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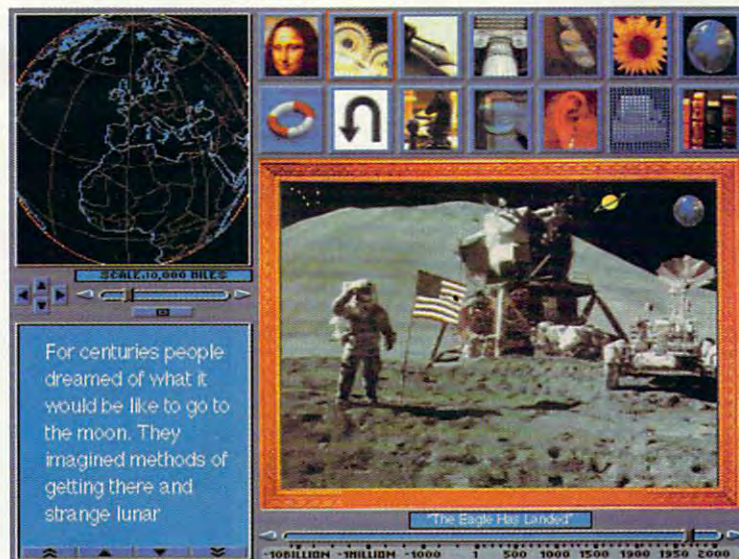
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# — TO — BOLDLY — GO —

**BY PAUL C. SCHUYTEMA**

While it seems as if it's been around forever, the original "Star Trek" television series never came close to finishing its five-year mission. Now, 25 years after the first episodes on that cardboard and primary-color set, we have the chance to return to the helm of the *Enterprise* and experience the fourth year of exploration and wonder. But this time, instead of living vicariously through the actions of one James T. Kirk, we have the opportunity to *be* Kirk. Interplay Productions' *Star Trek: 25th Anniversary* gives us the chance to sit in that Naugahyde center chair, lean hard into the

turns of a mighty starship, and experience seven episodes of the continuing voyages of the starship *Enterprise*.

## **Hero Without a Name**

Interplay's *Star Trek* is lovingly faithful to the look and feel of the original television series. The game is played in episodes which have the same sense of closure as the original episodes. And we have the opportunity, as Kirk, to continue our work with our trusted colleagues at our side: Spock, Bones, Scotty, Chekov, Sulu, Uhura, and, of course, the nameless postadolescent security guard dressed in a red velour top.

Bruce Schlickbernd, Star Trek's producer, wanted a game with the episodic look and feel of the television series. Star Trek is a precious commodity, one that Paramount guards carefully, and Paramount spends a great deal of energy making sure that the myriad of Star Trek products remain true to the Star Trek mythos. Bruce's team would run its scripts and videotapes past Paramount for approval for each episode. There was never really any major conflict between the game's development and Paramount's Star Trek universe. Most of the corrections, Bruce told me, were details that need-

ed to be ironed out. In one episode, Paramount felt that the shields of the *Enterprise* were weaker than they should be, and in another, a writer inadvertently referred to Bones by his given name, not his quintessential nickname.

Bruce told me that Paramount did set some limits as to what Interplay could not do. The Klingon home world was off-limits, for example, because a future "Next Generation" episode was going to be dealing with that. Also, the planet Vulcan was off-limits—but that still left Interplay with a lot of Federation real estate to explore.

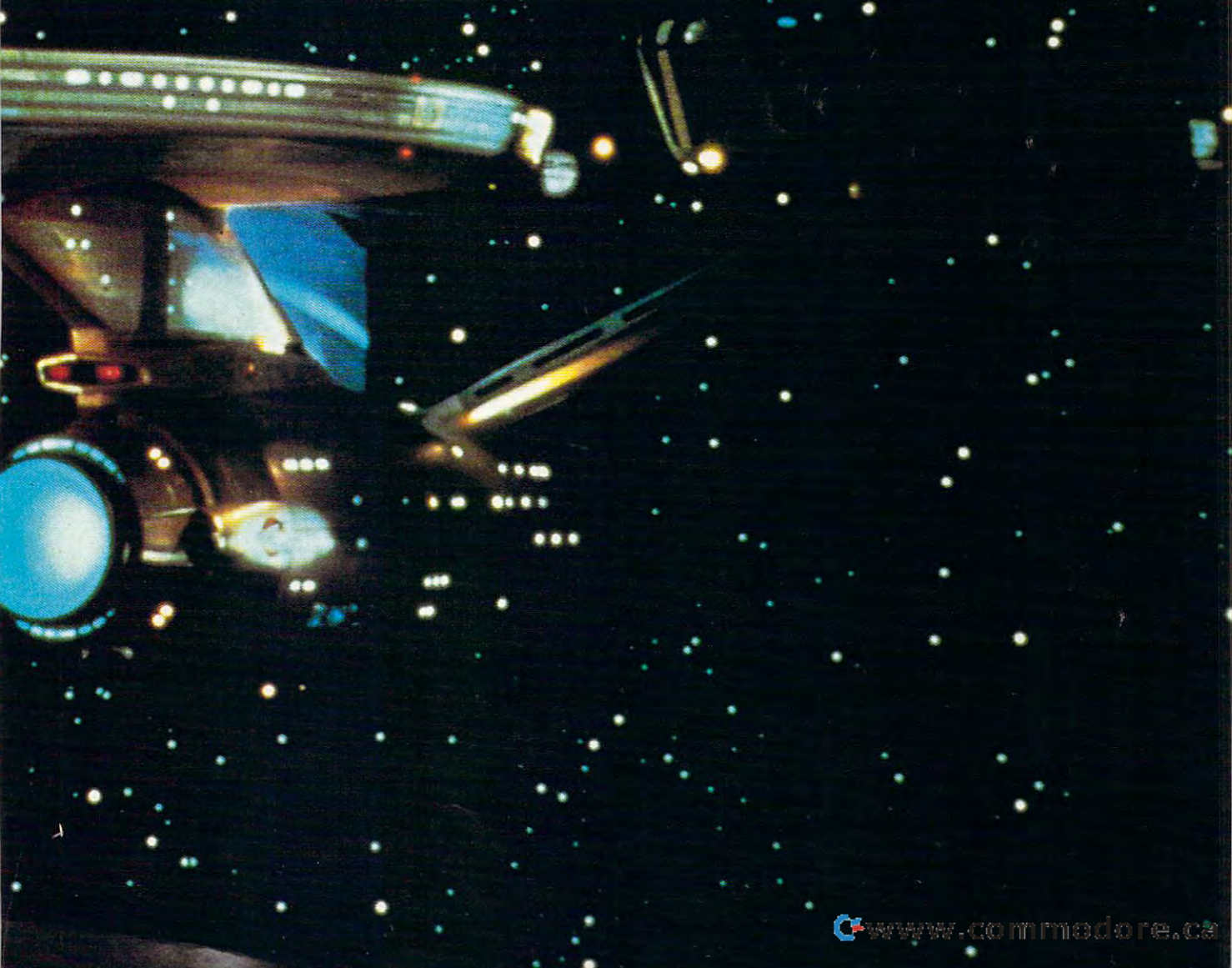
When I asked Bruce

what he considered the most enjoyable facet of working on the game, he told me that it was the characters. The original "Star Trek" was built on the foundation of the bridge crew, and it was their interaction as much as their individuality that made the fantasy seem real. For Bruce, getting the characters right was the major victory. After that, he said, "the episodes would almost write themselves."

The characters do seem alive in this game. Spock and Bones trade verbal barbs, and that no-name security guard always has some down-on-the-farm innocence to bring to light.

Also, each episode ends with the familiar bridge banter and a cerebral observation by Kirk. The first episode of Interplay's Star Trek is *Demon World*, and the story is slightly reminiscent of the science-fiction movie classic *Forbidden Planet*. Kirk sums it all up by stating, "We all have demons of our own, Bones. The ones that we can't confront are often the hardest to deal with."

When I asked Bruce what his crew did to research the game, his reply was immediate. "Oh, that's easy. Just watch 'Star Trek' endlessly." And what bits and pieces did they glean from their Trek-



fects? For one thing, the color of the *Enterprise's* phasers and photon torpedoes changes. Bruce explained that the first episode to feature really heavy space combat was episode 11, *The Balance of Terror*. In that episode, the *Enterprise* used blue phasers and red torpedoes to battle a Romulan Bird of Prey. But by the 16th episode, the colors had been reversed.

### Mudd in the Shadows

One of the interesting development snafus came near the end of the design process, according to Bruce. The character of Harry Mudd was well rendered and looked just like the Mudd in the television series. But Paramount insists that all detailed character art must be approved by the actor or actress who played the role, and the actor who originally played Mudd had passed away. There was no time to go through the lengthy channels of approval. The solution? The dialogue was tweaked a little, and the designers placed Mudd in shadows, obscuring the carefully rendered details of his character. But it's still Mudd—and he's a character who should be lurking in the shadows anyway.

It would be hard to classify the *Star Trek* game. It's not really a space-combat simulator, though skill in space combat plays a vital role. It's not a true role-playing game because you are bound to the conventions of the established characters (one of them being that if either Kirk, Bones, or Spock dies, the game is over). It's a sort of hybrid that is extremely playable, and what makes the game so playable is the episodic format. We focus on a very specific mission, and since all of the puzzles and challenges relate to the ultimate goal of the episode, it's very easy to stay edge-of-your-seat involved.

The game basically takes place on the bridge or with the actions of an away team featuring Kirk, Spock, and Bones (as well as the security officer—what was his name?). The bridge feels like a set right out of the television series, but with one major exception: Most of the blinking lights and bars of color actually mean something. Spock leans over his mysterious periscopelike scanner, and Uhura holds the receiver to her ear for better reception. We have control, through Sulu and Chekov, of shields, weapons, and navigation, and we can even order Sulu to "increase magnification," just as in the series. In the game, Scotty is on the bridge (he was there sometimes during the series), manning the engineering, furiously

repairing damaged systems, bringing up emergency power, and chortling lovingly that Romulan ale will never beat a good Scotch.

One of the most entertaining aspects of the game is the ship-to-ship combat. In the original series, the battles were often a means to an end, but in Interplay's *Star Trek*, we have control of the helm. Kirk controls the phasers and photon torpedoes (though, ostensibly, through Chekov). We maneuver the ship, control the impulse engines, roll the *Enterprise*, and bark repair priorities to Scotty. The battles can get furious, and if Kirk isn't up to snuff, the *Enterprise* explodes in a tumbling ball of flames.

To prepare Kirk for the battles, every time the game begins, the *Enterprise* must duke it out in simulated combat with the Federation ship *Republic*. Do well, and the *Republic's* captain sends congratulations. Do poorly, and Kirk shouts, "It's only a simulation!"

When the away team beams planet-side, we have the familiar array of equipment at our disposal: scientific tricorder, Bones's weird little medical wonder, communicator, and phaser (with stun and disintegrate settings). Through an ingenious icon-driven command system, Kirk can use any of the capabilities of his crew, as well as converse, manipulate objects, and pick up items.

While it's always important to remember the Federation's Prime Directive and to recognize that Kirk is a servant of Starfleet, it's nice to see that he still has a bit of the cowboy left in him. His banter can be as crass as we remember, and he slings his phaser more like Jesse James than a dignified Starfleet captain.

### Back to the Future

The graphics in Interplay's *Star Trek* are superb. The colors are bright and overvibrant (just as in the television series), and the scientific gizmos (accelerators, synthesizers, and so forth) all look wonderfully mysterious and gadgety. When a foe stumbles back from a phaser blast, the animation is realistic and properly theatrical. Even the wounded seem to convalesce at that odd angle (up on one arm) that was so peculiar in the original series.

One of my favorite features of the *Star Trek* series (both the original and "Star Trek: The Next Generation") is the characters' serious attitude toward science. I don't mean real science, because most of the science in either series is hokum; but it's taken with a great deal of seriousness, as if it were real and true in their world. And

Interplay's *Star Trek* maintains this tradition. It would have been easy to gloss over the litany of scientific terms that were so colorful in the series, but Interplay didn't. You can access medical databases to learn how to synthesize TLTDH gas, laughing gas for Romulans and Vulcans (their physiology is similar, remember?). You can use a cryptic and mysterious tool to repair a broken transporter, only after you jury-rig a "comb bit."

One of the hardest design tasks is to create new adventures in such a familiar universe. Paramount has made sure the universe is solid and consistent while allowing Interplay to be wonderfully creative in its scripting. These episodes are at once familiar and all new. Familiar because the fabric of the original "Star Trek" series remains intact, and all new because the challenges are fresh and exciting.

The game can be played in comfortable chunks, thanks to the episodic design, and you can save the game at any time. The entire game should take a player around sixty hours to complete, but there's no rush, since there's plenty to look at and interact with. Interplay designed the game for a *Star Trek* enthusiast, but not necessarily a Trekkie (though Bruce did admit to putting in a few extra goodies that will be apparent to Trekkies' eyes only).

### Outside of Time

So what's the future of *Star Trek*? I'm sure that it will still be vibrant after another 25 years. Spectrum HoloByte is working on an interactive entertainment center based on "Star Trek: The Next Generation." There is Task Force's strategy board game, *Star Fleet Battles*, and, of course, you can find *Star Trek* letterhead at any Trekkie convention. But what about *Star Trek* for our personal computers? We can now experience *Star Trek* as a screen saver (available from Berkeley Systems) and hear the voice of Spock coming through our sound boards. Bruce told me that Interplay has just signed a contract with Paramount for a continuing series of *Star Trek* games based on the original series, and while he couldn't give me specifics, he told me that a new adventure game is just over the horizon.

Like the *Republic* serials and Hal Roach's *Our Gang* comedies, *Star Trek* has become lodged in our culture, to be enjoyed through the generations. It may still be with us when real science has surpassed the fictional science of the Starfleet world. The catch phrase for *Star Trek* is truly "Live long and prosper." □

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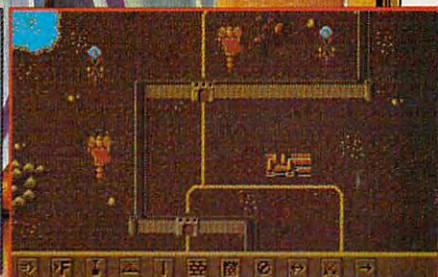
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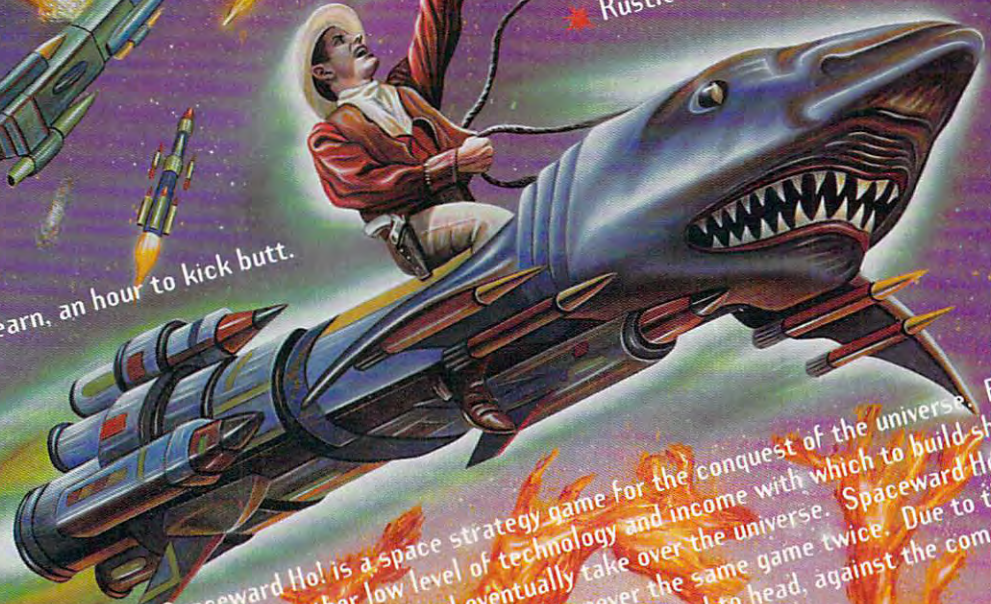
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# 64/128 VIEW

*Can't find a distributor for the great 64 software you've written? Maybe Mad Man can help.*

Tom Netsel

Last July in this column, I mentioned a major new adventure game for the 64 called Messiah III. It's a product of a group of programmers and artists who go by the name of Mad Man Software.

When I last talked with chief madman Gene Barker, he said we should expect to see Messiah in the spring. Finding a national distributor has been tough, however. Major software companies are not exactly thrilled to add a 64 game to their list of inventories, so Barker decided Mad Man would handle its own distribution.

Meanwhile, other independent programmers have been contacting Barker about distributing their products. Reluctantly, Barker has had to refuse. He knows how difficult it can be for an individual to find a distributor because his own company was having doors slammed in its corporate face.

Blocked by the distribution hurdle, many programmers release their products as shareware and hope for the best. Barker says that 90 percent of the people who use shareware don't pay for it, and that's no way to encourage new products.

To help his own company and to attract talented programmers back to the 64 platform, Barker has set up Independent Author Service as a new division of Mad Man Software. This service is designed to help programmers get their products to market. IAS offers disk and manual duplication, low-level software theft protection, copyright processing, marketing, and distribution.

In this arrangement, Mad

Man is the product's distributor. The author is solely responsible for content and user support. Mad Man will have an exclusive distribution right for a period of one year. After that time, the author may continue with Mad Man or go on his own.

Mad Man will run selected software through its quality control department for fine-tuning and polishing. The author then gets a percentage of the profits resulting from the sale of the product. That percentage is negotiable, depending on how much polishing Mad Man has to do to make the product marketable. Best of all, the service has no up-front fees. If Mad Man accepts a product, it'll also accept some of the financial risk in getting it to market.

"Our goal is to promote authors to the best of our abilities, because their success directly leads to our success," Barker explains. "With some extra work by our existing staff, we can provide authors with services that have taken us years to develop."

Mad Man has put together an Independent Author Kit that contains everything a programmer needs to know about Mad Man's service. You can get a kit by writing to Independent Author Service, Mad Man Software, Enterprise Center, 1400 East College Drive, Cheyenne, Wyoming 82007.

It's encouraging to see a company such as Mad Man offering its help to talented programmers, and I wish the venture luck. Success will benefit all of us who want to see new products for the 64. □

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# DISKS, DRIVES, AND DISASTER

CALVIN C. GUILD

Losing important computer data or programs can be a traumatic experience. Here are some tips to help you prevent data loss, corruption, and destruction.

Because I'm a librarian for a computer user group in Houston, Texas, a large number of floppy disks pass through my drives. As most user groups do, we exchange computer disks and maintain a large library of public domain computer programs.

What with all this activity, we've come across a number of hardware and software practices that are useful in protecting computer data and programs from loss, corruption, and destruction. This article is a collection of those tips, recommendations, and suggestions regarding storage devices and magnetic media.

## Cooling Fans

Heat is the greatest enemy of electronic components, and all electronic equipment—disk drives included—must be kept cool in order to work properly. Different types of drives have different cooling needs because of their design and the heat sinks that are provided by the manufacturer, but they all benefit from an adequate supply of moving air.

The 1541-II disk drive solves part of the heat problem by using an external power supply. I have seen old 1541 drives get hot enough to affect their operation. These older models should definitely have a fan

that pulls air through the drive mechanism.

Early Micro-Systems Development drives, SD-1 and SD-2, suffer degraded operation in hot rooms or where cooling is bad. The drives get very hot to the touch and need space for air circulation. Later drives from this company, however, are some of the best hot operation drives around. Our user group has several SD-2 drives, and they perform well in the hot Houston weather, even in buildings that lack air conditioning.

For the 1571 and 1581 drives, I recommend a small personal fan to maintain adequate cooling. As with all electronic equipment, you should plan your setup to include space around the drive to provide air circulation.

Raising the drive above the working surface is an effective way to provide more air circulation. At one time, many of our user group members placed their drives on top of small plastic storage baskets. These raised the drives three or four inches above the desk and provided for extra air circulation below the drive.

Avoid the habit of laying disks on top of your drive. For one thing, this practice interferes with the drive's

cooling, but it should especially be avoided because the drive can get hot enough to damage disks or data.

## Head-cleaning Kits

There is considerable disagreement over the usefulness of head-cleaning kits. These include dry systems that have a special disk that you run in your drive as if it were a data disk. This procedure cleans your disk drive heads of dust and debris. There are also wet systems which use a cleaning disk that's covered with an absorbent material. A solvent is added to the surface to aid in the cleaning action.

I have used both types of kits. I usually use them whenever I start to get error messages that disks will not load or read data correctly. Using them usually returns the drive to operation.

These kits do work, but they may introduce contaminants into the drive. If excessive fluid from a wet system gets onto a disk surface, it can destroy the surface and ruin data.

If you use the dry system extensively, it can damage the read heads through abrasion. In one drive that I examined, the interior was very dirty because of the accumulation of solvent from a cleaning disk.

Head-cleaning kits should be used sparingly. The preferred procedure is to open the drive and clean the heads manually. While the case is open, you can lubricate the drive assembly, which is important for proper operation.

Head-cleaning kits can be useful, but using them too often can damage your disks or drive. Try one if your drive won't load or save properly. It may prove to be a quick fix. It won't help, of course, if your drive head is out of alignment and needs proper maintenance.

## Disk Ratings

SD, DD, and HD are abbreviations for single-density, double-density, and high-density. These terms are used to indicate the size of the magnetic particles used in the sensitive coating on a magnetic disk. HD disks have smaller magnetic particles than SD or DD disks. The smaller particles produce a lower magnetic field; therefore, drives for HD disks require more sensitive heads to handle the lower voltages generated when reading the disks.

Commodore drives generally work best with DD disks. In our experience, however, no problems have been definitely linked to the use of SD disks. The 1571 drive is a sensitive drive and can often read disks that a 1541 can't read. Our user group has encountered several cases where a 1541 drive could not read data from an HD disk, although a 1571 drive could read the same disk. Naturally, older drives with alignment, speed, or other data-reading difficulties are more prone to read errors when attempting to read HD disks.

You may come across preformatted disks, but these aren't usable in Com-

modore drives. Available preformatted disks use a format that's not compatible with the 64 or 128.

## Flippy Disks

Many Commodore users know they can use both sides of what's normally thought of as a single-sided (SS) disk. Because you can flip these disks over and use the reverse side, they're often called flippy disks or simply floppies.

Many of our user group members regularly use flippy disks with their single-head drives. When disks were much more expensive, our 51/4-inch disk library collection was saved on flippy disks.

A floppy is made by cutting or punching a write-enable notch in the disk so that it can be flipped over and inserted in the drive as if it were a double-sided (DS) disk. The notch is cut on the side opposite the disk's normal notch. It can be cut by using a regular disk as a template. Any paper puncher can be used, but a disk puncher can be purchased to place a neat square notch in the correct place.

The nap of the mat inside a disk is generally designed for only one direction of rotation so that it cleans the

disk surface of any dust or other small particles. Floppies, being inserted upside down, rotate in the opposite direction. Rotating the wrong way can supposedly release accumulated dirt and debris.

We have used floppies for six or seven years with no problems. There have been no known instances of disk read errors or other failures that indicate that the back side of the disk used as a floppy is any less reliable than the front side. Some failures do appear, but they can occur on either side. There's no indication that the use of floppies is the cause. (See the sidebar "The Flip Side at 3M.")

This observation applies to home computer or amateur usage. In commercial applications, it may be prudent not to use floppies, but most commercial users generally use double-head drives anyway. Some users regularly discard used disks to avoid the occasional disk problem that may occur. For home use, however, any reduction in life or efficiency caused by using floppy disks is very small.

Commercial software producers often use floppy disks for their software. They may supply a program for one

computer on the front side and the same program converted for use on another computer on the back side.

Disks designated SS and DS can both be used as floppy disks. For SS disks, only one side of the disk is certified, but we've found that certification doesn't seem to be necessary. Few disks have been found to contain errors due to manufacturing. The errors that have occurred have been on either side, showing little regard for certification.

The most common errors have been a result of physical abuse, such as bending, finger marks, or scratches on the disk surface. A number of disks have also become warped from heat or pressure. Pressure problems can occur when disks are piled flat in a box.

Disks can also suffer in the mail. The weight from other packages and letters can compress the disk envelope, making it difficult for the disk to spin. This problem can often be remedied by gently prying up the folded-over corners of the disk.

## Backup Disk Copies

Most problems associated with home computer software, hardware, or

## Beware the Magnetic Monster

It's pleasant being near someone who has a magnetic personality. On the other hand, magnetism is something computer disks should avoid like a vampire avoids sunburn. The merest hint of a magnetic field can destroy the data on a valuable computer disk. Or can it?

Just how much magnetism is too much? We've all heard about the secretary who keeps data disks stuck to the side of a filing cabinet with a magnet. How can some people get away with such stunts when a ringing telephone will erase anything on a disk that's within two feet of it? Or will it?

The National Bureau of Standards recently conducted a variety of experiments to determine just how much magnetism is detrimental to the health of computer disks and tapes. The results of that test have debunked some old myths about magnets and disks.

As any physics student can tell you, the strength of a magnet's field is inversely related to the cube of the magnet's distance from an object. In other words, if you move a magnet away from an object by a factor of 2, its strength drops by a factor of 8.

Here are some true/false questions about magnets. The answers, based on the bureau's tests, may surprise you.

- A small magnet can erase disks or cause data loss.

True—but you have to work at it. A 1000-oersted magnet, which can lift 40 pounds, was placed within one inch of a computer tape with no effect. At one-half inch, the data was destroyed. The read/write heads in a disk drive have a field strength of between 750 and 1000 oersteds, and they must practically touch the disk surface to operate. An extraneous field of 200 oersteds can cause a loss of data, but one of 150 oersteds will not. Maybe that secretary wasn't so dumb if he simply hung the disk by its hole on the magnet.

- Airport metal detectors can damage computer disks.

False. Walk-through and hand-held detectors have a strength of about five oersteds. That strength is much too weak to affect a disk. Of course, if you check your suitcase with an airline and you have valuable disks inside, that almost guarantees their loss.

- A magnet near your disks can cause gradual damage.

False. Magnetism is not like

attribution. Its effects are not cumulative. The magnetic particles in a disk change polarity almost instantaneously. It just seems to take forever with a 1541. So don't worry about a magnetic paper clip dispenser that's sitting next to your computer.

- Radiation from a microwave oven can damage magnetic media.

False. The bureau warmed cassette tapes in an oven without losing any data. Slip the disk and a cheese sandwich into a microwave, however, and they'll both melt from the heat. A warped disk doesn't spin very well, but the cheese improves its flavor.

The bureau's tests prove that while magnets can cause data loss, distance is the deciding factor. A small magnet can be harmful if it comes in contact with a disk's surface, but you shouldn't have any problems with even a large one as long as you keep it an inch or two away.

(Editor's note: This article was adapted from National Bureau of Standards data and an article by Keith Faulkner that has appeared in a number of user group newsletters, including "Dis-Klosure," from the Salt City Commodore Club of Hutchinson, Kansas.)

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security can be alleviated by keeping backup copies of all software. Backup software must be stored away from the computer to avoid loss of both copies in a common disaster.

Theft, fire, or natural disasters are often thought of as major culprits responsible for software losses, but they're not the chief offenders. Heat, humidity, electrical storms, and magnetic fields in the environment damage many more programs.

Commercial software should be backed up immediately after purchase, if possible. An archival copy that won't be used unless the original is damaged should be maintained. For important software this might even mean purchasing a second copy of the disk. Commodore users realize that many good programs are no longer available. If you're down to one copy of such a program, a backup copy is a necessity.

Public domain software is usually not copy-protected. Several copies should be made and distributed to friends, relatives, and your local user group. Then, if your copy is lost or damaged, a replacement copy can easily be obtained.

## Disk Utility Programs

Good disk utility programs can resurrect or reconstruct programs that are lost. These vary from programs that can undo a NEW or SCRATCH command to sector editors and disk doctors. An excellent sector editor for the 128 is T/E 80 (August 1991). Doc Block (October 1992 Gazette Disk bonus) is a similar program for the 64. Directory Aid (January 1993) can also recover scratched files that haven't been overwritten.

Many public domain disk utilities are also available. They can be found at your local user group or from electronic bulletin board systems serving Commodore computers.

## When Trouble Strikes

You usually become aware of a disk failure when an error message appears while you're trying to load a file. If other disks load properly, the error is probably on the disk and not related to the drive. If you have problems with several disks, however, the problem may be due to a drive malfunction or head misalignment. Failure of an often-used disk may be due to wear of the disk's magnetic oxide surface.

A disk utility can be used to recover any usable files on the disk. It's a good idea to make a copy of the entire disk before recovery is attempted.

## The Flip Side at 3M

When manufacturers make any floppy disk, they apply the magnetic medium to both sides of the disk. This also applies to disks that are eventually sold as SS or single-sided disks.

According to tales told in user groups and other computer-related gatherings, if disks pulled from a batch for testing fail the manufacturer's quality control checks on their flip sides, that batch of disks is earmarked as SS. If they pass, they're certified and sold as DS.

Some computer users who want to double their disk capacity without paying for a guaranteed medium often cut another write-enable notch on the disk and use the disk as a floppy. While the process usually proves successful, many users shy away from using those disks to store valuable data. There's usually some concern about running into bad sectors on the flip side.

After hearing this story about flip-side tests from many sources,

Gazette checked into it and discovered that the procedure is a little different at one large disk manufacturing company.

A spokesperson at 3M's Diskette Hotline (800-328-9438) said 3M never tested the flip side of its SS disks. (All 3M disks are now rated as DS.) When SS disks were available, they were made with exactly the same care and precision as the DS disks. They were simply packaged and sold as SS disks. They cost less because fewer tests were required.

