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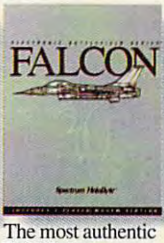

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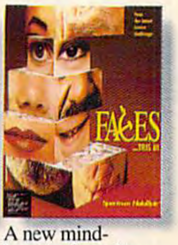

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TAKING THE SKY

RICHARD SHEFFIELD

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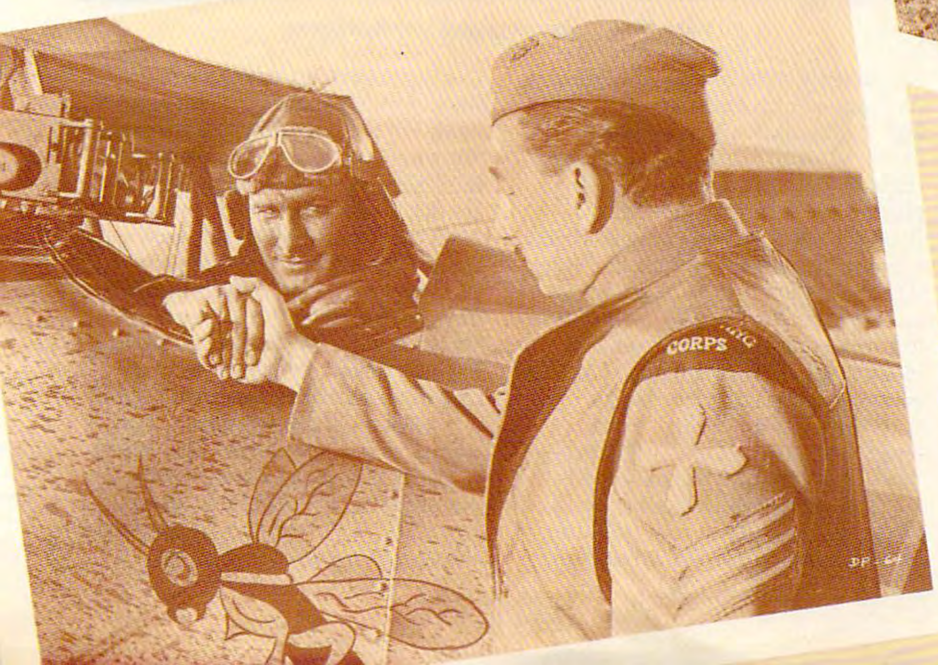
WHEN THE AIR WAS AS CLEAR AS THE MISSION
AND A FLYING MACHINE WAS SILK STRETCHED OVER WOOD. . . .**



THE KOBAL COLLECTION

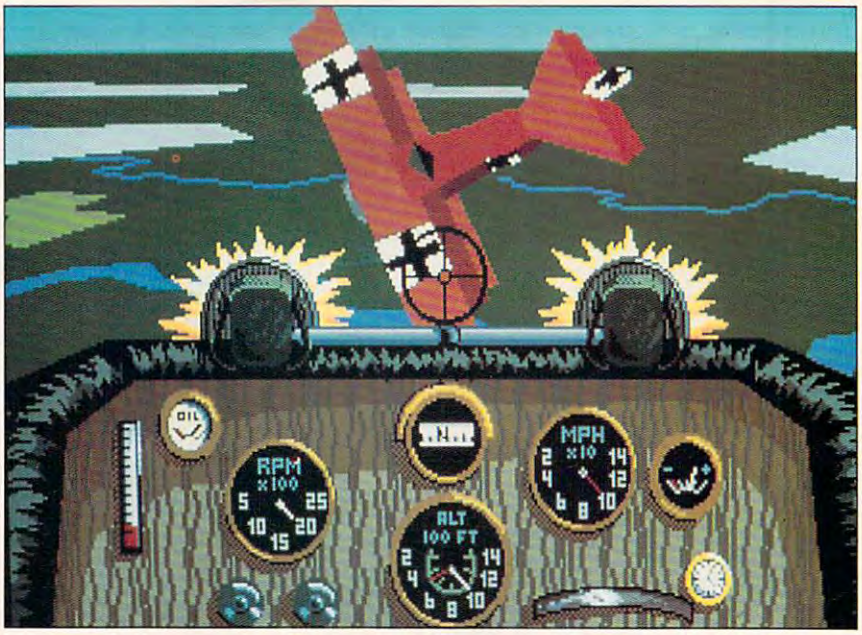
Sherman, set the Wayback Machine for the year 1914. We're taking these software executives back to the birth of air combat—France during World War I.

Well, that's one explanation for the phenomenon of three major game publishers coming up with the same answer to the question *What next?* Another explanation, of course, is that they didn't ask *What's next?* at all but instead asked *What's left?* Planes, ships, tanks, and helicopters from World War II on up have been pretty well covered. So it seemed like a good time to revisit World War I air combat, when the fighting was up close and personal. What's even more amazing is that three companies could start from the same place and end up with games as different as *Blue Max* (Three-Sixty), *Knights of the Sky* (MicroProse), and *Red Baron* (Dynamix).

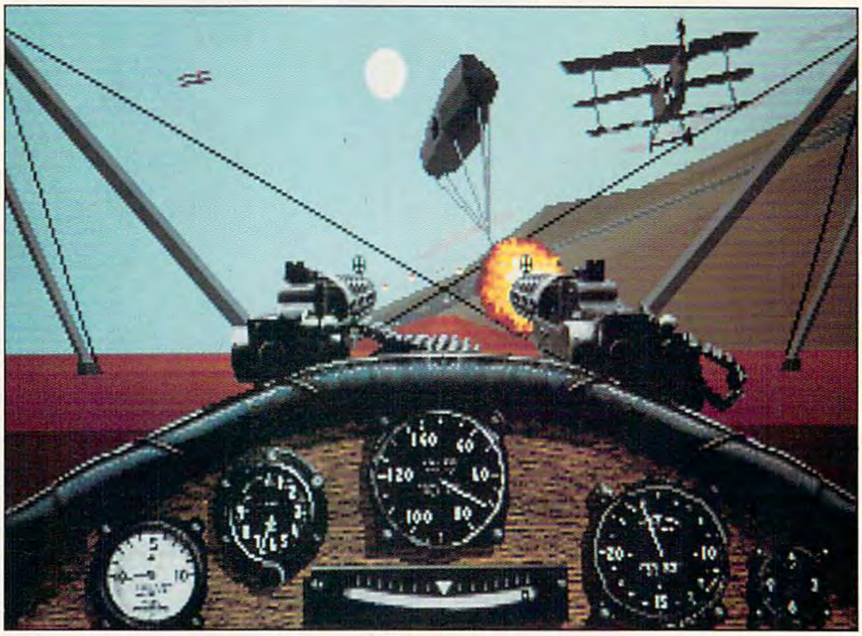
The first to reach the marketplace was *Blue Max*. This program sports one of the slickest introduction sequences I've seen, consisting of digitized photos and animated sequences. It's a pleasure to watch. But as stated in the documentation, this is not a true simulation—it's really more of a simulation/arcade hybrid. It would've been nice to put that on the box as well. *Blue Max* has the features found in most simulations, including multiple outside views, several choices of planes to fly, a VCR function, and a campaign mode. But the flight characteristics of the game are so far removed from reality that *Blue Max* takes on a pure arcade game feel when the planes are in the air.

However, *Blue Max* offers several things not found in either of the other two simulations. First is a split-screen two-player mode that allows two players to dogfight head-to-head on the same computer or fly as a team in a two-player campaign. While this is not as much fun as a modem option, letting two people play on the same machine is a real plus. Since this game is not very hard to learn, you should have no trouble finding opponents or wingmen. The main problem with this mode is that it's very awkward when both players have to use separate sides of the keyboard and when one gets the joystick and the other the mouse; inevitably they're unevenly matched.

The other unique feature found in *Blue Max* is a strategy game mode. This combines simulation with board game; players take turns moving planes on a hex system playing board. While this may not have wide appeal, it will be enjoyable for serious board gamers.



Knights of the Sky **takes out another enemy ace.**

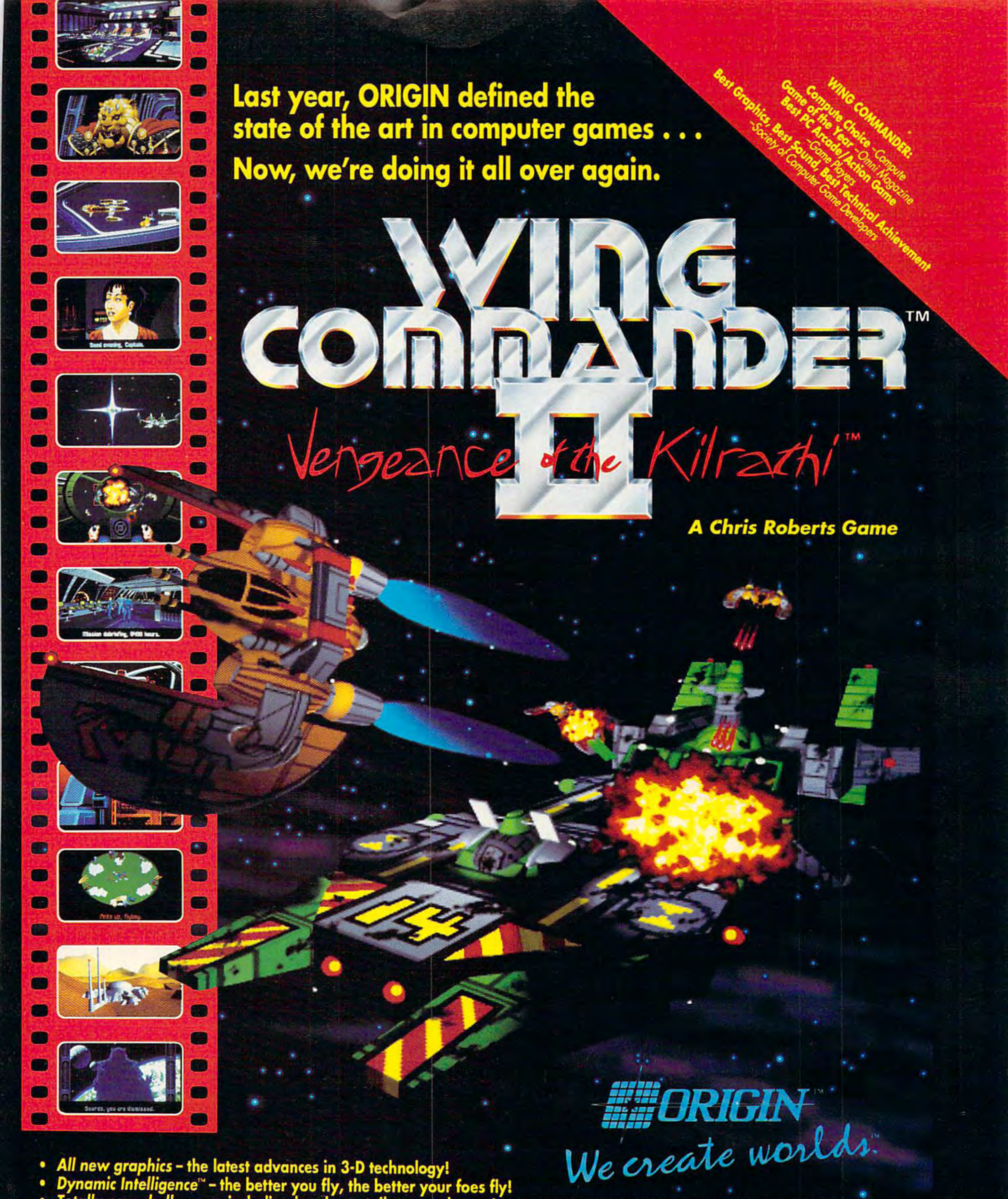


Make films of your dogfights with ***Red Baron.***

The next to make it into the fray was *Knights of the Sky* by MicroProse. As expected, this one lives up to the high standards of a MicroProse simulation. With 20 planes and a realistic flight model, *Knights of the Sky* is much more complete and realistic than *Blue Max*. A well-designed flight training mode with multiple difficulty levels helps get the new player off to an easy start. Learning to handle these low-tech aircraft and navigating by looking out of the cockpit takes a little getting used to, but soon enough you'll be ready for more of a challenge. The Dogfight option will provide you with plenty of challenges.

Choose a famous German ace as an opponent, and test your skills in close combat. But as much fun as the Dogfight option is, this game really shines in the World War I campaign mode. Of the three World War I sims, this game has the best campaign option. Your goal is to become the top ace of the war—the Ace of Aces—and to do that, you've got to stay busy in the air. News reports between missions on how the other great aces are doing add continuity and purpose to your campaign. If another ace has a big lead on you, follow the news to find out where he is, and go after him!

Ground-attack missions are assigned, as are the expected air-combat missions. Dropping a bomb by hand out of the cockpit requires a whole new set of skills when you're used to the smart weapons of the jet age.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Mission debriefing, 0400 hours.
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Features Chart

Feature	Blue Max	Knights of the Sky	Red Baron
VGA 256 color	yes	yes	yes
Play both sides	yes	no	yes
Copy protection	none	manual-based	none
Number of planes	8	20	28
VCR recorder	yes	no	yes
Instant replay	no	yes	no
Historical missions	no	no	yes
Campaign mode	yes	yes	yes
Modem option	no	yes	no
Ground attacks	no	yes	no
Balloon busting	yes	yes	yes
Famous aces	no	yes	yes
External views	yes	yes	yes
Medals/promotions	yes	yes	yes
Rudder controls	no	yes	yes
Variable-detail level	yes	yes	yes
Mouse support	yes	yes	yes
Multiplane squads	yes	no	yes
Customize aircraft	no	no	yes
Board-game mode	yes	no	no
Damage accumulation	yes	only in upgrade	yes
Start near action	no	no	yes
Quit without landing	no	no	yes

Another very interesting feature is the unexpected side action that can occur during missions. On your way home from battle, it's not unusual to spot a group of German aircraft about to pounce on a friendly observation balloon. Your gallantry would certainly be questioned if you didn't step in to lend a hand!

The VGA graphics and sound support are strong, and as if that weren't enough, they're topped off with a head-to-head-play modem option that saves you from connection headaches. Competing against a real live human adds a whole new level of enjoyment to the game.

Knights is not without its share of problems, however. Most notable is the fact that a single shot can kill you or your enemy. Such a clamor was raised over this feature that MicroProse has made an update available. The update not only takes care of this problem by adding degrees of damage, but it also includes some improvements to the already outstanding campaign mode. With the upgrade there will be even more action around you and friendly aircraft that may come to your aid. The upgrade is available directly from MicroProse, or it can be downloaded from either CompuServe or GEnie online services.

Red Baron, by Dynamix, was the last to arrive on the scene, but it was well worth the wait. *Red Baron* makes full use of 256-color VGA in both the user interface screens and the flying action. The interface uses numerous digitized photos and a very polished point-and-click system for making menu choices.

This game allows the player to fly any one of 28 aircraft and to fly for either side. The flight characteristics of each plane are very accurately portrayed, and each plane even sounds different. Strapping into a Fokker D.VII late in the war is a big change from flying the early Fokker E.III Eindecker and is certainly likely to boost your number of kills.

Since this is up-close combat, the level of detail shown is very important. *Red Baron* certainly leads the pack in this category. You should have little difficulty in identifying the other aircraft in the sky around you.

As in *Knights of the Sky,* you can choose to dogfight with the famous aces of the day. But here you have many more options. If British ace William Bishop is constantly ripping you up, put him in an old Airco D.H.2 and see how well he does. Flying against these famous aces is a real treat, since they're programmed to respond in the flying style of the real pilot. The artificial intelligence of the enemy pilots is the best I've seen in any air-combat simulator. The bad guys do much more than just fly around in circles—they can put some real moves on you.

A campaign mode is also included and is well done. Because of the repetitiveness of some of the missions, *Red Baron* isn't as much fun as *Knights of the Sky,* but at the same time, it's probably more realistic. In *Knights,* you can frequently get eight or nine kills in a single mission, whereas in *Red Baron* you feel lucky if you get one or two kills and make it back alive.

Red Baron sets a new standard for VCR-type mission recorders. You can record the entire mission and save it for playback later. And the playback is really slick. You can switch to an infinite variety of internal and external views, and a full range of editing features makes it possible to play movie director and put together a very entertaining "film" of your favorite encounters. These can also be shared with others. A number of great *Red Baron* movies are available for downloading on many of the online services.

Red Baron does have a few shortcomings. One is the lack of a modem option for head-to-head play. Another is the inability to land anywhere other than an aerodrome. Although the incremental damage feature and the ability to be wounded rather than be killed outright are great options, it would be nice to be able to set the plane down in an open field when in trouble rather than being forced to crash-land somewhere.

Counting its graphics, attention to detail, historical accuracy, sound quality, and mission recorder, *Red Baron* comes out on top in this three-way dogfight. But the upgraded version of *Knights of the Sky* may be the better choice for those interested in head-to-head modem play.

RICHARD SHEFFIELD

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IBM PC and compatibles; 512K RAM for CGA, EGA, Hercules, 640K RAM for MCGA, VGA, Tandy 16-color; joystick or mouse optional; hard drive recommended; supports Ad Lib, Sound Blaster, and Tandy sound cards—$49.95

Also available for Amiga—$49.95

Knights of the Sky
MICROPROSE
180 Lakefront Dr.
Hunt Valley, MD 21030
(800) 879-7529

IBM PC and compatibles; 512K RAM; CGA, EGA, VGA, Tandy 16-color; hard drive and mouse or joystick recommended; supports Ad Lib, Sound Blaster, Roland MT-32, and Tandy sound cards; modem option requires Hayes-compatible modem, 1200 baud or higher—$59.95

Red Baron
DYNAMIX
Distributed by Sierra On-Line
P.O. Box 485
Coarsegold, CA 93614
(800) 326-6654

IBM PC and compatibles (10 MHz or faster recommended), 640K RAM, EGA or VGA, high-capacity disk drive; hard drive and joystick recommended; supports Ad Lib, Sound Blaster, Roland MT-32, and LAPC-1 sound cards—$59.95

64/128 VIEW

TOM NETSEL

In the recent Readership Survey, I asked you how you use your computers. Personal home finances, games, education, and word processing are the big four computing activities among Gazette readers. Programming and using databases and other application programs for home or office also are popular.

Some of you went into detail about how your 64 or 128 plays an important part in your daily activities. One reader in Maine had quite a list: letters, labels, budget on a spreadsheet, stamp inventory, household inventory, name-and-address databases, family newsletter, games, family tree, greeting cards, horoscopes, biorhythms, amortization schedules, and Christmas name tags with a graphic clue as to the contents of the package. "With all this and more, who needs an Amiga?" he asked.

A reader from Kansas City, Missouri, who's employed by a large greeting card company uses three 128s and nine disk drives at home to support his work at the office. *GEOS* handles about 99 percent of his chores.

We received surveys from all across the country, Mexico, and Canada, plus a good number from Australia and New Zealand. A subscriber in Sweden had trouble finding software for his 128 until he discovered Gazette and started buying items by mail. He uses his computer to keep track of the addresses of friends and relatives and members of his radio club. He says his 128 is also useful for creating party and fox-hunting invitations.

A good many use the 64 for interesting and unusual applications. One Canadian reader uses his to pick lottery numbers, although he didn't say if it helped select *winning* numbers. Another reader has two 64s at work connected to a magnetic-strip reader that controls the electronic locks on two doors. These security-conscious computers have been on the job 24 hours a day since 1985.

If you put your 64 or 128 to an unusual use, why not tell us about it? Describe your application in 500 words or less and send it to me on disk (Commodore ASCII) or printed double-spaced. I'll print the more interesting items in this column or in a separate article. Be sure to include your name, address, and telephone number, preferably one where you can be reached during the day. Send them to Gazette Editor, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

In the survey, I also asked you what you'd like to see in Gazette in the way of articles and programs. Your suggestions covered everything from more beginner material to more advanced programming information. Some wanted more games, while others asked for anything but games. Requests covered the software spectrum.

Games are popular, but many of you want more application software. You want programs that will make your life simpler, tackle some job around the home or office, or control appliances. There were many requests for programs that you could use with hobbies, such as amateur radio, photography, or baseball cards.

In June we published *CoilCalc,* a CAD program for designing coils for electronic circuits. We liked *CoilCalc* but felt it would appeal only to ham radio operators. I would appreciate your comments on this type of program. Should we publish similar niche applications or stick to programs with more universal appeal?

GEOS is another area of strong interest. Since many of you asked for *GEOS*-related programs and articles, I'm seeking qualified writers and programmers to supply material. Several *GEOS* columns are already in the works and should be ready soon.

Here's your chance, programmers. Games, *GEOS* programs, and application software for the 64—and especially the 128—are in big demand. Send your programs, with instructions printed out and saved on disk, to Gazette Submissions Reviewer at the above address. We want to purchase and publish your programs. ⊡

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NEWS & NOTES

What's New on Q-Link?

Interactive game players and casino fans have something new to check out on Quantum-Link. *Puzzler* is a word game for two to four players. Contestants spin a slot machine and guess the letters in a puzzle that appears on the tile board. Correct guesses cause the corresponding tiles to turn, revealing their location. The object of the game is to solve the puzzle before your opponents do and to earn as many points as possible in the process.

Players appear as animated contestants behind podiums. Online and offline character editors are available for Q-Link members to design and animate their own contestants. They can also create and submit their own puzzles for inclusion in the game's database.

Puzzler, Puzzle Editor, and *Contestant Editor* can all be downloaded from the Backstage Puzzler support area in Just for Fun. Other information and instructions can be found there, also.

Q-Link has also added enhancements to its four popular casino games. These new tools give the casino staff the opportunity to change the stakes in *Blackjack, Poker, Bingo,* and *Slots.* In addition, they have two new options in *Bingo*—the new Cover All game, where the entire card must be covered, or the standard Straight Line play.

In order to make distinctions between the kinds of games being played and the amount of Q-Chips needed to register or ante, check the color of the background screen or the dealer's hand. Various screen colors identify the different games and amounts. Check with Q-Link for complete details.

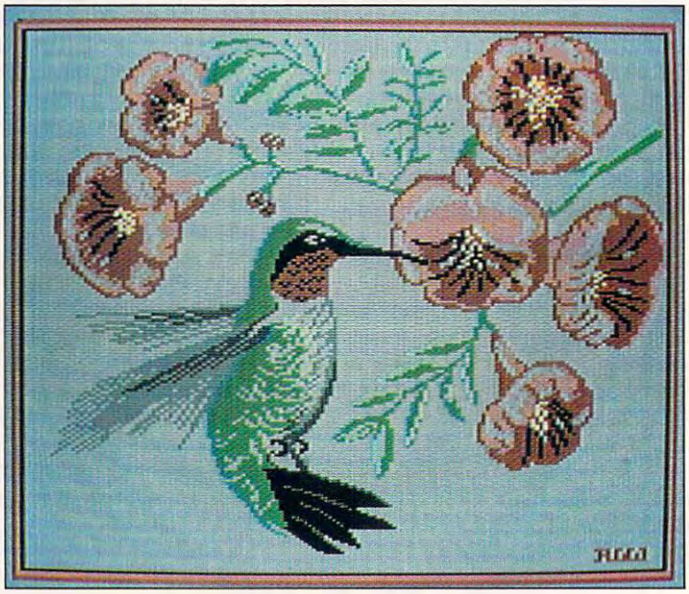
Quantum-Link (8619 Westwood Center Drive, Vienna, Virginia 22182; 703-448-8700) is a Commodore 64/128–specific online service.

Tee Up!

Are you an average golfer aware of your imperfections? If so, then check out *Personal Pro* ($39.95) from MicroLeague Sports (2201 Drummond Plaza, Newark, Delaware 19711-5711).

This interactive instructional golf package, which is due out in October, analyzes, diagnoses, and corrects your problem areas. *Personal Pro* displays animated diagrams of problems and solutions, records a file of your personal golf history, and prints out problem/solution checklists that you can take with you to the course or practice tee.

Unlike ordinary golfing manuals and instructional videos that try to teach you how to build a perfect swing—someone else's swing—*Personal Pro* is designed for the average golfer. It reviews the mistakes of each round and offers instant advice on how to correct them. Handicapping disks will also be available.



Hummingbird

***Hummingbird* by Robert Woodall of Rural Hall, North Carolina, is this disk's Picture of the Month.**

Each month *Gazette Disk* features a collection of the best 64/128 artwork submitted by our readers. We pay $50 for each piece of art we accept for "Gazette Gallery" and an extra $50 for the one selected as Picture of the Month. Send original art to Gazette Gallery, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

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NEWS & NOTES

Color Me Ninja

Those turtles are back! Merit Software (13635 Gamma Road, Dallas, Texas 75244) has released *Teenage Mutant Ninja Turtles' World Tour* ($14.95). This Electronic Crayon Deluxe release contains 30 pictures of those reinforced reptiles visiting famous world landmarks such as the Statue of Liberty, Mount Rushmore, and Stonehenge.

Children can color each picture again and again. They can also print banners, as well as posters and calendars, of their favorite turtle scenes.

Bible Study

SOGWAP Software (115 Bellmont Road, Decatur, Indiana 46733) is now shipping *Bible Search* version 3.1 ($79.95) for the 64 and 128. *Bible Search* is designed for general Bible study and in-depth Bible research. Its versatile search option can find any word or verse in the Bible in five seconds or less using a 1541. No hard disk or additional RAM is required for this fast performance.

Bible Search comes on seven double-sided disks with both 64 and 128 programs. Nearly 4.5 megabytes of Old and New Testament ASCII text has been compressed and indexed for use.

Other features include instant spelling check of the entire word list of more than 12,800 words. Search features include pattern matching, plus AND, OR, and NOT Boolean operators. Text can be displayed and scrolled in any direction. Printer and disk output are available for any verse. Disk output produces standard sequential text files for use with word-processing programs.

Bible Search is available in either the Authorized King James Version or the New International Version. It includes programs for the 64 and 128, a user's guide, and a disk storage case.

Trouble with a Capital *B*

UBI SOFT and Electronic Arts (1820 Gateway Drive, San Mateo, California 94404) have released *B.A.T.,* which stands for the Bureau of Astral Troubleshooters. You become one of the bureau's agents as you try to save the planet Selenia's only city, Terrapolis, from extinction.

Vrangor, a top scientist, and Mergio, a small-time crook, have announced their intention to set off bacterial bombs all over the city. This ultimatum leaves the government only ten days to evacuate the city and draw up a deed of ownership in Vrangor's name. Selenia contains vital energy matter that makes space travel possible. It's up to you to try to foil Vrangor's evil plans.

In this game, which comes on two double-sided disks, you can visit more than 1100 different locations, including discos, gunsmiths, restaurants, arcades, and parks. You can also program a computer implanted in your arm to understand extraterrestrial languages or to warn you when enemy robots approach. Create your own character or select one ready to go into action. You can also pilot the DRAG, a genuine flight simulator, across the planet's desert.

New Distributor

The *DMBBS* bulletin board program for the 64 or 128, formerly owned and distributed by ARTISoft, is now owned and distributed by A & C Enterprises, P.O. Box 71, Beachwood, New Jersey 08722-0071; (908) 349-9187 (voice), (908) 341-0945 (BBS).

How McFly Times

You won't need a DeLorean to take Marty McFly and Doc back and forth through time in this game. With a little help from Konami (900 Deerfield Parkway, Buffalo Grove, Illinois 60089), all you'll need is *Back to the Future II* ($29.95) and your 64.

Go back to 2015 to help save Marty and Jennifer's kids from themselves, the police, bully Biff and his gang of hoodlums, and Griff—Biff's evil grandson. You'll have lots of "items o' energy," "products o' points," and momentum boosters like plutonium, beverage cans, and your trusty tennies.

Featuring authentic re-creations of scenes and items from the film, *Back to the Future II* is really five games in one with each level—such as Jennifer's House of Fate and the Chase of a Lifetime—depicting a new chapter in the story.

Levels 1, 3, and 5 include arcade action where you'll need your hovercraft to fend off Biff's band of thugs. Levels 2 and 4 are logic puzzles that test your memory and ability to anticipate events. If you've seen the movie, you're one step ahead.

In Orbit

Edgeworth Software (44 Bower Street, Bedford MK40 3RE, England) has announced *E.S. Realorbit* ($7), a gravitational orbit simulator. Use your thruster jets to steer a spacecraft through a star's gravitational field. Try to achieve circular and elliptical orbits; then maneuver through a double star system. You can trace orbits and select jet power, star mass, distance between binary stars, and colors with this entertaining and educational simulator.

Edgeworth Software has recently left the U.S. and opened shop in England. Simon Edgeworth assures his 64/128 customers that all his products are still available and will remain compatible with U.S. computers. He accepts U.S. funds, either check or money order, and will ship all orders by airmail at no extra charge.

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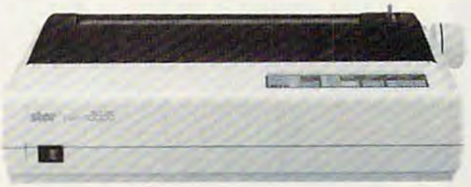

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MIRIAM SCHOTTLAND

Spotlight on Adventure

RUSS CECCOLA

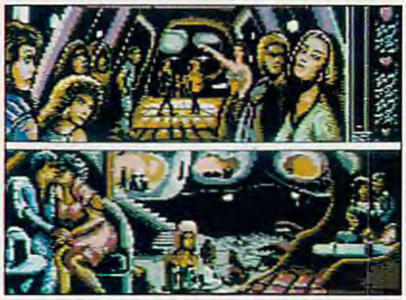
MAGICAL KINGDOMS AND MYTHICAL CREATURES ARE JUST A FEW OF THE EXCITING PLACES AND THINGS AWAITING STALWART PLAYERS OF ADVENTURE GAMES

Adventure games make up almost a third of the game releases for all computers. Arcade/action games make up another third, and the remaining third is divided between sports and simulations. These percentages apply to 64 software as well. Let's take a look at the interesting adventure-game segment of the industry and see what's happening.

Because of their complexity and the demands they can make on players, adventure games are not for everyone. Still, there are some recent games that deserve mention. *B.A.T.* from UBI Soft, *Bill & Ted's Excellent Adventure* from Capstone, and *The Keys to Maramon* from Mindcraft are all fun games that cover a broad range of subject matter and difficulty levels. True adventure fans will want to check out several SSI releases and the latest from Origin, *Ultima VI.*

Save the City

B.A.T. stands for Bureau of Astral Troubleshooters, of which you are a member. Your job is to save the city Terrapolis on the planet Selenia from destruction at the hand of Vrangor, a mad scientist, and his crooked sidekick, Merigo. This evil duo plans to detonate nucturobiogenic bombs within ten days unless the city and all its assets are turned over to them.



Visit more than 1000 locations in *B.A.T.* and interact with seven species.

The game has a futuristic setting and an unusual interface that actually works well. *B.A.T.* is played with a point-and-click interface that uses menus and icons. In addition, items found in the game can be examined by clicking on them. Indeed, only by examining everything you see on the screen will you be able to play *B.A.T.* successfully. The game is huge. The game box claims 1100 rooms, and from what I've seen, this figure could be accurate. This variety keeps *B.A.T.* interesting for hours.

The first thing you do in *B.A.T.* is create your character. As is not the case in a lot of other games, your alter ego in *B.A.T.* is extremely well developed. It takes a while to set up your character, but the time spent will surely result in a better representation of yourself. In addition to all of the standard adventure-game options that can be brought up in the menus, you also have access to B.O.B., a bidirectional organic bioputer that connects to your arm. B.O.B. lets you translate languages and examine your statistics and health. You program B.O.B. with a rudimentary language that will inform you of various conditions and enable it to perform other functions.

The graphics in *B.A.T.* are pretty good for the 64. And even after you've managed to defeat Vrangor, you can still have fun exploring the city.

Adventure Calls

Bill & Ted's Excellent Adventure is primarily a movie tie-in, but the game is still worthwhile because of its random elements and the different skill levels allowed. In this game, you control the title characters as they attempt to collect "historical dudes" from the past for a school project. Different skill levels determine how many people you must collect. As you gather these historical characters, you return them to the San Dimas Mall. When you've gotten your quota, you take them to school.

You control Bill and Ted from a three-dimensional side view, using a telephone booth and circuits of time to travel throughout history. Some of the destinations involve completing arcade sequences. Others only require the use of a correct object to attract one of the "historical dudes." The quicker you reach your goal, the more points you earn.

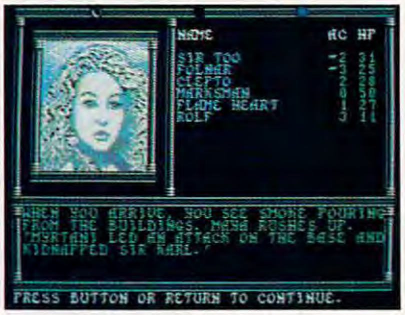
I'll be honest. The graphics in *B & T* leave a lot to be desired. The 64 can handle better. Music and other sound are almost nonexistent. The game does not look appealing, yet gameplay is addictive. I found myself wanting to play *B & T* again at a higher difficulty level to see how quickly I could finish the game. Because each game of *B & T* is different, it's worthwhile playing again and again. A typical game doesn't take very long. *B & T* is a great diversion, if you don't mind graphics that look like they were poorly ported from the IBM version.

Rampaging Monsters

Mindcraft has a different way of thinking about adventure games. Its games take almost no effort to play yet have a lot to make them interesting. In fact, much about *The Keys to Maramon* is not evident on the surface. The manual is brief and explains only the basics. The rest of the game is left for you to discover. You can almost play *Keys* without reading the instructions at all, but it's still wise to go through them.

Keys puts you in the role of an adventurer who must save the town of Maramon from the monsters that rampage every night after dark. The game takes place in town and in the dungeons beneath. It requires a quick hand and well-balanced character to confront the monsters.

The game takes place in pseudo realtime. You have 12 hours to kill all of the monsters each night, or a building will be damaged. If they do too much damage to the town, the game's over. Budgeting your time is important, so don't think too long while the clock is ticking.



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NAME                AC HP

SIR TOO             -2 31
FOLNAR              -3 25
CLEPTO               2 28
MARKSMAN             0 50
FLAME HEART          1 27
ROLF                 3 11

WHEN YOU ARRIVE, YOU SEE SMOKE POURING
FROM THE BUILDINGS. MAYA RUSHES UP.
"MYRTANI LED AN ATTACK ON THE BASE AND
KIDNAPPED SIR KARL."

PRESS BUTTON OR RETURN TO CONTINUE.
```

***Champions of Krynn* cuts unnecessary violence from many of its scenarios.**

Keys is a fast-paced game. You have potions and herbs to increase speed, strength, dexterity, armor, and life points. As the nights wear on, you'll need these aids to help you clear the town. Character interaction in the game is limited to conversation, but most people you encounter will offer valuable information. This moves the plot along.

You move your character around from an overhead view of the town and dungeons. Movement is quick and smooth. The graphics are nice, and you can easily identify each object and monster. After a couple of nights pass, you will know the town well enough to put away the map in the manual. *Keys* is not very difficult and can be played rather quickly. Exploring Maramon and discovering new things makes *Keys* enjoyable.

Advanced Dungeons & Dragons

One company that still supports the 64 is Strategic Simulations, Incorporated, more popularly known as SSI. With over ten years in the business and a large library of titles, SSI has journeyed through time with Commodore computers. In the past two years, SSI has produced a number of fine role-playing adventure games for the 64, most of which have been in its Advanced Dungeons & Dragons line of

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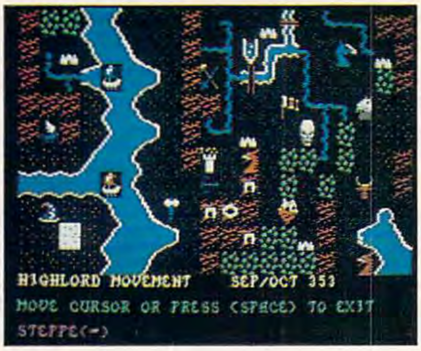
games. Using different-colored boxes to represent different types of AD & D adventures, SSI has a good variety of adventures.

The gold boxes contain large role-playing epics. Avoid two early games, *Pool of Radiance* and *Curse of the Azure Bonds,* unless you like an inordinate amount of combat. Two later games, *Champions of Krynn* and *Secret of the Silver Blades,* eliminate unnecessary combat and significantly improve the interface.

The two silver-box products are action games, with less role-playing elements and more arcade elements. Both are good, but *Dragons of Flame* is a big improvement over *Heroes of the Lance.*

War of the Lance in the green box is a war game in the fantasy world, so don't be deceived. The white-box game, *Hillsfar,* combines arcade and role-playing elements in a game with low difficulty and high fun factors.



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HIGHLORD MOVEMENT     SEP/OCT 353
MOVE CURSOR OR PRESS <SPACE> TO EXIT
STEPPE(-)
```

SSI's *War of the Lance* is a war game set in the world of fantasy.

Finally, SSI's latest AD & D game is *Dragon Strike,* a dragon flight simulator in the Dragonlance gaming world. It's more arcade game than anything else; don't let the word *simulator* throw you. If AD & D games aren't your bag, try some of the older SSI titles, like *Phantasie, Wizard's Crown,* and the Questron series.

Lord British

Origin has also been a strong supporter of the 64. Almost all of its past games have been converted from IBM versions or developed on the 64.

Given the amount of time and resources required to develop adventures on the scale of Origin's Ultima series, it came as a surprise to me when Origin announced *Ultima VI* for the 64 before it released the Amiga version.

The Ultima series is one of the most popular adventure game series, and much of the credit for that success is due to the creativity and imagination of chief designer Richard "Lord British" Garriott. Each game in the series has far surpassed the previous one in most areas, including size, plot, interface, and graphics. *Ultima VI* is no different in this regard. As far as 64 adventures go, *Ultima VI* is at the top. This game can take months to explore, and all the time you're getting your money's worth. That's value.

Through a Moon Gate

In *Ultima VI,* your character must stop the spread of gargoyles that have slipped through a moon gate into the realm of Britannia. That's the basic plot, but more unfolds as you enter the game. Britannia is about as large as it was in *Ultima V,* but this time, instead of playing the game on two scales, you play it entirely from an overhead view of the characters and their surroundings.

The graphics are smooth, and it feels more natural to move around in one scale than it does in previous Ultima games that only show the individual characters in towns, dungeons, and other buildings. The past games jump to a map view of the game whenever the party travels into the wilderness. Because you can't see far ahead in *Ultima VI,* the cloth map comes in handy.

In addition to the overhead viewpoint, the objects and other graphics in *Ultima VI* are very nice. You can't distinguish objects in your inventory as well as you can larger objects in rooms, but this is no problem since you can examine objects effortlessly.

The interface in *Ultima VI* is an improvement over that in earlier episodes. Unlike the IBM version, which employs icons for all of the game commands, the 64 version requires keystrokes for commands. However, the number of commands has been reduced by the addition of a Use command, which replaces many others.

To use an object, just hit the U key and move the crosshairs to select an object from your inventory or one next to your character. This is the way to open doors, move levers, throw switches, and equip your character with weapons, armor, and other items necessary to survival and success.

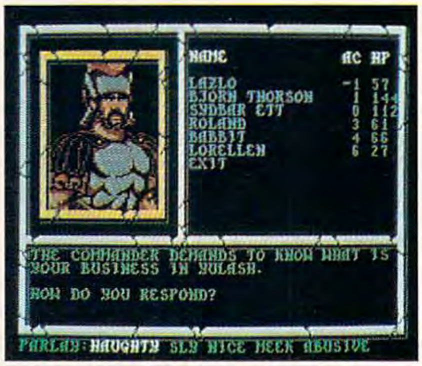
Old Friends Return

Accompanying you in *Ultima VI* are characters from past games, namely Shamino, Iolo, and Dupre. Lord British starts you on your quest and can be consulted at any time for information. Object manipulation is easily accomplished from an inventory screen that readily identifies which object your character is carrying and which ones are nearby. It is best to distribute supplies to each character so no one is weighed down and you don't have to keep switching objects.

When the time comes, it's easy to fight in *Ultima VI.* Just choose a combat option and use the cursor to select a monster. Each monster has its own representative theme.

Ultima VI is a game chock full of characters, objects, locations, and dungeons. Characters follow a certain daily pattern. Some game objects are hidden behind paintings, under plants or crates. Discovering new things is what *Ultima VI* is all about.

You may never finish the game because of its size and scope, but designer Garriott doesn't care. (He'll give you a synopsis of this game in the manual of his next one.) Garriott believes it's more important for you to enjoy yourself exploring a rich world full of adventure. He's confident that there is much that you can do and gives you lots of room for discovery and pleasure.



