:22 0F 20 93 0E AD 00 DC B1
0991:29 10 D0 03 4C 5A 0A 4C B2
0999:55 0A AD 12 D0 18 69 80 E9
09A1:CD 12 D0 D0 FB 4C F1 08 43
09A9:E0 FE 90 03 4C 5C 0A BD D3
09B1:80 40 A8 BD 80 41 AA 20 83
09B9:18 18 B1 26 C9 20 F0 02 34
09C1:A2 08 DD 83 18 F0 09 CA 7C
09C9:10 F8 4C 5C 0A 4C 4F 0A 9B
09D1:B1 28 29 07 48 AE 22 0F AC
09D9:BD 80 40 29 FC 48 A8 BD 9D
09E1:80 41 29 FC 48 A2 01 20 68
09E9:99 17 A2 07 A0 10 20 FE D7
09F1:15 A9 00 9D 20 40 9D 28 38
09F9:40 9D 30 40 9D 38 40 68 54
0A01:0A 0A 0A 18 69 35 9D 08 C2
0A09:40 68 0A 0A 18 69 0C 9D 55
0A11:00 40 A9 00 9D 10 40 68 80
0A19:9D 27 D0 20 4B 16 20 63 38
0A21:16 A9 19 20 31 0C A9 01 DD
0A29:85 AA EE 22 0F 20 93 0E D8
0A31:CE 35 0B D0 1F A9 80 8D 96
0A39:34 0B A2 F0 20 64 0A 20 54
0A41:44 0C EE 08 0E EE 02 17 20
0A49:20 D8 0D 4C 72 08 EE 22 BD
0A51:0F 20 93 0E A2 05 20 64 16
0A59:0A A2 01 A2 01 20 64 0A C0
0A61:4C F1 08 4C 10 20 8E 0D D4
0A69:0B A9 00 49 80 8D 6B 0A 1D
0A71:30 77 20 27 0C D0 10 20 D5
0A79:FF 0B 10 0B A9 01 20 2F C3
0A81:17 AA A9 07 20 09 0E A0 53
0A89:04 20 FC 0B 10 28 B9 2B B7
0A91:0B F0 0B 38 E9 01 99 2B 9D
0A99:0B D0 18 B9 21 0B 20 2F 0B
0AA1:17 18 79 26 0B 99 2B 0B F8
0AA9:A9 01 20 2F 17 AA A9 03 83
0AB1:20 2F 17 20 09 0E 88 10 28
0AB9:D0 20 E5 0B 10 2B AD 33 67
0AC1:0B F0 05 CE 33 0B D0 21 AD
0AC9:AD 31 0B 20 2F 17 18 6D D7
0AD1:32 0B 8D 33 0B 20 27 0C D9
0AD9:A9 01 20 2F 17 AA A9 02 B2
0AE1:20 2F 17 18 69 04 20 09 DA
0AE9:0E 0E 43 0C 90 03 20 AC 2F
0AF1:16 A2 06 1E 68 40 90 10 D1
0AF9:7E 70 40 A9 00 9D 20 40 03
0B01:9D 28 40 A0 11 20 FE 15 1E
0B09:CA 10 E8 A2 00 0E E4 0B DC
0B11:90 FB CA E0 00 D0 01 60 7B
0B19:4C 67 0A 78 5A 23 0F 3C B1
0B21:00 B4 B4 B4 B4 FF 00 00 EB
0B29:00 00 00 00 00 00 00 3F
0B31:64 3C 00 00 00 00 00 88
0B39:00 FF 01 00 FF 01 00 00 73
0B41:AD 19 D0 8D 19 D0 A2 07 BF
0B49:AD 15 D0 3D 90 16 F0 40 68

```


PROGRAMS

```

0B51:2C 34 0B 10 10 BD 70 40 85
0B59:30 0B E0 07 F0 07 BD 80 76
0B61:42 C9 04 30 2B BD 50 40 BF
0B69:F0 26 DE 60 4B D0 21 9D 88
0B71:60 40 DE 58 40 F0 06 FE F9
0B79:F8 07 4C 91 0B BD 78 40 F0
0B81:F0 0B DE 78 40 D0 06 20 A7
0B89:6B 16 4C 91 0B 20 7D 16 67
0B91:CA 10 B5 2C 34 0B 30 43 FB
0B99:A2 07 AD 15 D0 3D 90 16 7C
0BA1:F0 33 BD 10 40 18 7D 20 33
0BA9:40 9D 10 40 BD 00 40 7D 39
0BB1:28 40 9D 00 40 C9 AE 90 B6
0BB9:06 20 6B 16 4C D6 0B BD 3B
0BC1:18 40 18 7D 30 40 9D 18 A4
0BC9:40 BD 08 40 7D 38 40 9D 5F
0BD1:08 40 20 4B 16 CA 10 C2 73
0BD9:20 C8 0C A9 80 8D E4 0B 5D
0BE1:4C E9 18 00 A2 06 AD 15 39
0BE9:D0 3D 90 16 F0 09 BD 80 D2
0BF1:42 29 04 C9 04 F0 03 CA 45
0BF9:10 EC 60 A9 00 2C A9 04 02
0C01:8D 20 0C 8C 17 0C A2 06 66
0C09:AD 15 D0 3D 90 16 F0 12 FB
0C11:BD 88 42 29 7F C9 00 D0 F8
0C19:09 BD 80 42 29 04 C9 00 46
0C21:F0 03 CA 10 E3 60 AE 22 EC
0C29:0F BD 7F 41 4A 4A A8 60 69
0C31:18 6D 00 17 8D 00 17 90 4D
0C39:03 EE 01.17 A9 80 8D 43 CD
0C41:0C 60 00 A2 07 20 6B 16 47
0C49:CA 10 FA 60 A2 0A A0 08 B6
0C51:18 8E 65 0C 20 F0 FF AE F9
0C59:65 0C BD 69 0C BC 6C 0C AD
0C61:20 1E AB A2 00 E8 E0 0D 23
0C69:30 E4 AD 00 DC 29 10 D0 05
0C71:F9 60 79 93 AC 0C 0C 0C 00
0C79:05 20 20 20 20 20 20 20 C4
0C81:47 41 4D 45 20 4F 56 45 BB
0C89:52 20 20 20 20 20 20 20 BA
0C91:20 00 20 20 20 20 20 20 A1
0C99:20 20 20 20 20 20 20 20 B1
0CA1:20 20 20 20 20 20 20 20 B9
0CA9:20 20 00 50 52 45 53 53 80
0CB1:20 46 49 52 45 20 54 4F 5C
0CB9:20 50 4C 41 59 20 41 47 AB
0CC1:41 49 4E 00 4C C1 0D A2 BC
0CC9:06 AD 15 D0 3D 90 16 F0 49
0CD1:F3 BD 70 40 D0 EE BD 88 AB
0CD9:42 0A 0A 8E E4 0C AA 20 8C
0CE1:C8 0D A2 00 BD 00 40 18 7C
0CE9:69 02 4A 4A 38 E9 03 B0 45
0CF1:02 A9 00 8D 16 4D BD 00 AE
0CF9:40 18 69 0A 4A 4A 38 E9 DB
0D01:03 C9 28 30 02 A9 27 8D A9
0D09:35 0D 8E C0 0D A9 80 8D 7C
0D11:D6 0D A2 03 A0 00 4C 34 30
0D19:0D B1 FD C9 D9 90 13 C9 83
0D21:DD 90 3A C9 F9 F0 08 C9 9F
0D29:E0 90 07 C9 E5 B0 03 0E 5B
0D31:D6 0D C8 C0 00 30 E2 F0 96
0D39:E0 A5 FD 18 69 28 85 FD 63
0D41:90 02 E6 FE CA 00 CD 2C 52
0D49:D6 0D 30 72 AE C0 0D BD 8F
0D51:80 42 C9 04 B0 68 A9 04 34
0D59:85 A3 4C B4 0D AE C0 0D A5
0D61:BD 80 42 C9 04 B0 11 A9 0E
0D69:80 9D 68 40 A9 32 20 31 C3
0D71:0C A9 02 85 A3 4C C1 0D 73
0D79:BD 88 42 30 2D CC 35 0D F3

```

```

0D81:F0 2D A9 03 9D 28 40 A9 7C
0D89:00 9D 20 40 BD 88 42 10 B7
0D91:03 20 7D 0E A9 80 9D 70 C0
0D99:40 A9 64 20 31 0C A9 03 DC
0DA1:85 A3 A9 FF 8D 33 0B 4C 38
0DA9:C1 0D CC 16 0D D0 D3 A9 DF
0DB1:05 85 A3 A9 80 8D D7 0D B5
0DB9:8D 34 0B 4C C4 0D A2 00 6D
0DC1:CA 10 01 60 4C CA 0C BD CE
0DC9:F0 EC 85 FD BD 2E 18 17
0DD1:69 04 85 FE 60 00 00 A9 EE
0DD9:93 20 D2 FF A0 10 A2 0C B6
0DE1:20 20 F0 FF A9 FF A0 0D C9
0DE9:20 1E AB AD 08 0E 18 69 FD
0DF1:31 20 D2 FF A2 F0 20 64 84
0DF9:0A A9 93 4C D2 FF 05 4C A7
0E01:45 56 45 4C 20 23 00 00 50
0E09:8C 6B 0E 48 8A F0 04 98 45
0E11:09 80 A8 68 8C 59 0E 20 73
0E19:83 17 B0 4D 9D 80 42 48 63
0E21:98 9D 88 42 68 A8 B9 6D EC
0E29:0E 9D 20 40 B9 75 0E 19
0E31:28 40 A9 00 9D 30 40 9D 72
0E39:38 40 A9 00 9D 00 40 9D C1
0E41:10 40 AD 59 0E 10 0D 20 AB
0E49:7D 0E A9 AD 9D 00 40 98 BD
0E51:18 69 08 A8 20 FE 15 A9 30
0E59:00 0A 0A 0A 0A 69 36 5B
0E61:9D 08 40 20 4B 16 20 63 AE
0E69:16 A0 00 60 40 50 60 80 43
0E71:18 30 50 00 00 00 00 00 AF
0E79:00 00 00 01 BD 20 40 49 DD
0E81:FF 18 69 01 9D 20 40 BD 8C
0E89:28 40 49 FF 60 00 9D 28 A1
0E91:40 60 AE 22 0F CA CA 4C 63
0E99:A0 0E CA 20 C8 0E E8 E8 1E
0EA1:EC 22 0F 90 F5 CA 20 02 C4
0EA9:0F A8 B9 C4 0E 48 BD 80 88
0EB1:40 48 BD 80 41 AA 20 18 CC
0EB9:18 68 A8 68 91 26 A9 0B 1B
0EC1:91 28 60 DC DB DA D9 20 A8
0EC9:02 0F 0A 0A 8D D6 0E E8 59
0ED1:20 02 0F CA 69 00 A8 B9 63
0ED9:F2 0E 48 BD 80 40 48 8E FE
0EE1:F0 0E BD 80 41 AA 20 18 C6
0EE9:18 68 A8 68 91 26 A2 00 32
0EF1:60 F9 00 E1 E0 00 F9 E3 B9
0EF9:E2 E2 0E E4 00 E3 E1 00 FD
0F01:E4 BD 80 40 38 FD 7F 40 0E
0F09:18 69 01 A8 B9 23 0F 48 F8
0F11:BD 80 41 38 FD 7F 41 18 62
0F19:69 01 A8 68 18 79 26 0F C9
0F21:60 03 02 00 03 00 00 01 89
0F29:A2 00 A0 00 A9 05 20 2F 7D
0F31:17 18 69 0A 8E 65 0F A2 79
0F39:08 9D 8C 18 CA 10 FA AE 11
0F41:65 0F 8C 66 0F 8A A2 01 B6
0F49:20 93 17 AE 65 0F AC 66 51
0F51:0F 98 18 69 04 A8 C0 27 22
0F59:30 D2 8A 18 69 04 AA 0E A8
0F61:14 30 C7 60 00 8D 93 43
0F69:0F 8E 92 0F A0 00 8C 94 A8
0F71:0F AE 92 0F AC 94 0F AD 89
0F79:93 0F 20 2F 17 48 38 6D D3
0F81:94 0F 8D 94 0F 68 20 95 98
0F89:0F AD 94 0F C9 28 30 E1 4F
0F91:60 00 00 00 C9 00 F0 27 37
0F99:20 18 18 8C 12 18 18 6D 28
0FA1:12 18 8D 13 18 C0 00 F0 66
0FA9:03 A9 DF 2C A9 DE C0 28 E4

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```

0FB1:B0 0D 91 26 AD 16 18 91 87
0FB9:28 C8 CC 13 18 D0 ED 60 29
0FC1:78 A9 33 85 01 A9 D0 8D 23
0FC9:D6 0F A9 38 8D D9 0F A0 62
0FD1:08 A2 00 BD 00 D0 9D 00 F6
0FD9:38 E8 D0 F7 EE D6 0F EE C7
0FE1:D9 0F 88 D0 EE A9 37 85 E0
0FE9:01 58 A2 00 BD FD 0F 9D 94
0FF1:A0 3E BD FD 10 9D A0 3F FE
0FF9:E8 D0 F1 60 FF EA FF FB AC
1001:FB FF EA FF 03 00 00 00 94
1009:00 00 00 00 AA AA AA A0 27
1011:A0 00 00 00 2A 2A 2A 2A 1A
1019:2A 2A 2A 2A A0 80 00 00 C7
1021:00 00 00 00 C0 C0 EA B0
1029:C0 C0 00 00 03 03 AB 97
1031:03 03 00 00 3F 08 08 08 C5
1039:08 08 00 00 08 08 08 98
1041:08 08 08 3F FF AB BF FB 86
1049:FB BF AB FF FF AA BF FB F2
1051:FB BF AA FF 3F 2A 3F 3B 11
1059:3B 3F 2A 3F 00 15 15 15 B3
1061:15 15 15 15 00 55 55 55 9A
1069:55 55 15 15 15 15 15 15 B9
1071:15 15 00 00 15 55 55 55 5E
1079:55 55 00 00 00 55 55 55 5E
1081:55 55 00 00 00 00 02 02 A7
1089:0A 0A 2A 2A 3B 3B 3F 3F 9D
1091:3F 3F 2F 2F 00 00 00 00 F9
1099:00 03 0F 0E FF FF FF FF 3D
10A1:FF FF FF FC 00 00 00 00 91
10A9:C0 F0 FC FF FF FF FF 3F 15
10B1:0C 3F 00 00 00 00 00 3F E6
10B9:FF FF BF FF 0F 03 00 00 56
10C1:00 00 00 00 FF FF FF 3F 21
10C9:2F 2B 28 28 FF FF FF FC D0
10D1:F8 E8 28 28 FF FF FF FF 30
10D9:FF FF FF 3C 00 00 00 00 BD
10E1:00 C0 F0 FC FC F0 C0 00 4D
10E9:00 00 00 00 AA A8 AA AA 02
10F1:AA 2B 0F 3F AA AA AA AA 08
10F9:FF FF FF FF FF AA FF FF 1A
1101:FF FF FF FF 2A 2A 2A AA 1C
1109:AA AA AA A8 C0 00 00 00 11
1111:02 0A 2A AA A9 AA AA AA 9E
1119:AA AA AA AA 6A AA AA AA 39
1121:AA AA AA AA 15 15 15 15 7F
1129:15 15 15 15 00 00 00 00 0F
1131:00 C0 C0 C0 00 00 00 00 A7
1139:00 03 03 03 55 D5 D5 59 B3
1141:A9 F9 A4 50 00 00 50 54 45
1149:55 55 7D 69 55 57 57 65 CD
1151:6A 6F 1A 05 00 00 05 15 37
1159:55 55 7D 69 A9 33 8D 70 67
1161:11 A9 11 8D 6D 11 A0 05 67
1169:A2 00 BD 7E 11 9D 00 33 AE
1171:E8 D0 F7 EE 6D 11 EE 70 28
1179:11 88 D0 EE 60 00 AA 80 28
1181:02 AA A8 0A AA A8 2A AB FC
1189:EA 2A AF 7A AA AF 7A AA FC
1191:AB EA AA AA AA AA AA AA 44
1199:AA AA AA AA 9D DC AA B7 E8
11A1:74 AA AA A8 2A AA AA 2A 04
11A9:AA AA 0A AA A8 0A AA 01 B1
11B1:2A 2A A0 20 20 A0 28 28 85
11B9:28 28 28 28 00 00 AA 80 57
11C1:02 AA A8 0A AA A8 2A AB 3D
11C9:EA 2A AF 7A AA AF 7A AA 3D
11D1:AB EA AA AA AA AA AA AA 84
11D9:AA AA A8 AA 9D DC AA B7 29

```


11E1:74	AA	AA	A8	2A	AA	AA	2A	44	1411:00	00	A8	00	00	A8	00	00	F0	1641:16	90	03	1D	90	16	99	00	DE
11E9:AA	AA	0A	AA	A8	2A	AA	A0	DB	1419:A8	00	00	AA	A5	50	AA	A5	A9	1649:D0	60	8A	0A	A8	BD	10	40	84
11F1:A8	AA	A8	80	82	A8	A0	A0	C8	1421:44	AA	A5	41	AA	A5	44	2A	7D	1651:0A	BD	00	40	2A	99	00	D0	7E
11F9:A0	A0	A0	A0	00	00	AA	80	88	1429:A5	50	00	00	00	00	00	00	38	1659:BD	08	40	99	01	D0	A0	10	A4
1201:02	AA	A8	0A	AA	A8	2A	AB	7E	1431:00	00	00	00	00	00	00	00	59	1661:D0	D9	AD	15	D0	1D	90	16	A5
1209:EA	2A	AF	7A	AA	AF	7A	AA	7E	1439:00	00	00	00	00	00	00	00	61	1669:D0	06	AD	15	D0	3D	98	16	49
1211:AB	EA	AA	AA	AA	AA	AA	AA	C5	1441:2A	A5	41	AA	A5	50	AA	A5	24	1671:8D	15	D0	A9	00	9D	68	40	E5
1219:AA	AA	A8	AA	9D	DC	AA	B7	6A	1449:44	AA	A5	40	AA	A5	41	A8	0E	1679:9D	70	40	60	BD	40	40	9D	AB
1221:74	AA	AA	A8	2A	AA	AA	2A	85	1451:00	00	A8	00	00	A8	00	00	31	1681:F8	07	BD	50	40	9D	60	40	22
1229:AA	AA	0A	AA	A8	2A	AA	A0	1D	1459:A8	00	00	AA	A5	41	AA	A5	AD	1689:BD	48	40	9D	58	40	60	01	0E
1231:22	AA	A8	2A	0A	8A	2A	82	1A	1461:40	AA	A5	44	AA	A5	50	2A	04	1691:02	04	08	10	20	40	80	FE	C3
1239:8A	02	82	80	00	00	AA	80	51	1469:A5	41	00	00	00	00	00	00	B4	1699:FD	FB	F7	EF	DF	BF	7F	A0	5F
1241:02	AA	A8	0A	AA	A8	2A	AB	BE	1471:00	00	00	00	00	00	00	00	99	16A1:05	20	FA	16	A9	03	A0	17	CA
1249:EA	2A	AF	7A	AA	AF	7A	AA	BE	1479:00	00	00	00	00	00	00	00	A1	16A9:20	1E	AB	A0	0B	20	FA	16	D1
1251:AB	EA	AA	AA	AA	AA	AA	AA	06	1481:01	5A	A8	11	5A	AA	01	5A	C0	16B1:AD	02	17	F0	F4	16	AD	00	75
1259:AA	AA	A8	AA	9D	DC	AA	B7	AA	1489:AA	45	5A	AA	11	5A	AA	00	95	16B9:17	AC	01	17	85	63	84	62	53
1261:74	AA	AA	A8	2A	AA	AA	2A	C5	1491:00	2A	00	00	2A	00	00	2A	BF	16C1:A2	90	38	20	49	BC	20	DD	C7
1269:AA	AA	0A	AA	A8	0A	AA	A0	DC	1499:00	00	2A	11	5A	AA	45	5A	7A	16C9:BD	A2	FF	E8	BD	02	01	D0	D4
1271:0A	AA	A8	0A	08	28	0A	0A	F9	14A1:AA	01	5A	AA	11	5A	AA	01	9D	16D1:FA	F0	11	A9	30	8D	00	01	2D
1279:0A	0A	0A	0A	00	02	AA	00	64	14A9:5A	A8	00	00	00	00	00	00	29	16D9:A0	05	B9	00	01	99	01	01	40
1281:2A	AA	80	2A	AA	A0	AB	EA	32	14B1:00	00	00	00	00	00	00	00	D9	16E1:88	10	F7	E8	E0	04	D0	EB	88
1289:A8	AD	FA	A8	AD	FA	AA	AB	B1	14B9:00	00	00	00	00	00	00	00	E1	16E9:A0	1E	20	FA	16	A9	01	A8	A3
1291:EA	AA	AA	AA	AA	AA	AA	AA	D5	14C1:11	5A	A8	41	5A	AA	05	5A	14	16F1:4C	1E	AB	18	69	30	4C	16	7D
1299:2A	AA	AA	37	76	AA	1D	DE	BD	14C9:AA	11	5A	AA	01	5A	AA	00	48	16F9:E7	A2	17	18	4C	F0	FF	00	4D
12A1:AA	2A	AA	AA	AA	AA	AA	A8	AA	14D1:00	2A	00	00	2A	00	00	2A	FF	1701:00	00	05	4C	49	56	45	53	16
12A9:AA	A8	2A	AA	A0	0A	AA	A0	60	14D9:00	00	2A	01	5A	AA	11	5A	51	1709:3A	1D	1D	1D	1D	1D	1D	1D	C5
12B1:0A	A8	A8	0A	08	08	28	28	93	14E1:AA	05	5A	AA	41	5A	AA	11	70	1711:1D	1D	1D	1D	1D	1D	53	43	D1
12B9:28	28	28	00	02	AA	00	E0	E0	14E9:5A	A8	00	00	00	00	00	00	69	1719:4F	52	45	3A	00	AD	00	DC	63
12C1:2A	AA	80	2A	AA	A0	AB	EA	72	14F1:00	00	00	00	00	00	00	00	1A	1721:0A	0A	0A	0A	A0	04	0A	90	72
12C9:A8	AD	FA	A8	AD	FA	AA	AB	F1	14F9:00	00	00	00	00	00	00	00	22	1729:03	88	D0	FA	98	60	8D	5A	80
12D1:EA	AA	AA	AA	AA	AA	AA	AA	16	1501:05	5A	A8	11	5A	AA	41	5A	C4	1731:17	A9	81	8D	0F	D4	8D	12	57
12D9:2A	AA	AA	37	76	AA	1D	DE	FD	1509:AA	11	5A	AA	05	5A	AA	00	A9	1739:D4	A9	FF	8D	59	17	AD	5A	F1
12E1:AA	2A	AA	AA	AA	AA	A8	AA	E1	1511:00	2A	00	00	2A	00	00	2A	41	1741:17	D0	04	60	4E	59	17	0A	C5
12E9:AA	A8	2A	AA	A0	0A	AA	A8	A8	1519:00	00	2A	05	5A	AA	11	5A	D2	1749:90	FA	AD	1B	D4	2D	59	17	0B
12F1:2A	AA	2A	2A	82	02	0A	0A	F7	1521:AA	41	5A	AA	11	5A	AA	05	33	1751:CD	5A	17	F0	02	B0	F3	60	0A
12F9:0A	0A	0A	0A	00	02	AA	00	E4	1529:5A	A8	00	00	00	00	00	00	AA	1759:00	00	20	81	FF	A2	18	BD	1C
1301:2A	AA	80	2A	AA	A0	AB	EA	B3	1531:00	00	00	00	00	00	00	00	5B	1761:6A	17	9D	16	D0	CA	10	F7	69
1309:A8	AD	FA	A8	AD	FA	AA	AB	33	1539:00	00	00	00	00	00	00	00	63	1769:60	D8	00	1F	79	F0	00	FF	7F
1311:EA	AA	AA	AA	AA	AA	AA	AA	57	1541:41	5A	A8	05	5A	AA	11	5A	02	1771:00	00	00	01	00	0A	01	00	D9
1319:2A	AA	AA	37	76	AA	1D	DE	3F	1549:AA	01	5A	AA	41	5A	AA	00	C7	1779:01	00	01	02	03	04	05	06	A0
1321:AA	2A	AA	AA	AA	AA	A8	AA	23	1551:00	2A	00	00	2A	00	00	2A	81	1781:07	08	48	A2	00	AD	15	D0	1A
1329:AA	A8	2A	AA	A0	0A	AA	A8	E9	1559:00	00	2A	41	5A	AA	01	5A	B6	1789:4A	90	05	E8	E0	07	90	F8	6D
1331:2A	AA	88	A2	A0	A8	A2	82	C1	1561:AA	11	5A	AA	05	5A	AA	41	43	1791:68	60	48	A9	80	4C	9C	17	35
1339:A8	02	82	80	00	02	AA	00	E9	1569:5A	A8	00	00	00	00	00	00	EA	1799:48	A9	00	8D	17	18	68	8D	A6
1341:2A	AA	80	2A	AA	A0	AB	EA	F3	1571:00	00	00	00	00	00	00	00	9B	17A1:14	18	18	7D	97	18	8D	15	08
1349:A8	AD	FA	A8	AD	FA	AA	AB	73	1579:00	00	00	00	00	00	22	00	E7	17A9:18	98	8D	12	18	18	7D	95	8E
1351:EA	AA	AA	AA	AA	AA	AA	AA	97	1581:00	08	00	00	82	20	08	00	52	17B1:18	8D	13	18	BD	99	18	8D	45
1359:2A	AA	AA	37	76	AA	1D	DE	7F	1589:00	02	20	00	20	88	02	08	6C	17B9:ED	17	BD	9B	18	8D	EE	17	02
1361:AA	2A	AA	AA	AA	AA	A8	AA	63	1591:00	20	22	08	82	00	00	08	A4	17C1:BD	9D	18	8D	E7	17	BD	9F	C8
1369:AA	A8	2A	AA	A0	0A	AA	A0	22	1599:22	22	20	00	00	00	22	08	CD	17C9:18	8D	E8	17	A9	00	85	FC	4B
1371:2A	AA	A0	28	20	A0	A0	A0	53	15A1:82	00	82	00	00	00	00	02	AF	17D1:AE	14	18	AC	12	18	E0	19	F5
1379:A0	A0	A0	A0	00	00	00	00	36	15A9:08	00	00	00	00	00	22	00	20	17D9:BD	28	C0	28	B0	24	20	18	73
1381:2A	A5	40	AA	A5	44	AA	A5	12	15B1:00	00	00	00	00	00	00	00	DB	17E1:18	86	FB	A6	FC	BD	FF	FF	86
1389:40	AA	A5	51	AA	A5	44	A8	61	15B9:00	00	00	00	00	00	00	08	F3	17E9:8D	16	18	BD	FF	FF	A6	FF	8C
1391:00	00	A8	00	00	A8	00	00	6F	15C1:02	8A	00	00	88	80	0A	22	0C	17F1:C9	00	F0	0E	2C	17	18	30	22
1399:A8	00	00	AA	A5	44	AA	A5	F7	15C9:28	20	8A	08	22	88	A2	0A	64	17F9:02	A9	20	91	26	AD	16	18	DC
13A1:51	AA	A5	40	AA	A5	44	2A	72	15D1:20	8A	0A	A2	28	82	20	82	FA	1801:91	28	E6	FC	C8	CC	13	18	68
13A9:A5	40	00	00	00	00	00	00	B2	15D9:0A	8A	0A	A2	20	A0	20	A8	83	1809:D0	CC	E8	EC	15	18	D0	C3	2F
13B1:00	00	00	00	00	00	00	00	D7	15E1:8A	88	22	22	22	8A	20	22	77	1811:60	00	00	00	00	00	00	48	B9
13B9:00	00	00	00	00	00	00	00	DF	15E9:00	A8	08	A2	20	0A	22	80	57	1819:BD	F0	EC	85	26	85	28	BD	AF
13C1:2A	A5	44	AA	A5	41	AA	A5	C6	15F1:00	28	00	00	00	00	00	00	26	1821:2E	18	18	69	04	85	27	69	F5
13C9:50	AA	A5	44	AA	A5	40	A8	D0	15F9:00	00	00	00	00	B9	A1	18	66	1829:D4	85	29	68	60	00	00	00	D3
13																										