According to 3M's spokesperson, users with single-head drives can feel confident about using both sides of 3M disks, but she offered some words of warning and advice. Make sure the notches are cut in exactly the right place. A careless cut could damage the magnetic medium and ruin the disk. Also, be aware that cutting a second notch voids the lifetime warranty that 3M puts on each of its disks.

—TOM NETSEL

ed. Then use the copy to perform the recovery operations. This is just a safeguard to prevent further damage to the damaged disk. Next, copy any usable files to a third disk.

Errors may also be detected using a disk check program. The disk check will identify the tracks and sectors that contain errors. However, disk check programs will also identify some benign errors that will not affect disk operation.

A copy program can often recover scratched files if they haven't been overwritten. Some disk errors can be eliminated by using a file copier to transfer all files to a new disk. Errors in file linkage can be corrected in this way, as the file copier will build a new BAM for the disk.

The utility required to salvage damaged disks is a disk editor. It's used to transfer information or parts of a program to a new disk. This is done by using the sector editor to correct and transfer the good sectors to another disk. Parts of the program may not be recoverable, but important routines or data can often be retrieved.

Another function of a rescue program is the ability to isolate bad sectors from damaged software. Once these sectors are isolated, the remaining portions of the program can then be employed.

The power of disk drive utility programs allows even inexperienced users to recover deleted files. Many programs also have procedures for recovering data from a reformatted disk. When a program is scratched or deleted, the file is not erased. A couple of bytes are simply changed to eliminate the program's name from the disk directory. Disks with such files can even be recopied or transferred by modem and the files recovered from the disk copy.

If you wish to maintain any security or privacy regarding programs or data, it's necessary to reformat the disk and overwrite the files you wish to conceal. Keep this in mind when swapping disks with other users to safeguard your data and programs.

*Calvin Guild is a retired NASA space mission designer and rocket engineer. He has worked with computers since 1952, when he worked on a team to evaluate the DISIAC computer for space and missile applications. The DISIAC consisted of a double ENIAC, the first all-electronic computer, built in 1946. Mounted in two 44-foot semitrailers and a van, it was the first large-capability, general-purpose, "portable," all-electronic computer.* □



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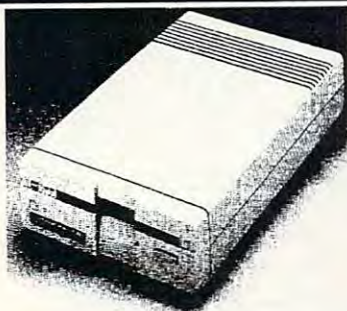
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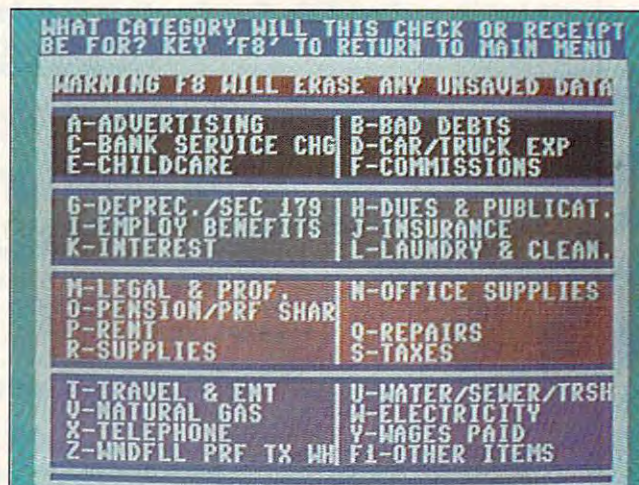
Its title isn't deceptive. While keeping track of your business or personal financial records can be complicated, Easy Books-1 is a bookkeeping program that's easy to use. Just because it's not complicated, don't make the mistake of thinking this program isn't complex. Using Easy Books-1 makes it easy for you to record checkbook and cash receipts, prepare and print a balance sheet, project year-to-date data to the end of the year, print a summary of weekly financial activity with or without a percent analysis, and print all annual expenditures for each expense account.

Easy Books-1 is much easier to use than other, more expensive accounting programs that I've tried in the past. It's also easier to read and understand its basic printouts than it is to decipher spreadsheets.

Easy Books-1 is designed for the cash basis business that doesn't need inventory tracking, yet it's also set up for the individual who wants to track household expenses and budgets. Its uncomplicated design makes it ideal for the computer beginner as well as the veteran. Another feature that I appreciate is trailing 0s. I prefer to see \$45.60, rather than \$45.6.

More than half of the manual is devoted to a sample week of business activity. After you load the program, I highly recommend that you work through this sample. It's a well-thought-out tutorial that contains what you'll need to know, starting with an explanation of the main menu and the preparation of a data disk.

The main menu has 10 categories



The Easy Books-1 expense menu lists 27 different predefined categories found in most businesses.

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Easy Books-1 makes it easy for you to track and analyze weekly and annual expenditures for your home or business.

egories that take you to all sections of the program, each with its own in-depth, individualized menu. The expense menu, for example, is a listing of 27 different predefined categories, including one for miscellaneous expenses that don't fit into any of the 26 other categories. Although many expense categories are already defined, most of them can be changed. Therefore, if you don't have a need for one of

the listed expenses, you can change it to one you can use.

Included in the expense categories are advertising, bad debts, bank service charges, car/truck expenses, commissions, dues, employee benefits, insurance, interest, laundry, professional fees, office expenses, pensions, rent, repairs, supplies, taxes, travel/entertainment, wages paid, and windfall profit withholding. All of

these categories can be changed by the user. Non-changeable categories are child care, depreciation, water-sewer-trash, natural gas, electricity, telephone, and other. The costs of the four utilities are presented as a total utility expense for your analysis, but they are kept separate for total expense purposes.

With a list this extensive, most of your personal and business needs should be covered. But since this program allows you to be creative, you aren't limited to this list. You can tailor the program to fit your needs, to make it a personalized bookkeeping program.

Most individuals and companies borrow money at some time or another. It's important to keep track of interest paid to credit cards, home loans, or other business-related loans. To use the interest category, which records the interest part of your payment only, you'll need an amortization schedule for each loan. As an alternative, you can wait until the end of the year when you receive statements from financial institutions showing your total interest payments. Either form of data entry will work to ensure that your annual amount of interest paid is correct. You can also set up more than one interest category, if you need them.

One of the expenses listed is depreciation. I have little working knowledge of this topic. Fortunately, this program doesn't expect you to be a depreciation whiz. When you enter an expense in the depreciation category, the program automatically takes you to a depreciation worksheet instead of the expense summary. If you don't use an account-

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## REVIEWS

ant, the manual tells you which IRS publication to consult to set up a depreciation schedule. In the back of the manual are another four pages that answer almost any question you might have on how to figure depreciation.

Data input is simple to master. Press a single key to make most any menu selection, and then enter your data when you see a question mark before a blinking cursor. The program will not proceed until you press Return. You can correct any typing errors with the Del key before you press Return. Pressing Return one or more times will usually let you exit a screen if you don't want to enter any data.

If you need to make a correction after you've hit the Return key, wait until you're at the end of a section. There you'll receive either the prompt *IS THIS CORRECT?* or the prompt *DO YOU WISH TO START AGAIN?* These prompts will give you an opportunity to correct any mistakes that you might have made. You'll have another chance to make changes when you use the second menu and review your input for expenses and receipts.

The author states that the printing module is the system's best feature, and he's right. The format is easy to use and understand. Forget about mastering complicated spreadsheets filled with little-used options; with this program that's not necessary. The print menu offers 11 different printouts. One rather nice feature is a list of checks by expense. At the expense menu, each category that has an expense entered will be highlighted. By selecting only the highlighted categories, you don't have to wait for the computer to search all the weekly files. That's a real timesaver!

Easy Books-1 wasn't written with speed in mind. It doesn't have the fastest execution time, but it makes up for that with its ease of use. You don't need to consult the manual constantly to use this program either. Its clear, concise menus and onscreen instructions make it easy to master. Devote your time and energy to running your business, not bookkeeping. If easy bookkeeping is what you're looking for, then Easy Books-1 is what you need.

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# WORLD VIEW

John Buckingham

## THE VIEW FROM AUSTRALIA

Australia, the land down under, is a commonwealth of some 17 million people from differing backgrounds and origins. Commodore entered the Australian market years ago with the VIC-20 and then followed up with the popular 64, which went on to become the most popular home computer in the nation.

Until the onslaught of the Amiga, every computer store and large retail chain was clamoring to have 64/128 stock on its shelves. But with Commodore pushing the Amiga and its PC line, it's now difficult to find 64 products except at a few computer games outlets or by mail order.

It's inevitable that some 64 owners upgrade to larger systems. When they do, many of them sell their older equipment. By making inexpensive secondhand hardware and software available to new buyers, they've caused a resurgence of 64 activity. The recession is keeping people to tight budgets, but they're finding that the 64 represents good value for their money.

The number of user groups and clubs catering to the 64/128 user is diminishing, although larger groups in big population areas are still active. One of the main problems seems to be a lack of communication between user groups. I'm presently working to establish a register of groups in Australia to enable users to maintain regular contact with a greater number of other 64 users. By staying together we can survive.

There are only three or four nationally advertised public domain libraries in Australia, but many user groups have their own software libraries. The few bulletin boards that cater

to the 64/128 user still have a lot of PD programs for downloading. The main PD libraries charge around \$A5 for a double-sided disk, but it's possible to buy disks for as low as \$A3. Blank disks vary from about 40 cents to a couple of dollars each. These prices are in Australian dollars (\$A). With the current exchange rate, one Australian dollar is worth about 75 U.S. cents.

Most PD software emanates from the U.S. these days. We occasionally have problems with such software, especially programs that use dates. Here in Australia, we use a day/month/year format, while programmers in the U.S. apparently use a month/day/year format. Also, our state abbreviations have three letters, not two as in the U.S.

GEOS is very popular over here, and more users convert to it every day. A lot of 64s are used only as game machines, so game software far outsells any other type of program.

Both hardware and software are less expensive in the U.S. than here, and many Australian users purchase through U.S. mail-order dealers. Here are several examples of price comparisons: a 1541-II drive—\$A279, \$185; GEOS—\$A68, \$39; Xetec interface—\$A109, \$59; The Print Shop—\$A80, \$35; Where in the World Is Carmen Sandiego?—\$A70, \$29. A 9-pin printer such as a Star NX-1000 costs around \$A300 over here, but in the U.S. you would pay no more than \$180. So we Australian users are certainly paying much more than our U.S. counterparts. Most U.S. hardware is unsuitable for us because of the voltage differences, but software, interfaces, and REUs are OK.

There are many thousands of bulletin boards operating in Australia, but very few cater specifically to 64/128 users ex-

cept to offer message boards and echo areas. Those that do have 64 files for downloading are usually very busy. Three main bulletin boards cater to GEOS, and these are very popular. Some software clubs and user groups have small BBSs that are used regularly by their members. But a great number of 64 users don't have modems because of the lack of nearby BBSs.

CompuServe has now begun operating in Australia, but its minimum cost is \$36 an hour, plus long-distance call fees for those who live outside the major cities. This high price makes it out of reach for most 64/128 users.

The *Australian Commodore & Amiga Review (ACAR)* has been the only commercially produced magazine for 64/128 users in Australia for many years. It started out as a VIC-20 magazine—without *Amiga* in its name, of course. Now, out of its 80 pages each month, only 5 or 6 are devoted to the 64. In September 1992 the number dropped to only one page for the 64.

Fortunately for us, a new 64/128 magazine called *Commodore Network* has just begun. It's produced in a newsletter format, but we expect it to improve with time. Former ACAR columnists are now part of the new magazine. I hope Australian users will support it.

The U.S. magazine COMPUTE with its Gazette section is available, and *RUN* was here until it folded. We also get U.K. magazines *Zzap*, *Commodore Format*, and *YC*. They are quite popular and readily obtainable here.

The 64 is still alive in Australia despite other machine users telling us that we're a dying breed. If the user groups and publications that support us now stick with us, we'll certainly be around for many more years. □

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Corrections to articles and programs, hints for beginner 128 users, and more

## Bug-Swatter

We printed some incorrect information about Compsult in "A Buyer's Guide to Commodore Software, Hardware, and Services" (December 1992). Here is the correction.

COMPSULT  
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We regret any inconvenience our error may have caused either Compsult or our readers.

Melvin Breyfogle notified us that Ham Antennas (December 1992) has a couple of problems with its Long Wire option. The screen colors make a portion of the program difficult to read, and the calculation for the coax wavelength in feet is incorrect. If you've already entered the program or if you have Gazette Disk for that month, load Ham Antennas and enter the following lines before you run it. This should correct the problems. Remember to save the corrected program.

```
GH 4027 GOSUB4097:INPUT:PRINT"  
{CLR}{6 SPACES}LONG WIRE  
CALCULATIONS"  
MX 4050 PRINT"{RVS}{YEL}{DOWN}  
LENGTH OF WIRE IN FEET  
" W  
BX 4060 PRINT"{DOWN}"492*V/F"  
{3 SPACES}=1/2 WAVE CO  
AX AT DESIGN FREQ IN F  
EET"
```

For the prompt in the Long Wire option that requests coax velocity factors, supply the following decimal values, depending on the type of transmission line you are using. Include the decimal when you enter the factor. For RG8 (50 ohm) use .66, for RG11 (75 ohm) use .88, and for flat TV line (300 ohm) use a factor of .82.

If your transmission line is made of material not listed here, check with a good ham antenna reference book for the correct velocity factor. For convenience, you may want to store this information as a REM statement within the program or have it print in conjunction with line 4059.

## Reset to 64 Mode

Six months after I bought my 128, I joined a user group to find out why I couldn't reset to 64 mode from 128 unless I had my FastLoad cartridge inserted. No one could help. I wrote to Commodore and even visited other user groups, but no one offered a viable solution.

Several months later, I was making up a list of hints and tips for printer commands, and I came across the solution: Hold down the Commodore key while pressing the Reset button.

Once you know this trick, it's obvious, but perhaps it'll help some newcomers.

BILL CLARK  
LYNDEN, WA

## To Scratch a Comma

I have a file that I want to scratch from a disk, but I can't seem to do it. The filename is simply a comma (.). I've tried using the SCRATCH command, but it doesn't work. Got any suggestions?

MAX YOUNT  
WALDEN, TN

*That file is going to be difficult to remove. The 64 processes the comma as a delimiter, which is a character that's used to separate two parts of a command. For example, when you want to read a sequential file, you have to open it with OPEN 2,8,2,"filename,S,R" (note how the commas separate the filename from the S for Sequential and the R for Read). The commas*

*perform a special function, and the disk drive doesn't recognize them as characters in the filename. As a result, your drive sees the file as "delimiter/end of filename." This renders the SCRATCH and RE-NAME commands useless.*

*There is a solution to your problem, however. If you have a disk editor (a program that can change a byte directly on the disk), you can change the comma on the directory to, say, an X, and then scratch that new filename. We published such an editor, Doc Block, as a bonus program on the October 1992 Gazette Disk.*

*Another way to clear up the problem is to copy any files or programs on that disk that you wish to save to another disk. Then reformat the disk with the bad file. To avoid this problem next time, stick to letters and numbers when naming disk files. Avoid punctuation marks like commas, colons, and asterisks.*

## Multicolor Sprites

How can I use more than one color with a sprite?

GEOFF CLARK  
NOTTINGHAM, ENGLAND

*Sprites are powerful graphics tools, but they can be complex to use. After you've worked out the shape that you want, the sprite must be converted to data statements and poked into a safe area of memory. A pointer must be set to the sprite shape, the x- and y-coordinate designated, the color defined, and the sprite activated.*

*Multicolor sprites give you more flexibility and more interesting shapes to work with. If you've reached the point where you can define sprites and move them about the screen, now's a good time to experiment with color. There are two ways to do it.*

The first is fairly easy. Define two sprites, using different colors, and put one on top of the other. Sprites are displayed in a certain order of priority, from lowest number to highest. This means that sprite 0 will always appear on top of (or in front of) all other sprites. Sprite 1 has priority over sprites 2-7, and so on.

Normally, if a bit is turned on, it'll appear on the screen in the color of the sprite. An off bit will let the background color show through. If you have one sprite on top of another, the off bits will let the second sprite's color show through. (The second sprite is the one with the lower priority.) As long as they have the same (x,y) location, it will appear that you have a single two-color sprite.

There are two drawbacks to this method, however. The first is that instead of having eight one-color sprites, you're limited to four two-color sprites (or two four-color sprites). Second, if your program needs to check sprite collisions, you have to be careful that the bits of the overlapping sprites do not intersect. You may get collisions when none actually exist if the program is written in BASIC.

A better way to make colorful sprites is to switch to multicolor mode, controlled by a register at 53276. The eight individual bits correspond to the eight different sprites. To make all sprites one color, enter POKE 53276,0. Poking a 1 makes sprite 0 multicolor (and the others one color), poking a 2 makes sprite 1 multicolor, poking a 4 makes sprite 2 multicolor, and so on up to 128, which affects sprite 7. Poking a 255 makes all of the sprites multicolor.

Multicolor mode gives you up to four different colors in each sprite. The four colors include the screen color (actu-

ally a transparent part of the sprite allowing the background screen color to show through), individual sprite color, sprite multicolor 0, and sprite multicolor 1. The individual sprite color can vary from sprite to sprite, but screen color and the two multicolors are the same for all eight sprites. The register for screen color is 53281. The registers for sprites 0-7 are 53287-53294, respectively. For multicolors 0 and 1, the registers are 53285 and 53286.

To turn on the multicolor mode for a single sprite, enter POKE 53276, PEEK(53276) OR (2↑N), where N is equal to the sprite number (0-7). To turn off the multicolor mode, enter POKE 53276, PEEK(53276) AND (255-2↑N).

Unlike the first method of adding color, multicolor mode lets you have eight different sprites moving around, but resolution is cut in half. Instead of coloring individual pixels, pairs of pixels are turned on or off. Let's say that one of the data statements is 50, which translates to a pattern of 00110010 in binary. With one-color sprites, a 1 represents a pixel that is turned on. In multicolor mode, however, you have to look at the pattern as bit pairs: 00, 11, 00, and 10. The first two pixels (00) would be transparent, the same color as the screen. The next two (11) would be multicolor 1, followed by the screen color again. The last two (10) would both be the sprite color. Even though the two bits are different, 1 and 0, the corresponding pixels would be the same color. Instead of each byte controlling eight different pixels, each byte controls four different pairs of pixels.

### Two Drives for SpeedScript

I've been using SpeedScript, which I typed in from your

magazine in September 1989. It works great, but I have one problem. Can you get a patch for it or a short program that will let you use it with two drives?

LEONARD PFEIFFER  
DAYTON, NJ

In the July 1992 issue, George Gunn wrote an article about the 1581 drive called "The Smaller, The Better." As a sidebar to that article, he included several POKES which enable SpeedScript users to access drive 9 instead of drive 8. This will let you load SpeedScript from drive 8 and then direct all disk commands to drive 9.

To accomplish this, load but do not run SpeedScript. Then enter the following two lines in immediate mode.

**POKE 4843,9: POKE 4908,9: POKE 5274,9: POKE 5873,9: 5967,9  
POKE 6367,9: POKE 6883,9: POKE 7003,9: POKE 7073,9**

Save this modified version with a unique name, such as SPEEDSCRIPT9. When you load and run this program, all normal disk commands will be addressed to drive 9. You won't be able to switch back and forth between drives, but you can load and work with whichever version of SpeedScript you wish, depending on your needs.

To switch between two drives while in SpeedScript, check out Speedram-64 (December 1992). This short patch by Frank Gordon lets you use SpeedScript with a 1764 RAM expansion unit or with two drives.

Send your questions and comments to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

**How to  
use multicolor  
sprites and  
SpeedScript with  
two drives**

# BEGINNER BASIC

Larry Cotton

## IN A LOOP WITH FOR-NEXT

Last March, I issued a plea for topics to discuss in this column. I received many helpful suggestions—and not one suggesting that I pack it in! I had several requests for columns that adhere to the title's premise—BASIC for beginners. Therefore, this month, we'll review the seemingly ubiquitous FOR-NEXT statement.

FOR-NEXT is used to put a program in a loop; FOR and NEXT are at the ends of the loop. The whole process requires seven distinct items.

1. the word *FOR*
2. a counter (any valid numeric variable)
3. an equal sign
4. a counter's starting value
5. the word *TO*
6. the counter's ending value
7. the word *NEXT*

The starting and ending values for the counter must be valid numeric expressions—that is, numbers or variables that represent numbers.

Here's a simple time delay loop. It uses all seven items in lines 10 and 20.

```
10 FOR C=1 TO 1000
20 NEXT
30 PRINT"END OF LOOP"
```

C is the counter; it increments itself from 1 to 1001, as fast as the BASIC language and the computer will allow. Try pressing the Run/Stop key while this program is running; then enter *PRINT C*.

The first six parts of a FOR-NEXT loop must be written on the same line. The NEXT command may be written on the same line (with a colon separating it from the FOR part of the loop) or on another line.

If uninterrupted, this delay loop increments C to 1001,

NEXT kicks in after the value for C exceeds the upper limit of 1000, and control then falls through to line 30. When things happen between FOR and NEXT, they happen the number of times specified by the counter's ending value.

Delay loops are often used just after a message is printed on the screen. I don't like them, however, because they're usually too short the first time they appear and too long after the user becomes familiar with the message. A better way is to eliminate the delay loop altogether and use GET to wait for the user to press a key whenever he or she is ready to move on.

There are many, many uses for FOR-NEXT. One of them is to gather multiple inputs from a program's user. This is often used in conjunction with arrays. (We'll review arrays in a later column.)

```
10 PRINTCHR$(147)
20 FORC=1TO4
30 INPUT"NAME OF A
STATE";S$(C)
40 NEXT:PRINT
50 PRINT"THE STATES YOU
ENTERED ARE"
60 PRINT:FORC=1TO4
70 PRINTS$(C)
80 NEXT
```

As C is incremented from 1 to 4 in line 10, the array is filled with words the program's user enters. S\$(1) might be *Virginia*, S\$(2) might be *Utah*, and so on. The program will ask for just four state names and then move on to line 50.

You can use C again in line 50, but it's not necessary. The following would also work for lines 50–70.

```
50 PRINT:FORZ=1TO4
60 PRINTS$(Z)
70 NEXT
```

You can accomplish lots of

tasks between a FOR and a NEXT. However, it's quite easy to lose track of where you are, especially if you use multiple or nested FOR-NEXT loops. Here's a nested one.

```
10 PRINTCHR$(147)
20 FORJ=1TO3
30 FORK=1TO4
40 PRINTJ;K
50 NEXT:PRINT:NEXT
```

The first NEXT in line 50 closes the inner K loop; the second one closes the outer J loop. To keep track of what's happening in nested loops, it's a good idea to use BASIC's option of printing the counter's name after the NEXT. Line 50 could've been written as follows. Note the order of the J and K.

```
50 NEXTK:PRINT:NEXTJ
```

The PRINT in line 50 just gives a visual separator between the three groups of four numbers on the screen. Here's a short graphic program that contains several FOR-NEXT loops.

```
10 POKE53280,1:POKE53281,1
20 PRINTCHR$(147)
30 FORJ=1TO10:READC(J):NEXT
40 B=4:H=32:R=18
50 POKE214,24:PRINT:
POKE211,B
60 FORT=1TO23:REM NUMBER OF
LINES
70 FORU=1TO10:REM NUMBER OF
COLORS
80 PRINTCHR$(C(U))CHR$(R)
CHR$(H);
90 NEXTU:PRINT:PRINTTAB(T+B)::
NEXTT
100 FORD=1TO1000:NEXT
110 FORP=1TO25:PRINT:NEXT
120 DATA149,28,129,150,158,
153,159,154,156,31
```

You may have to adjust your monitor's color controls for maximum effect. Next month, we'll see what STEP does to a FOR-NEXT loop. □

Use the FOR-NEXT statement to put a BASIC program into a loop.

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# MACHINE LANGUAGE

Jim Butterfield

## Strange Opcodes

An operation code is the instruction that tells the computer what to do. The opcodes for the 6502 CPU fit in a single byte; out of 256 possible combinations, only 151 are "legal." The remaining combinations are not supported by the chip manufacturer, but some of them work, often producing strange results.

You shouldn't use these codes in your regular programming sessions because they are not guaranteed to work consistently. Some of them are more reliable than others, however, and they appear in software occasionally without causing any problems. Some family versions of the 6502 in other computers put these undefined codes to work regularly; you would find this to be true in the case in the Apple IIgs, for example.

Even so, many of the extra codes sometimes do interesting and useful things. We'll experiment here with one of these. Even so, try not to make a habit of using these nonstandard instructions in your programs.

Perhaps the most interesting codes are those whose last two binary bits are 11. Written in hexadecimal, these codes would have a second digit of 3, 7, B, or F. No such codes are legal, but almost all of them exhibit an interesting characteristic: Their action is a combination of the next two opcodes in numeric order. For example, the code for load A (absolute) is hex AD and for load X is AE, so hex AF causes both A and X to be loaded! Other address modes work. For example, A7 does the same thing using 0 page addressing.

Some codes are deadly. Hex 02, 12, 22, and so on up to 72 will cause the processor to crash. Resetting will put

things back to normal, of course.

The first complete documentation of these extra opcodes was compiled in 1981 by Brian Grainger, a member of a user group in the United Kingdom. The various opcodes were given names about that time. The LDA/LDX mixture above, for example, was dubbed LAX.

For a small project, let's calculate the parity of a byte by using extra-code instruction LSE, which is a mixture of LSR and EOR. First, we logically shift right the accumulator (LSR) and then exclusive-or (EOR) the operand value. If we were writing a conventional parity calculation program, we might use EOR and LSR as separate instructions to do the job. In absolute addressing mode, LSR would be an opcode of hex 4E; EOR would be 4D. Code 4F combines the two to make LSE.

The program calculates parity—odd or even—of binary values from 0 to 16 (hex 10) inclusive. The parity subroutine, at address \$201A, is called with the selected value in the A register and also stored at address \$203F. We'll look at the subroutine code in detail.

The parity bit we are calculating will be in the low-order bit of the accumulator. The first bit is already there, so we need to loop seven times to get the eight bits. Set our counter to 0.

**201A A0 00 LDY #00**

Here comes our nonstandard opcode. LSE, code \$4F, will right-shift the contents of address \$203F and then EOR that value into the accumulator. Bit 0 of the accumulator will then contain the exclusive-or value of the two low bits, and as the loop continues, the remaining bits will be worked in.

**201C 4F 30 20 LSE \$203F**

The remaining subroutine code bumps the Y counter and loops seven times.

**201F C8 INY**  
**2020 C0 07 CPY #07**  
**2022 D0 F8 BNE \$201C**  
**2024 60 RTS**

It's worth noting that when the subroutine returns, the parity information is stored in the low bit of the A register. We can extract and test it very simply by moving it into the carry flag with instruction LSR.

**2009 A0 45 LDY #45**  
**; ascii E for Even**  
**200B 4A LSR A**  
**; move test bit to C flag**  
**200C 90 02 BCC \$2010**  
**; even parity, skip ahead**  
**200E A0 4F LDY #4F**  
**; odd parity, 0 for Odd**  
**2010 98 TYA**  
**; move E or 0 to A reg**  
**2011 20 D2 FF JSR \$FFD2**  
**; print E or 0**

Here's a listing that pokes the data in from BASIC.

```
100 PRINT "JIM BUTTERFIELD'S
      ILLEGAL OPCODES!"
110 DATA 162,0,138,141,
      48,32,32,26,32
120 DATA 160,69,74,144,2,
      160,79,152
130 DATA 32,210,255,232,
      224,17,208,233,96
140 DATA 160,0,79,48,32,
      200,192,7,208,248,96
200 FOR J=8192 TO 8228
210 READ X:T=T+X
220 POKE J,X
230 NEXT J
240 IF T<>4228 THEN STOP
300 PRINT "PARITY OF BINARY
      VALUES 0 TO 16:"
310 SYS 8192
```

*(Editor's note: For more information about unconventional 6502 opcodes, see Randy Thompson's "Programmer's Page" on page G-20. □*

**Unconventional  
opcodes  
sometimes do  
strange,  
interesting, and  
useful things.**



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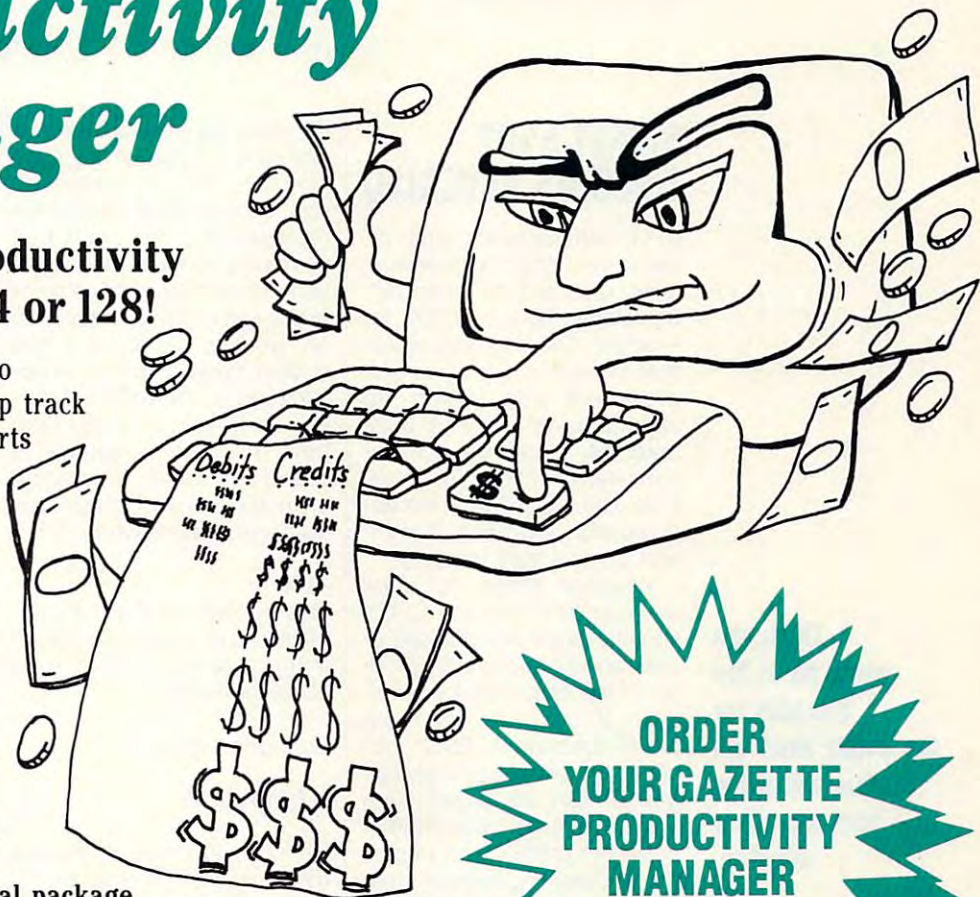
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# PROGRAMMER'S PAGE

Randy Thompson

## SECRET 6502 OPCODES REVEALED

CPU manufacturers often release their chips with several undocumented opcodes hidden inside. Take the 6502, for example. The sleuthing of several exceedingly curious programmers has turned up about a dozen unofficial 6502 machine language instructions—instructions such as LAX, which loads both the accumulator and the X register with a value from memory.