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NAME                 AC  HP
LAZLO                -1  57
BJORN THORSON         1 144
SYDBAR ETT            0 112
ROLAND                3  61
BABBIT                4  66
LORELLEN              6  27
EXIT

THE COMMANDER DEMANDS TO KNOW WHAT IS
YOUR BUSINESS IN YULASH.

HOW DO YOU RESPOND?

PARLAY:HAUGHTY SLY NICE MEEK ABUSIVE
```

SSI's *Curse of the Azure Bonds* is a role-playing epic filled with combat.

Ultima VI meets Garriott's criteria, and the game may be the largest adventure for the 64. It definitely is the most ambitious. Disk swapping is kept to a minimum in order to decrease the frustration factor. Sounds are appropriately scattered throughout the game, and the music is infectious. What results is a graphically rich world, full of places to go and things to see, where you can escape for minutes or hours. Plus, if you act now, you can probably still get the Special Edition of the game, celebrating the tenth anniversary of Ultima. This version is signed by the author and box artist. It contains an audio cassette of the history of Ultima narrated by Garriott and a higher-quality gemstone than that found in regular versions.

As you can see, adventure gaming for the 64 is alive and well. These are just a few of the many games out there. *Ultima VI* is my favorite, but the others are all fun and can be completed in a reasonable amount of time. In any case, if you're looking for a quest, try an adventure game. They're better than they were just a year ago. Happy questing! ◘

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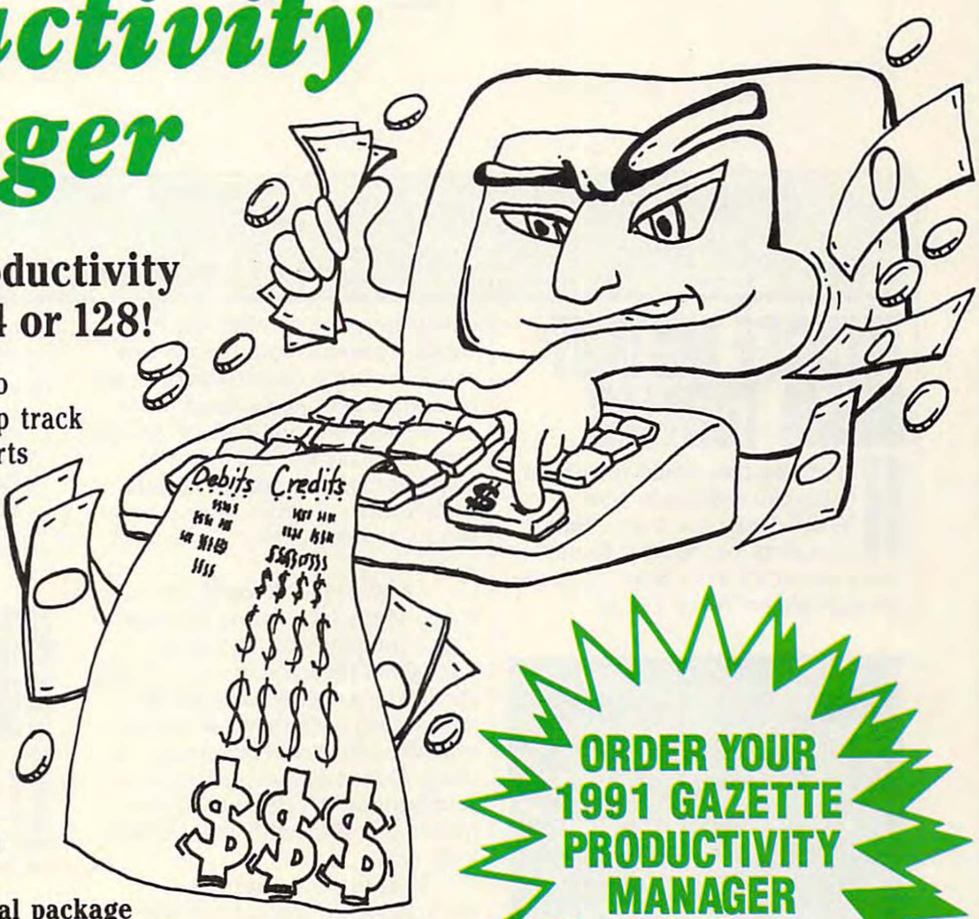

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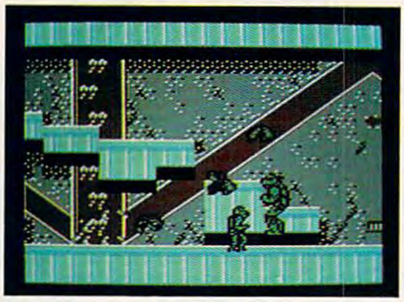
TEENAGE MUTANT NINJA TURTLES

Hey, dudes, how would you like to battle evil enemies in New York's dangerous sewers? Sure it's a dirty job, but that doesn't mean you won't enjoy playing Ultra's *Teenage Mutant Ninja Turtles.*



Based on the famous movies, TV show, and comic books, this action-packed arcade game will give you hours of enjoyment. Raphael, Michelangelo, Leonardo, and Donatello are ready for your control. As the game begins, you must help these four pizza-loving turtles rescue their beloved friend, April O'Neil, who was abducted by the evil villain Shredder. You must rescue April, destroy Shredder, and take his life transformer gun to win.

Along the streets and sewers of New York, you guide the turtles to where April may be held hostage. You control their every move. Many evil creatures lurk about, so be prepared to fight. Mousers, Roller Cars, Foot Clan Soldiers, and many more foes are waiting to capture your reptilian warriors. Some enemies are easily destroyed, while others are not.

Strategy is important. Each of the four turtles has unique skills and weapons. Thus, one turtle may be better able to handle a particular enemy or situation than another. For example, Leonardo would be the best choice for battles in the sewers, since he's expert at using a Katana Blade.

Besides the multitude of enemies, there are many useful items to be found during your quest. These include various weapons, rope, a party wagon, and best of all . . . awesome pizza!

An information screen can be accessed at any time during the game. This important screen will help you throughout the game, and you should check it on a regular basis. Turtle information includes those who are available and what weapons they are using. There's also a map that shows your position. Messages from your friends give you useful hints on what to do next.

Your turtles must make it through six levels of combat without being captured. Each level has different phases to complete before you can move on to the next level. Looking at playability from this standpoint, the game can be rather difficult. Joystick movements for combat and travel throughout the game are, however, generally basic and simple. In this respect, I find the game easy to play.

After reading the short manual that comes with the game, you'll quickly be on your way to action and adventure. The manual is easy to understand and provides you with the necessary information. It tells you about the game controls, displays sample screens, lists the useful items to be found, and describes each enemy you will combat.

The sound and graphics are good. Most characters and items in the game are displayed clearly on the screen, and the background music is entertaining as well.

While it does not get high marks for plot originality, this arcade game is fun to play and provides many hours of entertainment. So, dudes, if you're up for some radical ninja action, just slip *Turtles* into your 64, grab your joystick, and go to town!

CHRIS STAWASZ

Commodore 64 or 128—$29.95

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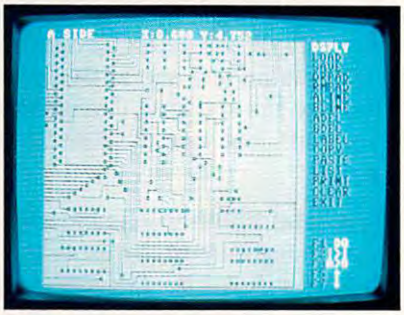
(708) 215-5100

PRINTED CIRCUIT BOARD-64

Once again, I've stumbled across a 64 program that takes that wonderful machine into an entirely new area: printed circuit board (PCB) design and layout. Although it lacks some of the power and options of PCB programs used in the work world, *Printed Circuit Board-64* from MicroSentinel Systems does an impressive job on a 64 or 128.



This program is designed for the electronics hobbyist. If you need to put together a simple circuit board for some home project, it should take no longer to enter it into the computer than it does to devise it in the first place.

I must make a confession. I make a living as an engineer, and I'm familiar with circuit boards from college classes and from fixing arcade games and pinball machines for my brother's

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former vending business. For this reason, I expected to have no problem with *PCB-64,* but I wasn't too sure about people who lack those skills. What I found is that the program is easy for anybody to use, regardless of level of experience. *PCB-64* is best suited for hobbyists and circuit-board designers who want to get a head start on a project at home without having to use the company computer.

The package contains two main parts: the Layout Editor and the Artwork Editor. The former contains the tools and options to create your printed circuit board. The latter lets you add text, tweak the pad, trace sizes, and optimize the sizes of all components. Both programs are very simple to learn. You almost don't have to use the concisely written manual. With each program, you see a portion of the circuit board in the viewing screen and a list of commands along the right side of the screen. Select these commands with the keyboard and draw with the mouse or joystick.

A circuit board consists of pads (terminal points), traces (wires), and components (integrated circuit chips, resistors, and so on). The purpose of PCB layout is to design the board to accommodate the most electronic components in the smallest space possible. You could almost make a game out of PCB layout, with the object being optimization of space using a certain number of components.

PCB-64 lets you design two-sided circuit boards that can be as large as 8.8 × 6.4 inches. An important feature of *PCB-64* is that it allows you to scale the board to meet the specifications of many types and brands of printers. With a paint program interface that gives you pads and traces to define a board, the program is complete.

The other big feature of *PCB-64* is a list that the program generates upon request of all of the labels associated with components and their coordinates on the screen. Although *PCB-64* is not a program many people would use, it's a great little niche product. It lives up to its claims and will more than meet the specifications of someone who needs a low-cost circuit-board editor.

RUSS CECCOLA

Commodore 64 or 128—$75

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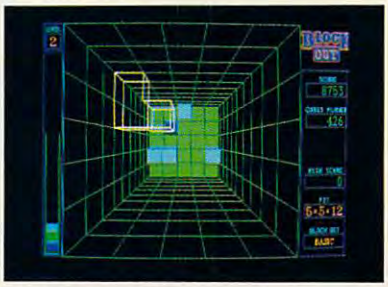
BLOCKOUT

For a perplexing challenge that exercises the brain instead of joystick reflexes, try *Blockout.* I highly recommend it to those of you who are looking for something more than just another shoot-'em-up.



***Block Out* will tax your hand-eye coordination. (IBM version pictured.)**

This game has a lot to offer—and it's not another *Tetris* clone. By taking the *Tetris* concept and making it three-dimensional, *Blockout* expands the old concept and takes it the next logical step.

As in *Tetris,* the object of the game is to drop irregularly shaped pieces into a pit. If you manage to fill a level across the pit, that level vanishes, and you win bonus points.

Sounds simple, huh? It's not. Simplicity disappears as you advance and the game picks up speed. Pieces that used to float into the pit like feathers begin to drop like stones. I was quite happy reaching level 5, the pinnacle of my *Blockout* career.

Blockout's graphics are relatively simple but more than adequate for gameplay. The blocks themselves are 3-D, starting out as rotatable wireframe objects that solidify into colored layers as they reach the bottom of the pit. Your goal is to fill a layer so that it can be removed. If the shapes pile up and reach the top of the pit, you lose.

Blockout expands on the *Tetris* concept by offering you a selection of three sets of blocks. The sets range in shape from the simple to the complex. Some of the predefined games are described as Flat Fun (flat blocks), 3-D Mania (3-D blocks), and Out of Control (abnormal blocks). You can create a pit of your own dimensions and make a custom game. Any of the three block sets (Flat, Basic, or Extended) can be used in your custom pit.

Parameters for rotation speed and sound can be customized. Practice mode lets you play *Blockout* without having the pieces fall into the pit, thus giving you time to get used to the keyboard controls. Demo mode lets your computer show you how to play. Help is available to display the game's controls.

Blockout keeps track of your score. The ten high scores for each kind of pit (dimensions and block set) are saved to disk. The game's playability is good, but a little less keyboard control would've been nice. While this isn't a great handicap, using a joystick to control the game would've made it easier to play. As it stands, the joystick is used only for the program's menus, and some of the menu options are not even available to the keyboard user.

One thing I can say about *Blockout* is that if you don't own it, get it. It's a most perplexing puzzle that will be a favorite for years to come. So toss out those boring shoot-'em-ups and head for the computer store. Pick this one up—you won't regret it!

DAVID W. MARTIN

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basketball court for fast action.

This program's excellent graphics and sound effects make you feel like you're right there on the court. You hear the clock ticking away and the referee blowing his whistle. You can see your teammates' positions as well as the opposing team's players on the court as they pass the ball. Cheerleaders appear at halftime to root for you. Best of all, you can see your points mounting on the scoreboard each time the ball passes through the hoop.

Double Dribble is a game for one or two players. However, for two players, you'll need a second joystick. Playing against the computer is quite challenging, since the computer can match your every move. As the game begins, use the joystick to select such options as the number of players, the amount of time for each of the four quarters, and the NBA team that you want to represent during the game. You also have the option of selecting one of three levels of difficulty. If you find that you want to change any of these settings during a game, you can do so with a touch of the f3 key.

Your joystick controls all aspects of the game, and you can move across the court in eight directions. By putting your player in the path of the player with the ball and pressing the fire button, you can steal the ball from your opponent. The joystick also lets you pass the ball to another player of your choice with the press of the fire button. To take a shot, just aim the joystick toward the hoop and press the fire button. It's that easy.

There are several types of shots that you can take. These include foul shots, three-pointers, jump shots, set shots, as well as three types of slam dunks. A closeup of these slam dunks appears in detail as a team scores. *Double Dribble* also follows the same rules and regulations as pro-style basketball. Your blocking or charging will give an opposing team member a chance at the free throw line.

Overall, I found this game to be quite challenging and entertaining. I didn't play like Michael Jordan or Larry Bird, but I did manage to score a few points. So if you love basketball, give *Double Dribble* a shot!

CHRIS STAWASZ

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FEEDBACK

QUESTIONS FROM OUR READERS

Missing Sections

From looking at the advertisers index in the February 1991 issue of *COMPUTE*, a reader would get the idea that there are both Amiga and Gazette sections in each issue, but there aren't. Why the discrepancy, and how often will a section turn up missing?

TODD MOORE
PIEDMONT, MO

This was explained last year in "64/128 View" (October 1990), but since there still seems to be some confusion, we'll repeat it. After General Media purchased the four magazines we produced at COMPUTE! Publications, the four were merged into one basic COMPUTE *magazine. There are different versions, however.*

If you are a Gazette subscriber, we send you COMPUTE *with the Commodore 64/128 material in the Gazette section. Amiga Resource subscribers get* COMPUTE *and the Amiga section. PC subscribers get* COMPUTE *with the PC section. If you subscribe to* COMPUTE, *you get* all *the sections, but* without *the Gazette type-in programs. For those people who may have several different computers, including a 64 or 128, we offer a multiversion edition that contains all the material, including the type-in programs.*

Until recently, the Gazette and Amiga sections were also available in the newsstand editions. Now they are available only by subscription and in certain computer stores: Babbage's, Software Etc., and Software Boutique. From time to time some editions may contain additional sections. Since we use the same advertisers index for all editions, you'll see the references to all the different editions. On occasion, subscribers may receive the wrong version. If this happens, please contact our subscription office at (800) 727-6937.

From *SpeedScript* to Amiga

I have been using *SpeedScript 64* for a number of years, and I have written a large number of files that I'd like to keep. I also own an Amiga 1000, and I would like to transfer these files to the Amiga. Unfortunately, the terminal program I have for the 64 doesn't seem to be able to transfer the *SpeedScript* files. What do you recommend?

MICHAEL W. BELL
ROCKFORD, IL

The problem of converting Commodore-specific text files to true ASCII (American Standard Code for Information Interchange) is a recurring one. The reason for making the conversion usually involves transferring files from one brand of computer to another. The 64 and 128 derive their character set from a time when ASCII wasn't the de facto standard it is today, and the big players took no pride in being compatible. Consequently, the 8-bit Commodores confuse upper- and lowercase, neglect common characters such as the brace and underscore, and even assign some odd character codes to the characters that they do have. The remedy is to run a program that converts Commodore character codes—commonly called PETSCII *after the original Commodore PET—into true ASCII.*

There are several such programs available, and usually they read from and write to sequential files. But SpeedScript *adds a little more complexity to the situation by using its own special codes for formatting, handling text itself in an atypical fashion, and writing program files instead of sequential files.* SpeedScript *does offer two ways around this problem. It will write PETSCII sequential files if you print the file to the disk by pressing Shift–Control–P and then D (for* disk*) at the prompt. If you press Control-£ and then the A key on the first line of your document and then print it to disk, the file will be saved as a true ASCII file and will be easy to upload.*

Screen Dumps and Errors

I have a 64 and a Cardco Card B interface. The Cardco manual has a screen-dump program, but it doesn't seem to work. Is there a screen dump available from any vendor? I need one for my BASIC programs.

Also, I have a Blue Chip (BCD 5.25) disk drive that gives erroneous characters when I add a spreadsheet or game scores. I have several spreadsheets that will not work. I would appreciate hearing from other people who may have similar problems with their Blue Chip drives.

DENNIS LONG
MANASSAS, VA

Cartridges, such as the Soft Group's Super Cartridge Explode V.5 and LMS's Super Snapshot V5, offer screen dumps and many more features. CMD's JiffyDOS also has a screen-dump option. Advertisements for these products can be found in recent issues of this magazine. If you have back issues of Gazette, *check for a type-in program called* PrintScreen *(December 1987). It also offered a customizer program for different printers. There was also a program called* Hi-Res Screen Dump *(October 1984) for 1525 or compatible printers.*

We have never heard of a disk drive's being responsible for erroneous characters in spreadsheets or game scores. Are you certain you've entered the formulas correctly? If any other readers have experienced similar problems, we'll be happy to pass their information on to you.

Nifty Jiffy

I was pleased to see Art Hunkins's favorable review of Creative Micro Design's JiffyDOS 6.0 in the December 1990 issue. It's a terrific system, but I have to take issue with him on several points.

First, his apparent horror at the idea of replacing soldered-in ROM chips. What's the big deal? I did it twice in old 64s. No sweat. Just use common sense and a good soldering tool to pull the ROMs, a low-watt iron to solder the new sockets, and gentleness when inserting the new chips. It's nothing that an experienced amateur or technician couldn't do in ten minutes. That's all it took me, and I'm no

FEEDBACK

whiz kid.

Second, save-with-replace routine. That command works fine in my machine. All I do is have the revised program in memory, hit f1 for the directory, cursor to the filename, insert three spaces between the open quotes and the filename, type @0:, hit f6, and then hit Return. It's quite convenient.

Third, validate and format speeds. They definitely are improved on my 1541.

I do have some minor bones to pick with CMD. I wish it had retained the function-key RUN and LIST commands as in previous versions and relegated TLIST and LOAD ML to program-mode commands.

Otherwise, all's great, and kudos to *COMPUTE* for the new design.

RICHARD VAN FRANK
MONTCLAIR, NJ

Once you have some experience with a soldering iron, removing ROM chips and soldering in new ones without damaging anything may not be such a difficult task. But it's not the place for a beginner to start. If you have a newer 64 with chips that slide in and out of their sockets, installing the JiffyDOS replacements is a snap. CMD recommends you check to see which type you have before ordering JiffyDOS.

Reader-to-Reader Help

I am desperate and don't know where to turn next. I am looking for a 36-pin plug so I can print documents in Epson mode for my SR 2000 Dual Interface printer. I have a 64 and a 1541 disk drive. Does anyone know where I can purchase this plug?

BOB CHALFANT
12229 SE 196TH ST.
RENTON, WA 98058-7518

The information about my modem was recently destroyed, so I wrote a letter to the company requesting a copy. My letter was returned, since the company apparently has gone out of business. Can anyone help me find an instruction manual for a Westridge Communications modem, model MFJ-1237?

GARY LEE REYNOLDS
15 DANIEL ST.
UNIONTOWN, PA 15401

Blasts from the Past

I read in one of your magazines that you could order a back issue of *COMPUTE,* but I was wondering if it's possible to order a full year's worth. Also, is it possible to get back issues of the disks?

ERIC SCHNEIDER
KILLEEN, TX

We have back issues of many magazines and disks, but supplies vary. If you contact Single Copy Sales, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408, (919) 275-9809 and specify which issues you want, we'll see what we can do. Back issues of magazines are $6.00, and disks are $9.95. There are no issues for July, August, or September 1990, as we did not publish during those months.

Final Help

This is in reply to David Richards' Final Cartridge III question in the February 1991 issue about the Help and Replace commands. There is a slight difference in the way the commands act in 64s with different ROM versions, but all commands work. Enter PRINT PEEK(65408) to see which version you have. I have computers with versions 0 and 3.

Help is useful in debugging BASIC. It lists the last executed line. Just enter HELP after pressing Stop or after an error occurs.

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FEEDBACK

It's nice when you can't see an error message onscreen.

Replace is my favorite command. It changes BASIC commands, numbers, or anything in quotes, excluding commas and quotation marks. For example, if you were to enter REPLACE "FOR J", "FOR K", it would change J to K in FOR-NEXT loops.

BRIAN KISSINGER
EVANSVILLE, IN

Software Resource

Here's a hint for your readers who want to find certain software for the 64, Amiga, Plus/4, VIC 20, or PET. It will also help you find the names and addresses of companies that produce that software. It's a book called *Software Information for Commodore Computers* by Menu. It can be found at public libraries. It's up to date and extensive.

JOHN REALING
SPOKANE, WA

You're right, John. We use it quite often. Menu, which is a division of Black Box, sold this 400-page directory to Commodore, which is now distributing it. If you would like to purchase a copy, write to Commodore—The Menu, Attention Customer Support, 1200 Wilson Drive, West Chester, Pennsylvania 19380. The cost is $12.95 plus $3.00 for shipping and handling.

Mangled Memory

I am working on a game program that uses redefined characters on the 64. The program also uses three-dimensional arrays. I have a problem with the screen elements turning to garbage after it runs for a while. A few reverse characters can be identified, but that's it. Can you help? Is it a problem with memory?

AL FREEMAN
MIAMI, FL

It sounds like you are experiencing a memory conflict. You've put new character shapes used in your game into a certain block of memory. As the program runs and uses different variables, BASIC stores these variables in the same memory where the character shapes are stored. This causes the individual character shapes to turn to garbage. Reverse character shapes are in the second half of the character set, so they are the last ones to be garbled.

The Video Interface Chip (VIC-II) handles all the video-related chores, including the display of character shapes. This chip can access only 16K of memory at a time. The default video bank is 0 (from location 0 to 16383), which means the screen, custom character shapes, and sprites must all reside in that same 16K block. Since a complete character set uses 2048 bytes, it's common to use the 2K at the top of the video bank for that purpose. This puts the custom characters at 14338–16383.

A 64's BASIC is built into a continuous section of memory. The 64 uses locations 0–1023 for its own purposes, and screen memory and sprite pointers occupy 1024–2047. The first byte available for BASIC is 2048. Read Only Memory (ROM) starts at 40960. So under normal circumstances BASIC controls the 38,911 bytes of the memory from 2048 to 40959.

What about the custom characters that are stored at 14336–16383? They are in the middle of the block of memory BASIC expects to use as its own. This is where the problem arises with your custom characters turning to garbage when your program runs. BASIC expects to use this area for its own purposes. As it uses more and more variables, memory fills up, and before long your character shapes have been overwritten by BASIC.

There are a couple of things you can do to get around this problem. Move the characters to another location, or move BASIC. Moving the character sets requires moving the video banks, which also means you have to move the screen and the HIBASE pointer at 648. If you do this, then you have to either disable the Restore key or avoid pressing Run/Stop–Restore. Most programmers find it easier to move BASIC to another location. To transfer the start of BASIC from 2048 to 16384 (which is just past the end of your character set), enter the following lines in direct mode before you load your program:

```
POKE 43,1:POKE 44,64: POKE
  16384,0: NEW
```

An ST Magazine?

First of all, I want to say that I'm not precisely happy with your decision to integrate Gazette into *COMPUTE.* Of course, I understand your decision, since there are fewer 64 owners; that means fewer subscribers. But I think you're going to lose more subscribers with this decision. Time will tell. Anyway, I'll probably renew my subscription, since I don't know of any good Commodore-only magazine other than yours.

The main purpose of this letter is not to complain, however. I've just bought an Atari 520 ST (I'll keep my good old 128), and I was wondering if you publish any ST-specific magazines or books.

JOSE LUIS REGUEIRO
MONTEVIDEO, URUGUAY

As 8-bit Commodore users upgrade to other systems, they also make changes in the computer magazines that they buy. It's true that Gazette doesn't have as many subscribers as it did when interest in the 64 was at its peak, but a more significant problem is the shrinking number of advertisers. For most publications to remain healthy, they must have advertisers as well as subscribers. Look at a Gazette from a few years ago and then look at this issue. Compare the number of ads for Commodore-related products.

By combining Gazette with COMPUTE, *which now has a PC focus (and more advertisers), we can somewhat offset the loss in 64 advertising revenue and yet still provide Commodore owners with the useful, entertaining, and informative material that they want.*

From 1986 until 1988, we published COMPUTE!'s Atari ST Magazine *with a companion disk. It failed to attract sufficient advertisers or a large enough base of subscribers to remain profitable. Back issues of the magazine and disk are still available. The price for each magazine and disk combination is $8. Foreign orders should add $6 for postage. To order back issues of any of our magazines, write to our Greensboro, North Carolina, address printed below.*

If you have a question, comment, or problem, we want to hear from you. Send your letters to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. ▣

PROGRAMMER'S PAGE

RANDY THOMPSON

This month "Programmer's Page" presents 128 programming tips—that is, programming tips for the Commodore 128 (not 128 tips). Got it? Good!

Taking It with You

Like to move to 64 mode without losing the current BASIC program? It's easy. Simply enter the following commands:

```
POKE 43,1
POKE 44,28
```

These POKE statements tell the 64 portion of your computer that the current BASIC program may be found in memory at 7169 ($1C01), the default location in 128 mode.

HENNING VAHLENKAMP
MATAWAN, NJ

Timely Program Saves

This utility programs one of your computer's function keys so that it saves the current BASIC program to disk. To keep successive saves separate, the elapsed time is added to the end of the program's filename.

When you run this utility, you are asked to enter a filename and a function-key number. As an example, enter MYPROGRAM, 5 (the 5 specifies the f5 key). Answer *Yes* at the RESET CLOCK prompt. Next, load the program you want to edit, make your changes, and then press f5. If 20 minutes and 32 seconds have elapsed, your program will be saved to disk using the filename MYPROGRAM 002032. Now let's say you make additional changes which take exactly 5 minutes. When you press f5, the program is saved with the filename MYPROGRAM 002532.

```
10 C$=CHR$(34):BL$="          "
20 INPUT "PROGRAM NAME,
   FUNCTION-KEY
   NUMBER";P$,K
30 P$=LEFT$(P$+BL$,10)
40 PRINT "RESET CLOCK?"
50 GET K$:IF K$<>"Y" AND
   K$<>"N" GOTO 50
60 IF K$="Y" THEN
   TI$="000000"
70 KEY K,"DSAVE"+C$+P$+
   C$+TI$+CHR$(13)
```

In addition to providing a way to differentiate between multiple versions of the same program, this utility also allows you to see how much time you spend between programming sessions.

JAMES A. SWIFT
ORLANDO, FL

HANDY
PROGRAMMING
**FOR THE
128 ONLY**

In Focus

To increase the readability of the 128's 80-column screen, try entering the following POKEs:

```
POKE 54784,9
POKE 54785,232
```

This smooths out the vertical appearance of the 128's slightly grainy 80-column character set.

JESSE SIEHLER
CUMBERLAND, MD

Undocumented Info

Although it's not mentioned in the 128 System Guide, you can use CTRL-S instead of the Scroll Lock key to pause screen scrolling. Press any other key to continue scrolling. Another undocumented keyboard tip is the ESC ESC sequence. Hitting the Escape key twice provides an alternative to the traditional ESC O sequence for canceling quote mode.

If you have a 128D or 128 with a ROM upgrade, enter the following instructions.

```
BANK15:FOR L=25589 TO
   25611:PRINT CHR$
   (PEEK(L));:NEXT
```

It reveals a secret message.

HENNING VAHLENKAMP
MATAWAN, NJ

Double-Spaced Listings

With the 128's expanded memory, programs can reach enormous lengths. Large BASIC listings can become quite a headache to debug, too. The following function-key definition can help out. After executing the code below, pressing the f7 key prints a double-spaced program listing to the screen.

```
KEY 7,"OPEN128,3:
   CMD128:LIST:CLOSE128:
   A"+CHR$(13)
```

Note the *A* at the end of the function-key string. This forces a syntax error which resets the computer's text output to normal, single-spaced printing. Without this *A*, strange side effects occur. If you'd like the option to list a specific range of program lines, use these function-key definitions:

```
KEY 7,"OPEN128,3:
   CMD128:LIST"
KEY 8,":CLOSE128:
   A"+CHR$(13)
```

To use these keys, press f7, enter the line-number range you want to list (or don't enter anything if you want to list the entire program), and then press f8.

ARTHUR MOORE
ORLANDO, FL

"Programmer's Page" is interested in your programming tips and tricks. Send all submissions to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We'll pay $25–$50 for each tip we publish. ◻

MACHINE LANGUAGE

CALCULATING HI-RES SCREENS

IT ALL ADDS UP

JIM BUTTERFIELD

Programming hi-res graphics on the Commodore 64 or 128 (in 40-column mode) has always been a mystery to newcomers. The most confusing thing about the Commodore hi-res screen is the fact that it isn't laid out the way you might expect. The eighth pixel on the top row of the screen appears next to the ninth, but they are actually eight bytes apart. As you might expect, plotting points on a screen like this can involve some pretty complicated math.

This month's column should make it crystal clear. Given X (0–319) pixels from the left of the screen, and Y (0–199) pixels from the top, the calculation goes as follows. Divide X and Y by 8 (keeping the remainders XR and YR). The quotients represent the row (0–39) and column (0–24) of the character cell in which the pixel is located. Multiply the Y quotient by 40 and add the X quotient; that gives the character cell number. Multiply this result by 8 to get the byte number for the start of the graphics cell memory; add YR to get the actual byte. The resulting number, from 0 to 7999, determines the byte within graphic memory. Add the graphics base to get the actual address. The XR value will tell us which of the eight bits will be involved.

It sounds complex, but it can be worked out neatly in machine language. Multiplying and dividing by 8 is just a matter of three shifts, left or right. Dividing by a value such as 8, the remainder is even easier: The AND function will extract it for us. Looking more closely, we see that a division by 8 is followed by a multiplication by 8; that provides another shortcut.

In fact, multiplying by 40 seems to be the hardest part, and that's just multiplying by 5 and then by 8.

Assuming that the graphics base is at address $2000, and that the user will POKE values of X into addresses 78 (high byte, $4E) and 79 (low, $4F), and POKE Y into address 80 ($50).

```
033C  A5 50       LDA  $50
033E  29 07       AND  #$07
0340  85 52       STA  $52
```

Note that the EOR command will produce the equivalent of INT(Y/8)*8 in a single instruction. We'll do this again later for X.

```
0342  45 50       EOR  $50
0344  85 FC       STA  $FC
0346  A2 00       LDX  #$00
0348  86 FD       STX  $FD
```

We'll multiply by 4 and add the original value to get the effect of multiplying by 5. We're arriving at the equivalent of INT(Y/8)*40.

```
034A  06 FC       ASL  $FC
034C  26 FD       ROL  $FD
034E  06 FC       ASL  $FC
0350  26 FD       ROL  $FD
```

The earlier value is still in A, so we may add immediately. Can you see why we may be sure that the carry flag is clear?

```
0352  65 FC       ADC  $FC
0354  90 02       BCC  $0358
0356  E6 FD       INC  $FD
```

The calculated value is in the A register (low) and address $FD (high). Next you want to multiply by 8, so continue to use A. A loop is possible, but straight code is easy.

```
0358  0A          ASL
0359  26 FD       ROL  $FD
035B  0A          ASL
035C  26 FD       ROL  $FD
035E  0A          ASL
035F  26 FD       ROL  $FD
0361  85 FC       STA  $FC
```

Time to work on X.

```
0363  A5 4F       LDA  $4F
0365  29 07       AND  #$07
0367  85 51       STA  $51
0369  45 4F       EOR  $4F
```

The three low bits of the A register must be 0. We want to add the value in A to the value in $FC and $FD, and then add the Y remainder that we stored long ago in address $52. These values have no bits in common, so we can combine them and save a step using the ORA instruction.

```
036B  05 52       ORA  $52
036D  65 FC       ADC  $FC
036F  85 FC       STA  $FC
```

Video base address is assumed as $2000.

```
0371  A5 4E       LDA  $4E
0373  09 20       ORA  #$20
0375  65 FD       ADC  $FD
0377  85 FD       STA  $FD
0379  60          RTS
```

In the above coding, the carry flag has been doing exactly the right thing every time. A happy occurence.

Address FC/FD contains the address of the byte for manipulation. You'll need this bit-lookup table.

```
037A  80 40 20 10 08 04 02 01
```

Finally, this calling routine will calculate the location and set the pixel.

```
0382  20 3C 03  JSR  $033C
0385  A6 51     LDX  $51
```

MACHINE LANGUAGE

```
0387  A0 00     LDY  #$00
0389  B1 FC     LDA  ($FC),Y
038B  1D 80 03  ORA  $037A,X
038E  91 FC     STA  ($FC),Y
0390  60        RTS
```

POKE 78,X-high (0 or 1); POKE 79,X-low; POKE 80,Y and then SYS 898 (that's address $382), and the pixel will be plotted. Although the above might seem like a lot of code, it's surprising how much good math you can pack into a relatively brief machine language program.

The following BASIC program may seem slow, but that's the fault of BASIC, not the ML code. Note that address 8192 (hex 2000) is within the activity area of the BASIC language; a larger program using this kind of code would need to look carefully so that the screen would not collide with BASIC.

```
100 DATA 165,80,41,7,133,82
110 DATA 69,80,133,252,162,0
120 DATA 134,253,6,252,38,253
130 DATA 6,252,38,253,101,252
140 DATA 144,2,230,253,10,38
150 DATA 253,10,38,253,10,38
160 DATA 253,133,252,165,79,41
170 DATA 7,133,81,69,79,5,82
180 DATA 101,252,133,252,165
190 DATA 78,9,32,101,253,133
200 DATA 253,96,128,64,32,16,8
210 DATA 4,2,1,32,60,3,166,81
220 DATA 160,0,177,252,29,122
230 DATA 3,145,252,96
300 FOR J=828 TO 912
310 READ X:T=T+X
320 POKE J,X
330 NEXT J
340 IF T<>9391 THEN STOP
400 REM SWITCH IN HI-RES
410 POKE 53272,24
420 POKE 53265,59
450 REM CLEAR COLOR
460 FOR J=1024 TO 2047
470 POKE J,118:NEXT
480 REM CLEAR CHARACTER
490 FOR J=8192 TO 16383
500 POKE J,0:NEXT
510 FOR X=30 TO 200
520 Y=20:GOSUB 900
530 Y=X-10:GOSUB 900
540 Y=X-9:GOSUB 900
550 NEXT X
790 FOR J=1024 TO 2047
800 POKE J,32:NEXT
810 REM SWITCH OUT HI-RES
820 POKE 53272,20
830 POKE 53265,27
840 END
900 POKE 78,X/256
910 POKE 79,(X AND 255)
920 POKE 80,Y:SYS 898
930 RETURN
```

□

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BEGINNER BASIC

LARRY COTTON

Although we studied this not long ago, we'll continue our BASIC math with a review of the somewhat arcane, but nevertheless quite useful, trigonometric functions sine, cosine, and tangent (or SIN, COS, and TAN, as they are used in BASIC). But first a brief course in trigonometry.

Triangles are the reasons trig exists. Without those ubiquitous three-sided figures, SIN, COS, and TAN probably would never have been invented. In the good old days, you had two methods for finding various sides and angles in triangles: trigonometry tables in books and a slide rule. Thanks to calculators and computers, trig functions are now a mere keypress away and more accurate than either the slide rule or tables. SIN, COS, and TAN can handle most triangulation problems you'd want to solve. Yes, there are more trig functions, but most of them can be derived from these basic three functions.

To use trig to discover unknown sides or angles, the triangle must be a right triangle—that is, one angle must equal 90 degrees. (In this column, *triangle* means "right triangle.")

You must also know at least two other things about it: the length of one side and the size of one angle, or the length of two sides. However, knowing all the angles is not sufficient to calculate the sides. Possibly the most common triangle is a 45-45-90 (so called because of its angles); both its short sides are the same length.

The next most common is a 30-60-90. The length of its shortest side is always half the length of its longest. Notice that the sum of a triangle's angles is always 180 degrees; if you know two angles, just subtract their sum from 180 to find the third angle. By knowing the lengths of any two sides of a triangle, you can find the length of the third side by using squares and square roots (see last month's column). Here's an example:

```
10 PRINT"[CLR][DN]IF YOU DON'T
   KNOW A SIDE,"
20 PRINT"JUST PRESS RETURN."
   :PRINT
30 INPUT"LONGEST SIDE";SL
40 INPUT"SHORTEST SIDE";SS
50 INPUT"SECOND LONGEST
   SIDE";SM
60 IFSL=0THENUS=SQR(SS↑2+SM↑2)
70 IFSM=0THENUS=SQR(SL↑2−SS↑2)
80 IFSS=0THENUS=SQR(SL↑−SM↑2)
100 PRINT:PRINT"UNKNOWN SIDE
    IS"US
```

When running this program, just press Return to denote the side you're trying to find. For instance, if you press Return at the first prompt, the value of the longest side will be 0. Then, after you enter the values of the two other sides, line 60 will execute. It detects that SL (the longest side) is 0, or unknown, and calculates its value.

We're using the Pythagorean theorem, which says that the square of the longest side of a triangle is the sum of the squares of the other two sides. Look at line 60. US (the unknown side) is calculated by taking the square root of the sum of the squares of the other two sides. Remember that math inside parentheses is done first. Therefore, SS (the shortest side) is squared first; then SM (the next longest side) is squared before those two numbers are added. The square root of that number is taken, giving the length of the longest side.

Line 70 or 80 is used if the longest side and one of the shorter sides are known. The longest side is squared first; then the known short side is squared. The latter result is

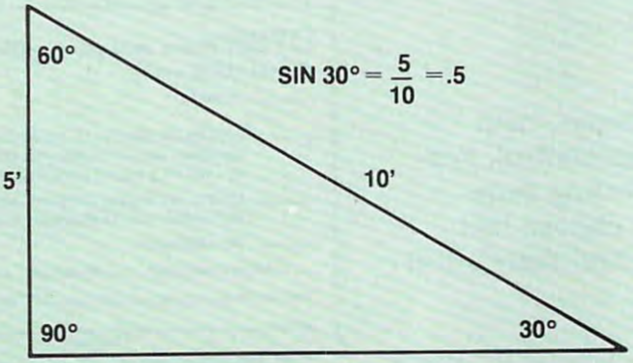

Figure 1

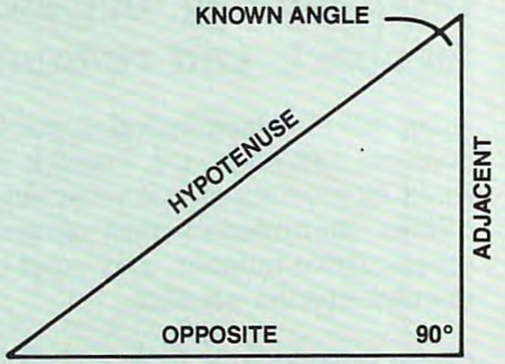

Figure 2

subtracted from the former, and the square root of that result is taken to get the answer. One of the IF-THENs will always be true if two legal values are entered. Even though three questions are always presented, only two positive values can be entered. Line 100 always prints the answer.

Try entering 5 for the longest side and 3 for the shortest. The second longest side will be 4. Another whole-number triangle is one whose sides are 5-12-13. In other words, if you just press Return at the first prompt and then enter 5 and 12, the answer will be 13. If you enter 13, skip the next, and enter 12 for the second longest side, the answer is 5.0000001, which should be exactly 5.

The reason for the very slight mathematical error is that the computer converts every decimal number you enter to a binary number, does the calculations in binary math, and then converts the binary answer back to decimal form. Some accuracy is lost in this conversion process.

SIN is simply a ratio of the lengths of two sides of a triangle. In a 30-60-90 triangle, if the shortest side is 5 feet, the longest will be 10 feet. The ratio of the two sides is 5:10, which can be written 5/10 or .5. The shortest side will be opposite the 30-degree angle. The SIN of 30 degrees is .5. The SIN of any angle is the ratio of the side opposite the angle to the longest side. (See figure 1.)

To find this value using the computer, try entering the following in the immediate mode.