```

1871:0A 0A 08 08 08 08 08 08 23
1879:0F 0F 0F 0F 08 0F 0F 0F 71
1881:0F 08 E7 EB E9 E6 F4 E8 B4
1889:EC EA F1 0A 0A 0A 0A 60
1891:0A 0A 0A 0A 05 03 06 03 6E
1899:47 83 18 18 65 8C 18 18 78
18A1:CC CC CC CC D4 D4 D4 D4 4A
18A9:D0 D0 D0 D0 D8 D8 D8 D8 52
18B1:DC DD 04 04 04 04 04 04 C4
18B9:04 04 04 04 04 04 04 04 E9
18C1:04 04 01 01 05 04 03 02 65
18C9:04 04 04 04 05 04 03 02 FD
18D1:04 04 04 04 0A 14 D2 D2 DE
18D9:D2 D2 92 92 92 92 D2 D2 FA
18E1:D2 D2 92 92 92 92 03 D3 64
18E9:A2 0D BD 90 42 9D 00 D4 CC
18F1:CA 10 F7 A2 07 B4 A3 F0 F7
18F9:40 88 98 8D 03 19 0A 0A F2
1901:0A 69 00 A8 A9 00 95 A3 39
1909:9D 05 D4 9D 06 D4 BD 94 53
1911:42 29 FE 9D 04 D4 A9 07 36
1919:85 A6 8E 2B 19 B9 66 19 D1
1921:9D 90 42 C8 E8 C6 A6 D0 9B
1929:F4 A2 00 B9 66 19 95 A5 82
1931:C8 B9 66 19 95 A4 4C 5C C8
1939:19 D6 A4 D0 08 BD 94 42 F1
1941:29 FE 9D 94 42 BD 91 42 33
1949:18 75 A5 9D 91 42 6A 55 33
1951:A5 10 08 A9 00 9D 06 D4 4D
1959:9D 96 42 8A F0 04 A2 00 CD
1961:F0 93 4C 31 EA 00 06 00 F0
1969:08 81 00 F9 00 03 00 01 AC
1971:00 08 81 00 FA 00 05 00 B7
1979:30 00 08 41 02 FA 00 06 DA
1981:00 86 00 08 41 00 FF FC DC
1989:03 00 03 00 08 21 10 F9 7C
1991:00 20 00 00 00 00 00 00 CB

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Ligia Latino is a programmer who lives in San Jose, California. □

QUIZZER 128

Bruce M. Bowden

Quizzer 128 is a high-tech, efficient, but easy-to-use improvement on flashcards. It is designed for the 128 in either 40- or 80-column display.

Unlike flashcards, *Quizzer 128* lets you design a quiz with three types of questions: direct answer, fill in the blank, and multiple choice. You may design your own quizzes using any or all of these types. You may also have as many questions as you like in a quiz. The program maintains a running score, and the questions are chosen randomly from those which either have not yet been answered or have been answered incorrectly.

Setting Up

There are two versions of *Quizzer 128*, one for 40-column screens and one for 80-column screens. Both are written en-

tirely in BASIC. To avoid typing errors, use *The Automatic Proofreader* to type in whichever version you prefer. See "Typing Aids" elsewhere in this section. After typing in *Quizzer 128*, save a copy to disk. It will serve as a master for all future quizzes you make up.

Prepare a Quiz

When the program is initially run, two options are available. You may either take a quiz with existing questions or enter new questions. Since there are no questions the first time you run the program, start by pressing the B key for the second option.

Now you can choose between the three problem types. Choose direct answer by pressing A. The parser is engaged, and you're asked to enter a question. For example, type WHO IS THE PRESIDENT OF THE UNITED STATES? Then press Return. The program will ask if you want to enter the question again, in case you wish to correct any mistakes you may have made. Press Y for yes or N for no. You may enter the question in uppercase, lowercase, or a combination of both.

Next you're asked for the correct answer. Type in BUSH and press Return. After responding to the reenter prompt, you're asked if there'll be another question. Press Y for yes if you wish to enter more questions.

Presented with the three problem types again, now choose option B, fill in the blank. For questions in this format, enter the question and type an asterisk to indicate the word left blank. For this example, type THE LARGEST CITY IN THE U.S. IS *. When asked for the correct answer, type NEW YORK. Now set up one more question, so press Y in response to that prompt.

For the final question, choose option C, multiple choice. Since you must supply several wrong answers to accompany the correct one, you're asked how many answers there'll be, out of a maximum of five. Enter 3 and press Return. For the question, type THOMAS JEFFERSON WAS A NATIVE OF WHICH STATE? Enter VIRGINIA as the correct answer. At the alternate answer prompt, enter NORTH CAROLINA and PENNSYLVANIA. When asked if there will be another question, press N for no. Now you're ready to take the quiz.

Renumbering

After entering a list of questions, you must prepare the quiz for taking. *Quizzer 128* inserts the questions as DATA statements at the end of the program listing. The number of entries is given (three, in this case), the prompt RENUMBER is printed, and a special program line is listed. Within this special program line is a GOTO statement. The line number after the GOTO now needs to be listed. In the 80-column version of *Quizzer*, the line number is 1510, so if you're using this mode, type LIST 1510. You should now see a DATA line followed by the remark NUMBER OF ENTRIES. After DATA, replace the 0 with a 3 because you've entered three questions; then press Return. For the 40-column version list line 1440.

The following step is necessary only if you plan to add more questions to *Quizzer* later on. If that is the case, move the cursor back to the line on the screen where RENUMBER is printed and press Return. The reason for renumbering is that when new questions are being processed as DATA statements, they receive line numbers starting at 40000. If you neglect to renumber, any new questions you add will simply replace the old ones in the quiz.

Save the Quiz

At this point, if you'd like to save this quiz for running later, list the first line of the save routine, which is line 90. Change the program name in quotes to one you like. If you choose HISTORY, for example, line 90 should begin 90 B\$(2)="HISTORY".

Now run the save routine to save your quiz. To do this, simply type RUN 90.

Taking a Quiz

Run the quiz you've just made; then choose option A. Note that a reversed bar appears at the top of the screen with elapsed time, the number of right and wrong answers, the total number of questions asked, and the percentage of the actual number of questions completed.

Answer the questions as you like and see how the various values change. Another experiment: In reply to WHO IS THE PRESIDENT OF THE UNITED STATES?, enter BUSH in either uppercase, lowercase, or a com-

bination. All answers are converted to lowercase. This makes entering answers easier.

The next time the program is run, reply to the same question with GEORGE BUSH instead of BUSH. Again, the answer is accepted because the answer being sought, BUSH, is part of the response. This solves many problems that may occur, for example, when asking about New York and getting answers such as NEW YORK CITY or NEW YORK, NY.

Notice that whenever a wrong answer is entered, the right answer is shown before the question is recycled. This reinforces the right answer in the mind of the person taking the quiz, and the information is absorbed faster. Questions answered incorrectly are placed back in the pool and are repeated before the quiz ends. Again, this helps reinforce the correct information.

QUIZZER 128 40-Column Version

```
GD 10 REM COPYRIGHT 1991 - COM
    PUTE PUBLICATIONS INTL L
    TD - ALL RIGHTS RESERVED
MM 20 POKE53280,0:POKE53281,0:
    PRINT"7":GOTO410
QD 30 GOTO 1390:REM THIS IS A
    {SPACE}RETURN FROM THE L
    INE ADDITION
FF 40 REM -----
XD 50 REM IMPORTANT ADDRESSES:
KX 60 GOTO 1370:REM THIS LINE
    {SPACE}CONTAINS A QUOTED
    GOTO WHICH SHOULD ADDRE
    SS THE SECOND LINE OF TH
    E PROGRAM
QP 70 GOTO1440:REM LOCATION OF
    NUMBER OF ENTRIES
KA 80 REM -----
DX 90 REM SAVE ROUTINE...
AC 100 BS(2)="QUIZZER40":BS(1)
    =BS(2)+".BK":PRINTCHR$(
    14):FORX=1TO2:PRINT:PRI
    NT "SCRATCHING ";BS(X):
    SCRATCH(B$(X)):CATALOG(
    BS(2)+"*")
AA 110 PRINT"SAVING ";BS(X):DS
    AVE(B$(X)+CHR$(160)+CHR
    $(172)+CHR$(184)+CHR$(1
    86))
CD 120 CATALOG(B$(2)+"*"):NEXT
    :END
AH 130 REM -----
GX 140 REM 40-COLUMN MESSAGE C
    ENTERING ROUTINES
```

```
DP 150 IFLEN(M$)>39 THEN BEGIN
PJ 160 YX=INT(LEN(M$)/2)
PJ 170 IF MID$(M$,YX,1)=CHR$(3
    2) THEN XX$=LEFT$(M$,YX
    ):YY$=MID$(M$,YX):GOTO1
    90
QB 180 YX=YX+1:GOTO170
MA 190 BEND
CH 200 IF LEN(M$)<40 THEN YX=I
    NT((40-LEN(M$))/2):FOR
    {SPACE}XW=1 TO YX:M$="
    {SPACE}" +M$:NEXT:PRINT"
    {CYN}";M$:RETURN
PD 210 YX=INT((40-LEN(XX$))/2)
    :FOR XW=1 TO YX:XX$=" "
    +XX$:NEXT:PRINT"{CYN}";
    XX$
GR 220 YX=INT((40-LEN(YY$))/2)
    :FOR XW=1 TO YX:YY$=" "
    +YY$:NEXT:PRINT"{CYN}";
    YY$:PRINT:RETURN
RR 230 REM -----
FX 240 YX=(40-LEN(M$))/2:FOR X
    W=1 TO YX:M$=" "+M$+" "
    :NEXT
MB 250 IF LEN(M$)<>40 THEN M$=
    M$+" ":GOTO250
BE 260 PRINT CHR$(149)+CHR$(18
    )+M$:RETURN
RS 270 REM -----
DK 280 REM MESSAGE INPUT ROUTI
    NE
PG 290 X$="":PRINT CHR$(15)+CH
    R$(28)+"<" +CHR$(143)+CH
    R$(157)+CHR$(149);
PA 300 GETKEY Y$
XM 310 IFY$<>CHR$(13)THENBEGIN
FD 320 IFY$=CHR$(20)THEN PRINT
    CHR$(29);Y$;Y$;CHR$(15
    );CHR$(28);"<";CHR$(143
    );CHR$(157);CHR$(149);:
    X$=LEFT$(X$,LEN(X$)-1):
    GOTO300
HM 330 IFY$=CHR$(34)THEN PRINT
    Y$;CHR$(27);CHR$(27);CH
    R$(15);CHR$(28);"<";CHR
    $(143);CHR$(157);CHR$(1
    49);:Y$=CHR$(190):GOTO3
    50
KR 340 PRINTY$;CHR$(15);CHR$(2
    8);"<";CHR$(143);CHR$(1
    57);CHR$(149);
QR 350 X$=X$+Y$:GOTO300
AM 360 BEND
PR 370 PRINT"... "
HS 380 RETURN
DG 390 REM -----
BB 400 REM CHOICE OF SELF-EXAM
    INATION OR ENTRY OF NEW
    QUESTIONS
EX 410 RESTORE 1440:READ NE:RE
    M READING THE NUMBER OF
    ENTRIES
JD 420 DIM T(200),N(200),Q$(20
    0),A$(200),R(200),C$(20
```

```
0,5),W$(200),V$(200),W(
    200),Q$(200,3)
SX 430 PRINT CHR$(147)+CHR$(17
    )+CHR$(17)+CHR$(149)+CH
    R$(14):M$="PLEASE CHOO
    S ONE":GOSUB150
JC 440 PRINT:PRINT:PRINT:M$="A
    ) QUIZ WITH EXISTING QU
    ESTIONS":GOSUB150:PRINT
    :M$="B) ENTER NEW QUEST
    IONS":GOSUB150
RJ 450 GETKEYX$:IFX$<"A" OR X$
    >"B"THEN450:ELSE ON ASC
    (X$)-64 GOTO 480,950
CC 460 REM -----
FC 470 REM SELF-EXAMINATION
CS 480 PRINT:PRINT:PRINT:M$="P
    REPARING...":GOSUB150
QE 490 TL=0:RT=0:WG=0:X=RND(-T
    I):FOR ZZ=1 TO NE:W$(ZZ
    )=" "
JK 500 READ T(ZZ):REM QUESTION
    TYPE 1=DIRECT ANSWER,
    {SPACE}2=FILL IN THE BL
    ANK, 3=MULTIPLE CHOICE
JF 520 READ Q$(ZZ):REM THE QUE
    STION
QG 530 READ A$(ZZ):REM THE ANS
    WER
FK 540 IF T(ZZ)=3 THEN READ R(
    ZZ):REM NUMBER OF THE R
    IGH T ANSWER
HK 550 IF T(ZZ)=3 THEN FOR X=1
    TO N(ZZ):READ C$(ZZ,X)
    :NEXT
EE 560 NEXT
JP 570 RD=0:FOR X=1 TO NE:W(X)
    =0:NEXT:ZZ=RND(-TI)
AB 580 PRINT CHR$(147)+CHR$(17
    )+CHR$(14):M$=STR$(RT)+
    " RIGHT ANSWERS":GOSUB2
    40
DB 590 M$=STR$(WG)+" WRONG ANS
    WERS":GOSUB240
SJ 600 M$=STR$(TL)+" TOTAL QUE
    STIONS":GOSUB240
EC 610 IF TL<0 THEN M$=STR$(I
    NT(10000*RT/TL)/100)+"
    {SPACE}PERCENT CORRECT"
    :GOSUB240
FQ 620 PRINT CHR$(30)"-----
    -----"CHR$(149)
KG 630 ZZ=INT(RND(ZZ)*NE+1)
CX 640 IF W(ZZ)=0 THEN 740
ES 650 FL=0:FOR X=1 TO NE:FL=F
    L+W(X):NEXT
CP 660 IF FL<NE THEN 630
DH 670 M$=CHR$(154)+"YOU DID "
QK 680 IF RT/TL=1 THEN M$=M$+"
    A PERFECT JOB!":GOSUB15
    0:GOTO730
CC 690 IF RT/TL>.89 THEN M$=M$
    +"VERY WELL INDEED!":GO
    SUB150:GOTO730
PG 700 IF RT/TL>.79 THEN M$=M$
    +"FINE. BUT PRACTICE!":
```


PROGRAMS

```

GOSUB150:GOTO730
SD 710 IF RT/TL>.69 THEN M$=M$
+"FAIR. SOME WORK IS NE
EDED.":GOSUB150:GOTO730
CQ 720 M$=M$+"A WEAK JOB THIS
{SPACE}TIME. I SUGGEST
{SPACE}YOU TRY AGAIN.":
GOSUB150
SK 730 PRINTCHR$(149):END
GQ 740 M$=Q$(ZZ):GOSUB150:TL=T
L+1:PRINT:PRINT
PF 750 IF T(ZZ)=3THEN850
EB 760 GOSUB290:MM$=X$:GOSUB90
0:X$=MM$:MM$=A$(ZZ):GOS
UB900:REM MESSAGE INPUT
ROUTINE
ME 770 IF INSTR(X$,MM$)=0 THEN
790
CE 780 PRINT CHR$(150)CHR$(15)
"CORRECT!":W(ZZ)=1:RT=R
T+1:GOTO810
SP 790 PRINT CHR$(154)CHR$(15)
"WRONG!!":W(ZZ)=0:WG=WG
+1
AA 800 M$="THE CORRECT ANSWER
{SPACE}IS.":GOSUB240:M$
=A$(ZZ):GOSUB150
HH 810 FOR X=1 TO 500:GET M$:I
F M$<>" THEN X=1000
PR 820 NEXT:IF M$="" THEN 580
HE 830 M$="PAUSED - PRESS ANY
{SPACE}KEY TO CONTINUE"
:GOSUB240
PH 840 GETKEY M$:GOTO580
GM 850 FORX=1 TO N(ZZ):M$=CHR$(
X+64)+" "+C$(ZZ,X):GO
SUB150:NEXT
AK 860 GETKEY X$:IF ASC(X$)-64
<1 OR ASC(X$)-64>N(ZZ)
{SPACE}THEN860
FS 870 IF ASC(X$)-64=R(ZZ) THE
N780:ELSE GOTO 790
EH 880 REM -----
-----
FD 890 REM REDUCING ALL UPPER
{SPACE}CASE CHARACTERS
{SPACE}TO LOWER CASE
QC 900 FOR X=1 TO LEN(MM$)
FS 910 IF MID$(MM$,X,1)>="A" A
ND MID$(MM$,X,1)<="Z" T
HEN MM$=LEFT$(MM$,X-1)+
CHR$(ASC(MID$(MM$,X,1))
-(ASC("A")-ASC("A")))+M
ID$(MM$,X+1)
XD 920 NEXT:RETURN
PB 930 REM -----
-----
XG 940 REM SELECTION OF NEW QU
ESTION ENTRY
QQ 950 XX=1
MX 960 QT$="":QQ$(XX,3)="REM N
OTHING HERE!":PRINT CHR
$(147)CHR$(17)CHR$(17)C
HR$(14):M$="PLEASE CHOO
SE THE ANSWER MODE.":GO
SUB150
EF 970 PRINT:PRINT:PRINT:M$="A
) DIRECT ANSWER":GOSUB1
50:PRINT:M$="B) FILL IN
THE BLANK":GOSUB150:PR
INT:M$="C) MULTIPLE CHO
ICE":GOSUB150:PRINT"{}2}
"
FQ 980 GETKEYX$:IFX$<"A" OR X$
>"C"THEN980:ELSE IIS=X$
GM 990 QT$="DATA "+STR$(ASC(X$
)-64)+"":REM QUESTION
{SPACE}TYPE IN NUMERAL
{SPACE}FORM
BJ 1000 REM * * * * *
{SPACE}*
JH 1010 IF IIS<>"C" THEN QT$=Q
T$+"99.":GOTO 1070
JG 1020 PRINT CHR$(147)CHR$(17
)CHR$(17):M$="HOW MANY
MULTIPLE CHOICE ANSWE
RS WILL THERE BE?":GOS
UB150
XX 1030 M$="(THERE MAY BE A MA
XIMUM OF 5)":GOSUB150:
PRINT"{}2}":INPUTA:M$="
DO THIS OVER?":GOSUB15
0:PRINT CHR$(149):GETK
EY$:IFY$="Y"THEN1020
DJ 1040 IFA>5 THEN A=5
XX 1050 YY=A:QT$=QT$+STR$(A)+"
,":GOTO 1110
DX 1060 REM * * * * *
{SPACE}*
XB 1070 IF IIS<>"B" THEN 1110:
REM OTHERWISE THIS IS
{SPACE}A FILL-IN-THE-B
LANK
PG 1080 PRINT CHR$(147)CHR$(17
)CHR$(17):M$="ENTER TH
E QUESTION USING * TO
{SPACE}REPRESENT THE B
LANK.":GOSUB150:GOSUB2
90
QE 1090 M$="DO THIS OVER?":GOS
UB150:PRINT CHR$(149):
GETKEY$:IFY$="Y"THEN1
080
CF 1100 GOTO1130
BR 1110 PRINT CHR$(147)CHR$(17
)CHR$(17):M$="PLEASE E
NTER THE QUESTION.":GO
SUB150:GOSUB290
RM 1120 M$="DO THIS OVER?":GOS
UB150:PRINT CHR$(149):
GETKEY$:IFY$="Y"THEN1
110
BK 1130 QT$=QT$+CHR$(34)+X$+CH
R$(34)
XA 1140 REM * * * * *
{SPACE}* *
KR 1150 PRINT CHR$(17)CHR$(17
):M$="WHAT IS THE CORRE
CT ANSWER?":GOSUB150:G
OSUB290
QB 1160 M$="DO THIS OVER?":GOS
UB150:PRINT CHR$(149):
GETKEY$:IFY$="Y"THEN1
150
JA 1170 QQ$(XX,2)="DATA "+CHR$(
34)+X$+CHR$(34)
EM 1180 IF IIS="B" THEN X=INST
R(QT$,"*"):QT$=LEFT$(Q
T$,X-1)+CHR$(15)+CHR$(
30)+"(BLANK)"+CHR$(149
)+CHR$(143)+MID$(QT$,X
+1)
KQ 1190 QQ$(XX,1)=QT$
DH 1200 IF IIS="C" THEN BEGIN
JP 1210 V$(1)=X$:QT$=X$
QC 1220 PRINT "NOW ENTER";YY-1
; "ALTERNATE ANSWERS"
CJ 1230 FOR X=1 TO YY-1:PRINT:
PRINTX;";":GOSUB290:V
$(X+1)=X$:NEXT
AA 1240 M$="DO THIS OVER?":GOS
UB150:PRINT CHR$(149):
GETKEY$:IFY$="Y"THEN1
230
XF 1250 FOR ZZ=1 TO YY-1:FOR X
=1 TO YY-1
SH 1260 IF V$(X)>V$(X+1) THEN
{SPACE}M$=V$(X):V$(X)=
V$(X+1):V$(X+1)=M$
CK 1270 NEXT:NEXT
QC 1280 FOR ZZ=1 TO YY:IF V$(Z
Z)=QT$ THEN X=ZZ
KD 1290 NEXT
XB 1300 QT$="DATA"+STR$(X)+" ,
":FORX=1TOYY:QT$=QT$+CH
R$(34)+V$(X)+CHR$(34)+
",":NEXT
AG 1310 X=LEN(QT$)-1:QQ$(XX,3)
=LEFT$(QT$,X)
BD 1320 BEND
KD 1330 M$="WILL THERE BE ANOT
HER ONE? (Y OR N)":GOS
UB150:PRINT CHR$(149):
GETKEY$:IFY$="Y"THENX
X=XX+1:GOTO960
JK 1340 REM -----
-----
KP 1350 X=0
HS 1360 X=X+1
EX 1370 PRINT CHR$(147)+STR$(X
*10+10000)+QQ$(X,1):PR
INTSTR$(X*10+10000+5)+
QQ$(X,2):PRINTSTR$(X*1
0+10000+6)+QQ$(X,3):PR
INTSTR$(X*10+10000+7)+
":":PRINT"GOTO30"
GC 1380 POKE208,6:POKE842,19:P
OKE843,13:POKE844,13:P
OKE845,13:POKE846,13:P
OKE847,13:BANK15:SYS19
910
AR 1390 IFX<=XX THEN 1360
HP 1400 PRINT"{CLR}{DOWN}{CYN}
THERE IS NOW A TOTAL O
F";XX+NE;"ENTRIES.":PR
INT"BE SURE TO NOTE TH
E CHANGE!"
CA 1410 PRINT:PRINT"RENUMBER":
LIST70
JJ 1420 END
AE 1430 REM -----
-----
XD 1440 DATA 0:REM NUMBER OF E
NTRIES