Whether these opcodes were omitted from the CPU's specifications accidentally or were an unintentional by-product of the chip's design is unclear. In any case, there are more functional 6502 opcodes than most assembly language manuals reveal. Here are a few that I discovered in some old articles and books, most notably "Complete Inner Space Anthology" by Karl J.H. Hildon in *Transactor* and *Programming the PET/CBM*, by Raeto Collin West, published by COMPUTE Books.

Because these opcodes are unofficial, I'd be surprised if you could find an assembler that supports them. In fact, the opcodes' mnemonics (the letters used to identify each instruction) were invented by the programmers who discovered the instructions. As a result, to use any of the opcodes listed below, you'll probably have to enter their numerical value into your code using a machine language monitor or an assembler's byte editor. Now, *this* is programming at the machine level. (See Jim Butterfield's "Machine Language" column in this issue for more information about how to put one of these secret opcodes to work.)

Please note that all opcode values in this article are given in hexadecimal. These hexa-

decimal values are listed immediately to the right of any sample code. The lowercase letters found in these examples represent the hex digits that you must provide as the instruction's immediate byte value or as the instruction's destination or source address. You should have a good understanding of the 6502's different addressing modes and how machine language is stored in memory if you plan on putting any of these "secret" opcodes to work.

### ALR

This opcode ANDs the contents of the A register with an immediate value and then LSRs the result.

Supported modes:

**ALR #ab ;4B ab**

Here's an example of how you might write it in a program.

**ALR #\$FE ;6B 02**

Here's the same code using equivalent instructions.

**AND #\$FE  
LSR A**

### ARR

This opcode ANDs the contents of the A register with an immediate value and then RORs the result.

Supported modes:

**ARR #ab ;6B ab**

Here's an example of how you might write it in a program.

**ARR #\$7F ;6B 02**

Here's the same code using equivalent instructions.

**AND #\$7F  
ROR A**

### ASO

This opcode ASLs the contents of a memory location and then ORs the result with the accumulator.

Supported modes:

**ASO abcd ;0F dc ab  
ASO abcd,X ;1F dc ab  
ASO abcd,Y ;1B dc ab  
ASO ab ;07 ab  
ASO ab,X ;17 ab  
ASO (ab),X ;03 ab  
ASO (ab),Y ;13 ab**

Here's an example of how you might use this opcode:

**ASO \$C010 ;0F 10 C0**

Here's the same code using equivalent instructions.

**ASL \$C010  
ORA \$C010**

### AXS

AXS ANDs the contents of the A and X registers (without changing the contents of either register) and stores the result in memory.

Supported modes:

**AXS abcd ;8F dc ab  
AXS ab ;87 ab  
AXS ab,Y ;97 ab  
AXS (ab),X ;83 ab**

Example:

**AXS \$FE ;87 FE**

Here's the same code using equivalent instructions.

**STX \$FE  
PHA  
AND \$FE  
STA \$FE  
PLA**

### INS

This opcode INCs the contents of a memory location and then SBCs the result from the A register.

Think you know all of the opcodes for the 6502? Here are some that the manuals never mention.

Supported modes:

```
INS abcd ;EF dc ab
INS abcd,X ;FF dc ab
INS abcd,Y ;FB dc ab
INS ab ;E7 ab
INS ab,X ;F7 ab
INS (ab),X ;E3 ab
INS (ab),Y ;F3 ab
```

Example:

```
INS $FF ;E7 FF
```

Here's the same code using equivalent instructions.

```
INC $FF
SBC $FF
```

LSE  
LSE LSRs the contents of a memory location and then EORs the result with the accumulator.

Supported modes:

```
LSE abcd ;4F dc ab
LSE abcd,X ;5F dc ab
LSE abcd,Y ;5B dc ab
LSE ab ;47 ab
LSE ab,X ;57 ab
LSE (ab),X ;43 ab
LSE (ab),Y ;53 ab
```

Example:

```
LSE $C100,X ;5F 00 C1
```

Here's the same code using equivalent instructions.

```
ASL $C100,X
EOR $C010,X
```

OAL  
OAL ORs the A register with #\$EE, ANDs the result with an immediate value, and then stores the result in both A and X.

Supported modes:

```
OAL #ab ;AB ab
```

Here's an example of how you might use this opcode:

```
OAL #$AA ;AB AA
```

Equivalent instructions:

```
ORA #$EE
AND #$AA
TXA
```

RLA  
RLA ROLs the contents of a memory location and then ANDs the result with the accumulator.

Supported modes:

```
RLA abcd ;2F dc ab
RLA abcd,X ;3F dc ab
RLA abcd,Y ;3B dc ab
RLA ab ;27 ab
RLA ab,X ;37 ab
RLA (ab),X ;23 ab
RLA (ab),Y ;33 ab
```

Example:

```
RLA $FE,X ;37 FE
```

Equivalent instructions:

```
ROL $FE,X
AND $FE,X
```

RRA  
RRA RORs the contents of a memory location and then ADCs the result with the accumulator.

Supported modes:

```
RRA abcd ;6F dc ab
RRA abcd,X ;7F dc ab
RRA abcd,Y ;7B dc ab
RRA ab ;67 ab
RRA ab,X ;77 ab
RRA (ab),X ;63 ab
RRA (ab),Y ;73 ab
```

Example:

```
RRA $030C ;6F 0C 03
```

Equivalent instructions:

```
ROR $030C
ADC $030C
```

```
SAX
```

SAX ANDs the contents of the A and X registers (leaving the contents of A intact), subtracts an immediate value, and then stores the result in X.

Supported modes:

```
SAX #ab ;CB ab
```

Example:

```
SAX #$5A ;CB 5A
```

Equivalent instructions:

```
STA $02
TXA
AND $02
SBC #$5A
TAX
LDA $02
```

Note: Memory location \$02 would not be altered by the SAX opcode.

XAA

XAA transfers the contents of the X register to the A register and then ANDs the A register with an immediate value.

Supported modes:

```
XAA #ab ;8B ab
```

Example:

```
XAA #$88 ;8B 88
```

Equivalent instructions:

```
TXA
AND #$88
```

*Do you have an interesting programming tip or trick for the 64 or 128 that you'd like to share? "Programmer's Page" is interested in receiving them. 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 that we publish. ☐*

# GEOS

Steve Vander Ark

## FOUR-DRIVE GEOS

Not long ago I spent a good deal of space in this column bemoaning the lack of a good way to handle four drives from GEOS. Since then I've received several new products which make all my worrying a thing of the past.

Yes, GEOS can handle four drives. The problem is that the GEOS program itself is written to look at drives in groups of two—A and B together, and then C and D. All GEOS applications, such as geoWrite and geoPublish, use those routines and therefore inherit an invisible barrier which prevents you, if you're in A and B, from talking to C or D, and vice versa. GEOS 2.0 jerry-rigs a way around this problem by letting you swap your third drive for either your first or second drive from the deskTop. You still have only two active drives, but you can access a third with some effort.

The fourth drive became part of the game with the release of DualTop, a program that I've mentioned in this column before. In the latest version, released by New Horizon Software last summer, you can access drive D as long as you're on the DualTop screen itself. Once you enter an application, however, the old biases surface, and you run the risk of crashing your system if you don't have the right things on the right drives.

For the author of DualTop, Paul Murdaugh, that wasn't good enough. He decided it was time to fix things once and for all. So, he wrote a series of patch programs which modify GEOS and GEOS applications to fully support the third and fourth drives. Yes, *fully* support them. If you run his patches over your copy of geoWrite, for example, you can have your document in drive A and geoWrite in drive

D, and when you double-click on the document, it'll open just as nicely as you please. Four-drive support is here.

One more thing. Back in the December issue, I reported that DualTop, while supporting CMD devices such as the RAMLink and FD-drive, couldn't access native mode partitions. I said that to use one of these devices most effectively in GEOS, you needed to use native mode partitions, subdirectories, and so on. I concluded, sadly, that there was no four-drive file handler which could properly access these high-powered drives. Well, I was wrong. DualTop will handle native mode partitions just fine, providing that you boot up with Gateway. You can get yourself a copy of the latest version of DualTop by writing to Paul Murdaugh at New Horizon Software, 2253 North Kansas Avenue, Springfield, Missouri 65803. New Horizon will also patch your applications and GEOS 64 or 128 kernel to run fully with three or four drives. Send \$5 per patch and a disk with whichever applications you want patched, and you're in business.

Another new program will let you access all four drives. It's called geoSHELL, and it brings a new twist to the GEOS interface. Using GeoSHELL, a command line interface, is a lot like using a Commodore before GEOS showed up with its point-and-click environment. GeoSHELL provides you with a prompt where you type in commands to make GEOS do its tricks. Its commands are very powerful indeed, containing enough bells and whistles to make geoSHELL a very attractive alternative to the deskTop or other replacement. GeoSHELL is available for \$24.95. You can order it by writing to Maurice Randall, P.O. Box 606, Char-

lotte, Michigan 48813.

Creative Micro Designs, the company which brought you the RAMLink and Jiffy-DOS, has released new versions of Gateway and Perfect Print, as well as a disk of some of some excellent GEOS utility programs written by Jim Collette. This Collette Utilities disk includes geoWizard, which no GEOS user should be without, and Font Edit 2.5, the best font-design tool around. For more information, write to Creative Micro Designs, P.O. Box 646, East Longmeadow, Massachusetts 01028.

Another company that supports the GEOS community with new products is The Soft Group. It sells VideoByte II, a digitizer that plugs into your computer's user port. This product creates images in multicolor mode, which until recently meant that they weren't directly compatible with GEOS and its high-resolution mode. A new cartridge called VideoMate provides a bridge between the two with a GEOS version of the VideoByte driver. When you activate the VideoByte desk accessory in geoPaint, you're given a control panel which lets you activate the digitizer. Once you've captured an image, the VideoMate cartridge converts it into high-resolution mode and places it in the geoPaint window. VideoMate (\$49.99) and VideoByte II (\$69.99) are available from Tenex, P.O. Box 6578, South Bend, Indiana 46660.

There are many more great products that deserve a mention here, but I'm running out of room. Hang on until next month, when I'll run through a list of some of the latest shareware and public domain programs that have made appearances recently on Q-Link.

Speaking of Q-Link, feel free to contact me by E-mail there. I am SteveV14. ☐

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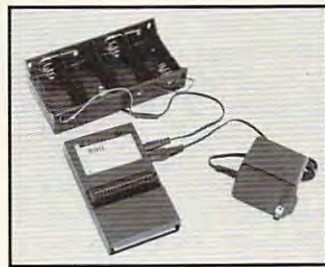


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# D'IVERSIONS

Fred D'Ignazio

## FRANK THE FIREPLACE AND LARRY THE LAMP

A recent issue of the *New York Times* reported on new electronic gadgets that let you control every appliance in your home. The gadget deluxe, SmartHome, is an all-in-one product that costs \$15,000 and lets you automate over 200 common household devices. SmartHome is an alarm system and a heating and cooling controller. It starts your coffee perking at a set hour, and it starts cooking your roast. One universal "zapper" with only 4000 buttons lets you walk around your home, magically bringing good things to life.

Unfortunately, SmartHome is already a dinosaur: a wired labyrinth with hundreds of feet of cable lurking behind the walls. It's bulky, difficult to install, and far too expensive for the average homeowner. In fact, SmartHome uses an older generation of microprocessors and really isn't so smart.

A new generation of wireless home-control gadgets is just around the corner. These gadgets are slick, tiny, and inexpensive, featuring the latest microprocessors and miniaturized circuits. These devices will spring to life instantly—when a person enters a room, when a person speaks, when daylight dawns, when the temperature drops, when night falls. The complicated zapper will be rendered obsolete by a new generation of "personal digital assistants" that respond to spoken words, the snap of fingers, the silent rhythms of morning and evening, and coolness and heat.

I can imagine that almost every conceivable item has become an electronic personal digital assistant with its own

name and probably its own voice and personality.

The question is whether the accumulation of these human-like assistants will be a homeowner's dream or a disaster. Let's peek into the living room of an average home, in late winter, sometime in the late 1990s. Enter one male human adult, theoretically the master of the household. Instantly, dozens of tiny, invisible electronic gremlins spring into action. The lights in the room blink on. The fireplace gasps, and gas-fed flames curl up metal logs. The CD player consults its built-in digital clock-calendar, notes that it is 5:00 p.m., and selects a CD filled with romantic music. The thermostat checks its program and decides that the room is a bit chilly. It cranks up the furnace and heat flows into the room.

Everything is working smoothly except for one tiny helper—the semi-intelligent home security alarm that's been caught off guard, since its schedule tells it that no one is supposed to be home on a weekday until 6:00 p.m. "Who goes there?" it booms in a threatening baritone voice.

"Just me, Butch," says the master. "I'm home early. I think I'm catching a cold."

"How do I know it's you?" asks Butch suspiciously. "What's your wife's name?"

"Margaret."

"Wrong!" says Butch, who doesn't realize that the master has remarried and forgotten to inform him. "Intruder alert! Intruder alert! Police are on their way. You have a right to remain silent or request the presence of an attorney."

Things may not get this carried away. But think of how interesting it will be if the appliances in the room not only respond to human cues but also to each other.

Again, enter the master. He sits on Catherine the Couch.

Catherine is intelligent and re-arranges her shape to cushion him comfortably. The lights blink on, the fireplace blazes, and the temperature soars.

"Stop! Stop!" yells Frank the Fireplace to Thelma the Thermostat. "I'm supposed to warm the room. If you keep warming it, Ron the Room will tell my sensors to shut me off. The master wants my fire for atmosphere as much as my heat. He'll be really angry if I suddenly switch off."

Thelma the Thermostat is about to make an angry retort, but she is interrupted by Larry the Lamp. "Shut up, Frank!" cries Larry, who is very rude for a lamp. "You don't have any real heat; you're just for show. And take a look at the master. He's got a book in his hand, so he must want to read. Lighting the room for reading is my job."

As the other appliances hear the argument, they join in. Stan the Stairway begins complaining to Ruth the Rug. Catherine the Couch unwinds at Tubby the Table. Wendy the Window starts whining at Dora the Doorknob. Pretty soon, the entire room is filled with the screams and shouts of disgruntled appliances.

In the middle of the room, the master has been dumped on the floor by Catherine, flipped on his back by Ruth, left in the dark by Larry and Frank, and frozen by Thelma. He starts to complain. But his tiny human voice is drowned out by the taunts and threats of the incensed appliances.

This story's moral: It's fine and magical to bring good things to life. Soon, we'll have the technology to do this inexpensively for almost every device in our homes. But maybe there's a limit, beyond which we wave bye-bye to common sense and sanity and say hello . . . to the twilight zone. □

**It's fine and  
magical to bring  
good things  
to life—but there  
is a limit.**

# PROGRAMS

## UMBRELLAS

By Maurice Yanney

Acid raindrops are falling and destroying the plants. In order to provide the vegetation with a temporary measure of protection, you can shield them with a pair of umbrellas. The umbrellas move in unison, so it will take some skill to protect the plants from the rancid rain.

### Typing It In

Umbrellas is written entirely in machine language, but it loads and runs like a BASIC program. To type it in, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts you, respond with the following values.

Starting address: 0801

Ending address: 15A0

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

### Playing the Game

The Umbrella playing screen consists of two umbrellas, a row of 12 seeds near the bottom of the screen, and plants of various heights above the seeds. The top of the screen contains a random number of clouds. The bottom line of the screen displays the number of raindrops remaining in the current level, your extra seeds, your score, and the current level.

You begin with your two umbrellas placed at the far left and far right of the screen. The umbrellas move in unison. To move the umbrellas toward the sides of the screen, use the cursor up/down key or the = key. If you are using a joystick, move it left or down. To move the umbrellas toward the center, use the cursor left/right key or the ↑ (up arrow) key. If you are using a joystick, move it right or up.

The umbrellas will wrap around the screen if moved too far in one direction. If the umbrellas are in the center of the screen and you make another move toward the center, the umbrellas will move to the far sides of the screen. Conversely, if the umbrellas are at the far sides of the screen and you make another move toward the sides, the umbrellas will move to the center of the screen. This maneuvering

is a little tricky at first and will take some time for you to master.

When you move the umbrellas, they position themselves automatically on top of a plant or seed. To prevent a raindrop from destroying part of a plant or a seed, you must shield it with an umbrella. (This is one game where you may find the keyboard more responsive than a joystick.)

If a raindrop hits an umbrella, you receive 50 points, and the drop count is reduced by one. If the raindrop hits a plant, the plant's height is diminished, and the drop count is reduced by one. If the raindrop hits a seed, you lose a reserve seed. Move to a new level when the number of drops reaches 0. When you complete a level, you receive an additional 1000 points. The game ends when a raindrop hits a seed and you have none in reserve.

As you advance to higher levels, the game gets harder. The number of raindrops increases by 5 at each level, beginning with 50 on level 1. You'll notice that the plants don't seem to grow as well on higher levels. You can help improve growth on subsequent levels by leaving the plants on the current level in a good state. The third level adds another dimension of difficulty, and a bonus seed is awarded each 2500 points.

You can pause the game by holding down the Shift key or by pressing the Shift Lock key. Release the Shift key or press the Shift Lock key again to resume play.

### UMBRELLAS

```
0801:0B 0B 0A 00 9E 20 32 30 A4
0809:36 32 00 00 00 A9 0C 8D 0D
0811:20 D0 A9 0F 8D 21 D0 20 3E
0819:43 0E 20 73 0B 20 D8 12 26
0821:20 DA 09 A9 03 8D A2 15 5C
0829:A9 00 8D A0 15 8D B5 15 29
0831:8D CB 15 8D C7 15 8D C8 EC
0839:15 8D C6 15 8D C4 15 A9 B4
0841:FA 8D C5 15 8D C3 15 20 02
0849:E5 0C A9 03 8D A9 15 8D 7F
0851:AA 15 8D AC 15 A9 24 8D 9D
0859:AB 15 A9 F3 8D D2 15 8D 68
0861:D3 15 8D D4 15 20 08 11 E9
0869:20 C2 13 20 03 14 AD 01 63
0871:DC 29 10 F0 0F AD 8D 02 97
0879:29 01 C9 01 D0 06 20 16 9C
0881:15 4C 6F 08 A0 21 20 3C A3
0889:0B 88 D0 FA AD D6 15 F0 EE
0891:0A AC D6 15 88 8C D6 15 37
0899:4C 9F 08 20 21 15 AD B5 29
08A1:15 18 69 01 29 01 8D B5 9D
```

```
08A9:15 20 3F 12 20 B5 0C AD F2
08B1:D5 15 F0 03 4C 4E 09 AD 9B
08B9:B5 15 F0 03 4C 38 09 A5 33
08C1:C5 C9 07 F0 35 C9 35 F0 43
08C9:31 C9 02 F0 4D C9 36 F0 23
08D1:49 AD 00 DC C9 7B F0 22 FF
08D9:C9 7E F0 3E C9 77 F0 3A B8
08E1:C9 7D F0 16 AD 01 DC C9 AA
08E9:FE F0 2F C9 FB F0 0B C9 BB
08F1:F7 F0 27 C9 FD F0 03 4C C1
08F9:38 09 A9 20 8D B4 15 20 29
0901:D9 11 38 AD A9 15 E9 03 9E
0909:8D A9 15 18 AD AB 15 69 20
0911:03 8D AB 15 20 08 11 4C 5E
0919:38 09 A9 20 8D B4 15 20 4A
0921:D9 11 18 AD A9 15 69 03 B9
0929:8D A9 15 38 AD AB 15 E9 C2
0931:03 8D AB 15 20 08 11 20 52
0939:B5 0C AD D5 15 F0 03 4C FA
0941:4E 09 A9 20 8D B4 15 20 7D
0949:08 11 4C 6F 08 20 16 15 26
0951:A0 00 B9 C0 09 99 B0 04 0B
0959:A9 05 99 B0 D8 C8 A9 F9 F6
0961:99 B0 04 A9 02 99 B0 D8 38
0969:20 43 0B C0 09 D0 E3 A9 C6
0971:20 99 B0 04 A0 00 B9 C9 92
0979:09 99 24 05 A9 05 99 24 04
0981:D9 C8 A9 F9 99 24 05 A9 98
0989:02 99 24 D9 20 43 0B C0 0A
0991:11 D0 E3 A9 20 99 24 05 2C
0999:AD 00 DC C9 7F F0 03 4C CC
09A1:1E 08 AD 01 DC C9 FF F0 89
09A9:03 4C 1E 08 A5 C5 C9 19 85
09B1:D0 03 4C 1E 08 C9 27 D0 DE
09B9:DF 20 16 15 20 E2 FC 07 65
09C1:01 0D 05 20 0F 16 05 12 27
09C9:10 0C 01 19 20 01 07 01 AC
09D1:09 0E 3F 20 28 19 2F 0E E7
09D9:29 A9 FF A0 D8 99 C0 06 A9
09E1:C8 D0 FA A9 05 A0 AF 99 2A
09E9:E9 DA C8 D0 FA A9 FE A0 EA
09F1:DA 99 C1 06 C8 C8 C0 2C
09F9:FE D0 F6 A0 00 B9 0A AD
0A01:99 C0 07 C8 C0 28 D0 F5 BD
0A09:60 FD 04 12 0F 10 13 3A 87
0A11:30 30 FD FC FC FC 20 20 15
0A19:20 20 20 20 20 20 FD 0B
0A21:30 30 30 30 30 30 FD 03
0A29:0C 05 16 05 0C 3A 30 30 71
0A31:FD AD AF 15 85 FB AD B0 1F
0A39:15 85 FC A9 FB A0 01 91 69
0A41:FB 20 D1 14 A9 05 91 FD 59
0A49:C8 91 FD C8 91 FD 38 AD 15
0A51:AD 15 E5 FB 8D B3 15 AD 11
0A59:AE 15 E5 FC 0D B3 15 F0 E8
0A61:16 20 E8 14 A9 F7 A0 00 55
0A69:91 FB A9 FA C8 91 FB A9 58
0A71:F8 C8 91 FB 4C 42 0A 60 06
0A79:20 E1 14 A9 07 85 FC A9 25
0A81:A1 85 FB AC A2 15 B1 FB DA
0A89:8D B3 15 A9 FE 99 A1 07 37
0A91:18 A9 A1 6D A2 15 CD B1 DD
0A99:15 B0 38 AD B3 15 AE A2 38
0AA1:15 9D A1 07 8A 18 69 A1 75
0AA9:CD B1 15 F0 62 BD A1 07 17
0AB1:8D B3 15 A9 FE 9D A1 07 6F
0AB9:8E D5 15 20 4E 15 AE D5 29
0AC1:15 20 43 0B A9 00 8D D5 BF
0AC9:15 AD B3 15 9D A1 07 E8 06
0AD1:4C A5 0A AD B3 15 AC A2 7F
```