```
PRINT SIN(30)
```

Surprisingly, the computer spits out −.988031623. What gives?

The computer calculates trigonometric functions in radians. There are pi (about 3.14) radians in 180 degrees; one degree equals about .017 radian. Therefore, in order to calculate SIN in degrees we must type the following:

```
PRINT SIN(30*π/180)
```

This will yield the correct answer, .5.

The side opposite the known angle is called, appropriately, the opposite side. The side next to the known angle is called the adjacent side, and the long side is the hypotenuse. (See figure 2.) As an example, if you know one angle and its opposite side, you can calculate everything else.

```
10 INPUT"[CLR][DN]SHORT SIDE";SS
20 INPUT"[DN]ANGLE OPPOSITE
   SHORT SIDE";KA
30 SL=SS/SIN(KA*π/180)
40 AN=180-90-KA
50 SM=SQR(SL↑2-SS↑2)
60 PRINT:PRINT"LONG SIDE IS"SL
70 PRINT:PRINT"NEXT LONGEST SIDE
   IS"SM
80 PRINT:PRINT"SHORT SIDE IS"SS
90 PRINT:PRINT"ANGLES ARE 90,"KA",
   AND"AN
```

Next month: more trig! ⊡

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D'IVERSIONS

FRED D'IGNAZIO

About a year ago I wrote a column announcing the Design-a-Robot Contest. Shortly after that piece appeared, COMPUTE! Publications went through major changes, and the Design-a-Robot Contest had to be postponed. Recently we've had a resurgence of interest in this contest, so we've decided to run it again.

When I was a little kid, the only robots I saw were on TV and in the movies. Back then there were no real robots, only robots of fantasy and science fiction—robots like Robbie, Tobor, Klaatu, and Gog. That didn't stop me from trying to build a robot of my own. I scavenged parts from old bicycles, washing machines, photocopiers, and toasters. I once even used a bedpan as a robot's body. During school I daydreamed about building a robot of my own—a man Friday, a servant, a buddy, a friend.

When I grew up, I learned that while I was dreaming up make-believe robots, real robots were being built in the U.S., Europe, and Japan. The real robots looked like long skinny sea monsters with pliers for jaws. They were called *robot arms* and were bolted to factory floors. They painted cars, welded, and lifted heavy objects.

NASA built other robots and launched them into outer space. In space or on earth, robots journeyed where humans could not go—into the poisonous atmosphere of Venus, the crushing gravitational pressure of Jupiter, and the cores of nuclear reactors. They became a sort of human *telepresence* that could explore the universe and take risks we humans dared not take.

Robots began doing jobs that were dull, dirty, or dangerous. Robots never got sick, didn't take coffee breaks, had an infinite attention span, and could work three shifts without dropping. Bosses liked them because they never talked back, didn't go on strike, and didn't belong to a union.

All these outer space, undersea, and factory robots were neat, but they weren't what I really wanted. I wanted a robot like C3PO, R2D2, or Vincent in Walt Disney's *The Black Hole*.

For a while, in the early 1980s, it looked as if I would get my wish. As personal computers grew in popularity, a new field of personal robotics emerged. An International Personal Robotics Congress was held in Albuquerque, New Mexico, in April 1984. The following two years personal robots were everywhere. Every week new robots came to my house so I could review them for *COMPUTE!'s Gazette* or for the TV program I was on, "The New Tech Times." When the show's TV crew arrived, I would plug the robots into my Commodore 64, turn them on, and let them roam the house.

THE CONTEST RETURNS:

DESIGN A ROBOT

For one of the TV shows I had 27 robots (monkeys, turtles, and robo-balls) all running at the same time.

I was in seventh heaven. My childhood dreams had (almost) come true. But then the bottom fell out in the personal robotics business. No new robots came to stay. I was sad. I missed the whir and buzz of the little motors, the tire tracks across my scrambled eggs, and the occasional wandering robot who ended up stuck in the bathtub, wedged under the toilet, or lost among the galoshes in the back of the closet. I missed their chipper voices, their songs (like "Old MacDonald Had a Robot"), and their clever remarks when they encountered the broom or the cat. "Hi!" they'd say. "Are you a human being?"

I can't wait around any longer. If the robot revolution isn't going to happen on its own, I'll make it happen with the Design-a-Robot contest.

Entering the contest is easy. All you have to do is invent a new personal robot on paper. It can be completely original or a combination of all the robots you've seen, dreamed about, or imagined. Draw a picture of the robot, label all of its interesting parts, and describe what each part does. Show me how the robot relates to your computer. Does the computer control the robot? Does it program the robot? If so, how? How are the signals and commands transmitted and received? What kind of programming language should the robot use? Can you invent commands of your own?

Along with the robot's diagram I would like a short description of what robots mean to you. Reach down into your heart. What would you do if you had a robot just like the robot you've designed? Be specific. Be imaginative. Be wild. Send me your creations.

All entries must be received by August 30, 1991, and winners will be selected by October 15. The first-place winner will receive a model robot valued at $200; five runners-up will each receive a smaller robot valued at $30.

Please send me your contest entry (pictures, labels, description, and so on) to Design-a-Robot Contest, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Be sure to include your name, address, and telephone number. Winners must consent to have their robots featured in a future "D'Iversions" column without additional compensation. The odds of winning a prize will be determined by the number and quality of entries. The decision of the judges will be final, and COMPUTE Publications cannot be held responsible for entries misdirected in the mail. Entries become the property of COMPUTE Publications and cannot be returned. Employees of COMPUTE Publications are not eligible. ◘

PROGRAMS

MOONS OF JUPITER

LEARN MORE ABOUT THE NUMEROUS MOONS THAT ORBIT AROUND THE PLANET JUPITER WITH THIS ASTRONOMY PROGRAM FOR THE 64

SIMON EDGEWORTH

In ancient times humans regarded Jupiter as the ruler of the sky. Recently, interest in the giant planet has rocketed due to the wealth of new information discovered by the Voyager spaceships. This program displays the 16 major moons and their orbits around Jupiter.

The program consists of two modules: JUP.BAS and JUP.ML. The first is written in BASIC. To avoid typing errors, use *The Automatic Proofreader* to type it in; see "Typing Aids" elsewhere in this section. When you've finished typing it in, be sure to save a copy of the program.

The second part of the program, JUP.ML, is written in machine language. Enter this module with *MLX,* our machine language entry program; again, see "Typing Aids." When *MLX* prompts you, respond with the values given below.

Starting address: C000
Ending address: C18F

When you've finished entering JUP.ML, be sure to save it with that name to the same disk as JUP.BAS. Load and run JUP.BAS; it will automatically load JUP.ML.

Choosing Moons

After a short pause, the main menu will appear. You'll see a list with Jupiter at the top, then the 16 moons, starting with Metis (the moon closest to the planet) and ending with Sinope (the moon farthest from Jupiter).

Use the up- and down-cursor keys to select which moon orbits you wish to see. Discs on the left of the screen will indicate which moons are currently selected. You can choose a group of either four or eight moons. Press the G key to display the moon orbits. After a pause for calculations, the graphic screen will appear.

Orbit Graphics

Jupiter is shown in the center of the screen. The scale depends on which moons you select, so Jupiter will appear as a circle when you select the inner moons and as a dot when you select the outer moons.

The moons are shown as dots at various distances from the planet. Press G, and the moons will move around the planet in their orbits, leaving a trace behind them. You can adjust the speed of the graphics by pressing the F key (faster) or the S key (slower).

At the lower left corner of the screen, a readout shows how many earth days have elapsed. The innermost moons take only a few hours to complete an orbit. The outermost moons take more than an earth year. To halt the moons, press X.

Names and Facts

While the graphic screen is halted, you can identify the moons shown by pressing the N key. A moon will flash while its name appears on the screen. To identify the next moon, press N again. When a moon is flashing, you can press I to view information about it.

To exit from any part of the program, simply press X. It will take you back to the previous screen.

Comparing Moons

Go back to the main menu and press the C key. The comparison menu will appear. Now hit P, D, E, or S to compare period, distance, eccentricity, or size, respectively. To make the figures more meaningful, the corresponding data for our own moon is also shown for comparison.

Customizing

You can easily change the program's colors on line 380. C0 is the border color, C1 is the screen color, C2 is the text color, and C3 is the color used for Jupiter and moon traces. Similarly, you can change the 16 moon colors on line 390, but don't make anything the same color as the screen, or it will be invisible.

Callistro's orbit should appear circular on your screen. If not, try slightly adjusting the value of SC on line 380.

If you want to tinker with the orbits, here's the data format in lines 110–270: name, diameter, semimajor axis, eccentricity, period, longitude of perihelion, longitude at start.

Notes

The graphics show views approximately from the ecliptic north. When viewed from the north, all the planets and most of the moons in our solar system orbit counterclockwise. Notice that four of Jupiter's moons orbit the other way around. One possible explanation is that they might have been asteroids captured by Jupiter's gravitational field.

JUP.BAS

```
RF 100 REM COPYRIGHT 1991 - CO
       MPUTE PUBLICATIONS INTL
        LTD - ALL RIGHTS RESER
       VED
JK 110 DATA METIS,40,128,0,.29
       5,0,0
DX 120 DATA ADRASTEA,40,129,0,
       .295,0,120
PF 130 DATA AMALTHEA,270X165X1
       50,180,.003,.489,0,281
MD 140 DATA THEBE,80,222,.013,
       .670,0,331
XP 150 DATA IO,3640,422,.004,1
       .77,0,233
```

```
DR 160 DATA EUROPA,3100,671,.0
        1,3.55,0,273
EQ 170 DATA GANYMEDE,5270,1070
        ,.001,7.16,0,81
MG 180 DATA CALLISTO,4990,1885
        ,.007,16.69,0,332
EE 190 DATA LEDA,16,11110,.147
        ,240,280,309
FG 200 DATA HIMALIA,96,11470,.
        158,251,249,101
XE 210 DATA LYSITHEA,16,11710,
        .107,260,11,297
BG 220 DATA ELARA,32,11740,.20
        7,260,149,81
DF 230 DATA ANANKE,16,21200,.1
        7,-610,180,36
FC 240 DATA CARME,16,22600,.21
        ,-690,6,239
BQ 250 DATA PASIPHAE,16,23500,
        .38,-734,0,90
BM 260 DATA SINOPE,16,23700,.2
        8,-760,226,243
RM 270 DATA OUR MOON,3478,384,
        .055,27.32,0,0
DR 280 IFI=0THENI=1:LOAD"JUP.M
        L",8,1
XX 290 POKE55,0:POKE56,136:CLR
        :Q=16
JR 300 DIMSN(255),CS(255),NA$(
        Q),DI$(Q),CR(Q),RA(Q),E
        C(Q),PE(Q),PA(Q),EA(Q)
JE 310 V=53248:PP=34816:SP=368
        56
DJ 320 S1=53200:S2=S1+8:S3=S2+
        8
MF 330 YC=139.5:XC=173.5:MI=0:
        RJ=71.6
SJ 340 TT$="{RVS} THE MOONS OF
         JUPITER {OFF}
        {2 SPACES}"
JM 350 CP$="COMPUTE PUBLICATIO
        NS INTL LTD (C) 1991"
JB 360 WT$="{3 DOWN}CALCULATIO
        NS WILL TAKE A FEW SECO
        NDS ...":CM$="COMPARISO
        N"
RS 370 DJ$=" DISTANCE FROM CEN
        TER OF JUPITER":TK$="TH
        OUSAND KM"
FS 380 C0=06:C1=0:C2=14:C3=11:
        SC=1.3
RF 390 DATA 2,3,4,5,6,7,8,9,10
        ,12,13,14,15,4,3,2
EK 400 PRINT"{CLR}"CHR$(142)CH
        R$(8):CT=11
PG 410 POKEV+32,C0:POKEV+33,C1
        :POKE646,C2
KA 420 PRINT CP$:PRINT
BR 430 PRINTTAB(8)TT$:PRINTWT$
BS 440 FORI=0TO255:J=I*↑/128
JA 450 SN(I)=SIN(J):CS(I)=COS(
        J):NEXT
KM 460 FORN=0TOQ
BS 470 READNA$(N),DI$(N),RA(N)
        ,EC(N),PE(N),J,K
KH 480 PA(N)=(J*256/360+.5)AND
        255
PM 490 EA(N)=(K-J)/360:NEXT
KP 500 FORN=0TOQ-1:READCR(N):N
        EXT
FC 510 FORI=PPTOPP+126:POKEI,0
        :NEXT
QQ 520 POKEPP+28,112:POKEPP+31
        ,112
KP 530 POKEPP+34,112:POKEPP+89
        ,112
CB 540 POKEPP+92,248:POKEPP+95
        ,248
JD 550 POKEPP+98,248:POKEPP+10
        1,112
MS 560 T=0:PRINT"{CLR}"TT$"MAI
        N MENU":PRINT
RC 570 PRINTCHR$(113)"JUPITER"
BE 580 FORI=0TO15:PRINT" "NA$(
        I):NEXT
PE 590 PRINT:PRINT"UP/DOWN=SEL
        ECT MOONS"
JB 600 PRINT"G=GO":PRINT"C=COM
        PARE":PRINT"E=END PROGR
        AM"
EK 610 IFMI>6THENMI=0
AQ 620 IFMI<0THENMI=6
CK 630 BI=(6ANDMI)*2
KP 640 BO=BI+3+4*(1ANDMI)
DB 650 PRINT"{HOME}{2 DOWN}":F
        ORI=0TO15
JF 660 J=113:IFI<BIORI>BOTHENJ
        =32
MX 670 PRINTCHR$(J):NEXT
XD 680 POKE198,0
GJ 690 GETK$:IFK$="G"THEN750
SP 700 IFK$="C"THEN1200
XJ 710 IFK$="{DOWN}"THENMI=MI+
        1:GOTO610
PE 720 IFK$="{UP}"THENMI=MI-1:
        GOTO610
AF 730 IFK$<>"E"THEN690
AG 740 PRINT"{CLR}":END
SP 750 PRINT"{CLR}"TT$:PRINTWT
        $
BJ 760 ONMI+1GOSUB770,780,790,
        800,810,820,830:GOTO840
QP 770 TL=.0004:TS=.005:TH=.04
        :RETURN
MC 780 TL=.005:TS=.02:TH=.1:RE
        TURN
EM 790 TL=.02:TS=.1:TH=.4:RETU
        RN
XC 800 TL=.1:TS=.2:TH=.7:RETUR
        N
HF 810 TL=.4:TS=3:TH=12:RETURN
FH 820 TL=1:TS=4:TH=16:RETURN
GS 830 TL=1.5:TS=6:TH=45:RETUR
        N
AR 840 MA=RA(BO)*(1+EC(BO))
FE 850 YS=99/MA:XS=YS*SC
BD 860 QB=BO-BI:CN=0
BQ 870 FORN=0TOQB:POKEV+39+N,C
        R(N+BI):NEXT
SQ 880 FORI=0TO23:POKES1+I,0:N
        EXT:SYS49281
BX 890 POKE53247,C1+C3*16:SYS4
        9521
MF 900 FORI=36800TOI+63:POKEI,
        32:NEXT
AS 910 SYS49208
QP 920 IFMI<3THEN960
PH 930 FORI=158TO160:FORJ=98TO
        100
GK 940 POKE253,I:POKE254,0:POK
        E255,J
FP 950 SYS49373:NEXT:NEXT:GOTO
        1000
MM 960 FORI=0TO255
DS 970 POKE253,159.5+XS*RJ*SN(
        I):POKE254,0
JH 980 POKE255,99.5+YS*RJ*CS(I
        )
SG 990 SYS49373:NEXT
PE 1000 GOSUB1980:GOSUB1600
MJ 1010 FORN=0TOQB:M=N+BI:E=EC
         (M):A=EA(M)+T/PE(M)
SG 1020 A=((A-INT(A))*256+.5)A
         ND255:IFE<.1THENX=-CS(
         A):Y=SN(A):GOTO1050
QD 1030 Z=(E*E-1)/(E*CS(A)-1):
         X=2*E-Z*CS(A):Y=Z*SN(A
         )
XE 1040 I=PA(M):J=X*CS(I)+Y*SN
         (I):Y=Y*CS(I)-X*SN(I):
         X=J
MF 1050 Y=INT(YC+Y*RA(M)*YS):X
         =INT(XC+X*RA(M)*XS)
XX 1060 IFY<40ORY>239ORX<14ORX
         >333THENY=0:X=0
HE 1070 POKES1+N,INT(X/256):PO
         KES2+N,XAND255:POKES3+
         N,Y:NEXT
RF 1080 SYS49281:SYS49331:IFHF
         THEN1150
HX 1090 PRINT" "RIGHT$(" "+STR
         $(INT(T)),3)"{UP}"
RR 1100 GETK$:IFK$=""THENT=T+T
         S:GOTO1010
MM 1110 IFK$="X"THENGOSUB1600:
         GOTO1150
RQ 1120 IFK$="F"THENTS=TS*1.5:
         IFTS>THTHENTS=TH
PC 1130 IFK$="S"THENTS=TS/1.5:
         IFTS<TLTHENTS=TL
BE 1140 GOTO1100
CX 1150 POKE198,0
BM 1160 GETK$:IFK$="N"THEN1660
FS 1170 IFK$="G"THENGOSUB1630:
         GOTO1100
CQ 1180 IFK$="X"THENGOSUB2010:
         GOTO560
QQ 1190 GOTO1160
JJ 1200 PRINT"{CLR}"TT$"COMPAR
         E MENU":PRINT
GE 1210 PRINT"P=PERIOD":PRINT
SK 1220 PRINT"D=DISTANCE":PRIN
         T
GH 1230 PRINT"E=ECCENTRICITY":
         PRINT
RE 1240 PRINT"S=SIZE":PRINT
HP 1250 PRINT"X=MAIN MENU"
EE 1260 POKE198,0
JM 1270 GETK$:IFK$="X"THEN560
HG 1280 K=VAL(K$)
SG 1290 IFK$="P"THEN1340
FK 1300 IFK$="D"THEN1410
RC 1310 IFK$="E"THEN1460
AP 1320 IFK$="S"THEN1520
MH 1330 GOTO1270
AR 1340 PRINT"{CLR}"TT$CM$:PRI
         NT
PA 1350 PRINT"ORBIT PERIOD"
DH 1360 PRINT"(EARTH DAYS)":PR
         INT
FQ 1370 FORI=0TO16
MR 1380 PRINTNA$(I),ABS(PE(I))
         ;
XS 1390 IFPE(I)<0THENPRINT"RET
         ROGRADE";
FH 1400 PRINT:NEXT:GOTO1570
XK 1410 PRINT"{CLR}"TT$CM$:PRI
         NT
DH 1420 PRINT"AVERAGE DISTANCE
          FROM PLANET CENTER"
SB 1430 PRINT"(THOUSAND KM)":P
         RINT
KD 1440 FORI=0TO16
ME 1450 PRINTNA$(I),RA(I):NEXT
         :GOTO1570
BF 1460 PRINT"{CLR}"TT$CM$:PRI
         NT
SC 1470 PRINT"ORBIT ECCENTRICI
         TY"
XJ 1480 PRINT"(CIRCLE=0)":PRIN
         T
MH 1490 FORI=0TO16
MQ 1500 PRINTNA$(I),:IFEC(I)<.
         01THENPRINT0:NEXT:GOTO
         1570
XR 1510 PRINTEC(I):NEXT:GOTO15
         70
```

```
DG 1520 PRINT"{CLR}"TT$CM$:PRI
        NT
SB 1530 PRINT"DIAMETER"
JS 1540 PRINT"(KM)":PRINT
QM 1550 FORI=0TO16
HF 1560 PRINTNA$(I),DI$(I):NEX
        T:GOTO1570
PG 1570 PRINT:PRINT"X=MENU":PO
        KE198,0
FA 1580 GETK$:IFK$="X"THEN1200
JM 1590 GOTO1580
AB 1600 GOSUB1790
FG 1610 PRINT"G=GO N=NAME X=ME
        NU{UP}"
CC 1620 HF=1:RETURN
XC 1630 GOSUB1790
JQ 1640 PRINT"{4 SPACES}EARTH
        {SPACE}DAYS{2 SPACES}F
        =FAST S=SLOW X=HALT
        {UP}"
BA 1650 HF=0:RETURN
XS 1660 POKE198,0
QM 1670 GOSUB1790:CM=CN+BI
FK 1680 PRINT"*"NA$(CM)"*"TAB(
        11)"I=INFO N=NEXT X=CO
        NTINUE{UP}"
QB 1690 J=9
AP 1700 J=J+1:IFJ=10THENPOKESP
        +CN,33
FS 1710 IFJ>19THENJ=0:POKESP+C
        N,32
DD 1720 GETK$:IFK$=""THEN1700
PX 1730 POKESP+CN,32
XS 1740 IFK$="I"THEN1800
QE 1750 IFK$="X"THENGOSUB1600:
        GOTO1150
KK 1760 IFK$<>"N"THEN1690
FQ 1770 CN=CN+1:IFCN>QBTHENCN=
        0
MH 1780 GOTO1660
HK 1790 PRINT"{37 SPACES}{UP}"
        :RETURN
KC 1800 GOSUB2010
QH 1810 PRINT"{CLR}"TT$:PRINT
SC 1820 PRINT"*"NA$(CM)"*":PRI
        NT
DC 1830 PRINT"AVERAGE"DJ$:PRIN
        TRA(CM)TK$:PRINT
DR 1840 PRINT"MINIMUM"DJ$:PRIN
        TINT(RA(CM)*(1-EC(CM))
        +.5)TK$:PRINT
HD 1850 PRINT"MAXIMUM"DJ$:PRIN
        TINT(RA(CM)*(1+EC(CM))
        +.5)TK$:PRINT
AM 1860 PRINT"ORBIT ECCENTRICI
        TY"
CK 1870 IFEC(CM)<.01THENPRINT0
        :PRINT:GOTO1890
EK 1880 PRINTEC(CM):PRINT
HC 1890 PRINT"ORBIT PERIOD"
EE 1900 PRINTABS(PE(CM))"EARTH
         DAYS":PRINT
RK 1910 PRINT"DIAMETER"
BX 1920 PRINT" "DI$(CM)" KM":P
        RINT
QX 1930 PRINT"X=CONTINUE"
BB 1940 POKE198,0
PK 1950 GETK$
JS 1960 IFK$="X"THENGOSUB1980:
        GOTO1660
XC 1970 GOTO1950
HF 1980 POKE808,234:SYS49232:S
        YS49248
FG 1990 POKEV+21,2↑(QB+1)-1:PR
        INT"{HOME}"
AP 2000 FORI=2TO24:PRINT"
        {DOWN}";:NEXT:RETURN
RX 2010 SYS49474:SYS49497:POKE
        808,237
JQ 2020 POKEV+21,0:RETURN
```

JUP.ML

```
C000:A9 0F 8D 19 D0 A9 1B 8D 4E
C008:11 D0 A9 34 8D 18 D0 A9 D6
C010:FF 8D 12 D0 A9 1C 8D 14 31
C018:03 4C 81 EA A9 0F 8D 19 CA
C020:D0 A9 38 8D 18 D0 A9 3B E6
C028:8D 11 D0 A9 F2 8D 12 D0 2C
C030:A9 00 8D 14 03 4C 31 EA 10
C038:A9 00 85 FB A9 A0 85 FC D6
C040:A9 00 A8 A2 20 91 FB C8 DD
C048:D0 FB E6 FC CA D0 F6 60 C5
C050:AD 00 DD 29 FC 09 01 8D 92
C058:00 DD A9 8C 8D 88 02 60 42
C060:78 A9 7F 8D 0D DC A9 01 81
C068:8D 1A D0 A9 1B 8D 11 D0 ED
C070:A9 F2 8D 12 D0 A9 00 8D 11
C078:14 03 A9 C0 8D 15 03 58 25
C080:60 A2 07 BD D0 CF 4A 2E 20
C088:F8 CF CA 10 F6 A2 07 A0 C5
C090:0F BD E0 CF 99 E8 CF 88 BA
C098:BD D8 CF 99 E8 CF 88 CA 25
C0A0:10 EF A2 10 AD 11 D0 10 DE
C0A8:FB BD E8 CF 9D 00 D0 CA 0B
C0B0:10 F7 60 A2 07 8E F9 CF A4
C0B8:BD E0 CF F0 1C 38 E9 28 18
C0C0:85 FF BD D0 CF 85 FE BD 1A
C0C8:D8 CF 38 E9 0E 85 FD B0 83
C0D0:02 C6 FE 20 DD C0 AE F9 30
C0D8:CF CA 10 D9 60 A9 00 85 C3
C0E0:02 A5 FF 29 F8 0A 26 02 9D
C0E8:0A 26 02 0A 26 02 85 FB 1A
C0F0:A6 02 86 FC 0A 26 02 0A DD
C0F8:26 02 18 65 FB 85 FB A5 FA
C100:02 65 FC 85 FC A5 FD 29 79
C108:F8 18 65 FB 85 FB A5 FE E0
C110:65 FC 85 FC A5 FF 29 07 8C
C118:18 65 FB 85 FB A9 A0 65 06
C120:FC 85 FC A5 01 29 FE 85 AD
C128:01 A5 FD 29 07 AA A9 00 1E
C130:38 6A CA 10 FC A0 00 11 40
C138:FB 91 FB A5 01 09 01 85 AB
C140:01 60 78 A9 00 8D 1A D0 41
C148:A9 31 8D 14 03 A9 EA 8D 02
C150:15 03 A9 81 8D 0D DC 58 1F
C158:60 AD 00 DD 09 03 8D 00 C4
C160:DD A9 14 8D 18 D0 A9 04 F3
C168:8D 88 02 A9 1B 8D 11 D0 B1
C170:60 A9 00 85 FB A9 8C 85 0C
C178:FC AD FF CF A0 00 A2 04 31
C180:91 FB C8 D0 FB E6 FC CA 32
C188:D0 F6 60 00 00 00 00 00 3E
```

⊡

NOAH'S ARC

ARCHIVE FILES FOR EASY UPLOADING AND DOWNLOADING WITH THIS UTILITY FOR THE 64

DANIEL LIGHTNER

If you call an electronic bulletin board system (BBS) and browse through its library of programs available for downloading, chances are that many of the files have been archived—that is, several programs and instruction files may have been combined into one master program.

If all of a program's related files have been combined, a caller has only to download one file to obtain all the programs, modules, sprite data, music files, and instructions required for proper operation. Archiving (or *arcing* as it's often called) is a convenient method for uploading and downloading BBS files.

Some archived files need a special rate program to separate (or dearc) the files into their original form. Others are self-dearcing (SDA), meaning that one has only to load and run the master program for it to separate and save its individual files to disk, ready for running.

Typing It In

Noah's Arc is such a program. It creates SDA files that separate automatically. It is written entirely in machine language, but it loads and runs like a BASIC program. Use *MLX,* our machine language entry program, to type it in; see "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following values.

Starting address: 0801
Ending address: 1298

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

Using the Program

Noah's Arc will load a collection of files and save them in a single master file. It accepts program, sequential, or user files, and it does not matter if different types are loaded together. In addition to making it convenient for sending files via modem, SDA files are also useful for creating backups.

When you run *Noah,* it asks for the number of files you wish to archive. Respond with a number less than 100. Try not to use more files than will fit into memory at one time. *Noah* can handle about 160 disk blocks, depending on the number of files, not the file size. *Noah* reserves 25 bytes of memory per file in its own directory located at $0960 hex or 2480 decimal. This directory has to be saved along with the SDA file.

If you aren't sure of the number of files, you can check the directory by entering $ and pressing Return. The directory listing can be stopped and started by touching any key. This is useful in determining which and how many files you wish to load.

After you enter the number, *Noah* asks for the filenames. It will then ask if it is a program, sequential, or user file. Just press the corresponding number. *Noah* checks the disk for that file and returns the disk error status. If all is well, it continues loading the file into memory.

This process repeats until the memory is full or all the files have been loaded. Anytime you are asked for a filename, you can enter $ to get a directory or enter @ to abort and save the files already loaded.

When all the files have been loaded, *Noah* asks for a master filename. At this point make sure that the disk has enough room on it for the file you are saving. *Noah* appends an *SDA* suffix automatically to the file name. If a disk error occurs during a save, *Noah* lets you try the procedure again.

Noah can be useful as a file copier as well. If you enter @ when *Noah* prompts for a Save filename, it will dump all files in memory to disk in their original form. To make more copies of these files, when *Noah* comes back with a prompt asking if you wish to create more files, press N, and you will be returned to BASIC. Put another disk in the drive and enter SYS2088. You can repeat this process as many times as you like. *Noah* always saves to drive 8.

If you load an SDA file and list it, you'll see the number of files the SDA file contains. To dearc an SDA file, just load and run it. If you wish to save an SDA file to another disk, load it and enter SYS2088.

Most smaller SDA files can be loaded and saved like BASIC programs, but some larger ones may pose a problem because *Noah* stores files under BASIC ROM. If you try saving a file that is too big, you'll get an OUT OF MEMORY message. *Noah's Arc* itself can be loaded and saved like a BASIC program, but do not try to save it after it's been run. If you wish to restart it at any time, enter SYS50675 and press Return.

NOAH'S ARC

```
0801:22 08 0A 00 9E 32 30 38 BB
0809:38 20 20 3A 31 39 39 31 F6
0811:20 43 4F 4D 50 55 54 45 86
0819:2E 2E 2E 20 20 20 20 20 75
0821:00 00 00 0B 0A F3 C5 AD 3B
0829:24 08 8D B2 02 AD 25 08 43
0831:8D B3 02 AD 26 08 85 FD 6A
0839:AD 27 08 85 FE A9 8E 85 84
0841:FB A9 08 85 FC 18 A5 FB A2
0849:6D B2 02 8D B4 02 A5 FC CB
0851:6D B3 02 8D B5 02 A0 00 15
0859:B1 FB 91 FD 18 A5 FB 69 0C
0861:01 85 FB A5 FC 69 00 85 40
0869:FC 18 A5 FD 69 01 85 FD EA
0871:A5 FE 69 00 85 FE A5 FB B0
0879:CD B4 02 F0 03 4C 88 08 4F
0881:A5 FC CD B5 02 F0 03 4C DE
0889:59 08 6C 26 08 AD 0E DC 28
0891:29 FE 8D 0E DC A5 01 29 31
0899:FE 85 01 AD 0E DC 09 01 7C
08A1:8D 0E DC 20 CC FF A9 00 53
08A9:8D B4 02 8D 20 D0 8D 21 47
08B1:D0 A9 0B 85 73 A9 CD 85 B1
08B9:74 20 F9 CC A9 36 85 73 BC
08C1:A9 CD 85 74 20 F9 CC 20 B4
08C9:6A C9 AD 35 03 C9 24 D0 E2
08D1:06 20 80 CC 4C 22 C6 AD EF
08D9:34 03 C9 03 B0 DE C9 00 C2
08E1:F0 DA A0 00 B9 35 03 C9 A7
08E9:30 90 D1 C9 3A B0 CD C8 06
08F1:CC 34 03 D0 EF 20 34 CA 16
08F9:20 45 CB 20 76 CA C9 27 80
0901:F0 BA 20 E8 C9 A0 00 A9 47
0909:01 85 FB A9 08 85 FC B9 21
0911:64 CD 91 FB C8 C0 C8 D0 66
0919:F6 A0 00 A9 C9 85 FB A9 6F
0921:08 85 FC B9 2C CE 91 FB 8F
0929:C8 C0 E9 D0 F6 AD B5 02 F5
0931:8D B0 09 A9 B0 8D BA 02 25
0939:A9 09 8D BB 02 A0 00 18 7A
0941:AD BA 02 69 19 8D BA 02 26
0949:AD BB 02 69 00 8D BB 02 A7
0951:C8 CC B5 02 D0 E9 18 A9 D9
0959:B0 69 01 8D B2 02 A9 09 11
0961:69 00 8D B3 02 AD C5 02 69
0969:8D 16 08 AD C6 02 8D 17 14
0971:08 20 F4 CC 20 D2 FF 20 67
0979:6A CA 20 F4 CC 20 6A C9 4C
0981:AD 34 03 C9 01 D0 14 AD 95
0989:35 03 C9 40 F0 0A C9 24 9B
0991:D0 09 20 80 CC 4C D7 C6 68
0999:4C DE C8 20 34 CA 20 76 28
09A1:CA C9 27 F0 CC A0 00 B9 22
09A9:E4 CF 20 D2 FF C0 05 F0 51
09B1:42 C0 09 F0 44 C0 0D F0 75
09B9:46 C8 C0 10 D0 E9 A5 CB 7F
09C1:C9 38 F0 0E C9 3B F0 15 F7
09C9:C9 08 F0 1C 20 E4 FF 4C 83
09D1:24 C7 85 FB 20 EF CC 20 D2
09D9:49 CA 4C 6B C7 85 FB 20 EF
09E1:EF CC 20 5F CA 4C 6B C7 3F
09E9:85 FB 20 EF CC 20 54 CA 1B
09F1:4C 6B C7 20 49 CA 4C 1F 2D
09F9:C7 20 5F CA 4C 1F C7 20 1F
0A01:54 CA 4C 1F C7 A9 0D 20 8C
0A09:76 CA C9 27 D0 03 4C 0B EC
0A11:C7 A5 FB C9 38 F0 08 C9 ED
0A19:3B F0 0A C9 08 F0 0C 20 21
0A21:91 CA 4C 94 C7 20 A6 CA 5A
0A29:4C 94 C7 20 BB CA 20 E5 B2
0A31:CA AC 34 03 88 A9 52 99 B5
0A39:35 03 20 F4 CC 20 F4 CB 98
0A41:20 3A CA 20 F4 CC AD 34 B9
0A49:03 A2 35 A0 03 20 BD FF 4C
0A51:A9 02 A2 08 A0 02 20 BA 97
0A59:FF 20 C0 FF 20 2F C9 C9 A8
0A61:0D F0 33 A2 02 20 C6 FF E6
0A69:AD BA 02 85 FD AD BB 02 BB
0A71:85 FE A0 00 20 E4 FF 91 42
0A79:FD 18 A5 FD 69 01 85 FD 7F
0A81:A5 FE 69 00 85 FE A5 FD C6
0A89:C9 F1 F0 2C 20 B7 FF C9 89
0A91:40 F0 3B 4C DA C7 20 2A 8E
0A99:C8 20 05 C8 4C D7 C6 AD 44
0AA1:C0 02 8D B2 02 AD C1 02 BF
0AA9:8D B3 02 AD C2 02 8D BA 80
0AB1:02 AD C3 02 8D BB 02 60 8A
0AB9:A5 FE C9 C5 F0 03 4C F2 15
0AC1:C7 4C CD C8 A2 00 20 C6 2F
0AC9:FF A9 02 4C C3 FF 20 2A D5
0AD1:C8 AD B2 02 85 FB AD B3 57
0AD9:02 85 FC A0 00 A5 FD 91 1E
0AE1:FB C8 A5 FE 91 FB 18 A5 1D
0AE9:FB 69 02 8D B2 02 A5 FC 55
0AF1:69 00 8D B3 02 18 A5 FD 61
0AF9:69 01 8D BA 02 A5 FE 69 6E
0B01:00 8D BB 02 20 F4 CC 20 A0
0B09:2F C9 C9 0D F0 91 20 5E 9F
0B11:CC 18 AD B4 02 69 01 8D D9
0B19:B4 02 CD B0 09 F0 03 4C 2D
0B21:D7 C6 20 F4 CC 20 F4 CC C5
0B29:20 EF CC A9 12 20 D2 FF 36
0B31:20 6A CA 20 DE CB 20 F4 A8
0B39:CC 20 6A C9 AD 34 03 C9 B5
0B41:01 D0 14 AD 35 03 C9 40 F2
0B49:D0 0D A9 9E 8D 81 09 A9 58
0B51:CB 8D 82 09 4C 28 08 20 C4
0B59:34 CA 20 76 CA C9 27 F0 64
0B61:C1 20 D0 CA 4C 50 CB A9 0C
0B69:40 85 73 A9 CF 85 74 20 A7
0B71:F9 CC 20 5E CC 20 05 C8 5B
0B79:A9 C2 85 73 A9 CF 85 74 09
0B81:20 F9 CC 20 2A C8 A5 CB 4D
0B89:C9 0D F0 14 C9 0A F0 0A 89
0B91:C9 14 F0 09 20 E4 FF 4C 21
0B99:EC C8 4C 9E CB 4C D7 C6 D1
0BA1:A0 00 AD B4 02 8D B0 09 B9
0BA9:85 FB 38 E9 0A 90 04 C8 8A
0BB1:4C 10 C9 69 0A 85 FB 98 B8
0BB9:18 69 30 8D 16 08 18 A5 BB
0BC1:FB 69 30 8D 17 08 4C 88 09
0BC9:C8 A5 BA 20 B4 FF A9 6F 6F
0BD1:85 B9 20 96 FF A9 0D 20 67
0BD9:D2 FF A9 20 A0 00 20 D2 A8
0BE1:FF 99 E4 02 C8 20 A5 FF 2D
0BE9:C9 0D D0 F2 20 D2 FF 20 DD
0BF1:AB FF AD E5 02 C9 30 D0 5A
0BF9:08 AD E6 02 C9 30 D0 01 2E
0C01:60 A9 0D 60 20 E4 FF A0 90
0C09:00 20 F4 CC 20 EF CC A9 98
0C11:3E 20 D2 FF A9 9A 20 D2 75
```