```


QUIZZER 128

80-Column Version

```

JF 10 GOTO 400:REM COPYRIGHT 1
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DR 20 GOTO 1460:REM THIS IS A
{SPACE}RETURN FROM THE LINE
ADDITION
BK 30 REM -----
MA 40 REM IMPORTANT ADDRESSES:
HQ 50 GOTO 1440:REM THIS LINE
{SPACE}CONTAINS A QUOTED
GOTO WHICH SHOULD ADDRESS
THE SECOND LINE OF THE
PROGRAM
CM 60 GOTO1510:REM LOCATION OF
NUMBER OF ENTRIES
RM 70 REM -----
EJ 80 REM SAVE ROUTINE...
AM 90 B$(2)="QUIZZER":B$(1)=B$(
2)+"_BK":PRINTCHR$(14):
FORX=1TO2:PRINT:PRINT"SCR
ATCHING ";B$(X):SCRATCH
(B$(X)):CATALOG(B$(2)+"*
")
QB 100 PRINT"SAVING ";B$(X):DS
AVE(B$(X)+CHR$(160)+CHR
$(172)+CHR$(184)+CHR$(1
86))
SD 110 CATALOG(B$(2)+"*"):NEXT
:END
EH 120 REM -----
GQ 130 REM 80-COLUMN MESSAGE C
ENTERING ROUTINES
GG 140 IFLen(M$)>79 THEN BEGIN
HP 150 YX=INT(LEN(M$)/2)
PX 160 IF MID$(M$,YX,1)=CHR$(3
2) THEN XX$=LEFT$(M$,YX
-1):YY$=MID$(M$,YX+1):G
OTO180
XD 170 YX=YX+1:GOTO160
BX 180 BEND
CD 190 IF LEN(M$)<80 THEN YX=I
NT((80-LEN(M$))/2):FOR
{SPACE}XW=1 TO YX:M$="
{SPACE}" +M$:NEXT:PRINTM
$:RETURN
FH 200 YX=INT((80-LEN(XX$))/2)
:FOR XW=1 TO YX:XX$=" "
+XX$:NEXT:PRINTXX$
DF 210 YX=INT((80-LEN(YY$))/2)
:FOR XW=1 TO YX:YY$=" "
+YY$:NEXT:PRINTYY$:RETU
RN
XQ 220 REM -----
BS 230 YX=(80-LEN(M$))/2:FOR X
W=1 TO YX:M$=" "+M$+" "
:NEXT
GG 240 IF LEN(M$)<>80 THEN M$=
M$+" ":GOTO240
FH 250 PRINT CHR$(149)+CHR$(18
)+M$:RETURN
XK 260 REM -----
HJ 270 REM MESSAGE INPUT ROUTI
NE
HG 280 X$="":PRINT CHR$(15)+CH
R$(28)+"<" +CHR$(143)+CH
R$(157)+CHR$(149);
QA 290 GETKEY Y$
DP 300 IFY$<>CHR$(13)THENBEGIN
MH 310 IFY$=CHR$(20)THEN PRINT
CHR$(29);Y$;Y$;CHR$(15
);CHR$(28);"<";CHR$(143
);CHR$(157);CHR$(149);:
X$=LEFT$(X$,LEN(X$)-1):
GOTO290
FC 320 IFY$=CHR$(34)THEN PRINT
Y$;CHR$(27);CHR$(27);CH
R$(15);CHR$(28);"<";CHR
$(143);CHR$(157);CHR$(1
49);:Y$=CHR$(190):GOTO3
40
FR 330 PRINTY$;CHR$(15);CHR$(2
8);"<";CHR$(143);CHR$(1
57);CHR$(149);
JF 340 X$=X$+Y$:GOTO290
EK 350 BEND
HR 360 PRINT"... "
DR 370 RETURN
RF 380 REM -----
JB 390 REM CHOICE OF SELF-EXAM
INATION OR ENTRY OF NEW
QUESTIONS
PB 400 RESTORE 1510:READ NE:RE
M READING THE NUMBER OF
ENTRIES
RX 410 DIM T(200),N(200),Q$(20
0),A$(200),R(200),C$(20
0,5),W$(200),V$(200),W(
200),QQ$(200,3):HY$="":
FOR X=1 TO 80:HY$=HY$+"
-":NEXT
FM 420 SP$="":FOR X=1 TO 80:SP
$=SP$+" ":NEXT
GR 430 FAST:PRINT CHR$(147)+CH
R$(17)+CHR$(17)+CHR$(14
9)+CHR$(14):M$="PLEASE
{SPACE}CHOOSE ONE":GOS
UB140
EE 440 PRINT:PRINT:PRINT:M$="A
) QUIZ WITH EXISTING QU
ESTIONS":GOSUB140:PRINT
:M$="B) ENTER NEW QUEST
IONS":GOSUB140
EC 450 GETKEYX$:IFX$<"A" OR X$
>"B"THEN450:ELSE ON ASC
(X$)-64 GOTO 480,1020
MS 460 REM -----
FC 470 REM SELF-EXAMINATION
AX 480 PRINT:PRINT:PRINT:M$="P
REPARING":GOSUB140:TIS$=
"000000"
HM 490 TL=0:RT=0:WG=0:X=RND(-T
I):FOR ZZ=1 TO NE:W$(ZZ
)=" ":PRINT". ";
JK 500 READ T(ZZ):REM QUESTION
TYPE 1=DIRECT ANSWER,
{SPACE}2=FILL IN THE BL
ANK, 3=MULTIPLE CHOICE
FX 510 READ N(ZZ):REM NUMBER O
F MULTIPLE-CHOICE ANSWE
RS (99 IF NOT MULTIPLE
{SPACE}CHOICE)
JF 520 READ Q$(ZZ):REM THE QUE
STION
QG 530 READ A$(ZZ):REM THE ANS
WER
FK 540 IF T(ZZ)=3 THEN READ R(
ZZ):REM NUMBER OF THE R
IGHT ANSWER
HK 550 IF T(ZZ)=3 THEN FOR X=1
TO N(ZZ):READ C$(ZZ,X)
:NEXT
EE 560 NEXT
JP 570 RD=0:FOR X=1 TO NE:W(X)
=0:NEXT:ZZ=RND(-TI)
DX 580 PRINT CHR$(147)+CHR$(17
)+CHR$(14):M$=TIS$:M$="A
PPROXIMATE ELAPSED TIME
: "+LEFT$(M$,2)+" H "+M
ID$(M$,3,2)+" M "+RIGHT
$(M$,2)+" S ":GOSUB230
QR 590 M$=STR$(RT)+" RIGHT ANS
WERS":GOSUB230
RE 600 M$=STR$(WG)+" WRONG ANS
WERS":GOSUB230
GK 610 M$=STR$(TL)+" TOTAL QUE
STIONS ASKED":GOSUB230
QX 620 M$="("+STR$(RT)+" /"+STR
R$(NE)+"="+STR$(INT(RT/
NE*1000)/10)+"% COMPLET
ED)":GOSUB230
CF 630 IF TL<>0 THEN M$=STR$(I
NT(10000*RT/TL)/100)+"
{SPACE}PERCENT CORRECT"
:GOSUB230
RB 640 PRINT CHR$(30)"-----
-----
---CHR$(149)
BA 650 ZZ=INT(RND(ZZ)*NE+1)
SQ 660 IF W(ZZ)=0 THEN 760
QX 670 FL=0:FOR X=1 TO NE:FL=FL
L+W(X):NEXT
MX 680 IF FL<NE THEN 650
PB 690 M$=CHR$(154)+"YOU DID "
GM 700 IF RT/TL=1 THEN M$=M$+"
A PERFECT JOB!":GOSUB14
0:GOTO750
KX 710 IF RT/TL>.89 THEN M$=M$
+"VERY WELL INDEED!":GO
SUB140:GOTO750
EB 720 IF RT/TL>.79 THEN M$=M$
+"FINE. BUT PRACTICE!":
GOSUB140:GOTO750
CQ 730 IF RT/TL>.69 THEN M$=M$
+"FAIR. SOME WORK IS NE
EDED.":GOSUB140:GOTO750
PB 740 M$=M$+"A WEAK JOB THIS
{SPACE}TIME. I SUGGEST
{SPACE}YOU TRY AGAIN.":
GOSUB140
GJ 750 PRINTCHR$(149):END
CQ 760 M$=Q$(ZZ):GOSUB140:TL=T

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PROGRAMS

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L+1:PRINT:PRINT
HK 770 IF T(ZZ)=3THEN870
QF 780 GOSUB280:MM$=X$:GOSUB97
0:X$=MM$:MM$=A$(ZZ):GOS
UB970:REM MESSAGE INPUT
ROUTINE AND CHANGE ALL
UPPERCASE CHARACTERS
JC 790 IF INSTR(X$,MM$)=0 THEN
810
HM 800 PRINT CHR$(150)CHR$(15)
"OFF}CORRECT!"CHR$(143)
){2}...{RVS}";:W(ZZ)
=1:RT=RT+1:PRINTA$(ZZ);
"OFF}{2 SPACES}";:GOTO
830
MP 810 PRINT CHR$(154)CHR$(15)
"OFF}WRONG!!":W(ZZ)=0:
WG=WG+1
KR 820 M$="THE CORRECT ANSWER
{SPACE}IS":GOSUB230:M$
=A$(ZZ):GOSUB140
GA 830 FOR X=1 TO 15:GOSUB940:
GET M$:IF M$<>" THEN X
=1000
DQ 840 NEXT:IF M$="" THEN 580
RH 850 M$="PAUSED - PRESS ANY
{SPACE}KEY TO CONTINUE"
:GOSUB230
DF 860 GETKEY M$:GOTO580
JD 870 Y=0:FORX=1 TO N(ZZ):IF
{SPACE}LEN(C$(ZZ,X))>Y
{SPACE}THEN Y=LEN(C$(ZZ
,X))
SK 880 NEXT
GA 890 FORX=1 TO N(ZZ):C$(ZZ,X
)=LEFT$(SP$,Y-LEN(C$(ZZ
,X)))+C$(ZZ,X):NEXT
QF 900 FORX=1 TO N(ZZ):M$=CHR$(
X+64)+" "+C$(ZZ,X):GO
SUB140:NEXT
AH 910 GETKEY X$:IF ASC(X$)-64
<1 OR ASC(X$)-64>N(ZZ)
{SPACE}THEN910
JF 920 IF ASC(X$)-64=R(ZZ) THE
N800:ELSE GOTO 810
KJ 930 REM ANIMATED CURSOR
PF 940 FORY=1TO150:NEXT:PRINT"
{RVS}{F}{LEFT}";:FORY=1
TO150:NEXT:PRINT"{RVS}
{D}{LEFT}";:FORY=1TO150
:NEXT:PRINT"{RVS}{C}
{LEFT}";:FORY=1TO150:NE
XT:PRINT"{RVS}{V}{LEFT}
";:RETURN
FB 950 REM -----
EX 960 REM REDUCING ALL UPPERC
ASE CHARACTERS TO LOWER
CASE
AE 970 FOR X=1 TO LEN(MM$)
KA 980 IF MID$(MM$,X,1)>="A" A
ND MID$(MM$,X,1)<="Z" T
HEN GOSUB940:MM$=LEFT$(
MM$,X-1)+CHR$(ASC(MID$(
MM$,X,1))-ASC("A")-ASC
("A"))+MID$(MM$,X+1)
DF 990 NEXT:RETURN
FM 1000 REM -----
FH 1010 REM SELECTION OF NEW Q
UESTION ENTRY
CR 1020 XX=1
RQ 1030 QT$="":QQ$(XX,3)="REM
{SPACE}NOTHING HERE!":
FAST:PRINT CHR$(147)CH
R$(17)CHR$(17)CHR$(155
)CHR$(14):M$="PLEASE C
HOOSE THE ANSWER MODE:
":GOSUB140
EK 1040 PRINT:PRINT:PRINT:M$="
A) DIRECT ANSWER":GOSU
B140:PRINT:M$="B) FILL
IN THE BLANK":GOSUB14
0:PRINT:M$="C) MULTIPL
E CHOICE":GOSUB140:PRI
NT"{2}"
HQ 1050 GETKEYX$:IFX$<"A" OR X
$>"C"THEN1050:ELSE IIS
=X$
XA 1060 QT$="DATA "+STR$(ASC(X
$)-64)+"":REM QUESTIO
N TYPE IN NUMERAL FORM
GS 1070 REM * * * * *
{SPACE}*
EA 1080 IF IIS<"C" THEN QT$=Q
T$+"99":GOTO 1140
CM 1090 PRINT CHR$(147)CHR$(17
)CHR$(17)CHR$(155):M$=
"HOW MANY MULTIPLE CHO
ICE ANSWERS WILL THERE
BE?":GOSUB140
BD 1100 M$="(THERE MAY BE A MA
XIMUM OF 5)":GOSUB140:
PRINT"{2}":INPUTA:PRIN
T"{8}":M$="ENTER THIS
{SPACE}AGAIN?":GOSUB14
0:PRINT CHR$(149):GETK
EY$:IFY$="Y"THEN1090
CQ 1110 IFA>5 THEN A=5
DD 1120 YY=A:QT$=QT$+STR$(A)+"
":GOTO 1180
QD 1130 REM * * * * *
{SPACE}* *
QC 1140 IF IIS<"B" THEN 1180:
REM OTHERWISE THIS IS
{SPACE}A FILL-IN-THE-B
LANK
DM 1150 PRINT CHR$(147)CHR$(17
)CHR$(17)CHR$(155):M$=
"ENTER THE QUESTION US
ING * TO REPRESENT THE
BLANK":GOSUB140:GOSU
B280
RM 1160 PRINT CHR$(155):M$="EN
TER THIS AGAIN?":GOSUB
140:PRINT CHR$(149):GE
TKEY$:IFY$="Y"THEN115
0
SK 1170 GOTO1200
JQ 1180 PRINT CHR$(147)CHR$(17
)CHR$(17)CHR$(155):M$=
"PLEASE ENTER THE QUES
TION":GOSUB140:GOSUB2
80
HX 1190 PRINT CHR$(155):M$="EN
TER THIS AGAIN?":GOSUB
140:PRINT CHR$(149):GE
TKEY$:IFY$="Y"THEN118
0
BF 1200 QT$=QT$+CHR$(34)+X$+CH
R$(34)
JE 1210 REM * * * * *
{SPACE}* *
HR 1220 PRINT CHR$(17)CHR$(17)
CHR$(155):M$="WHAT IS
{SPACE}THE CORRECT ANS
WER?":GOSUB140:GOSUB28
0
DF 1230 PRINT CHR$(155):M$="EN
TER THIS AGAIN?":GOSUB
140:PRINT CHR$(149):GE
TKEY$:IFY$="Y"THEN122
0
SQ 1240 QQ$(XX,2)="DATA "+CHR$(
34)+X$+CHR$(34)
BJ 1250 IF IIS="B" THEN X=INST
R(QT$,"*"):QT$=LEFT$(Q
T$,X-1)+CHR$(15)+CHR$(
30)+LEFT$(HY$,LEN(X$))
+CHR$(149)+CHR$(143)+M
ID$(QT$,X+1)
KA 1260 QQ$(XX,1)=QT$
GR 1270 IF IIS="C" THEN BEGIN
DR 1280 V$(1)=X$:QT$=X$
CE 1290 PRINT CHR$(155)"NOW EN
TER";YY-1;"ALTERNATE A
NSWERS"
GQ 1300 FOR X=1 TO YY-1:PRINT:
PRINT"{8}";X;":GOSU
B280:V$(X+1)=X$:NEXT
CC 1310 PRINT CHR$(155):M$="EN
TER THIS AGAIN?":GOSUB
140:PRINT CHR$(149):GE
TKEY$:IFY$="Y"THEN130
0
XK 1320 FOR ZZ=1 TO YY-1:FOR X
=1 TO YY-1
KD 1330 IF V$(X)>V$(X+1) THEN
{SPACE}M$=V$(X):V$(X)=
V$(X+1):V$(X+1)=M$
DR 1340 NEXT:NEXT
SS 1350 FOR ZZ=1 TO YY:IF V$(Z
Z)=QT$ THEN X=ZZ
MH 1360 NEXT
PX 1370 QT$="DATA"+STR$(X)+"":
:FORX=1TOYY:QT$=QT$+CH
R$(34)+V$(X)+CHR$(34)+
":NEXT
GJ 1380 X=LEN(QT$)-1:QQ$(XX,3)
=LEFT$(QT$,X)
EK 1390 BEND
DK 1400 PRINT CHR$(155):M$="WI
LL THERE BE ANOTHER ON
E? (Y OR N)":GOSUB140:
PRINT CHR$(149):GETKEY
Y$:IFY$="Y"THENXX=XX+1
:GOTO1030
JB 1410 REM -----
MX 1420 X=0
HD 1430 X=X+1
GJ 1440 PRINT CHR$(147)+STR$(X
*10+40000)+QQ$(X,1):PR
INTSTR$(X*10+40000+5)+

```



```

      QQS(X,2):PRINTSTR$(X*1
      0+40000+6)+QQS(X,3):PR
      INTSTR$(X*10+40000+7)+
      " ":PRINT"GOTO20"
HS 1450 POKE208,6:POKE842,19:P
      OKE843,13:POKE844,13:P
      OKE845,13:POKE846,13:P
      OKE847,13:BANK15:SYS19
      910
CA 1460 IFX<XX THEN 1430
GA 1470 PRINT"THERE IS NOW A T
      OTAL OF";XX+NE;"ENTRIE
      S. BE SURE TO NOTE THE
      CHANGE!"
GE 1480 PRINT:PRINT"RENUMBER":
      LIST 60
DR 1490 END
BM 1500 REM -----
      -----
JX 1510 DATA 0:REM NUMBER OF E
      NTRIES

```

COMPUTE programmer Bruce Bowden lives in Greensboro, North Carolina. □

SAMMY SEAL

Arthur Moore

The trainers at Seal World have been quite amazed at the talents of their recent addition. Although he looks just like any other seal, Sammy has been stunning crowds day after day with his remarkable intelligence. After trainers mark blocks of ice with four distinct patterns, audiences stand in awe as Sammy matches pattern after pattern. A little foresight and quite a bit of patience are all you'll need to master this unusual yet addicting game of logic for the 64. A joystick is required. Plug one into port 2 to control Sammy's actions as he tosses blocks of ice with his nose.

Typing It In

Although written in machine language, *Sammy Seal* loads and runs like a BASIC program. To enter the program, use *MLX*, our machine language entry program; see "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following.

Starting address: 0801
Ending address: 1458

Be sure to save a copy of the program before you exit *MLX*.

Balancing Act

Sammy balances on his nose a block

of ice that is marked with a distinctive pattern. Have Sammy throw the block of ice at a matching ice block in the stack on the opposite side of the arena. If Sammy's toss is accurate and it lands on a matching block, those blocks will be removed, and the next block in the path will be returned to Sammy's nose. Continue this way and remove all of the blocks in the stack. If you strike a block that doesn't match or if you run out of time, you must start over, using one of your reserve blocks. Use up all three of your locks, and the show is over.

On the Nose

Your faithful Sammy appears on the left of the playfield. Using his best balancing skills, he holds the block to match on the tip of his nose. On the right, a stack of 36 ice blocks stands between you and a stellar performance.

At the start of a game, the blocks will shuffle randomly until you press and release the fire button. Your goal block (explained below) will flash, and the round begins.

A glowing block, known as a wild block, rests on Sammy's nose. This block will match any block in the stack. To the left of the stack, a yellow arrow points to the block you'll strike should you throw from Sammy's current position. By moving Sammy up and down, you can aim the arrow at a specific block. Moving Sammy above the height of the stack causes the arrow to point downward. This represents a throw that will strike the angled portion of the wall and rebound downward before striking a block on the top of the stack. Blocks on the side and top may be hit, but blocks inside the stack cannot be struck until surrounding blocks have been removed.

If a throw from Sammy's location will not strike a block, the arrow will disappear. Throwing without an arrow is not permitted.

How Blocks Move

Throwing a block sends it horizontally toward the stack. If a block hits a wall, it will bounce downward until it strikes a block in the stack. If the patterns match, the one in the stack will be removed, and the block in motion will continue in the same direction until it

strikes another block or wall. If more matching blocks are aligned in the path, all will be removed.

If Sammy's toss lands on a block that doesn't match, the nonmatching block returns to Sammy, who catches it on his nose. (Sammy never misses.) Should a block strike the ground or the back corner, a wild block will be returned. Wild blocks behave just as the first block on each level, matching whichever block it first strikes. Play a few practice games, and the rules will become clearer.

Once a block returns to Sammy, the stack may shift because of gravity. This shifting creates an ever-changing playfield which can reveal further moves or obscure current ones.

Goal Blocks

The goal block that flashes at the beginning of each round distinguishes advanced from standard skill level. If you can complete a round with the goal block resting on Sammy's nose, you'll receive 1000 bonus points. In the standard level, there is no penalty for not reaching the goal. Should you fail in the advanced level, the round will be considered incomplete, and you'll lose a reserve wild block.

Scoring

Scoring is based on the number of matching blocks that are removed in one toss before a nonmatching block (or bottom wall) is encountered.

Matching blocks	Points
One	50 points
Two	100
Three	200
Four	400
Five or more	800

If you complete a round, you'll earn ten points for each remaining second, and five seconds will be deducted from your allotted time for the next round. *Sammy Seal* records the score of the previous game as well as the score of the current game. This is convenient for two players taking alternate turns.