# PROGRAMS

```

0AD9:15 99 A1 07 18 A9 A1 6D 9B
0AE1:A2 15 AA 8A CD B1 15 F0 DA
0AE9:26 BD 00 07 8D B3 15 A9 FF
0AF1:FE 9D 00 07 8E D5 15 20 73
0AF9:4E 15 AE D5 15 20 43 0B 68
0B01:A9 00 8D D5 15 AD B3 15 D6
0B09:9D 00 07 CA 4C E4 0A AE 34
0B11:B1 15 A9 FE 9D 00 07 AD 13
0B19:B2 15 8D AE 15 38 AD B1 01
0B21:15 E9 29 8D AD 15 38 AD 1A
0B29:B1 15 E9 41 8D AF 15 AD B1
0B31:B2 15 E9 01 8D B0 15 20 AC
0B39:32 0A 60 A9 00 69 01 D0 0A
0B41:FC 60 8A 8D CC 15 A2 96 AE
0B49:20 3C 0B E8 D0 FA AE CC 0B
0B51:15 60 A9 64 20 3B 10 20 B3
0B59:D8 12 20 E5 C0 20 C2 13 3C
0B61:20 03 14 20 44 14 A9 03 95
0B69:8D AA 15 8D AC 15 20 08 6E
0B71:11 60 20 D8 12 20 DA 09 89
0B79:A0 00 A2 00 A9 06 9D 00 D4
0B81:D8 9D 00 D9 9D 00 DA E8 94
0B89:D0 F4 A2 00 BD 0E 0C 99 71
0B91:34 04 E8 C8 C8 E0 09 D0 19
0B99:F3 A2 00 BD 17 0C 9D AE 01
0BA1:04 E8 E0 0D D0 F5 A2 00 84
0BA9:BD 24 0C 9D F6 04 E8 E0 7D
0BB1:1C D0 F5 A2 00 BD 40 0C 76
0BB9:9D B8 05 E8 E0 22 D0 F5 23
0BC1:A2 00 BD 62 0C 9D EC 05 BC
0BC9:E8 E0 18 D0 F5 A2 00 BD 94
0BD1:7A 0C 9D 30 06 E8 E0 23 97
0BD9:D0 F5 A2 00 BD 9D 0C 9D 44
0BE1:64 06 E8 E0 18 D0 F5 20 E6
0BE9:97 0E A5 8F 29 0F A2 EC 69
0BF1:C9 0F F0 07 9D 48 D7 E8 E5
0BF9:E8 D0 F9 AD 00 DC C9 7F 59
0C01:03 0A AD 01 DC C9 FF D0 A8
0C09:D3 4C E8 0B 60 15 0D 02 F6
0C11:12 05 0C 0C 01 13 14 0F 41
0C19:20 13 14 01 12 14 20 07 C0
0C21:01 0D 05 10 12 05 13 13 7C
0C29:20 13 10 01 03 05 20 0F A3
0C31:12 20 0D 0F 16 05 20 0A FB
0C39:0F 19 13 14 09 03 0B 14 41
0C41:0F 17 01 12 04 20 13 09 B7
0C49:04 05 13 3A 20 20 03 12 44
0C51:13 12 20 15 10 2D 04 0F 19
0C59:17 0E 20 20 0F 12 20 20 A7
0C61:3D 0F 12 20 0A 0F 19 13 F1
0C69:14 09 03 0B 20 0C 05 06 20
0C71:14 20 0F 12 20 04 0F 17 E4
0C79:0E 14 0F 17 01 12 04 20 69
0C81:03 05 0E 14 05 12 3A 20 64
0C89:03 12 13 12 20 0C 05 06 6C
0C91:14 2D 12 09 07 08 14 20 72
0C99:0F 12 20 1E 0F 12 20 0A AE
0CA1:0F 19 13 14 09 03 0B 20 B5
0CA9:12 09 07 08 14 20 20 0F DE
0CB1:12 20 15 10 A9 00 8D D0 B7
0CB9:15 8D D1 15 20 04 0F AD 2A
0CC1:D5 15 D0 1F A9 01 8D D0 53
0CC9:15 A9 02 8D D1 15 20 84 97
0CD1:0F AD D5 15 D0 0D A9 02 F8
0CD9:8D D0 15 A9 04 8D D1 15 39
0CE1:20 84 0F 60 A2 80 8A 8D CA
0CE9:AA 15 20 97 E0 AD CA 15 92
0CF1:CA A5 8F 29 03 D0 23 A9 98
0CF9:F4 9D 00 04 A9 01 9D 00 C0
0D01:D8 E8 A9 F5 9D 00 04 A9 F4
0D09:01 9D 00 D8 E8 A9 F6 9D 12
0D11:00 04 A9 01 9D 00 D8 4C 5C
0D19:1D 0D E8 E8 E8 E8 E0 78 D5
0D21:D0 C4 A9 32 8D A1 15 18 62
0D29:AD A0 15 69 01 8D A0 15 10
0D31:20 E5 10 A9 0F 6D CB 15 4C
0D39:8D C9 15 C9 1E 90 05 A9 B2
0D41:1E 8D C9 15 AC A0 15 C0 2B
0D49:05 90 02 A0 05 C0 01 F0 72
0D51:16 38 AD C9 15 E9 03 8D BA
0D59:C9 15 18 AD A1 15 69 05 B4
0D61:8D A1 15 88 4C 4E 0D 20 AB
0D69:C2 10 A0 00 AD C9 15 8D 49
0D71:CB 15 A9 00 99 B6 15 C0 7E
0D79:0B F0 04 C8 4C 73 0D A9 56
0D81:00 8D B3 15 A0 00 98 8D 8A
0D89:CA 15 20 97 E0 A5 8F 29 B1
0D91:01 AA AC CA 15 B9 B6 15 2B
0D99:C9 03 F0 1B E0 01 F0 17 2D
0DA1:18 B9 B6 15 69 01 99 B6 97
0DA9:15 18 AD B3 15 69 01 8D 23
0DB1:B3 15 CD C9 15 F0 0A C8 8A
0DB9:C0 0C D0 CA A0 00 4C 87 23
0DC1:0D A2 00 E0 0C F0 5D BD 9B
0DC9:B6 15 F0 47 A9 07 80 B0 4C
0DD1:15 8D AE 15 A9 72 8D AF E2
0DD9:15 8D AD 15 20 19 0E 18 82
0DE1:6D AF 15 8D AF 15 BD B6 1E
0DE9:15 A8 20 29 0E 20 19 0E 80
0DF1:18 6D AD 15 8D AD 15 38 FF
0DF9:AD AF 15 E9 28 8D AF 15 04
0E01:AD B0 15 E9 00 8D B0 15 0E
0E09:8A 8D CA 15 20 32 0A AD 04
0E11:CA 15 AA E8 4C C4 D0 60 AB
0E19:8A A8 A9 00 C0 00 F0 07 C8
0E21:88 18 69 03 4C 1D 0E 60 38
0E29:C0 00 F0 15 88 38 AD AF 45
0E31:15 E9 78 8D AF 15 AD B0 18
0E39:15 E9 00 8D B0 15 4C 29 CE
0E41:0E 60 A9 30 85 34 85 38 F4
0E49:AD 0E DC 29 FE 8D 0E DC 15
0E51:A5 01 29 FB 85 01 A9 00 E8
0E59:A0 00 B9 00 D0 99 00 30 1A
0E61:B9 00 D1 99 00 31 B9 00 66
0E69:D2 99 00 32 B9 00 D3 99 87
0E71:00 33 B9 00 D4 99 00 34 D2
0E79:B9 00 D5 99 00 35 B9 00 0F
0E81:D6 99 00 36 B9 00 D7 99 E9
0E89:00 37 C8 D0 CD A5 01 09 A9
0E91:04 85 01 AD 0E DC 09 01 03
0E99:8D 0E DC 18 AD 18 D0 29 B5
0EAL:F0 69 0C 8D 18 D0 A9 0F 42
0EA9:A0 00 B9 C4 0E 99 90 37 C8
0EB1:C8 0C 70 D0 F5 A0 00 B9 69
0EB9:34 0F 99 80 31 C8 C0 50 6D
0ECL:D0 F5 60 00 10 38 38 00 A1
0EC9:00 00 00 00 00 00 00 E5
0ED1:10 38 38 01 07 1F 3F 3F 8D
0ED9:1F 07 01 87 DF FF FF FF DE
0EE1:FF FB E1 80 E0 F8 FC FC 23
0EE9:F8 E0 80 06 0F F0 F0 07 05
0EF1:01 00 00 06 F0 F0 F0 E0 A2
0EF9:80 00 00 3C 7E FF FF BD CB
0F01:18 1A 0E FF FF FF FF 73
0F09:FF FF FF 3C 66 C3 99 99 F9
0F11:C3 66 3C 00 00 18 3C 3C 47
0F19:18 00 00 7E 7E 7E 7E 94
0F21:7E 7E 7E FF FF E7 C3 D8
0F29:E7 FF FF AA AA AA CF 3B
0F31:FF FF FF 00 7F 7F 63 73
0F39:63 7F 7F 00 1C 3C 6C 0C 8F
0F41:0C 7F 7F 00 7F 7F 03 7F B4
0F49:60 7F 7F 00 7F 7F 03 1F 86
0F51:03 7F 7F 00 66 66 66 7F D9
0F59:7F 06 06 00 7F 7F 60 7F B3
0F61:03 7F 7F 00 7F 7F 60 7F 0B
0F69:63 7F 7F 00 7F 7F 03 03 0C
0F71:03 03 03 00 7F 7F 63 7F 72
0F79:63 7F 7F 00 7F 7F 63 7F 59
0F81:03 03 03 A9 00 8D D5 15 D3
0F89:AC D1 15 20 C2 14 A0 00 BE
0F91:B1 FB C9 F9 D0 0E A9 05 77
0F99:20 3B 10 20 88 15 20 9D 11
0FA1:14 4C 03 10 C9 FE D0 44 6E
0FA9:AC D1 15 B9 A3 15 8D B1 0F
0FB1:15 B9 A4 15 8D B2 15 A0 B0
0FB9:00 20 C2 14 91 FB A0 02 39
0FC1:20 C2 14 91 FB AE A0 15 2D
0FC9:E0 03 90 0A A0 04 20 C2 E3
0FD1:14 91 FB 20 44 14 20 03 95
0FD9:14 20 C2 13 20 30 13 AD 29
0FE1:A2 15 C9 FF D0 05 A9 01 BE
0FE9:8D D5 15 60 C9 FB D0 29 F5
0FF1:AC D1 15 B9 A3 15 8D AF 55
0FF9:15 B9 A4 15 8D B0 15 20 70
1001:64 13 AC D0 15 C0 00 F0 57
1009:0C C0 01 F0 04 20 44 14 CB
1011:60 20 C2 13 60 20 03 14 90
1019:60 AC D1 15 20 C2 14 AC 01
1021:D0 15 B9 CD 15 D0 12 B9 CC
1029:D2 15 A0 00 91 FB 18 A5 5E
1031:FC 69 D4 85 FC A9 06 91 49
1039:FB 60 18 6D C7 15 8D C7 BE
1041:15 AD C8 15 69 00 8D C8 F0
1049:15 20 51 10 20 0E 12 60 60
1051:A0 18 A2 18 38 A9 0F ED 12
1059:C7 15 8D B3 15 A9 27 ED 1B
1061:C8 15 D0 B3 15 90 3D C8 36
1069:38 A9 E7 ED C7 15 8D B3 4D
1071:15 A9 03 ED C8 15 0D B3 2E
1079:15 90 29 C8 38 A9 63 ED 17
1081:C7 15 8D B3 15 A9 00 ED F4
1089:C8 15 0D B3 15 90 15 C8 0E
1091:38 A9 09 ED C7 15 8D B3 99
1099:15 A9 00 ED C8 15 0D B3 F5
10A1:15 90 01 C8 18 20 0A E5 58
10A9:AD C8 15 AE C7 15 20 CD 01
10B1:BD A0 00 C0 08 F0 09 A9 A4
10B9:05 99 D6 DB C8 4C B4 10 4C
10C1:60 A0 00 AD A1 15 C9 0A 14
10C9:90 0C A0 01 E9 0A C9 0A 6E
10D1:90 04 C8 4C CD 10 18 69 61
10D9:30 8D C8 07 18 98 69 30 25
10E1:8D C7 07 60 A0 00 AD A0 A2
10E9:15 C9 0A 90 0C A0 01 E9 20
10F1:0A C9 0A 90 04 C8 4C F0 A0
10F9:10 18 69 30 8D E6 07 18 86
1101:98 69 30 8D E5 07 60 A9 5E
1109:16 8D AA 15 8D AC 15 AD 37
1111:A9 15 C9 15 D0 0D A9 03 E8
1119:8D A9 15 A9 24 8D AB 15 6D
1121:4C 35 11 AD A9 15 C9 00 E8
1129:D0 0A A9 12 8D A9 15 A9 73
1131:15 8D AB 15 A9 04 85 FC 6D
1139:A9 00 85 FB AC AA 15 20 FA
1141:C8 11 18 A5 FB 6D A9 15 67
1149:85 FB A5 FC 69 00 85 FC 05
1151:A0 00 B1 FB C9 FA D0 0C A1
1159:38 AD AA 15 E9 03 8D AA CA
1161:15 4C 35 11 A9 04 85 FC 3E

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1169:A9 00 85 FB AC AC 15 20 33
1171:C8 11 18 A5 FB 6D AB 15 9B
1179:85 FB A5 FC 69 00 85 FC 35
1181:A0 00 B1 FB C9 FA D0 0C D1
1189:38 AD AC 15 E9 03 8D AC 3D
1191:15 4C 65 11 18 AD AA 15 F0
1199:69 01 8D AA 15 18 AD AC 1E
11A1:15 69 01 8D AC 15 AD AA 61
11A9:15 C9 17 D0 05 A9 16 8D 41
11B1:AA 15 AD AC 15 C9 17 D0 BD
11B9:05 A9 16 8D AC 15 A9 F9 6B
11C1:8D B4 15 20 D9 11 60 18 68
11C9:A5 FB 69 28 85 FB A5 FC D1
11D1:69 00 85 FC 88 D0 F0 60 F2
11D9:A9 04 85 FC A9 00 85 FB A6
11E1:AC AC 15 20 26 12 18 A5 79
11E9:FB 6D AB 15 85 FB A5 FC 90
11F1:69 00 85 FC A0 00 AD B4 5E
11F9:15 91 FB 20 37 12 A9 04 E5
1201:85 FC A9 00 85 FB AC AA 7C
1209:15 20 26 12 18 A5 FB 6D 62
1211:A9 15 85 FB A5 FC 69 00 B3
1219:85 FC A0 00 AD B4 15 91 4F
1221:FB 20 37 12 60 18 A5 FB FD
1229:69 28 85 FB A5 FC 69 00 70
1231:85 FC 88 D0 F0 60 20 D1 90
1239:14 A9 02 91 FD 60 AD CD C5
1241:15 F0 09 38 E9 01 8D CD 0D
1249:15 4C 58 12 A9 00 8D D0 70
1251:15 8D D1 15 20 96 12 AD 1C
1259:CE 15 F0 09 38 E9 01 8D D1
1261:CE 15 4C 73 12 A9 01 8D B9
1269:D0 15 A9 02 8D D1 15 20 8E
1271:96 12 AD A0 15 C9 03 90 8B
1279:1B AD CF 15 F0 09 38 E9 E7
1281:01 8D CF 15 4C 95 12 A9 5B
1289:02 8D D0 15 A9 04 8D D1 C7
1291:15 20 96 12 60 AC D0 15 A8
1299:B9 D2 15 18 69 01 C9 F4 4B
12A1:D0 09 A9 F2 99 D2 15 20 37
12A9:B0 12 60 99 D2 15 60 AC A8
12B1:D1 15 B9 A3 15 85 FB B9 E5
12B9:A4 15 85 FC A0 00 A9 20 6E
12C1:91 FB AC D1 15 B9 A3 15 4C
12C9:10 69 28 99 A3 15 B9 A4 7C
12D1:15 69 00 99 A4 15 60 A0 4F
12D9:00 A9 20 99 00 04 99 00 49
12E1:05 99 00 06 99 98 06 C8 53
12E9:D0 F1 60 38 AD C7 15 ED 27
12F1:C3 15 8D B3 15 AD C8 15 30
12F9:ED C4 15 0D B3 15 90 2E FA
1301:18 AD C3 15 6D C5 15 8D A2
1309:C3 15 AD C4 15 6D C6 15 59
1311:8D C4 15 AD A2 15 C9 0C B5
1319:F0 14 20 33 15 AD A2 15 AD
1321:18 69 01 8D A2 15 A9 FC 60
1329:AC A2 15 99 C9 07 60 20 D5
1331:4E 15 A9 20 A0 00 91 FB 1F
1339:AD A2 15 C9 00 D0 06 A9 17
1341:FF 8D A2 15 60 AC A2 15 80
1349:A9 20 99 C9 07 18 AD CB DB
1351:15 69 02 8D CB 15 20 79 E1
1359:0A 38 AD A2 15 E9 01 8D 52
1361:A2 15 60 20 70 15 38 AD 22
1369:CB 15 E9 01 8D CB 15 38 06
1371:AD AF 15 E9 01 85 FB AD 5F
1379:B0 15 E9 00 85 FC 20 B5 90
1381:14 20 B5 14 20 B5 14 18 C9
1389:AD AF 15 E9 D0 8D B3 15 EC
1391:AD B0 15 E9 06 0D B3 15 DC

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1399:B0 17 20 E1 14 A9 FB C8 08
13A1:91 FB A9 20 C8 91 FB 20 6B
13A9:D1 14 A9 05 91 FD 4C BE 1F
13B1:13 20 B5 14 20 E1 14 C8 DA
13B9:91 FB C8 91 FB 20 9D 14 89
13C1:60 20 97 E0 A5 8F 29 07 E5
13C9:C9 06 B0 F5 8D A5 15 18 11
13D1:6D A5 15 6D A5 15 69 7B 61
13D9:8D A5 15 A9 04 8D A6 15 26
13E1:38 AD A5 15 ED A7 15 8D 5B
13E9:B3 15 AD A6 15 ED A8 15 16
13F1:0D B3 15 F0 CC 20 97 E0 34
13F9:A5 8F 29 0F 69 01 8D CE 2F
1401:15 60 20 97 E0 A5 8F 29 26
1409:07 C9 06 B0 F5 8D A3 15 35
1411:18 6D A3 15 6D A3 15 69 F3
1419:8D 8D A3 15 A9 04 8D A4 4E
1421:15 38 AD A3 15 ED A7 15 96
1429:8D B3 15 AD A4 15 ED A4 7C
1431:15 0D B3 15 F0 CC 20 97 81
1439:EO A5 8F 29 0F 69 01 8D 6D
1441:CD 15 60 20 97 E0 20 97 BB
1449:E0 A5 8F 29 0F C9 0B B0 36
1451:F2 8D A7 15 18 6D A7 15 77
1459:6D A7 15 69 7B 8D A7 15 D1
1461:A9 04 8D A8 15 38 AD A5 26
1469:15 ED A7 15 8D B3 15 AD F0
1471:A6 15 ED A8 15 0D B3 15 D3
1479:F0 C9 38 AD A3 15 ED A7 63
1481:15 8D B3 15 AD A4 15 ED 77
1489:A8 15 0D B3 15 F0 B4 20 1E
1491:97 E0 A5 8F 29 0F 69 01 C4
1499:8D CF 15 60 38 AD A1 15 F5
14A1:E9 01 8D A1 15 20 C2 10 89
14A9:AD A1 15 C9 00 F0 01 60 76
14B1:20 53 0B 60 20 E1 14 C8 9F
14B9:91 FB C8 91 FB 20 E8 14 22
14C1:60 B9 A3 15 85 FB B9 A4 82
14C9:15 85 FC A0 00 A9 20 60 CE
14D1:18 A5 FB 69 00 85 FD A5 3D
14D9:FC 69 D4 85 FE A0 00 60 A8
14E1:A9 20 A0 00 91 FB 60 18 50
14E9:A5 FB 69 28 85 FB A5 FC F7
14F1:69 00 85 FC 60 A9 16 8D B2
14F9:01 D4 A9 41 8D 04 D4 A9 F0
1501:0F 8D 05 D4 A9 E6 8D 06 0E
1509:D4 60 A9 0F 8D 18 D4 A9 FB
1511:05 8D D6 15 60 A2 19 A9 B6
1519:00 9D FF D3 CA D0 FA 60 D7
1521:AD B5 15 D0 09 20 F6 14 0A
1529:A9 0B 8D 18 D4 60 20 16 9C
1531:15 60 A9 C8 8D 01 D4 A9 83
1539:13 8D 04 D4 A9 09 8D 05 AF
1541:D4 A9 0F 8D 06 D4 20 0B C9
1549:15 20 43 0B 60 8A 8D 01 68
1551:D4 A9 83 8D 04 D4 A9 00 60
1559:8D 05 D4 A9 F0 8D 06 D4 5F
1561:20 0B 15 20 3C 0B A9 00 64
1569:8D D6 15 20 16 15 60 A9 24
1571:0A 8D 01 D4 A9 83 8D 04 EB
1579:D4 A9 00 8D 05 D4 A9 7F 9F
1581:8D 06 D4 20 0B 15 60 A9 A7
1589:01 8D 01 D4 A9 83 8D 04 7F
1591:D4 A9 00 8D 05 D4 A9 7F B7
1599:8D 06 D4 20 0B 15 60 00 16

```

Maurice Yanney, the author of *Cats and Mice* (January 1993), tends his garden in Lebanon, Pennsylvania.

## STEPMAN

By David Williams

Stepman is a simple game for the 128 in 40-column mode that's designed to improve a child's spelling. The game includes colorful animated graphics, music, and sound effects.

### Entering the Program

Stepman consists of two parts: the main program and sprite data. The main part is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before exiting Proofreader.

The second part is data for Stepman's sprites. Enter this part of the program with MLX, our machine language entry program. See "Typing Aids" again. When MLX prompts, respond with the following values.

Starting address: 0E00  
Ending address: 0FFF

Be sure to save this data with the filename STEPMAN.SPR. The main program looks for and loads this filename when it runs.

### A Helping Hand

Stepman is a very tiny person. In order to make it to his girlfriends' house by lunchtime, he must get to the top of a very large staircase. It's way too large for him to climb, but fortunately he's a champion high jumper at school. This is where you come in. At every step, Stepman is presented with a word that may or may not be spelled correctly. You must type in the correct spelling in order to help him on his upward journey. If you spell the word correctly, he'll be able to jump to the next higher step. Spell it incorrectly, and he'll fall back one step, bruising a sensitive spot of his anatomy.

Once Stepman has reached the top of the staircase, he'll be very grateful to you for your invaluable aid. He'll jump for joy and ask if you'd like to play again.

When you're entering a word, use the Del key to correct any mistakes you may make. An invalid keypress will cause a bell to ring. Use the Return

# PROGRAMS

key when you believe you've entered the word correctly.

The words that the program uses are listed in data statements. These can be modified at any time. Remember, however, to enter a pair of words for each entry: one with a common spelling mistake and the other spelled correctly. Of course, you could make an entry with both words spelled correctly if you wish.

Stepman can be used for situations other than spelling. The words could be replaced with atomic elements to help you study for a chemistry test.

Stepman also has a Help function that contains brief instructions. It can be called at any time by pressing the 128's Help key.

## STEPMAN

```
SQ 0 FAST: BLOAD"STEPMAN.SPR": I
=RND(-TI): CLR: GRAPHIC.: RE
STORE: SYS24812,,9,,CHR$(
27)+"H": COLOR.,12: COLOR4,
16: FORI=2TO7: SPRITEI,..: NE
XT: SPRITE1,1,16,,...: T
EMPO6
DR 1 W=49: DIMS,J,A$,B$,C$,S$,A
$(W-1),C$(W-1): FORI=.TOW-
1: READA$(I),C$(I): NEXT
XB 2 PRINT"{2 HOME}{CLR}{BLK}
{N}{RVS}STEPMAN
{10 SPACES}DM WILLIAMS &
{SPACE}SR PATTON": PRINTTA
B(8){DOWN}{3}EASY STEPS
{SPACE}TO SPELLING!
JJ 3 PRINTTAB(7){YEL}COMPUTE
{SPACE}PUBLICATIONS 1993":
PRINTTAB(6)"PROGRAMMING
{SPACE}: DAVID WILLIAMS":
PRINT"{2 DOWN}{6}YOU MUST
HELP STEPMAN CLIMB UP AL
L THE
RR 4 PRINT"STAIRS. TO DO THIS,
YOU ARE GIVEN A": PRINT"S
ERIES OF WORDS, WHICH MAY
OR MAY NOT BEMISPELT. Y
OU ARE TO TYPE IN THE COR
RECTSPELLING, AND IF YOU
{SPACE}ARE CORRECT,
SQ 5 PRINT"STEPMAN WILL CLIMB
{SPACE}UP A STAIR, OTHERW
ISEHE WILL FALL BACK DOWN
ONE !!": SPRITE8,..,16,..,1
,1,..: MOVSPR8,150,170
BJ 6 GRAPHIC1,1: COLOR1,2: FORI=
12TO24: FORJ=1TO40-3*(24-I
): CHAR1,40-J,I," ",1: NEXT
: NEXT
GG 7 COLOR1,1: CHAR1,.., "STEPM
AN{10 SPACES}DM WILLIAMS
{SPACE}& SR PATTON",1: COL
OR1,11: CHAR1,31,24,"STEP
```

```
{SPACE}: ",1: SLOW
CD 8 SPRSAV8,1: MOVSPR1,25,222:
CHAR1,15,2,"{10 SPACES}":
CHAR1,..,3,"{40 SPACES}": C
HAR1,2,4,"{35 SPACES}"
MH 9 S=: GOSUB30: PLAY"V104T7U8
X0V204T08X0V201IAV103IEV
202QAV103SA04CO3BEV202I#G
V103SBO4DV104ICV202SAEMV1
04IEV202SA03CV103I#GV202S
BEV104IEV202SBO3D
QJ 10 PLAY"V203ICV103SAEV202IA
V103SA04CV202I#GV103SBEV
202IEV103SBO4DV104ICV202
SAEV103IAV202SA03CV104QR
V202SBEBO3D
SB 11 CHAR1,..,2,"YOUR WORD IS
{SPACE}": CHAR1,..,3,"HOW
DO YOU SPELL THIS CORRE
CTLY?
RQ 12 I=INT(RND(.)*W): A$=A$(I)
: C$=C$(I): IFRND(.)<.1THE
NA$=C$
GM 13 CHAR1,15,2,"{15 SPACES}":
: CHAR1,15,2,A$: CHAR1,1,4
,"{0}": B$=""
SC 14 GETKEYS$: IFS$=CHR$(27)TH
ENGETS$: IFS$="H"THENGRAP
HIC.: SPRITE1,..: SPRITE8,1
: GETKEYS$: GETS$: GRAPHIC1
: SPRITE8,..: SPRITE1,1: GOT
O14
AE 15 IFS$=CHR$(20)ANDLEN(B$)>
.THENB$=LEFT$(B$,LEN(B$)
-1): CHAR1,LEN(B$)+1,4,"
{0} " :GOTO14
CG 16 IFS$=CHR$(13)THENCHAR1,L
EN(B$)+1,4," " :GOTO18: EL
SEIFS$<"A"ORS$>"Z"THENPR
INT"{G}":GOTO14
CQ 17 B$=B$+S$: CHAR1,LEN(B$),4
,S$+"{0}":GOTO14
EQ 18 IFS$=C$THENBEGIN: CHAR1,1
5,7,"WELL DONE!": SOUND2,
20000,50,..,2000,100: SPRS
AV2,1: FORJ=1TO10: MOVSPR1
,+2,-1: NEXT: SLEEP.5: SPRS
AV3,1: FORJ=1TO2: MOVSPR1,
+1,+1
RD 19 NEXT: MOVSPR1,+2,+.: SPRSA
V8,1: S=S+1: GOSUB30: IFS=1
2THENSPRSAV7,1: FORI=1TO3
: FORJ=1TO15: MOVSPR1,+.,-
1: NEXT: SLEEP.5: FORJ=1TO1
5: MOVSPR1,+.,+1: NEXT: NEX
T
RS 20 CHAR1,15,7,"{10 SPACES}":
: BEND
RC 21 IFS$<C$ANDS>.THENBEGIN:
CHAR1,17,7,"OOPS!": SOUND
2,49152,70,1,..,100,1,..: S
LEEP.5: SPRSAV4,1: MOVSPR1
,-2,+.: FORJ=1TO2: MOVSPR1
,-1,-1: NEXT: SLEEP.5: SPRS
AV5,1
GA 22 FORJ=1TO10: MOVSPR1,-2,+1
: NEXT: SLEEP.5: SPRSAV6,1:
```

```
SLEEP1: SPRSAV8,1: S=S-1: G
OSUB30: CHAR1,17,7,"
{5 SPACES}": BEND
HB 23 CHAR1,1,4,"{14 SPACES}":
IFS<12THENGOTO12
KH 24 CHAR1,..,2,"{15 SPACES}WE
LL DONE!": CHAR1,..,3,"YOU
HAVE HELPED STEPMAN CLI
MB THE STAIRS
DF 25 PLAY"V203ICV104SREV202IA
V104SCEV203ICV103SA04CV2
02IAV102SEGV103IFV203SDO
2AV103IAV202SFAV104IFV20
1SA02C
BH 26 PLAY"V201IFV104SCO3AV201
IDV103SFAV103IDV201SGO2G
V103IBV202SFGV201IAV104S
CO3AV202I#FV104SCEV201IB
V104SDO3BV202I#GV104SDF
DB 27 PLAY"V202ICV104SECV202IA
V104SEGV202IDV104SFEV202
I$BV104SDCV202I#GV103SBO
4CV202IFV104SDEV202IDV10
4SFDV201IBV104S#GD
SP 28 PLAY"V202I#GV104SBDV202I
AV104SCAV202IDV104SFDV20
2IEV103SBO4DV202IFV103S#
GBV202I#DV104SCO3AV202IE
V103SEAV202IEV103SB#GV20
1HAV103SAECE02QA
EB 29 SLEEP2: CHAR1,2,4,"WOULD
{SPACE}YOU LIKE TO PLAY
{SPACE}AGAIN? (Y/N)": POK
E208,..: GETKEY$: IFA$="Y"
THENGOTO8: ELSESPRITE1,..:
GRAPHIC.: PRINT"{CLR}GOOD
BYE!": END
KC 30 COLOR1,11: J=S: S$="00": IF
S>9THENMID$(S$,1,1)="1":
J=S-10
QB 31 MID$(S$,2,1)=CHR$(ASC("0
")+J): CHAR,38,24,S$,1: CO
LOR1,8: RETURN
JQ 32 DATAWORD,WORD,BLUD,BLOOD
,BISKIT,BISCUIT,CIRKIT,C
IRCUIT,DISPARE,DESPAIR,P
ROFFESOR,PROFESSOR,ENDEVE
ER,ENDEAVOUR,WALLNUT,WAL
NUT,DISDANE,DISDAIN,KONV
OY,CONVOY
CB 33 DATASELEBRAITION,CELEBRA
TION,WENDSDAY,WEDNESDAY,
DREEM,DREAM,CAPTIN,CAPTA
IN,GAURD,GUARD,COOKOO,CU
CKOO,BASIN,BASIN,BASAUL
T,BASALT,PEECH,PEACH,CLE
ER,CLEAR
PH 34 DATAMEENING,MEANING,PERF
ORMENSE,PERFORMANCE,INVE
STAGATE,INVESTIGATE,THON
DER,THUNDER,NECESSARY,NEC
ESSARY,LURN,LEARN,NURV,N
ERVE,TURM,TERM,FORTEEN,F
OURTEEN
RA 35 DATASIMALAR,SIMILAR,SATE
RDAY,SATURDAY,SESON,SEAS
ON,JELY,JELLY,COMAND,COM
```

MAND, CONSTELATION, CONSTE  
LLATION, BUSINES, BUSINESS  
, DIFICULT, DIFFICULT, HARB  
OR, HARBOUR  
AA 36 DATA CHALLENGE, CHALLENGE,  
INTELLAGANT, INTELLIGENT,  
DUPLICAIT, DUPLICATE, PEEP  
LE, PEOPLE, AMUSMENTS, AMUS  
EMENTS, SPESHEL, SPECIAL, P  
UTEY, BEAUTY, LISSSEN, LISTE  
N  
DJ 37 DATADISTANS, DISTANCE, CAM  
ARA, CAMERA, CHOCLET, CHOCO  
LATE

### STEPMAN.SPR

```

0E00:03 F8 00 04 04 00 08 92 DE
0E08:00 08 22 00 08 72 00 04 78
0E10:04 00 03 F8 00 0E 07 00 64
0E18:1A 05 80 31 04 C0 18 84 7D
0E20:60 0C 44 30 00 FF 00 01 FB
0E28:C3 80 03 81 C0 07 00 E0 C1
0E30:0E 00 E0 1C 01 C0 38 03 AF
0E38:80 70 07 00 00 00 00 00 91
0E40:03 F8 00 04 04 00 08 92 1F
0E48:00 08 22 00 08 72 00 04 B8
0E50:04 00 03 F8 00 0E 07 00 A4
0E58:1A 05 80 31 04 D8 30 84 4E
0E60:60 18 44 00 00 FF 00 01 3C
0E68:C3 80 03 81 C0 03 80 E0 F2
0E70:07 01 C0 0E 03 80 1C 07 A2
0E78:00 38 0E 00 00 00 00 00 64
0E80:00 00 00 03 F8 00 04 04 A0
0E88:00 08 92 00 08 22 00 08 C9
0E90:72 00 04 04 00 03 F8 00 A4
0E98:0E 07 00 1A 05 B0 31 04 70
0EA0:E0 18 84 00 0C 44 00 00 35
0EA8:FF 00 01 C3 80 03 81 C0 F4
0EB0:03 81 C0 03 83 80 07 07 2A
0EB8:00 0E 0E 00 1C 1C 00 00 6B
0EC0:03 F8 00 04 04 00 08 92 9F
0EC8:00 08 22 00 08 72 00 04 39
0ED0:04 00 03 F8 00 0E 07 00 25
0ED8:1A 05 B0 31 04 E0 60 84 55
0EE0:00 C0 44 00 00 FF 00 01 B6
0EE8:C3 80 01 C1 C0 03 80 E0 37
0EF0:07 00 70 0E 00 E0 1C 01 3C
0EF8:C0 38 03 80 00 00 00 EB
0F00:03 F8 00 04 04 00 08 92 E0
0F08:00 08 22 00 08 72 00 04 7A
0F10:04 00 03 F8 30 0E 07 60 48
0F18:DA 05 80 71 04 00 00 84 B0
0F20:00 00 44 00 00 FF 00 01 C7
0F28:C3 80 01 C1 C0 00 E0 E0 2D
0F30:00 70 70 00 38 38 00 1C 37
0F38:1C 00 0E 0E 00 00 00 00 07
0F40:00 00 00 00 00 00 00 00 5E
0F48:00 00 00 00 00 00 00 00 66
0F50:00 00 07 F0 00 08 08 00 8E
0F58:11 24 00 10 44 00 10 E4 30
0F60:00 08 08 00 07 F1 CE 9C BB
0F68:0F 9C B4 07 38 E2 0E 70 16
0F70:01 1C E0 00 BD C0 01 FF 25
0F78:80 00 E7 00 00 00 00 D3
0F80:03 F8 00 04 04 00 08 92 61
0F88:00 08 22 10 88 72 30 C4 21
0F90:04 60 63 F8 C0 3E 07 80 52
0F98:02 04 00 01 04 00 00 84 6D
0FA0:00 00 44 00 00 FF 00 01 48

```

```

0FA8:C3 80 03 81 C0 07 00 E0 44
0FB0:0E 00 70 1C 00 38 38 00 F6
0FB8:1C 70 00 0E 00 00 00 00 E1
0FC0:03 F8 00 04 04 00 08 92 A1
0FC8:00 08 22 00 08 72 00 04 3B
0FD0:04 00 03 F8 00 0E 07 00 27
0FD8:1A 05 80 31 04 C0 18 84 40
0FE0:60 0C 44 30 00 FF 00 01 BE
0FE8:C3 80 03 81 C0 07 00 E0 84
0FF0:0E 00 E0 1C 01 C0 38 03 72
0FF8:80 70 07 00 00 00 00 00 54

```

David Williams is the author of *Hangman 128*, *Typing Tutor*, and *Mega Adventure*. He lives in Charlestown, New South Wales, Australia.