```
0C19:FF A9 00 8D 34 03 20 E4 47
0C21:FF C9 00 F0 F9 C9 14 F0 CA
0C29:40 C9 7B B0 F1 C9 11 F0 18
0C31:ED C9 13 F0 E9 C9 1D F0 C5
0C39:E5 C9 22 F0 E1 C9 2C F0 89
0C41:DD C9 0D F0 10 AC 34 03 0A
0C49:C0 10 F0 D2 20 D2 FF 20 7D
0C51:C5 C9 4C 84 C9 AC 34 03 FC
0C59:C0 00 F0 C2 4C D2 FF AC 76
0C61:34 03 99 35 03 EE 34 03 1A
0C69:60 AC 34 03 C0 01 B0 03 02
0C71:4C 84 C9 20 D2 FF 38 AD C0
0C79:34 03 E9 01 8D 34 03 4C 49
0C81:84 C9 AD 34 03 C9 01 F0 79
0C89:05 C9 02 F0 13 60 A9 20 73
0C91:8D C5 02 AD 35 03 8D C6 94
0C99:02 38 E9 30 8D B5 02 60 A8
0CA1:AD 35 03 8D C5 02 38 E9 A7
0CA9:30 A8 A9 00 8D B5 02 18 98
0CB1:AD B5 02 69 0A 8D B5 02 D8
0CB9:88 C0 00 D0 F2 AD 36 03 11
0CC1:8D C6 02 38 E9 30 18 6D C3
0CC9:B5 02 8D B5 02 60 20 F4 11
0CD1:CC 20 EF CC A0 00 B9 35 D0
0CD9:03 20 D2 FF C8 CC 34 03 BA
0CE1:D0 F4 60 A9 1B 85 73 A9 C5
0CE9:CF 85 74 4C F9 CC A9 23 18
0CF1:85 73 A9 CF 85 74 4C F9 6C
0CF9:CC A9 28 85 73 A9 CF 85 A7
0D01:74 4C F9 CC A9 33 85 73 0D
0D09:A9 CF 85 74 4C F9 CC 60 28
0D11:A9 4C 85 73 A9 CD 85 74 FE
0D19:20 F9 CC A5 CB C9 19 F0 5E
0D21:EE C9 27 F0 EA 20 E4 FF BA
0D29:4C 81 CA AC 34 03 A2 00 E0
0D31:BD 0F CF 99 35 03 C8 8C 55
0D39:34 03 E8 E0 04 D0 F1 60 01
0D41:AC 34 03 A2 00 BD 17 CF 3E
0D49:99 35 03 C8 8C 34 03 E8 8E
0D51:E0 04 D0 F1 60 AC 34 03 37
0D59:A2 00 BD 13 CF 99 35 03 FF
0D61:C8 8C 34 03 E8 E0 04 D0 5D
0D69:F1 60 AC 34 03 A2 00 BD CD
0D71:BE CF 99 35 03 C8 8C 34 ED
0D79:03 E8 E0 04 D0 F1 60 A0 5B
0D81:00 AD B2 02 8D C0 02 85 76
0D89:FB AD B3 02 8D C1 02 85 A0
0D91:FC 18 AD 34 03 91 FB A5 25
0D99:FB 69 01 85 FB A5 FC 69 5E
0DA1:00 85 FC B9 35 03 91 FB 2D
0DA9:C8 CC 34 03 D0 F5 18 A5 46
0DB1:FB 6D 34 03 85 FB A5 FC 40
0DB9:69 00 85 FC A0 00 AD BA 24
0DC1:02 8D C2 02 91 FB C8 AD 74
0DC9:BB 02 8D C3 02 91 FB 18 96
0DD1:A5 FB 69 02 8D B2 02 A5 EB
0DD9:FC 69 00 8D B3 02 60 A9 B5
0DE1:53 85 73 A9 CF 85 74 4C D9
0DE9:F9 CC A9 00 85 9D 20 F4 41
0DF1:CC 20 E9 CB 20 3A CA 20 14
0DF9:F4 CC A9 00 A2 08 A0 01 6E
0E01:20 BA FF AD 34 03 A2 35 DE
0E09:A0 03 20 BD FF A9 01 85 44
0E11:FB A9 08 85 FC A9 FB AE 24
0E19:BA 02 AC BB 02 20 D8 FF A6
0E21:20 F4 CC 20 2F C9 C9 0D 67
0E29:F0 2F 20 F4 CC A9 5A 85 24
0E31:73 A9 CF 85 74 20 F9 CC A8
0E39:20 F4 CC 20 F4 CC A9 7C E8
0E41:85 73 A9 CF 85 74 20 F9 67
0E49:CC A5 CB C9 27 F0 0D C9 2C
0E51:19 F0 22 20 E4 FF 4C AF EB
0E59:CB 4C 88 C8 AD 0E DC 29 94
0E61:FE 8D 0E DC A5 01 09 01 34
0E69:85 01 AD 0E DC 09 01 8D B9
0E71:0E DC 4C E2 FC 4C F3 C5 4A
0E79:A9 71 85 73 A9 CF 85 74 BA
0E81:4C F9 CC A9 A2 85 73 A9 32
0E89:CF 85 74 4C F9 CC A9 97 30
0E91:85 73 A9 CF 85 74 4C F9 10
0E99:CC A9 AC 85 73 A9 CF 85 DB
0EA1:74 4C F9 CC 20 EF CC A9 1B
0EA9:00 8D D3 02 A5 FC A6 FB 2E
0EB1:8D D1 02 8E D0 02 A2 09 0F
0EB9:8E D2 02 A0 B0 AD D0 02 FB
0EC1:DD F3 CF AD D1 02 FD F4 26
0EC9:CF 90 0F 8D D1 02 AD D0 6F
0ED1:02 FD F3 CF 8D D0 02 C8 66
0ED9:D0 E3 98 CA F0 11 C9 B0 27
0EE1:F0 03 8D D2 02 2C D2 02 7E
0EE9:30 05 AD D3 02 F0 05 29 59
0EF1:7F 20 D2 FF CA 10 C4 60 B0
0EF9:A0 00 20 F4 CC A9 F1 85 30
0F01:FB A9 C5 85 FC 38 A5 FB A8
0F09:ED BA 02 85 FB A5 FC ED C3
0F11:BB 02 85 FC 20 0A CC 4C 1D
0F19:FF CB A9 01 A2 08 A0 00 E5
0F21:20 BA FF A9 01 A2 EE A0 A9
0F29:CC 20 BD FF 20 C0 FF A2 14
0F31:01 20 C6 FF 20 E8 CC 20 0F
0F39:DA CC F0 30 A5 C6 F0 12 55
0F41:A9 00 85 C6 A5 CB C9 0D 4E
0F49:F0 22 A5 C6 F0 FC A9 00 58
0F51:85 C6 20 F4 CC 20 CF FF BD
0F59:AA 20 CF FF 20 16 CC 20 E1
0F61:EF CC 20 CF FF F0 D0 20 31
0F69:D2 FF D0 F6 A9 01 20 C3 CF
0F71:FF 4C CC FF 20 CF FF 85 02
0F79:FB 20 CF FF 05 FB 60 20 90
0F81:E8 CC 20 CF FF 4C CF FF 19
0F89:24 A9 20 4C D2 FF A9 0D E3
0F91:4C D2 FF 98 AA A0 00 B1 9D
0F99:73 F0 07 C8 20 D2 FF 4C B3
0FA1:FD CC 8A A8 60 93 96 0D 59
0FA9:0D 20 20 20 12 20 4E 4F 59
0FB1:41 48 53 2E 41 52 43 20 C9
0FB9:43 4F 50 59 52 49 47 48 7B
0FC1:54 20 31 39 39 31 20 43 DD
0FC9:4F 4D 50 55 54 45 20 00 3A
0FD1:0D 0D 99 20 48 4F 57 20 3D
0FD9:4D 41 4E 59 20 46 49 4C 47
0FE1:45 53 20 3F 0D 00 0D 0D FE
0FE9:99 20 41 52 45 20 59 4F D6
0FF1:55 20 53 55 52 45 20 3F A9
0FF9:20 96 59 2F 4E 00 22 08 AA
1001:0A 00 9E 32 30 38 38 20 10
1009:4E 4F 41 48 27 53 20 53 EA
1011:44 41 20 20 20 20 46 49 01
1019:4C 45 53 20 20 20 00 00 9E
1021:00 2F 00 00 00 AD 0E DC BC
1029:29 FE 8D 0E DC A5 01 29 D8
1031:FE 85 01 AD 0E DC 09 01 24
1039:8D 0E DC 18 EE B0 09 EA F7
1041:EA A9 08 85 BA A9 0F 85 BA
1049:B9 A0 00 A9 00 8D 20 D0 50
1051:8D 21 D0 A9 93 20 D2 FF F7
1059:A9 00 8D B2 02 18 A9 B0 9F
1061:69 01 8D BE 02 A9 09 69 46
1069:00 8D BF 02 AD BE 02 85 F6
1071:FB AD BF 02 85 FC A0 00 74
1079:B1 FB 8D C4 02 18 A5 FB 27
1081:69 01 85 FB 8D C6 02 A5 38
1089:FC 69 00 85 FC 8D C7 02 8A
1091:18 A5 FB 6D C4 02 85 FB B2
1099:A5 FC 69 00 85 FC A0 00 5A
10A1:B1 FB 8D C0 02 C8 B1 FB E9
10A9:8D C1 02 C8 B1 FB 8D C2 29
10B1:02 C8 B1 FB 8D C3 02 18 92
10B9:A5 FB 69 04 8D BE 02 A5 2A
10C1:FC 69 00 8D BF 02 EE B2 2A
10C9:02 AD B2 02 CD B0 09 D0 E0
10D1:03 4C 67 09 AD C6 02 85 16
10D9:FB AD C7 02 85 FC A0 00 DD
10E1:B9 A4 09 20 D2 FF C8 C0 14
10E9:08 D0 F5 A0 00 B1 FB 20 E9
10F1:D2 FF C8 CC C4 02 D0 F5 27
10F9:A9 0D 20 D2 FF AD C4 02 A5
1101:AE C6 02 AC C7 02 20 BD 7B
1109:FF A9 02 A2 08 A0 02 20 E6
1111:BA FF 20 C0 FF A2 02 20 4F
1119:C9 FF A0 00 AD C0 02 85 2E
1121:FB AD C1 02 85 FC AD C2 43
1129:02 85 FD AD C3 02 85 FE 78
1131:B1 FB 20 D2 FF 18 A5 FB 04
1139:69 01 85 FB A5 FC 69 00 B4
1141:85 FC A5 FB C5 FD F0 03 E4
1149:4C 33 09 A5 FC C5 FE F0 C7
1151:03 4C 33 09 A2 00 20 C9 1E
1159:FF A9 02 20 C3 FF 20 83 0A
1161:09 4C 6F 08 AD 0E DC 29 12
1169:FE 8D 0E DC A5 01 09 01 42
1171:85 01 AD 0E DC 09 01 8D C7
1179:0E DC CE B0 09 4C E2 FC FA
1181:20 CC FF A5 BA 20 B4 FF 01
1189:A9 6F 85 B9 20 96 FF A9 AD
1191:0D 20 D2 FF 20 A5 FF C9 FD
1199:0D D0 F6 20 D2 FF 4C AB 32
11A1:FF 0D 53 41 56 49 4E 47 41
11A9:20 2C 50 2C 57 2C 55 2C F5
11B1:57 2C 53 2C 57 50 52 4F A7
11B9:47 52 41 4D 00 55 53 45 52
11C1:52 00 53 45 51 55 45 4E 84
11C9:54 49 41 4C 00 81 20 46 E1
11D1:49 4C 45 4E 41 4D 45 20 23
11D9:3F 00 0D 0D 1C 20 4F 55 63
11E1:54 20 4F 46 20 4D 45 4D 92
11E9:4F 52 59 0D 00 20 46 49 9A
11F1:4C 45 53 00 20 53 2E 44 E4
11F9:2E 41 2E 20 46 49 4C 45 80
1201:53 20 46 49 4E 49 53 48 BA
1209:45 44 00 20 46 4F 52 20 17
1211:53 41 56 45 20 00 9A 20 A4
1219:43 52 45 41 54 45 20 4D 75
1221:4F 52 45 20 46 49 4C 45 61
1229:53 20 96 59 2F 4E 20 3F 99
1231:00 0D 20 4C 4F 41 44 49 B2
1239:4E 47 20 00 0D 20 53 41 2B
1241:56 49 4E 47 20 00 20 81 E3
1249:42 59 54 45 53 20 52 45 C8
1251:4D 41 49 4E 49 4E 47 00 8C
1259:2E 53 44 41 0D 0D 20 12 F4
1261:9A 20 53 2D 53 41 56 45 A9
1269:20 41 2D 41 42 4F 52 54 EF
1271:20 43 2D 43 4F 4E 54 49 F5
1279:4E 55 45 20 0D 00 0D 0D 54
1281:9E 20 31 20 0D 20 32 20 92
1289:0D 20 33 20 0D 0D 01 00 43
1291:0A 00 64 00 E8 03 10 27 E1
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COMPUTE Publications
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Ste. 200
Greensboro, NC 27408

Please enclose an SASE if you wish to have the materials returned.

MINER

DIG FOR GOLD BUT WATCH OUT FOR DEADLY SURPRISES IN THIS ARCADE GAME FOR THE 64

GUS VAKALIS

Mining for precious metals is a tough and dangerous occupation that's part skill and part luck. Miner is an arcade-style game that requires some skill and a lot of luck. It can also be dangerous for your onscreen miner.

The action is simple and straightforward. Use a joystick plugged into port 2 to control your miner as he digs around the screen searching for gold nuggets. Each screen contains 40 nuggets, and you must collect at least 20 of them in a specified amount of time in order to advance to the next screen. That's the simple part.

In addition to the gold, the earth your miner tunnels through contains a couple of deadly hazards—namely, pockets of methane gas and deposits of highly radioactive uranium. You want your miner to collect the gold and make it back to the surface without succumbing to these subterranean perils or running out of time.

Miner is written entirely in machine language, but it loads and runs like a BASIC program. Enter the program with *MLX,* our machine language entry program; see "Typing Aids" elsewhere in this section. When *MLX* prompts you, respond with the values given below.

Starting address: 0801
Ending address: 1BB0

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

Starting the Game

The game begins with one of your three miners standing in the doorway of a local bank. The bank is where you sell your gold for cash. You'll collect any gold nuggets that your miner uncovers, but you must deliver them to the bank before time runs out, or you'll lose whatever he's found.

Push the fire button to start the game and pull down on your joystick to have the miner dig straight down; push forward to move him up. Push left or right, and he'll dig in that direction in search of gold. You'll have to maneuver him around boulders that you see scattered across the screen. Occasionally he'll uncover immovable blocks of granite and have to make a detour around them.

Deadly Perils

There's more than gold and granite waiting for your miner to uncover. The two hazards, as mentioned earlier, are methane gas and uranium deposits. The number of hazards per screen is proportional to the skill level you've selected. Skill level 1 contains one or two uranium deposits and two to four methane pockets. Skill level 2 has two to four uranium deposits and four to six methane pockets, and so on up to skill level 5. Methane pockets appear as blue bubbles, and uranium deposits appear as gray oblong balls, not to be confused with the gray boulders that litter the screen.

When you first expose a hazard, you'll have about one second to get away from it before it becomes lethal. Once the grace period expires, the methane bubble will begin to move through the tunnel network that you've dug. Uranium deposits remain stationary at first, but they soon begin to flash and emit deadly radiation. This radiation slowly spreads throughout the tunnel system unless you can seal off tunnels with some of the boulders you've uncovered. Position your miner next to a boulder and push it in the desired direction.

If the gas or radiation reaches a miner or if he's below ground when time runs out, you'll lose one miner. You can play with a longer time limit, but nothing is free. Gold nuggets are worth 100 points in the 150-second game, 75 points in the 200-second game, and 50 points in the 250-second game. Before you start a new game, you can buy more time by pressing the 1, 2, or 3 key to select either a 150-, 200-, or 250-second game.

Onscreen Info

At the top of the screen, you'll see a readout of the number of miners you currently have, the number of gold nuggets that the active miner is carrying, the time remaining on the clock, and your score. Also displayed are the skill level and whether you're playing screen 1 or 2 of that level. You must complete two screens at each skill level in order to advance to the next level. You'll receive an additional miner for every 5000 points.

Once you deposit some gold in the bank, a counter will appear in the bank itself displaying how much gold you've deposited. Once this counter reaches 20, you can advance to the next screen by pressing the fire button. You may continue to mine the present screen, but be sure to deposit any gold you have before pressing the fire button.

Press the space bar to pause the game. When the border turns red, the game is paused. Press the space bar again to resume play. The Restore key resets the game to the title screen.

Strategy

Avoid digging large cavernous rooms, since the more surface area the radiation has, the more quickly it spreads. Try to protect the entrance to the bank, or you won't be able to deposit your gold. Remember that the clock is just as deadly as the radiation or methane. Don't let time run out on you.

After playing a few games, you may discover that some areas are usually free of radiation or methane. Gold nuggets are distributed randomly over the screen as are boulders and the immovable granite blocks.

Methane bubbles tend to move in a counterclockwise direction and always start by moving to the left. When a methane bubble encounters an obstruction and cannot move in any other direction, it will then double back on itself. Knowing this may enable you to dig traps for the bubbles so they can't follow you through the tunnels. You may also want to block off tunnel sections with boulders as you dig them; then, should you uncover a uranium deposit that you can't quickly seal, radiation won't spread throughout the entire tunnel.

MINER

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0809:31 00 00 00 A9 93 20 D2 60
0811:FF A9 00 8D 20 D0 8D 21 E4
0819:D0 20 00 14 A9 0F 8D 18 97
0821:D4 A5 9D 29 7F 85 9D A9 42
0829:80 8D 91 02 78 A5 01 29 B4
0831:FB 85 01 A2 00 BD 00 D8 BA
0839:9D 00 38 BD 00 D9 9D 00 9D
0841:39 BD 00 DA 9D 00 3A BD 2A
0849:00 DB 9D 00 3B BD 00 DC B1
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08B9:03 A0 0D 20 F0 FF A2 00 E3
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0931:18 C9 04 F0 C0 A0 00 A9 83
0939:06 91 03 EE 70 18 E6 03 B6
0941:E6 03 A9 07 91 03 20 57 5D
0949:14 20 F6 0E 4C F6 08 A9 25
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0971:97 18 8D 98 18 A9 FF 8D 85
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09A9:11 20 2D 11 20 AA 12 A9 7C
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09C9:4C CF 09 20 D1 14 20 CF 08
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0A31:78 D8 9D C0 DB E8 E0 28 E3
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0A41:A9 04 85 F8 85 FA A9 D8 AF
0A49:85 FC 85 FE A9 C7 85 F9 71
0A51:85 FD A0 00 A9 61 91 F7 A9
0A59:91 F9 A9 03 91 FB 91 FD B7
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0A79:85 FA 18 A5 FB 69 28 85 C7
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0AE9:4C 31 0B A9 04 8D 74 18 C3
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0D51:38 0E 4A 90 03 4C 88 0E C5
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0D71:8D AB 18 4C BB 18 20 F6 7A
0D79:0E 4C 0B 0D 38 A5 03 E9 28
0D81:28 85 0B A5 04 E9 00 85 1A
0D89:0C 18 A5 0B 69 60 85 09 F5
0D91:A5 0C 69 3B 85 0A 60 A9 21
0D99:00 8D A6 18 8D A7 18 8D 36
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0DB9:07 C9 69 B0 0A 4C 59 13 49
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0E19:67 0D 4C D2 12 4C 1C 11 ED
0E21:20 D3 13 4C 67 0D 38 A5 EE
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0E31:00 85 0C 20 8A 0D 60 A9 25
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0E41:A8 18 20 27 0E A0 00 B1 D2
0E49:0B C9 5C F0 23 C9 5F F0 E7
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0E59:07 C9 69 B0 0A 4C 59 13 EA
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0E89:00 8D A5 18 8D A6 18 8D 04
0E91:A7 18 20 77 0E A0 00 B1 A7
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0EA1:1C C9 5E F0 15 C9 65 90 44
0EA9:07 C9 69 B0 0A 4C 59 13 3B
0EB1:C9 5D D0 03 20 D4 10 4C 15
0EB9:67 0D 4C 04 13 4C 1C 11 A9
0EC1:20 D3 13 4C 67 0D A5 03 C7
0EC9:85 05 A5 04 85 06 18 A5 F8
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0ED9:D4 85 08 AD 76 18 38 E9 0C
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0EE9:A0 00 AD 77 18 91 07 AD 46
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0F21:D0 11 AC A9 18 88 B9 00 72
0F29:54 C9 3C 90 15 A0 00 A9 49
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0F49:EE A9 18 AD A9 18 C9 1F 87
0F51:D0 B8 AD AB 18 D0 40 A9 A4
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0F61:24 54 85 10 C8 B9 24 54 22
0F69:85 11 F0 2B A0 00 B1 10 D7
0F71:C9 64 D0 0F AC A9 18 88 5D
0F79:B9 24 54 C9 3C 90 08 A0 79
0F81:00 A9 65 49 03 91 10 EE B8
0F89:A9 18 EE A9 18 EE A9 18 E2
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0F99:8C 04 C9 62 D0 08 AD 8C EC
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1009:AD AA 18 29 0F 09 30 8D CA
1011:4B 04 60 AD AA 18 29 0F D5
1019:09 30 8D 4A 04 60 A9 FF 15
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1031:FA A9 00 8D 20 D0 8D 7E EF
1039:18 20 CD 10 4C 3B 0D AD 3F
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1049:18 AD 1B D4 C9 3B 90 0B F8
1051:C9 7D 90 1B C9 BF 90 26 0E
1059:4C 8E 10 AD A3 18 D0 E9 29
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1069:A9 04 69 00 85 04 60 18 A1
1071:A9 68 6D 7F 18 85 03 A9 AC
1079:05 69 00 85 04 60 18 A9 4A
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10B9:AD 00 DC 29 10 F0 F9 A2 B9
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1109:76 18 20 C7 0E 20 F2 19 DC
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1119:D3 13 60 F8 18 AD 81 18 18
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1151:29 0F 09 30 8D 0B 04 60 F0
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1169:18 29 0F 09 30 8D 64 04 D8
1171:A9 07 8D 63 D8 8D 64 D8 B0
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1189:F4 A0 02 18 B9 96 18 79 E1
1191:91 18 99 96 18 88 10 F4 17
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11A9:82 18 D8 AD 97 18 C9 50 0A
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11B9:09 EE 9F 18 AD 9F 18 8D 3B
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11F9:8E 18 29 0F 99 99 18 E8 CB
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1229:20 99 21 04 C8 C0 06 D0 4E
1231:F8 60 AD 82 18 C9 20 B0 A0
1239:03 4C 67 0D AD 70 18 C9 D8
1241:04 F0 1A F8 18 AD AA 18 5B
1249:69 01 8D AA 18 D8 C9 03 79
1251:D0 16 A9 01 8D AA 18 EE DE
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12B1:24 54 C8 C0 24 D0 F5 60 D2
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12C1:0C E9 00 85 0A EE A5 18 2E
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12F1:09 A5 0C E9 00 85 0A EE 3D
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1321:C9 5C F0 03 4C 67 0D AD 59
1329:A4 18 C9 03 B0 03 4C 67 A2
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1351:A7 18 8D A8 18 4C D1 0D 30
1359:A9 FF 8D 7E 18 8D 7E 18 F9
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1369:18 8D 08 04 C9 30 F0 29 5A
1371:18 A2 0A A0 0A 20 F0 FF 4A
1379:A2 00 BD 70 17 20 D2 FF 8E
1381:E8 E0 16 D0 F5 AD 9F 18 E1
1389:8D AD 05 20 B9 10 20 9D 70
1391:10 AD 6E 18 D0 F8 4C 76 F3
1399:09 18 A2 0A A0 0A 20 F0 9D
13A1:FF A2 00 BD 86 17 20 D2 EF
13A9:FF E8 E0 15 D0 F5 20 B9 CF
13B1:10 20 9D 10 AD 6E 18 D0 C4
13B9:F8 4C A5 08 18 A2 08 A0 A0
13C1:08 20 F0 FF A2 00 BD B4 57
13C9:17 20 D2 FF E8 E0 B9 D0 EC
13D1:F5 60 A9 5C 8D 76 18 20 9C
13D9:C7 0E A5 0B 85 03 A5 0C 5C
13E1:85 04 A9 62 8D 76 18 20 BD
13E9:C7 0E 20 21 14 60 20 00 EF
13F1:14 A9 FF 8D 0E D4 8D 0F 53
13F9:D4 A9 80 8D 12 D4 60 A2 25
1401:00 8A 9D 00 D4 E8 E0 18 A3
1409:D0 F8 60 A9 30 8D 06 D4 17
1411:A9 11 8D 04 D4 A2 04 20 9D
1419:F8 0E A9 00 8D 04 D4 60 FC
1421:20 00 14 A9 50 8D 00 D4 04
1429:A9 21 8D 01 D4 A9 44 8D 93
1431:05 D4 A9 20 8D 06 D4 A9 20
1439:68 8D 16 D4 A9 01 8D 17 8C
1441:D4 A9 4A 8D 18 D4 A9 81 49
1449:8D 04 D4 A2 06 20 F8 0E AE
1451:A9 80 8D 04 D4 60 20 00 C8
1459:14 A9 55 8D 01 D4 4C 0C 79
1461:14 20 00 14 A9 40 8D 01 47
1469:D4 A9 08 8D 05 D4 4C 0C 60
1471:14 AD AC 18 D0 03 4C F1 43
1479:14 A5 C5 C9 38 D0 06 20 9B
1481:9D 14 4C EB 14 C9 3B D0 D4
1489:06 20 B7 14 4C EB 14 C9 F8
1491:08 D0 06 20 D1 14 4C EB 18
1499:14 4C 31 EA A9 01 8D AD CD
14A1:18 A9 01 8D 92 18 A9 00 81
14A9:8D 93 18 A9 01 8D 94 18 9A
14B1:A9 50 8D 95 18 60 A9 02 65
14B9:8D AD 18 A9 00 8D 92 18 25
14C1:A9 75 8D 93 18 A9 02 8D FF
14C9:94 18 A9 00 8D 95 18 60 CA
14D1:A9 03 8D AD 18 A9 00 8D 11
14D9:92 18 A9 50 8D 93 18 A9 20
14E1:02 8D 94 18 A9 50 8D 95 C1
14E9:18 60 20 CF 0F 4C 31 EA 2E
14F1:AD 7E 18 F0 03 4C 31 EA 39
14F9:20 31 15 EE A0 18 EE A1 F4
1501:18 EE A2 18 AD A0 18 C9 B2
1509:78 D0 08 A9 FF 8D A8 1B E1
1511:4C 31 EA AD A1 18 C9 10 F6
1519:90 06 20 01 0F 4C 31 EA 18
1521:AD A2 18 C9 3C 90 06 20 BA
1529:A8 0F 4C 31 EA 4C 31 EA DD
1531:A2 00 FE 00 54 FE 24 54 C7
1539:E8 E8 E8 E0 24 D0 F3 60 E9
1541:48 AD 6D 18 D0 06 68 68 02
1549:68 4C A5 08 68 40 3C 42 EE
1551:99 A1 A1 99 42 3C 00 00 81
1559:00 00 00 00 00 00 E7 BE 12
1561:CA ED 7F B3 39 CF 3C 72 8B
1569:7A DF DD ED 72 1C 00 18 7F
1571:3C 6C 76 3C 38 00 00 3C 65
1579:7E 7E 7E 7E 3C 00 CF E6 A2
1581:23 B0 7E 9F 83 F9 18 18 7F
1589:66 FF DB 3C 66 E7 00 3C 35
1591:7E 7E 7E 7E 3C 00 38 44 E8
```

```
1599:42 82 81 41 62 1C 38 44 02
15A1:42 82 81 41 62 1C 1C 22 AF
15A9:42 41 81 82 46 38 08 08 C8
15B1:98 92 D2 43 41 01 82 82 F0
15B9:C3 49 49 18 10 10 00 00 83
15C1:00 36 7F FF 00 FF 00 00 69
15C9:00 DB FF FF 00 FF 00 70 5B
15D1:70 74 FE FF 00 FF 93 93 EB
15D9:FF 93 93 FF FF FF 00 7E D9
15E1:3E 7E 7A 7A 3E 7E C9 C9 0B
15E9:FF C9 C9 FF FF FF 9E 20 1D
15F1:20 20 20 20 CD C9 CE C5 33
15F9:D2 20 20 20 20 20 20 20 7D
1601:20 20 20 20 20 20 20 20 2D
1609:20 20 11 20 20 20 20 20 53
1611:20 20 20 20 1F C4 45 53 45
1619:49 47 4E 45 44 20 42 59 5A
1621:20 C7 55 53 20 D6 41 4B 59
1629:41 4C 49 53 2E 20 20 20 B9
1631:20 20 20 20 11 20 20 20 E4
1639:20 20 20 20 20 20 20 20 65
1641:20 C3 4F 50 59 52 49 47 4B
1649:48 54 20 DB 20 31 39 39 E1
1651:31 2E 20 20 20 20 20 20 89
1659:20 20 20 20 20 11 20 C3 EC
1661:CF CD D0 D5 D4 C5 20 D0 2F
1669:55 42 4C 49 43 41 54 49 FF
1671:4F 4E 53 20 C9 4E 54 45 BA
1679:52 4E 41 54 49 4F 4E 41 35
1681:4C 20 CC 54 44 2E 11 20 D7
1689:20 20 20 20 20 20 20 20 B5
1691:20 20 C1 4C 4C 20 52 49 A3
1699:47 48 54 53 20 52 45 53 63
16A1:45 52 56 45 44 2E 9F D0 0F
16A9:4C 55 47 20 41 20 4A 4F AA
16B1:59 53 54 49 43 4B 20 49 4F
16B9:4E 54 4F 20 50 4F 52 54 C6
16C1:20 54 57 4F 2E 20 20 20 45
16C9:20 20 11 20 20 20 20 1F 13
16D1:D3 45 4C 45 43 54 20 41 04
16D9:20 53 4B 49 4C 4C 20 4C 09
16E1:45 56 45 4C 3A 20 20 31 77
16E9:20 32 20 33 20 34 20 35 31
16F1:20 20 20 20 20 20 20 20 1E
16F9:20 20 20 20 20 20 11 9F 87
1701:D0 52 45 53 53 20 1C 46 A3
1709:49 52 45 20 9F 54 4F 20 28
1711:42 45 47 49 4E 2E 1F CD 66
1719:49 4E 45 52 53 3A 20 9A AB
1721:20 05 20 20 20 20 20 20 88
1729:20 20 20 20 20 20 20 20 57
1731:20 20 20 1F D3 43 4F 52 0A
1739:45 3A 05 20 20 20 20 20 1D
1741:20 20 20 1F CC 45 56 45 EA
1749:4C 3A 20 05 20 20 20 20 62
1751:20 20 20 20 20 20 20 20 7F
1759:20 20 20 20 20 20 20 1F 86
1761:D3 43 52 45 45 4E 3A 05 C5
1769:20 20 20 20 20 20 20 9A 12
1771:20 CD 49 4E 45 52 53 20 6B
1779:52 45 4D 41 49 4E 49 4E 44
1781:47 3A 20 05 30 1C 20 C7 30
1789:20 C1 20 CD 20 C5 20 20 91
1791:20 20 CF 20 D6 20 C5 20 B6
1799:D2 20 20 9A D0 52 45 53 94
17A1:53 20 1C 46 49 52 45 20 A7
17A9:9A 54 4F 20 42 45 47 49 25
17B1:4E 2E 20 9F A1 A1 A1 A1 09
17B9:A1 A1 A1 A1 A1 A1 A1 A1 E7
17C1:A1 A1 A1 A1 A1 A1 A1 A1 EF
17C9:A1 A1 A1 A1 1D 1D 1D 1D 34
17D1:1D 1D 1D 1D 1D 1D 1D 1D FF
17D9:1D 1D 1D 1D A1 20 20 20 41
17E1:20 20 20 20 20 20 20 20 10
17E9:20 20 20 20 20 20 20 20 18
17F1:20 20 20 A1 1D 1D 1D 1D 0B
17F9:1D 1D 1D 1D 1D 1D 1D 1D 28
```

```
1801:1D 1D 1D 1D A1 20 20 20 6A
1809:20 20 20 20 20 20 20 20 39
1811:20 20 20 20 20 20 20 20 41
1819:20 20 20 A1 1D 1D 1D 1D 34
1821:1D 1D 1D 1D 1D 1D 1D 1D 51
1829:1D 1D 1D 1D A1 20 20 20 92
1831:20 20 20 20 20 20 20 20 61
1839:20 20 20 20 20 20 20 20 69
1841:20 20 20 A1 1D 1D 1D 1D 5C
1849:1D 1D 1D 1D 1D 1D 1D 1D 79
1851:1D 1D 1D 1D A1 A1 A1 A1 45
1859:A1 A1 A1 A1 A1 A1 A1 A1 89
1861:A1 A1 A1 A1 A1 A1 A1 A1 91
1869:A1 A1 A1 A1 00 00 00 00 21
1871:00 00 00 00 00 00 00 00 A1
1879:00 00 00 00 00 00 00 00 A9
1881:00 00 00 00 00 00 00 00 B1
1889:00 00 00 00 00 00 00 00 B9
1891:00 00 00 00 00 00 00 00 C1
1899:00 00 00 00 00 00 00 00 C9
18A1:00 00 00 00 00 00 00 00 D1
18A9:00 00 00 00 00 00 09 0C F7
18B1:07 0F 03 0E 0F 0E 0E 0E 45
18B9:07 07 AD A8 1B D0 03 4C DD
18C1:77 0D A9 00 8D A8 1B 8D F8
18C9:A0 18 20 A7 19 20 7A 19 26
18D1:20 71 19 A0 00 B1 12 C9 50
18D9:60 F0 1C C9 67 F0 18 20 E5
18E1:99 19 A5 12 C9 BF D0 EB D5
18E9:A5 13 C9 07 D0 E5 20 7A 34
18F1:19 20 B2 19 4C 0B 0D 20 67
18F9:39 19 20 13 19 20 47 19 33
1901:20 13 19 20 55 19 20 13 8F
1909:19 20 63 19 20 13 19 4C 99
1911:E0 18 A0 00 B1 0B C9 5C 77
1919:F0 05 C9 62 F0 12 60 A5 9A
1921:0B 85 03 A5 0C 85 04 A9 1D
1929:68 8D 76 18 20 C7 0E 60 DF
1931:68 68 20 20 19 4C 59 13 77
1939:38 A5 12 E9 28 85 0B A5 E4
1941:13 E9 00 85 0C 60 18 A5 87
1949:12 69 28 85 0B A5 13 69 BA
1951:00 85 0C 60 38 A5 12 E9 D2
1959:01 85 0B A5 13 E9 00 85 EE
1961:0C 60 18 A5 12 69 01 85 CC
1969:0B A5 13 69 00 85 0C 60 12
1971:A9 A1 85 12 A9 04 85 13 2E
1979:60 20 71 19 A0 00 B1 12 1E
1981:C9 68 D0 04 A9 67 91 12 2D
1989:20 99 19 A5 12 C9 BF D0 B7
1991:EB A5 13 C9 07 D0 E5 60 C9
1999:18 A5 12 69 01 85 12 A5 02
19A1:13 69 00 85 13 60 A5 03 78
19A9:8D 84 18 A5 04 8D 85 18 9A
19B1:60 AD 84 18 85 03 AD 85 AA
19B9:18 85 04 60 A5 03 8D 84 B8
19C1:18 A5 04 8D 85 18 A5 05 9F
19C9:8D 86 18 A5 06 8D 87 18 4F
19D1:A5 07 8D 88 18 A5 08 8D C7
19D9:89 18 A5 0B 8D 8A 18 A5 A8
19E1:0C 8D 8B 18 AD 76 18 8D 75
19E9:8C 18 AD 77 18 8D 8D 18 BF
19F1:60 AD 84 18 85 03 AD 85 EA
19F9:18 85 04 AD 86 18 85 05 99
1A01:AD 87 18 85 06 AD 88 18 59
1A09:85 07 AD 89 18 85 08 AD A4
1A11:8A 18 85 0B AD 8B 18 85 43
1A19:0C AD 8C 18 8D 76 18 AD F5
1A21:8D 18 8D 77 18 60 A2 00 D2
1A29:A9 01 9D 48 54 E8 E0 12 C4
1A31:D0 F8 60 20 BD 19 A9 01 C0
1A39:8D A9 1B AC A9 1B B9 24 1E
1A41:54 85 0D C8 B9 24 54 85 BB
1A49:0E D0 03 4C F2 19 AD A9 DE
1A51:1B 4A 8D AA 1B A8 B9 48 39
1A59:54 8D A7 1B A0 00 B1 0D 37
1A61:C9 64 D0 03 4C 48 1B AD 45
```

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1A69:A7 1B 4A B0 09 4A B0 21 80
1A71:4A B0 39 4A B0 51 20 E3 B1
1A79:1A 20 23 1B 20 F3 1A 20 FD
1A81:23 1B 20 13 1B 20 23 1B FD
1A89:20 03 1B 20 23 1B 4C 48 5A
1A91:1B 20 F3 1A 20 23 1B 20 5F
1A99:03 1B 20 23 1B 20 E3 1A 87
1AA1:20 23 1B 20 13 1B 20 23 7C
1AA9:1B 4C 48 1B 20 03 1B 20 9C
1AB1:23 1B 20 13 1B 20 23 1B 2E
1AB9:20 F3 1A 20 23 1B 20 E3 E9
1AC1:1A 20 23 1B 4C 48 1B 20 FA
1AC9:13 1B 20 23 1B 20 E3 1A BF
1AD1:20 23 1B 20 03 1B 20 23 2C
1AD9:1B 20 F3 1A 20 23 1B 4C D3
1AE1:48 1B A9 FF 8D 7B 18 A9 6A
1AE9:FF 8D 7C 18 A9 01 8D 7D 7C
1AF1:18 60 A9 28 8D 7B 18 A9 36
1AF9:00 8D 7C 18 A9 02 8D 7D 90
1B01:18 60 A9 01 8D 7B 18 A9 D4
1B09:00 8D 7C 18 A9 04 8D 7D A9
1B11:18 60 A9 D8 8D 7B 18 A9 62
1B19:FF 8D 7C 18 A9 08 8D 7D C9
1B21:18 60 18 A5 0D 6D 7B 18 06
1B29:85 0B A5 0E 6D 7C 18 85 8D
1B31:0C A0 00 B1 0B C9 5C F0 D9
1B39:24 C9 62 F0 57 60 AC AA 8F
1B41:1B AD 7D 18 99 48 54 EE 27
1B49:A9 1B EE A9 1B EE A9 1B 96
1B51:AD A9 1B C9 25 F0 03 4C 08
1B59:3C 1A 4C F2 19 68 68 A5 CD
1B61:0D 85 03 A5 0E 85 04 A9 72
1B69:5C 8D 76 18 20 C7 0E A5 63
1B71:0B 85 0D A5 0C 85 0E AC C9
1B79:A9 1B A5 0D 99 24 54 85 5C
1B81:03 C8 A5 0E 99 24 54 85 8C
1B89:04 A9 65 8D 76 18 20 C7 CD
1B91:0E 4C 3F 1B 68 68 A9 FF B3
1B99:8D 78 18 8D 7E 18 20 F2 18
1BA1:19 68 68 4C 59 13 00 00 67
1BA9:00 00 00 00 00 00 00 00 DF
```

⊡

ONLY ON DISK

When you buy *Gazette Disk* ($9.95 plus $2.00 shipping and handling), you not only get all the type-in programs found in that month's magazine, you also get "Gazette Gallery," bonus programs, and more. To order, write to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Here's a description of this month's bonus.

Sector Patrol

Grant Young

Battle Thraxion space fighters in this fast-paced arcade game in a race to collect four quarters of a magic crystal of unlimited power. For each fighter you destroy, you'll collect one bomb to be used against the renegade unit patrolling that sector. Destroy a unit and teleport to a new sector.

DUNGEON TRIALS

DEFEAT THE POWERFUL DEMONS THAT BLOCK YOUR WAY TO SAFETY IN THIS ADVENTURE GAME FOR THE 64

BRYAN CHRIST

You and your allies have been accused of murdering the king of Acacia. Due to uncertainty about your guilt among the High Council judges, you and your party have been locked in a maze filled with magical doors and powerful demons. Legend has it that the gods of the underworld will determine who is guilty and who is not.

Here is where you will be tested. Those who are untruthful have their fates sealed from the beginning. It will only be a matter of time before it's apparent who among your party is innocent and who is guilty. Those who escape the dungeon trials alive will be excused of all charges, and their names will be cleared.

Typing It In

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

Enter the Dungeon

Plug a joystick into port 2 to play *Dungeon Trials.* Load and run the program; then wait for a minute while the computer reads the sprite data. When the main screen appears, you'll see what your party sees.

There are doors on all sides of each room. These doors match a compass rose in that north is straight ahead, east is to the right, and west is to the left. South is always behind you and can't be seen. Above the room are the six members of your party.

As you search for the exit, a variety of evil foes will appear, blocking your path. You can't leave a room until you've defeated each demon in combat. Even after one of your party has defeated a foe, another one may appear immediately.

When you select Fight from the menu, you'll be asked which of the six members of your party will engage the monster. Enter that member's number and press Return. At this point the background screen will clear, and a crosshairs pointer will appear. Try to maneuver the crosshairs over the head of the demon, and press the fire button before the demon can move away. The head is the only vital spot, and your timing is very important.

The snake is the exception. You must aim just over its head and strike the lower part of its tail. If your blow strikes it there, the snake will be banished to its realm.

You get only one chance to defeat a demon. If you miss, your party member dies. The maze has 150 rooms; the object is to reach the last one. There are five magical doors that will teleport you to other parts of the dungeon, but you won't be able to return to the teleport by retracing your steps.

Good luck—I hope you have been truthful.