Sammy Seal can be paused by pressing the Shift-Lock key. The border will turn red to signal this. If a block is in motion, the pause will begin once the block returns to Sammy's nose.

PROGRAMS

SAMMY SEAL

0801:0C	08	C7	07	9E	32	30	36	D6	0A21:D4	AD	60	14	C9	19	F0	0C	F8	0C51:EE	62	14	20	53	0E	20	86	97	
0809:33	3A	00	00	00	00	20	F0	72	0A29:CE	60	14	AD	60	14	8D	01	89	0C59:0D	A9	0A	20	1C	0D	4C	3E	91	
0811:10	20	99	0E	A2	08	A0	09	C4	0A31:D4	4C	3A	0A	A9	80	8D	04	19	0C61:0C	A5	F8	F0	09	C6	F8	A9	16	
0819:18	20	F0	FF	A0	10	A9	56	4A	0A39:D4	A0	01	B1	FB	C9	20	D0	33	0C69:3C	85	F7	4C	3E	0C	A9	10	4A	
0821:20	1E	AB	A9	C0	8D	01	D0	E7	0A41:13	20	2F	0D	20	63	0D	AD	F3	0C71:8D	04	D4	20	2F	0D	A9	FF	EE	
0829:A9	E9	8D	F8	07	A9	00	8D	36	0A49:F8	07	C9	EC	F0	03	EE	F8	0E	0C79:20	1C	0D	20	45	0E	AD	5A	64	
0831:66	14	AD	00	DC	29	1F	C9	C2	0A51:07	4C	22	0A	C9	3B	D0	12	CF	0C81:14	D0	08	CE	5B	14	A9	3C	80	
0839:1E	F0	0B	C9	1D	F0	0F	C9	27	0A59:E8	A0	28	B1	FB	C9	20	D0	42	0C89:8D	5A	14	38	E9	05	8D	5A	DD	
0841:0F	D0	EF	4C	76	08	AD	66	65	0A61:09	20	2F	0D	20	63	0D	4C	AD	0C99:0E	A9	FF	20	1C	0D	20	1C	96	
0849:14	F0	E7	4C	56	08	AD	66	F5	0A71:54	14	C9	6C	F0	03	4C	92	73	0CA1:0D	20	2F	0D	A0	00	A9	20	77	
0851:14	C9	01	F0	DD	AD	66	14	93	0A79:0A	EE	53	14	B1	FB	8D	54	E6	0CA9:91	FD	CE	65	14	30	03	4C	ED	
0859:49	01	8D	66	14	A2	09	BD	61	0A81:14	20	2F	0D	20	63	0D	E0	E7	0CB1:90	08	20	3D	0E	A0	10	A9	A8	
0861:C1	05	49	80	9D	C1	05	BD	80	0A89:00	F0	03	4C	22	0A	4C	5A	2B	0CB9:3D	20	1E	AB	AD	00	DC	29	47	
0869:11	06	49	80	9D	11	06	CA	BC	0A91:0A	B1	FB	C9	3B	D0	15	E0	5B	0CC1:10	D0	F9	AD	00	DC	29	10	06	
0871:10	ED	4C	33	08	20	DF	0E	50	0A99:00	F0	03	4C	59	0A	A9	6C	C1	0CC9:F0	F9	20	45	0E	AD	61	14	2F	
0879:A9	00	8D	61	14	8D	62	14	D5	0AA1:8D	54	14	20	3A	0D	EE	63	5D	0CD1:8D	AC	10	AD	62	14	8D	AD	E4	
0881:A9	03	8D	65	14	A9	1E	8D	40	0AA9:14	4C	C3	0A	AD	53	14	F0	C7	0CD9:10	4C	15	08	AD	01	D0	C9	0D	
0889:5A	14	A9	01	8D	5B	14	A9	BC	0AB1:0E	20	2F	0D	B1	FB	8D	54	78	0CE1:C0	B0	16	18	69	08	8D	01	52	
0891:FF	8D	07	D4	A9	F0	8D	0D	6C	0AB9:14	20	63	0D	4C	C3	0A	4C	EE	0CE9:D0	20	2F	0D	A5	FB	69	28	41	
0899:D4	A9	00	8D	0C	D4	A9	0F	6D	0AC1:95	0C	98	48	8A	48	AD	63	6F	0CF1:85	FB	90	02	E6	FC	4C	46	08	
08A1:8D	18	D4	A9	C0	8D	01	D0	C2	0AC9:14	A8	38	ED	53	14	8D	63	61	0CF9:09	4C	B5	09	AD	01	D0	C9	CD	
08A9:A9	E9	8D	F8	07	AD	65	14	18	0AD1:14	CE	63	14	AC	53	14	88	B4	0D01:58	F0	F6	38	E9	08	8D	01	71	
08B1:18	69	30	8D	A8	07	20	86	2F	0AD9:C0	04	90	02	A0	04	B9	AE	B8	0D09:D0	20	2F	0D	A5	FB	E9	28	63	
08B9:0D	A2	17	A0	21	18	20	F0	80	0AE1:10	18	6D	61	14	8D	61	14	75	0D11:85	FB	B0	02	C6	FC	4C	46	2C	
08C1:FF	AE	AC	10	AD	AD	10	20	78	0AE9:90	03	EE	62	14	20	86	0D	46	0D19:09	A9	28	8D	56	14	A9	FF	56	
08C9:CD	BD	A9	30	20	D2	FF	AD	62	0AF1:68	AA	68	A8	20	BB	0D	20	A6	0D21:8D	55	14	CE	55	14	D0	FB	5F	
08D1:5A	14	85	F7	AD	5B	14	85	CC	0AF9:1A	0D	20	DA	0D	A5	FC	48	51	0D29:CE	56	14	D0	F6	60	98	48	82	
08D9:F8	A9	3C	85	F9	20	53	0E	B5	0B01:18	69	D4	85	FC	A0	00	B1	8C	0D31:A0	00	A9	20	91	FB	68	A8	C8	
08E1:20	E0	0D	AD	00	DC	29	10	8C	0B09:FB	8D	59	14	68	85	FC	AD	ED	0D39:60	A9	01	8D	55	14	A5	FC	2A	
08E9:D0	F6	20	E0	0D	AD	00	DC	2E	0B11:5C	14	8D	5E	14	AD	5D	14	18	0D41:48	A9	01	8D	55	14	A5	FC	2A	
08F1:29	10	F0	F6	AD	B1	07	8D	F7	0B19:8D	5F	14	AD	54	14	C9	6C	1E	0D49:AD	55	14	91	FB	68	85	FC	B4	
08F9:54	14	A9	32	8D	08	D4	A2	6A	0B21:D0	03	CE	5F	14	AD	5F	14	5A	0D51:AD	54	14	91	FB	E0	00	D0	27	
0901:05	A9	10	8D	0B	D4	A9	20	F9	0B29:F0	1F	20	2F	0D	38	A5	FB	07	0D59:05	EE	5D	14	D0	03	EE	5C	6B	
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0921:CA	D0	DE	A9	10	8D	0B	D4	E4	0B49:0B	AD	5E	14	F0	26	20	2F	EC	0D79:0D	38	E9	A5	20	30	0C	0D	A9	75
0929:AF	24	8D	63	14	A9	B2	85	33	0B51:0D	A5	FB	D0	02	C6	FC	C6	CF	0D81:08	20	1C	0D	60	48	8A	48	7D	
0931:FB	A9	06	85	FC	A9	00	85	D8	0B59:FB	AD	59	14	20	3C	0D	CE	20	0D89:98	48	A2	17	A0	6E	18	20	35	
0939:FD	A9	04	85	FE	A9	6C	8D	92	0B61:5E	14	AD	5E	14	C9	03	B0	C5	0D91:F0	FF	A2	01	8E	86	02	CA	E5	
0941:54	14	20	86	0D	A0	01	84	60	0B69:03	CE	F8	07	A9	08	20	1C	0E	0D99:86	C7	78	AE	61	14	AD	62	FB	
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0951:FD	A5	FB	85	FD	A5	FC	85	A9	0B79:14	A9	06	85	3E	CE	64	14	27	0DA9:D2	FF	A9	20	20	D2	FF	A9	5A	
0959:FE	A2	1F	C8	B1	FD	C9	20	3D	0B81:AD	64	14	30	5D	18	69	99	C4	0DB1:13	20	D2	FF	68	A8	68	AA	19	
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09A1:68	85	FE	8A	91	FD	8D	58	C9	0BC9:00	A9	20	91	3D	AD	64	14	E4	0DF9:69	03	8D	B1	DB	69	A5	8D	B3	
09A9:14	20	1A	0D	AD	63	14	D0	D5	0BD1:C9	05	D0	BE	A5	3D	18	69	CF	0E01:B1	07	60	A9	00	8D	00	D4	69	
09B1:03	4C	E6	0B	A5	02	10	03	3E	0BD9:28	85	3D	90	AD	E6	3E	4C	E7	0E09:8D	01	D4	A9	0F	8D	18	D4	15	
09B9:4C	95	0C	AD	8D	02	F0	17	21	0BEL:8B	0B	4C	4E	09	C6	02	AD	04	0E11:A9	2D	8D	05	D4	A9	A5	8D	75	
09C1:A9	02	8D	20	D0	A9	FF	85	8F	0BE9:54	14	CD	B1	07	F0	0B	AD	C3	0E19:06	D4	A9	21	8D	04	D4	A9	84	
09C9:02	AD	8D	02	D0	FB	A9	01	E4	0BF1:66	14	D0	03	4C	29	0C	4C	F5	0E21:07	8D	01	D4	A9	C8	20	1C	5E	
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09D9:00	DC	29	1F	C9	1D	F0	0B	E9	0C01:49	20	1E	AB	AD	61	14	18	77	0E31:20	1C	0D	20	1C	0D	A9	20	90	
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09E9:4C	F2	09	4C	DD	0C	4C	FD	7A	0C11:62	14	20	86	0D	A2	06	20	EA	0E41:18	4C								


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0E81:B0 05 A9 30 20 D2 FF A9 65
0E89:00 20 CD BD 68 8D 86 02 CB
0E91:68 AA 68 A8 18 4C F0 FF F7
0E99:A9 00 85 02 78 A2 AC A0 A3
0EA1:0E 8E 14 03 8C 15 03 58 32
0EA9:4C DA 0E EE 22 D0 A5 02 F4
0EB1:F0 24 30 22 C6 F9 D0 1E 55
0EB9:A5 F7 D0 0A A5 F8 F0 12 66
0EC1:C6 F8 A9 3C 85 F7 C6 F7 0A
0EC9:A9 3B 85 F9 20 53 0E 4C 90
0ED1:D7 0E A9 FF 85 02 4C 31 90
0ED9:EA A9 93 20 D2 FF A9 1E 52
0EE1:8D 18 D0 AD 11 D0 09 40 DD
0EE9:8D 11 D0 A2 01 8E 23 D0 AE
0EF1:CA 8E 20 D0 8E 21 D0 A9 6C
0EF9:E9 8D F8 07 A9 E8 A2 06 3A
0F01:9D F8 07 CA D0 FA A9 0C 8B
0F09:8D 27 D0 A9 00 A2 06 9D A0
0F11:27 D0 CA D0 FA 8D 1B D0 72
0F19:8D 1C D0 8D 1D D0 8D 17 56
0F21:D0 A9 7F 8D 15 D0 A2 10 1C
0F29:BD B3 10 9D 00 D0 CA 10 D7
0F31:F7 A9 13 20 D2 FF A9 0D 11
0F39:20 D2 FF 20 D2 FF A9 02 0A
0F41:8D 86 02 A9 00 8D 90 14 0E
0F49:20 8A 0F 20 8A 0F A0 12 E1
0F51:8C 90 14 20 8A 0F C8 C0 41
0F59:17 D0 F5 A0 09 A9 17 8D AA
0F61:90 14 20 8A 0F 88 D0 F5 AB
0F69:A0 11 8C 90 14 20 8A 0F FB
0F71:8C 90 14 20 8A 0F 20 8A D9
0F79:0F 20 8A 0F A9 0D 20 D2 FD
0F81:FF A9 C4 A0 10 20 1E AB 95
0F89:60 98 48 A9 20 A0 06 20 51
0F91:D2 FF 88 D0 FA A9 3B 20 4C
0F99:D2 FF 20 D2 FF A0 19 AE B5
0FA1:90 14 F0 0B A9 20 20 D2 BC
0FA9:FF 8E CE 0E 14 D0 F7 A9 4A
0FB1:3B 20 D2 FF 88 D0 FA A9 F6
0FB9:0D 20 D2 FF 68 A8 60 20 87
0FC1:2F 10 A9 09 A2 03 9D 67 05
0FC9:1A CA 10 FA A9 23 8D 8F DA
0FD1:14 AD 1B D4 29 03 AA BD 7E
0FD9:67 14 F0 F5 DE 67 14 8A 75
0FE1:AC 8F 14 99 6B 14 CE 8F 2F
0FE9:14 10 E6 A9 13 20 D2 FF 4C
0FF1:A9 11 A2 0B 20 D2 FF CA 45
0FF9:D0 FA A0 23 A9 0D 20 D2 1A
1001:FF A9 1D A2 19 20 D2 FF 48
1009:CA D0 FA A2 06 A9 12 20 67
1011:D2 FF B9 6B 14 18 69 03 5F
1019:8D 86 02 69 25 20 D2 FF C7
1021:88 30 05 CA D0 EC F0 D4 CF
1029:A9 13 20 D2 FF 60 A9 80 69
1031:8D 0F D4 8D 12 D4 A5 A2 21
1039:8D 0E D4 60 05 20 47 A1 BC
1041:4D 45 20 4F 56 45 52 00 BE
1049:05 42 4F 4E 55 53 20 31 B4
1051:30 30 30 21 00 9E 92 43 90
1059:48 4F 4F 53 45 20 53 4B 2D
1061:49 4C 4C 3A 0D 0D 1D 2F
1069:9C 1D 1D 1D 1D 1D 1D 49
1071:1D 1D 20 53 54 41 4E 44 29
1079:41 52 44 20 0D 0D 1F 1D 51
1081:1D 1D 1D 1D 1D 1D 1D A1
1089:20 41 44 56 41 4E 43 45 07
1091:44 0D 0D 0D 9E 1D 1D 1D 4A
1099:1D 1D 1D 1D 1D 1D 46 49 38
10A1:52 45 20 54 4F 20 50 4C 6D
10A9:41 59 00 00 00 05 0A 14 FC
10B1:28 50 5A C0 E0 92 F8 92 27
10B9:E0 A2 F8 A2 E0 B2 F8 B2 B2
10C1:00 00 00 9E 53 43 4F 52 64
10C9:45 3A 20 20 20 20 20 03
10D1:20 20 AC 3D 05 20 20 7C
10D9:20 9E 47 4F 41 4C 3A 20 5F
10E1:20 20 4C 41 53 54 3A 05 1D
10E9:20 20 20 20 20 20 00 A2 4C
10F1:00 BD 13 11 9D 00 38 BD 10
10F9:13 12 9D 00 39 BD 13 13 D5
1101:9D 00 3A CA D0 EB A2 40 A1
1109:BD 13 14 9D 00 3B CA 10 BD
1111:F7 60 3C 66 6E 6E 62 85
1119:3C 00 0C 0C 16 16 2E 23 24
1121:77 00 76 33 33 36 33 33 0D
1129:76 00 36 63 60 60 60 63 2C
1131:36 00 76 33 33 33 33 70
1139:76 00 77 31 30 36 30 31 84
1141:77 00 77 31 30 36 30 30 0C
1149:78 00 36 63 60 67 63 63 6F
1151:36 00 63 63 63 77 63 63 54
1159:63 00 3C 18 18 18 18 9F
1161:3C 00 0F 06 06 06 66 9E
1169:2C 00 73 36 3C 3E 37 F9
1171:73 00 78 30 30 30 31 33
1179:77 00 63 37 5F 4B 43 29
1181:43 00 61 71 39 5D 4E 47 AB
1189:43 00 36 63 63 63 63 1D
1191:36 00 76 33 33 36 30 30 D3
1199:78 00 36 63 63 63 63 D2
11A1:37 00 76 33 33 36 33 6D
11A9:7B 00 36 63 78 3E 0F 63 C4
11B1:36 00 7F 5D 1C 1C 1C 5A
11B9:3E 00 63 63 63 63 63 70
11C1:36 00 61 61 32 32 18 1C E7
11C9:08 00 61 61 61 6D 7E 77 67
11D1:63 00 63 36 1C 1C 36 96
11D9:63 00 62 62 34 34 18 18 DA
11E1:3C 00 7B 47 0E 1C 38 71 C8
11E9:6F 00 3C 30 30 30 30 21
11F1:3C 00 0C 12 30 7C 30 62 0B
11F9:FC 00 3C 0C 0C 0C 0C 97
1201:3C 00 18 18 18 18 7E 3C 22
1209:18 00 00 00 0C FE FE 0C 20
1211:08 00 00 00 00 00 00 39
1219:00 00 1C 1C 1C 1C 00 1C EF
1221:1C 00 66 66 66 66 00 B9
1229:00 00 66 66 FF 66 FF 66 80
1231:66 00 18 3E 60 3C 06 7C EB
1239:18 00 62 66 0C 18 30 66 A3
1241:46 00 3C 66 3C 38 67 66 6E
1249:3F 00 06 0C 18 00 00 4F
1251:00 00 00 00 3C 18 18 3C 24
1259:00 00 00 00 3C 3C 3C 05
1261:00 00 00 00 18 3C 3C 7E 2E
1269:00 00 00 00 18 3C 3C 18 CF
1271:00 00 FF 81 81 81 81 44
1279:81 FF 00 00 00 7E 00 00 58
1281:00 00 00 00 00 00 18 BD
1289:18 00 00 03 06 0C 18 30 AA
1291:60 00 36 63 63 63 63 B5
1299:36 00 18 38 18 18 18 C8
12A1:3C 00 6E 47 07 0E 1C 38 07
12A9:7F 00 6E 47 07 1C 07 47 CD
12B1:6E 00 06 16 36 66 77 06 6F
12B9:0F 00 7F 61 60 76 03 43 91
12C1:76 00 36 61 60 7E 63 63 25
12C9:36 00 7F 43 06 0C 18 BD
12D1:18 00 36 63 63 36 63 63 1D
12D9:36 00 36 63 63 3F 03 43 77
12E1:36 00 00 00 18 00 00 18 F9
12E9:00 00 00 7F 7F 7F 00 F7 F7
12F1:F7 F7 0E 18 30 60 30 18 CE
12F9:0E 00 00 00 7E 00 7E 00 16
1301:00 00 70 18 0C 06 0C 18 5F
1309:70 00 3C 66 06 0C 18 00 E5
1311:18 00 01 01 01 01 01 01 82
1319:01 01 01 01 01 01 01 3F
1321:01 01 01 01 01 01 01 FF 46
1329:FF FF 01 01 01 01 01 01 5E
1331:01 01 01 01 01 01 01 57
1339:01 01 01 01 01 01 01 FF 5E
1341:FF FF 00 00 00 00 00 00 67
1349:00 00 00 00 00 00 00 6F
1351:00 01 00 00 00 00 00 00 B7
1359:00 00 40 00 00 00 00 01 0C
1361:E0 00 03 60 00 03 E0 00 2C
1369:07 80 00 07 C0 00 07 C0 78
1371:00 03 C0 00 03 E0 07 FB 16
1379:E0 1F FD F0 3F FD F0 7F F9
1381:FF F0 7F FF F0 77 FD E0 16
1389:3B FB C0 1C 07 80 36 06 D2
1391:00 00 00 00 00 00 00 00 B7
1399:00 00 00 00 00 78 00 00 A1
13A1:D8 00 01 F8 00 03 B0 00 51
13A9:03 C0 00 03 C0 00 03 C0 7E
13B1:00 03 C0 00 01 C0 07 F9 C3
13B9:E0 1F FD E0 3F FD F0 7F 39
13C1:FF F0 7F FF E0 77 FD E0 D5
13C9:3B FB C0 1C 07 80 36 06 13
13D1:00 00 00 00 00 00 00 00 F7
13D9:00 00 00 00 00 70 00 00 C1
13E1:F8 00 01 EC 00 01 FC 00 71
13E9:03 B0 00 03 C0 00 03 C0 BA
13F1:00 03 C0 00 03 C0 07 FB 16
13F9:C0 1F FD C0 3F FD E0 7F 47
1401:FF E0 7F FF E0 77 FD E0 13
1409:3B FB C0 1C 07 80 36 06 54
1411:00 00 00 00 00 00 00 39
1419:00 00 00 00 00 00 00 41
1421:70 00 00 F8 00 01 EC 00 EE
1429:03 FC 00 03 D8 00 07 80 97
1431:00 07 80 00 07 80 07 FB 6F
1439:C0 1F FD C0 3F FD E0 7F 88
1441:FF E0 7F FF E0 77 FD E0 53
1449:3B FB C0 1C 07 80 36 06 94
1451:00 00 00 00 00 00 00 79

```

Arthur Moore lives in Orlando, Florida, and this is his first game in machine language. He wrote *Labyrinth Adventure*, a bonus on the June 1991 *Gazette* Disk. □

RPG CODEBUSTER

George Kouba

Are you tired of slaying that same goblin time and again as you try to develop enough experience points to advance in your favorite role-playing game (RPG)? Does your character get killed every time you try to collect a little treasure or booty as you explore those mysterious dungeons?

At their best, multicharacter role-play-

ing games offer suspense, intrigue, and that good old sense of wonder. At their worst, these games become an exercise in mind-numbing tedium as you slowly amass experience points.

If you're into these games, there's hope! I recently spent an enjoyable stint sloshing around a certain subaquatic castle I probably wouldn't have seen for weeks, if ever, in the normal course of events. A judicious bit of character editing on my part provided the shortcut to increase my gaming enjoyment. Now you, too, can edit many, if not all, RPG characters to your own benefit.

Noble Cheating

It may not be entirely fair to the spirit of the game, but it's your time and your computer. If your character bogs down in an RPG because of lack of experience, take this shortcut and get into the real plot and high points of these games.

When you play most RPGs, you have to supply a blank disk in order to save a game. As you've probably gathered, your characters' stats are recorded on this disk often during play and always when the game is saved. In many cases it is possible to isolate that data and modify it for extra lives, increased power, and more experience points that will help you in the game.

To experiment with this editing process, you'll need your character disk, at least one blank disk for a backup, a copy program to make the backup (your RPG may include this utility), a disk editor program, and a copy of *RPG Codebuster*.

Typing It In

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

The Purpose

RPG Codebuster facilitates your attempts at character editing in three ways. First, the program converts your character statistics from decimal numeric quantities to the hexadecimal form most likely to be displayed as disk bytes. This shows you what to look for

in the character block and what to change with the disk editor. Second, the program converts the character's name into ASCII, one of the more common forms of disk storage.

Finally, *RPG Codebuster* attempts to locate the particular block (track and sector) on the disk that contains the character data that you'll want to edit. This search works with some but not all RPG character disks. Games that save the character's name as part of their statistics are the games compatible with the *Codebuster* character trap routines.

Easy Cases and Hard Ones

Character disks may contain a massive amount of game data along with the character stats, or they may only save game position and statistics. Whichever type of character disk you have, it may be categorized as an easy case or a hard case.

Easy cases store character data in blocks of relatively neat organization, each containing the character's name in some variation. Hard cases use complex programming techniques to store data much more indirectly, in essence masking or hiding data among the disk's sectors.

The following process for character editing works with the easy cases. Fortunately, many character disks for even the biggest and baddest RPGs use this storage technique. You won't be able to tell whether your disk is easy or hard until you attempt to find the character block.

Step by Step

Let's go through the RPG character-editing procedure step by step. First, load your game and play it just long enough to bring up a display of your characters' statistics. Write down their most vital statistics: experience points, hit points, level, and money (gold). Stop playing now. Save the game, remove your disk, and turn off the computer so these statistics will not be altered.

Next, make a backup copy of that character or play disk. Disk editing of this sort involves a bit of detective work and trial and error, so you don't want to lose your current saved game should you damage some data field.

Translate to Hex

Even if you were to select the correct track and sector and look at that area with your disk editor, chances are that you'd only see incomprehensible gibberish. Not only would the stats not be in evidence, but the character name would probably not be visible as such (even in the character translation columns to the right of the hex dump in a Commodore disk editor). Stats are stored in byte form as quantities in the hexadecimal numbering system, and names may be stored in a variety of display and print codes, not all of which are immediately translatable.

In order to be able to identify the stats you want to find and change in the disk sector and in order to know the most probable byte form of your character's name (most likely standard ASCII), you'll need *RPG Codebuster*.

Hexadecimal, of course, is the number system based on powers of 16. In our everyday decimal system, we use the digits 0-9 to represent tens, hundreds, and so on. In hex, digits include the numerals 0-9 plus the letters A-F, which represent 10-15. Higher-order hex digits in multidigit quantities represent sixteens and successive powers thereof.

However familiar you may be with hex, save yourself the math and use Convert Character Stat to Hex from the *Codebuster* menu. Type in your character stat at the prompt. The hex bytes, including the likely left-to-right order in which they might be stored on disk, will be returned to you. Copy these down so you'll know what to look for when you edit your disk.

Note that while the higher-order hex digits in one byte are stored to the left of the lower-order digits as in decimal, the overall order of the bytes that total to make up your stat will probably be stored with the lower-quantity bytes on the left and the higher ones on the right. You can ignore excess 0s to the right of your translated result.

Repeat this process for the important stats of your character(s). Also, choose Convert Name to Probable Bytes from the menu. Enter the name and jot down the probable disk bytes that will equal this name in the disk sector. There is a good chance that the alphabetical bytes on your disk will actual-

ly be slightly different. The second letter, however, will almost certainly be the same as the second digit in each byte. This is because different games may use standard ASCII, PETSCII, screen characters, a mixture of upper- and lowercase, or even a customized character set to store the letters in the name. Luckily, all these variations usually have that second digit in common, which should make the name recognizable enough for you to track down. That's the next step.

Find Character's Sector

Somewhere on your data disk are your character's stats, usually stored with the character name. Because disks of this type are commonly crammed with other miscellaneous game data, finding the sector which holds your character stats is half the battle.

Complicating matters further is the fact that many variations of alphabetical coding may be used to store these names, as mentioned above. Also, some names will be "left-justified" in the lines of data in a sector, while some names will be embedded further toward the center of the sector. Scanning the sectors with a disk editor may or may not be of much help here, as the character name may not actually be displayed in the character translation columns.

One idea is to print out the contents of the various tracks sector by sector. A properly configured printer with a good interface can show both ASCII and PETSCII and may reveal the tell-tale character names alongside the sectors. A program, such as *Display T&S* from the Commodore disk drive manual, modified to loop will allow you to do this. This method, however, requires a lot of time and miles of fanfold paper.

With luck, *RPG Codebuster* can do this onerous chore for you, telling you the exact track and sector where the character data probably is stored. Note: If you find your first character, you've probably found the rest of your party; simply scan the following sectors in that vicinity.

To search every byte in every sector, translating data and comparing strings, would be exhausting. Therefore, I have narrowed the search subprograms to the most likely sector loca-

tions. In fact, I have included options to customize hunting for the names of your RPG characters on the disk.

Traps

First, choose Find Character Disk Block and then Left Justified Character Trap from the *Codebuster* options. Type in the name of your game party's first character at the prompt and press Return. You'll also be asked if you wish to change the sector range default. Answer N for no for a quicker search (12 sectors per track). Answering Y will cause the program to search all sectors of the tracks, if needed. Since there are 35 tracks on a disk, specifying suitable starting and ending tracks can save time. Some possible ranges to try are suggested onscreen. Character data, like data in most programs, often appears toward the end of the disk contents.

The trap subprogram will report on the success or failure of the search for character track and sector. The traps search the most likely sector lines (first, second, and eighth) for an occurrence of the name. If your names apparently are not left-justified in relation to sector data, try the Running (Embedded) Trap option. While this routine takes longer to execute, it checks more bytes for any embedded names on those likely lines.

A third option, Party Initial Trap, looks for a series of leading initials at full- or half-block intervals. This may even help locate hard-case data, since tough-coded disks often have these initials as the first bytes in sectors that otherwise appear scrambled.

Experiment with variations of the initial trap if other traps don't succeed. It may be helpful to type in the initials of only the first two or three party names in order, since character sectors are sometimes separated by intervals of a few data blocks. There's a chance that the initial trap may find a series of bytes which by coincidence contain the same letters but are not the data blocks you want. (FastLoad cartridges may adversely affect the success of this routine. If you have no luck, try it again with any cartridges removed.)

If you still have trouble finding the characters, try renaming any default-named game characters or creating a

uniquely named character in the lead position. Get the new entity on your saved-game backup and repeat the search. You may find that some sectors are not be what they seem. There are inactive character blocks on some disks (more on this shortly). If the coding is a true hard case, decipher at your own discretion, and good luck! Fortunately, even many of these sectors are editable. On the other hand, if they are too tough to edit, they may let you transfer powerful characters from another RPG that is editable!

Edit Data

Now you're ready to edit those stats with your disk editor. Get your editor up and running, and put your backup character disk in the drive. Go directly to the track and sector where your character was found and scan the data for the hexadecimal pairs you jotted down when you converted your character stats. For example, let's say your character Quixilva, from *Minstrel's Saga III*, has 1127 (67 04) experience points and 907 (8B 03) gold. The easy-case sector would look something like the listing below.