## POWERSPRITE

By Danny English

If you've ever used sprites in your own programs, you know how time consuming they can be. Setting their colors, expansion, coordinates, and other pointers can be tedious.

Powersprite, a program for the 64, makes setting up sprites a snap. A simple onscreen editor allows total control over all sprite registers. You can then save the data to disk for use in your own programs.

Many programs require graphics larger than a single sprite. Connecting sprites and moving them together can be a serious task, but Powersprite makes that chore easy. Powersprite lets you connect up to eight sprites to form one giant powersprite, which can be moved or animated with a single command. All you have to do is draw the sprites!

### Getting Started

Powersprite is written entirely in machine language. All codes and data reside in memory locations \$C000-\$C6FF. A demonstration is included as an example of how to use Powersprite in a BASIC program. Since Powersprite doesn't draw sprite shapes, they must be drawn using a sprite editor, such as COMPUTE's Sprite Magic. Powersprite is compatible with almost any sprite editor if the sprite data can be loaded into bank 0.

You must enter Powersprite with MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following.

Starting address: C000

Ending address: C6FF

Be sure to save a copy of the program with the filename POWERSPRITE before you exit MLX. This is the filename that the demonstration program loads when it runs.

The demo program is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; see "Typing Aids" again. Be sure to save it on the same disk as the Powersprite program. By running the demo and following its code, you'll have a good idea of how to use Powersprite commands.

### The Editor

To use Powersprite, load it with the .8,1 extension and then enter *NEW*. Next, load your sprites. To enter the editor, type *SYS 49152*. You will be prompted about how many sprites to connect. If you don't wish to create a powersprite, press 0 to skip that option.

If you are making a powersprite, press 1 through 8, depending on the number of sprites you want to connect. The editor commands will now appear at the top of the screen with a block of sprites below them. The commands are similar to those of other sprite editors. Press X or Y to expand, O to turn sprites off or on, and so on. Press the key again to undo that command.

The current sprite being set is displayed in gray in the upper left corner of the screen. To select another sprite, press keys 0-7. If you select a sprite that isn't enabled, simply press 0 to turn it on.

Use the cursor keys to move individual sprites. Sprites can be moved anywhere on the screen. Multiple sprites can be connected in any way to form a powersprite. The @/:; keys move a defined powersprite up, down, left, or right, respectively. For example, if you define four sprites to be connected, sprites 0-3 would move together as one powersprite.

Pressing the + or - keys will increment or decrement the frame of an individual sprite. All sprite frames default to 192, meaning sprite data is stored at 12288. Please see the animation section below for details on powersprite frames.

To edit the colors on an individual

sprite, press C. A new menu will appear that will let you set sprite and background colors using keys 1-4. All three sprite colors can be accessed only if the sprite is in multicolor mode.

When all sprites are in place, press Q to quit the editor. You will then be prompted to save your data to disk or abort. If you choose to abort but change your mind a short time later, don't worry. The data will still be stored in memory. At anytime after quitting, you can enter the editor again, and all sprites will remain intact for further editing. If you choose to save to disk, you will be prompted for a filename. A copy of the code is stored along with your custom data. A saved file will function independently of the original Powersprite program.

## Storing and Recalling

In some cases, you may wish to set up your sprite display manually using POKES and PEEKs, or you may wish to leave it under program control. To take a snapshot of all sprite registers, type *SYS 49155*. If you wish to define a powersprite, enter *POKE 49192, N* where N is the number of sprites connected. To store the snapshot on disk, simply enter *SYS 50754*.

To recall your stored sprite registers, load your saved file. Enter *SYS 49158*, and the sprites will appear exactly as you positioned them. If you decide to make any more changes, simply enter *SYS 49152* to use the editor again.

## Powerful Sprites

The most advanced feature of Powersprite allows you to move and animate multiple sprites. To move a powersprite, it should first be displayed using the RECALL command. The format for moving a powersprite is *SYS 49164,X,Y,M*. The X and Y values correspond to the x and y coordinates of sprite 0. All other sprites will be moved respective to these values. The legal limits of X and Y are 0 to 255. To move beyond the 255th X position, set X back to 0 and M to 1. When you set M to 1, the program will automatically add 255 in the x-axis to each sprite that is beyond that range. For example, to move a powersprite to location 265, 100, the command would be *SYS 49164,10,100,1*.

## Limitations

There are restrictions when manipulating a powersprite. First, don't move a powersprite more than 255 positions at a time. The program won't add or subtract a value greater than 255.

Second, be careful when moving larger powersprites off the border. Some of the sprites may wrap around, causing unwanted effects. If your powersprite does wrap around, simply move it back in the opposite direction a few times. Any other sprites on the screen won't be disturbed by a powersprite.

## Animation

Animating a powersprite is much like animating a normal sprite. The only difference is that one frame of a powersprite may consist of up to eight normal sprite frames. To set the frame of a powersprite, enter *SYS 49161, F* where F is the starting frame number. Legal frame values range from 0 to 255. For example, if you enter 192 for F and three sprites have been defined as a powersprite, sprite 0 will point to 192, sprite 1 to 193, and sprite 2 to 194. The next frame should start at 195. Designing correct frames should be done using a good sprite editor.

A moving animated powersprite can produce a high-speed, commercial-quality display. Whether you're making a giant animated dragon for an adventure game or just setting up a simple sprite display, Powersprite will make it a lot less painful.

## POWERSPRITE

```
C000:4C 40 C0 4C 43 C0 4C 46 90
C008:C0 4C 49 C0 4C 4C C0 00 47
C010:85 7C 9D 7C B5 7C CD 7C A6
C018:85 91 9D 91 B5 91 CD 91 AE
C020:00 45 4C 45 43 FF 20 00 2B
C028:08 00 00 00 00 00 F2 F3 87
C030:F1 F1 F1 F1 F1 F1 F1 B1
C038:C0 C0 C0 C0 C0 C0 C0 B9
C040:4C 43 C3 4C 34 C2 4C 7F BA
C048:C2 4C FB C4 4C 1B C5 00 64
C050:50 4F 57 45 52 53 50 52 DF
C058:49 54 45 20 20 20 20 20
C060:13 12 9B 53 50 52 49 54 4B
C068:45 20 20 05 20 5B 30 2D E4
C070:37 5D 20 53 45 4C 45 43 47
C078:54 20 20 5B 40 2F 3A 3B 54
C080:20 43 52 53 52 5D 20 4D F7
C088:4F 56 45 20 20 20 5B 2B 55
C090:2D 5D 20 46 52 41 4D 45 DF
C098:20 20 20 5B 58 59 5D 20 EE
C0A0:45 58 50 41 4E 44 20 20 DC
C0A8:20 5B 4F 5D 46 46 2F 4F C9
```

```
C0B0:4E 20 20 20 20 20 5B 4D EC
C0B8:5D 55 4C 54 49 43 4F 4C 4F
C0C0:4F 52 20 20 20 5B 43 5D D6
C0C8:4F 4C 4F 52 20 20 5B 31
C0D0:51 5D 55 49 54 2F 53 41 D8
C0D8:56 45 20 20 13 12 9B 20 15
C0E0:53 50 52 49 54 45 20 20 17
C0E8:20 05 20 2D 20 98 50 52 E8
C0F0:45 53 53 20 31 2D 34 20 1D
C0F8:46 4F 52 20 43 4F 4C 4F FC
C100:52 20 20 5B 51 5D 55 49 62
C108:54 05 20 5B 31 5D 20 53 43
C110:50 52 49 54 45 20 43 4F 3F
C118:4C 4F 52 20 20 20 20 20 C3
C120:5B 32 5D 20 4D 55 4C 54 38
C128:49 43 4F 4C 4F 52 20 23 F6
C130:31 20 20 5B 33 5D 20 4D AA
C138:55 4C 54 49 43 4F 4C 4F D7
C140:52 20 23 32 20 20 20 20 5E
C148:5B 34 5D 20 42 41 43 4B 1D
C150:47 52 4F 55 4E 44 20 20 2F
C158:20 20 93 12 05 20 45 4E 09
C160:54 45 52 20 23 20 4F 46 2A
C168:20 53 50 52 49 54 45 53 79
C170:20 54 4F 20 43 4F 4E 4E 47
C178:45 43 54 20 28 31 2D 38 94
C180:29 3F 20 20 20 93 12 05 E6
C188:20 53 41 56 45 20 54 4F 21
C190:20 9B 44 05 49 53 4B 20 32
C198:4F 52 20 9B 41 05 42 4F 08
C1A0:52 54 3F 20 20 20 20 20 E2
C1A8:20 20 20 20 20 20 20 20 2C
C1B0:20 20 20 20 20 93 05 92 3E
C1B8:46 49 4C 45 4E 41 4D 45 E6
C1C0:3A 20 A0 00 B9 60 C0 20 6E
C1C8:D2 FF C8 C0 7D D0 F5 AD A3
C1D0:22 C2 18 69 B0 8D 07 04 7D
C1D8:60 A0 00 B9 DC C0 2D D2 4D
C1E0:FF C8 C0 7E D0 F5 AD 22 72
C1E8:C2 18 69 B0 8D 07 04 60 FC
C1F0:A0 00 B9 5A C1 20 D2 FF D5
C1F8:C8 C0 2B D0 F5 60 A0 00 F5
C200:B9 85 C1 20 D2 FF C8 C0 B6
C208:2F D0 F5 60 A0 00 B9 B5 4C
C210:C1 20 D2 FF C8 C0 0D 00 D0
C218:F5 60 01 02 04 08 10 20 71
C220:40 80 00 01 A9 14 8D 4F FD
C228:C0 A2 00 CA D0 FD CE 4F CE
C230:C0 D0 F8 60 A0 00 B9 00 E7
C238:D0 99 10 C0 C8 C0 11 D0 D6
C240:F5 AD 15 D0 8D 25 C0 AD 0C
C248:17 D0 8D 27 C0 AD 1B D0 75
C250:8D 2B C0 AD 1C D0 8D 2C C5
C258:C0 AD 1D D0 8D 2D C0 A0 9D
C260:00 B9 27 D0 99 30 C0 B9 0F
C268:F8 07 99 38 C0 C8 C0 08 95
C270:D0 EF AD 25 D0 8D 2E C0 3C
C278:AD C6 D0 8D 2F C0 60 20 AE
C280:C0 22 AD 25 C0 8D 15 D0 56
C288:AD 27 C0 8D 17 D0 AD 2B 22
C290:C0 8D 1B D0 AD 2C C0 8D 77
C298:1C D0 AD 2D C0 8D 1D D0 30
C2A0:A0 00 B9 30 C0 99 27 D0 3C
C2A8:B9 30 C0 99 F8 07 C8 C0 01
C2B0:08 D0 EF AD 2E C0 8D 25 FB
C2B8:D0 AD 2F C0 8D 26 D0 60 0B
C2C0:A0 00 B9 10 C0 99 00 D0 0C
C2C8:C8 C0 11 D0 F5 60 20 F0 74
C2D0:C1 20 E4 FF C9 2F B0 03 4B
C2D8:4C D1 C2 C9 39 90 03 4C 4C
```

```

C2E0:D1 C2 C9 30 F0 22 38 E9 A6
C2E8:30 8D 28 C0 A9 01 8D 15 7C
C2F0:D0 AC 28 C0 88 C0 00 F0 53
C2F8:0E 18 B9 1A C2 6D 15 D0 2B
C300:8D 15 D0 88 4C F5 C2 60 56
C308:A9 FF 8D 15 D0 60 BD 00 EA
C310:D0 2D 23 C2 CD 23 C2 F0 4D
C318:0D AD 23 C2 18 7D 00 D0 A9
C320:9D 00 D0 4C 60 C3 BD 00 E2
C328:D0 38 ED 23 C2 9D 00 D0 73
C330:4C 60 C3 A2 00 AC 22 C2 52
C338:C0 00 D0 01 60 E8 E8 88 4B
C340:4C 38 C3 A9 93 20 D2 FF D1
C348:A9 0B 8D 20 D0 A9 06 8D E1
C350:21 D0 20 7F C2 20 CE C2 8F
C358:A2 00 8E 22 C2 20 C2 C1 03
C360:AC 22 C2 B9 1A C2 8D 23 D4
C368:C2 20 E4 FF C9 38 90 29 6F
C370:C9 58 F0 39 C9 59 F0 3A 74
C378:C9 4D F0 3B C9 4F F0 3C B3
C380:C9 51 F0 3D C9 2B F0 3C 4C
C388:C9 2D F0 47 C9 43 F0 36 16
C390:20 E2 C3 4C 60 C3 4C BD 86
C398:C4 C9 30 B0 03 4C 70 C3 F3
C3A8:38 E9 30 8D 22 C2 AA 20 2F
C3A8:C2 C1 4C 60 C3 A2 1D 4C C0
C3B0:0E C3 A2 17 4C 0E C3 A2 BA
C3B8:1C 4C 0E C3 A2 15 4C 0E 6F
C3C0:C3 4C 42 C6 AC 22 C2 18 7D
C3C8:B9 F8 07 69 01 99 F8 07 4A
C3D0:4C 60 C3 A2 22 C2 38 B9 20
C3D8:F8 07 E9 01 99 F8 07 4C F6
C3E0:60 C3 20 51 C4 20 24 C2 54
C3E8:A5 C5 C9 07 F0 05 C9 02 8F
C3F0:F0 0B 60 AD 8D 02 C9 01 A3
C3F8:F0 0D 4C 0E C4 AD 8D 02 A0
C400:C9 01 F0 11 4C 33 C4 20 B6
C408:33 C3 DE 01 D0 60 20 33 83
C410:C3 FE 01 D0 60 20 33 C3 16
C418:BD 00 D0 C9 00 F0 04 DE E1
C420:00 D0 60 AD 23 C2 38 ED 47
C428:10 D0 8D 10 D0 A9 FF 9D 6B
C430:00 D0 60 20 33 C3 BD 00 20
C438:D0 C9 FF F0 04 FE 00 D0 98
C440:60 AD 23 C2 18 6D 10 D0 5D
C448:8D 10 D0 A9 00 9D 00 D0 98
C450:60 A5 C5 C9 2E F0 24 C9 10
C458:37 F0 29 C9 2D F0 46 C9 FE
C460:32 F0 2A 60 AD 00 D0 8D 27
C468:15 C5 AD 01 D0 8D 16 C5 62
C470:AD 10 D0 29 01 8D 17 C5 B3
C478:4C 34 C2 20 64 C4 CE 16 79
C480:C5 4C 2D C5 20 64 C4 EE 0D
C488:16 C5 4C 2D C5 20 64 C4 27
C490:EE 15 C5 AD 15 C5 C9 00 BD
C498:F0 03 4C 2D C5 A9 01 8D 1C
C4A0:17 C5 4C 2D C5 20 64 C4 BF
C4A8:CE 15 C5 AD 15 C5 C9 FF C5
C4B0:F0 03 4C 2D C5 A9 00 8D 32
C4B8:17 C5 4C 2D C5 20 D9 C1 BF
C4C0:20 E4 FF C9 31 F0 13 C9 6D
C4C8:32 F0 1E C9 33 F0 20 C9 6F
C4D0:34 F0 22 C9 51 D0 E9 4C 7F
C4D8:5D C3 AC 22 C2 B9 27 D0 D5
C4E0:18 69 01 99 27 D0 4C C0 60
C4E8:C4 EE 25 D0 4C C0 C4 EE 20
C4F0:26 D0 4C C0 C4 EE 21 D0 4C
C4F8:4C C0 C4 20 9B B7 8A A6 EA
C500:00 A0 00 E6 00 F0 0D 99 39
C508:F8 07 18 69 01 CA C8 CC FC
C510:28 C0 D0 EF 60 00 00 00 FB
C518:00 00 00 20 9B B7 8E 15 93
C520:C5 20 9B B7 8E 16 C5 20 FD
C528:9B B7 8E 17 C5 AD 16 C5 89
C530:CD 11 C0 B0 12 A9 01 8D D0
C538:18 C5 AD 11 C0 38 ED 16 E0
C540:C5 8D 1A C5 4C 56 C5 A9 A2
C548:00 8D 18 C5 AD 16 C5 38 20
C550:ED 11 C0 8D 1A C5 A2 00 35
C558:A0 00 AD 18 C5 C9 01 F0 B3
C560:0D BD 11 C0 18 6D 1A C5 80
C568:9D 11 C0 4C 78 C5 BD 11 4B
C570:C0 38 ED 1A C5 9D 11 C0 51
C578:C8 E8 E8 CC 28 C0 D0 DA 4D
C580:AD 10 D0 29 01 CD 17 C5 C6
C588:F0 3E 90 1E A9 01 8D 18 94
C590:C5 A9 FF 38 ED 15 C5 8D C9
C598:19 C5 AD 10 C0 18 6D 19 33
C5A0:C5 8D 19 C5 EE 19 C5 4C A5
C5A8:F1 C5 A9 00 8D 18 C5 A9 D5
C5B0:FF 38 ED 10 C0 8D 19 C5 3D
C5B8:AD 15 C5 18 6D 19 C5 8D 83
C5C0:19 C5 EE 19 C5 4C F1 C5 C2
C5C8:AD 15 C5 CD 10 C0 B0 12 FC
C5D0:A9 01 8D 18 C5 AD 10 C0 6A
C5D8:38 ED 15 C5 8D 19 C5 4C A3
C5E0:F1 C5 A9 00 8D 18 C5 AD 12
C5E8:15 C5 38 ED 10 C0 8D 19 0E
C5F0:C5 A0 00 A2 00 AD 18 C5 5E
C5F8:C9 01 F0 1F 18 BD 10 C0 52
C600:6D 19 C5 9D 10 C0 A9 00 F3
C608:69 00 C9 00 F0 29 B9 1A 3D
C610:C2 18 6D 20 C0 8D 20 C0 F1
C618:4C 37 C6 38 BD 10 C0 ED 93
C620:19 C5 9D 10 C0 A9 00 E9 F6
C628:00 C9 00 F0 0A AD 20 C0 3F
C630:38 F9 1A C2 8D 20 C0 E8 1F
C638:E8 C8 CC 28 C0 D0 B6 4C 8B
C640:00 C2 20 FE C1 20 E4 FF 2B
C648:C9 44 F0 09 C9 41 F0 03 B2
C650:4C 45 C6 60 0B 20 03 C0 D3
C658:20 C0 C2 A9 00 8D 54 C6 91
C660:A9 A0 AC 54 C6 99 0A 04 7A
C668:20 E4 FF C9 00 F0 F1 C9 4D
C670:14 F0 2F C9 0D F0 48 C9 4D
C678:10 F0 0E C9 2F B0 03 4C 3F
C680:60 C6 C9 5B 90 03 4C 00 68
C688:C6 AE 54 C6 E0 10 90 03 87
C690:4C 60 C6 AC 54 C6 99 50 41
C698:C0 20 D2 FF EE 54 C6 4C 8B
C6A0:60 C6 AD 54 C6 C9 00 D0 39
C6A8:03 4C 60 C6 A9 20 AC 54 BE
C6B0:C6 99 0A 04 CE 54 C6 A9 88
C6B8:14 20 D2 FF 4C 00 C6 A9 CD
C6C0:20 AC 54 C6 99 0A 04 A9 27
C6C8:00 8D 15 D0 A9 11 20 D2 0E
C6D0:FF AD 54 C6 A0 C0 A2 50 5E
C6D8:20 BD FF A9 00 A2 08 A0 BB
C6E0:01 20 BA FF A0 C0 A2 00 9B
C6E8:86 FA 84 FB A0 C6 A2 FF 2E
C6F0:A9 FA 20 D8 FF 4C 06 C0 A1
C6F8:C7 A2 0F A9 FA 20 D8 00 99
D"POWERSPRITE",8,1
FA 30 POKE53280,11:POKE53281,6
PB 40 PRINT "{CLR}"CHR$(14):POK
E53269,0
MS 50 PRINT "{DOWN}"{WHT}
{6 SPACES}{RVS} POWERSPR
ITE{2 SPACES}DEMONSTRATI
ON"
SC 60 PRINT "{2 DOWN}"{CYN} POSI
TIONING, MOVING AND ANIM
ATING{6 SPACES}"
CR 70 PRINT "MULTIPLE SPRITES
{SPACE}IS NOW A SNAP.
{2 SPACES}THIS{2 SPACES}
"
DA 80 PRINT "UTILITY CONNECTS
{SPACE}UP TO EIGHT SPRIT
ES TO"
CJ 90 PRINT "CREATE A GIANT 'P
OWERSPRITE', THAT CAN "
ES 100 PRINT "BE MOVED OR ANIM
ATED WITH ONE COMMAND.
{SPACE}"
HM 110 PRINT "POWERSPRITE IS A
CCESSED USING SIMPLE
{3 SPACES}"
AJ 120 PRINT "SYS COMMANDS FRO
M DIRECT MODE, OR YOUR
{SPACE}"
JR 130 PRINT "OWN BASIC OR MAC
HINE LANGUAGE PROGRAMS.
"
EH 140 PRINT "{DOWN}"{YEL}
{7 SPACES}- HIT A KEY T
O CONTINUE -"
PJ 150 GET K$:IFK$=""THEN150
ER 160 PRINT "{CLR}"{3 DOWN}
{CYN} POWERSPRITE CAN B
E USED TO STORE DATA
{2 SPACES}"
HX 170 PRINT "FOR ALL SPRITES,
INCLUDING ALL X AND Y
{5 SPACES}"
PK 180 PRINT "VALUES, COLORS,
{SPACE}FRAMES, AND EXPA
NSION. "
HK 190 PRINT "A SIMPLE EDITOR
{SPACE}ALLOWS SPRITE SE
TUP{4 SPACES}"
GG 200 PRINT "WITHOUT TEDIOUS
{SPACE}PEEK AND POKES.
{2 SPACES}DATA "
QJ 210 PRINT "CAN BE STORED ON
DISK FOR USE IN YOUR
{2 SPACES}"
FX 220 PRINT "OWN PROGRAMS.
{2 SPACES}DATA IS RECAL
LED WITH{3 SPACES}"
AF 230 PRINT "ONE SIMPLE COMMA
ND.{2 SPACES}PLEASE HIT
A KEY{2 SPACES}"
JX 240 PRINT "TO SEE A POWERSP
RITE IN ACTION...
{6 SPACES}"
EA 250 GET K$:IFK$=""THEN250
RE 260 REM ** POWERSPRITE DEMO
**

```

### POWER DEMO

```

PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
AE 10 REM POWERSPRITE DEMO
EB 20 IFPEEK(49152)<>76THENLOA

```

```

AF 270 PRINT"{CLR}":POKE53281,
0
JQ 280 PRINT"{DOWN}{CYN}THE BI
G BLOCK IS A POWERSPRIT
E USING{4 SPACES}"
MG 290 PRINT"ALL EIGHT SPRITES
CONNECTED.{2 SPACES}A
{SPACE}SINGLE{2 SPACES}
"
GE 300 PRINT"COMMAND WILL MOVE
OR ANIMATE THIS GIANT
{SPACE}"
RB 310 PRINT"SPRITE.{2 SPACES}
NOTE: POWERSPRITE IS NO
T A{5 SPACES}"
FF 320 PRINT"SPRITE EDITOR.
{2 SPACES}ANY SPRITE ED
ITOR, SUCH "
QX 330 PRINT"AS SPRITE MAGIC W
ILL CREATE GRAPHICS
{4 SPACES}"
EB 340 PRINT"COMPATIBLE WITH P
OWERSPRITE.
AC 350 PRINT"{2 DOWN}{YEL}
{4 SPACES}- HIT A KEY &
WAIT TO CONTINUE -"
BQ 360 FOR X=12288 TO 12352:PO
KEX,255:NEXT
PS 370 SYS 49158: REM ** DISPL
AY/RECALL SPRITES
XH 380 SYS 49164,50,200,0: REM
** SET START X AND Y C
OORDINATES FOR POWERSPR
ITE
XC 390 FOR X=50 TO 200 STEP 2
EA 400 SYS49164,X,200,0:NEXT
MD 410 FOR Y=200 TO 100 STEP -
1
AE 420 SYS49164,200,Y,0:NEXT
CA 430 FOR X=200 TO 50 STEP -2
FC 440 SYS49164,X,100,0:NEXT
XR 450 FOR Y=100 TO 200
SH 460 SYS49164,50,Y,0:NEXT
PB 470 IF PEEK(198)=0THEN 390
CS 480 POKE53269,0:POKE53281,6
:POKE198,0
JQ 490 PRINT"{CLR}{DOWN}{WHT}
{9 SPACES}{RVS} POWERSP
RITE{2 SPACES}COMMANDS"
FB 500 PRINT"{2 DOWN}{YEL}ALL
{SPACE}ACCESSABLE THRU
{SPACE}BASIC OR DIRECT
{SPACE}MODE"
AQ 510 PRINT"{2 DOWN}{WHT} SYS
49152 {CYN}- ENTER POW
ERSPRITE EDITOR
BB 520 PRINT"{DOWN}{WHT} SYS 4
9155 {CYN}- STORE SPRIT
E INFO MANUALLY"
MR 530 PRINT"{DOWN}{WHT} SYS 4
9158 {CYN}- DISPLAY/REC
ALL SPRITES"
HP 540 PRINT"{DOWN}{WHT} SYS 4
9161,F{CYN} - ANIMATES
{SPACE}A POWERSPRITE"
AX 550 PRINT"{DOWN}{WHT} SYS 4
9164,X,Y,M {CYN}- MOVES

```

```

A POWERSPRITE"
HF 560 PRINT"{2 DOWN}{YEL}
{3 SPACES}PLEASE SEE AR
TICLE FOR A DETAILED
{4 SPACES}"
BA 570 PRINT"{6 SPACES}EXPLANA
TION OF EACH COMMAND."
MF 580 GET K$:IF K$=""THEN580
JK 590 GOTO30

```

*Danny English, the author of Tunnel Trap (November 1992), lives in Moreno Valley, California.*

## MATCH-A-THON

By Troy McBain

Match-A-Thon is an amusing game for the 64 that tests your memory in the style of "Concentration," the old television game show. Match-A-Thon can be played by one or two players using one or two joysticks. The object is to match 15 pairs of shapes hidden behind 30 squares on a 5 x 6 playing grid. The player who matches the most shapes wins.

When only one person is playing, the game keeps track of the number of guesses it takes to clear the board. Single players can try to better their scores by matching all 15 shapes in a fewer number of attempts.

### Entering the Game

Match-A-Thon is written entirely in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, enter the following starting and ending addresses.

**Starting address: 8000**

**Ending address: 8D27**

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

### Playing the Game

Load Match-A-Thon with the .8,1 extension and then type `SYS 32768` to start the game. You'll be asked whether this is a one-player or two-player game using one or two joysticks. Make selections by moving the cursor with a joystick in port 1 and pressing the fire button. Then move the cursor to the Start Game option to begin play.

When the grid appears, move the cursor to one of the squares and press

the fire button. One of 15 shapes will appear. Move to another square and press the fire button again to reveal another shape. If the two shapes match, you'll hear a tone, and those two squares will be removed from play. If they do not match, the shapes will disappear. As the game progresses and more shapes appear, try to remember their locations so you can make future matches.

This game is fun and addictive to play. It makes good use of the 64's SID chip to produce sounds as the players make selections. The graphics are very crisp since each shape is created with four programmable characters.