DUNGEON TRIALS

```
XG 100 LVL=1:RM=5
AP 110 MF=12:TSF=63
PF 120 FOR T=1TO6
MM 130 CH(T)=0
KE 140 NEXTT
CM 150 PRINTCHR$(147);
FJ 160 POKE53281,0:POKE53280,1
       1
BG 170 PRINTTAB(12);"{YEL}READ
       ING DATA..."
PX 180 FORCA=12672TO12734:READ
       QA:POKECA,QA:NEXT
KM 190 FORCB=12736TO12798:READ
       QB:POKECB,QB:NEXT
SF 200 FORCC=12800TO12862:READ
       QC:POKECC,QC:NEXT
HE 210 FORCD=12864TO12926:READ
       QD:POKECD,QD:NEXT
XM 220 FORCE=12928TO12990:READ
       QE:POKECE,QE:NEXT
AQ 230 FORCF=12992TO13054:READ
       QF:POKECF,QF:NEXT
MM 240 FORDA=12288TO12350:READ
       ZA:POKEDA,ZA:NEXT
FJ 250 FORDB=12352TO12414:READ
       ZB:POKEDB,ZB:NEXT
DD 260 FORDC=12416TO12478:READ
       ZC:POKEDC,ZC:NEXT
JF 270 FORDD=12480TO12542:READ
       ZD:POKEDD,ZD:NEXT
KP 280 FORDE=12544TO12606:READ
       ZE:POKEDE,ZE:NEXT
CC 290 FORDF=12608TO12670:READ
       ZF:POKEDF,ZF:NEXT
PD 300 PRINTCHR$(147);
GB 310 V=53248
HA 320 POKEV+23,TSF
ES 330 POKEV+28,TSF:POKEV+37,7
       :POKEV+38,10
KE 340 POKEV+0,50:POKEV+1,58
HC 350 POKEV+2,80:POKEV+3,58
HJ 360 POKEV+4,110:POKEV+5,58
DH 370 POKEV+6,140:POKEV+7,58
SX 380 POKEV+8,170:POKEV+9,58
CH 390 POKEV+10,200:POKEV+11,5
       8
SP 400 POKE2040,198:POKE2041,1
       99
QQ 410 POKE2042,200:POKE2043,2
       01
HG 420 POKE2044,202:POKE2045,2
       03
CM 430 POKEV+21,TSF
JQ 440 POKEV+39,5:POKEV+40,6
KC 450 POKEV+41,8:POKEV+42,4
FS 460 POKEV+43,6:POKEV+44,5
GG 470 PRINTCHR$(19);
JC 480 POKE214,6:PRINT
BB 490 PRINT"{WHT}{4 SPACES}1
       {3 SPACES}2{3 SPACES}3
       {2 SPACES}4{3 SPACES}5
       {3 SPACES}6"
AJ 500 PRINT"{2 SPACES}{RVS}
       {WHT}{24 SPACES}"
JX 510 FORT=1TO8
HM 520 PRINT"{2 SPACES}{RVS}
       {WHT} ";TAB(25);"{RVS}
       {WHT} "
AC 530 NEXT
BH 540 PRINT"{2 SPACES}{RVS}
       {WHT}{24 SPACES}"
FP 550 PRINTCHR$(19);
DE 560 POKE214,8:PRINT
BC 570 FORT=1TO8
PF 580 PRINT"{3 RIGHT}{RVS}
```

```
            {BLU}{22 SPACES}{WHT}"
JH 590  NEXT
QK 600  PRINTCHR$(19);
MP 610  POKE214,8:PRINT
SM 620  PRINTTAB(11);"{RVS}{5}
        {E}{R}{E}{R}{E}{R}"
KC 630  PRINTTAB(11);"{RVS}{5}
        {R}{E}{OFF}£{*}{RVS}
        {R}{E}"
CR 640  PRINTTAB(11);"{RVS}{5}
        {E}{R}{OFF}{2 SPACES}
        {RVS}{E}{R}"
JS 650  PRINTTAB(11);"{RVS}{5}
        {R}{E}{OFF}{2 SPACES}
        {RVS}{R}{E}"
MX 660  PRINTTAB(11);"{RVS}{5}
        {E}{R}{OFF}{2 SPACES}
        {RVS}{E}{R}"
RX 670  PRINTTAB(10);"{BLU}£
        {6 SPACES}{*}"
GR 680  PRINTTAB(9);"{BLU}{OFF}
        £{8 SPACES}{*}"
SM 690  PRINTTAB(8);"{BLU}{OFF}
        £{10 SPACES}{*}"
JD 700  PRINTCHR$(19);
SS 710  POKE214,10:PRINT
DP 720  PRINTTAB(8);"{BLU}{OFF}
        £";TAB(19);"{BLU}{OFF}
        {*}"
AG 730  PRINTTAB(7);"{BLU}{OFF}
        £ ";TAB(19);"{BLU}
        {OFF} {*}"
DJ 740  FORT=1TO2
GD 750  PRINTTAB(7);"{OFF}
        {2 SPACES}";TAB(19);"
        {OFF}{2 SPACES}"
FP 760  NEXTT
RR 770  PRINTTAB(7);"{BLU}{OFF}
        {2 P}";TAB(19);"{BLU}
        {OFF}{2 P}"
CF 780  PRINTTAB(7);"{OFF}
        {2 SPACES}";TAB(19);"
        {OFF}{2 SPACES}"
BX 790  DM=INT(RND(0)*MF)+1
AK 800  IF DM>6 THEN MC$="
        {5 SPACES}NONE"
DB 810  IFDM=1THENSM=192:MNC=12
        :MC$="{4 SPACES}SHADOW"
PF 820  IFDM=2THENSM=193:MNC=1:
        MC$="{4 SPACES}GHOST"
HD 830  IFDM=3THENSM=194:MNC=5:
        MC$="{3 SPACES}SERPENT"
PF 840  IFDM=4THENSM=195:MNC=6:
        MC$="WINGED WARRIOR"
XM 850  IFDM=5THENSM=196:MNC=1:
        MC$="{3 SPACES}SKELETON
        "
SA 860  IFDM=6THENSM=197:MNC=2:
        MC$=" VAPOR DEMON"
BX 870  PRINTCHR$(19);
HX 880  PRINT
CP 890  PRINTTAB(31);"{WHT}
        {OFF}FOE"
MD 900  PRINTTAB(31);"{WHT}
        {OFF}{3 U}":PRINT
DM 910  PRINTTAB(26);"{WHT}";TA
        B(26);MC$
CX 920  IF DM>6THEN990
HM 930  POKEV+23,TSF+64:POKEV+2
        8,TSF+64
XB 940  POKEV+37,7:POKEV+38,10
MA 950  POKEV+12,124:POKEV+13,1
        40
BG 960  POKE2046,SM
FP 970  POKEV+21,TSF+64
PA 980  POKEV+45,MNC
DH 990  PRINTCHR$(19);
RJ 1000 POKE214,7:PRINT
CB 1010 PRINTTAB(29);"{WHT}
        {OFF}OPTIONS"
PX 1020 PRINTTAB(29);"{WHT}
        {OFF}{7 T}"
RD 1030 PRINTTAB(29);"{WHT}
        {RVS}F{OFF}IGHT"
QX 1040 PRINTTAB(29);"{WHT}
        {RVS}N{OFF}ORTH"
KD 1050 PRINTTAB(29);"{WHT}
        {RVS}S{OFF}OUTH"
GA 1060 PRINTTAB(29);"{WHT}
        {RVS}E{OFF}AST"
PB 1070 PRINTTAB(29);"{WHT}
        {RVS}W{OFF}EST"
CK 1080 GETKY$:IFKY$=""THEN1080
BJ 1090 IF MC$="{5 SPACES}NONE
        " THEN 1120
PS 1100 IF KY$="F"THEN 1170
JG 1110 GOTO1080
BH 1120 IF KY$="S"THEN2040
PQ 1130 IF KY$="N"THEN2200
AD 1140 IF KY$="E"THEN2350
KG 1150 IF KY$="W"THEN2490
KM 1160 GOTO 1080
FG 1170 PRINT CHR$(19);
ED 1180 POKE214,18:PRINT
DA 1190 PRINTTAB(2);"{WHT}CHAR
        ACTER TO"
PG 1200 INPUT"{2 SPACES}FIGHT
        {SPACE}WITH";C
FC 1210 IF C>6 THEN 1250
EX 1220 IF C<1 THEN 1250
SQ 1230 IF CH(C)=255 THEN 1250
BX 1240 GOTO 1320
SJ 1250 PRINTTAB(2);"THAT CHAR
        ACTER DOES NOT EXIST!"
XM 1260 PRINTTAB(2);"CHOOSE AG
        AIN."
FG 1270 FORO=1TO1000:NEXTO
AK 1280 PRINTCHR$(19);
KP 1290 POKE214,18:PRINT
GA 1300 FORO=1TO4:PRINT"
        {34 SPACES}":NEXTO
SF 1310 GOTO 1170
JX 1320 PRINTCHR$(19);
KC 1330 POKE214,8:PRINT
RJ 1340 FORT=1TO8:PRINTTAB(3);
        "{22 SPACES}":NEXTT
QE 1350 PL=1024:PC=55296
QQ 1360 MY=124
DJ 1370 PX=14:PY=13
DJ 1380 IF C=1 THEN CW=30:WC=9
EH 1390 IF C=2 THEN CW=66:WC=6
DK 1400 IF C=3 THEN CW=30:WC=9
PX 1410 IF C=4 THEN CW=42:WC=4
BF 1420 IF C=5 THEN CW=43:WC=7
GF 1430 IF C=6 THEN CW=30:WC=9
DJ 1440 POKE53275,255
DD 1450 MDR=INT(RND(0)*2)+1
PM 1460 IF MDR=1ANDMY-4<50THEN
         MDR=2
MJ 1470 IF MDR=2ANDMY+4>192THE
        N MDR=1
KR 1480 IF MDR=1 THEN MY=MY-8
PQ 1490 IF MDR=2 THEN MY=MY+8
RM 1500 JY=PEEK(56320)
GC 1510 IF JY=127 THEN1620
KD 1520 IF JY=119 THEN WX=1
RQ 1530 IF JY=123 THEN WX=-1
AD 1540 IF JY=125 THEN WY=1
RK 1550 IF JY=126 THEN WY=-1
AG 1560 IF JY=111 THEN 1660
XQ 1570 IFPEEK(1024+PY*40+(PX+
        WX))=160THENWX=0
QP 1580 IFPEEK(1024+(PY+WY)*40
        +PX)=160THEN WY=0
KA 1590 POKE1024+(PY*40)+PX,32
HJ 1600 PX=PX+WX
XR 1610 PY=PY+WY
XJ 1620 POKEPC+(PY*40)+PX,3
KE 1630 POKE1024+(PY*40)+PX,91
        :WX=0:WY=0
CF 1640 POKEV+12,MY:POKEV+13,1
        40
XM 1650 GOTO 1450
CB 1660 SWX=1664
KS 1670 FX=SWX+PX
SE 1680 FOR FY=FX TO (1024+40*
        PY+PX) STEP-40
AC 1690 POKEPC+(FY-1024),WC
MJ 1700 POKEFY,CW
SJ 1710 FORGJ=1TO10:NEXTGJ
DE 1720 POKEFY,32:NEXTFY
BB 1730 IF MDR=1 THEN MY=MY+8
HR 1740 IF MDR=2 THEN MY=MY-8
SG 1750 HM=INT(MY/8)
JH 1760 IF PY=11 THEN 1790
AF 1770 IF PY=12 THEN 1790
BJ 1780 GOTO 1890
SF 1790 IF PX+1=HM THEN 1820
KF 1800 IF PX+2=HM THEN 1820
MP 1810 GOTO 1890
BG 1820 FORGJ=1TO10:FORT=0TO15
XR 1830 POKE V+45,T
XC 1840 NEXTT:NEXTGJ
MD 1850 POKEV+21,TSF
FE 1860 POKE53275,0
QX 1870 PRINTCHR$(147);
PH 1880 GOTO 470
QA 1890 IF C=1 THEN VP=39:TSF=
        TSF-1
BH 1900 IF C=2 THEN VP=40:TSF=
        TSF-2
BB 1910 IF C=3 THEN VP=41:TSF=
        TSF-4
KJ 1920 IF C=4 THEN VP=42:TSF=
        TSF-8
FA 1930 IF C=5 THEN VP=43:TSF=
        TSF-16
BB 1940 IF C=6 THEN VP=44:TSF=
        TSF-32
XS 1950 CH(C)=255
XX 1960 FORGJ=1TO10:FORT=0TO15
HH 1970 POKE V+VP,T
FP 1980 NEXTT:NEXTGJ
AR 1990 POKE53275,0
CM 2000 POKEV+21,TSF
AF 2010 IF TSF=0 THEN 2810
FH 2020 PRINTCHR$(147);
CJ 2030 GOTO300
SP 2040 IF RM=1 THEN 2640
PJ 2050 IF RM=4 THEN 2640
AS 2060 IF RM=5 THEN 2640
EX 2070 IF RM=10 THEN 2640
QS 2080 IF RM=11 THEN 2640
EQ 2090 IF RM=12 THEN 2640
FD 2100 IF RM=15 THEN 2640
AB 2110 IF RM=17 THEN 2640
JA 2120 IF RM=18 THEN 2640
JQ 2130 IF RM=20 THEN 2640
RB 2140 IF RM=23 THEN 2640
FH 2150 IF RM=24 THEN 2640
RG 2160 IF RM=25 THEN 2640
XP 2170 IF RM=28 THEN 2640
AS 2180 IF RM=29 THEN 2760
FP 2190 RM=RM+1:GOTO300
FB 2200 IF RM=1 THEN 2640
SG 2210 IF RM=5 THEN 2640
BE 2220 IF RM=6 THEN 2640
CF 2230 IF RM=11 THEN 2640
ME 2240 IF RM=12 THEN 2640
CM 2250 IF RM=13 THEN 2640
EX 2260 IF RM=16 THEN 2640
```

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DR 2270 IF RM=18 THEN 2640
PQ 2280 IF RM=19 THEN 2640
MJ 2290 IF RM=21 THEN 2640
JX 2300 IF RM=24 THEN 2640
AR 2310 IF RM=25 THEN 2640
JQ 2320 IF RM=26 THEN 2640
PB 2330 IF RM=29 THEN 2640
KB 2340 RM=RM-1:GOTO300
MS 2350 IF RM=2 THEN 2640
RR 2360 IF RM=3 THEN 2640
PA 2370 IF RM=9 THEN 2640
QD 2380 IF RM=11 THEN 2640
SA 2390 IF RM=14 THEN 2640
QH 2400 IF RM=17 THEN 2640
EF 2410 IF RM=18 THEN 2640
QE 2420 IF RM=19 THEN 2640
CH 2430 IF RM=22 THEN 2640
KE 2440 IF RM=26 THEN 2640
BM 2450 IF RM=27 THEN 2640
KK 2460 IF RM=28 THEN 2640
JX 2470 IF RM=25 THEN 2760
PS 2480 RM=RM+5:GOTO300
PF 2490 IF RM=1 THEN 2640
AF 2500 IF RM=2 THEN 2640
KE 2510 IF RM=3 THEN 2640
CM 2520 IF RM=4 THEN 2640
PK 2530 IF RM=5 THEN 2640
MX 2540 IF RM=7 THEN 2640
DR 2550 IF RM=8 THEN 2640
KS 2560 IF RM=14 THEN 2640
KD 2570 IF RM=16 THEN 2640
HB 2580 IF RM=19 THEN 2640
SQ 2590 IF RM=22 THEN 2640
CQ 2600 IF RM=23 THEN 2640
FD 2610 IF RM=24 THEN 2640
DA 2620 IF RM=27 THEN 2640
PE 2630 RM=RM-5:GOTO300
PD 2640 PRINTCHR$(19);
XG 2650 POKE214,8:PRINT
XF 2660 FORT=1TO4
PB 2670 PRINTTAB(3);"{RVS}{5}
        {E}{R}{E}{R}{E}{R}{E}
        {R}{E}{R}{E}{R}{E}{R}
        {E}{R}{E}{R}{E}{R}{E}
        {R}"
RB 2680 PRINTTAB(3);"{RVS}{5}
        {R}{E}{R}{E}{R}{E}{R}
        {E}{R}{E}{R}{E}{R}{E}
        {R}{E}{R}{E}{R}{E}{R}
        {E}"
QP 2690 NEXTT
KA 2700 PRINTCHR$(19);
XR 2710 POKE214,11:PRINT
SA 2720 PRINTTAB(7);"{WHT}A WA
        LL BLOCKS"
AP 2730 PRINTTAB(7);"{WHT}
        {2 SPACES}THIS HALL
        {2 SPACES}"
AM 2740 FOR O=1TO1000:NEXTO
DG 2750 GOTO 300
FB 2760 IF LVL=1 THEN LVL=2:RM
        =3:GOTO300
RK 2770 IF LVL=2 THEN LVL=3:RM
        =18:GOTO300
QA 2780 IF LVL=3 THEN LVL=4:RM
        =11:GOTO300
SA 2790 IF LVL=4 THEN LVL=5:RM
        =28:GOTO300
SG 2800 IF LVL=5 THEN 2880
QK 2810 PRINTCHR$(19);
DF 2820 POKE214,11:PRINT
DX 2830 PRINTTAB(7);"{WHT}
        {2 SPACES}GAME OVER"
RH 2840 PRINTTAB(7);"{WHT}REST
        ART (Y/N)"
GD 2850 GETKY$:IF KY$=""THEN28
        50
CJ 2860 IF KY$<>"Y"THENSYS6473
        8
EM 2870 IF KY$="Y"THEN RESTORE
        :GOTO100
EA 2880 FOR J=1TO10:FORT=0TO15
FC 2890 PRINTCHR$(19);
XB 2900 POKE214,11:PRINT
KM 2910 POKE646,T
JK 2920 PRINTTAB(6);"CONGRATUL
        ATIONS!"
BS 2930 NEXTT:NEXTJ
GX 2940 GOTO2840
GJ 2950 REM--ARCHER (GIRL) *LE
        FT--
QA 2960 DATA1,0,0,4,0,0,4,85,8
        0
FX 2970 DATA16,63,80,16,15,64,
        16,63,0
DG 2980 DATA16,12,0,62,170,160
        ,30,171,232
MD 2990 DATA16,42,224,16,42,0,
        16,8,0
XK 3000 DATA4,34,0,4,170,128,1
        ,170,128
MC 3010 DATA0,170,128,3,192,24
        0,3,192,240
FG 3020 DATA3,192,240,10,0,40,
        42,0,168
QQ 3030 REM--HUNTER (GIRL) *RI
        GHT--
JS 3040 DATA128,0,0,128,0,0,12
        8,21,80
AP 3050 DATA128,87,192,64,31,0
        ,128,95,192
ED 3060 DATA129,95,192,128,12,
        0,131,191,128
JD 3070 DATA131,239,176,143,17
        1,172,240,42,172
QB 3080 DATA128,15,204,128,10,
        128,128,58,240
AS 3090 DATA128,62,240,128,60,
        240,128,252,252
SG 3100 DATA128,240,60,128,160
        ,40,128,168,42
RQ 3110 REM--ARCHER (GUY) *RIG
        HT--
GM 3120 DATA10,160,32,42,168,8
        ,34,252,8
DB 3130 DATA2,192,2,0,252,2,0,
        48,2
QS 3140 DATA10,138,2,14,171,2,
        63,175,194
EX 3150 DATA240,168,254,192,16
        8,2,0,168,2
BG 3160 DATA0,32,2,0,168,2,0,1
        68,2
MG 3170 DATA2,170,2,2,138,8,10
        ,138,8
GX 3180 DATA10,10,32,12,3,0,15
        ,3,192
KE 3190 REM--WIZARD (GUY) *RIG
        HT--
SQ 3200 DATA2,160,0,10,168,0,8
        ,188,0
GK 3210 DATA4,240,0,0,252,0,0,
        48,8
HE 3220 DATA0,168,38,2,170,8,1
        0,170,172
QF 3230 DATA10,170,172,56,170,
        40,50,170,8
JP 3240 DATA0,136,8,10,34,8,10
        ,170,8
XJ 3250 DATA10,170,8,10,170,8,
        42,170,8
AK 3260 DATA42,170,8,170,171,8
        ,60,3,200
MK 3270 REM--WANDERER (GUY) *L
        EFT--
GA 3280 DATA0,0,0,0,42,0,0,168
        ,128
JG 3290 DATA0,248,0,0,56,0,0,2
        48,0
PP 3300 DATA0,48,0,2,186,192,1
        5,171,240
GP 3310 DATA62,34,48,48,136,16
        ,0,168,68
PM 3320 DATA0,168,0,0,32,0,0,1
        68,0
GX 3330 DATA2,170,0,2,138,0,10
        ,10,0
FE 3340 DATA10,2,128,15,3,192,
        63,15,192
DD 3350 REM--HUNTER (GUY) *RIG
        HT--
KD 3360 DATA2,0,0,10,160,0,8,1
        68,0
EQ 3370 DATA0,172,0,0,176,0,0,
        252,0
BP 3380 DATA0,32,0,3,168,80,95
        ,233,16
BC 3390 DATA93,85,85,0,164,64,
        0,165,0
SH 3400 DATA0,168,0,0,32,0,0,1
        68,0
CJ 3410 DATA2,170,0,2,138,0,10
        ,10,0
FH 3420 DATA10,10,0,12,3,0,15,
        3,192
PJ 3430 REM--SHADOW--
HA 3440 DATA0,0,0,0,32,0,0,32,
        0
KM 3450 DATA0,136,0,0,136,0,2,
        70,0
EQ 3460 DATA2,2,0,0,136,0,0,16
        8,0
PQ 3470 DATA2,170,169,10,170,1
        69,10,42,40
RC 3480 DATA10,138,8,10,106,0,
        1,106,0
EM 3490 DATA2,170,0,10,170,0,1
        0,170,0
PM 3500 DATA42,170,128,42,170,
        128,170,170,128
FS 3510 REM--GHOST--
BS 3520 DATA0,40,0,0,170,0,0,1
        70,0
HJ 3530 DATA2,40,128,10,40,160
        ,42,170,168
EB 3540 DATA42,170,168,40,170,
        40,160,170,10
GP 3550 DATA162,170,138,162,17
        0,138,130,170,130
QK 3560 DATA162,170,138,34,170
        ,136,2,170,128
PE 3570 DATA10,170,160,10,170,
        160,10,170,160
AF 3580 DATA42,170,168,10,170,
        160,0,0,0
AA 3590 REM--SERPENT--
BR 3600 DATA0,0,0,0,160,32,2,1
        68,160
GJ 3610 DATA10,170,176,10,138,
        192,42,0,0
JA 3620 DATA42,10,128,42,42,16
        0,42,22,80
AR 3630 DATA168,38,96,168,42,1
        60,168,32,32
FA 3640 DATA168,10,128,170,15,
        192,42,175,192
DE 3650 DATA42,191,0,10,191,0,
        2,252,0
AQ 3660 DATA0,0,0,0,0,0,0,0,0
SA 3670 REM--WINGED WARRIOR--
PK 3680 DATA0,0,0,0,0,0,5,65,8
```

```
           0
SS 3690 DATA21,125,84,21,255,8
           4,21,60,84
DR 3700 DATA21,255,84,21,125,8
           4,23,191,212
AA 3710 DATA95,191,245,127,239
           ,253,125,251,125
PQ 3720 DATA117,254,93,125,170
           ,125,85,170,85
GX 3730 DATA86,130,149,70,130,
           145,70,130,145
PM 3740 DATA66,130,129,2,0,128
           ,10,0,160
KS 3750 REM--SKELETON--
MS 3760 DATA0,170,0,2,170,128,
           2,40,128
PD 3770 DATA2,0,128,2,170,128,
           0,170,0
RP 3780 DATA0,130,0,8,40,32,34
           ,40,136
KE 3790 DATA0,130,0,32,40,8,32
           ,130,8
JD 3800 DATA32,40,8,32,130,8,0
           ,40,0
XR 3810 DATA0,130,0,0,130,0,0,
           130,0
GR 3820 DATA2,0,128,2,0,128,10
           ,0,160
FR 3830 REM--VAPOR DEMON--
PC 3840 DATA2,170,128,10,170,1
           60,8,170,32
XS 3850 DATA10,40,160,10,170,1
           28,2,170,160
AC 3860 DATA10,130,160,10,40,1
           28,2,170,128
CR 3870 DATA0,170,128,2,170,0,
           0,170,128
JR 3880 DATA0,170,0,0,170,0,0,
           40,0
AM 3890 DATA0,168,0,0,40,0,8,8
           ,0
GM 3900 DATA0,32,136,2,32,0,32
           ,2,32
```

□

METEOR MATH

PRACTICE ADDITION OR MULTIPLICATION WHILE FLYING THROUGH SPACE IN THIS EDUCATIONAL GAME FOR THE 64

MARK GERHARDSTEIN

The Meteor Mining Company is hiring pilots to fly a fleet of ships for collecting asteroids in outer space. It has devised a test to discover people who have the necessary talents to pilot a spaceship while simultaneously solving problems to decide which asteroids are valuable.

The object of *Meteor Math* is to collect correct answers to simple math problems while avoiding the incorrect ones. You'll be given the first number in an addition or multiplication problem and its answer. It will be your job to maneuver your ship through a field of moving numbers to collect the one that completes the problem.

Getting Started

Although *Meteor Math* loads and runs like a BASIC program, it's written entirely in machine language. Use *MLX*, our machine language entry program, to type it in; see "Typing Aids" elsewhere in this section. When *MLX* prompts you, respond with the values given below.

Starting address: 0801
Ending address: 1658

When you've finished typing, don't forget to save a copy of the program before exiting *MLX*.

Playing the Game

When you run *Meteor Math*, the title screen will offer you several options. Press f1 and f3 to set the beginning and top levels. The level is the first number in the math equation. You can solve problems that start with the same number each time or cycle through them in consecutive order.

Press T to set the game's time limit. Games can last from one to nine minutes and will continue until that time limit has been reached or three ships have been destroyed.

You set the speed at which the answers scroll by pressing B for beginner, N for normal, or E for expert. This option always defaults to normal, although the other options will remain as you've set them.

When you're ready to begin, press f7 to complete addition problems or f5 to complete multiplication ones. Control your ship with a joystick plugged into port 2.

As your ship flies through the field of possible answers, you want to collect the right one. Touching a correct answer with your ship collects it. You'll receive two points for each correct answer and a bonus for each level you complete. The amount of the bonus depends on the level that you've finished. Level 9 is worth more than level 8, for example.

Running into an incorrect answer will destroy your ship. You may have to let some correct ones go by if they're too close to other numbers. When a ship has been destroyed or you've collected the correct number, the math problem changes; stay alert.

If your ship needs extra speed to snare the correct answer, press your fire button. This engages your turbothruster, which doubles the speed of your ship. Turbo fuel is expensive; this speed can be maintained for only about ten seconds per ship. The game ends when either the time limit has expired or you've crashed three ships into incorrect answers.

There's no real qualifying score in *Meteor Math*. I wrote this program to give my children practice with addition and the multiplication tables and to keep them from figuring out the answers by counting on their fingers. I made it flexible so that they could design their own tests, spending more time practicing problems in their areas of biggest need.

METEOR MATH

```
0801:14 08 0A 00 9E 32 30 37 B3
0809:30 3A 8F 20 4D 41 52 4B 13
0811:47 32 00 00 00 A9 80 8D 86
0819:0B D4 A2 00 BD 99 12 9D 4E
0821:00 20 BD 99 13 9D 00 21 BA
0829:BD 99 14 9D 00 22 BD 99 78
0831:15 9D 00 23 CA D0 E5 A9 74
0839:40 A9 00 9D BF 23 CA D0 9E
0841:F8 20 44 E5 A2 2F BD F6 01
0849:09 9D 00 D0 CA 10 F7 A9 82
0851:80 8D FA 07 8D FC 07 8D D0
0859:FD 07 A9 83 8D FE 07 A9 B7
0861:8B 8D F8 07 A9 8A 8D FB B8
0869:07 A9 8D 8D FF 07 A9 8C ED
0871:8D F9 07 A2 19 BD 25 0A E5
0879:9D 00 D4 CA 10 F7 A9 3E 91
0881:85 FC A9 0A 85 FD A0 00 CE
0889:B1 FC F0 0C 20 D2 FF E6 C3
0891:FC D0 02 E6 FD 4C 87 08 3B
```

PROGRAMS

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0899:AD 4C 11 8D 47 11 09 30 4F
08A1:8D 29 06 AD 4D 11 18 69 A6
08A9:2F 8D 51 06 A9 01 8D 48 F3
08B1:11 A9 30 8D 01 12 A9 02 39
08B9:8D 4A 11 A9 09 8D 46 11 FB
08C1:A9 00 8D 26 10 A9 00 8D 6F
08C9:25 10 A9 00 8D 27 10 A9 78
08D1:FF 8D 28 10 A9 1E 8D 4B 77
08D9:11 AD 49 11 09 30 8D 41 7D
08E1:07 20 3A 0D A5 CB C9 16 9B
08E9:F0 31 C9 04 F0 30 C9 05 19
08F1:F0 46 C9 06 F0 73 C9 03 91
08F9:F0 55 C9 1C F0 14 C9 0E 4C
0901:F0 13 C9 27 F0 12 4C E5 4A
0909:08 A5 C5 C9 40 D0 FA 4C 65
0911:E5 08 4C 84 09 4C A8 09 BD
0919:4C 96 09 4C BA 09 AE 47 7B
0921:11 E8 E0 0A D0 02 A2 01 87
0929:8E 47 11 8E 4C 11 8A 09 24
0931:30 8D 29 06 E8 4C 43 09 4C
0939:AE 4D 11 E8 E0 0B D0 02 7D
0941:A2 02 8E 4D 11 8A 18 69 18
0949:2F 8D 51 06 4C 0A 09 78 F5
0951:A9 8A 8D FB 07 20 44 E5 73
0959:20 D1 09 A9 00 8D 0A DC D2
0961:8D 09 DC 8D 08 DC 4C 5E 9B
0969:0D 78 A9 8E 8D FB 07 20 C8
0971:44 E5 20 D1 09 A9 00 8D BC
0979:0A DC 8D 09 DC 8D 08 DC 14
0981:4C EE 0D A9 02 8D C9 06 91
0989:A9 00 8D 48 11 A9 30 8D C3
0991:01 12 4C 0A 09 A9 0E 8D 6B
0999:C9 06 A9 01 8D 48 11 A9 B0
09A1:30 8D 01 12 4C 0A 09 A9 B6
09A9:05 8D C9 06 A9 01 8D 48 EF
09B1:11 A9 F0 8D 01 12 4C 0A A0
09B9:09 EE 49 11 AD 49 11 C9 C4
09C1:0A 90 02 A9 01 8D 49 11 B9
09C9:09 30 8D 41 07 4C 0A 09 B8
09D1:A2 09 A0 00 CA CA 30 18 85
09D9:8A 99 00 D8 E8 8A 99 00 C9
09E1:D9 E8 8A 99 00 DA CA 8A 91
09E9:99 00 DB CA C8 D0 E5 60 A6
09F1:A2 09 4C D5 09 20 D2 20 0D
09F9:D2 32 39 1B 57 19 6E 32 09
0A01:6E 20 3C 32 4D BC 99 5D EC
0A09:E2 00 FF C8 00 15 78 F0 51
0A11:19 76 08 00 00 06 00 F1 5A
0A19:F2 F3 07 04 05 F4 07 04 D2
0A21:07 07 0A 0E 00 3C 00 00 8D
0A29:00 00 E9 00 00 00 00 81 FB
0A31:00 FF 00 FF 00 00 80 00 46
0A39:00 00 80 02 CA 11 9E 20 75
0A41:20 20 20 20 20 20 20 20 55
0A49:20 20 20 20 20 4D 45 54 90
0A51:45 4F 52 20 4D 41 54 48 88
0A59:0D 11 9C 20 20 20 20 20 AF
0A61:20 20 43 4F 4C 4C 45 43 4C
0A69:54 20 43 4F 52 52 45 43 B6
0A71:54 20 41 4E 53 57 45 52 99
0A79:53 0D 20 20 20 20 20 20 62
0A81:20 57 48 49 4C 45 20 41 12
0A89:56 4F 49 44 49 4E 47 20 3C
0A91:49 4E 43 4F 52 52 45 43 E4
0A99:54 0D 9E 53 48 49 50 53 7F
0AA1:9C 20 20 4F 4E 45 53 0D 40
0AA9:0D 20 20 20 20 20 20 20 34
0AB1:1E 54 48 45 20 46 49 52 46
0AB9:45 20 42 55 54 54 4F 4E F6
0AC1:53 20 45 4E 47 41 47 45 28
0AC9:53 0D 20 20 20 20 20 20 B2
0AD1:20 59 4F 55 52 20 54 55 9C
0AD9:52 42 4F 20 54 48 52 55 51
0AE1:53 54 45 52 2E 0D 0D 9F E1
0AE9:20 20 20 20 20 20 20 59 37
0AF1:4F 55 20 53 54 41 52 54 DC
0AF9:20 57 49 54 48 20 9E 33 95
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0B01:9F 20 53 48 49 50 53 2E 3E
0B09:96 11 0D 20 20 20 20 20 34
0B11:96 CF B7 B7 B7 B7 B7 B7 9C
0B19:B7 B7 B7 B7 B7 B7 B7 B7 2F
0B21:B7 B7 B7 B7 B7 B7 B7 B7 37
0B29:B7 B7 B7 B7 B7 B7 B7 B7 3F
0B31:D0 20 0D 1D 1D 1D 20 96 5F
0B39:20 A5 9E 20 46 31 2D 20 10
0B41:53 45 54 53 20 53 54 41 4A
0B49:52 54 49 4E 47 20 4C 45 44
0B51:56 45 4C 20 20 20 31 20 73
0B59:20 92 96 A7 20 0D 1D 1D FD
0B61:1D 20 20 A5 9E 20 46 33 A1
0B69:2D 20 53 45 54 53 20 45 52
0B71:4E 44 49 4E 47 20 4C 45 66
0B79:56 45 4C 20 20 20 20 20 79
0B81:31 20 20 92 96 A7 20 0D 06
0B89:1D 1D 1D 96 20 20 A5 20 6F
0B91:20 20 20 20 20 20 20 20 A7
0B99:20 20 20 20 20 20 20 20 AF
0BA1:20 20 20 20 20 20 20 20 B7
0BA9:20 20 20 20 20 A7 20 0D CA
0BB1:1D 1D 1D 20 96 20 A5 99 5D
0BB9:20 42 20 2D 20 53 45 54 74
0BC1:53 20 42 45 47 49 4E 4E 70
0BC9:45 52 20 53 50 45 45 44 B6
0BD1:20 20 20 20 20 20 92 96 43
0BD9:A7 20 0D 1D 1D 1D 96 20 E9
0BE1:20 A5 99 20 4E 20 2D 20 14
0BE9:53 45 54 53 20 4E 4F 52 E5
0BF1:4D 41 4C 20 53 50 45 45 36
0BF9:44 20 20 99 20 20 20 4E E7
0C01:20 96 20 A7 20 0D 1D 1D D9
0C09:1D 20 96 20 A5 99 20 45 A5
0C11:20 2D 20 53 45 54 53 20 FF
0C19:45 58 50 45 52 54 20 53 BF
0C21:50 45 45 44 20 20 20 20 81
0C29:20 20 20 20 92 96 A7 20 BD
0C31:0D 1D 1D 1D 96 20 20 A5 A7
0C39:20 20 20 20 20 20 20 20 51
0C41:20 20 20 20 20 20 20 20 59
0C49:20 20 20 20 20 20 20 20 61
0C51:20 20 20 20 20 20 A7 20 78
0C59:0D 1D 1D 1D 96 20 20 A5 CF
0C61:9C 20 54 20 2D 20 53 45 32
0C69:54 53 20 54 49 4D 45 20 F3
0C71:4C 49 4D 49 54 20 20 20 C3
0C79:20 20 20 20 32 20 96 20 0F
0C81:A7 20 0D 1D 1D 1D 96 20 93
0C89:20 A5 20 20 20 20 20 20 03
0C91:20 20 20 20 20 20 20 20 A9
0C99:20 20 20 20 20 20 20 20 B1
0CA1:20 20 20 20 20 20 20 20 B9
0CA9:A7 20 0D 1D 1D 1D 20 81 30
0CB1:20 A5 9F 20 46 35 2D 20 BA
0CB9:53 54 41 52 54 53 20 4D 5B
0CC1:55 4C 54 49 50 4C 49 43 40
0CC9:41 54 49 4F 4E 20 20 20 09
0CD1:20 92 96 A7 20 0D 1D 1D 78
0CD9:1D 20 81 20 A5 9F 20 46 EC
0CE1:37 2D 20 53 54 41 52 54 BA
0CE9:53 20 41 44 44 49 54 49 59
0CF1:4F 4E 20 20 20 20 20 20 2D
0CF9:20 20 20 20 92 96 A7 20 8E
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0D09:AF AF AF AF AF AF AF AF 23
0D11:AF AF AF AF AF AF AF AF 2B
0D19:AF AF AF AF AF AF AF AF 33
0D21:AF AF AF AF AF AF BA 20 C1
0D29:00 60 00 01 02 03 04 05 94
0D31:06 07 08 09 00 01 02 03 AC
0D39:04 A2 09 A9 0B 9D 2B 0D EB
0D41:CA 10 F8 A2 09 AD 1B D4 18
0D49:C9 0A B0 F9 A0 09 D9 2B 88
0D51:0D F0 F2 88 10 F8 9D 2B DF
0D59:0D CA 10 E9 60 AE 46 11 A8
0D61:30 48 E0 0A B0 4A AD 47 B3
```