```
Track 27, Sector 2
51 55 49 58 49 4C 4C 56
41 00 00 00 00 00 00 00
00 00 00 67 04 00 8B 03
```

Note that the 40-column limit of the 64 causes most disk editors to break a 16-byte sector line into two 8-byte rows. There is a small chance that the bytes as translated by *Codebuster* will appear reversed, 03 8B, for example, rather than 8B 03. Either way, move the cursor to that matching stat field and change bytes, as the editor allows. One quick way to raise the stats is to change each of the bytes to FF. This gives you the highest possible quantity in that field. If you desire a specific quantity, convert using the stat conversion option from *RPG Codebuster*, and you'll know what to insert.

One concern here is the size of the data field. If there is another pair of 0s or similarly formatted bytes to the right (left, in case of reversed bytes) of the data now in the field, chances are that you can increase the stat even more. First, though, stick with changing the

PROGRAMS

bytes that you know represent your stats. Also, you may want to jot down the bytes that you changed and their original values in case you have to change them back after this initial experiment in editing.

Test Your Changes

Now, boot up your RPG and play the game. Go to the character stats display and observe whether your editing changes took. With a little luck, you'll immediately see your powered-up character points. If the changes are not reflected in the game, you have either changed the wrong data field or stumbled upon an inactive character block.

An inactive block is a sector which holds character data similar to that used in the saved game but which is not being used by the game. This happens when a character has been removed from the party during a play session or just because the game keeps a duplicate roster block of all possible characters before their entry into the current game.

If your editing doesn't seem to have any effect, check your data fields with the disk editor and change (or change back) any fields which might have stored duplicate bytes in the block. If the changed stats still don't show in the game, you must have an inactive block. You'll have to search a different range of tracks and sectors for the active sector. If you suspect the active block is in the same track and need to start a character trap in *RPG Codebuster* with a sector other than 0 (the sector following the inactive one), you can easily modify line 600 in the program to read `S = N`, with `N` being the sector desired. Note: Editing an inactive block may prove fruitful, as you can add that powered-up character to your party later.

Extra Power

After your initial changes have taken, you may want to see if you can boost the stats even higher by typing over bytes outside the known data field. Try this by filling the first byte to the right (left, for reversed bytes) with `FF`. Then boot your game and see if the change took. If it didn't, you'll know that that byte is not meant to be part of the

stat; you can change the byte back, if you wish, with your disk editor.

If your RPG is the type of game that requires you to visit a particular guild or headquarters to gain new levels and skills, simply changing the experience and gold/cash fields is probably all the editing you'll need to do. In this sort of game, just visit that guild or temple after your editing and get your ranks amply rewarded.

In a game that automatically raises levels at certain points after battles, you may want to change the data fields holding hit points, level number, and so on. It will require a bit of logic to edit the sector(s) to your satisfaction, depending on the game structure. In fact, you may want to reedit at certain points if your characters change class or require a boost to their magic points, gold, and the rest.

Don't worry about spoiling your game by making it too easy. If the role-playing game is worth its salt, there will still be plenty of challenging puzzles, mazes, and monsters to deal with. At least now you'll have half a chance to make some headway. Remember that all `FFs` are always nice for a quick edit. Happy venturing!

RPG CODEBUSTER

```
MM 5 REM COPYRIGHT 1992 - COMP
    UTE PUBLICATIONS INTL LTD
    - ALL RIGHTS RESERVED
JP 10 DIM BY$(15),CM$(15)
PR 20 PT$=" ABCDEFGHIJKLMNOPQR
    STUVWXYZ0123456789'-#&"
SF 30 AS$="2041424344454647484
    94A4B4C4D4E4F50515253545
    5565758595A"
CQ 40 SC$="3031323334353637383
    9272D23":AS$=AS$+SC$
HX 50 HX$="0123456789ABCDEF"
MH 60 PRINT"INSERT CHARACTER D
    ISK, PRESS A KEY..."
BA 70 GETAS:IFAS$=""THEN GOTO 7
    0
HA 80 OPEN 15,8,15,"I"+"0"
FJ 90 OPEN 2,8,2,"#&"
XX 100 PRINT"RPG CODEBUSTER":P
    RINT"RUN/STOP TO QUIT.
    {SPACE}OPTIONS:"
KH 110 PRINT:PRINT:PRINT"(1) C
    ONVERT CHARACTER STAT T
    O HEX"
DG 120 PRINT:PRINT:PRINT"(2) C
    ONVERT NAME TO PROBABLE
    BYTES"
MB 130 PRINT:PRINT:PRINT"(3) F
```

```
IND CHARACTER DISK BLOC
    K"
HJ 140 GETAS:IF AS$="1" OR AS$="
    2" THEN GOTO 160
RQ 150 IF AS$<>"3" THEN GOTO140
FR 160 IF AS$="1" THEN GOSUB 13
    20
BM 170 IF AS$="1" THEN GOTO 100
DC 180 IF AS$="2" THEN GOTO 330
FS 190 PRINT"CHOOSE METHOD A,B
    OR C:"
EG 200 PRINT:PRINT:PRINT"(A) L
    EFT JUSTIFIED CHARACTER
    TRAP"
KP 210 PRINT:PRINT:PRINT"(B) R
    UNNING (EMBEDDED) CHARA
    CTER TRAP"
KM 220 PRINT:PRINT:PRINT"(C) P
    ARTY INITIAL TRAP"
HE 230 GETAS:IF (AS$<>"A"ANDAS$<>
    "B")AND AS$<>"C" THEN GO
    TO230
AF 240 FL=1:IF AS$="B" THEN FL=
    0
QG 250 IF AS$="C" THEN FL=3:L1$
    ="":L2$="" :L3$="" :I$=""
CR 260 SF=0:PRINT:PRINT:PRINT"
    CHANGE SECTOR RANGE DEF
    AULT (Y OR N)?"
FR 270 GETAS:IFAS$<>"Y" AND AS$<
    >"N" THEN GOTO270
MD 280 IF AS$="Y" THEN SF=1
AH 290 IF FL<>3 THEN GOTO330
EC 300 PRINT"TYPE PARTY FIRST
    {SPACE}INITIALS"
QB 310 INPUT"IN ORDER, NO SPAC
    ES";RP$
FH 320 GOTO340
KQ 330 INPUT"TYPE YOUR CHARACT
    ER'S NAME, THEN RETURN"
    ;RP$
HE 340 FORJ=1TO15
RK 350 H$=MID$(RP$,J,1):FORT=1
    TO40:IF H$=MID$(PT$,T,1
    ) THEN I=2*T-1:T=41
RJ 360 NEXT
AF 370 CM$(J)=MID$(AS$,I,2)
FJ 380 IF CM$(J)="20" THEN GOT
    O410
HE 390 IF MID$(CM$(J),1,1)="3"
    AND AS$<>"2" THEN CM$(J
    )="5"+MID$(CM$(J),2,1)
JK 400 IF MID$(CM$(J),1,1)="2"
    AND AS$<>"2" THEN CM$(J
    )="4"+MID$(CM$(J),2,1)
CM 410 IF FL=3 THEN I$=I$+CM$(
    J)
FF 420 IFJ=LEN(RP$)THEN J=16
QQ 430 NEXT
GX 440 IF AS$<>"2" THEN GOTO510
AH 450 BY$=""
HM 460 FORK=1TOLEN(RP$)
CK 470 BY$=BY$+CM$(K):BY$=BY$+
    "" :NEXT
HE 480 PRINT"PROBABLE DISK BYT
    ES FOR NAME:"
XG 490 PRINT" ";BY$
HX 500 GOTO100
```



```

HG 510 PRINT"POSSIBLE HOT TRAC
KS - 27-30,17-20"
KG 520 INPUT"WHICH STARTING TR
ACK";T
MR 530 INPUT"WHICH ENDING TRAC
K";ET
RX 540 IF T<1 OR T>35 THEN GOT
O520
BJ 550 IF ET<1 OR ET>35 THEN G
OTO520
HF 560 IF T>ET THEN GOTO520
JJ 570 PRINT"THIS TAKES A WHIL
E -- "
BC 580 PRINT"CURRENT TRACK AND
SECTOR"
DB 590 PRINT"{4 SPACES}BEING E
XAMINED:"
QB 600 S=0
QE 610 PRINT#15,"U1:2,"0;T;S
XM 620 PRINT#15,"B-P:2,1"
AS 630 PRINT#15,"M-R"CHR$(0)CH
R$(5)
MP 640 GET#15,BY$(0):IF BY$(0)
="" THEN BY$(0)=CHR$(0)
SC 650 F=1
JJ 660 PRINT"{7 SPACES}";T;S
QA 670 FORC=0TO8
PE 680 FORD=F*TO15
MP 690 GET#2,BY$(D)
DA 700 IF BY$(D)="" THEN BY$(D
)=CHR$(0)
HP 710 NEXT D:F=0
AH 720 NM=1
RX 730 IF C=0 OR C=1 THEN GOTO
750
QQ 740 IF C<>8 THEN NM=0:GOTO1
090
CM 750 BY$=""
BQ 760 FORD=0TO15
QS 770 BN=ASC(BY$(D))
JD 780 N1=INT(BN/16)
MG 790 B1$=MID$(HX$,N1+1,1)
JS 800 N2=INT(BN-16*N1)
SE 810 B2$=MID$(HX$,N2+1,1)
AC 820 FORK=2TO18STEP2
RM 830 IF B1$=MID$(HX$,K,1) TH
EN B1$="5"
SG 840 NEXT
KC 850 IF B1$<>"5" THEN B1$="4
"
EG 860 BY$=B1$+B2$
JQ 870 IF BY$="40" THEN BY$="2
0"
QP 880 IF FL=0 THEN GOTO920
PE 890 IF CM$(D+1)<>BY$ THEN N
M=0
HS 900 IF FL=1 AND NM=0 THEN D
=16:GOTO990
PC 910 IF D=LEN(RP$)-1 THEN D=
16:GOTO990
PF 920 BY$(D)=BY$
CX 930 IF FL<>3 THEN GOTO990
SF 940 NM=0
DP 950 IF C=0 THEN L1$=L1$+BY$
:GOSUB1590
HA 960 IF C=1 THEN L3$=L3$+BY$
:GOSUB1590
HB 970 IF C=0 OR C=8 THEN L2$=

```

```

L2$+BY$:GOSUB1590
HF 980 IF FL=3 THEN D=16
JC 990 NEXTD
QC 1000 IF FL=1 OR FL=3 THEN G
OTO1090
QK 1010 FORD=0TO15-LEN(RP$):NM
=1
DR 1020 IF BY$(D)<>CM$(1) THEN
GOTO 1070
MS 1030 FORK=1TOLEN(RP$)-1
XM 1040 IF BY$(D+K)<>CM$(K+1)
{SPACE}THEN NM=0
JD 1050 NEXT
PG 1060 IF NM=1 THEN D=16:GOTO
1080
BJ 1070 IF D=15-LEN(RP$) THEN
{SPACE}NM=0
DF 1080 NEXT
DA 1090 IF NM=1 THEN C=9
FF 1100 NEXT
DS 1110 IF NM=1 THEN GOTO1220
FD 1120 S=S+1:GOSUB1150
MS 1130 IF T>ET THEN GOTO1290
AF 1140 GOTO610
RP 1150 IF SF=0 THEN SL=12:GOT
O1200
BA 1160 IF T<18 THEN SL=20:GOT
O1200
XJ 1170 IF T<25 THEN SL=18:GOT
O1200
JM 1180 IF T<31 THEN SL=17:GOT
O1200
JM 1190 IF T<35 THEN SL=16
DA 1200 IF S>SL THEN S=0:T=T+1
:L1$="" :L2$="" :L3$=""
JM 1210 RETURN
XJ 1220 PRINT RP$ FOUND -"
EC 1230 PRINT"TRACK, SECTOR:";
T;S
RG 1240 PRINT"MORE RPG CODEBUS
TING? (Y OR N)"
GQ 1250 GETA$:IF A$="" THEN GO
TO1250
CK 1260 CLOSE 15,8,15:CLOSE 2,
8,2
AG 1270 IF A$="Y" THEN GOTO 60
MA 1280 END
GK 1290 PRINT RP$;" NOT YET FO
UND..."
MP 1300 CLOSE 15,8,15:CLOSE 2,
8,2
RR 1310 GOTO 60
KC 1320 FORD=0TO7:BY$(D)="0":N
EXT
RH 1330 PRINT "NO COMMAS, PLEA
SE..."
BM 1340 INPUT"CHARACTER STAT";
CS
AJ 1350 IF CS>268435456 THEN P
RINT"FIGURE TOO LARGE
{SPACE}FOR ROUTINE":RE
TURN
DH 1360 IF CS=268435456 THEN B
Y$(6)="1":GOTO1500
CH 1370 IF CS=16777216 THEN BY
$(7)="1":GOTO1500
DM 1380 IF CS>16777216 THEN DV
=16777216:D=7:GOSUB155

```

```

0
HA 1390 IF CS=1048576 THEN BY$
(4)="1":GOTO1500
FC 1400 IF CS>1048576 THEN DV=
1048576:D=4:GOSUB 1550
EB 1410 IF CS=65536 THEN BY$(5
)="1":GOTO1500
DB 1420 IF CS>65536 THEN DV=65
536:D=5:GOSUB 1550
RR 1430 IF CS=4096 THEN BY$(2)
="1":GOTO1500
CD 1440 IF CS>4096 THEN DV=409
6:D=2:GOSUB1550
BQ 1450 IF CS=256 THEN BY$(3)=
"1":GOTO1500
QQ 1460 IF CS>256 THEN DV=256:
D=3:GOSUB1550
XR 1470 IF CS=16 THEN BY$(0)="
1":GOTO1500
CC 1480 IF CS>16 THEN DV=16:D=
0:GOSUB1550
MK 1490 BY$(1)=MID$(HX$,CS+1,1
)
AD 1500 BY$(0)=BY$(0)+BY$(1):B
Y$(1)=BY$(2)+BY$(3)
JX 1510 BY$(2)=BY$(4)+BY$(5):B
Y$(3)=BY$(6)+BY$(7)
QR 1520 PRINT"PROBABLE FORM OF
CODED STAT IN BLOCK:"
HS 1530 PRINT BY$(0),BY$(1),BY
$(2),BY$(3)
DA 1540 RETURN
MF 1550 Q=CS/DV:Q=INT(Q)
JJ 1560 BY$(D)=MID$(HX$,Q+1,1)
GH 1570 CS=CS-DV*Q
XF 1580 RETURN
XE 1590 IF L1$=I$ THEN NM=1
GF 1600 IF L2$=I$ THEN NM=1
KP 1610 IF L3$=I$ THEN NM=1
QX 1620 IF NM=1 THEN C=9:RETUR
N
BA 1630 IF LEN(L1$)=LEN(I$) TH
EN T$=L1$:GOTO1670
MR 1640 IF LEN(L2$)=LEN(I$) TH
EN T$=L2$:GOTO1670
CK 1650 IF LEN(L3$)=LEN(I$) TH
EN T$=L3$:GOTO1670
XQ 1660 GOTO1740
DD 1670 FORK=3TOLEN(T$)-1STEP2
:W=LEN(T$)-(K-1):T2$=R
IGHT$(T$,W):V=LEN(T2$)
CM 1680 IF T2$=MID$(I$,1,V)THE
NK=LEN(T$)
SR 1690 NEXT
RC 1700 IF MID$(T2$,1,2)<>MID$
(I$,1,2) THEN T2$=""
CH 1710 IF LEN(L1$)=LEN(I$) TH
EN L1$=T2$:GOTO1740
XD 1720 IF LEN(L2$)=LEN(I$) TH
EN L2$=T2$:GOTO1740
MX 1730 IF LEN(L3$)=LEN(I$) TH
EN L3$=T2$
HX 1740 RETURN

```

George Kouba lives in Madison Heights, Michigan. □

THE AUTOMATIC PROOFREADER

Philip I. Nelson

The *Automatic Proofreader* helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in *Proofreader* exactly as listed. Because the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy before running it.

Next, type RUN and press Return. After the program displays the message *Proofreader Active*, you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, *Proofreader* displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, the line probably was typed correctly. If not, check for your mistake and correct the line.

Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. Spaces inside quotes are almost always significant, so the program pays attention to them.

Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can still check the line by listing it, moving the cursor back to the line, and pressing Return.

If you're using *Proofreader* on the 128, do not perform any GRAPHIC commands while *Proofreader* is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the *Proofreader*—to another memory area, causing *Proofreader* to crash. The same thing happens if you run any program with a GRAPHIC command while *Proofreader* is in memory.

Though *Proofreader* doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. To disable it, turn the computer off and then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64).