### MATCH-A-THON

```

8000:A9 FF 8D 68 88 8D 69 88 E3
8008:A9 00 8D C7 88 8D C6 88 9C
8010:8D C5 88 20 B0 83 A9 00 43
8018:8D C8 88 8D CB 88 8D 20 B7
8020:D0 8D 21 D0 A0 00 8C B5 F1
8028:88 20 75 85 A9 00 99 B6 B3
8030:88 99 BA 88 C8 C0 04 90 9D
8038:F3 A0 00 A9 00 99 C1 02 E1
8040:A9 10 99 22 8D C8 C0 1E 9E
8048:D0 F1 A0 00 8C 3E 03 A9 4F
8050:00 85 FB A9 1D 85 FC 20 E5
8058:2A 82 A6 FD BD C1 02 C9 86
8060:00 D0 EC C8 98 9D C1 02 80
8068:88 EE 3E 03 AD 3E 03 C9 97
8070:02 D0 DC C8 A9 00 8D 3E 75
8078:03 C0 0F D0 D2 A0 00 B9 EC
8080:0A 87 C9 00 F0 07 20 D2 58
8088:FF C8 4C 7F 80 A2 00 A9 75
8090:00 8D 3E 03 8D FF 03 A0 FF
8098:00 B9 43 87 20 D2 FF C8 FD
80A0:C0 07 D0 F5 E8 E0 06 D0 E4
80A8:EE EE FF 03 AD FF 03 C9 4A
80B0:02 F0 19 A9 92 20 D2 FF 67
80B8:A2 00 A9 9E 20 D2 FF A9 20
80C0:DD 20 D2 FF A9 0D 20 D2 A7
80C8:FE 4C 97 80 EE 3E 03 AD FB
80D0:3E 03 C9 05 F0 18 A0 00 64
80D8:B9 4A 87 C9 00 F0 07 20 C8
80E0:D2 FF C8 4C D8 80 A2 00 37
80E8:8E FF 03 4C 97 80 A0 00 56
80F0:B9 64 87 C9 00 F0 07 20 67
80F8:D2 FF C8 4C F0 80 A0 00 0C
8100:B9 26 88 99 00 38 C8 C0 47
8108:2A F0 03 4C 00 81 A9 00 DA
8110:99 00 38 C8 C0 40 F0 03 5F
8118:4C 0E 81 A9 E0 8D F8 07 C5
8120:A9 0D 8D 27 D0 A9 01 8D 1C
8128:1D D0 A9 01 8D 17 D0 A9 47
8130:01 8D 15 D0 20 4C 82 20 1E
8138:6A 8B 20 DD 8B 20 E8 8C 70
8140:C9 00 F0 F9 C9 08 F0 13 49
8148:C9 04 F0 12 C9 01 F0 11 B5
8150:C9 02 F0 10 C9 10 F0 0F 57
8158:4C 3D 81 4C 6A 81 4C 9E 56
8160:81 4C D2 81 4C FE 81 4C 57
8168:75 82 AD 66 88 C9 05 D0 29
8170:03 4C 3D 81 EE 66 88 AD 97

```

8178:00	D0	18	69	18	8D	00	D0	11	83A8:84	8C	4C	16	80	4C	3D	81	31	85D8:FB	38	E9	28	85	FB	A5	FC	14
8180:AD	10	D0	69	00	8D	10	D0	36	83B0:A9	00	85	FB	A9	D0	85	FC	95	85E0:E9	00	85	FC	4C	9E	85	A0	E9
8188:A5	B0	18	69	03	B0	A5	59	83B8:A9	00	85	FD	A9	30	85	FE	3D	85E8:00	A9	20	91	FB	A5	FB	38	22	
8190:B1	69	00	85	B1	20	66	85	7F	83C0:AD	0E	DC	29	FE	8D	0E	DC	77	85F0:E9	50	85	FB	A5	FC	E9	00	6A
8198:20	66	85	4C	3D	81	AD	66	6C	83C8:A5	01	29	FB	85	01	A2	00	3D	85F8:85	FC	4C	9E	85	AD	C4	88	6E
81A0:88	C9	00	D0	03	4C	3D	81	AC	83D0:A0	00	B1	FR	91	FD	C8	C0	F4	8600:C9	02	D0	03	4C	A4	85	A0	5D
81A8:CE	66	88	AD	00	D0	38	E9	36	83D8:08	90	F7	E8	F0	00	F0	1D	9B	8608:00	A9	20	91	FB	EE	C4	88	4A
81B0:18	8D	00	D0	AD	10	D0	E9	69	83E0:A5	FB	18	69	08	85	FB	A5	47	8610:AD	C4	88	C9	02	F0	10	A5	6C
81B8:00	8D	10	D0	A5	B0	38	E9	78	83E8:FC	69	00	85	FC	A5	FD	18	B3	8618:FB	18	69	28	85	FB	A5	FC	3D
81C0:03	85	B0	A5	B1	E9	00	85	D1	83F0:69	08	85	FD	A5	FE	69	00	3B	8620:69	00	85	FC	4C	9E	85	A5	EF
81C8:B1	20	66	85	20	66	85	4C	C3	83F8:85	FE	4C	D0	83	A5	01	09	D6	8628:FB	18	69	50	85	FB	A5	FC	CF
81D0:3D	81	AD	67	88	C9	00	D0	3B	8400:04	85	01	AD	0E	DC	09	01	5E	8630:69	00	85	FC	4C	9E	85	20	7A
81D8:03	4C	3D	81	CE	67	88	AD	03	8408:8D	0E	DC	AD	CE	88	AD	0C	D1	8638:21	85	20	66	85	AD	C4	88	96
81E0:01	D0	38	E9	18	8D	01	D0	08	8410:84	85	FB	AD	0D	84	85	FC	99	8640:C9	02	D0	16	20	51	85	20	9F
81E8:A5	B0	38	E9	78	85	B0	A5	71	8418:A9	08	85	FD	A9	35	85	FE	B4	8648:51	85	20	DA	84	AD	C5	88	FF
81F0:B1	E9	00	85	B1	20	66	85	FF	8420:A2	00	A0	00	B1	FB	91	FD	2D	8650:C9	01	F0	05	A9	02	8D	C5	27
81F8:20	66	85	4C	3D	81	AD	67	CD	8428:C8	C0	08	90	F7	E8	E0	3C	31	8658:88	60	C9	00	D0	5B	20	64	93
8200:88	C9	04	D0	03	4C	3D	81	8E	8430:F0	1F	A5	FB	18	69	08	85	E9	8660:86	4C	A4	85	EE	C5	88	AD	FD
8208:EE	67	88	A5	B0	18	69	78	FA	8438:FB	A5	FC	69	00	85	FC	A5	94	8668:C5	88	C9	02	D0	05	A9	00	C1
8210:85	B0	A5	B1	69	00	85	B1	DB	8440:FD	18	69	08	85	FD	A5	FE	6A	8670:8D	C5	88	C9	00	D0	14	20	EE
8218:AD	01	D0	18	69	18	8D	01	97	8448:69	00	85	FE	A0	00	4C	24	68	8678:01	87	A0	00	B9	50	88	C9	E5
8220:D0	20	66	85	20	66	85	4C	AC	8450:84	AD	18	D0	29	F0	18	69	BD	8680:00	F0	07	20	D2	FF	C8	4C	21
8228:3D	81	A9	FF	8D	0F	D4	A9	5D	8458:0C	8D	18	D0	60	20	DA	84	98	8688:7C	86	60	AD	C5	88	C9	01	41
8230:80	8D	12	D4	8D	18	D4	B6	C5	8460:A9	00	8D	3E	03	A5	B0	8D	71	8690:D0	14	20	01	87	A0	00	B9	97
8238:FC	AE	1B	D4	E4	FB	F0	09	1A	8468:FB	03	A5	B1	8D	0C	03	A0	07	8698:5B	88	C9	00	F0	07	20	D2	65
8240:90	F7	E4	FC	90	03	4C	39	5A	8470:00	A5	B0	85	B2	A5	B1	18	F8	86A0:FF	C8	4C	97	86	60	20	01	D9
8248:82	86	FD	60	A9	79	85	B0	E4	8478:69	D4	85	B3	AD	CC	88	91	9A	86A8:87	A0	00	B9	00	C0	C9	00	D0
8250:A9	04	85	B1	A9	1D	8D	00	D3	8480:B0	AD	CD	88	91	B2	C8	AD	26	86B0:F0	F3	20	D2	FF	C8	4C	AB	C0
8258:D0	A9	47	8D	01	D0	A9	00	90	8488:CC	88	91	B0	AD	CD	88	91	9E	86B8:86	20	BF	86	4C	A4	85	EE	60
8260:8D	66	88	8D	67	88	A9	00	60	8490:B2	98	18	69	27	A8	AD	CC	B6	86C0:C7	88	AD	C7	88	C9	02	D0	46
8268:8D	10	D0	AC	B5	88	B9	AC	0D	8498:88	91	B0	AD	CD	88	91	B2	A1	86C8:05	A9	00	8D	C7	88	18	A2	CE
8270:88	8D	27	D0	60	AD	67	88	20	84A0:C8	AD	CC	88	91	B0	AD	CD	14	86D0:03	A0	0E	20	F0	FF	AD	C7	F5
8278:0A	0A	18	6D	67	88	18	6D	D9	84A8:88	91	B2	EE	3E	03	AD	3E	37	86D8:88	0A	0A	0A	18	6D	C7	88	1D
8280:67	88	18	6D	66	88	A8	8C	68	84B0:03	C9	02	F0	D0	AD	C2	88	2A	86E0:18	6D	C7	88	18	6D	C7	88	65
8288:FD	03	B9	C1	02	C9	00	D0	A8	84B8:85	B0	AD	C3	88	85	B1	4C	AC	86E8:A8	A2	00	B9	50	88	20	D2	46
8290:03	4C	3D	81	99	22	8D	20	7A	84C0:6F	84	AD	FB	03	85	B0	AD	55	86F0:FF	C8	E8	E0	04	F0	03	4C	91
8298:AE	8A	EE	CB	88	AD	CB	88	4D	84C8:FC	03	85	B1	60	A9	4E	8D	B0	86F8:EB	86	60	20	00	00	4C	A4	E8
82A0:C9	02	FE	1C	A5	B0	8D	C2	B8	84D0:CC	88	A9	0A	8D	CD	88	4C	39	8700:85	18	A2	02	A0	0E	20	F0	BA
82A8:88	A5	B1	8D	C3	88	AD	FE	05	84D8:5D	84	A0	00	A2	00	C8	C0	2D	8708:FF	60	93	20	20	20	9B	4D	A9
82B0:03	8D	B4	88	AD	FD	03	8D	B2	84E0:00	D0	FB	E8	E0	C8	90	F6	6E	8710:41	54	43	48	2D	41	2D	54	DE
82B8:C9	88	20	21	85	4C	3D	81	34	84E8:60	A2	00	A9	00	9D	00	D4	B0	8718:48	4F	4E	0D	98	20	20	5F	5F
82C0:A5	B0	CD	C2	88	D0	D0	A5	F1	84F0:E8	E0	19	90	F8	60	20	E9	46	8720:A3	A3	A3	A3	A3	A3	A3	A3	2F
82C8:B1	CD	C3	88	D0	06	CE	CB	23	84F8:84	A9	00	8D	02	D4	A9	01	3F	8728:A3	A3	A3	A3	0D	9E	B0	C0	A5
82D0:88	4C	3D	81	A9	00	8D	CB	21	8500:8D	03	D4	A5	00	8D	05	D4	9C	8730:C0	B2	C0	C0	B2	C0	C0	B2	3D
82D8:88	AD	FD	03	8D	CA	88	AD	D3	8508:A9	05	8D	06	D4	A9	0F	8D	34	8738:C0	C0	B2	C0	C0	B2	C0	C0	4D
82E0:B4	88	CD	FE	03	F0	55	A9	3C	8510:18	D4	A5	00	8D	04	D4	AD	E4	8740:AE	0D	00	92	9E	DD	12	9F	43
82E8:A0	8D	CC	88	A9	03	8D	CD	06	8518:B3	88	8D	00	D4	8D	01	D4	84	8748:20	20	92	9E	DD	0D	9E	AB	B7
82F0:88	20	31	85	20	5D	84	AD	ED	8520:60	A9	24	85	00	A9	41	85	51	8750:C0	C0	DB	C0	C0	C0	C0	C0	2F
82F8:B5	88	0A	A8	B9	BA	88	18	A8	8528:00	A9	19	8D	B3	88	4C	F6	E8	8758:DB	C0	C0	DB	C0	C0	DB	C0	DC
8300:69	01	99	BA	88	C8	B9	BA	70	8530:84	A9	07	85	00	A9	41	85	CF	8760:C0	B3	0D	00	92	9E	DD	0D	36
8308:88	69	00	99	BA	88	20	CC	4C	8538:00	A9	03	8D	B3	88	4C	F6	36	8768:9E	AD	C0	C0	B1	C0	C0	B1	1A
8310:8C	20	DD	8B	20	29	8C	AD	46	8540:84	A9	24	85	00	A9	41	85	83	8770:C0	C0	B1	C0	C0	B1	C0	C0	61
8318:B5	88	C9	00	F0	18	AD	C5	5E	8548:00	A9	2D	8D	B3	88	4C	F6	8B	8778:B1	C0	C0	BD	00	1F	54	55	FE
8320:88	C9	00	D0	11	20	00	00	F3	8550:84	20	41	85	20	66	85	20	EB	8780:52	4E	53	20	20	4D	41	54	C5
8328:AD	84	03	CD	85	03	D0	03	41	8558:21	85	20	66	85	20	41	85	74	8788:43	48	45	53	0D	00	1C	A3	6D
8330:4C	3C	83	4C	E7	82	20	DC	08	8560:20	66	85	4C	21	85	A0	00	EA	8790:A3	A3	A3	A3	20	20	A3	A3	75
8338:8C	4C	3D	81	20	CC	8C	20	C5	8568:A2	00	C8	C0	00	D0	FB	E8	0E	8798:A3	A3	A3	A3	A3	0D	00	99	FB
8340:51	85	20	CD	84	AC	C9	88	25	8570:E0	28	90	F6	60	A0	00	B9	B6	87A0:5E	4C	41	59	45	52	20	4F	AB
8348:A9	00	99	C1	02	99	22	8D	BB	8578:BB	87	C9	00	F0	07	20	D2	33	87A8:4E	45	3A	05	00	9C	50	4C	27
8350:AC	CA	88	99	C1	02	99	22	76	8580:FF	C8	4C	77	85	A9	00	8D	1F	87B0:41	59	45	52	20	54	57	4F	D4
8358:8D	EE	C8	88	AD	C8	88	C9	EE	8588:C4	88	20	CE	86	CE	C5	88	8C	87B8:3A	05	00	93	20	9B	4D	41	AA
8360:0E	F0	27	AD	B5	88	0A	A8	F6	8590:20	64	86	A9	50	85	FB	A9	6A	87C0:54	43	48	2D	41	2D	54	48	56
8368:B9	B6	88	18	69	01	99	B6	C5	8598:04	85																

# PROGRAMS

```

8808:59 53 54 49 43 4B 53 3A E1
8810:0D 0D 1C 20 12 99 20 53 FA
8818:54 41 52 54 20 47 41 4D 21
8820:45 20 92 9F 0D 00 FF E0 71
8828:00 80 20 00 80 20 00 80 62
8830:20 00 80 20 00 80 20 00 A5
8838:80 20 00 80 20 00 80 20 BB
8840:00 80 20 00 FF E0 00 00 F8
8848:00 00 00 00 00 00 00 00 59
8850:4F 4E 45 20 50 4C 41 59 D6
8858:45 52 00 54 57 4F 20 50 6E
8860:4C 41 59 45 52 00 00 00 F9
8868:00 00 96 42 45 53 54 20 B0
8870:53 4F 4C 4F 20 47 41 4D 6B
8878:45 3A 20 9E 00 12 9A 20 46
8880:47 41 4D 45 20 4F 56 45 B3
8888:52 20 92 1D 1D 1D 1D 1D A3
8890:1D 9F 50 52 45 53 53 20 85
8898:05 12 20 53 50 41 43 45 3D
88A0:20 92 00 20 9C 54 55 52 9B
88A8:4E 53 9F 00 0D 04 A9 02 77
88B0:8D C5 88 00 00 00 00 00 0B
88B8:00 00 00 00 00 00 00 00 F1
88C0:64 32 00 00 00 00 00 00 90
88C8:00 00 00 00 00 00 FF FF D9
88D0:FF F0 F0 F0 F0 F0 FF FF 96
88D8:FF 0F 0F 0F 0F 0F 0F 0F 08
88E0:F0 F0 F0 FF FF FF 0F 0F F1
88E8:0F 0F 0F FF FF FF FF FF 27
88F0:FF FC F8 F0 F0 E0 FF FF 7A
88F8:FF 3F 1F 0F 0F 07 E0 F0 F5
8900:F0 F8 FC FF FF FF 07 0F 86
8908:0F 1F 3F FF FF FF FF FF 52
8910:FF FE FC F8 F0 E0 FF FF 1D
8918:FF 7F 3F 1F 0F 07 E0 F0 2C
8920:F8 FC FE FF FF FF 07 0F EB
8928:1F 3F 7F FF FF FF FF FF 8A
8930:FF F8 F0 E0 E0 E0 FF FF 38
8938:FF 9F 0F 07 07 07 E0 F0 8C
8940:F8 FC FE FF FF FF 07 0F 0C
8948:1F 3F 7F FF FF FF FF FF AA
8950:FF FC F8 F0 E0 E0 FF FF 5B
8958:FF 1F 0F 27 7F FF E0 E0 26
8960:F0 F8 FC FF FF FF FF 7F 49
8968:27 0F 3F FF FF FF FF FF BA
8970:FF FE FE FC FC F8 FF FF BE
8978:FF 7F 7F 3F 1F FF F0 A8
8980:F0 E0 E0 FF FF FF 1F 0F AD
8988:0F 07 07 FF FF FF FF FF C5
8990:FF FE EC F6 F8 98 FF FF 9A
8998:FF 7F 37 6F 1F 19 E0 F8 81
89A0:F0 E8 DC FF FF FF 07 1F 2F
89A8:0F 17 3B FF FF FF FF FF 70
89B0:FF FC F8 F0 E0 E0 FF FF BB
89B8:FF 3F 1F 0F 07 07 FC F8 B7
89C0:F8 F8 F8 FF FF FF 3F 1F 4B
89C8:1F 1F 1F FF FF FF FF 17
89D0:FF FF FF FF FF FF FF FF E3
89D8:FF 9F 67 7F 7F 7F F8 F0 95
89E0:F0 F0 F8 FF FF FF 7F 7F 46
89E8:7F 7F FF FF FF FF FF 9B
89F0:FF FE FC FC F2 E0 FF FF 4E
89F8:FF 7F 3F 3F 4F 07 E0 F2 13
8A00:FC FC FE FF FF FF 07 4F 10
8A08:3F 3F 7F FF FF FF FF 7C
8A10:FF FF FE FC FC FC FF FF 70
8A18:FF 7F 7F 3F 3F 3F F8 DA
8A20:F0 E0 FE FF FF FF 3F 1F 63
8A28:0F 07 7F FF FF FF FF FF 76
8A30:FF FC FC F0 E8 E8 FF FF 1E

```

```

8A38:FF 7F 7F 1F 2F 2F F8 F8 30
8A40:F9 F9 F1 FF FF FF 3F 3F CC
8A48:3F 3F 1F FF FF FF FF FF B0
8A50:FF FE FC F8 F0 E0 FF FF 5F
8A58:FF 7F 3F 1F 0F 07 E0 E0 5E
8A60:F2 FC FC FF FF FF 07 07 E2
8A68:4F 3F 3F FF FF FF FF FF DC
8A70:FF FC FE FF FF FF FF FF A0
8A78:FF 07 07 07 07 07 FC F8 E7
8A80:F1 E3 E7 FF FF FF 67 F7 4B
8A88:FF FF FF FF FF FF FF FF 9D
8A90:FF FF FD FD F5 F5 FF FF CC
8A98:FF 7F 5F 5F 5F 5F 5F F8 A2
8AA0:F8 F8 FC FF FF FF 07 0F 2D
8AA8:1F 1F 3F FF FF FF AA CA 1D
8AB0:8A 8D FE 03 0A 0A 18 69 90
8AB8:A1 8D FF 03 A5 B0 85 B2 DF
8AC0:A5 B1 18 69 D4 85 B3 A0 73
8AC8:00 AD FF 03 91 B0 A9 01 1D
8AD0:91 B2 EE FF 03 AD FF 03 0B
8AD8:C8 91 B0 A9 01 91 B2 98 B3
8AE0:18 69 27 A8 EE FF 03 AD F6
8AE8:FF 03 91 B0 A9 01 91 B2 23
8AF0:C8 EE FF 03 AD FF 03 91 5B
8AF8:B0 A9 01 91 B2 60 AD 15 91
8B00:D0 29 FE 8D 15 D0 A9 79 3B
8B08:85 B0 A9 04 85 R1 A0 00 B7
8B10:8C 66 88 8C 67 88 8C CB 23
8B18:88 8C FD 03 B9 C1 02 C9 29
8B20:00 F0 0D 20 AF 8A EE CB 60
8B28:88 AD CB 88 C9 02 F0 36 5F
8B30:EE 66 88 AD 66 88 C9 06 33
8B38:F0 14 A5 B0 18 69 03 85 7E
8B40:B0 A5 B1 69 00 85 B1 AC 0C
8B48:FD 03 C8 4C 19 8B A9 00 47
8B50:8D 66 88 EE 67 88 A5 B0 21
8B58:18 69 69 85 B0 A5 B1 69 44
8B60:00 85 B1 4C 47 8B 20 51 CD
8B68:85 60 18 A2 13 A0 0D 20 DC
8B70:F0 FF A0 00 B9 7D 87 C9 B0
8B78:00 F0 07 20 D2 FF C8 4C 23
8B80:74 8B 18 A2 14 A0 0D 20 3F
8B88:F0 FF A0 00 B9 8E 87 C9 0D
8B90:00 F0 07 C8 20 D2 FF 4C E9
8B98:8C 8B A0 00 B9 9F 87 C9 12
8BA0:00 F0 07 20 D2 FF C8 4C 4B
8BA8:9C 8B A9 0D 20 D2 FF AD F0
8BB0:C5 88 C9 02 D0 01 60 C9 3B
8BB8:01 D0 11 A0 00 B9 AD 87 7A
8BC0:C9 F0 07 20 D2 FF C8 60
8BC8:4C BD 8B 60 A0 00 B9 00 65
8BD0:00 C9 00 F0 07 20 D2 FF C7
8BD8:C8 4C CE 8B 60 18 A2 15 B7
8BE0:AD 0F 20 F0 FF AE BA 88 D7
8BE8:AD BB 88 20 CD BD 18 A2 11
8BF0:15 A0 17 20 F0 FF AE B6 3B
8BF8:88 AD B7 88 20 CD BD AD A0
8C00:C5 88 C9 02 F0 22 18 A2 5A
8C08:16 A0 0F 20 F0 FF AE BC D9
8C10:88 AD BD 88 20 CD BD 18 E4
8C18:A2 16 A0 17 20 F0 FF AE 01
8C20:B8 88 AD B9 88 20 CD BD 27
8C28:60 AD C5 88 C9 02 F0 12 68
8C30:EE B5 88 AD B5 88 C9 02 7F
8C38:D0 05 A9 00 8D B5 88 20 A4
8C40:4C 82 60 AD 68 88 C9 FF FF
8C48:D0 08 AD 69 88 C9 FF D0 54
8C50:01 60 18 A2 0A A0 00 20 22
8C58:F0 FF A0 00 B9 6A 88 C9 50
8C60:00 F0 07 20 D2 FF C8 4C 0D

```

```

8C68:5C 8C AE 68 88 AD 69 88 85
8C70:20 CD BD A0 00 B9 A3 88 85
8C78:C9 00 F0 07 20 D2 FF C8 1A
8C80:4C 75 8C 60 AD C5 88 C9 14
8C88:02 D0 21 AD BB 88 CD 69 DA
8C90:88 90 0D F0 03 4C AC 8C F1
8C98:AD BA 88 CD 68 88 B0 0C F7
8CA0:AD BA 88 8D 68 88 AD BB A5
8CA8:88 8D 69 88 18 A2 09 A0 1D
8CB0:04 20 F0 FF A0 00 B9 7D E7
8CB8:88 C9 00 F0 07 20 D2 FF F5
8CC0:C8 4C B6 8C 20 E4 FF C9 4F
8CC8:20 D0 F9 60 AD C5 88 C9 CA
8CD0:00 F0 01 60 AD B5 88 C9 6B
8CD8:00 F0 01 60 AD 15 D0 29 E0
8CE0:FE 18 69 01 8D 15 D0 60 7F
8CE8:AD C7 88 C9 00 F0 1D AD 24
8CF0:B5 88 C9 00 F0 16 AD 00 7B
8CF8:DC 29 1F 8D 84 03 A9 1F 2A
8D00:38 ED 84 03 8D 84 03 C9 C1
8D08:00 F0 EB 60 AD 01 DC 29 37
8D10:1F 8D 84 03 A9 1F 38 ED 07
8D18:84 03 8D 84 03 C9 00 F0 60
8D20:EB 60 00 00 00 00 00 49

```

Troy McBain is a computer technology student at Southern Alberta Institute of Technology in Calgary, Canada.

## XINPUT

By Farid Ahmad

Xinput is a replacement for BASIC's INPUT command for the 64. It overcomes all the weaknesses of INPUT and offers many additional features.

Xinput can handle strings up to 255 characters in length. It supports all of the usual editing keys, including cursor up, down, left, and right and the Inst/Del key. In addition, Xinput offers tight control over the characters that a user might enter. Up to 25 ranges of ASCII codes can be set up, allowing any combination of characters to be defined as valid.

### Entering the Program

Xinput is written entirely in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, enter the following values.

Starting address: CC08

Ending address: CECF

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

### Using Xinput

To use Xinput in your BASIC program, first load it into memory with the ,8,1 ex-



tension. Type in or study the demonstration program that follows the Xinput listing. It shows how to use Xinput from within a program.

The demo is written in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; again see "Typing Aids." Note that line 430 completely fills two screen lines. You might want to use a question mark as an abbreviation for PRINT when entering that line. To get the correct Proofreader checksum, after you've entered line 430, list it, cursor back to it, and press Return.

The XINPUT command requires the following format.

#### SYS 52232,X,Y,L,\$\$

The X and Y represent the row and column at which the input field will start. X may be 0-24 and Y 0-39. L is the maximum length of the string that can be entered. This can be 2-255 characters in length.

\$\$ is the variable in which the string will be returned. If \$\$ contains a string prior to using the XINPUT command, that string will be placed in the input field as the default string. If the default string is longer than the specified maximum string size, it will be truncated.

When the XINPUT command is executed, an input field appears on the screen in reverse video. The user can type in any valid keys (see below) and use any of the editing keys. The user won't be able, however, to move the cursor out of the input field.

If you attempt to place the input field in such a position that it cannot fit on the screen, you will get an *ILLEGAL QUANTITY ERROR* message. For example, SYS 52232,24,0,41,L\$ will produce an error condition.

#### Is It Valid?

To control the characters that can be typed in, you must define the range of ASCII codes that will be considered valid. For example, to allow entry of only the unshifted alphabet, the range would be 65 (the ASCII value for a) to 90 (ASCII for z). If you want to declare a single, isolated character as valid, its ASCII code would be both the upper and the lower limit of the range. To include the space bar, for example, the

range would be 32-32. Up to 25 separate ranges can be defined.

To set up these ranges, first poke the number of ranges into 52940. Then poke the lower limit followed by the upper limit of the first range into the next two locations. Similarly, poke the lower and upper limits of each range into successive locations.

Because of the way in which characters are stored by BASIC, you must use the codes 192-223 for the shifted keys, rather than codes 96-127.

The easiest way to poke the correct values is to set up a string consisting of the characters at the lower and upper limits of each range and then call a subroutine similar to the one starting at line 520 in the demo program. For example, to allow only the lowercase alphabet, the digits, and the space bar, use AL\$="AZ 09": and the a GOSUB to your subroutine. The demo program shows other examples.

If the default string contains any out-of-range characters, they will be removed by Xinput. If you poke 52960 with 0 or any number greater than 25, all keys will become valid.

#### A Little Extra

If you simply want to position the cursor anywhere on the screen, use the XINPUT command and leave out the last two parameters and preceding comma—for example, SYS 52232,9,8.

The speed with which the cursor blinks can be changed by poking a number into location 52579. The fastest blink rate is 1, and 255 is the slowest. The default value is 60.

Xinput uses memory from 52941 to 53247 for temporary storage.