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0D69:11 09 80 8D FA 07 AD 4A D0
0D71:11 30 34 BD 2B 0D 09 30 52
0D79:8D 45 11 BD 2B 0D 18 6D D4
0D81:47 11 C9 0A 90 11 18 69 BF
0D89:76 8D FD 07 A9 81 8D FC DD
0D91:07 20 29 10 4C 5E 0D 09 5C
0D99:80 8D FD 07 A9 80 8D FC EE
0DA1:07 20 29 10 4C 5E 0D 4C AF
0DA9:1A 0F 20 B7 0D 4C 5E 0D 77
0DB1:20 E5 0D 4C 5E 0D A9 09 3F
0DB9:8D 46 11 EE 47 11 AD 47 5E
0DC1:11 0A AA 20 A7 0F AD 47 5A
0DC9:11 CD 4D 11 F0 0D C9 0A F3
0DD1:D0 05 A9 01 8D 47 11 20 A6
0DD9:3A 0D 60 AD 4C 11 8D 47 44
0DE1:11 4C D8 0D A9 09 8D 46 56
0DE9:11 20 3A 0D 60 A9 00 85 DB
0DF1:FC AE 46 11 30 48 E0 0A 7E
0DF9:B0 4A AD 47 11 09 80 8D 64
0E01:FA 07 AD 4A 11 30 34 BD 26
0E09:2B 0D 09 30 8D 45 11 BD 83
0E11:2B 0D AC 47 11 A9 00 18 57
0E19:7D 2B 0D 88 D0 F9 C9 0A F4
0E21:90 07 E6 FC E9 0A 4C 1F 23
0E29:0E 09 80 8D FD 07 A5 FC CB
0E31:69 80 8D FC 07 20 29 10 BE
0E39:4C EE 0D 4C 1A 0F 20 B7 A2
0E41:0D 4C EE 0D 20 E5 0D 4C A4
0E49:EE 0D 4C 42 08 9E 4D 49 6C
0E51:53 53 49 4F 4E 20 43 4F D2
0E59:4D 50 4C 45 54 45 11 9D 85
0E61:9D 9D 9D 9D 9D 9D 9D 9D 7D
0E69:9D 99 49 4E 11 9D 9D 11 14
0E71:9D 9D 9D 05 20 30 30 20 0A
0E79:9A 4D 49 4E 11 9D 9D 9D 1C
0E81:9D 9D 9D 05 30 30 20 9A F4
0E89:53 45 43 1E A6 A6 A6 A6 AE
0E91:A6 A6 A6 A6 A6 A6 11 9D 79
0E99:9D 9D 9D 9D 9D 9D 9D 9D B5
0EA1:9D A6 20 20 20 20 20 20 1E
0EA9:20 20 A6 11 9D 9D 9D 9D FF
0EB1:9D 9D 9D 9D 9D 9D A6 20 62
0EB9:20 05 30 30 30 30 20 20 D2
0EC1:1E A6 11 9D 9D 9D 9D 9D CE
0EC9:9D 9D 9D 9D 9D A6 20 20 91
0ED1:20 20 20 20 20 20 A6 11 EB
0ED9:9D 9D 9D 9D 9D 9D 9D 9D F5
0EE1:9D 9D A6 20 9C 50 4F 49 19
0EE9:4E 54 53 20 1E A6 11 9D F9
0EF1:9D 9D 9D 9D 9D 9D 9D 9D 0E
0EF9:9D A6 20 20 20 20 20 20 76
0F01:20 20 A6 11 9D 9D 9D 9D 59
0F09:9D 9D 9D 9D 9D 9D A6 A6 42
0F11:A6 A6 A6 A6 A6 A6 A6 A6 2F
0F19:00 58 A2 05 A0 0F 18 20 83
0F21:F0 FF A2 00 BD 8C 0E F0 39
0F29:07 20 D2 FF E8 4C 25 0F FE
0F31:A9 00 8D 08 D4 8D 07 D4 16
0F39:A2 0D A0 0C 18 20 F0 FF E3
0F41:A2 00 BD 4E 0E 20 D2 FF E3
0F49:E8 E0 3E 90 F5 AD 26 10 A7
0F51:09 30 8D 2D 05 AD 25 10 BD
0F59:09 30 8D 2C 05 AD 27 10 B9
0F61:09 30 8D 2B 05 A9 BF 8D 50
0F69:15 D0 AD 09 DC 29 0F 09 3F
0F71:30 8D B9 06 AD 09 DC 29 17
0F79:70 4A 4A 4A 4A 09 30 8D B4
0F81:B8 06 AD 0A DC 29 0F 09 86
0F89:30 8D 91 06 AD 0A DC 29 2E
0F91:70 4A 4A 4A 4A 09 30 8D CC
0F99:90 06 EE 20 D0 A5 CB C9 DF
0FA1:40 F0 F7 4C 42 08 EE 26 16
0FA9:10 AD 26 10 C9 0A D0 17 30
0FB1:A9 00 8D 26 10 EE 25 10 4F
0FB9:AD 25 10 C9 0A D0 08 A9 E3
0FC1:00 8D 25 10 EE 27 10 CA E7
0FC9:D0 DC A9 23 85 FD A9 C0 27
```

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0FD1:85 FC A0 1A AD 26 10 20 ED
0FD9:EE 0F A0 19 AD 25 10 20 1B
0FE1:EE 0F A0 18 AD 27 10 20 1B
0FE9:EE 0F 4C 0B 10 0A 0A 0A 44
0FF1:AA A9 33 85 01 BD 80 D1 60
0FF9:91 FC E8 C8 C8 C8 C0 30 E4
1001:B0 03 4C F6 0F A9 37 85 46
1009:01 60 A9 8F 8D FE 07 A9 10
1011:40 8D 17 D0 A9 48 8D 1D 4B
1019:D0 A9 36 8D 1C D0 A9 0A 2D
1021:8D 2D D0 60 00 00 00 FF 73
1029:20 F7 11 20 4E 11 AD 0A 97
1031:DC CD 49 11 90 03 4C 1A B0
1039:0F AD 28 10 F0 19 AD 00 99
1041:DC 29 10 D0 12 CE 28 10 55
1049:D0 05 A9 0C 8D 20 D0 20 B7
1051:4E 11 A9 80 8D 07 D4 AD F9
1059:1F D0 29 01 F0 CA A9 04 7C
1061:85 FD A9 00 85 FC AD 01 75
1069:D0 E9 31 4A 4A 4A F0 0F A3
1071:AA A5 FC 18 69 28 85 FC 65
1079:90 02 E6 FD CA D0 F4 AD 50
1081:10 D0 29 01 D0 18 AD 00 55
1089:D0 4A 4A 4A 38 E9 03 4C 4E
1091:A8 10 AD 00 D0 4A 4A 4A 4E
1099:38 E9 03 4C A8 10 AD 00 56
10A1:D0 4A 4A 4A 18 69 1D 18 63
10A9:65 FC 85 FC 90 02 E6 FD 94
10B1:A2 03 A0 04 B1 FC CD 45 9A
10B9:11 F0 6F C9 20 D0 14 88 1E
10C1:10 F2 A5 FC 18 69 28 85 67
10C9:FC 90 02 E6 FD CA D0 E2 DA
10D1:4C 41 11 A9 20 91 FC A9 10
10D9:00 8D 27 D0 A9 81 8D 04 C1
10E1:D4 EE 21 D0 20 F7 11 20 7C
10E9:F7 11 20 F7 11 20 44 E5 45
10F1:20 D1 09 CE 21 D0 CE 4A D8
10F9:11 AD 4A 11 09 80 8D FE CC
1101:07 A9 00 8D 17 D0 A9 08 41
1109:8D 1D D0 A9 76 8D 1C D0 E0
1111:A9 FF 8D 28 10 A9 06 8D FC
1119:20 D0 A9 05 8D 27 D0 A9 59
1121:80 8D 04 D4 EE 46 11 4C B3
1129:41 11 A9 20 91 FC A9 11 4C
1131:8D 04 D4 A9 10 8D 04 D4 E3
1139:CE 46 11 A2 02 20 A7 0F 8F
1141:AD 10 D0 60 30 05 05 00 FD
1149:02 0A 00 01 02 AD 00 DC A2
1151:29 0F C9 0F D0 0F A9 00 0C
1159:8D 08 D4 8D 07 D4 AD 21 BF
1161:D0 8D 28 D0 60 AD 00 DC F7
1169:4A B0 03 20 8B 11 4A B0 25
1171:03 20 9C 11 4A B0 03 20 FC
1179:AD 11 4A B0 03 20 D2 11 5A
1181:EE 28 D0 A9 10 8D 08 D4 75
1189:60 00 AE 01 D0 CA CA E0 E9
1191:32 B0 01 60 8E 01 D0 8E C7
1199:03 D0 60 AE 01 D0 E8 E8 6E
11A1:E0 E9 90 01 60 8E 01 D0 E0
11A9:8E 03 D0 60 A8 AE 00 D0 C4
11B1:D0 08 AD 10 D0 29 FC 8D A7
11B9:10 D0 CA CA E0 18 90 08 AE
11C1:8E 00 D0 8E 02 D0 98 60 13
11C9:AD 10 D0 29 03 D0 F1 98 4B
11D1:60 A8 AE 00 D0 E8 E8 D0 F0
11D9:08 AD 10 D0 09 03 8D 10 F9
11E1:D0 E0 41 B0 08 8E 00 D0 23
11E9:8E 02 D0 98 60 AD 10 D0 22
11F1:29 03 F0 F1 98 60 AD 12 5A
11F9:D0 C9 00 D0 F9 AD 11 D0 7D
1201:30 F4 AD 11 D0 29 07 C9 44
1209:07 F0 0C EE 11 D0 AD 11 95
1211:D0 2D 48 11 D0 EC 60 A2 A0
1219:09 A0 00 A9 90 8D 11 D0 32
1221:BD 80 12 85 FD 85 FF BD A2
1229:8A 12 85 FC 85 FE 18 69 59
1231:28 85 FE 9D 8A 12 90 02 44
1239:E6 FF A5 FF 9D 80 12 C9 62
1241:07 D0 06 A5 FE C9 D0 B0 A9
1249:0C B1 FC 91 FE A9 20 91 09
1251:FC CA 10 CC 60 A9 04 85 AC
1259:FF 9D 80 12 AD 1B D4 29 C2
1261:3F C9 28 B0 F7 85 FE 9D 19
1269:8A 12 AD 1B D4 45 A2 29 E8
1271:0F C9 0A B0 F5 09 30 A0 B0
1279:00 4C 4C 12 4C 4C 12 04 17
1281:04 04 05 05 06 06 06 07 F4
1289:07 27 77 EF 3F B7 07 7E 4E
1291:CF 47 97 00 00 00 00 00 62
1299:00 00 00 02 AA 80 0A FF 49
12A1:A0 0B FF E0 2F AA F8 2E 2B
12A9:82 B8 2E 00 B8 2E 00 B8 3A
12B1:2E 00 B8 2E 00 B8 2E 00 26
12B9:B8 2E 00 B8 2E 00 B8 2E 62
12C1:00 B8 2E 00 B8 2E 82 B8 16
12C9:2F AA F8 0B FF E0 0A FF 97
12D1:A0 02 AA 80 00 00 00 CC F0
12D9:00 00 00 00 2A 00 00 2E 7D
12E1:00 00 2E 00 00 2E 00 00 84
12E9:2E 00 00 2E 00 00 2E 00 64
12F1:00 2E 00 00 2E 00 00 2E 41
12F9:00 00 2E 00 00 2E 00 00 9C
1301:2E 00 00 2E 00 00 2E 00 7D
1309:00 2E 00 00 2E 00 00 2E 5A
1311:00 00 2A 00 00 00 00 7C F8
1319:00 00 00 2A AA A8 2F FF 38
1321:F8 2F FF F8 2E AA B8 2E DA
1329:00 B8 2A 00 B8 00 00 B8 41
1331:00 00 B8 00 00 B8 00 00 51
1339:B8 2A AA B8 2F FF F8 2E C0
1341:AA A8 2E 00 00 2E 00 00 65
1349:2E 00 00 2E AA A8 2F FF BF
1351:F8 2A AA A8 00 00 00 C4 23
1359:00 00 00 AA AA A8 BF FF A1
1361:F8 BF FF F8 BA AA B8 A8 1E
1369:00 B8 00 00 B8 00 00 B8 3C
1371:00 00 B8 00 AA B8 00 BF A6
1379:F8 00 AA B8 00 00 B8 00 6E
1381:00 B8 00 00 B8 A8 00 B8 F6
1389:BA AA B8 BF FF F8 BF FF 2E
1391:F8 AA AA A8 00 00 00 BC 7B
1399:00 00 00 00 0A 80 2A 0B 71
13A1:80 2E 0B 80 2E 0B 80 2E C9
13A9:0B 80 2E 0B 80 2E 0B 80 3F
13B1:2E 0B 80 2E 0B 80 2E AB 07
13B9:A8 2F FF F8 2A AB A8 00 E0
13C1:0B 80 00 0B 80 00 0B 80 D8
13C9:00 0B 80 00 0B 80 00 0B 28
13D1:80 00 0A 80 00 00 00 C4 46
13D9:00 00 00 0A AA A8 2F FF F6
13E1:F8 2E AA A8 2E 00 00 2E 8F
13E9:00 00 2E 00 00 2E 00 00 8E
13F1:2E AA A8 2F FF F8 2A AA C4
13F9:B8 00 00 B8 00 00 B8 00 79
1401:00 B8 00 00 B8 2A 00 B8 7E
1409:2E 00 B8 2E AA B8 2F FF D8
1411:F8 2A AA A0 00 00 00 C4 64
1419:00 00 00 0A AA A8 2F FF 38
1421:F8 2E AA A8 2E 00 00 2E D0
1429:00 00 2E 00 00 2E 00 00 CF
1431:2E 00 00 2E 00 00 2E 00 AF
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1449:2E 00 B8 2E AA B8 2F FF 19
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1469:00 B8 00 00 B8 00 02 F8 82
1471:00 02 E0 00 0B E0 00 0B 1D
1479:80 00 2F 80 00 2E 00 00 88
1481:BE 00 00 B8 00 02 F8 00 8E
1489:02 E0 00 0B E0 00 0B 80 39
1491:00 0A 80 00 00 00 00 1C 68
1499:00 00 00 0A AA A0 2F FF 98
14A1:F8 2E AA B8 2E 00 B8 2E C3
14A9:00 B8 2E 00 B8 2E 00 B8 FC
14B1:2E 00 B8 2F AA F8 0B FF 4A
14B9:E0 2F AA F8 2E 00 B8 2E 14
14C1:00 B8 2E 00 B8 2E 00 B8 15
14C9:2E 00 B8 2E AA B8 2F FF 99
14D1:F8 0A AA A0 00 00 00 5C B4
14D9:00 00 00 0A AA A0 2F FF D8
14E1:F8 2E AA B8 2E 00 B8 2E 04
14E9:00 B8 2E 00 B8 2E 00 B8 3D
14F1:2E 00 B8 2E AA B8 2F FF C1
14F9:F8 0A AA B8 00 00 B8 00 73
1501:00 B8 00 00 B8 00 00 B8 D7
1509:00 00 B8 2A AA B8 2F FF 83
1511:F8 0A AA A0 00 00 00 1C B5
1519:00 00 00 00 00 00 00 00 43
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1539:00 0C 00 00 0C 00 00 0C D2
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1559:00 00 00 00 00 00 00 00 83
1561:00 00 00 00 00 00 00 00 8B
1569:00 00 00 18 00 00 3C 00 8D
1571:00 FF 00 01 A5 80 03 FF E0
1579:C0 3F FF FC 11 C3 88 3F 8B
1581:FF FC 00 00 00 00 00 00 EA
1589:00 00 00 00 00 00 00 00 B3
1591:00 00 00 00 00 00 00 50 0C
1599:00 00 00 00 00 00 00 00 C3
15A1:00 00 00 00 00 00 00 00 CB
15A9:00 00 00 00 00 00 00 00 D3
15B1:00 00 00 00 00 00 00 FF DB
15B9:00 00 FF 00 5F FF F5 00 CA
15C1:00 00 08 82 20 00 00 00 16
15C9:00 00 00 00 00 00 00 00 F3
15D1:00 00 00 00 00 00 00 5C 58
15D9:00 00 00 00 00 00 00 00 04
15E1:00 00 00 00 00 00 00 00 0C
15E9:00 00 00 3F C0 00 7F E0 ED
15F1:00 F0 F0 01 E0 70 01 C0 12
15F9:30 01 C0 30 00 00 70 00 78
1601:0F E0 00 0F C0 00 0C 00 FB
1609:00 0C 00 00 0C 00 00 00 98
1611:00 00 00 00 00 0C 00 E8 56
1619:00 00 00 00 00 00 00 00 45
1621:00 00 00 00 00 00 00 E0 2E
1629:E0 00 71 C0 00 3B 80 00 ED
1631:1F 00 00 0E 00 00 0E 00 E9
1639:00 1F 00 00 3B 80 00 71 7A
1641:C0 00 E0 E0 00 00 00 00 F7
1649:00 00 00 FF FF FF FF FF 75
1651:FF FF FF FF 00 00 00 BA 38
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TYPING AIDS

MLX, the machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in Gazette programs without making mistakes. These labor-saving utilities are on each *Gazette Disk* and printed in issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write and we'll send you free copies of both of these handy utilities. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope. Write to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Greensboro, North Carolina 27408.

How to Type In COMPUTE's Gazette Programs

Each month, Gazette publishes programs for the Commodore 128 and 64. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We regularly publish two programs designed to make typing easier: *The Automatic Proofreader,* for BASIC programs, and *MLX,* for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements, as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off and then on, erasing what was in memory. This could cause you to lose valuable data, so be sure to *save a program before you run it.* If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from Gazette, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor-down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be shifted (hold down the Shift key while pressing another key), the character is underlined. For example, A means hold down the Shift key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight shifted A's).

If a key is enclosed in special brackets, Ɛ Ǝ, hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the Ctrl key while typing the letter in braces. For example, {A} means to press Ctrl-A.

The Quote Mode

You can move the cursor around the screen with the Crsr keys, but you may want to move it under program control, as in examples like {LEFT} and {HOME} in the listings. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote key, you're in quote mode, which can be confusing if you mistype a character and cursor left to change it. You'll see a graphics symbol for cursor left. Use the delete key to back up and edit the line. Type another quotation mark to get out of quote mode. If things get too confusing, exit quote mode by pressing Return; then cursor up to the mistyped line and fix it. If the mistake involves cursor movement, you must press the quote key to reenter quote mode. ◘

When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME	♥
{HOME}	CLR/HOME	S
{UP}	SHIFT ↑ CRSR ↓	●
{DOWN}	↑ CRSR ↓	Q
{LEFT}	SHIFT ← CRSR →	▌
{RIGHT}	← CRSR →	]
{RVS}	CTRL 9	R
{OFF}	CTRL 0	▬
{BLK}	CTRL 1	■
{WHT}	CTRL 2	E
{RED}	CTRL 3	£
{CYN}	CTRL 4	◣

When You Read:	Press:	See:
{PUR}	CTRL 5	▒
{GRN}	CTRL 6	↑
{BLU}	CTRL 7	←
{YEL}	CTRL 8	π
{ F1 }	f1	▬
{ F2 }	SHIFT f1	◥
{ F3 }	f3	▬
{ F4 }	SHIFT f3	◣
{ F5 }	f5	▌
{ F6 }	SHIFT f5	◢
{ F7 }	f7	▐
{ F8 }	SHIFT f7	■

When You Read:	Press:	See:
←	←	▒
↑	SHIFT ↑	π

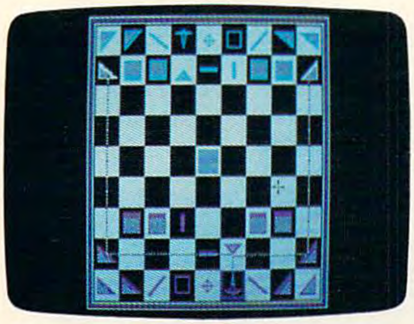
For Commodore 64 Only

When You Read:	Press:	See:
Ɛ 1 Ǝ	COMMODORE 1	♣
Ɛ 2 Ǝ	COMMODORE 2	◤
Ɛ 3 Ǝ	COMMODORE 3	╳
Ɛ 4 Ǝ	COMMODORE 4	○
Ɛ 5 Ǝ	COMMODORE 5	┼
Ɛ 6 Ǝ	COMMODORE 6	▐
Ɛ 7 Ǝ	COMMODORE 7	◆
Ɛ 8 Ǝ	COMMODORE 8	▚

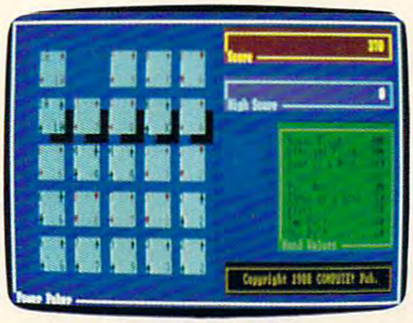
Super Publisher's Closeout Sale

COMPUTE's BEST PC GAMES

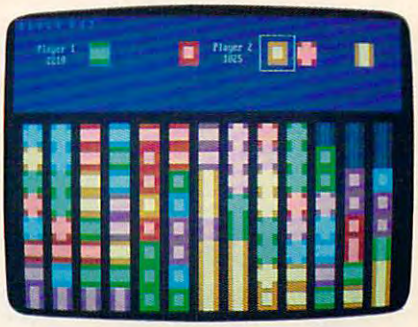
Don't miss these six dazzling, ready-to-run games complete with a 16-page magazine jammed with instructions!



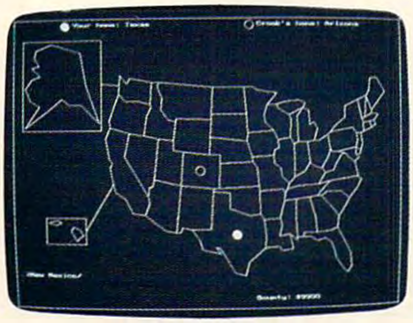
Laser Chess
Award-winning, two-player strategy game patterned after chess—but with an exciting new twist.



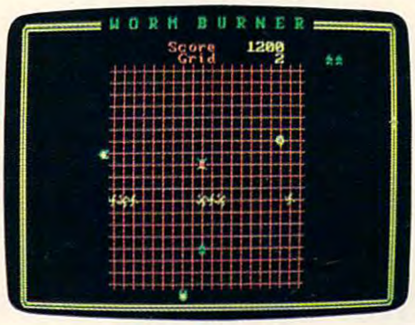
Power Poker
Addictive strategy game with a new dimension. Fun for one player or a group.



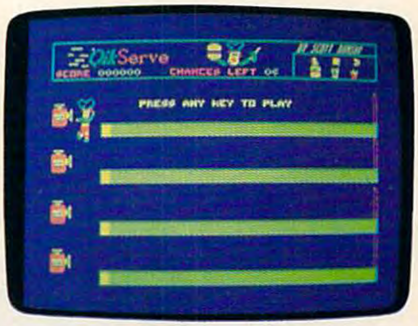
Block Out
Colorful and delightful strategy game that everyone in the family will want to play.



Bounty Hunter
Catch the crook and collect the bounty! So much fun, you'll never know you're mastering U.S. geography.



Wormburner
Skill and arcade action combine to form an unbeatable challenge.



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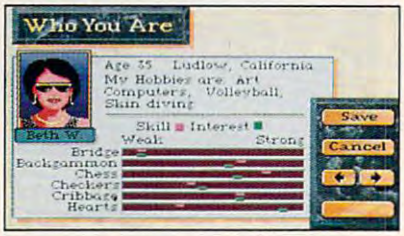
REVIEWS

SNEAK PEEKS

THE SIERRA NETWORK

What can you do if it's Saturday afternoon and there's nobody around you can play chess with? Or if you're a shut-in and there's no one around to talk to? Or if you're an avid *Red Baron* or *Stellar 7* player looking for a new level of excitement? The Sierra Network (TSN), which was announced on May 6, may hold the answer. It's the first computer network dedicated to online game playing.



Age 35 Ludlow, California
My Hobbies are Art
Computers, Volleyball,
Skin diving

Beth W.

Skill ■ Interest ■
Weak Strong
Bridge
Backgammon
Chess
Checkers
Cribbage
Hearts

Your dossier and mugshot (which you create yourself) help other people to get to know—and play—you better.

In fact, the philosophy behind the Sierra Network is person-to-person game playing. There's no option to play against the computer, nor will there be. Human interaction is key. Chess, checkers, hearts, backgammon, bridge, and cribbage are the games available as this is being written, but according to the comments left in the bulletin board area, there is a strong demand for other kinds of two-player adventure and action games. Sierra intends to use TSN as a conduit for modem games like *Red Baron* and *Stellar 7*, allowing players to fight a realtime dogfight or tank engagement against a human opponent anywhere within the bounds of Telenet.

TSN displays the distinct Sierra EGA 16-color look: blocky letters, Larry Laffer graphics, and two-line dialog boxes for conversation. But the company promises that soon the network will boast 256-color graphics and scanned images for playing boards, a segregated area for grown-ups called *Larry Land* (complete with a casino), and other exciting amenities.

TSN can also be used to carry on a text conversation. And you can get in some checkers at the same time!

ROBERT BIXBY

Scheduled to come online: June 1991
For IBM PC and compatibles—$11.95 per month in selected cities; $2.00 an hour from 6:00 p.m. to 6:00 a.m. in others)

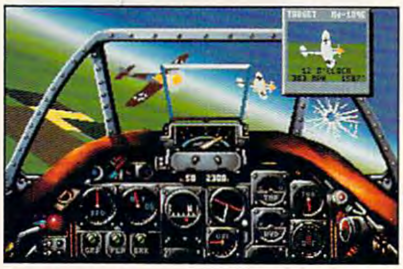
SIERRA ON-LINE
P.O. Box 485
Coarsegold, CA 93614
(209) 683-4468

CHUCK YEAGER'S AIR COMBAT

The new *Chuck Yeager's Air Combat* is the most versatile, exciting combat flight simulator to land on the PC. You'd think a program that lets you fly six combat aircraft ranging from the piston-engined P-51 Mustang to the Mach 2–capable MiG-21 Fishbed against 17 different types of enemy aircraft would be full of compromises. Not this one. Whether your combat is over WWII Europe, Korea, or Vietnam, you'll find the program as realistic as single-era simulators.

As you'd expect in a simulation bearing the Yeager name, the planes fly very accurately. You won't be making hairpin turns at Mach 2 in your F-4, and you can't climb vertically in a Focke-Wulf 190.

The preset scenarios are a welcome change from standard flight simulator fare. Many missions bring unexpected complications, such as enemy MiGs showing up on what's supposed to be a ground attack mission. Others are unique; in one mission, you take on the role of Lt. Kim Sok Ho, the North Korean MiG-15 pilot who defected with his plane for a $100,000 reward.



Take wing against a variety of enemy aircraft in this latest simulation.

The game uses a refined version of the graphics system used in EA's *LHX Attack Chopper* and *Stormovik* simulators. The full release version promises digitized speech and explosions, as well as sound card support. Control with a mouse or trackball was awkward; this game definitely requires a joystick for full enjoyment.

Fast action, original missions, and fascinating fantasy combat make this a must-have program for PC pilots.

DENNY ATKIN

Scheduled Release: June 1991
For IBM PC and compatibles, 640K RAM—$59.95

ELECTRONIC ARTS
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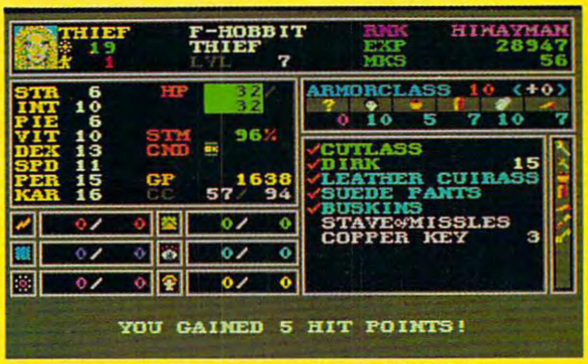
(415) 571-7171

What Are Sneak Peeks?

Sneak Peeks are advance reviews of upcoming software and hardware products. Every effort is made to ensure that the information contained in these reviews is accurate at the time they are published. *COMPUTE* will review the final edition when it becomes available.

Wizardry®
A Fantasy Role-Playing Simulation by D.W. Bradley
BANE OF THE COSMIC FORGE
SIR-TECH

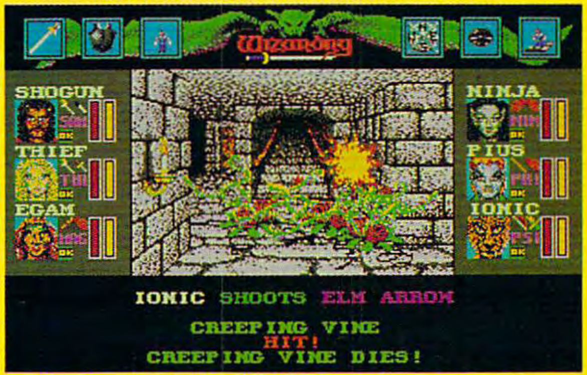


```
THIEF          F-HOBBIT     RNK    HIMAYMAN
  19           THIEF        EXP       28947
   1           LVL     7    MKS          56

STR  6    HP   32/        ARMORCLASS 10 <+0>
INT 10         32           0 10  5  7 10  7
PIE  6
VIT 10    STM      96%    ✓CUTLASS
DEX 13    CND  OK         ✓DIRK             15
SPD 11                    ✓LEATHER CUIRASS
PER 15    GP      1638    ✓SUEDE PANTS
KAR 16    CC   57/  94    ✓BUSKINS
                           STAVE of MISSLES
   0/    0      0/    0    COPPER KEY        3
   0/    0      0/    0
   0/    0      0/    0

        YOU GAINED 5 HIT POINTS!
```

Actual Screens from MS-DOS Version



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IONIC SHOOTS ELM ARROW

CREEPING VINE
HIT!
CREEPING VINE DIES!
```

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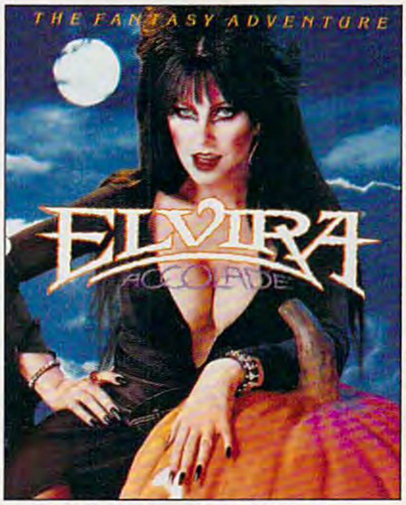
GAMES CHOICE

ELVIRA, MISTRESS OF THE DARK

Killbragant Castle looms before you, looking nothing like the description the adventurers' union gave of a quaint castle in the peaceful English countryside. Still, all you've got to do is help the sweet young thing that lives there solve a tiny problem with some unwanted guests. "Piece of cake," they said, "a pleasant vacation." One glance at the captain of the guard confirms your worst fears—Killbragant is hardly quaint. You're in trouble all right, big trouble!

Thus begins the fantasy adventure game *Elvira, Mistress of the Dark,* a successful mixture of a graphics adventure and fantasy role-playing game. As for that nice vacation, forget it; this vacation is the stuff of nightmares. It seems Elvira's great-grandmother, Queen Emelda, is due for a resurrection and plans to rule the world with the help of her evil minions. Your task is to help Elvira find her chest and the six keys that open it in order to put a stop to Grandma's imminent return. Of course, Elvira's unwanted, not to mention undead, houseguests, including everything from zombie soldiers to a beautiful but deadly vampiress, are dead set on seeing to it that you fail.

Elvira may start a new trend in graphics-oriented adventures. Many games sacrifice depth and length of play in favor of striking graphics. Accolade, however, has created a game that provides hours of play in addition to stunning graphics. As you enter the castle, the attention to detail becomes apparent, and thanks to *Elvira's* first-person perspective, the feeling of being there is immediate. As you wander the ancient grounds of Killbragant, you'll have the opportunity to battle a variety of creatures, all of which will grimace, scream, and snarl at you in remarkable detail. I found the animation to be excellent. At one point in the game you'll encounter a falcon, which scrolls smoothly across the screen just before ripping out your eyes. Another excellent animation sequence is the werewolf transformation. I recommend that you bring some silver when you visit this guy, and I'm not talking about your fork and spoon.



Visually stunning and full of dangerous surprises, *Elvira's* only for the intrepid.

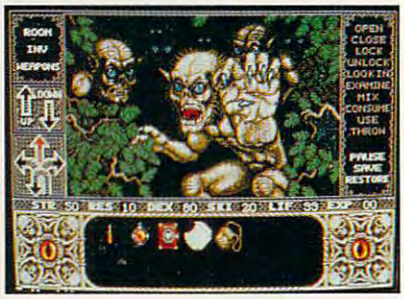
The box states that *Elvira* contains blood-curdling graphics. This is a warning as well as a selling point; the game contains graphic violence. You will be beheaded, have your throat ripped out, and sustain various other fatal and unpleasant injuries—all with minute attention to detail. The results are sometimes shocking. For this reason, I feel that *Elvira* is not suitable for young children.

Of course, a superior adventure game relies on more than good graphics for its appeal, and *Elvira* is no exception. The game boasts an excellent soundtrack and supports today's most popular sound cards. I found the music to be very well done, creating tension at just the right moment. Another excellent feature is the incorporation of digitized sound effects. No matter what sound card you're using, you'll still be able to hear screams, cries of agony, and the clash of steel on steel as you engage in battle. For those of you whose only source of sound is the PC speaker, Accolade has done a creditable job with the music, and you'll even be able to hear the digital sound.

Elvira is an icon-driven game that uses a point-and-click interface. All the necessary icons are located on one screen, which speeds gameplay by minimizing the amount of mouse pushing you'll do. Needless to say, because of the nature of the interface, a mouse is highly recommended.

During the game all text, descriptions, and inventory items will appear in a lower window. Arrows direct your movement along the four compass points, and up or down arrows allow you to negotiate stairways. You manipulate objects by using command icons such as Examine, Open, Close, Use, and the like. Picking up an object is a simple matter of clicking on it and dragging it to your inventory. Another interesting feature, the ability to drop things in a room and retrieve them later, isn't found in many of today's graphic adventure games.

During combat, when you confront one of the castle beasties, a special combat window appears, alternately displaying Lunge/Hack and Block/Parry. The intelligent combat interface requires you not only to select the proper attack or defense but also to time your defense correctly. Not that it's going to help you much. There's going to be a lot of blood spilled here—mostly yours. One more note on combat: Once you engage in battle, it's a fight to the death. If you wish to run or use magic against your enemy, you must do so before the combat window appears.



Out for your blood, the ghastly denizens of Killbragant close in for the kill.

Strategy for *Elvira* is somewhat simplistic; try to stay alive and grab everything that isn't nailed down. In the castle, you find some of the better weapons and other items used throughout the game. You'll have to

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engage in combat to enter many of the rooms in the castle, and since fighting is strictly on-the-job training, save often. The game has so many items you can pick up that I recommend selecting a centrally located room in the castle as a repository. I found that the library serves nicely, since it's never guarded. Make sure you read the documentation, as it contains some good pointers. Last, but not least, if you truly get stuck, Accolade does offer an excellent hint book that includes a layout of the castle and grounds.

Despite my disappointment with the lack of a user-friendly installation process and some minor documentation oversights, I consider *Elvira* a noteworthy achievement. If a dank and dangerous setting is your element, you'll be right at home in Castle Killbragant. Grab a copy and begin your adventure—exploring *Elvira* may take days, but every moment's a thrill.

GREGG OWENS

IBM PC and compatibles; 640K RAM; EGA, VGA, or Tandy 16-color; hard drive; 8-MHz or faster processor recommended; mouse recommended; supports Ad Lib, Sound Blaster, Roland MT-32, Casio CT460, and CMS—$59.95

Also available for Amiga—$59.95 and Atari ST—$59.95

ACCOLADE
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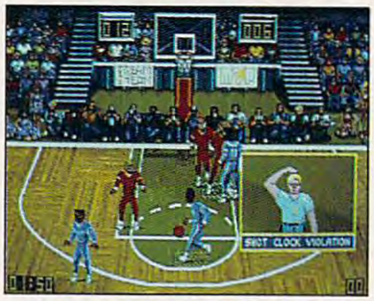
San Jose, CA 95128
(408) 985-1700

THE DREAM TEAM 3 ON 3 CHALLENGE

With the long, hot days of summer quickly approaching, basketball fans find themselves dreading the long wait for the action of their favorite sport to heat up. The wait is over! In *The Dream Team 3 on 3 Challenge,* three of the NBA's top stars are waiting to bring their brand of half-court action right into your living room.

Joe Dumars, Patrick Ewing, and Dominique Wilkins are the team to beat in this fast-moving arcade challenge. For one or two players, *The Dream Team* can be played either competitively or cooperatively and with one-, two-, or three-man teams. In any variation, players are chosen from a roster of 24 of the NBA's finest.

You can also participate in the ultimate challenge, the Dream Team Tournament. This single-elimination showdown is played between eight three-man teams, which are randomly paired in each game. Up to eight of the teams can be controlled by humans, so you can invite seven of your friends over to see which of you really is number 1.



Basketball season never ends with *The Dream Team Three on Three Challenge.*

The mechanics of this game are easy to master. Your players dribble automatically as they move; everything else is just a matter of positioning and timing. Press button 1 on your joystick to shoot, rebound, or block a shot; press button 2 to pass. The colored "pad" that appears beneath the feet of one of your players makes it instantly apparent which player you control at any given time.

The Dream Team also involves tactical considerations, requiring you to select one of four active plays before inbounding the ball. Choose from 16 preprogrammed plays, or design your own. You can change your active plays as often as you like. Calling plays adds a bit of realism to the game and makes passes easier to execute because you can anticipate the movements of your players.

The Dream Team's designers obviously paid a great deal of attention to creating an attractive game, and it shows: This is easily the best-looking basketball game on the market. The graphics are rich and detailed to the point of shading the ball so that it appears rounded and three-dimensional. Unlike some other games, *The Dream Team* won't strain your eyes. The players are large, bright, and colorfully animated, with moves such as a behind-the-back lay-up and a soaring two-handed slam along the baseline.

The weakest part of this game involves the sound effects, which are limited to the sound of dribbling, the ball hitting the rim, and the referee's whistle. While these effects are well done, there should be more. Where are the squeaking sneakers? Where is the roar of the crowd when a player comes up with a big slam-dunk or a long three-pointer?

Overall, this is a commendable effort from Data East. The graphics and animation are engaging, the sound effects are sparse but good and, most important, it's fun to play. So all you sports gamers out there—grab a joystick, lace your sneakers up, and try *The Dream Team 3 on 3 Challenge.*

RICHARD RAPP

IBM PC and compatibles; 512K RAM for CGA, EGA, and Hercules; 640K RAM for VGA and Tandy 16-color; 10 MHz or faster recommended for VGA or Tandy graphics; supports Ad Lib and Sound Blaster sound cards; joystick recommended—$49.95

DATA EAST USA
1850 Little Orchard St.
San Jose, CA 95125
(408) 286-7074

KING'S QUEST I

A classic game, *King's Quest* now boasts a new, easier-to-use interface that hasn't upset the game's balance. It only enhances by eliminating the drudgery of keyboard control. To find out about an object, just point at it and click the right mouse button. To move the hero, Sir Graham, you merely need to click on the desired location, and Graham obligingly moves in that direction. And while *KQ's* graphics are no longer state-of-the-art, the soundtrack and overall quality of the game are still remarkable. In sum—bravo! *King's Quest* has been given a new lease on life.

TOM CAMPBELL

IBM PC and compatibles, 512K RAM, CGA, EGA, VGA; mouse recommended—$59.95

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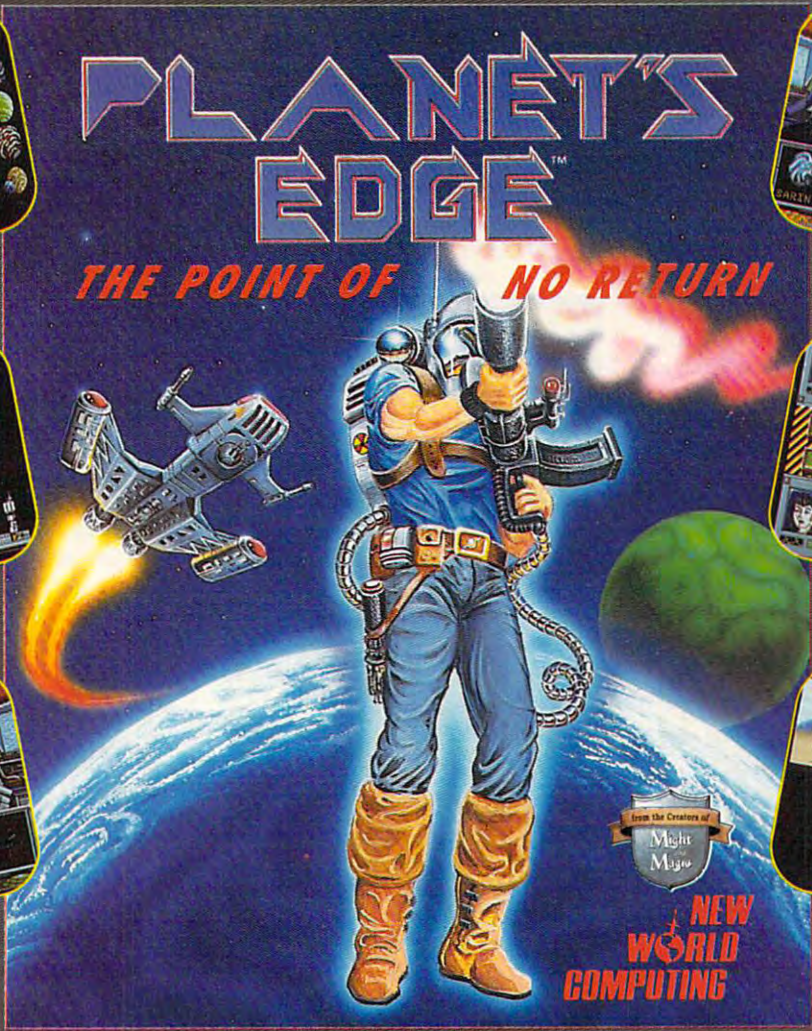
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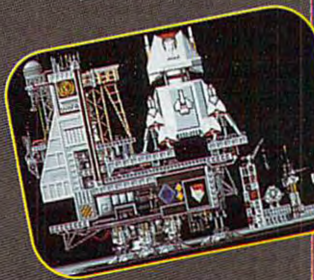

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GAMES

FUTURE CLASSICS COLLECTION

Arcade lovers will get a bang out of this five-game omnibus. In *Diskman* you gather floppy disks, while avoiding magnets, bombs, and other deadly devices. *Diet Riot,* on the other hand, gives you a chance to close down junk-food restaurants. Don't eat those hamburgers and French fries! You'll get fat. Other games include *Blockalanche,* a 3-D *Tetris*-like puzzle; *Lost 'N Maze,* a first-person-perspective maze treasure hunt; and *Tank Battle,* a simple combat game.

While none of the games is conceptually original, each is cleverly implemented. Moreover, they boast much better graphics than you might expect from a budget collection. At the price, *Future Classics Collection* is a steal.

CLAYTON WALNUM

IBM PC and compatibles, 512K RAM, CGA, EGA, MCGA, VGA, and Tandy 16-color; supports Ad Lib, Sound Blaster sound cards; joystick optional—$39.95
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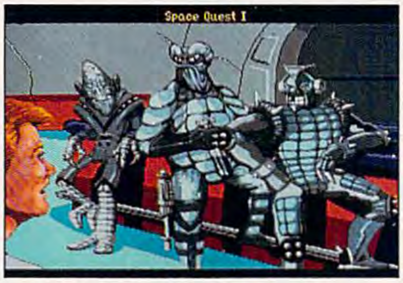
SPACE QUEST IV: ROGER WILCO AND THE TIME RIPPERS

Roger Wilco foils Sludge Vohaul's plans for revenge by jumping into the Time Rip, and the adventure has just begun. Roger won't rest until he's seen *Space Quest XXII,* revisited *Space Quest I,* and stopped briefly at *Space Quest X.*

Familiarity with Sierra's line of terrific software didn't prepare me for the dazzling opener. Stunning 256-color MCGA graphics, a soundtrack rivaling Hollywood's best, and a well-planned introduction to an exciting story kept me on the edge of my seat.

When you play, don't try typing *Look Around.* The parser of old has been replaced with a new-generation interface. Click the Eye icon in the area you want to look, and you're given a full report. With the Hand, Walking, Nose, and Tongue icons, you'll have an easy time figuring out what to do.



You run into some pretty tough customers in *Space Quest IV.*

The story line is full of surprises. When the Latex Babes captured Roger, I witnessed Roger's former lover exacting revenge. And experiencing the Skate-O-Rama in the mall, with its antigravity instead of skates, reminded me that the Galaxeria Mall, after all, was in the middle of deep space. One of the biggest surprises is meeting Roger's son and seeing a hologram of his wife. I won't give things away, but you'll be in for a shock because of his wife's notoriety.

There are technological twists, too. Roger plugs into Vohaul's supercomputer to find the programming room for the supercomputer and avoid the security detail. Once at the programming room, he has an opportunity to format Vohaul's evil storage media.

If you're a Space Quest fan or you just love games that have great graphics and wonderful sound, get this game. It's hard to guess how Sierra will follow this act after exposing you to the far-flung future of *Space Quest XXII,* but I imagine it will be every bit as stimulating as this adventure.