```
AS 0 CLR
KK 10 VE=PEEK(772)+256*PEEK(773):LO=43:HI=44:PRINT"
```

```
{CLR}{WHT}AUTOMATIC PROOFREADER FOR ";
EB 20 IF VE=42364 THEN PRINT "64"
AA 30 IF VE=17165 THEN LO=45:HI=46:GRAPHIC CLR:PRINT"128"
KK 40 SA=(PEEK(LO)+256*PEEK(HI))+6:FOR J=SA TO SA+166:READ B:POKE J,B:CH=CH+B:NEXT
QF 50 IF CH<>20570 THEN PRINT {SPACE}"*ERROR* CHECK TYPING IN DATA STATEMENTS":END
PD 60 FOR J=1 TO 5:READ RF,LF,HF:RS=SA+RF:HB=INT(RS/256):LB=RS-(256*HB)
XB 70 CH=CH+RF+LF+HF:POKE SA+LF,HB:POKE SA+HF,HB:NEXT
SB 80 IF CH<>22054 THEN PRINT {SPACE}"*ERROR* RELOAD PROGRAM AND CHECK FINAL LINE":END
PH 90 IF VE=17165 THEN POKE SA+14,22:POKE SA+18,23:POKE SA+29,224:POKESA+139,224
JS 100 POKE SA+149,PEEK(772):POKE SA+150,PEEK(773):PRINT"{CLR}PROOFREADER ACTIVE"
FA 110 SYS SA:POKE HI,PEEK(HI)+1:POKE (PEEK(LO)+256*PEEK(HI))-1,0:NEW
PS 120 DATA120,169,73,141,4,3,169,3,141,5,3,88,96,165,20,133,167
PS 130 DATA165,21,133,168,169,0,141,0,255,162,31,181,199,157,227
XS 140 DATA3,202,16,248,169,19,32,210,255,169,18,32,210,255,160
JC 150 DATA0,132,180,132,176,136,230,180,200,185,0,2,240,46,201
XJ 160 DATA34,208,8,72,165,176,73,255,133,176,104,72,201,32,208
GM 170 DATA7,165,176,208,3,104,208,226,104,166,180,24,165,167
KH 180 DATA121,0,2,133,167,165,168,105,0,133,168,202,208,239,240
RM 190 DATA202,165,167,69,168,72,41,15,168,185,211,3,32,210,255
BR 200 DATA104,74,74,74,168,185,211,3,32,210,255,162,31,189
RM 210 DATA227,3,149,199,202,16,248,169,146,32,210,255,76,86,137
HJ 220 DATA65,66,67,68,69,70,71,72,74,75,77,80,81,82,83,88
XR 230 DATA 13,2,7,167,31,32,151,116,117,151,128,129,167,136,137
```

ONLY ON DISK

Here are the *Gazette Disk* bonuses.

Hacker Helper

Daniel Lightner
Sidney, MT

Wouldn't it be great to have the 64's memory locations, PEEK and POKE addresses, and similar material stored in the computer, ready to call up when needed?

Hacker Helper provides 13 coding reference screens for 64 BASIC in seven categories: Screen, Sprites, Sound, Graphics, Input/Output, Odds & Ends, and Key Words. Call these reference screens without disturbing your BASIC program.

Future Lock

Danny English
Moreno Valley, CA

Robot patrols have locked city exits and are attacking innocent people. Now, it's your turn to fight back.

Armed with nine bombs and a geniuslike knowledge of computers, you set out to locate and repair the computer malfunction that has caused the robots to mutiny. This fast-paced machine language game for the 64 requires a joystick.

Gazette Gallery

Picture of the Month
"Springtime"
By Jack Modjallal
Encino, CA

"Highland Beast"
By Brian Kissinger
Evansville, IN

"Sailing"
By John Green
Freeport, NY

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.

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'COHORT' from **IMPRESSIONS** is an unusual wargame using a miniatures style interface to cover combat between roman legions & their enemies. Features animated combat & movement, 7 unit types, infantry, cavalry, & archers, user definable army composition, 4 different maps, scenario builder, stop & give orders real time combat, 256 color VGA, & sound board support. **\$34**



'NEMESIS GO VER 5' from **TOYOGO** is the ultimate computer GO program. With the simplicity of checkers and the complexity of chess, GO is both an enjoyable recreation and a serious strategy game. GO MASTER is a basic GO player and tutor. JOSEKI GENIUS adds complex corner openings. TACTICAL WIZARD is the ultimate tutor offering in depth tactical analysis. GO is 4000 years old. **\$39**

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Space Wars	\$37
Speedball	\$12
Speedball 2	\$27
Stellar 7	\$21
Stormlord	\$15
Super Off Road	\$15
Super Pac Man	\$9

'DOLPHIN SAILING SIMULATOR'

from **DOLPHIN MARINE SYSTEMS** is a realistic sailing adventure. You may choose from four different sailboats, raise or lower sails to adjust for wind conditions, view the area in cockpit or binocular view. Expand your system with the following voyage disks: San Francisco, Long Island, California, Vancouver, New England, Florida, Chicago. **\$39**



'GEMINI JOYSTICK' from **DAN AMERICA** is the first joystick for videogame machines and PCs. A Champ testing disk is included for checking PC configuration. Features include dual-axis trim adjusters for accurate and stable cursor control, high speed autofire, and auto-centering. One joystick switches between PC or the following: Turbo Grafx 16, Genesis, or Nintendo. **\$24**

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Midwinter 2	\$29
Vengeance of Excalibur	\$32
Windwalker	\$28
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Wizardry 4	\$19
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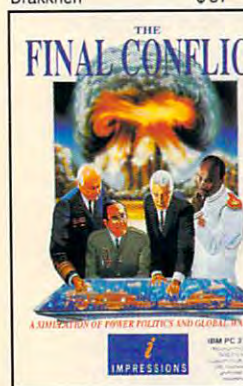
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Blockout	\$28
Brain Blaster	\$28
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Budokan	\$17
Colorado	\$9
Continuum	\$32
Crackdown	\$19
Crossbow	\$29
Dark Century	\$29
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D Generation	\$32
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Wizardry 4	\$19
Wizardry 5	\$32
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PT 109	\$15
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Red Baron VGA	\$36
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'FINAL CONFLICT' from **IMPRESSIONS** is a strategy game of power politics & global warfare. Allocate resources. Build factories and control food production. Produce armies, tanks, ships, & missiles. Send out spies & conduct diplomacy to uncover military secrets & win allies. Features 95 countries, nuclear winter, optional arcade missile sequence, entirely icon driven. **\$34**



'HYPERSPEED' from **MICROPROSE** is a combination 3D space combat simulator and roleplaying game. Pilot a complex starship armed with fighters, kamikaze ships, plasma canon and remote probes. Conduct deep space diplomacy, negotiate with dozens of alien races, make alliances and treaties, each alien race responds according to its own customs and hidden agendas. **\$39**

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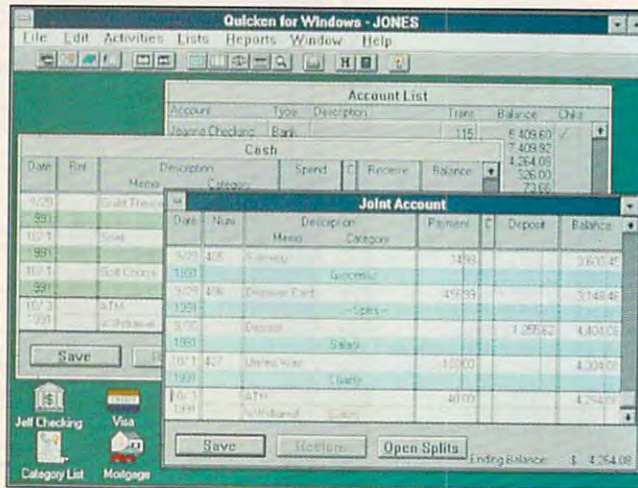
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Red Baron VGA	\$36
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QUICKEN FOR WINDOWS

In the early 1980s, one of the most persuasive arguments against home computers was the existence of computerized checkbook programs—they were so complicated that only computer jocks and accountants could figure them out. These days, home-finance programs are much easier to use and can do a lot more than balance your checkbook. The best-selling program of its kind, *Quicken for Windows* lets you work with multiple accounts, pay your bills electronically, track your stocks and investments, and create year-end tax reports—all for just \$69.95.

So how do you improve a program that offers nearly every feature under the sun for a ridiculously low price? You create a *Windows* version. *Quicken for Windows* has all the features of the DOS version, as well as an icon bar for quick access to common menu commands; easy data export to *Windows* spreadsheet, word processing, and tax programs; support for laser-printed wallet-style checks; and the ability to have multiple registers and reports open at the same time. Like the DOS version, *Quicken for Windows* is designed for both home finance and small business bookkeeping. In fact, Intuit reports that half the people who buy *Quicken* use it for business.

While it's hard to argue with a program that offers so much for so little, the icons could be a bit larger—they're so small that you can barely tell them apart—and it would be useful to be able to view your budget as a chart or graph.



Let *Quicken for Windows* balance your checkbook, pay your bills by modem, and check your stocks.



FoxPro allows you to search your database at blinding speed—as much as 20 to 30 times faster than the competition.

Fortunately for the consumer, Intuit won't have the *Windows* market all to itself. Microsoft recently released a near twin of *Quicken for Windows* with strikingly similar features and an identical price. *Microsoft Money* does a better job of spotting data-entry errors but lacks the investment and electronic-checking components of *Quicken for Windows*. Expect spirited competition between Intuit and Microsoft as each company

tries to offer more features than the other. This normally quiet area of software publishing could create quite a ruckus over the next year or two. DAVID ENGLISH

IBM PC and compatibles, EGA or VGA, hard drive, *Windows* 3.0, printer (to print checks), modem (to send electronic payments)—\$69.95

INTUIT
P.O. Box 3014
Menlo Park, CA 94026-3014
(415) 322-0573

Circle Reader Service Number 323

FOXPRO

In fox hunts, the hounds nearly always catch up with the fleeing fox. With the arrival of *FoxPro* 2.0 in the database chase, however, things look good for the fox. Latest in a series of swift, powerful *dBASE*-compatible databases from Fox Software, *FoxPro* will stay well ahead of the pack of fully relational, programmable databases. Despite other attractive features, breathtaking speed alone will make it a bestseller.

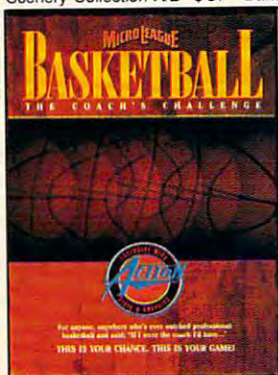
Using new patent-pending Rushmore technology, *FoxPro* retrieves data as much as 20 to 30 times faster than its nearest competitor and, under certain conditions, hundreds of times faster than some slower products, such as *dBASE IV*. If you use a professional database with files containing thousands of records, you know all about thumb-twiddling waits of five and ten minutes (or hours for complex requests on larger files) while even the speediest modern computer grinds away at your request.

Consider what 30 times faster means: *FoxPro* would complete in 20 seconds a task that takes your current database ten minutes. Even at only 20 times faster, the calculations would take only 30 seconds. We're talking dramatic differences here.

While its speed must headline any story about *FoxPro* 2.0, many other outstanding features deserve attention. The user interface, for instance, takes a lot of the mystery out of working with a complex mass of capabilities. *FoxPro* is a text- or character-based product that runs under ordinary DOS. Even though it's *not* a *Windows* product, it has a window-

IBM MAC & AMIGA GAMES FOR LESS

IBM SIMULATION		AMIGA GAMES		AMIGA GAMES		AMIGA GAMES		MACINTOSH		MACINTOSH	
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West Coast Voyages	\$39	ATP	\$37	Eye of the Beholder	\$39	Space Quest 1 or 2	\$29	Lost Treasures Infocom	\$59	Space Quest 3	\$34
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'MICROLEAGUE BASKETBALL' from MICROLEAGUE is a realistic Basketball simulation. Features include full court scrolling graphics, pop-up screens for easy mid-game access to stats and substitutions, injury and fatigue factors, automatic stat compiler function, and a quick-play option. Expanded offensive & defensive options like, full court press, Double team, and Fast-Break. **\$28**



'ACTION STATIONS' from RAW SOFTWARE is a naval surface combat simulation. This game covers 1922 to 1945 in amazing detail. Features 21 status displays, 30 scenarios in the Atlantic, Med & Pacific, subordinate commanders, treatment of smoke, starshells, flares, radar, weather, shore batteries, aircraft spotting & more. Ships are modeled in detail. This is the premier WW2 naval game. **\$29**

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Strike Aces	\$32
Strike Commander	\$45
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TD2 California Chaling	\$15
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Thunderhawk	\$32
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Bard's Tale 2	\$19
Bard's Tale 3	\$34
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Battle Isle	\$32
Battle Tank Barbarosa	\$36
Battletech	\$34
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Imperium	\$26
Indy Jones Adventure	\$24
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Wordtris	\$25



The **'ADLIB'** music synthesizer card by **ADLIB INC** adds sound capability to hundreds of existing PC games. Using its 11 different FM synthesized voices, it can reproduce any sound. The standard audio jack allows you to plug in any headphone, boombox, or bookshelf speaker. The AdLib Juke Box playback program containing numerous pre-programmed compositions is also included. **\$69**

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'ADLIB GOLD' from **ADLIB INC** is a high quality sound card. It complies with Multimedia PC sound adapter standards. Features: 16 bit stereo DAC providing 96db of dynamic range, programmable audio mixer, 20 stereo channels, MIDI input and output, stereo input jack, and game port. **\$199**

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'FIRETEAM 2200' from **SIMS SYSTEMS** is a strategy game of armored combat in the far future. Fight alone or command up to 16 armored units. Over 30 different vehicles with 25 different weapons systems. Features adlib support, 15 scenarios, hidden movement, campaign game, datalink reports from vehicles in your command, line of sight tactical display, and play by modem. **\$29**

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Rules of Engagement	\$39
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'DUSK OF THE GODS' from **INTERSTEL** is a roleplaying game that lets you enter Valhalla. Become one of Odin's champions, explore the realms of creation (Asgard, Midgard, & Jotenheim), seek out knowledge and attempt to tip the scales in favor of Odin at the battle of Ragnarok. Features include accurate world of Viking mythology, 256 color VGA, sound board support & point click interface. **\$38**

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Simcity Terrain Editor	\$15

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based interface with familiar pull-down menus, dialog boxes, scroll bars, and even a simple way to move or size the onscreen windows. Because Fox designed the interface using IBM's common user access (CUA) standards, *FoxPro* works much like other CUA-compliant software (such as *Microsoft Windows*).

The interface works surprisingly well from the keyboard, but adding a mouse speeds up tasks significantly. Because so much of the work of designing and working with a database in *FoxPro* 2.0 involves choosing from lists of options, most of your work can be done with the mouse. Of course, you need the keyboard for actual data entry.

The tutorial—a separate 299-page book—patiently takes you through the basics up to the generation of your own simple application. I worked through the whole thing in about eight hours, but two of those hours were lost to a half dozen instances when the computer didn't do what the tutorial said it would, usually because of steps missing from the instructions.

FoxPro 2.0 allows you to build entire applications without typing a single line of command language. You make choices from menus and dialog boxes while *FoxPro*'s artificial intelligence lurks in the background translating your choices into hundreds of lines of program code.

Any database can be quickly examined using the versatile Browse window, which instantly displays the database onscreen in a tabular format. This window scrolls across the screen at your command, giving you a window view of the whole table. You can immediately

size or move fields within the table by merely dragging them with your mouse.

To select and display individual records from a series of related database files, use the remarkable RQBE (Relational Query By Example) window. Pick databases and fields from scrollable lists, specify how the various files link, create virtual fields, select sort order and grouping for subtotals, and set the filters you want applied to the data. You also specify the output form, which can include a browse screen, a screen report, a printed report, or one of several other forms.

If you've chosen the right options, *FoxPro* generates a Quick Report format for you. You spiff up the resulting bare-bones report in a report-design window where you can move fields, change field size, and move text elements such as headings and other labels by dragging them with the mouse. This expedient process also works in the screen-design function. Once you've used this, any other screen- or report-formatting system seems crude.

Professionals will appreciate other new features, including over 100 new or enhanced *dBASE* language commands, extensive printer driver customization, template generation using standard *FoxPro* language, the compressed index files, the project manager, and the optional-at-extra-cost compiler that creates stand-alone EXE file applications. You'll enjoy using the RQBE window to generate complex SQL code as well.

FoxPro 2.0 can run on a mixed bag of hardware. Its speed gives new life to old XT-class computers; older machines will now work at an acceptable speed when run-

ning this relational database manager. Be aware, though, that depending on how many of its optional features you install, *FoxPro* 2.0 takes from 8 to 16MB of hard disk space, plus space for the data you'll be adding.

High-end professional databases are exceedingly complex beasts, as attested by *FoxPro* 2.0's 6½ inches of heavy (but well-written) manuals. Some databases acknowledge that they exist well out of the end-user class, limiting themselves to professional programmers. Others try to include enough easy-to-use features to allow end-users to do some of their own work. Others create a personal version for end-users.

FoxPro 2.0—perhaps the most powerful of them all—allows nonprogrammers to create simple database applications without programming. The more technically inclined among you will stretch your limits by learning more and more about database programming with *FoxPro*.

Nontechnical users should probably think twice before spending the money for *FoxPro* 2.0, though; you could get everything you need in a simpler, less expensive package. But if you have large databases and can't wait through seemingly endless data chases any longer, the blinding speed of *FoxPro* 2.0 could make it worth every penny of its price, even if you never touch its advanced programming features.

RICHARD O. MANN

IBM PC and compatibles, 512K RAM, hard drive and one floppy drive; extended version (included in every package) requires 386 or 486 with 1.5MB RAM—\$795, LAN version (no limit on number of users)—\$1,295, Distribution Kit—\$500, Library Construction Kit—\$500

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HARVARD GRAPHICS

For serious business graphics, there's no name as well known or as respected as *Harvard Graphics*, the charting and graphics program from Software Publishing. *Harvard Graphics* 3.0 provides all kinds of graphs and requires little more from the user than the figures necessary to create the graph.

The program can use data files generated by the most popular products, including *dBASE*, *1-2-3*, and *Excel*—formats most minority products can create as export files. Even if you rely only on *Harvard Graphics*' default settings when creating a chart or graph, you still come away with attractive, informative graphs on paper or in electronic form for metamorphosing into slides or transparencies. Or you can get into the options tables and alter the graphs almost endlessly.

The graphics area of the program provides powerful features. For example, you can capture bitmap screens courtesy of a *Harvard Graphics* feature. Or you can obtain pictures created by other graphics programs and import them into *Harvard Graphics* as backgrounds for your presentations and charts.

Harvard Graphics is now able to do very simple animation, as well as blends (gradual shifts from one shape to another and from one color to another through a series of program-generated objects) and gradient and bitmap fills. Although in the earlier ver-

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'NFL PRO LEAGUE FOOTBALL' from MICRO SPORTS INC. is a strategic football game. You take the field with 2 billion different play combinations. Features include animated uniformed players, weather conditions, true modern head-to-head play, 5 years of teams with real players names & data, a stats keeper with 140 different categories, and a challenging computer coach to play. **\$49**



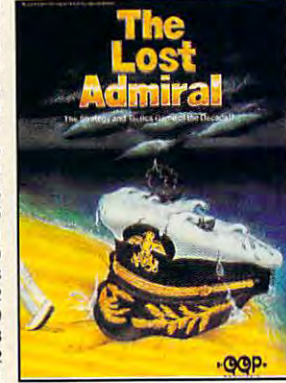
'POWER MONGER' from ELECTRONIC ARTS is a unique strategy game. A living world with forests, mountains, waterfalls, rivers, towns, farmers, shepherds, merchants, fisherman, weather, homes, jobs & NPCs with individual identities. Plan, produce, invent, negotiate, bribe, recruit subordinates, & feed your people. 3D zoom & rotate, play by modem, random maps & great graphics. **\$34**

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Harpoon Editor	\$27		



'EYE OF THE BEHOLDER 2' from SSI is a first person role playing game. A bigger adventure including forests, a temple, catacombs, and three huge towers. There are more people to meet, clues to learn, an improved point and click interface, and lots of newer, smarter, and meaner monsters. More complex non-player characters. Features 256 color VGA & sound board support. **\$38**

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Sim Ant	\$37	Future Wars	\$28
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'LOST ADMIRAL' from QUANTUM QUALITY PRODUCTIONS is a turn based production naval strategy game. Features 9 scenarios, a random map scenario, 15 campaign games, flagships with special abilities, very strong artificial intelligence, in depth officers ranking system, accumulates your career history as you play, 2 player option, and sound board support. In short better than EMPIRE. **\$34**



'PLANET'S EDGE' from NEW WORLD is a save the Earth sci fi roleplaying game. Track down a missing Earth & return it to its own place & time. Explore dozens of solar systems featuring unique inhabitants & environments. Design your own space ship. Features puzzles with multiple solutions, 3D perspective, strategy or real time combat, 256 color VGA & sound board support. **\$38**

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IBM ADVENTURE



'THUNDER BOARD' from MEDIAVISION is a sound board that is 100% compatible with Soundblaster and Adlib cards for PC Games. It reproduces all digitized sounds using an 8 bit Digital to Audio Converter (DAC). Features include dynamic filtering, 11 Voice FM music synthesizer, sampling rate up to 22 KHz, microphone input, joystick port, and a 2 watt power amp. **\$84**

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War in Middle Earth	\$15
Whales	\$34
Where Amrcas Pst CSD	\$37

sions of the product I didn't much care for its drawing capabilities, in this latest incarnation it completely lives up to its reputation as a premium graphics package.

A long list of features will make the product easier to use for beginners and for power users. Context-sensitive help arrives at the press of the F1 function key. *Harvard Graphics* now supports macros internally, which means that if you go through a series of formatting procedures each time you create a graph, you can record a macro and let *Harvard Graphics* take care of the busywork for you.

Furthermore, this most recent version contains all the conveniences users have grown to love in *Harvard Graphics* over the years, like the built-in palettes that allow you to use professionally selected colors for your presentation (too much choice can be as much of a headache as too little). Perfect for creating charts, *Harvard Graphics* is a better-than-fair graphics package as well.

ROBERT BIXBY

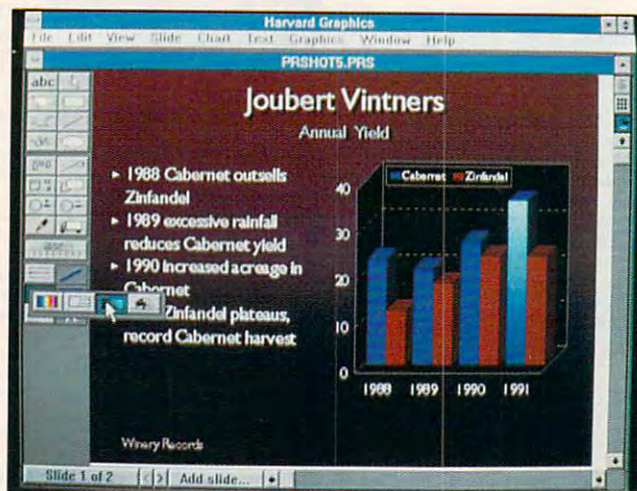
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SMITH CORONA ACER PC 110/286

Although Tandy introduced ROM-based applications in personal computers early on, the concept remains fairly fresh. When the Smith Corona Acer PC 110/286 boots



Create your own graphs, import data files, and use limited animation with Harvard Graphics.



With its on-board ROM-based applications, this PC compatible takes you right to work when you power up.