#### XINPUT

```
CC08:20 FD AE 20 9E B7 86 02 EB
CC10:20 FD AE 20 9E B7 8A A8 A2
CC18:84 03 A6 02 E0 19 B0 3D B3
CC20:C0 28 B0 39 18 20 F0 FF F0
CC28:18 A9 00 65 03 85 FD A9 62
CC30:04 69 00 85 FE A5 02 F0 02
CC38:11 18 A5 FD 69 28 85 FD E9
CC40:A5 FE 69 00 85 FE C6 02 51
CC48:D0 EF A0 00 B1 7A C9 2C 91
CC50:F0 01 60 20 FD AE 20 9E 3A
CC58:B7 E0 02 B0 05 A2 0E 4C 6C
CC60:37 A4 CA 8E C9 CE 18 A5 60
CC68:FD 6D C9 CE 85 FB A5 FE E8
CC70:69 00 85 FC A5 FC C9 07 FA
CC78:F0 04 B0 0C 90 0D A5 FB 62
CC80:C9 E7 F0 07 B0 02 90 03 39
```

```
CC88:4C 5D CC AD CC CE C9 1A 63
CC90:90 05 A9 00 8D CC CE AC D2
CC98:C9 CE A9 A0 91 FD A9 20 02
CCA0:99 FF CE 88 D0 F4 99 FF F6
CCA8:CE A9 A0 91 FD 8C C7 CE C1
CCB0:20 FD AE 20 8B B0 A6 0D 2B
CCB8:E8 F0 05 A2 16 4C 37 A4 C2
CCC0:A5 5F 85 FB A5 60 85 FC 2C
CCC8:A0 02 B1 FB CD C9 CE 90 EC
CCD0:05 AE C9 CE E8 8A 8D C8 14
CCD8:CE AA F0 28 C8 B1 FB 85 AF
CCE0:04 C8 B1 FB 85 05 A0 00 26
CCE8:84 03 8C CA CE A4 03 B1 84
CCF0:04 AC CA CE 20 07 CD E8 9F
CCF8:F0 01 C8 E6 03 A5 03 CD 55
CD00:C8 CE D0 E6 4C 83 CD 84 CC
CD08:02 AC CE CE F0 1C A2 01 94
CD10:DD CC CE B0 04 E8 4C 21 30
CD18:CD E8 DD CC CE 90 0B F0 1D
CD20:09 E8 88 D0 EB A4 02 A2 31
CD28:FF 60 A4 02 99 FF CE C9 C4
CD30:40 C8 B1 FB 85 05 A0 00 26
CD38:E9 40 4C 40 CD 38 E9 80 0A
CD40:09 80 91 FD A2 00 60 AC 15
CD48:C7 CE B1 FD 49 80 91 FD FE
CD50:60 20 47 CD A9 00 85 C6 09
CD58:85 02 AA 85 03 E6 02 D0 6D
CD60:0C E8 E0 3B D0 07 20 47 36
CD68:CD E6 03 A2 00 A5 C6 F0 44
CD70:EC A5 03 4A B0 03 20 47 0A
CD78:CD AD 77 02 C9 A0 D0 02 E9
CD80:A9 20 60 20 51 CD C9 1D 79
CD88:D0 0E AD C7 CE CD C9 CE 52
CD90:B0 F1 EE C7 CE 4C 83 CD D7
CD98:C9 9D D0 0D AD C7 CE C9 5F
CDA0:00 F0 E0 CE C7 CE 4C 83 17
CDA8:CD AE C9 CE E0 28 90 38 FD
CDB0:C9 91 D0 13 AD C7 CE C9 D4
CDB8:28 90 C8 38 AD C7 CE E9 3D
CDC0:28 8D C7 CE 4C 83 CD C9 8F
CDC8:11 D0 1D 38 AD C9 CE E9 64
CDD0:27 8D CB CE AD C7 CE CD C1
CDD8:CB CE B0 A7 18 AD C7 CE 74
CDE0:69 28 8D C7 CE 4C 83 CD E5
CDE8:C9 14 D0 2B AE C7 CE F0 5E
CDF0:F4 8A A8 CA B1 FD 88 91 93
CDF8:FD C8 B9 FF CE 9D FF CE B8
CE00:E8 C8 EC C9 CE 90 ED 88 9B
CE08:A9 A0 91 FD A9 20 99 FF B5
CE10:CE CE C7 CE 4C 83 CD C9 84
CE18:94 D0 45 AC C9 CE B1 FD 92
CE20:C9 A0 F0 03 4C 83 CD AE D3
CE28:C9 CE CA 8A A8 E8 38 ED A7
CE30:C7 CE 8D CA CE EE CA CE 5A
CE38:A9 00 85 02 B1 FD C8 91 24
CE40:FD 88 B9 FF CE 9D FF CE F1
CE48:CA 88 E6 02 A5 02 CD CA 06
CE50:CE D0 E9 C8 A9 A0 91 FD 44
CE58:A9 20 99 FF CE 4C 83 CD 82
CE60:C9 0D D0 03 4C 7B CE AC 0B
CE68:C7 CE 20 07 CD E8 F0 08 0E
CE70:CC C9 CE B0 03 4C 92 CD 08
CE78:4C 83 CD AC C9 CE B9 FF 9E
CE80:CE C9 20 D0 04 88 4C 7E 62
CE88:CE C8 8C C8 CE D0 07 84 2A
CE90:04 84 05 4C B5 CE 38 A5 B5
CE98:33 ED C8 CE 85 33 85 04 59
CEA0:A5 34 E9 00 85 34 85 05 68
CEA8:A0 00 B9 FF CE 91 04 C8 5B
CEB0:CC C8 CE D0 F5 A0 02 AD B1
```

```
CEB8:C8 CE 91 FB C8 A5 04 91 D6
CEC0:FB C8 A5 05 91 FB 60 02 D2
CEC8:01 04 FF 00 FF 00 00 00 E7
```

## XINPUT DEMO

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
GG 10 IF LL= 0 THEN LL=1:LOAD"
XINPUT",8,1
FG 20 POKE650,128:PRINTCHR$(14
):PRINTCHR$(8)
KD 30 XX=52232
XE 40 PRINT"{CLR}":POKE53281,0
:POKE53280,0:POKE646,1
AK 50 SYSXX,0,15:PRINT"{RVS}XI
NPUT"
MJ 60 SYSXX,3,0:PRINT"XINPUT I
S A REPLACEMENT FOR THE
{SPACE}BASIC
PB 70 PRINT:PRINT"INPUT COMMAN
D. IT PROVIDES COMPLETE
{SPACE}"
EE 80 PRINT:PRINT"CONTROL OVER
THE INPUT PROCESS. "
AJ 90 PRINT:PRINT:PRINT"
{4 SPACES}WHAT IS YOUR N
AME? "
GS 100 SYSXX,13, 2:PRINT"YOU M
AY USE ONLY "
PG 110 SYSXX,15,3:PRINT"THE UP
PERCASE/LOWERCASE ALPH
ABET KEYS"
FQ 120 SYSXX,16,3:PRINT"AND TH
E SPACE BAR."
XS 130 SYSXX,18,0:PRINT"USUAL
{SPACE}EDITING & CURSOR
KEYS ARE ACTIVE."
RE 140 ALS="AZAZ{2 SPACES}":GO
SUB520
EJ 150 SYSXX,10,23,15,N$
FM 160 REM-LONG
GJ 170 PRINT"{CLR}OK, ";N$,"
,{SPACE}NOTE THAT XINPUT
CAN"
HS 180 PRINT"HANDLE STRINGS OF
LENGTH UP TO 255":PRIN
T"CHARACTERS."
PB 190 PRINT:PRINT"ENTER A LON
G STRING. (THIS TIME";
CA 191 PRINT" ONLY THE LOWERCA
SE ALPHABET & NUMBERS C
AN BE"
FQ 192 PRINT" ENTERED.)"
GP 200 SYSXX,20,0:PRINT"REMEMB
ER THAT {RVS}CRSR UP, D
OWN LEFT, RIGHT{OFF} KE
YS AND ";
ME 210 PRINT"THE {RVS}INSERT &
DELETE KEYS{OFF}
{3 SPACES}ARE ACTIVE."
DP 220 ALS="AZ{2 SPACES}09":GO
SUB520
SD 230 SYSXX,10,0,255,N1$
KS 240 PRINT"{CLR}YOU ENTERED
{SPACE}THE FOLLOWING ST
RING:{DOWN}"
```

```
GE 250 PRINTN1$:GOSUB480
KB 260 :
AA 270 REM-RANGE
FA 280 PRINT"{CLR}YOU HAVE FUL
L CONTROL OVER CHARACTE
RS{3 SPACES}THAT CAN BE
ENTERED."
KA 290 PRINT"{DOWN}{5 SPACES}E
NTER A NUMBER IN EXPONE
NT FORM,"
MG 300 PRINT"SUCH AS -6.254 E+
10.
DH 310 PRINT"{DOWN}{RVS}THE FO
LLOWING KEYS ARE ACTIVE
:"
CQ 320 PRINT"{DOWN}{2 SPACES}N
UMBER KEYS
RM 330 PRINT"{2 SPACES}PLUS &
{SPACE}MINUS KEYS
GC 340 PRINT"{2 SPACES}THE LET
TER E
RR 350 PRINT"{2 SPACES}THE DEC
IMAL POINT
MQ 360 ALS="09{2 SPACES}EE-.++
":GOSUB520
RP 370 SYSXX,16,0,15,N2$
CH 380 SYSXX,18,0 :PRINT"YOU E
NTERED THE FOLLOWING NU
MBER:{DOWN}"
JD 390 PRINTN2$:GOSUB480
XK 400 :
EJ 410 REM-FINAL
PE 420 PRINT"{CLR}XINPUT ALSO
{SPACE}OFFERS A DEFAULT
STRING."
AQ 430 PRINT"ENTER A STRING US
ING ONLY THE {RVS}SPACE
BAR{OFF} & {RVS}LOWERC
ASE ALPHABET KEYS{OFF}"
HC 440 ALS="{2 SPACES}AZ":GOSU
B520
JR 450 N3$="DEFAULT STRING":
{2 SPACES}SYSXX,09,5,30
,N3$
EP 460 SYSXX,13,0:PRINT"YOU EN
TERED THE STRING{DOWN}"
:PRINTN3$:GOSUB480
JB 470 PRINTCHR$(142):PRINTCHR
$(9):PRINT"DEMO OVER":E
ND
HQ 480 SYSXX,23,8:PRINT"{RVS}P
RESS ANY KEY TO GO ON":
POKE198,0:WAIT198,1:POK
E198,0
FF 490 RETURN
FA 500 :
DE 510 REM INCLUDE THIS SUBROU
TINE IN YOUR OWN PROGRA
MS
EE 520 AL=LEN(ALS):IF(AL AND 1
)= 1 THENPRINT"{RVS}BAD
LENGTH FOR XINPUT":STO
P
PF 530 FOR R= 1 TO AL
KR 540 POKE52940+R,ASC(MID$(AL
$,R,1))
JE 550 NEXT
```

```
FF 560 POKE52940,AL/2
JM 570 RETURN
```

*Farid Ahmad is a mechanical engineer in Islamabad, Pakistan, and he's seeking employment. He says the 64 is a great help for filling the vacant hours and keeping mentally active.*

## SPIRALS

By Frederic Isaman

Spirals for the 128 is a simulation of a Spirograph set, allowing you to draw intricate geometric designs on the computer screen. Spirals duplicates most of the features of those old sets and also adds new ones, and you never have to worry about your pen slipping!

Spirals is written entirely in BASIC 7.0. To help you avoid typing errors, enter it with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you exit Proofreader.

Spirals acts by mathematically simulating the act of rotating a wheel around a stationary circle called the rim. An imaginary pen is set into the wheel, and its path is traced onto the screen. The disk can be set inside or outside the stationary rim, and the pen can be set anywhere within the wheel.

Because this is only a simulation, you can even set the pen a fixed distance outside the wheel. Finally, results can be altered by changing the number of points the program calculates when drawing the spirals. This feature can make designs rounded or angular.

### Go Spiraling

To use the program, just load it and run it. Enter the data that Spirals requests, and watch as the picture draws on the screen.

Here are some points to remember about Spirals' prompts. *Rim radius* is the radius of the stationary circle. *Wheel radius* is the radius of the rotating disk. *Pen location* is where the pen is put on the wheel. A value of 0 puts it in the center of the wheel, and a value equal to the radius of the wheel puts it on the edge.

*Pen color* is assigned with the same numbers used by Commodore's COLOR command. *Number of points* drawn is a measure of how smooth or

choppy the picture will be. The higher the number, the smoother and more realistic the picture. Very interesting results can occur if you make the chopiness extreme, using values less than 10 or so.

The program then asks where you want the wheel. It can be placed to rotate either outside or inside the rim.

Finally, you are asked if you wish to clear the screen before starting. Spirals then goes to the graphics screen and begins to draw. You can halt drawing by pressing the space bar. Press it again to restart.

When a drawing has finished, you can start a new spiral by pressing Return. When you do, you'll see the parameters that you've just entered. To alter a parameter while leaving the others as they were, press Return until the desired parameter appears.

It's important to note that when a spiral is drawn and the screen cleared, the screen is scaled so that the spiral will occupy the whole screen. The program will keep this scale factor until the next time the screen is cleared. Thus, if you draw several spirals without clearing the screen, you must draw the largest one first in order to set the screen's scale correctly.

Finally, if circles are distorted into ovals, you can remedy this by drawing a circle, measuring its height and width, and using the value of the width divided by the height in place of the 1.12 in line 140.

Here are a few sample settings to show what can be accomplished and how the various parameters are used. The following are replies given to prompts asking for the rim radius, wheel radius, pen location, number of points, and whether or not the wheel should be outside the rim.

200,45,245,20,N  
200,45,245,40,N  
200,70,270,20,N  
100,124,200,5,N  
200,245,350,5,N  
200,20,220,60,N  
200,5,100,25,Y  
200,5,100,200,Y  
200,270,470,10,N

Experiment by changing any of these numbers to create new spirals.

## SPIRALS

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
PX 10 GOTO180
SJ 20 DRAW1,XM+LR-IR+E,YM:DF=L
R-IR:DR=LR/IR-1
GJ 30 DO:T=T+S:TM=DR*T:X=DF*CO
S(T)+E*COS(TM):Y=DF*SIN(
T)-E*SIN(TM):GOTO60
CS 40 DRAW1,XM+LR+IR-E,YM:DF=L
R+IR:DR=LR/IR+1
KG 50 DO:T=T+S:TM=DR*T:X=DF*CO
S(T)-E*COS(TM):Y=DF*SIN(
T)-E*SIN(TM)
EE 60 DRAW TOX+XM,Y+YM
CJ 70 GETA$:IFAS=CHR$(13)THEN1
00
QX 80 IFAS=" "THENWT=1-WT
GC 90 IFWTTHEN70
KG 100 LOOP UNTIL AS=CHR$(13):
GRAPHIC0:GOTO190
BE 110 PRINT"BACK COLOR? (1-16
)?"BC$:PRINT"{UP}"TAB(1
8):INPUTBC$:IF(BC%<1)OR
(BC%>16)THEN110
RH 120 COLOR0,BC$:COLOR4,BC%:Q
Q=0
JS 130 IFX$="Y"THENYM=LR-IR+AB
S(E):ELSE YM=LR+IR+ABS(
E)
PE 140 XM=YM*1.12:IFXM<160THEN
PRINT"VALUES TOO SMALL.
{2 SPACES}TRY AGAIN.":Q
Q=1
GH 150 IFXM>16383THENPRINT"VAL
UES TOO LARGE.
{2 SPACES}TRY AGAIN.":Q
Q=1
GR 160 IFQQ=0THENGRAPI1,1
RB 170 RETURN
KJ 180 DIMT, TM, E, DF, X, Y, DR, XM,
YM, S: X$="N": C$="Y": CL%=
2: BC%=1
MG 185 LR=200: IR=45: E=245: D=20
DP 190 PRINT"RIM RADIUS?"LR: PR
INT"{UP}"TAB(10);: INPUT
LR
BK 200 PRINT"WHEEL RADIUS?"IR:
PRINT"{UP}"TAB(12);: INP
UTIR
HF 210 PRINT"PEN LOCATION?"E: P
RINT"{UP}"TAB(12);: INPU
TE
SP 220 PRINT"PEN COLOR? (1-16)
?"CL$:PRINT"{UP}"TAB(17
):INPUTCL$:IF(CL%<1)OR(
CL%>16)THEN220
XX 230 COLOR1,CL%
BA 240 PRINT"PLOT HOW MANY POI
NTS?"D:PRINT"{UP}"TAB(2
0);:INPUTD:IFD=0THEN240
QJ 250 PRINT"WHEEL INSIDE RIM?
(Y/N)? "X$:PRINT"{UP}"
TAB(23):INPUTX$
KC 260 IFX$<>"Y"ANDX$<>"N"THEN
250
```

```
DD 265 IF(X$="Y")AND(IR>=LR)TH
ENPRINT"RIM MUST BE LAR
GER THAN WHEEL.":GOTO20
0
DH 270 PRINT"CLEAR SCREEN? (Y/
N)? "C$:PRINT"{UP}"TAB(
19):INPUTC$
BX 280 IFCS="N"THEN330
JH 290 IFCS="Y"THENGOSUB110:EL
SE270
JS 300 IFQQTHEN190
QJ 310 WT=0:T=0:S=2*↑/D:SCALE1
,XM*2,YM*2
FJ 320 IFX$="N"THEN40:ELSE20
SP 330 QQ=0:IFX$="Y"THENIFYM<L
R-IR+ABS(E)THENQQ=1
PC 340 IFX$="N"THENIFYM<LR+IR+
ABS(E)THENQQ=1
RA 350 IFQQ=0THENGRAPI1,0:GO
TO310
MK 360 PRINT"SPIRAL LARGER THA
N SCREEN. TRY AGAIN.":G
OTO190
```

*Frederic Isaman creates spirals and computer programs in Holland, New York.*

## ONLY ON DISK

Here are the bonus programs on this month's Gazette Disk.

### Runestone

By John Cameron  
Newcastle, NB, Canada

Magical runestones in this two-player strategy game attack, bless, or eradicate areas of the playing field.

### Electronic Billboard

By Bob Markland  
Newcastle, WY

This multifeatured message display uses sprites for big letters without jaggies.

## TYPING AIDS

MLX, our machine language entry program, and The Automatic Proofreader are utilities that help you enter Gazette programs without mistakes. MLX is listed in this issue. For a free printed copy of Proofreader, send a self-addressed, stamped envelope to Typing Aids, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

## Machine Language Entry Program

### MLX for Commodore 64

Ottis R. Cowper

Type in and save some copies of MLX—you'll want to use it to enter future ML programs from Gazette. When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters A–F. But even if you know nothing about ML or hex, you should have no trouble using MLX.

After you've entered the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option. A functions menu will appear. The first option in the menu is Enter Data. If you're just starting to type in a program, pick this. Press the E key and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you stopped typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing Return alone when asked for the address. (You can get back to the menu from most options in the program by pressing Return with no other input.)

#### Entering a Listing

Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an

MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing.

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

#### Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press Return after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

#### 64 MLX Keypad

7	8	9	0
4 U	5 I	6 O	F P
1 J	2 K	3 L	E :
A M	B ,	C .	D /
0 Space			

Only the numerals 0–9 and the letters A–F can be entered. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, a numeric keypad function is included. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration.

MLX checks for transposed characters. If you're supposed to type in A0

and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take care while entering data.

#### Editing Features

To correct typing mistakes before finishing a line, use the Inst/Del key to delete the character to the left of the cursor. If you mess up a line badly, press Ctr/Home to start the line over. The Return key is also active, but only before any data is typed on a line. Pressing Return at this point returns you to the command menu. After you type a character, MLX disables Return until the cursor returns to the start of a line. Remember, press Ctr/Home to quickly get to a line-number prompt. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing and then move the cursor to the mistake and type the correct key. The cursor-left and -right keys provide the normal cursor controls. (The Inst/Del key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, Return is active; pressing it tells MLX to recheck the line. You can press the Ctr/Home key to clear the entire line if you want to start from scratch or if you want to get to a line-number prompt to use Return to get back to the menu.

#### Display Data

The second menu choice, Display Data, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at

which point the menu is redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press the space bar again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press Return.

### Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are Save File and Load File. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. This is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Also note that the drive prefix 0: is added to the filename (line 750), so this should *not* be included when entering the name. This also precludes the use of @ for save-with-replace, so be sure to give each version saved a different name.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When you're saving a partially completed listing, make sure to note the address where you stopped typing.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. It also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT address, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct start-

ing and ending addresses.

The Quit menu option has the obvious effect—it stops MLX and enters BASIC. The Run/Stop key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, Run/Stop-Restore also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or press any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the Clear Workspace option.

### The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready for the results. Refer to the corresponding article for details on loading and running the program.

### An Ounce of Prevention

Don't take chances—use The Automatic Proofreader to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses; then use the display option to verify that the data has been entered correctly. Test the save and load options to ensure that you can recall your work from disk.

### 64 MLX

```
SS 10 REM VERSION 1.1: LINES 8
30,950 MODIFIED, LINES 4
85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
4=254:Z5=255:Z6=256:Z7=
127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
:BS=PEEK(55)+Z6*PEEK(56)
:H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
:S$=" ":D$=CHR$(20):Z$=
CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
+23:POKE I,0:NEXT:POKE
{SPACE}SD+24,15:POKE 78
8,52
FC 150 PRINT "{CLR}"CHR$(142)CH
R$(8):POKE 53280,15:POK
E 53281,15
EJ 160 PRINT T$ "{RED}"{RVS}
{2 SPACES}{8 @}
```

```
{2 SPACES}"SPC(28)"
{2 SPACES}{OFF}{BLU} ML
X II {RED}{RVS}
{2 SPACES}"SPC(28)"
{12 SPACES}{BLU}"
FR 170 PRINT "{3 DOWN}
{3 SPACES}COMPUTE!'S MA
CHINE LANGUAGE EDITOR
{3 DOWN}"
JB 180 PRINT "{BLK}STARTING ADD
RESS{4}";:GOSUB300:SA=A
D:GOSUB1040:IF F THEN18
0
GF 190 PRINT "{BLK}{2 SPACES}EN
DING ADDRESS{4}";:GOSUB
300:EA=AD:GOSUB1030:IF
{SPACE}F THEN190
KR 200 INPUT "{3 DOWN}"{BLK}CLEA
R WORKSPACE [Y/N]{4}";A
$:IF LEFT$(A$,1)<>"Y"TH
EN220
PG 210 PRINT "{2 DOWN}"{BLU}WORK
ING...";:FORI=BS TO BS+
EA-SA+7:POKE I,0:NEXT:P
RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
{BLK}{RVS} MLX COMMAND
{SPACE}MENU {DOWN}{4}":
PRINT T$"{RVS}E{OFF}NTE
R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
LAY DATA":PRINT T$"
{RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
FILE":PRINT T$"{RVS}Q
{OFF}UIT{2 DOWN}"{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
MID$(EDLSQ",I,1)THEN A
=I:I=5
FD 270 NEXT:ON A GOTO420,610,6
90,700,280:GOSUB1060:GO
TO250
EJ 280 PRINT "{RVS} QUIT ":INPU
T "{DOWN}"{4}ARE YOU SURE
[Y/N]";A$:IF LEFT$(A$,
1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
=MID$(IN$,3):GOSUB320:A
D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
$(B$,J,1):B=ASC(A$)-C4+
(A$)"0")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
H$,B+1,1):B=A-B*C6:PRI
NT MID$(H$,B+1,1)::RETU
RN
RR 360 A=INT(AD/Z6):GOSUB350:A
=AD-A*Z6:GOSUB350:PRINT
":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
CK+Z5*(CK>Z7):GOTO390
```

# PROGRAMS

```

PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
{4}";GOSUB300:IF IN$<
N$ THEN GOSUB1030:IF F
{SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
{SPACE}":GOSUB400:IF IN
S=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
THEN PRINT IN$:PRINT"
{UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:BS
=S$:FOR J=1 TO 2:IF F T
HEN BS=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$LS;:IF I<
24THEN PRINT"{OFF}";
HD 470 GET AS:IF AS=N$ THEN470
FK 480 IF (AS>"/"ANDAS<"")OR(A
$>"@ANDAS<"G")THEN540
GS 485 A=(AS="M")-2*(AS=",")-
3*(AS=".")-4*(AS="/")-5
*(AS="J")-6*(AS="K")
FX 486 A=A-7*(AS="L")-8*(AS=":
")-9*(AS="U")-10*(AS="I
")-11*(AS="O")-12*(AS="
P")
CM 487 A=A-13*(AS=S$):IF A THE
N AS=MID$("ABCD123E456F
0",A,1):GOTO 540
MP 490 IF AS=R$ AND((I=0)AND(J
=1)OR F)THEN PRINT BS;:
J=2:NEXT:I=24:GOTO550
KC 500 IF AS="{HOME}" THEN PRI
NT BS:J=2:NEXT:I=24:NEX
T:F=0:GOTO440
MX 510 IF (AS="{RIGHT}")ANDF TH
ENPRINT B$LS;:GOTO540
GK 520 IF AS<>L$ AND AS<>D$ OR
((I=0)AND(J=1))THEN GOS
UB1060:GOTO470
HG 530 AS=L$+S$+L$:PRINT B$LS;
:J=2-J:IF J THEN PRINT
{SPACE}L$;:I=I-3
QS 540 PRINT AS;:NEXT J:PRINT
{SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}
{5 RIGHT}";:INPUT#3,IN$
:IF IN$=N$ THEN CLOSE3:
GOTO220
QC 560 FOR I=1 TO 25 STEP3:BS=
MID$(IN$,I):GOSUB320:IF
I<25 THEN GOSUB380:A(I
/3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
B1060:PRINT"{BLK}{RVS}
{SPACE}ERROR: REENTER L
INE {4}":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
R I=0 TO 7:POKE B+I,A(I
):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
LOSE3:PRINT"{DOWN}{BLU}
** END OF ENTRY **{BLK}
{2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}
{SPACE}DISPLAY DATA ":G
OSUB400:IF IN$=N$ THEN2
20
RJ 620 PRINT"{DOWN}{BLU}PRESS:
{RVS}SPACE{OFF} TO PAU
SE, {RVS}RETURN{OFF} TO
BREAK{4}{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
I=BTO B+7:A=PEEK(I):GOS
UB350:GOSUB380:PRINT SS
;
CC 640 NEXT:PRINT"{RVS}";:A=CK
:GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
ENPRINT"{DOWN}{BLU}** E
ND OF DATA **":GOTO220
KC 660 GET AS:IF AS=R$ THEN GO
SUB1080:GOTO220
EQ 670 IF AS=S$ THEN F=F+1:GOS
UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD
{SPACE}DATA ":OP=1:GOTO
710
PC 700 PRINT"{DOWN}{RVS} SAVE
{SPACE}FILE ":OP=0
RX 710 IN$=NS:INPUT"{DOWN}FILE
NAME{4}";IN$:IF IN$=N$
{SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}
{RVS}T{OFF}APE OR {RVS}
D{OFF}ISK: {4}";
FP 730 GET AS:IF AS="T"THEN PR
INT"T{DOWN}":GOTO880
HQ 740 IF AS<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
,15,"I0":B=EA-SA:IN$="
0":+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+"P,W":G
OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
H*256):PRINT#1,CHR$(AL)
;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
R$(PEEK(BS+I));:IF ST T
HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
O940
GS 800 GOSUB1060:PRINT"{DOWN}
{BLK}ERROR DURING SAVE:
{4}":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+"P,R":G
OSUB860:IF A THEN220
GE 820 GET#1,AS,BS:AD=ASC(AS+Z
$)+256*ASC(BS+Z$):IF AD
<>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,AS:P
OKE BS+I,ASC(AS+Z$):IF(
I<>B)AND ST THEN F=2:AD
=I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
>0)+1 GOTO960,970
SA 860 INPUT#15,A,AS:IF A THEN
CLOSE1:CLOSE15:GOSUB10
60:PRINT"{RVS}ERROR: "A
$
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
187,PEEK(FA+3):POKE188,
PEEK(FA+4):IFOP=0THEN92
0
HJ 890 SYS 63466:IF(PEEK(783)A
ND1)THEN GOSUB1060:PRIN
T"{DOWN}{RVS} FILE NOT
{SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
30):IF AD<>SA THEN F=1:
GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
2)-1:F=F-2*(A<EA)-3*(A>
EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
UB1010:ON OP GOTO950:SY
S 63591
AE 940 GOSUB1080:PRINT"{BLU}**
SAVE COMPLETED **":GOT
O220
XP 950 POKE147,0:SYS 63562:IF
{SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}**
LOAD COMPLETED **":GOT
O220
DP 970 GOSUB1060:PRINT"{BLK}
{RVS}ERROR DURING LOAD:
{DOWN}{4}":ON F GOSUB98
0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
G ADDRESS (":GOSUB360:
PRINT)":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
AD=SA+AD:GOSUB360:PRINT
D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
*256):POKE193,AL:POKE1
94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
*256):POKE174,AL:POKE1
75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
1050
CR 1040 IF (AD>511 AND AD<6528
0) THEN GOSUB1080: F=0
: RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
{SPACE}INVALID ADDRESS
{DOWN}{BLK}":F=1:RETU
RN
AR 1060 POKE SD+5,31:POKE SD+6
,208:POKE SD,240:POKE
{SPACE}SD+1,4:POKE SD+
4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
240:POKE SD,0:POKE SD+
1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
KE SD+4,0:POKE SD,0:PO
KE SD+1,0:RETURN

```

## BCC AVANTI 486SLC

Just a couple of years ago, a laptop or portable computer had little in common with a desktop model. Essentially, the portables were just make-do, low-power devices used when "real" computers were unavailable. No more! Today, a notebook computer selling for the same price as one of those make-do models of the recent past not only packs the power of a desktop unit but also includes a multitude of enhancements enabling it to serve in both desktop and portable roles. Case in point: the Avanti 486SLC.

The Avanti 486SLC notebook computer from BCC is as aesthetically pleasing as it is powerful—and it's a powerful machine! It's built around the Cyrix 486SLC 25-MHz, 32-bit microprocessor, with all the 486 features intact. On board are an 87SLC math coprocessor for those arithmetic-intensive chores, a high-speed cache controller (on-board cache memory is 1K), and an Advanced Power Management (APM) controller. It has a 2½-inch hard drive, with a 19-ms average access time.

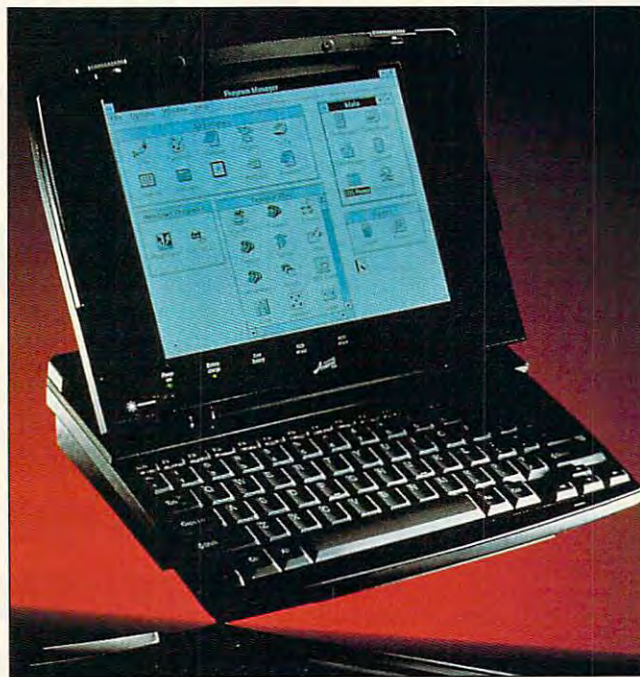
Most eye-catching about this notebook PC is its well-thought-out physical design. The soft-touch rubberized case is sleek and streamlined—both stylish and professional. The contoured shape also makes the unit easy to carry. The 80-key layout is neatly arranged and inclined forward for comfort.

My standard of good design is how well a small keyboard approximates the omnipresent 101-key variety. Minor variations in key size and placement aren't usual-

ly a problem, nor is a missing keypad. But I begin throwing fits if major keys are out of place or awkward to actuate. In the case of the Avanti 486SLC, the cursor keys are at the lower right in an inverted-T formation, as they should be. While the Esc, Ctrl, and Alt

connector supplied with the machine.