RICHARD LEINECKER

IBM PC and compatibles, 640K RAM, MCGA or VGA; supports mouse or joystick, supports Ad Lib, Roland, Game Blaster, PS/1, and Sound Blaster sound cards—$59.95

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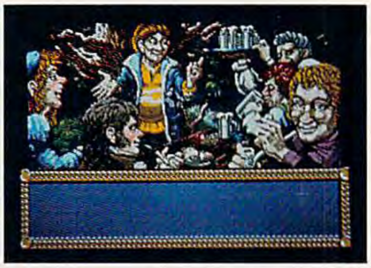
LORD OF THE RINGS, VOL. I

Hobbits are good guys, honest and tough, the kind of folks you wouldn't mind having next door. One of them, Bilbo Baggins, found a ring of unimaginable power and gave it to his nephew Frodo. Now Frodo must destroy the ring, but its creator, the dread Sauron, wants it back.

Are these the makings of adventure? You bet! Author J. R. R. Tolkien used these very ingredients to create his celebrated fantasy, *Lord of the Rings.* Now Interplay Productions has adapted them to the phosphor screen with *Lord of the Rings, Vol. I,* a computer-based version of the Tolkien classic.



The denizens of Tolkien's Middle Earth come to life in *Lord of the Rings.*

Interplay has done a good job of equipping you for your quest. You move with your mouse (highly recommended) or keyboard (awkward), and the interface is icon-based, allowing you to readily procure and use objects, cast magic spells, and attack enemies. You can recruit some characters to help you in your quest and talk with others to get information you need. Depending on where you are, you can acquire new weapons, learn new spells, or eat food to restore lost life points. You can even put the ring on your finger, rendering yourself invisible. But be careful if you do; the ring drains your will, and if your will falls to zero, you are, for all practical purposes, dead.

Icons initiate action, and you'll see plenty of that, but you'll need information, too, and information comes from written words. Some of those words are written on neat little

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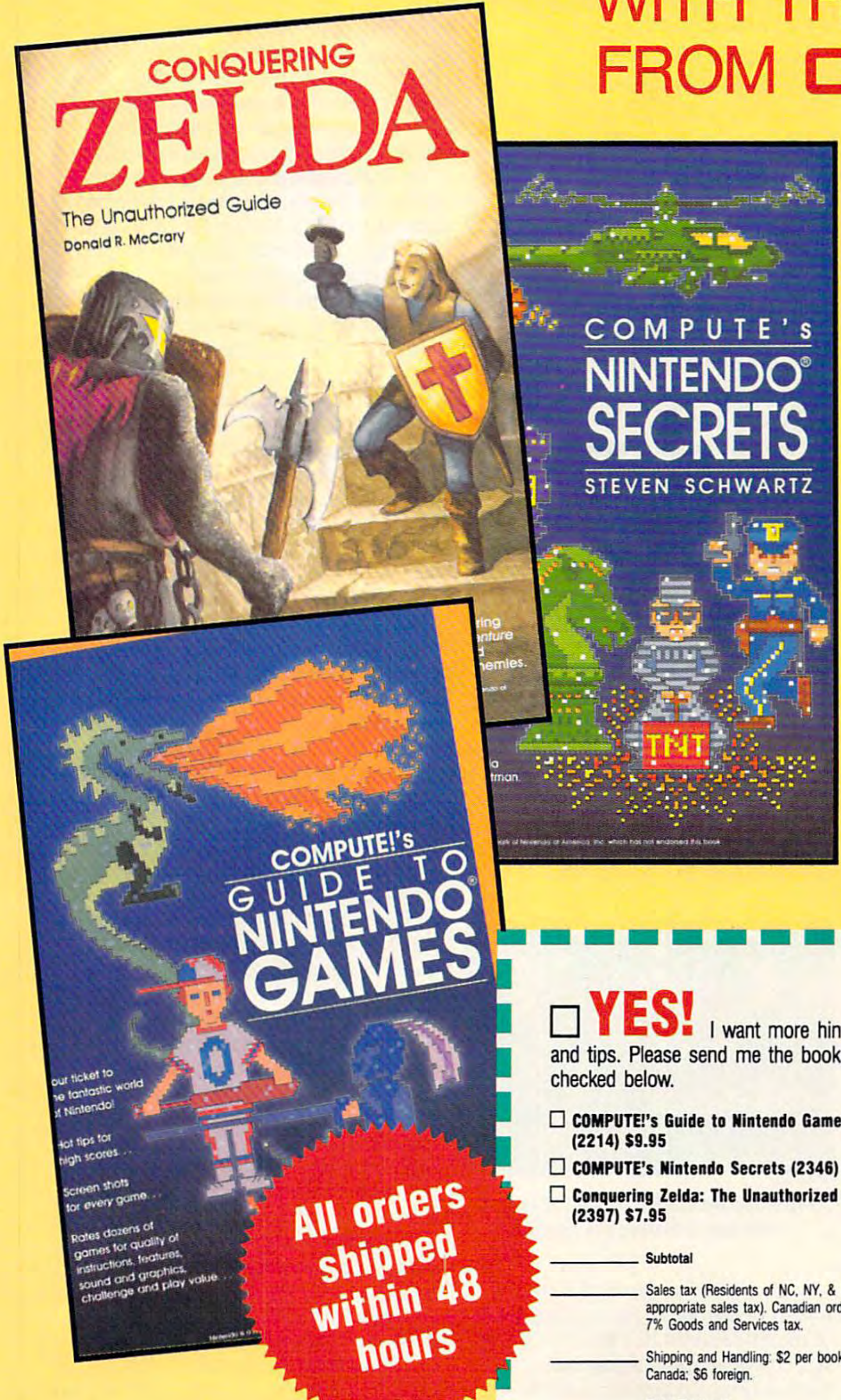
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yellowed scrolls that magically appear and then automatically unfurl whenever the need arises. These may, for example, give you the lowdown on what's in a room. As you explore, the ever-helpful scroll also tells you if there are desirable items to be found wherever you happen to be. It works like this: As you enter a room, the scroll may pop up and roll down and notify you that there are items of interest nearby. Sure enough, when you call up the Get icon, you'll find that there are indeed worthwhile objects waiting for you, but you'd never know it by looking, since there's no visual hint. Don't real adventurers always depend on their eyes?

Other words are printed in your *Lord of the Rings* play manual, where you'll find 259 numbered blocks of text. From time to time, the yellowed scroll will prompt you to refer to paragraph such and such, and you've got to open the manual and locate the paragraph. Is this the poor man's text adventure? Admittedly, the paragraphs add depth to the game, but why not just put the information on the screen?

The program has other quirks, too. For example, you can pick up something useful and then discard it, but if you try to pick it up again, it may not be there. Another thing that's puzzling: Since wearing the ring makes you invisible, you'd expect your cohorts not to notice you when you slip it on. But even when you wear it, they'll still dutifully follow you around.

Another problem lies with the scrolling screen itself. It's good, not great. When you move, your character stays more or less stationary on the screen while the background scrolls past. The scrolling is jerky, and with more than 9000 screens worth of Middle Earth terrain to explore, eyestrain is inevitable.

How effective is this translation of a fantasy classic into the language of microprocessors? I'm caught in the middle, loving the gameplay but disappointed by visuals that could never live up to those of my imagination. Interplay's Middle Earth citizens are remarkable in VGA, but some of them seem to be a cross between Elvis Presley and Mr. Spock. If you're a reader of Tolkien, this computer-granted glimpse of the land the Hobbits call home may or may not match your own mental image, but even if it doesn't, don't let that keep you from enjoying Interplay's *Lord of the Rings.* Rest assured that those little guys will keep you on the road to adventure for a long time to come.

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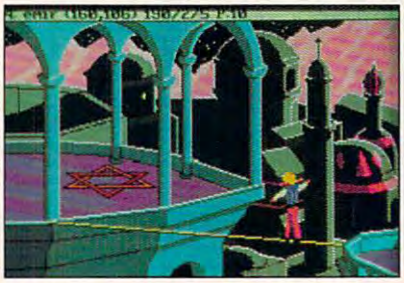
QUEST FOR GLORY II: TRIAL BY FIRE

When a designer tries to graft role-playing onto adventure, the result is usually a Frankenstein monster of a game that returns to haunt the author, the publisher, and the game players of the world. *Hero's Quest* scored high marks as one of the few games to successfully blend the puzzle-solving aspects of an adventure with the combat and skill elements that characterize role-playing games. The sequel, which bears a different name due to a trademark conflict with a board game, is even better than the original.



Tightrope walking in *Trial by Fire* isn't safe, but it certainly is heroic.

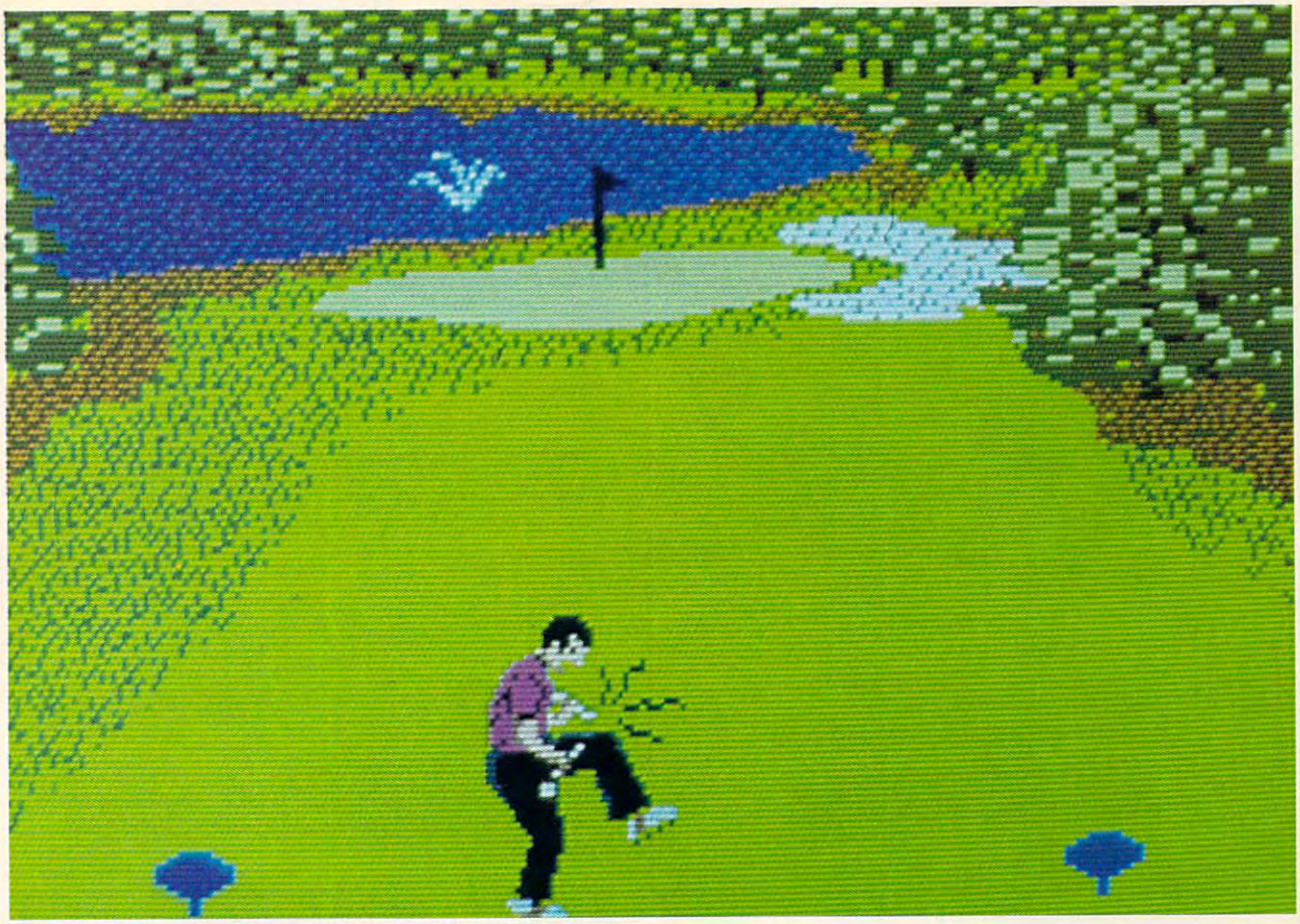
Our hero has traveled from the forests of Europe to the burning sands of the Mideast for this story. In the desert city of Shapeir, things have not been shaping up according to the sultan's plan. The emir in the nearby city of Raseir has fallen victim to the evil plot of his sinister sibling. Your quest is to find the missing ruler and set things right in Raseir before the villain takes over Shapeir, too.

You may use a character from *Hero's Quest* or roll up a fresh one. As before, the choice is fighter, thief, or magic user—each profession possessing strengths and shortcomings in skills necessary to solve various puzzles. Some puzzles are unique to the different classes, and many problems have different solutions for each class. The fighter, for example, obtains the bellows needed to defeat the air elemental by arm-wrestling the man in the weapon shop, while the magic user casts Fetch on the bellows (at night) to get it. In most places, the magic user and thief rely more on wits; the fighter on strength.

I enjoyed battling the brigands and giant scorpions of *Trial by Fire* more than the villains of *Hero's Quest,* because the combat system has been revamped and improved. Instead of viewing a first-person picture of the foe, you watch animated figures of both characters. There are only a few combat commands, so they're easy to learn and execute. Magic is useful in combat as well as when solving puzzles.

As in *Hero's Quest,* your character can improve certain skills if he or she uses them successfully. Pick enough locks, and you'll find the next lock easier to pick. In a major leap forward over *Hero's Quest, Trial by Fire* lets your characters advance to higher classes; a fighter strives to become a paladin, for instance. This gives the quest a dual purpose: to save the land and to get your character promoted. An added feature is a different final scene for each character class, so you have more incentive to replay that character, and more fun doing so.

Trial by Fire supports everything from 16-color VGA to Hercules and sound boards that haven't even been invented yet, but it doesn't employ the "cinemagraphics" and icon interface of *King's Quest V.* You still type words into a parser to interact with people and things, and the graphics are cartoonish. This is apppropriate, however, considering the abundance of humor here. Authors Lori and Corey Cole display a rare talent for



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demented puns and obscure jokes. The weapon shop, for instance, is run by a man called Issur, a play on A. E. van Vogt's classic novel, *The Weapon Shops of Isher.* For its playfulness and improvements over the original, *Trial by Fire* is highly recommended.

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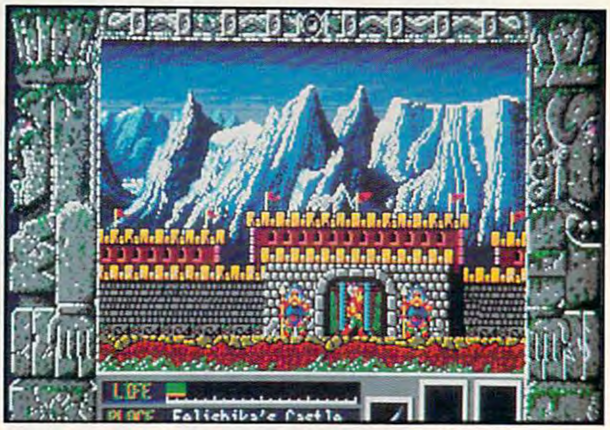
ZELIARD

I don't like sword-and-sorcery games, but twenty minutes after beginning *Zeliard,* I took the phone off the hook and put my rudest Do Not Disturb sign on the front door.



You come across a mountain fortress in *Zeliard.*

A Japanese import from Sierra's Game Arts division, *Zeliard* is a well-crafted, entertaining hack-and-grab fantasy adventure. As Duke Garland, you must search for the Tears of Esmemanti, nine crystals that are the only defense against the demon Jashiin, who has laid waste the land and turned the princess into stone. Your quest takes you through caverns where you do battle with evil frogs, slugs, owls, fire-spitting serpents, and the inevitable giant monsters. Along the way, you have the chance to buy better weapons and increase your strength and endurance, and if you persevere to the end, you'll restore the land of Zeliard to its former happy state. OK, you've heard it all before, but *Zeliard's* familiar premise profits immensely from detailed graphics (even on CGA), limited but clever animation, satisfyingly convoluted labyrinths, and an original musical score that, for a wonder, is pleasant to listen to.

Not that there aren't problems: On slower systems the lags during screen changes may be infuriatingly slow, playing the game without a hard drive will involve frequent disk swapping (three 5¼s, two 3½s), and after several deaths, you'll wish it were possible to save a game without leaving the cavern to go to the Sage's house in the village. But the first two problems are probably signs that it's time to upgrade your system, and the last problem will at least keep you on your toes. On the whole, the obvious care that went into the creation of *Zeliard* makes playing the game a lot of high-quality unsophisticated fun.

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UMS II: NATIONS AT WAR

Have you ever wanted to fight a battle in a war game that hasn't been developed yet? Have you ever wondered what would have happened had Napoleon faced Alexander the Great in battle in the twenty-first century with nuclear weapons, missiles, and air power? This capability is what Ezra Sidran and the staff of Intergalactic Development have programmed into their new Microplay release, *UMS II: Nations at War.*

UMS II is a computer war game simulation which purports to have real artificial intelligence and a depth of simulation not yet realized in any other war game. This may or may not be true, but *UMS II* certainly does have complex algorithms that define thousands of variables including leadership, morale, supply level, experience, efficiency, and unit strength. The game player can set and reset these values to study the effects of a variety of combat circumstances. Terrain, weather, elevation, and military formations must also be taken into account. For the realist, these are welcome details.

UMS II has the further advantage of being a game system that promises the imminent release of a planet editor that will allow you to create your own planetwide battles. While the editor doesn't come with the game, it's easily the most appealing aspect of *UMS II.* Expect the editor to be available within the next two months, though there is some confusion as to whether the planet editor will be a free upgrade to the original program. Unlike its predecessor, *UMS, UMS II* transcends the limitations of a mundane, geographically limited battlefield and engages you in planetwide conflicts instead.

Obviously, *UMS II* targets the true war gamer who has hours of time to pore over manuals and to enjoy and master the intricacies of gameplay, not the average gamer. Even when you use one of the three enclosed scenarios, the game isn't an undertaking for a few afternoon hours. Schedule a whole day or night to complete a single game.

Functioning better with a mouse than a keyboard, the interface is adequate, but not obvious or easy to learn. Ex-

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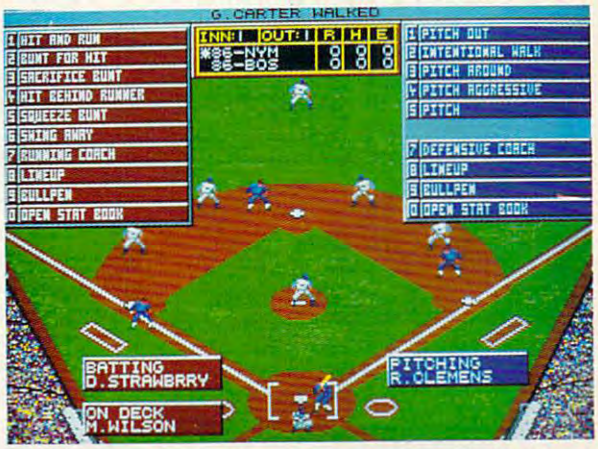

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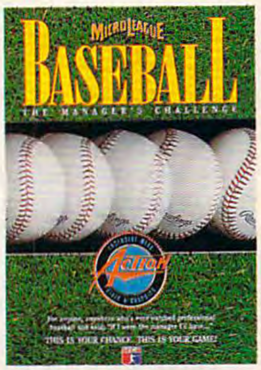

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pect to make many mistakes, and don't expect the manual to answer all your questions: The documentation is not quite sufficient. To make up for this problem, the designers provide a free newsletter, complete with tips and warnings against pitfalls.

Offering no sound effects and possessing limited color graphics , *UMS II* has sacrificed glitz to afford players greater control of the simulation. When designing the artificial intelligence of generals, for example, you decide whether they're passive or aggressive, or desire the destruction of opposing forces over the conquest of territory. But if you're looking for a stereo shoot-'em-up, this is not your game. Only the highly cerebral need look into this military simulator. The current version of *UMS II* is version 1.2.4. You need to send your original game disks and registration card to Intergalactic Development to get the upgrade. This new version improves on the earlier version and addresses many user complaints. The newer version runs faster and is far more capable of unattended play than the prior game. Lengthy battles need trouble you no longer; array your forces and let the game resolve the combat while you clean the garage or make a sandwich. Upon your return, view the results and issue another set of commands.

UMS II: Nations at War is by far the most monumental and ambitious undertaking in military war game history. Be aware of the drawbacks of the system, however, and remember that this game is not for everyone. I would recommend *UMS II* for anyone who intends to purchase the planet editor (assuming the upgrade isn't free) and who is an avid war gamer—or perhaps for anyone who enjoys alternate history or wants to set his or her own conditions for worldwide conflict without actual bloodshed.

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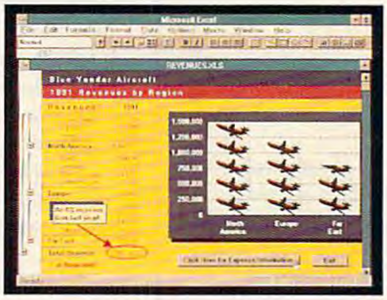
If there's one immutable law in personal computing, it's this: For any hardware platform or operating system to succeed, it must be the delivery system for a killer spreadsheet. This may sound strange, but if you look at history, you'll see that it's true.



The new *Excel*'s toolbar makes the program faster and easier to use.

When *VisiCalc* hit the scene in 1979, it turned the Apple II from a toy into a powerful business tool. Apple II sales skyrocketed, and the machine became *the* personal computer for computing's first generation. *Lotus 1-2-3* was the next standard. It was a great improvement on *VisiCalc* and the epitome of user-friendly software in 1983. *Lotus 1-2-3* made businessmen and -women really want to buy MS-DOS–based, 8088-powered PCs. And they did . . . by the *millions.*

Since *1-2-3's* success, there have been many spreadsheet contenders, but none have really captured the computing public's imagination and driven users to a new hardware or operating-system platform.

Lotus tried recapturing the magic and setting a new standard with *1-2-3* 3.0, but without much success—most users who upgraded went with the lower-end 2.2 version of *1-2-3.* And Microsoft has tried before with *Excel* 1.0 and 2.0, but previous versions of *Excel* simply didn't have the wiles to lure people away from the comfort of DOS, *1-2-3,* and their 8088s.

Now we have *Excel* 3.0. Is it just another also-ran, or is it the spreadsheet to set a new standard and fuel the blastoff of *Windows* 3.0 and the 386 hardware it demands?

Keep reading. In the next five minutes, you'll find out.

First, don't let anything you've heard about previous versions of *Excel* influence you. Version 3.0 has been completely redesigned from the ground up. Not only does *Excel* 3.0 have amazing new features and power, but Microsoft has made dramatic strides in making the program easier to use.

Right off the bat, you'll notice that the new *Excel* looks different. When you run it for the first time, you'll see one of its most impressive new features, the toolbar. The toolbar is a horizontal bar that rests under the menus and contains groups of push buttons. These push buttons are shortcuts for commonly used commands, the mouse equivalent of accelerator keys, and they make using *Excel* both easier and faster.

The toolbar isn't a new idea. It's borrowed from *Microsoft Word for Windows,* which places often-used word-processing commands on a bar called the ribbon. But the toolbar concept seems even more of a natural for a spreadsheet than a word processor.

You can easily get a feel for what's new with *Excel* by looking at what's on the toolbar. Going from left to right, you'll see buttons for selecting styles, promoting and demoting outline elements, toggling outline display on and off, selecting visible cells, autosumming (which automatically sums rows or columns), bold and italic, alignment (left, center, and right), selecting graphics objects, drawing (including buttons for drawing lines, rectangles, ellipses, and curves), autocharting, creating text boxes, creating your own user-defined buttons, and recording macros.

One of these buttons, autosum, is especially useful. Microsoft did some impressive research to determine just what users wanted and needed in a spreadsheet. One of the things the research showed was that summing rows and columns was the most repeated task for almost all spreadsheet users.

To make summing as easy as possible, Microsoft created autosum. ▷

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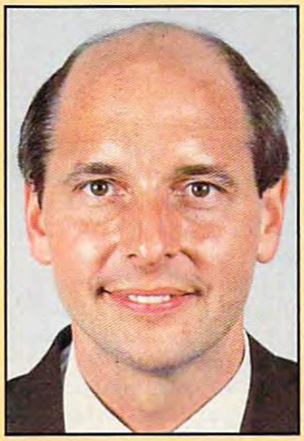

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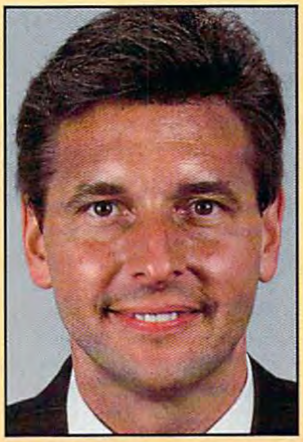

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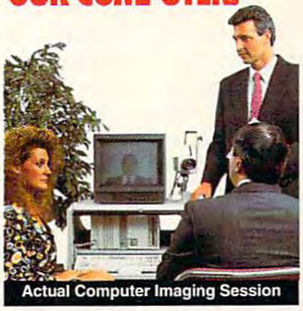

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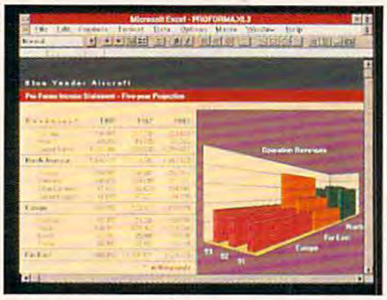
To use it, you place the cursor at the end of any row or column at the point where you want your total to go. Next, click on the autosum button. The program places the SUM formula in the current cell and selects a range based on the configuration of your data. If autosum finds cells filled in to the right or left of your sum cell, it chooses that part of the row. If it finds cells above the formula (the more common situation), it selects the column above. I've found that autosum almost always chooses the right range for the sum, but when it doesn't, it's easy to compress or extend the selection or to move it somewhere else on the work sheet.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You can control both the color and perspective of *Excel*'s 3-D charts.

Autosum may be *Excel*'s most frequently used new feature, but it's just one example of the care that went into the design of 3.0. Another thoughtful extra is *Excel*'s new automatic best fit for column width. To use this, place the pointer between any two cells and double-click. The program adjusts the width of the column on the left and makes a best fit for the data therein. Resizing your spreadsheet's columns for optimum width is now easy—and it's almost fun.

When you need to take a quick look at a note attached to a cell, you don't want to have to navigate through menus. With 3.0, all you have to do is double-click on any cell that contains a note (cells with notes are identified by a small red dot in the upper right corner of the cell) to display the note's text.

When it's time to print your spreadsheet, you'll be pleased to find that this new version of *Excel* knows all about fonts. Version 2.0 was limited to four fonts per work sheet, but 3.0 gives you unlimited access to your system's entire font arsenal. It's also worth noting that *Excel* works flawlessly with both Bitstream's *Facelift* and *Adobe Type Manager* font packages.

To top off new output enhancements, 3.0 now offers style control. You can access styles with the style combo box on the toolbar, just like the style box on the *Word for Windows* ribbon. To define a style, select an area of your work sheet and format it with the font you want (you can specify bold, italic, underline, or strikeout) and its point size. Click on the style box and type in the name for your new style. Now the style appears on your style combo box menu. Fonts and style control are a double-edged sword, however. If you want to keep your spreadsheets from looking like ransom notes, stick to Helvetica for numbers and perhaps one serifed font—like Times or Bookman—for headlines.

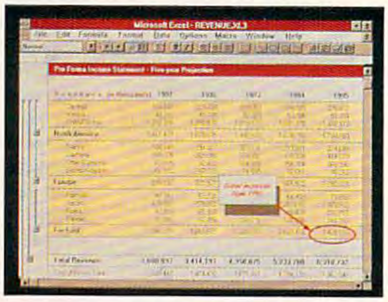
All the features mentioned so far make *Excel* faster and easier to use, but this version also has several new tricks to make power users' mouths water. At the top of the list is outlining. With it, you can structure your spreadsheet in an interrelated hierarchy, and even more important, you can display selected parts of the spreadsheet based on that hierarchy.

Here's a quick look at how outlining works. Let's say, for example, that you're working on a balance sheet containing several subtotals, and each is the sum of 50 to 100 numbers. The work sheet to contain all these numbers could easily be 400–500 rows long. With a length like that, it would be nearly impossible to see the important data. The trees would block the forest.

With outlining, the solution is simple. First, select the range of the rows that comprise each subtotal and demote them with the right-pointing arrow on the toolbar. You'll see a small button with a minus sign on it and a line indicating the range of the button. Click on the button (which will change to a +), and the range will be hidden. If you click on the + button again, your range will appear. If you change your mind and want to promote the cells you demoted earlier, just select the range again and click on the left-pointing arrow on the toolbar. The small outline button with the minus sign in it will disappear.

If you have several outline levels in your spreadsheet, you'll appreciate the program's outline display button, also on the toolbar. Press this, and the outline buttons disappear. When you're ready to work with outlining again, press the outline display button, and you'll see your outline levels and their associated buttons.

The toolbar, autosumming, and outlining are all great, but *Excel* has a little something extra for the kid in all of us—dazzling, eye-popping graphics. You'll find all the standard (and often boring) graphs supplied, but you'll also find gorgeous 3-D area, column, line, and pie charts. With all graph types, you have complete control over the chart's rotation, perspective, and color. You can also incorporate graphs right in your spreadsheet. It's easy, and as you might expect, you do it with the toolbar.


Microsoft Excel - REVENUE.XL3
Pro Forma Income Statement - Five-year Projection

With *Excel*'s new drawing tools, you can fine-tune your spreadsheets.

To create a graph, select a range of cells, click on the graph button on the toolbar, and draw a box on your work sheet (by clicking and dragging the mouse) just where you want the graph to go.

If you have the soul of an artist, you can even use *Excel*'s on-board drawing tools to jazz up your chart and make your point in style.

Last, there's *Excel*'s database. This is the only module in the program not completely redesigned and upgraded for release 3.0, and it does show its age a little. Microsoft, however, has solved the database problem by bundling Pioneer software's *Q+E* database with *Excel*.

Q+E has been billed as a database editor, but it's much more than that. With it, you can import files (*Ex-*

cel, dBase, and text), edit them, and perform SQL queries. You can also create databases in *Q+E*. The whole affair is wrapped in a MDI (Multiple Document Interface), like *Excel's* own, that features multiple overlapping windows. *Q+E* is an impressive and useful database program in its own right. Match it up with *Excel* and DDE, *Windows'* Dynamic Data Exchange, and it's a real winner.

So, is *Excel* the one? The new spreadsheet standard that's going to propel us into the next generation of hardware and operating systems? It is indeed. It's the spreadsheet we've been waiting for.

CLIFTON KARNES

■

IBM PC and compatibles, *Microsoft Windows* 3.0—$495

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CORELDRAW!

Ordinarily, I would be wary of recommending a graphics package that costs as much as *CorelDRAW!*. If it costs that much, it had better do it *all*. After working with *CorelDRAW!* intensively for about a year and with *CorelDRAW!* 2.0 virtually full-time since January in connection with a book project, I can tell you without hesitation or fear of contradiction that *CorelDRAW!* will do the job for you as far as graphics are concerned, almost without regard to the kind of job you need done. If you've outgrown *Corel's* list of options, you have simply outgrown the PC, and you should be shopping for a workstation.

I would've had a more difficult time making that recommendation prior to the emergence of the 2.0 version (which may be updated to a higher number by the time you see this, to account for minor bug fixes that are underway as of this writing). Although the earlier version was a noble effort and certainly a heavy hitter among graphics packages, there was nothing that sufficiently distinguished it from the pack of other CAD programs to make a specific recommendation. Each of the major players had a special trick or two, and there was as much compelling evidence that you should purchase one as another. *Corel's* programmers eliminated all the waffle room with version 2.0, beating the competition at its own game and leaving it in the dust. The cleaned-up version that will shortly emerge from the current upgrade process will be bulletproof.

I will attempt the daunting task of listing the reasons why you should invest $695 in a graphics program—and why you will count that investment as money well spent.

CorelDRAW! is easy to learn and use, as it always was. It features intu-

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itive little pluses like a Repeat command in the File menu that allows you to reiterate an action, no matter how complex, with a single menu selection. It allows you to add perspective to your drawing automatically, to "extrude" a two-dimensional object into the third dimension, and to distort at will the envelope containing a drawn object as if it were printed on a sheet of rubber or Silly Putty. *CorelDRAW!* has a complete blend option for the first time with version 2.0. It features a broad range of import and export features that will make it a ready partner for all your other graphics software. The *CorelDRAW!* fonts are famous for their variety and attractiveness, but they offer much more: These fine fonts can be exported in various forms for use with your other applications, provided that you have a font manager to work with *Windows.*

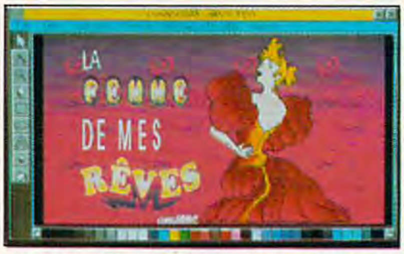
The Mosaic feature turns your *CorelDRAW!* on-disk graphics portfolio into an onscreen gallery of drawings that you can peruse at will, looking for the specific piece of art that you need at the moment. But even if you opt not to use Mosaic for whatever reason, the Open dialog box displays a thumbnail sketch of whatever file is selected in the list box, providing a similar, if less dramatic, service in the basic software.

New in *CorelDRAW!* 2.0 are the vector and raster fill options. These options provide you with the ability, for example, to grab a section of a drawing on the screen and use it as a continuously tiling fill inside of another object. You can also import any bitmap (TIFF or PCX) drawing as a fill pattern. Once the fill has been imported, you can color it as you please, size it, edit it with *Corel's* pattern editor, and save it for future use in the gallery of raster fills or, if it's a vector fill, as a special kind of *CorelDRAW!* fill file.

One of the drawbacks of the earlier versions of the product was that you couldn't offset a fountain fill. A fountain fill was always squarely centered in the selection rectangle of an object, and the only way you could alter the way it filled was to combine the filled object with some irrelevant bit of data off in the direction of the desired offset. This minor irritant was removed in the 2.0 version with the addition of an offset option.

In many ways, *CorelDRAW!* was always just as good as its principal rivals, *Micrografx Designer* and *Arts & Letters Graphic Editor,* but it lacked the friendly fountains of *Designer* and the powerful blending options of *Graphic Editor.*

There are still areas that could use improvement. The powerful *Corel TRACE,* an associated program provided with *CorelDRAW!,* is functional enough when it comes to turning raster graphics into line art, but its options aren't particularly intuitive, and it seems slow, particularly when compared with the spritely performance of *Designer. Corel* also has an autotrace feature within the program. Someday it would be nice to have this autotrace made powerful enough to stand up next to *Designer's* so you wouldn't have to leave the program to perform your traces. Likewise, the font-export option is the envy of the industry, but for a novice at moving fonts around, it's not well documented (and the information in the *Windows* 3.0 manual is as good as nonexistent). The ability to alter fonts and use them as your own is another good reason to purchase *CorelDRAW!,* but you'll have to become a *Windows* expert before you'll discover how to use these fonts with other *Windows* programs.



Both intuitive and powerful, *CorelDRAW!* is the premier paint program for *Windows.*

But even with these minor problems, *CorelDRAW!* has more to recommend it than any other *Windows* graphics program.

ROBERT BIXBY

IBM PC and compatibles, *Microsoft Windows* 3.0—$695

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WILLMAKER

Nobody enjoys making a will and keeping it current, but everybody knows that the chore must be done for the sake of loved ones. One way to do it is to visit a lawyer. That places some demands on your time and checkbook. A more convenient and inexpensive method is provided in *WillMaker* 4.0.

WillMaker 4.0 comes from Nolo Press, a company well known for its authoritative books on legal matters for lay people. The manual states that in the past 50 years the legal profession has scored a public relations coup by convincing many people that writing a will without a lawyer is like doing your own brain surgery. This, the authors insist, is nonsense. Their program produces a will which you can understand, in clear language without jargon such as "I hereby give, bequeath, and devise." And it's a will that will stand up in court.

After a simple installation process, *WillMaker* takes you through a series of questions regarding the allocation of your estate. When you type an answer, a window shows you how your answer will appear in your will and seeks your approval.

Let's say you are married and wish to leave everything to your spouse and your children. A will meeting these conditions can be completed in a very few minutes. The program asks for your name, your social security number, your state and county of residence, and the names of your children. The program prompts you for the name of a contingency custodian for any beneficiaries who are minors, and suggestions for alternate forms of custodianship are given.

If your will is more complicated and you have specific bequests, the program makes provision for those. It also cautions you about what you cannot do in a will with provisional bequests. For example, you cannot leave something to Uncle Bill provided that he quits smoking. Such a bequest would probably be set aside by a probate court.

When you have finished the sequence of screens, you may review the finished document, make alterations to your answers if you wish, and print the will, which makes provision for the signatures of three witnesses, plus their initials, on each page. The printout also produces a "self-proving" affidavit. Nolo urges you to complete this document, which must have the notarized signatures of yourself and your witnesses. In most states, its existence will make it unnecessary for your witnesses to appear in probate court.

Documents produced by *WillMaker* are state specific, taking into account variations in state laws. The manual asserts that the documents are valid in all states except Louisiana, where laws are based upon the French legal system. The manual contains far more information than just instructions for the use of the program. It points out the limitations of a will, provides information about the probate process, and discusses action you may wish to take, outside your will, to avoid probate. It also discusses situations which a simple will cannot cover and suggests steps you may wish to take to avoid estate taxes if your estate is substantial. It even suggests that there are circumstances under which you may wish to consult a lawyer.

WillMaker 4.0 is an excellent program and deserves your consideration for use in matters of estate. Ask yourself these questions: Is your will up to date? Are you sure? *WillMaker* 4.0 offers some peace of mind.

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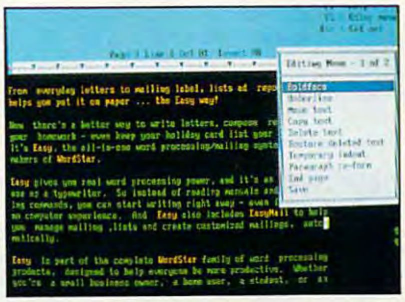
WORDSTAR LAPTOP COLLECTION

Laptop software can unfortunately be a bit like microwave meals—convenient, but less substantial and satisfying than conventional fare. If you've longed to beef up your laptop menu, now's the time. That longtime favorite of touch-typists, *WordStar*, is now available in a laptop version you can really sink your teeth into—*WordStar Laptop Collection.*

The collection gives you basically a modified version 6.0 along with *LapLink Special Edition,* which facilitates transfers between your laptop and desktop (the cable costs extra), and *OnTime,* a flexible calendar program. Although you don't have every single feature offered in the desktop version, there's still plenty to work with: a spelling dictionary, a thesaurus, a definitions dictionary, multiple help levels, pull-down or classic menus, an extra-window capability, dot commands, word counts, headers, footers, an advanced page preview, abundant printer support, and much more. (For a fuller discussion of basic program features in version 6.0, see the December 1990 *COMPUTE* review.)



Take touch-typing power on the road with *WordStar Laptop Collection*.

In using the program, I haven't felt that I lacked any features necessary for normal laptop use. *WordStar* seems every bit as full-featured on the laptop as it does on my desktop computer. In addition to the program proper, you get *WordStar's MailList* program for generating form letters, printing labels or envelopes, and creating mailing lists. You also get a quite capable communications program, *TelMerge,* which lets you access online services, send or receive electronic mail, and communicate with other computers. Conveniently, each of these programs is accessible from within *WordStar.*

Like the desktop version, *WordStar Laptop Collection* offers free membership in CompuServe with $15 usage credit, free Bitstream typefaces, and free Agfa typefaces.

What's missing from the original 6.0 version? You don't get integrated text and graphics, *PC-Outline, Profinder* (a shell program), and *StarExchange* (which converts file formats between this and several other word processors). Once you become a registered user of the laptop edition, however, you qualify to buy the desktop version for a mere $99. And as the company points out, that's like getting both products for less than the retail price of the desktop version—quite a bargain.

While you'll enjoy many of the desktop version's features in the laptop edition, the company has clearly adapted the program with the laptop user in mind. The README file, the installation and customization program, and the manuals all reflect that a laptop is being used. And yes, you can run the program on a floppy system. WordStar supplies a quick-start disk with a condensed version of the program, and you also get tips on installing the program on a high-capacity disk.