up, it offers you instant access to *Smith Corona Word Processing 6.0* and a *Desktop Reference* with a spelling checker, thesaurus, calculator/converter, calendar/scheduler, and other interesting features. Still other menu options include a DOS shell and system hardware information. All these ROM-resident applications obviate the

need to swap disks back and forth in the disk drive. ROM-based programs also run faster than their floppy versions since they access memory and not a comparatively slow disk drive.

From box to desktop, this machine's trouble-free. The *Getting Started* user's guide provides easy-to-understand text and clear illustrations.

Sometimes small footprint systems run hot because of a lack of ventilation, but the Acer PC 110's case offers adequate ventilation along both sides. The fan runs so quietly you'll hardly notice its presence.

After almost standing on my head to get inside the unit (I finally read the appropriate section in the manual to find out how to remove the system case. It's embarrassingly simple once you know the trick.), I found that the layout offers easy access to the two open 16-bit expansion slots and the memory chips. Expansion from the standard 640K to 2MB won't prove difficult.

This system doesn't include a hard drive, but you can add one later since the motherboard comes with a hard drive controller. The on/off and reset buttons are conveniently located on the front of the system.

The flicker-free 14-inch high-resolution VGA monitor causes little eyestrain and comes with a removable tilt-and-swivel base. All monitor controls reside near the front of the unit. Users who like the solid click of a typewriter will like this 101-key AT-style keyboard with its row of function keys located along the top.

The Acer PC 110/286 ran all the games and applications I tried. I felt limited in the type of applications I could run because the system doesn't have a hard drive. Programs such as *Lotus 1-2-3*, *Express Publisher*, and *Avagio* take up as many as four or five disks, and disk swaps won't do for anyone who expects PCs to make life easier, not more tedious. The optional hard drive, in spite of the clever ROM-resident software, is actually a must. I would sug-

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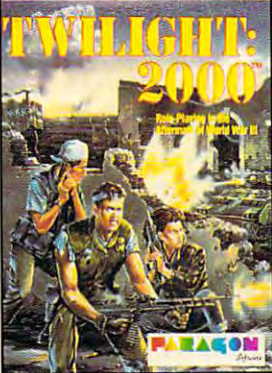
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Heroes of the Lance	\$12
Pool of Darkness	\$38
Pool of Radiance	\$32
Secret of Silver Blades	\$32
Shadow Sorcerer	\$32
War of the Lance	\$9



'TWILIGHT 2000' from MICROPROSE is a roleplaying game set in the aftermath of WW3. Test your leadership skills by commanding a squad of 20. Features individual motivations, values & moral code, 50 attributes/skills, 60 careers, overhead 3D outdoor views, detailed 3D military vehicle simulators, masses of vehicles, weapons, & explosives to kill & maim with. 256 color VGA, adlib support. **\$34**



'CIVILIZATION' from MICROPROSE is a competitive multi-player strategy game with a great deal of replayability. You explore cities, continents, and the world in an EMPIRE like way. You make economic decisions, prioritizing technological growth in order to advance your civilization more rapidly than the other players. The best of both SIMCITY & EMPIRE. **\$39**

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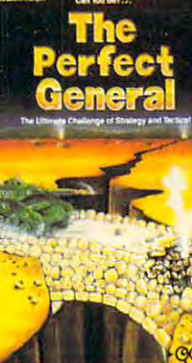
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Weaver 2.0 Comm Edt	\$59

'CARRIERS AT WAR' from SSG is WW2 carrier warfare. Explore Pearl Harbor, Santa Cruz, Coral Sea, Midway, Eastern Solomons, & Marianas Turkey Shoot. Great graphics and simulation. You must seek out the enemy carriers, fleets and aircraft before they find you. Hundreds of ships & aircraft are individually modeled. With point & click interface, 256 color VGA & sound board support. **\$37**



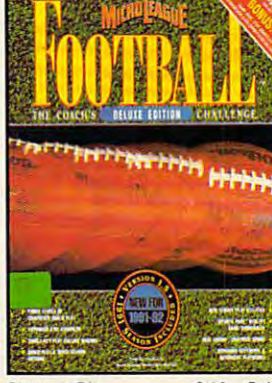
'PERFECT GENERAL' from QQP INC is a turn based ground war game. Features 12 years of play testing, great maps in VGA, easy to use mouse or keyboard interface, 14 scenarios, very strong artificial intelligence, hidden movement, line of sight option, in depth player ranking system, saves your career history as you play, 2 player option, modem play, sound board support. **\$34**

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Yeager's Air Combat	\$19
Zak McKracken	\$10



'STRIP POKER 3' from ARTWORX is a poker game for adults. It combines the strategic play action of 5 card draw poker with very unusual table stakes. Pit your skill against Laura, Greta, and Kami, each have their own style and personality. Includes digitized VGA graphics, simultaneous play against up to three opponents, digitized speech, and mouse support. 4 Data Disks available. **\$31**



'MICROLEAGUE FOOTBALL DELUXE' from MICROLEAGUE SPORTS is a realistic football simulation. You get 48 pro football rosters that you can form into leagues of up to 28 teams. Single-key playbooks macros let you program plays for faster play. The computer coach picks offensive & defensive plays based on actual team stats and player stats, adjusting his game plan to your every move. **\$39**

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Wonderland	\$34
Zak McKracken	\$18

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Drakkhen	\$10

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Pool of Darkness	\$12
Pool of Radiance	\$10
Power Monger	\$10
Puzzle Gallery	\$10
Quest for Clues 2, 3 or 4	\$21
Quest for Glory 1 - 3 Ea	\$10
Railroad Tycoon	\$10
Rise of the Dragon	\$10
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Savage Empire	\$10
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Tunnels & Trolls	\$10
Ultima 4 - 7 Ea	\$10
Wizardry 6 Cosmic Frg	\$12
Wizardry 7 Crusade	\$12
Yeager's Air Combat	\$19
Zak McKracken	\$10

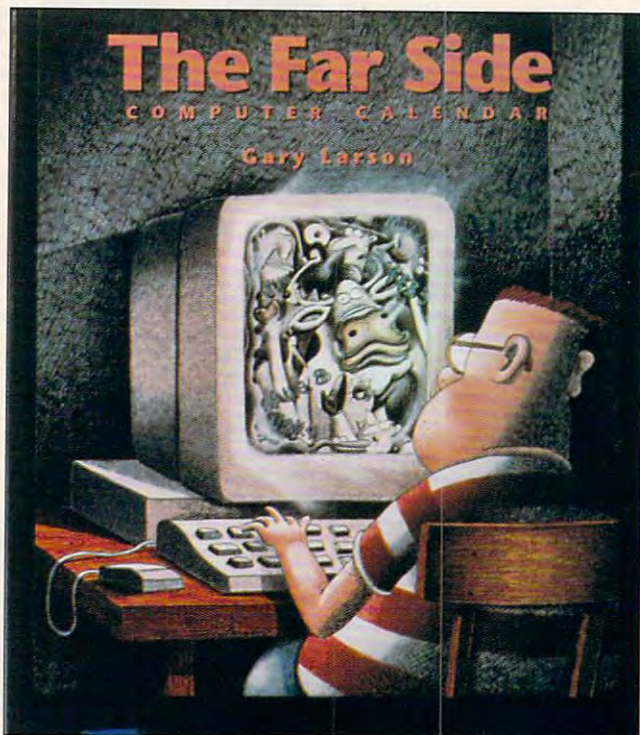
gest that a user who already knows how to use DOS commands and how to run applications move up to the Acer PC 120, since it comes with a 40MB hard drive.

Of the ROM-based applications, the word processor proves most useful. Although not *Microsoft Word* by a longshot, this Acer homebody sports blazing fast access to the online dictionary and thesaurus, prints envelopes and labels, performs address merges, and has all the basic text-manipulation features anyone could want. Multipage documents, however, can cause a few problems since this word processor lacks automatic pagination. Once a document runs longer than one page, you must use the Alt-F9 command to reformat and place end-of-page markers—not hard, just inconvenient.

The word processing User's Guide offers clear illustrations and easy-to-understand text. In fact, it holds your hand. The table of contents is well developed and accurate, and the index is adequate. There's even a chapter on Problem-Solving Tips that includes two toll-free technical support numbers.

An on-disk tutorial explains computer basics to novice users. This nuts-and-bolts how-to provides you with graphic descriptions of the parts of a computer, information on how to care for your system and disks, and tips on putting your computer to work. You'll find out more about MS-DOS by learning some DOS terms and commands and also by learning how to use the DOS shell provided with the system.

With helpful and friendly personnel, the toll-free customer service and technical support numbers can put your system back online when you encoun-



If a cow is walking across your spreadsheet, you must be using The Far Side Computer Calendar.

ter problems you can't fix yourself. Even with a one-year limited warranty, you can receive on-site service for major problems. That service covers the 48 contiguous United States, Puerto Rico, Hawaii (Oahu), and major Canadian cities.

Not the most inexpensive unit at \$1,299, the Acer ranks near the top when you want a cooperative and ready-to-go machine. If this were a cake mix, you'd just add water. Of course, experienced users should probably look elsewhere for the system of their dreams, but beginners might give the Acer some of the attention it deserves.

JOYCE SIDES

Smith Corona Acer PC 110/286—\$1,299

SMITH CORONA
Consumer Affairs Dept.
P.O. Box 2090
Cortland, NY 13045
(800) 443-5748

Circle Reader Service Number 326

THE FAR SIDE COMPUTER CALENDAR

Users of *Windows* may be seeing a lot more biped, English-speaking cows in their future. Gary Larson's comic strip *The Far Side* has migrated to the PC courtesy of Amaze!nc's calendar program.

More than just a full year's collection of wry, near-legendary cartoons, *The Far Side Computer Calendar* puts the standard *Windows Calendar* to shame. You can view your appointments by year, month, week, or day, and add colorful, animated icons, including telephones, cars, airplanes, and balloons. Your choice of alarms includes the traditional beep along with excerpts from the works of Mozart and Vivaldi.

The Far Side Computer Cal-

endar further enlivens your day with random animations. Penguins float across the screen and a trio of grass-skirted savages bows down in unison, perhaps paying you homage. Obviously, like any product associated with *The Far Side*, this offbeat but useful calendar promises to start conversations and provoke laughter.

DAVID SEARS

IBM PC and compatibles with 286 or higher microprocessor, *Windows 3.0* or higher—\$69.95

AMAZE!NC
11810 115th Ave. NE
Kirkland, WA 98034
(206) 820-7007

Circle Reader Service Number 327

MARIO ANDRETTI'S RACING CHALLENGE

At one time, slamming into a wall at 240 mph could ruin your whole day. Behind the wheel of *Mario Andretti's Racing Challenge*, you almost look forward to that sort of disaster.

This high-octane outing hails from the mechanics at Distinctive Software, creators of the original *Test Drive* and last year's fabulous *Stunts*. It's a project of the company's B team—veterans Don Mattrick, Brad Gour, and Kevin Pickell are conspicuously absent from the credits—but the rookies pull off an ambitious effort with only minor bumps and bruises.

Though similar in form to EA's *Indianapolis 500*, this game travels a more rugged path than previous efforts in the genre. Rather than spotlighting a particular race or racing style, the designers run players through the real-life rigors of professional sports car competition. To

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Manufacturer's suggested price: \$99.95

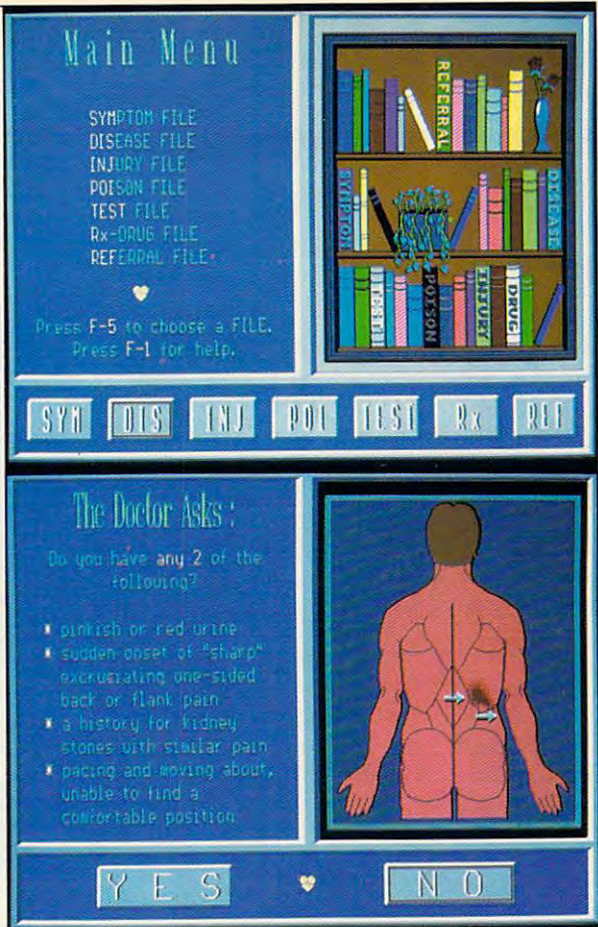
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Circle Reader Service Number 169

reach the top, you must pound your way up from the bottom, earning cash to finance a move to the next, more difficult, series. You'll experience triumph and frustration on this long road.

Players begin their careers on the venerable sprint car circuit. Little more than roll cages on wheels, these feisty racers perform the bump and grind on dirt tracks at rural fairgrounds.

The series picks up speed as you advance into modifieds, stock cars, prototypes, Formula One, and Indy cars. All circuits are authentically staged according to season schedule, race lengths, and qualification requirements.

The game nicely exploits the gut-level relationship between car, track, and driver. In sprint car racing, for example, you feel the tires spin and grasp for traction, sliding sideways through tight corners. The strain's fearsome as you hug an inside curve at top speed, centrifugal

Welcome to the rough and tumble world of Sprint Car racing. You may think that these bull rings are a long way from the road courses of Europe or the Winner's circle at Indy. There are important lessons to be learned here. If you are going to win there, you will have to gain a real feel for car control. These cars and this style of racing is one of the best schools around.



The backgrounds may be no more than serviceable, but the thrills are palpable in Mario Andretti's Racing Challenge.

force pulling your Formula One racer into the retaining wall.

Twelve tracks comprise the entire series, ranging from tiny Ascot Park to the lengthy Hockenheim Speedway. The designers capture perfectly the unique characteristics of each track, from the banked curves of Daytona to the deceptive turns of Monte Carlo's Grand Prix.

Three levels of graphic detail allow slower machines to

trade background embellishments—clouds, trees, buildings—for extra speed. Even at the highest VGA setting, the solid-fill polygon graphics are merely serviceable. In a race for the checkered flag, however, only the losers concern themselves with landscaping.

Overresponsive steering negates the use of a joystick, where a simple flick of the wrist results in a spin-out. Serious drivers will opt instead

for the cursor keys, applying a lighter touch for better control.

The simulation strives for accuracy, yet it exhibits some curious lapses in realism. The cars in the first lineup—near-perfect computer-controlled opponents—seem to execute every move with uncanny speed and agility. The margin for human error seems almost nonexistent.

Every track and automotive class allows for practice laps. Pit stops are available in some races, delegated to specific laps. It's simply a routine, not a consequence of your actions, so there's no sense of urgency.

Other dubious frills include an instant replay with six fixed-position cameras. Limited mobility and negligible memory capacity render this feature of questionable worth.

Mario Andretti's Racing Challenge falls short of the ultimate racing simulation, but it does take us several laps in the right direction.

SCOTT MAY

IBM AT and compatibles running at 10 MHz or faster; 640K RAM; EGA, MCGA, VGA, or Tandy 16-color; hard drive installable; joystick optional; supports Ad Lib, Roland, and Sound Blaster—\$49.95

ELECTRONIC ARTS
1450 Fashion Island Blvd.
San Mateo, CA 94404
(800) 245-4525

Circle Reader Service Number 328

MICKEY'S JIGSAW PUZZLES

Join Mickey and friends Donald Duck, Goofy, and Minnie Mouse for an electronic jigsaw puzzle adventure. *Mickey's Jigsaw Puzzles* features 15 colorful pictures showing these famous Disney characters in a variety of familiar settings. You'll see Mickey riding a skateboard, running with a football, or scuba-diving. Minnie dances or does aerobics. Mickey, Goofy, and Donald jam in a jazz band or tiptoe through a haunted castle.

Youngsters (ages 5 and up) select puzzle type and size using arrow keys, joystick, or mouse. A point-and-click graphical user interface makes operation a breeze. After selecting a puzzle, kids decide whether it divides into 4, 9, 16, 25, 36, 49, or 64 pieces. The more puzzle fragments, the harder the picture reassembly.

Puzzle pieces come in your choice of either the traditional jigsaw shapes or simple squares that can make for a greater challenge. A silhouette option lets children easily solve puzzles by dropping shapes into a picture outline. Somewhat older players will enjoy solving puzzles with grid lines (outlines of puzzle shapes) active. With all pieces placed correctly, kids can animate the scene by selecting the Movie Cam-



Put Mickey, Minnie, Goofy, and Donald together again in this talking collection of Mickey's Jigsaw Puzzles.

era icon. Alternatively, they can animate individual puzzle pieces by pointing at and clicking on a part of the puzzle.

Customizing options let adults configure the program to run with a timer (to show how long it takes to complete a puzzle), work with a printer (to generate line art picture printouts), and take advantage of a sound card or Disney's Sound Source, a sound accessory peripheral that plugs into your computer's parallel port. Disney characters actually speak clearly through the Sound Source.

Mickey's Jigsaw Puzzles entertains your kids for hours just like puzzles have throughout history. If you've been looking for a low-impact way to introduce your children to your PC, this talking, animated collection of soon-to-be-classic Disney art will certainly start their relationship off right.

CAROL HOLZBERG

IBM PC and compatibles; 512K RAM for CGA, EGA, or Tandy 16-color,

640K for 256-color VGA; supports Sound Blaster or Sound Source; supports mouse or joystick—\$49.95, with Sound Source—\$69.95

WALT DISNEY COMPUTER SOFTWARE
500 S. Buena Vista St.
Burbank, CA 91521
(818) 841-3326

Circle Reader Service Number 329

PARADOX ENGINE

If you need to access *Paradox* data from applications written in other languages, this program solves your problem. A powerful tool for developers, *Paradox Engine* allows database programmers to develop software applications that use *Paradox* data tables and allows *Paradox* to interact with other Borland products and *Windows 3.0* (if you have the *Windows Software Development Kit*).

Supported languages include *Quattro Pro*, *SideKick 2.0*, *Object Vision*, *C (Turbo C++)*, *Borland C++*, *Turbo C 2.0*, and *Microsoft C* versions 5.1 and 6.0, and just about any other programming language that can call

a Dynamic Link Library (DLL). Needless to say, in order to fully utilize the *Paradox Engine*, you must have a working understanding of *Paradox* and the supported language you're using.

It also goes without saying that the *Paradox Engine* is not a substitute for *Paradox* or the *Paradox Application Language (PAL)* or any of the supported languages. It is designed solely as a tool that allows program developers to access the best functions of each of the supported languages and to develop the most efficient database possible, as quickly as possible.

If you're a PAL developer, you'll have little trouble learning *Engine* commands. There aren't that many, and they seem fairly close logically to PAL commands. For example, to create a table in PAL, you use the *CREATE* command (the same as in *Paradox*); in *Engine* you use *PXTblCreate*.

However, as a developer, the speed at which you'll be able to create an application using PAL, the *Engine*, and a supported language will be a direct result of your knowledge of the languages you use in the application. The *Paradox Engine* comes with a User's Guide, a Pascal Reference Guide, and a C Reference Guide (which has specific information relevant to each version of C supported by the *Engine*). These reference books also provide some sample applications to get you started.

Paradox Engine has two very important features that are necessary today. The first is that like *Paradox* and PAL, it uses Borland's VROOMM (Virtual Runtime Object Oriented Memory Manager) technology. The second is that it supports multiuser environments.

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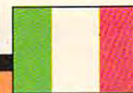
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side of the brain, both increases the speed and heightens the retention of learning. Utilizing these untapped mental capacities of your learning ability is the basis of this unique, highly effective course.

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VROOMM technology allows *Paradox*, PAL (version 3.5), and the *Engine* (version 2.0) to make the best use of the PC's memory. VROOMM does this by swapping small bits of code in and out of memory, thereby using less memory overall. This frees up the rest of the available memory for other parts of the application.

Network compatibility is one of the fastest-growing requirements of the PC market today. The most critical areas of network operability are file, table, and record sharing. Like *Paradox*, the *Engine* allows for a sophisticated multiuser control such as single-record locking. Other third-party *Engine* products allow access from a network, but most can lock an entire table. This limits the number of users who can access the table to one at a time and ties up the database until the user exits the table.

PEER PLAUT

IBM PC and compatibles; 512K RAM; hard drive and one floppy drive; DOS 3.0 or higher, 100 percent compatible version; shares data with *Quattro Pro*, *SideKick 2.0*, *Object Vision*; requires one of the following: *Borland C* or *C++*, *Microsoft C* (version 5.1 or higher), *Turbo Pascal* (version 5.5 or higher) or any DLL development environment; supports the following networks: 3Com 3Plus with 3Com 3Plus operating system version 1.0 or higher, 3Com 3Plus Open 1.1 or higher, Novell with Novell Advanced Network version 2.0A or higher, IBM Token Ring or PC Network with IBM PC Local Area Network Program 1.12 or higher, Banyan Vines version 2.10 or higher, AT&T Star-*GROUP* DOS software version 3.1 or higher, and other network configurations 100-percent compatible with DOS 3.1 and one of the networks listed above—\$495 (Price includes an unlimited runtime license for applications using *Paradox Engine*. There is no extra charge for use on networks.)

BORLAND INTERNATIONAL
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Circle Reader Service Number 330

SUPERBASE 2

Until recently, *Windows 3.0* users could buy only one *simple* database: *Superbase 2*. We'll see others come to market now, but *Superbase* has the advantage of product maturity—all the bugs have been exterminated, and the program is reliable.

You don't program *Superbase 2*. While not truly relational, the program can display fields from several files at once and use them in reports. As a true *Windows* application from the ground up, many of its strengths and weaknesses mirror those of *Windows*. Consisting entirely of graphics screens and images, *Superbase* allows you to create striking visuals for input screens, output forms, and reports. The Form Painter module takes full advantage of *Windows*' graphic talents to invoke color, fonts, shading, borders, and imported images to enliven data on-screen or on paper.

You can even include scanned-in images in database records by putting the graphics image filename in a field. *Superbase 2* makes the common example of displaying a photo of each employee in a personnel database a simple example to replicate. The possibilities are exciting and endless—if you have the scanning equipment and enough disk storage to handle all those large image files. Using the Dynamic Data Exchange (DDE) function, *Superbase 2* can capture and modify data in other *Windows* applications' files.

Of course, the standard *Windows* menus and functions will prove quite navigable. Not all *Windows* programs truly deliver quick familiarity, but *Superbase 2* has shoehorned the database commands into the *Win-*

dows framework rather well. If you have a working knowledge of other *Windows* programs, you'll pick up the basics of *Superbase* quickly. Of course, you'll also suffer with *Windows*' poky speed.

Superbase 2 is powerful. Rich and capable, it has a query function with enough flexibility to do anything you could reasonably expect of a nonprogrammable database. It reads *dBASE* files directly, allowing you to work with *DBF* data (on a read-only basis) without converting the data into *Superbase* format. It provides multilevel file security through passwords and can handle massive databases of up to 16 billion records with 999 indexed fields—that is, if your hard disk could hold such a monster.

I found little to dislike in *Superbase 2*. Written in a stiff style, the manual proved less than enjoyable to read. Sequences of steps in the tutorial cry out for presentation in numbered or bulleted lists instead of long, hard-to-follow sentences. Using the manual to install the product, I began to panic as it went directly from installation into some rather dense reference material. I had to seek out the tutorial on my own; I found it hidden in the back, just before the appendices.

Competent on the whole, though, *Superbase 2* takes full advantage of the *Windows* graphic interface. In fact, the program is a good example of what *Windows* applications are all about.

RICHARD O. MANN

IBM PC and compatibles, 1MB hard drive space, *Windows 2.1* or higher, mouse—\$345

SOFTWARE PUBLISHING
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Circle Reader Service Number 331

HEWLETT-PACKARD DESKJET 500

Every time I run something through the HP DeskJet 500, I find myself wishing I'd had one of these years ago. This ink-jet printer can provide laser quality output for a fraction of the price of a laser printer.