If you've been waiting for a full-featured word processor for your laptop, this is a great one. And if you've enjoyed *WordStar* on a desktop computer, this new laptop edition might be just the excuse you need to buy a laptop.

MIKE HUDNALL

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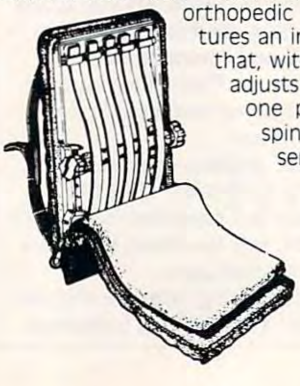

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SIMEARTH

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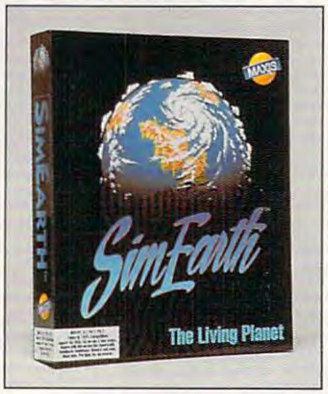
That neatly sums up *SimEarth,* the expansive exploration of planetary management from Maxis. Like its ancestor *SimCity,* this simulation puts you in charge of life, lets you say who gets liberty, and even demands that you oversee the pursuit of happiness. But instead of lording it over a measly city, *SimEarth* sets you up as master of an entire planet.

SimEarth is nothing if not ambitious. It may be a toy compared to planetary models developed for climate and weather research, but it's a toy that's hard to put down. Loosely based on the Gaia hypothesis—that our world is a living system that adapts to changing conditions—*SimEarth* includes everything from climate control and continental drift to evolution, mutation, and the quest for fire. All of these are integrated into an entertaining and educational look at the dynamics between a planet and its inhabitants.

You can sit back and watch a world develop on its own, but the real fun is in getting your hands dirty and messing around. You'll make a dozen decisions every minute, many under pressure, so ease of use is critical. *SimEarth* sports a graphical interface clearly taken from its Macintosh version (Maxis develops first on the Mac), so you'll need a mouse to enjoy the game. Though the interface proves more than adequate, PC users would've been more comfortable with a true *Windows* approach.

SimEarth offers up seven ready-to-evolve planets, from Earth of the Cambrian Era to Aquarium, an all-water world. You can terraform Mars and Venus, build continents on Aquarium, or even test the Gaia hypothesis on Daisyworld. Play with Earth of 1990 and see if you can motivate humanity to head into space. Or try to make dinosaurs the intelligent life form by manipulating Earth of 550 million years ago (they're not that smart; they still have wars).

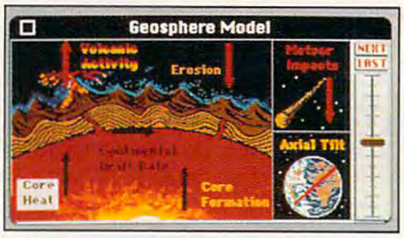


Create and maintain a world.

The real challenge comes in letting *SimEarth* create random worlds. You can start at any of four points in time, but the best place is at the beginning, when the world's a slag heap. Customize continents with earthquakes, tidal waves, meteors, and more. As oceans form, you populate them with single-celled species and propagate life. At your whim you can extinguish some creatures while promoting the evolution of others.

As millions of years slip by, you'll evolve multicell organisms—it's not hard—and move to the next step, creating intelligent life. That's not always easy, for some planets seem stubborn about letting advanced life flourish. Fortunately, you've got a well-stocked set of planetary tools. Windows open to show you simplified models of the geosphere, atmosphere, and biosphere. A click of the mouse button slows down the greenhouse effect to cool off a hot world, speeds up mutations to push evolution, or puts a stop to continental drift to hold land in place. Changing a variable costs energy, the currency of *SimEarth,* but if you're playing in experimental mode, money's no object. In any other mode, energy is limited, and your options restricted to what you can afford. It's a nice brake on out-of-control terragenesis.

Later, if your world matures, you'll get a shot at guiding the dominant species toward civilization and then through its technological stages. You set priorities for your wards in an attempt to stop plagues and wars (or promote them if you're in a bad mood). And you can try to nudge them to use more efficient energy sources, though the consequences—emissions from fossil fuels and possible radiation poisoning from atomics—are as well known to your random world as they are to our own.



You can modify and monitor planetary formation in the geosphere window.

Manipulating all this sounds daunting. It's not. Icons and buttons change the satellite-from-space view to give information about cataclysmic events, air and water temperatures, animal and plant distribution, and wind and water currents. Other icons open selections to place life forms or perform acts of God. Menus at the top of the screen lead you to the reports and graphs you need to keep track of your world's development.

Play *SimEarth* on a VGA-equipped system if you can—the resolution and colors add to the experience. The program also supports the Ad Lib, Sound Blaster, and Sound Master boards, so you can listen to quality sound effects and music when meteors splash and new life evolves. You may have problems with mouse cursor ghosts in high-resolution modes, but the solution is simple for most, and Maxis' technical support is helpful. *SimEarth* is slightly unstable; the simulation crashed twice in as many days with no warning and for little reason. Memory requirements are high but not unreasonable

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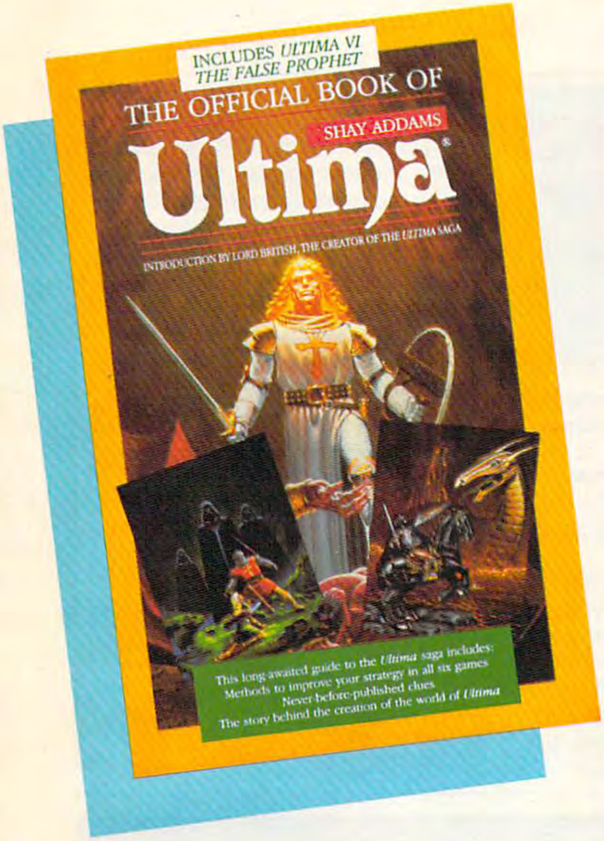
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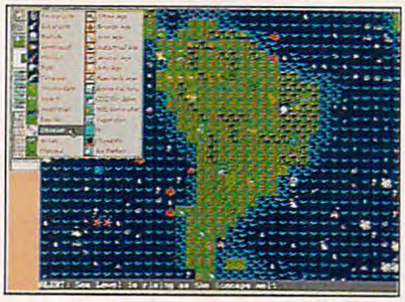
for most systems, assuming you don't run TSRs or crowd RAM with device drivers. Even on a 20-MHz 386SX system, though, *SimEarth* seemed sluggish.

More than just a good time, *SimEarth* is an excellent example of transparent learning. You walk away from this simulation with a better understanding of global interconnections. Watch firsthand how planetary heat buildup snuffs out species, how high mutation rates make evolution leap like a Mexican jumping bean, and how technologies always have tradeoffs.

True, *SimEarth* makes assumptions not everyone agrees with. All *SimEarth* life is carbon based, worlds easily form oceans, and the game developers apparently take the Gaia hypothesis as gospel. No one said the world—even a made-up one—was perfect. On the other hand, you can play with ideological incorrectness if you want. Smash civilizations by eliminating moral barriers to war or obliterate entire species with the click of a button. It's all fun because none of it's real.



Add new life forms to your developing planet and subtly alter the biosphere.

SimEarth may be less inviting than the boffo bestseller *SimCity,* if only because it's more complex, and the intricacies of the 'ologies—geology, meteorology, biology, and technology—are scary compared to simple city planning. On the other hand, although *SimEarth* demands more from you, it gives back much more in return.

This is a landmark PC program that everyone must play. Not because it's the morally correct thing to do, but because it fires your imagination like few other pieces of software. If absolute power corrupts absolutely, I plead guilty to addictive corruption. I've nurtured worlds, and I've killed worlds. Go ahead—indict me. Just keep your hands off my planet.

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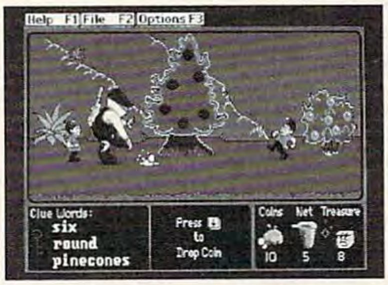
How do you engage children's attention long enough to teach basic skills? What can you do to encourage kids to practice skills they've learned? Try inviting them on an electronic excursion to *Treasure Mountain!* This "fantasy-exploration" software combines action-packed, arcadelike entertainment with puzzle-solving challenges to keep players creatively absorbed for hours. The Learning Company's *Treasure Mountain!* pits infamous Morty Maxwell against fast-thinking Super Solver detectives. Immoral Morty has maliciously made off with the mountain's magic crown. Sagacious Super Solvers must stop the merciless Maxwell from using the crown to steal the mountain's magic gold. Will Super Solvers successfully rescue the crown and beat misguided Morty at his own game?



***Super Solvers Treasure Mountain!* scores major points for educational fun.**

Enterprising detectives embark on a journey up the mountain in search of hidden treasures. To prevent the unrelenting Maxwell from carrying out his dishonorable deeds, players must successfully retrieve enough booty to fill the treasure chest at the mountaintop. The task is not an easy one. There are several obstacles to overcome along the way.

Success depends on capturing the mountain's elusive elves. Youngsters must hunt for elves who carry scrolls. When nabbed in Super Solver nets, the sprightly (but sometimes pesky) beings offer clues to treasure whereabouts. Players who correctly answer an elf's question win a clue. Answers may require solving a math problem, completing a word puzzle, recognizing word patterns, or applying a scientific principle.

Super Solvers have three chances to answer an elf's question. They win two gold coins and a clue word for answering correctly on the first try, one gold coin and a clue word for a correct answer on the second try, but just a clue word (no gold coin) for questions answered correctly the third time around. As Super Solvers move up in the clubhouse ranks, scroll-bearing elves become harder to catch, there are more hidden treasures on each mountain level, and players must successfully avoid mischievous elves who throw coin-eating magic dust.

Treasures are hidden in places that match two of the three word clues. For example, if clue words are *five, flowers,* and *round,* enterprising detectives must be on the lookout for items like five flowers, round flowers, or five round objects (possibly rocks or bushes). When youngsters come upon a mountain location that matches two of the clue words, they drop a coin. If there's a treasure hidden in that spot, it is automatically theirs. When Super Solvers find the spot that matches all three clue words, they obtain a key that unlocks the path leading up to the next mountain level.

Players' nets deteriorate with every elf captured. Eventually, nets are so damaged that elves can easily escape. When this happens, Super Solvers must locate a "net cave" and use the gold to pay for repairs. Luckily, players who do not have enough coins eventually find more coins along the mountain path.

Unlike conventional arcade diversions, *Treasure Mountain!* offers more than just mindless entertainment. The game encourages children to use analytical reasoning to solve puzzles, inductive thinking to infer connections, deductive logic to test hypotheses—all without imposing time limitations. Colorful animated graphics, realistic sound effects, and positive audiovisual reinforcement make the mountain a wonderful place to visit.

Treasure Mountain! rewards curiosity, motivates exploration, and reinforces basic elementary school subject areas. In the final analysis, however, the software succeeds because children find that it's a lot of fun to play! And for parents, *Treasure Mountain!* means that children spend playtime productively.

CAROL HOLZBERG

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LEARNING

PLAYING WITH MICKEY MOUSE MEANS LEARNING

You sit at your home computer, your favorite driving simulation loaded and running. As you concentrate on avoiding a fiery crash, suddenly a small voice about hip level pipes up,"Mom, can I play, too?"

Your three-year-old can't race cars with you but wants to play computer games. What should you buy that can involve both of you? An excellent first purchase would be one of the following Mickey Mouse packages from Disney.

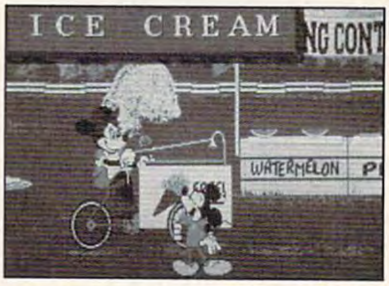
Mickey's Colors and Shapes is subtitled *The Dazzling Magic Show.* In this particular package, America's favorite mouse comes on stage and performs various magic acts, such as juggling and pulling an animal out of his hat. A friendly lady's voice leads your child through the game, and you can watch and help him or her make choices.

Mickey's 123's is called *The Big Surprise Party.* Your child plans a party for one of the Disney characters; buys toys, food, and decorations; and sends invitations. At the end, he or she serves the food.

Mickey's ABC's offers you *A Day at the Fair.* You begin by waking Mickey up at home and then go with him on a interesting trip to a country fair. Again, the friendly voice helps your child along.

Children will find the controls for all these games to be user-friendly. There are no wrong moves. The animation is top-quality and quite imaginative. Your child will be entertained and may never notice he or she is also learning numbers, letters, and shapes!

How do the three packages compare to one another? I played all three games with my three-year-old son, and he liked each one. But *ABC's* is my favorite by far. My son is well acquainted with the alphabet and spelling, and we both were challenged by the game. Besides offering a chance to become familiar with letter shapes and sounds, this game also teaches many useful cognitive skills necessary for computer use—primarily learning to make the connection between what you see on the screen and what you need to do with the keyboard. Your child will learn how to control Mickey's actions and how to anticipate events that are offscreen. He or she will learn to go through several steps to arrive at certain places or to see certain actions.



Your child and Mickey spend a day at the fair together in *Mickey's ABC's*.

My least favorite Mickey Mouse adventure is *123's.* It is only slightly more interactive than television. Each number that is pressed causes a lengthy animation sequence. My son enjoyed looking at it, but he was not very involved in what was happening. A lot of number information was handed to him, without much opportunity for active thought until the party at the end of the game.

Colors and Shapes is my son's favorite game. It calls for the most creativity, particularly during the segment in which he creates his own picture by selecting colors and shapes. The animation is less dramatic than that in *ABC's,* but that didn't affect his level of interest. This game comes with a soft rubber template printed with color blocks and shapes that fits over the keyboard. I think this makes it an especially suitable first computer game for the youngest of children.

Which of these packages should you purchase if you can afford only one? *Colors and Shapes* is best for the child who has the least computer experience and is still unfamiliar with letters and numbers. If your child likes Candyland, he will love *Colors and Shapes. ABC's* is the most complex, interactive game. It is best for the more computer-literate, verbal child who is able to discern patterns and make complex connections. Somewhere in between, *123's* is the one to pick if your child is one of those who has a love of numbers.

BETH ANN MURRAY

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BOOKS

COMPLETE LAPTOP COMPUTER GUIDE

Some recent analytical surveys suggest that the laptop PC, the category of personal computers with the fastest-growing sales, will in a few years account for more than half of the computers sold in the United States. More and more people are looking to portables, laptops, and notebooks as their secondary, or even primary, machine. Students, writers, accountants, sales reps—anyone who needs portability and functionality needs a laptop. That person also needs a solid grounding in what the laptop computer can and can't do.

This book, by David H. Rothman, leads readers through the promise and peril of laptop use. The early pages are devoted to detailed descriptions of various laptop designs, with pros and cons clearly spelled out. Chapter 3 is devoted to software solutions for laptop users (who are always short of storage space, especially with less expensive models).

In light of Rothman's statement that laptops are superior to all other communication devices, it isn't surprising that several of the book's chapters are devoted to that idea. Here you'll find everything from a tour of online services to a primer on logging on, no matter how inhospitable or adversarial the terrain.

Throughout, the author maintains a good balance of fact and humor, which will help readers get more from these pages. Only a couple of biases mar an otherwise clear—if somewhat lighthearted—approach. Rothman hates mice and especially abhors graphical user interfaces (GUIs). Considering the movement toward such environments, Rothman could have served his readers better with solid information about using a laptop with a GUI, rather than dismissing them outright. These faults are outweighed, however, by the book's overall usefulness.

PETER SCISCO

Author: David H. Rothman
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It all started with the phone phreaks. These outlaws made monkeys out of the biggest monopoly on earth—the telephone company—and tweaked the noses of the electronic lawmen determined to track them down. And because nobody *really* loves AT & T, there may've been a certain amount of tacit support for their activities among the common folk, who were happy to see someone finally getting back at the big, impersonal bureaucracies of the world. William Gibson knew how to tap into that latent desire for revenge when he wrote *Neuromancer,* as did John Brunner when he wrote *Shock Wave Rider,* Bruce Sterling when he wrote *Islands in the Net*—just as George Orwell knew it when he created the tragic hero of *1984.*

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BOOKS

this was primarily a province of juveniles and the juvenile at heart, it was inevitable that some frat-house pranks might occur. The problem is that dropping a cherry bomb down a toilet in the campus administration building frosts only a few well-deserving cookies. Dropping an electronic bomb on an international network of million-dollar computer installations represents a hazard to business, the military, and millions—perhaps billions—of lives.

The stories related by the husband and wife team of Katie Hafner and John Markoff are legend: Kevin Mitnick, the telephone hacker rumored to have ruined the credit rating of a judge who ruled against him; Karl Koch, the paranoid computer spy who identified himself as Hagbard Celine, after the hero of a conspiracy novel, and ended up horribly killing himself by self-immolation; and rtm, the brilliant Cornell student and son of a computer security expert whose innocent worm crashed computers from coast to coast and landed him in a legal quagmire.

Many of the people in this book take on other identities online—Pengo, named after a penguin in a videogame; Obelix, after a French cartoon character; Captain Crunch; the Phantom; the Cheshire Catalyst; and so on. But what makes the book so successful is that it enters these identities. And, as you can imagine, the human stories behind a man who would identify himself as a penguin or a woman who would call herself Susan Thunder are rife with attendant ironies.

By using stolen credit card numbers and network user identifications, the hackers were able to take advantage of system operators' gullibility, huge corporations' fear of bad publicity, and a kind of telephone con game called *human engineering* to break down seemingly impregnable security, and in the process they earned the admiration and respect of fellow hackers and impressionable young people throughout the world.

The authors take you inside the minds and value systems of hackers, showing how human curiosity, and longing to be on the inside and privy to secret power, can become highly destructive impulses. The writing takes on a tense journalistic style that reveals the incredible depth of the research performed. Without becoming bogged down in technical details, it explains in layman's terms how the nets operate and how they were breached. Each of the hackers' stories is told in an insightful biography. Many of the characters in *Cyberpunk* seem driven, like addicts, unable to control their appetites for power, more to be pitied than censured.

But there is no ambiguity about the carnage they have left behind. The authors look with a jaundiced eye upon the kind of society that results when fears of terrorism and vandalism overwhelm the desire to communicate and remain open to human interaction.

In all, *Cyberpunk* is a valid look at recent history, as important in its own way as any of the industry insiders' books about the corporate role in the computerization of America, and far more broad ranging and complete than Cliff Stoll's book *The Cuckoo's Egg* (to say nothing of the fact that *Cyberpunk* is far better written). Stoll appears now and then as a minor character in *Cyberpunk*. It was very enlightening to see this character (whom I felt I had come to know so well through his book) from the outside. *Cyberpunk* is a masterwork of reportage, and it belongs on your bookshelf.

ROBERT BIXBY

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ALEX RANDALL'S USED COMPUTER HANDBOOK

Known as a computer hardware junkie by most of my friends and associates, I spend a fair amount of time out looking for "good deals." I own two complete systems, but there always seems to be some card or peripheral needing an upgrade to a newer/faster/enhanced version. For those of you looking to buy a computer, whether for the first time or as an upgrade to a better system, reading Alex Randall's book will expedite the decision-making process.

This 240-page book covers the ins and outs of acquiring a used computer for both you and your business. Randall explains the tactics to employ whether you're the seller or the buyer of a system. Also covered well are where to advertise a computer and what to look out for, from both the seller's and buyer's perspectives. Even a computer novice will soon gain a better idea of what to look for and how much to pay.

The author relates a few amusing stories regarding people he's dealt with and reveals common misconceptions concerning both price and value of different products (hint: four- to five-year-old computers are generally not worth 90 percent of the original sales price, but you'd be surprised at how many people hold this misconception). The explanation of how systems depreciate is useful if you're looking to sell a computer (as I am) and may help steer unwary first-time buyers away from that "real good deal" that isn't. Quite useful and enjoyable, *Alex Randall's Used Computer Handbook* makes clear the state of the secondhand computer market. Don't shop without it.

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If you're in the market for a personal computer or just want to learn more about computers in general, then you should take a look at this new guide. Author Wayne Parker's experiences as a writer and a computer programmer/user allow him to cover the A–Zs of selecting a computer to fit your needs.

The Computer Buyer's Handbook cuts through the rhetoric so pervasive in today's advertisements, explaining in layman's terms the technical jargon that surrounds peripherals such as monitors, modems, hard drives, printers, and mice; and the handbook offers recommendations regarding brands to try. Unix and OS/2 also receive coverage, and new computer owners will welcome the overview of software.

Although quite partial to 80386 IBM and IBM-compatible systems, the author does briefly cover other systems like the Macintosh, NeXT, and Amiga computers. *The Computer Buyer's Handbook* lacks an index, does not cover in any detail either interrupt or I/O address conflicts between add-on cards, and uses price information that was inaccurate as of April, 1991 (understandably, since the publication date is November, 1990, and six months can make a big difference for prices in the computer industry).

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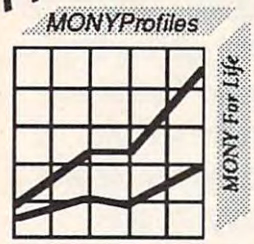

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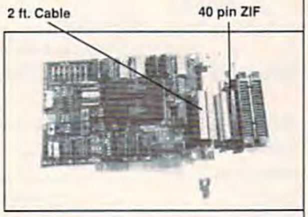

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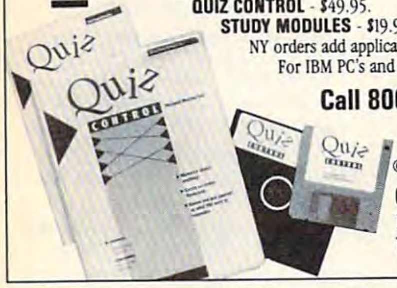

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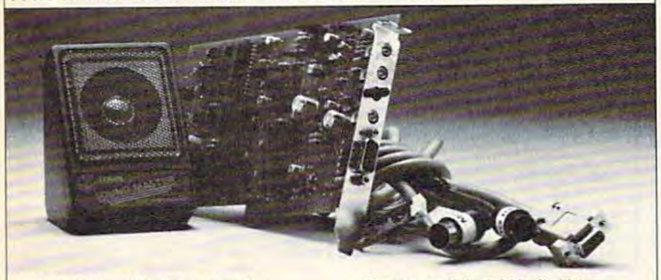

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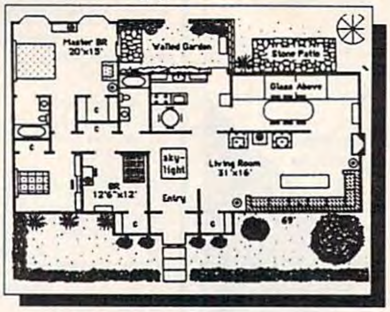

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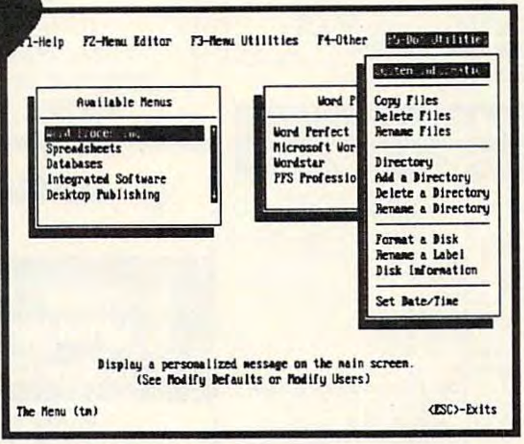

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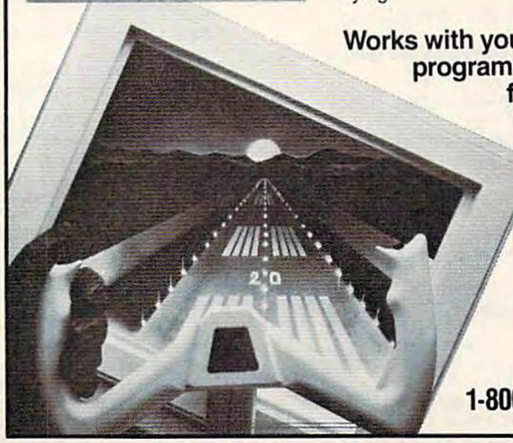

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COMPUTE!'s PC MAGAZINE

BACK ISSUES

Note:

- *Selected titles are listed under contents for each issue*
- *3½-inch disks available for all issues except March 1988 and May 1988*
- *Programs requiring more than 256K or a color monitor are so noted*

March 1988, Issue 4, Vol. 2, No. 2

Feature

Flying Home: *Flight Simulator* adventure

Software on Disk

TheDraw: Design custom menu screens, presentations, or animated sequences
Tonto!: Pop-up with ASCII chart, clock/calendar, directory, hex converter, keyboard scan code reader, and printer setup
Font Typesetter: New fonts for your printer (CGA)
Designing Custom Fonts: Create your own fonts for Font Typesetter (CGA)
FileFinder: Locate any file, in any directory
SuperTiler: More power for BASIC's PAINT (CGA)
Hover: Futuristic tennis game (CGA)
DOS Help: Help screens for DOS commands

May 1988, Issue 5, Vol. 2, No. 3

Feature

Advanced Spreadsheets: Special techniques for power tools

Software on Disk

Quick Scheduler: Organize yourself!
Source Code XREF: Debugging made easy
Text File Compare: Find out which file is which
WHOA!: Control your PC's speed (EGA not supported)
Las Vegas Solitaire: Solitaire with casino rules
States & Capitals: Learn U.S. geography and have some fun (CGA)
QikServe: Arcade fun in a fast-food setting (CGA)

July 1988, Issue 6, Vol. 2, No. 4

Features

How to Build Your Own PC Clone: Expert advice on a money-saving alternative
In Praise of PC Play: PC blasts into the game market
Talking to Your Printer: Make your printer do all its tricks
Buyer's Guide to Simulation Software: 38 exciting games put you in command

Software on Disk

JLSCAN: Super file lister
Presentation Graphics: Create professional-looking graphs and charts (CGA)
File-It: Save text screens to disk
Graphics Shape Editor: Design your own graphics for games (CGA)
Ancient Empires: The glory of battles past (CGA)
Power Poker: An old favorite with a new twist

March 1989, Issue 10, Vol. 3, No. 2

Features

Laser Power from Your Dot-Matrix Printer: Supercharge your 9-pin printer
RAM Charge! How to Expand Your PC's Memory: Everything you need to know
Buyer's Guide to Expanded Memory Boards: 83 memory boards for more RAM power

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Software on Disk

Arcade Volleyball: Electrifying on-court action
Spin 'n' Print: Print spreadsheets sideways (CGA)
HDtest: Tune up your hard disk
Cribbage: The game of kings and queens
FixBeep: Control your PC's speaker
ColorSet: Choose your own screen palette (CGA)

May 1989, Issue 11, Vol. 3, No. 3

Features

Game Designers' Favorite PC Games: Five pros pick their favorites
How to Install a Hard Disk: It's as easy as 1-2-3
Future Games: Put your imagination into overdrive
Buyer's Guide to Sports Games: 62 super diversions

Software on Disk

Iskib: Save the planet from hostile aliens (CGA)
Dr. Sleeptite and the Nightmare Factory: Foil the villain and destroy his Dream Machine (CGA)
Block Out: Fast-paced strategy for the whole family (CGA or EGA)
Vmusic: Compose and play three-part music
Rich Levin's Checkup: Defend your system against virus attack
SearchIn: Find the text you want—fast!
Subdir: Soar through directories
Snooper: Uncover messages hidden in program files

July 1989, Issue 12, Vol. 3, No. 4

Features

PC Video Systems Made Easy: It's all in the cards
Desktop Publishing Revolution: Get started in style
King's Quest IV: A new dimension in PC entertainment
Buyer's Guide to Desktop Publishing Software: 50 hot publishing packages; 101 clip-art collections

Software on Disk

TurboTYPE: Kiss DOS's TYPE command good-bye
CGA: At last! CGA programs on your monochrome graphics card
Menu-Matic: One keypress runs any program
Nifty James' Famous Utilities: Zap backups, calculate online, and get a quote for the day
PrtLabel: Design and print custom labels

September 1989, Issue 13, Vol. 3, No. 5

Features

Best-Kept Secrets: Five word processors priced at under $100
Learning Is FUN!: 60 games that instruct and delight
CD-ROM: Dazzling new graphics and sound
Buyer's Guide to Self-Improvement Software: 70 ways to improve your skills and career

Software on Disk

Lumpies of Lotis IV: Aliens meet their match!
WPK: Word processing for kids
DOS Help: Never look up a command again
Touch Type Tutor: Be a keyboard superstar
QDups: Zap duplicate files in a flash

November 1989, Issue 14, Vol. 3, No. 6

Features

Hot Paint: How to get started with PC art
Get It Together with Integrated Software: 5 programs that do it all
Online Art: Best PC graphics
Buyer's Guide to Integrated Software: 30 integrated solutions; 16 desktop organizers

Software on Disk

MemTool: Organize your desktop
To_Quick: Subdirectories at your fingertips
DynaBoot: Reboot any configuration
BIO-CAL: Master biorhythms
Kingdom of Kroz: Run for your life!

March 1990, Issue 16, Vol. 4, No. 2

Features

High-End Word Processors: Four writers meet four top-rated tools
Power Breakthrough: How to Upgrade to a 386
FYI: Floppy Disks
Buyer's Guide to 386 Motherboards: High-powered replacements
Future Computing: Expert's guide to neural networks

Software on Disk

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Upgrade: Hands-on advice for upgrading to a 386

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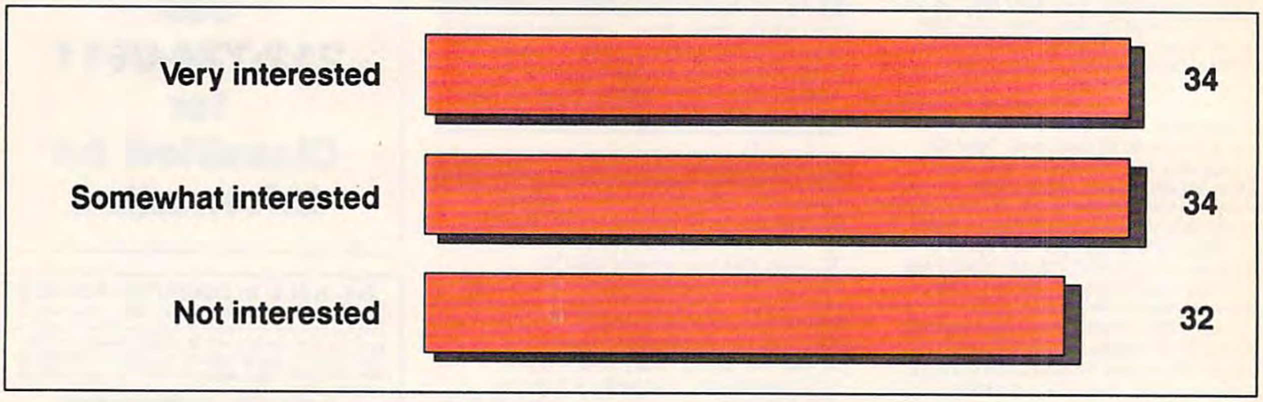
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EXCELLENCE IN SOFTWARE AWARDS: 1991

This past March, the Software Publishers Association met in San Francisco and granted awards for what its members considered the best in software for the past year. The Association presented awards for business and consumer products. In addition, the SPA's Consumer Software and Critics' Choice sections presented several other prizes, including one for best industry analysis to Keith Ferrell, a former senior editor with *COMPUTE* and now editor of *Omni* magazine.

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B. Is this your first computer? ☐ Yes 7 ☐ No 8

C. How long have you owned your computer? ______ 9 Years ______ 10 Months

D. Do you use your computer mostly for ☐ playing games 11 ☐ working at home 12 ☐ working at office outside home 13 ☐ school work/learning? 14

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H. What is your age? ______ 27 Years

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J. Do you advise other people on computer purchases? ☐ Yes 32 ☐ No 33

K. Comments: ____________________ 34

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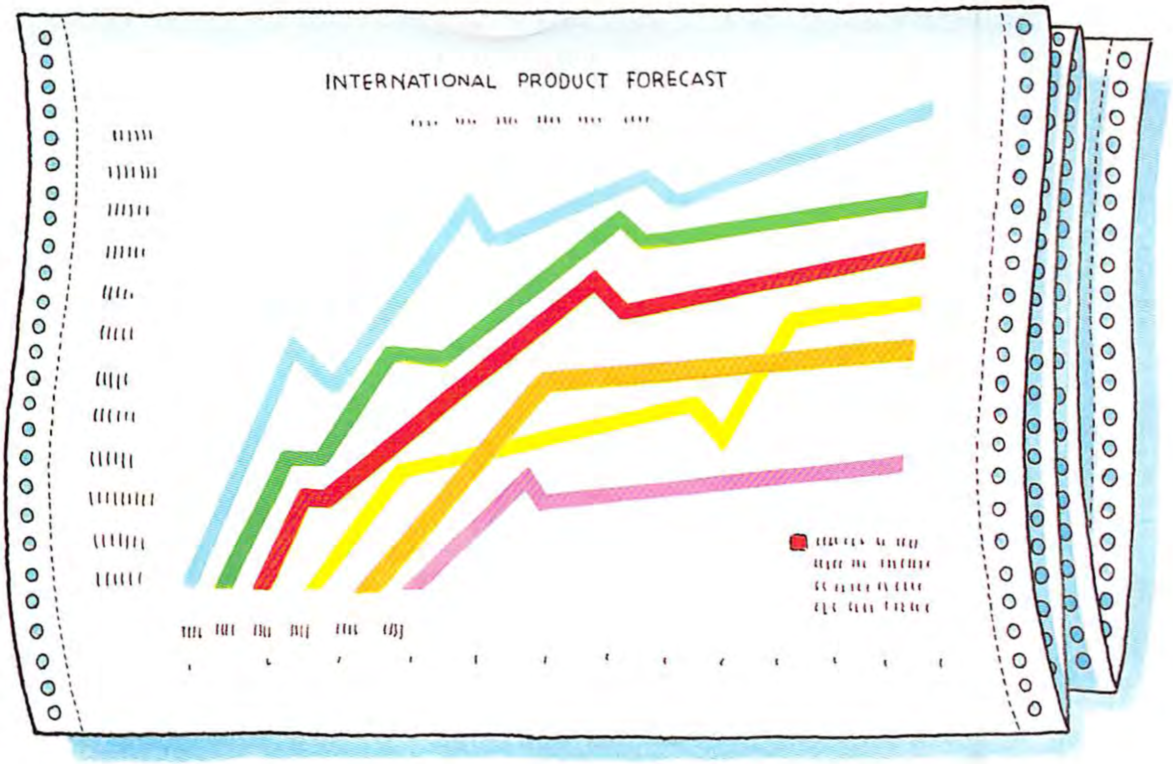

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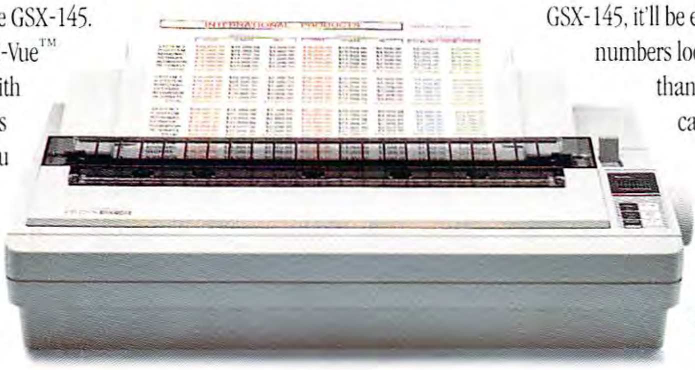

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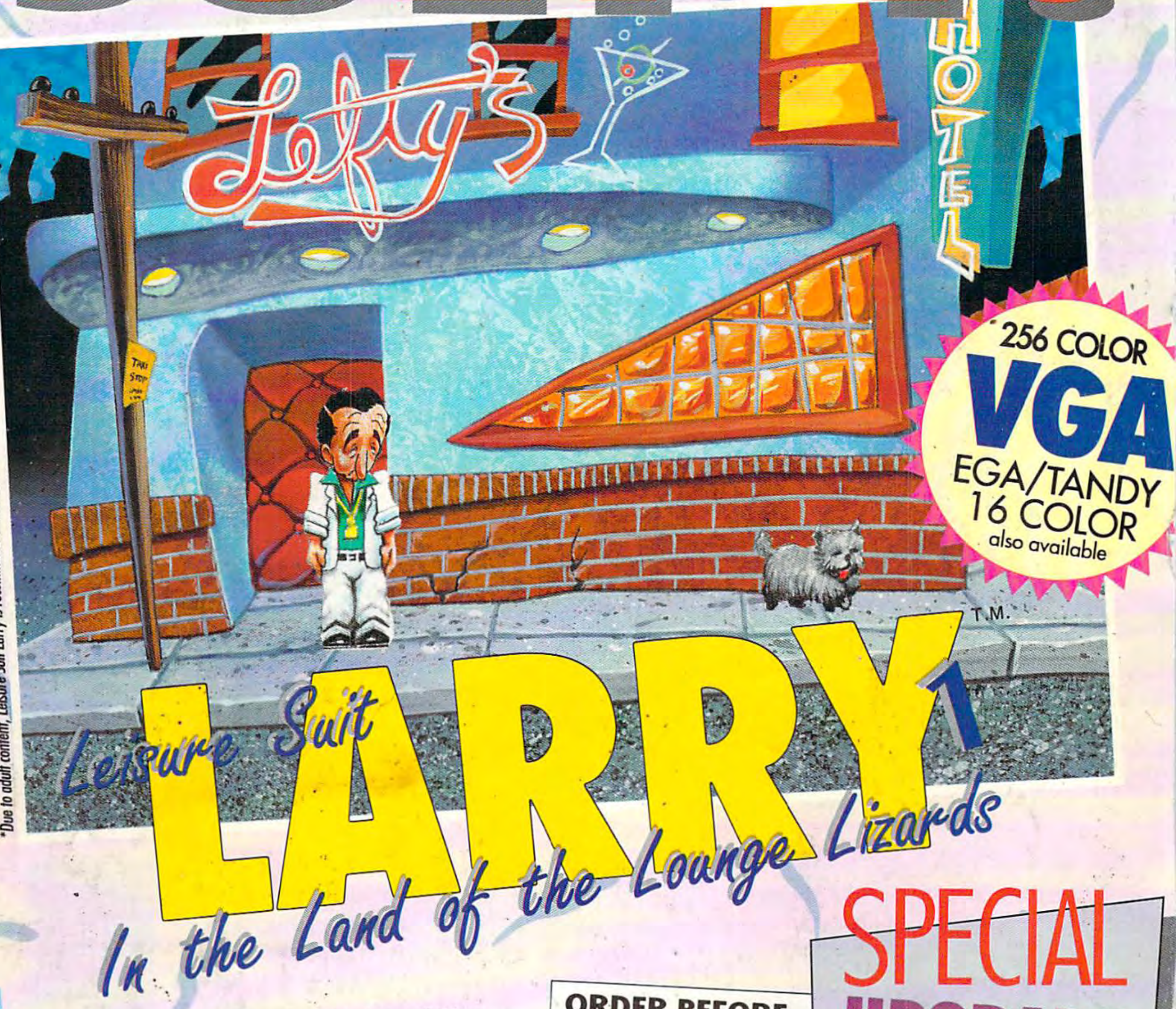
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