Although it operates at about the same pace as a fast dot-matrix printer, the DeskJet 500 hums along with laserlike quietness—a great relief to office mates and coworkers.

The printer sets up easily and is a breeze to operate. The documentation amply covers setup and maintenance and provides excellent detail on sending printer commands, if necessary, via Hewlett-Packard's printer control language: PCL.

Front panel controls allow you to select portrait or landscape mode; letter quality or draft mode; and 10-, 16.67-, or 20-cpi Courier fonts.

Other fonts—CG Times, a proportionally spaced font, and Letter Gothic, a sans-serif font—come with the printer, but access to them requires additional software. A Software Notes manual details how to use the printer with drivers for such programs as *Lotus 1-2-3*, *Microsoft Word*, *PFS: First Publisher*, *PFS: Professional Write*, *WordPerfect*, and *WordStar Professional*. These drivers must be obtained from the software vendors.

However, *Windows 3.0* users will find a disk containing a scalable printer driver in the package. Using this setup, *Windows* applications can easily access the DeskJet 500's additional fonts. With *Adobe Type Man-*

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ager installed, the printer handled an array of other fonts as well. If your work mandates additional fonts, use the DeskJet 500's slots for optional font cartridges or optional RAM cartridges to accommodate downloaded soft fonts.

The DeskJet 500 can use letter- or legal-size paper, can print on letterhead, and can handle envelopes. Up to 100 sheets of paper will rest in the printer's paper tray; envelopes require manual feeding.

My only complaint is that printed pages stack faceup. Unless your software allows for reverse-order printing, you'll have to reorder your pages after every print job. Transparencies, multipart forms, and perforated stock (such as labels) aren't recommended. The printer connects to your system via either your parallel or your serial port.

Sharp and clean both in letter quality mode and in 300-dpi graphics mode, output marginally drops in quality when produced using draft mode. The ink adheres well and doesn't rub off or smudge. Expect an ink cartridge to last for approximately 500-600 pages.

Near perfect for the home or small office, the DeskJet 500 could quickly reach its limits in a busier environment. This unit should print no more than 50 pages per day. If you expect no heavier use than this, consider the DeskJet 500 for your next printer purchase.

TONY ROBERTS

HP DeskJet 500—\$599

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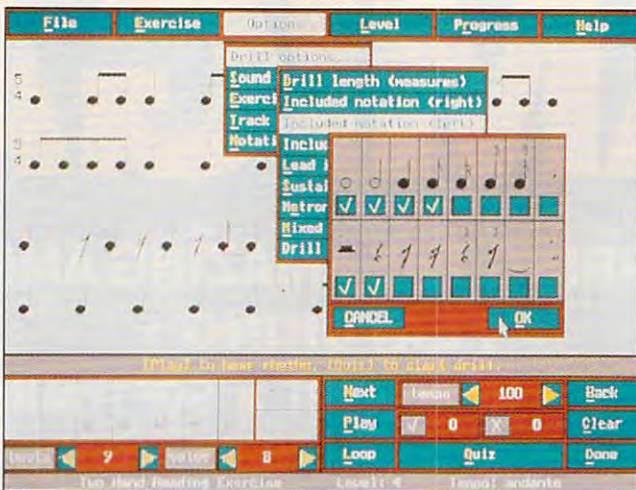
Circle Reader Service Number 332

RHYTHMACE

Think you're pretty hot with rhythm, eh? Think you absorbed all that tapping and counting they tried to cram into your head back in elementary school? *RhythmAce*,

ette of notes and rests, you must reproduce it on the screen. The custom exercises let you create your own rhythm drills.

A menu bar provides access to more options than you can shake a drumstick



Throw away your metronome and pop in *RhythmAce* to test your ability to keep time and sustain a rhythm.

a rhythm tutor designed for students, teachers, and musicians, gives you a chance to prove it. But don't be surprised if you're not as good as you think. *RhythmAce* truly separates the bebops from the can't-bebops.

Nevertheless, with its long list of options, 12 skill levels, and three drill modes, *RhythmAce* is appropriate for just about everyone, from novice to professional.

In reading mode, *RhythmAce* displays a rhythm on the screen using standard musical notation. Your task is to play the rhythm as accurately as possible, by tapping your keyboard, your mouse buttons, or the keys on a MIDI-compatible keyboard. If you can get over 90-percent accuracy on both timing and sustain, you're doing great. In dictation mode, the computer plays a rhythm, and by choosing from a pal-

at. You can set the number of quizzes per drill; the number of measures in each quiz; the notes, rests, and time signatures to include in the drills; and much more. In addition, graphs and reports track your progress on a drill-by-drill basis. The onscreen panel makes it a snap to manipulate the program with your mouse, or you can opt for keyboard control.

By separating rhythm from other musical components such as melody and harmony, *RhythmAce* lets you refine your timing skills without musical distractions. Because it's fully configurable, the quizzes can be fine-tuned to your experience level or needs, making it possible to focus on virtually any principle of rhythm. With *RhythmAce* you'll soon be marching to the beat of a different drummer.

CLAYTON WALNUM

IBM PC and compatibles; 640K RAM; CGA, EGA, VGA, or Hercules; hard drive installable; supports Ad Lib and Sound Blaster; MIDI card and instrument optional; mouse optional—\$99.95

IBIS SOFTWARE
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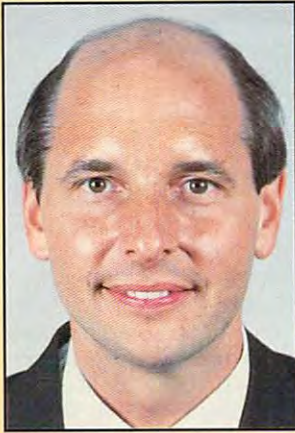
RULES OF ENGAGEMENT

A strategic game of extraordinary breadth and challenge, *Rules of Engagement* makes good on its promise to redefine the art of science fiction role-playing. Set in the year 2374, the game casts you as fleet commander in the Federated Worlds Armed Forces. Your tour of duty coincides with an era of great turmoil in the universe. Deep space exploration continues to uncover new alien life forms, many of which are openly hostile. Rebellion in the outer worlds presents increased diplomatic and military complications. The most harrowing news, however, has just arrived: The United Democratic Planets (UDP) have declared war on the Federated Worlds.

Your objective in the game is simply to advance your character through 11 levels in rank, from lowly ensign to mighty fleet admiral. You accomplish this goal with the successful completion of individual missions, earning points based on a number of performance criteria. Although higher rank has its privileges—including larger, faster ships—it also means more complex and dangerous assignments.

Commanders issue orders through a series of primary control panels: Navigation, Communications, Tactical, Deployment, and Data

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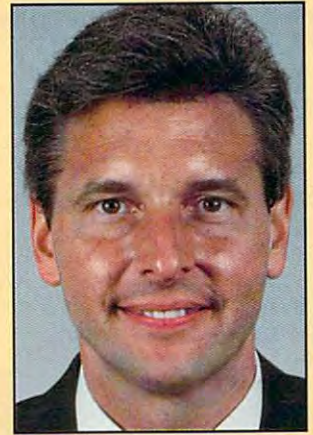


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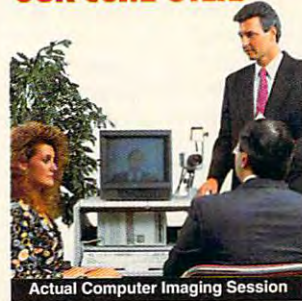
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Retrieval. In addition, each primary menu hosts a series of submenus, many of which are interconnected. The entire system fills more than a half-dozen screens, packed to the last pixel with buttons, dials, gauges, and interactive displays. The result is an eye-popping array that's both aesthetically appealing and slightly intimidating.

Fortunately, several of the game's opening scenarios build confidence as well as character. The 212-page manual, penned by codesigners Thomas Carbone and Maurice Molyneaux, reads as a masterwork of clarity considering the magnitude of its subject.

The action unfolds in real-time, instilling a rare sense of urgency for a game strategic in nature. Despite the cold, calculated menus and often faceless commands, the game evokes intense emotions. As the tides of war shift and responsibilities increase, players run the gamut of exhilaration, fear, and frustration.

Sensational on its own, *Rules of Engagement* takes on renewed vigor when joined by Mindcraft/Omnitrend's *Breach 2* (\$29.95) via the company's unique Interlocking Game System (IGS). During ship boardings and planetary commando raids, gameplay automatically shifts to *Breach 2* tactical combat. Although only 6 of the 21 scenarios offer IGS compatibility, both titles have mission builders capable of utilizing this exciting new feature. Omnitrend also promises to support IGS with upcoming products and supplemental mission disks.

Sound effects are sparse but well placed and appropriately atmospheric. Likewise, the graphics are strictly functional. How ironic that a game

boasting so many innovations should resign itself to chunky, garish EGA graphics! Omnitrend would do well to invest in VGA technology.

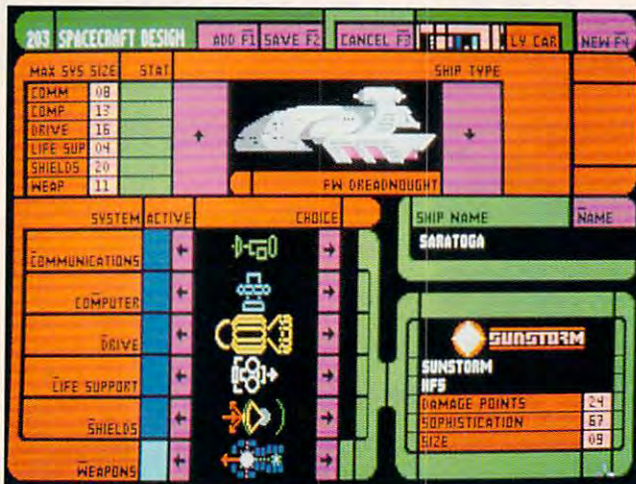
Intelligent and original,

mental hardware and software available for laptops ups the ante even further. For a price, a laptop owner can customize his machine with all sorts of goodies, rang-

on scrolling, a choice of 20 distinctive fonts, and the opportunity to change the screen's foreground and background luminosity, even on monochrome monitors.

In other words, *Laptop Ultravision* readily lives up to the claims it makes. The questions for the laptop owner, then, are whether those claims sound like desirable improvements and whether those improvements would be worth paying for. That part's up to you.

EDDIE HUFFMAN



The United Democratic Planets and the Federated Worlds are at war. Have you got what it takes to command a fleet?

Rules of Engagement pens a bold new chapter in the future of role-playing games. Commit yourself to a lifelong mission today.

SCOTT MAY

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Circle Reader Service Number 334

LAPTOP ULTRAVISION

Given the price of the average laptop computer, it's a safe bet the machines aren't made with the cost-conscious in mind. Unlike their desktop counterparts, these luxury items offer freedom and flexibility at a premium price. The amount of supple-

menting from helpful to totally superfluous.

Laptop Ultravision, a laptop screen enhancer for EGA and VGA displays, falls somewhere in between. Hardly a necessity, the program's helpfulness depends entirely on how fussy you are about what you're looking at. If you never would've thought about needing such a thing, chances are you don't. If, on the other hand, you demand that your little laptop screen at least approach what you see on your big desktop monitor, *Laptop Ultravision* might meet your needs.

An easy hard drive installation process and a relatively easy-to-remember help function make *Laptop Ultravision* simple to start and use. The program begins by changing your laptop's standard text to a larger, clearer variation and then offers a wealth of options: a compressed display to cut down

Portable PCs from Compaq, Toshiba, Zenith, IBM, NEC, Sharp, Tandon, TI, Libre1x, Zeos, Grid, Dolch, and others; EGA or VGA flat-panel display, including liquid crystal, gas plasma, and active-matrix—\$69.95

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Circle Reader Service Number 335

TRAVELER'S GUILD: GERMAN

Learning a new language means stepping into previously unexplored territory, a prospect both exciting and a little scary. Discovering familiar signs in the form of words similar to those in your own language helps gradually clear a path, but forge ahead too quickly and you might find yourself lost in a jungle of convoluted rules and complex verb forms.

Traversing the world of umlauts and guttural utterances becomes easier with *Traveler's Guild: German* as your tour guide. Using rudimentary graphics and a deceptively simple format, the program aims to make learning German as painless as possible without ignoring the unavoidable complexities.

Traveler's Guild: German keeps would-be polyglots

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REVIEWS

waiting during a lengthy installation process, thanks to the multiple disks accompanying the optional digitized speech package. When run, the program begins by showing a self-explanatory table of contents. Starting and progressing through a series of exercises takes only a few simple, obvious keystrokes or clicks of a mouse button.

A supplemental tutorial program holds your hand through a thorough demonstration of the capabilities of *Traveler's Guild: German*. It's a nice introduction, but the language program seems patterned after models of simplicity and really doesn't require much explanation. The program has two basic sections: the beginner's phrase book, accessing such topics as useful phrases, shopping/money, and clothing, and the language review, for those more experienced with the language. Both break down further into various types of teaching exercises, including flashcards and matching.

The exercises vary widely in type and complexity. They range from multiple-choice, single-word translation tasks to more demanding blank-line sentence reconstructions, which requires use from memory of the proper spelling, capitalization, and verb tenses, whether translating an English sentence into German or vice versa. Help comes in the form of pop-up special features, such as a dictionary that defines a word, shows its phonetic pronunciation, tells what part of speech the word is, and demonstrates additional forms or tenses depending on the part of speech. The optional digitized vocabulary provides fair, if a bit scratchy, audible examples so you can hear what you learn.

The dictionary feature can be both a blessing when you're stumped and a dangerously easy out if you lack the self-discipline to avoid it. On multiple-choice questions, for instance, the program will define each word in the potential answers if commanded to do so, effectively answering the question for you. Once you're inside a dictionary entry, there's usually a related topics option offering further detail. Some exercises also offer a language reference option, providing useful information on a topic relevant to the task at hand, such as masculine and feminine word endings.

Despite its simplicity, there's a sound pedagogical approach here. The basic teaching methods won't frighten away novice users, yet veterans will find plenty of detail to build an array of language skills. Accompanied by *Traveler's Guild: German*, you experience the thrill of discovery along with the security of a friendly, knowledgeable guide.

EDDIE HUFFMAN

IBM PC and compatibles; 384K RAM; CGA, EGA, VGA, or Hercules; dual floppies or hard drive; mouse recommended but not required; hard drive required to use speaking dictionary—\$79.95, speech hardware and disks—\$79.95

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CAKEWALK

If you buy a MIDI (Musical Instrument Digital Interface) instrument and hardware interface for your PC, *Cakewalk* is probably the software you'll buy with it. Being to MIDI what *WordPerfect* is to word processing, *Cakewalk* leads with good reason.

You need a sequencer between your MIDI equipment and PC. Instead of recording the actual sounds your instrument produces, a sequencer memorizes the commands required to reproduce your music—switch to instrument number 46, play a note with a specified pitch and duration, turn on the sustain pedal, and so on. A sequencer stores songs on your disk, just like a word processor saves document files. *Cakewalk* does these things well.

You can enter music in any of three ways. You can simply play with Record on and store your song exactly as you play it. You can enter notes one at a time; this helps if you don't have the technical facility to play a particular part, but it does impart a mechanical sound to the music.

If you know how to read music but haven't used a sequencer before, you'll be surprised to note that *Cakewalk*, like almost every other sequencer, doesn't have a facility to allow you to enter notes on a traditional staff. Instead, it employs a popular "piano-roll" notation style that takes some getting used to. You can also use the Step Record

mode to enter music, in which you enter a long series of notes or chords of equal duration (say, quarters or sixteenths) by playing them at your own speed; *Cakewalk* normalizes the speed later.

You can save songs either as standard MIDI files or in the richer *Cakewalk* format, which includes such niceties as descriptions for each instrument, multiple MIDI ports (with certain MIDI cards), and even free-form text created with *Cakewalk's* built-in editor.

The manual contains a short but cogent tutorial, a complete reference, and—miracle of miracles—a complete list of features added or corrected since the previous release. Its sections on mouse terminology and troubleshooting, the user interface (a slick, standard menu system in text mode), and decent online help make MIDI work easy on the beginner. Context-sensitive help can prove useful as well, though you'll notice a lag between the time you press F1 and the time you receive help.

Cakewalk takes a while to learn if you've never used a sequencer, yet it's probably the most powerful and easiest to learn of any on the market. You'll grow to love the numerous keyboard shortcuts and the well-integrated mouse support. Best among the recent improvements: You can change just about anything while playing your music. *Cakewalk* runs several different tasks at a time internally, so you can adjust the tempo, use the text editor, and even save a file while playing your song.

Tech support was tested over a one-year period and found to be speedy, courteous, and highly knowledgeable. *Cakewalk* is a feature-rich program and deserves its place at the top of the mountain; I've barely touched on its many advanced capabilities. Suffice it to say that if you're a serious musician, you can't go wrong with *Cakewalk*.

TOM CAMPBELL

IBM PC and compatibles, 512K RAM (640K recommended), two floppy disks (hard disk recommended); mouse optional—\$150

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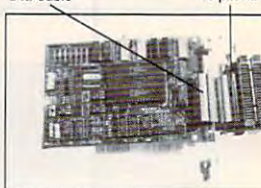
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CONVERSATIONS

Lisa Sarasohn

ROBERT MOOG SYNTHESIZED

COMPUTE: *At the age of 14, you built your first electronic musical instrument. What was the instrument?*

Robert Moog: It was a Theremin. Back then, there was a big army of hobbyists, electronics hobbyists, who used to build simple projects from scratch. There were magazines that catered to these people. One of the projects that would appear over and over again was a simple Theremin. So I built one from one of the articles at the age of 14. When I was 19, I knew enough about it so that I could write my own article.

After I was 19, I knew enough about it to make them for other people. So right through the 1960s, I was making them while I was going to college, one at a time.

C: *What's the impact of PCs on electronic music and composition? Are we going to become a nation of songwriters?*

Moog: We already are. Computer software is the fastest-growing segment of the musical instrument business now. You go into a rock shop—they used to have nothing but guitars and drums, and now there's likely to be a whole big section on music software. . .

The problem for a computer wordsmith is to restrain [your]self and really try not to write more words with less thought than you should. I think musicians are finding the same thing. You put a synthesizer and a computer system in front of them, and it's just very easy to knock out a whole bunch of music, but you have to use a lot of discretion and make sure that what you're doing is actually making music. You have to develop discipline.

C: *What changes do you*

see happening over the next few years in electronic music?

Moog: There's a tremendous amount of work now being done on new . . . control devices—things you put your hands on or work with your body as a dancer . . . interesting interfaces between the musician and the stuff that makes the sound.

Part of that interface is computer programs that detect electrical signals that come from what the performer is doing and operate on those to make a virtual reality. If you move your hand one way, the machine will translate it into something that is new and yet somehow natural and intuitively obvious to a musician—it feels right.

The keyboard is an old invention. It's very useful, but it's not all that can be done now that we have computers. One that I'm involved in is a space-controlled interface. You wave your hands around [to] change sound parameters.

C: *What effect will multimedia have on electronic music?*

Moog: [It's] possible now to integrate [high-resolution computer graphics with music]—to have both of them under the control of one program.

One thing you can already do with today's MIDI sequencing packages is to synchronize any music you make with something that's on film or video. And if you can carry that one step further and put the visual part of it under the same program control as the sound part, then it opens up a whole new world of how you can make a work of art.

C: *What changes in the computer industry are most exciting to you?*

Moog: Most of the excitement is in software. The hardware platform—IBM, Amiga, Macintosh—is getting to be more and more a generic thing. The best thing that you

can say about any of them is that they work well—they don't break. But the real character, the real resource, is in the software.

This program MAX, for example, is a new type of musical creativity. The program is not a performance, and it's not a composition. It is a . . . musical tool that has opened up the minds of composers and performers and is bound to result in a type of creativity that would not have been possible before it was designed.

C: *Will electronic music affect society in any new ways?*

Moog: [What] word processors have done is return the publication of newspapers and magazines to the grass roots. I think the same thing is happening with music.

The Music Business—with a capital M and a capital B—is getting more and more up into the stratosphere with the amount of money it takes to start a group . . . and the amount of overhead that's involved. And what comes out of Columbia Records or Elektra or any of those companies is more and more common denominator and more and more safe. But now we have thousands of creative artists, and they're making CDs—making high-quality music for peanuts and selling it over these . . . small networks of customers that they have.

The most exciting thing about this is not all the different kinds of music that you can make but the fact that once you have something that is important to you—artistically significant—anybody with a reasonable amount of money in his pocket can start disseminating it. You can make a cassette for half a dollar; you can make a CD—the price of pressing CDs now has come down to about two dollars each or a dollar and a half each. That's amazing. □

Word processors have returned publishing to the grass roots. The same thing is happening with music.

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4 5 6
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 working in your home office working in office outside home school work
7 8 9 10
- C. How many hours a week do you use your computer? 5 15 25 35+
11 12 13 14
- D. Which word processor do you use? WordPerfect Microsoft Word
 PC Write Wordstar DisplayWrite Other
15 16 17 18 19 20
- E. Which spreadsheet do you use? Lotus 1-2-3 Excel Quattro Pro
21 22 23
- F. Which online services do you use? CompuServe GEnie America Online
 Prodigy Q-Link
24 25 26 27 28
- G. What other computer magazines do you read? PC/Computing Computer Gaming World
 Home Office Computing Computer Shopper PC Sources PC Magazine PC World
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- H. Do you influence the purchase of PCs where you work? Yes
35
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37 38 39 40
- J. How many times per year do you purchase by mail order? 3-5 6-10 >10
41 42 43
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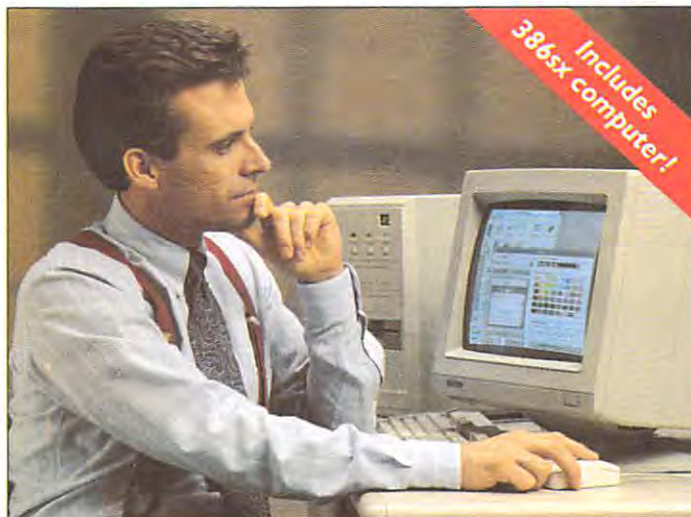
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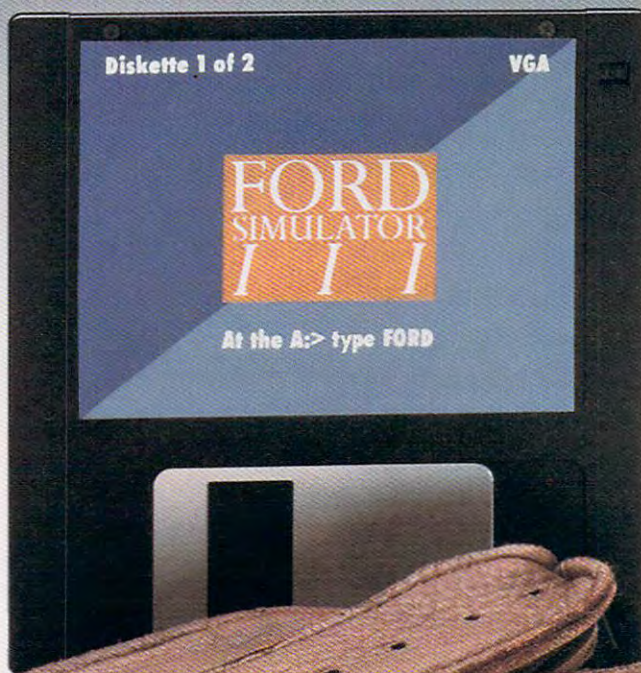
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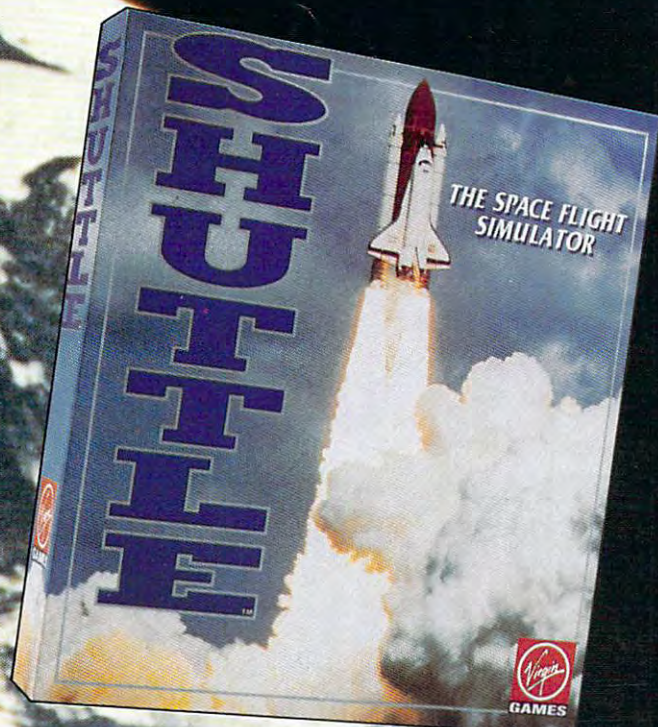
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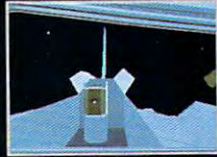
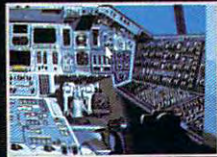
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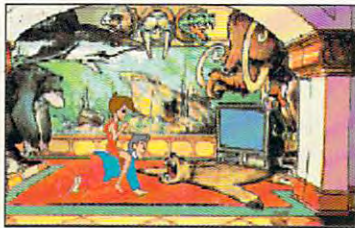
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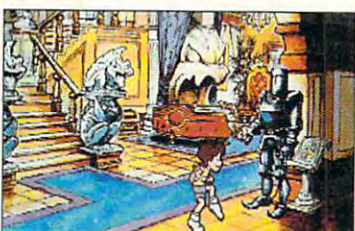
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