You're not really inhibited when it comes to the display, either. The unit's own 10-inch nonglare, triple super-twist, backlit LCD has a 9½-inch viewing area and 1 : 1 aspect ratio. VGA color emulation utilizes 32



*The BCC Avanti 486SLC joins other notebook computers that emulate desktop performance in a portable package.*

keys occupy familiar positions, the oft-used Home, Page Down, Page Up, and End keys are accessed as special functions on the cursor keys—a very annoying arrangement.

If you hate notebook keyboards regardless of the cleverness of their design, remember that this is a new era of notebook design. You can still enjoy a full-size keyboard by plugging it into a PS/2-type mini-DIN socket on the side of the computer. The very same plug can accommodate a mouse instead—or both keyboard and mouse using a Y

shades of gray—a very sharp and adequate emulation, in most cases. You can time the backlighting to go off at a convenient interval. If an LCD isn't to your liking and there's a VGA monitor available, a handy 15-pin video port on the side allows you complete color or VGA capability.

In terms of power management—always a consideration with notebook computers—the Avanti 486SLC uses a nicad battery rated at three to six hours under normal use. It can be fully recharged in an hour's time. The speed of the CPU is

switched automatically as usage allows. There's sleep-mode shutdown of the CPU, video display, hard disk drive, floppy disk drive, and ports. You have complete control of the intervals before it enters sleep mode.

The power button is recessed at the rear of the right side—easy to reach and use, but unlikely to be depressed accidentally. The socket for the keyboard or mouse is on the right side near the front. The 9-pin RS232C serial port, 25-pin parallel port, and video port are located behind a flip-down hatch at the rear of the left side. The hatch can be something of a problem because it hinges open and lies level with the base of the unit and can't be removed for convenience.

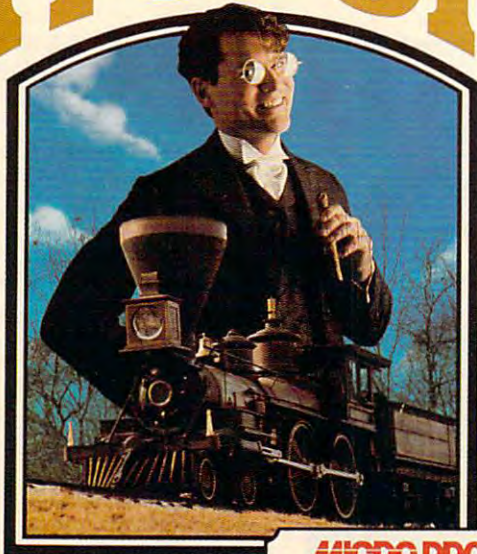
The unit also comes with a 9600-bps fax and 2400-bps data modem. You can receive faxes even while the unit is in sleep or suspend mode.

You get an interesting pointing device which can serve as a mouse substitute. It's a hand-held trackball with measurements of about one inch by one inch, and it consists of the trackball with three buttons. The trackball is a tiny plastic thing which works surprisingly well. Two of the buttons correspond to those of a two-button mouse, while the third serves as a lock for dragging.

Directly below the LCD screen lie LED indicators for power, battery charge, low battery, floppy drive access, hard drive access, caps lock, number lock, and scroll lock. On either side at the base of the LCD panel are the brightness and contrast slider controls.

After a month's frequent but typical use, I timed the

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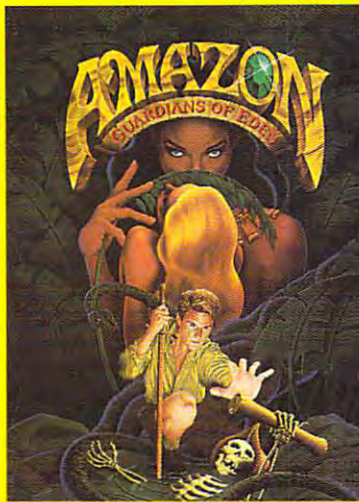
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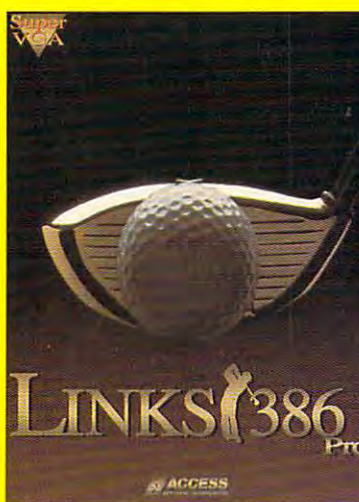
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battery and power-warning functions. After powering up at full charge, I used the unit only in spurts.

During that time, the hard drive was accessed for no more than a total of 5 minutes. It took two hours and 45 minutes for my first warning beeps to begin. The final warning beep came 10 minutes later; I had just enough time to append a note to a text file and save the file before the computer shut down entirely. After a complete power-down (even the battery-charge indicator went out), it took an hour and 8 minutes for a full recharge.

The unit, with battery, weighs only about six pounds. It's about 8½ inches deep, 11 inches wide, and 2½ inches high.

In other respects, it's hardly a pint-size lightweight. Although there's room for improvement on the keyboard and it powers down awfully quickly, the Avanti 486SLC from BCC does everything a notebook should do—and does it well.

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## SYDOS 44i

There is one and only one immutable law of physics in the universe, one and only one constant true from the depths of the blackest black hole to the wispiest extremes of the most nebulous nebula—or from San Jose to Atlanta: Your hard disk is running out of space.

SyDOS offers several solu-

tions, all removable cartridge drives that work like fixed hard disks yet offer unlimited capacity. Just as with a cassette tape recorder, you have one host unit, but as many cartridges as you want.

I tried the SyDOS 44i—a unit using 44MB cartridges (the *i* is for *internal*). An 88MB drive is also available. I used the 44i on a 40-MHz 386, using the removable drive both as a local drive and as a network directory over a Novell NetWare Lite network.

The unit works the same as fixed hard drives. No special techniques are required for access.

Access times are not blindingly fast, but they're quite acceptable. An average seek time of 20 ms is claimed, and I found the claim to be true. I ran a number of tests copying large, multimegabyte files from and to the 44i, both locally and over the network. A removable drive won't match a big SCSI or ESDI drive in speed, but it will effectively give you a lot of megabytes for less money.

The removable cartridges contain the hard disk platter, which is actually visible through the dark plastic case. The system is just like a regular hard drive in all aspects except that an unlimited number of cartridges can be employed.

SyDOS removable drives are SCSI devices, but an interface board is included that coexists with other types of disk controllers. I installed the SyDOS removable drive without conflict in a machine with an IDE controller. If a SCSI controller is already present, the SyDOS drive uses it instead of the supplied board. Installation is straightforward—merely a

matter of plugging in the board, mounting the drive in an empty bay, and attaching two cables. Running the SyDOS installation software takes only a couple of additional minutes. For those who don't care for even this minimal amount of hardware installation, SyDOS also has units that are completely external and use your computer's parallel port rather than an internal card slot.

The SyDOS and other removable drives offer several advantages. They are better than fixed hard drives in that there is no limit to the amount of room for storing data—simply add additional cartridges as needed. One disadvantage, obviously, is that only 44MB (or whatever the size of the cartridge) is available at any one time. Still, removable drives eliminate or at least put off the need for costly fixed hard disk upgrades. If security considerations are important, sensitive data can be stored on a removable cartridge and the cartridge kept in a safe unless it's actually in use.

Removable cartridges are much better than tape for backup because you can randomly access them (just like a regular hard disk) instead of waiting perhaps hours to find and restore a particular file from tape. (I had to do that yesterday; it's a pain.)

Optical drives offer a lot more storage space (more than 600MB for some) but are three times slower and cost several times more than a SyDOS or other removable cartridge system.

I like the SyDOS 44i. It fills a need many computer owners have. In fact, I like it so well that I'm considering buying one for myself.

RALPH ROBERTS

SyDOS 44i—\$719 for unit with 8-bit adapter and add-on cartridge; additional 44MB cartridges—\$178 each

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## REX NEBULAR AND THE COSMIC GENDER BENDER

Rex Nebular, the main character in *Rex Nebular and the Cosmic Gender Bender* from MicroProse, resembles Han Solo of *Star Wars*. He's the space smuggler pilot of a specially altered cargo ship called the *Slippery Pig*, which resembles Solo's *Millennium Falcon*. Rex is mostly a down-on-his-luck pilot who will do almost anything for money where galactic deliveries are concerned.

Rex gets a request from Colonel Stone, a wealthy Elvis impersonator, to retrieve a valuable vase from Terra Androgena, a planet populated only by xenophobic women. Apparently, Terra Androgena's biology-proficient women killed all the technology-proficient men in the Gender Wars and promptly used a cloaking device to make the planet disappear. In order to reproduce without men, the women invented the extremely distasteful Gender Bender, a machine that turns women into men and vice versa.

Rex discovers Terra Androgena, and his ship is immediately disabled by a planetary defense craft. The *Slippery Pig* crashes into the sea, and Rex must find the vase on a planet of hostile women. Rex also finds it necessary to use the Gender

# Trade Up!

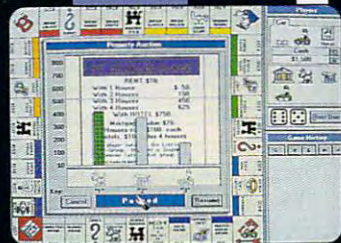
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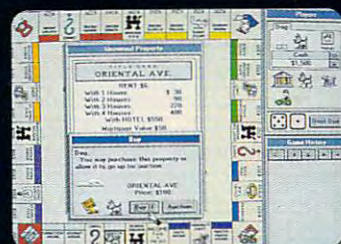
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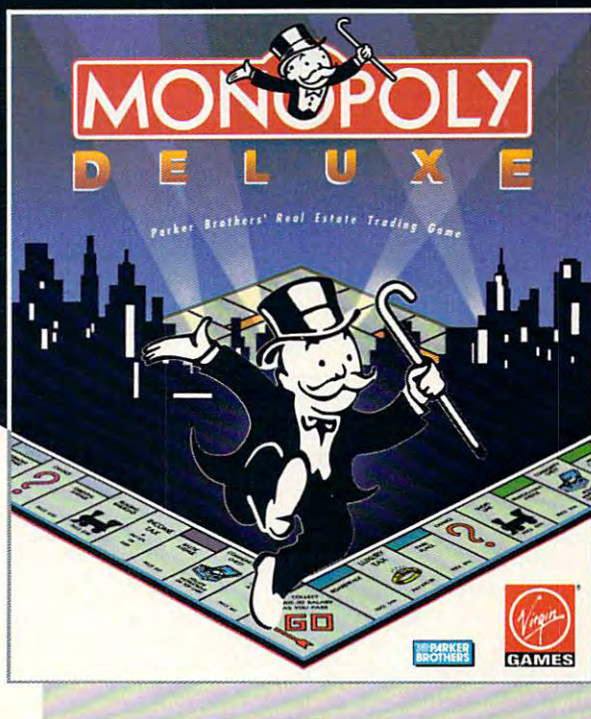
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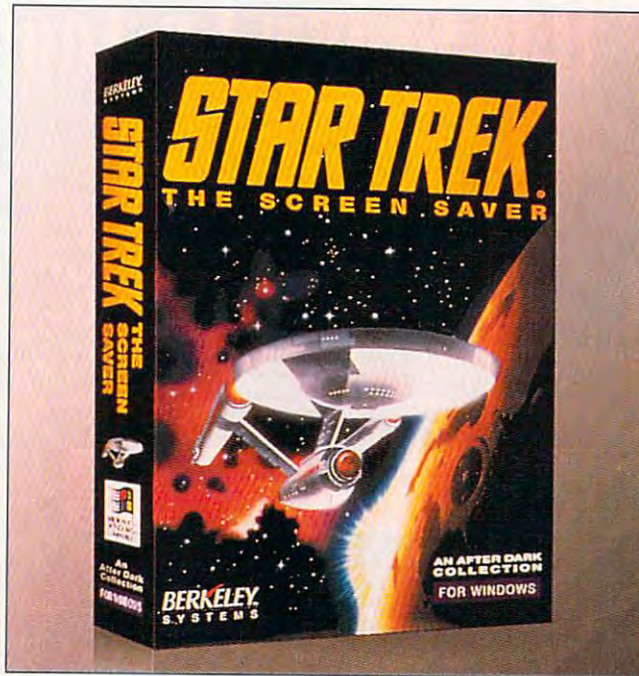
Bender to change into a woman (who resembles graphic adventure game inventor Roberta Williams of Sierra On-Line).

Bug-free Rex Nebular is the first graphic adventure produced by MicroProse, right on the heels of the company's first role-playing adventure, the unfortunately bugridden Darklands. Rex Nebular has very high production standards, and MicroProse has virtually reinvented scanned images with a new graphic rotoscopic process that produces attractive, realistic, and smoothly animated images from filmed actors. The process also integrates the animated images with the backgrounds, blending them into one picture.

The music, which can be turned on or off but has no volume control, is mood enhancing, interesting, and never monotonous, repetitive, or annoying—unlike many of the barnyard noises passing for music in other software. There are an enormous number of Foley and electronically produced squashes, splats, thuds, and squeaks. The beginning animation is enhanced by more than a minute of digital speech with simultaneous text display.

The game has both a naughty and a nice mode, either of which might be desired in a game where there is only one man on a planet full of women. The nice mode eliminates the one sexual encounter and most of the gratuitous—and ubiquitous—blood and gore.

The interface uses a mouse-activated, text-constructed parser that combines ten standard action words with object-specific action words to produce text parserlike sentences. The



*Captain! Captain! If we don't turn the ship around, we'll never be able to protect the monitor screen from phosphor burn-in!*

treasure-hunt puzzles require the player to find objects and discern how they're used. The game has no dead ends; you get second chances to acquire essential artifacts. It can be played in easy, intermediate, or advanced mode. I'd recommend intermediate, since the advanced mode has significantly fewer hints and is more lethal, while the intermediate mode has more interesting puzzles.

There are a variety of interesting characters, such as the intelligent, 12-foot-tall reptilian "buddy beast" that befriends Rex in the female underground complex. Happily, Rex Nebular has no annoying, obligatory arcade sequence. The logically designed connecting scenes are simple but interesting, obviating the need to map or have an automapping utility. Essential items can be maintained and manipulated in the unlimited and versatile in-

ventory. Rex Nebular is highly recommended for novice and advanced players alike.

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toasters, fractal landscapes, dueling blenders, tropical fish—few computers get any rest during the day.

Berkeley Systems, the developer of After Dark, has created yet another screen saver—this one based on the original "Star Trek" television series. The 15 different modules include Spock walking across your screen, the sick bay's medical readouts, an atlas of planets, the ship's crew stalking the silicon-based horta, Scotty's technical files on various electronic devices and space vehicles, an animated sequence with Kirk in the captain's chair, two Tholian ships entrapping the *Enterprise* in an energy web, a Starfleet Academy final exam, and, of course, a room filling up with tribbles.

If you're running Windows with an 8-bit (256-color) display card, many of the modules will be of photographic quality. If you have a Windows-compatible sound card, you'll be able to hear digital recordings of Kirk, Spock, Bones, and Scotty. (A PC-speaker sound driver is included, but its performance can vary greatly among computers.) In addition, you can use the Star Trek modules with After Dark.

Whether you need to protect your screen from phosphor burn-in or you're simply a fan of the series, Star Trek: The Screen Saver is a great way to brighten up (and darken) your computer screen. Live long and phosphor!

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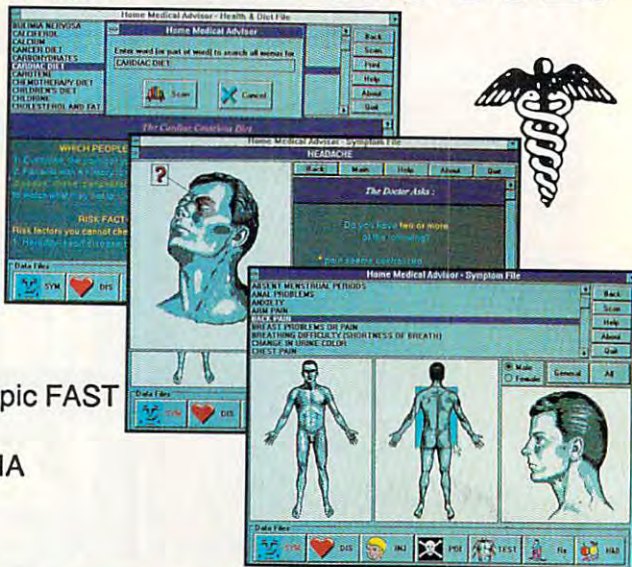
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## DUNE

What's so special about a barren planet, some spice, and two warring factions drawing lines in the sand? When combined with the theme of Frank Herbert's renowned novel and Virgin Software's technical wizards, you get the computer version of *Dune*.

While *Dune* purists will scoff at any computer (or movie) version of their beloved book, Virgin's *Dune* flawlessly blends adventure with strategic elements (while taking liberties with the original story). It offers compelling gameplay, good characterizations, and stunning graphics influenced largely by the David Lynch movie. And unlike most movie-based games, it succeeds.

*Dune* is the sweltering planet whose redeeming feature is its exclusive natural resource—melange. The ability of this spice to prolong life and bend space and time makes it the most valuable

commodity in the universe.

The emperor, who controls the spice, offers mining rights to your House of Atreides. Your bitter rivals, the Harkonnens, have been successfully mining the spice at the expense of the indigenous population—the Fremen tribes, who have been enslaved to extract the ore.

As Paul Atreides, you must provide the leadership to persuade the Fremen to side with you against the Harkonnens and eliminate their threat from the planet. This involves slowly recruiting and building your forces.

But there's more. In return for the right to mine the spice, the emperor demands an ever-increasing percentage of your yield. Cross him, and his collection agency stops at nothing short of killing you (game over) for failing to send his cut. So you must also maintain your shipments of spice and ensure that your forces are diligently mining it.

Supernatural elements al-

so play a key role in the game through visions, mental communication, and the Fremen prophecy of a great leader who will release their people from bondage.

As your forces grow, you have to keep track of your troops and assign them to the various tasks, including prospecting, spice mining, and military training. Besides dealing with the emperor and outright attacks from your friendly neighborhood Harkonnens, there are the giant sand worms (which play an important role later in the game) that destroy your mining operations.

The interface is straightforward and easy to use—especially with a mouse. The main screen depicts the scene through Paul's eyes, and an options window tells you what you can do in each scene.

The game's graphics—particularly in the character closeups and the travel sequences through various times of the day—are excel-

lent. Also, the music and sound effects are first-rate (with an audio card).

The only negative aspect is the sparse manual. The authors seem far more concerned with providing biographies of the game's designers (who, admittedly, deserve a lot of credit) than adequately explaining how to play the game.

In *Dune*, the hours fly by like the sands of time, and the game succeeds with a strategic line that is refreshingly different from those of other adventure games, with a strong sense of theme and character.

WAYNE N. KAWAMOTO

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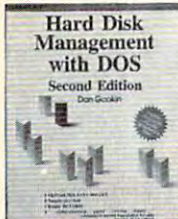
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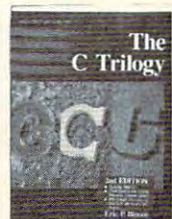
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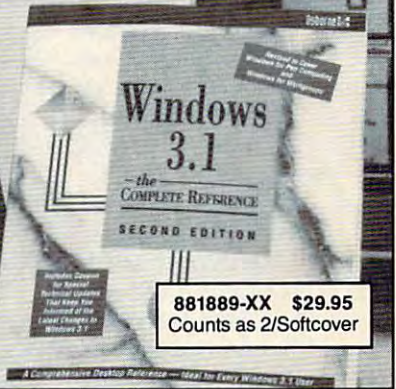
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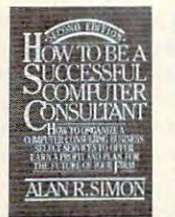
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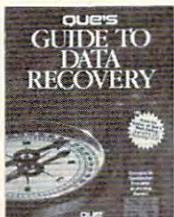
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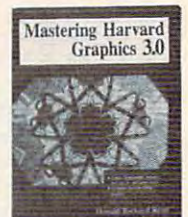
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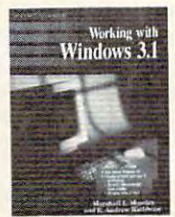
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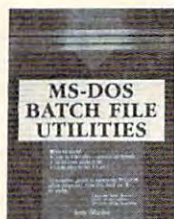
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## DACEASY ACCOUNTING 4.3, DACEASY INSTANT ACCOUNTING 1.0

DacEasy Accounting is kind of like the Volvo of inexpensive accounting software. It's not glamorous, and sometimes it's kind of hard to drive, but it's reliable. It works. It's not an overpriced luxury car, but neither is it a Yugo.

DacEasy introduced a sportier, lower-priced model in the spring of 1992. DacEasy Instant Accounting, available in both DOS and Windows versions (bundled in the same package for less than \$50), isn't as powerful or feature packed, but it's a good entry-level product for the individual or small business looking for an accounting package that can be learned quickly and easily recalled upon use.

The recent upgrade of DacEasy Accounting contains the same 12 integrated modules found in earlier versions: General Ledger, Accounts Payable, Accounts Receivable, Cash Management, Billing, Inventory, Product Assembly, Purchase Order, Budgeting, Forecasting, Graphics, and Report Generator.

Version 4.3 uses the same menu-driven DOS user interface with lookup

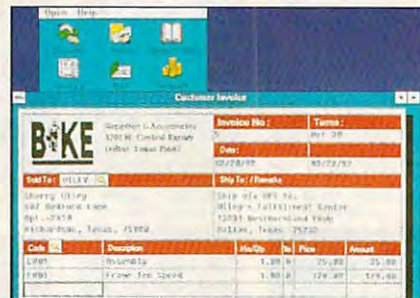
windows for easy access to lists of such things as customers, vendors, products, and services. New features include a dramatic increase in print speed, the ability to print multiple copies of the same invoice, the ability to keep two full years open at once, on-line help screens that explain error messages, footer text for invoices and purchase orders, and expanded address fields. Many other functions have been enhanced to make the product more flexible.

Entering transactions is easy. You pull down the menu you want (using either the keyboard or mouse), select the activity you want, and fill in the blanks in the dialog box or on the form provided (check, invoice, and so on). You can enter an unlimited number of transactions (including automatically recurring ones), add customers or vendors on the fly, and run a wide variety of reports, like Trial Balance, Balance Sheet, Income Statement, Aging, Payments, Products and Services, Price Break, and Product Activity and Alerts. If you want a graphic representation of a report, you can generate any of nine types of charts and graphs.

DacEasy Accounting can be used as a stand-alone. But if your needs are sophisticated enough, you may want to

consider purchasing one of the program's add-on products: Payroll 4.3 (\$99.95) or Point of Sale 4.3 (\$149.95). DacEasy Accounting and Payroll can be purchased as a bundle; this Bonus Pack retails for \$199.95.

Instant Accounting's operations are divided slightly differently, by Customers, Vendors, General Ledger, Invoicing, Bank, Financials, Reports, Period



*DacEasy's accounting programs aren't pretty, but they get the job done well.*

End, and Backup/Restore. The DOS and Windows versions are practically identical in both appearance and functionality. You click on the module you want (both mouse and keyboard are supported in the DOS version), and the work area for that function appears, with icons representing the options available there. For example, in the Vendors module, you can scan the activity there, create a new record, write an invoice or debit memo, make a phone call or send a fax, write a letter or report, or print labels.

The two programs offer a similar core of features. You can use them to build databases of customers and vendors, write checks and send invoices, set up and track budgets, and compile and print reports. Each includes a sample chart of accounts, step-by-step written documentation, and online help; and both are based on double-entry accounting principles simplified for users who aren't financial professionals.

Instant Accounting was designed with the absolute novice or occasional user in mind; it's easier to navigate than DacEasy Accounting, and it's much less expensive. It's an excellent choice for someone who runs a small business and needs quick access to financial information. Instant Accounting's user interface is one of the most attractive and intuitive I've seen in any accounting software product.

DacEasy Accounting is more of a workhorse, though. It's not as pretty, but it can service much larger businesses with far more complex needs. The growth and flexibility provided by the add-on modules make it one of the most reliable products of its type.

KATHY YAKAL



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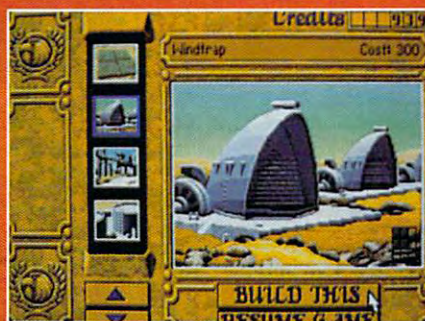
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## FLIGHT SIMULATOR ADD-ONS

After a long, hard day, there's nothing like leaning back in your captain's chair, climbing to 5000 feet, and cruising with the clouds. I'm willing to bet, in fact, that Microsoft's Flight Simulator has headed off more nervous breakdowns than most \$200-an-hour shrinks. After hundreds of hours in the air over the same terrain, though, sometimes you've got to have a change. Luckily, there are plenty of add-on mod-

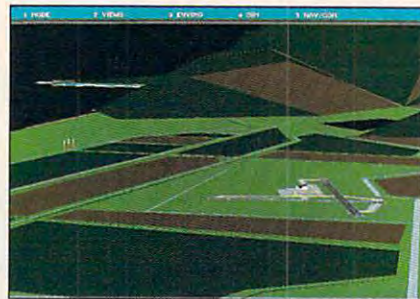
ules for Flight Simulator: not only new scenery but also computer-assisted flight planners, airport databases, pilots' logbooks, and much more.

One of the most prolific of the add-on developers is Mallard Software, which boasts an impressive line of scenery disks and other enhancements. One of Mallard's recent offerings is the Hawaii scenery upgrade. In this tropical tour, you can sightsee from the air as you discover the mountains of Hawaii, the beach resorts of Maui, the shipwrecks of Molokai, the infamous Pearl Harbor, the canyons of Kauai, and more tourist attractions than the land-bound can hope to see from their limited viewpoint. The package includes a small map of all the islands—even the tiny leeward islands—and a manual chock-full of tour suggestions. With this detailed scenery disk, your Hawaiian vacation may be closer than you think.

Besides its many scenery disks, Mallard produces handy utility programs for Microsoft's Flight Simulator. One, called Flight Planner, helps armchair pilots plot their courses, needing only the names of two airports to get the job done. You simply enter your departure and destination points, and the computer applies itself to the task, filling in

your flight plan with the information required to complete your trip. (If you like planning your own flights, Flight Planner also features a manual entry mode.) A database of airports and a pilot's calculator that figures wind correction, descent rate, and descent distance round out the package. Both DOS and Windows versions are included.

Mallard also markets a similar prod-



Don't go to therapy or a travel agency—I fly to Hawaii or Great Britain on your PC.

uct called FS-Pro, which provides much of what is found in the Flight Planner package but with a more hands-on approach. For example, FS-Pro's flight planner isn't as automated as the one in the Flight Planner package. FS-Pro will, however, automatically calculate your initial heading and the distance between airports.

FS-Pro also features a series of ready-to-fly scenarios that you can select from FS-Pro's main menu. When you choose a scenario (or adventure, as Mallard calls them), FS-Pro gives you a description of the challenge at hand and then automatically transfers you to Flight Simulator, with your engine humming and the scenario ready to go. In addition, FS-Pro includes a more powerful pilot's calculator than the one in Flight Planner, an airport and aircraft database, a pilot's logbook, an airport graphics editor, and a pilot's ground school, where you can learn the basics of flying.

Another company that produces add-ons for Microsoft's Flight Simulator (not to mention for its own flight simulator) is subLOGIC. The company's latest offering, the Great Britain Scenery Collection, comes with three disks, each packed with more than 300,000 square miles of new terrain for you to explore. With this package, you can wing your way over England, Wales, Scotland, Ireland, and other areas surrounding Britain. An excellent set of navigational maps is included, as is a plotting and navigational tool. The complete manual features navigation and information charts for more than two dozen major airports. An impressive package.

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## MAG INNOVISION MX17F

When I first opened the carton containing the MX17F, I expected to see a bigger version of MAG InnoVision's 15-inch monitor, the MX15F. While there's an unmistakable family resemblance—both share the same clean lines, for instance—there are other differences besides size and weight that soon became apparent.

This larger-screen unit boasts a fine .26-mm dot pitch. Like its sibling, it's capable of 1280 × 1024 noninterlaced resolution. The MX17F also comes with a detachable tilt-swivel base and rubber-tipped feet (in case you decide to forgo using the base).

At the rear of the MX17F, there's an AC power socket, along with two D connectors

for inputting the video signal. The input used with PCs and PS/2 machines is an elongated 15-pin D connector (two rows of holes instead of the usual three) that looks like a joystick connector rather than a video hookup.

A standard 15-pin D con-

display at the right side, flanked by an unobtrusive LED power indicator. At the left side you'll find rotary dials for adjusting brightness and contrast. Next to these dials is mounted a two-line, 32-character backlit display, with a drop-down door next to it concealing all the im-

is used for each of the following: vertical size, vertical position, horizontal phase (position), and horizontal size. Another single push button to the right of this bank is used for storing and recalling memory settings. Next to the memory button is a two-position slider switch for selecting either user-programmed or factory-preset timing modes, and another slider switch for selecting either the BNC or D-subconnector inputs. The MX17F's nonvolatile memory comes with 13 preset modes and can also accommodate 8 user-programmed modes.

The monitor has an FCC Class B compliance certification for input signals with horizontal frequencies of 58 kHz or lower. It should be noted that this monitor isn't certified Class B for frequencies above 58 kHz because of a lack of Class B-compliant input devices that operate at such frequencies. In other words, monitors that operate in the MX17F's frequency range didn't exist when the Class B compliance standards were set. My, isn't it amazing how technology has progressed!

The image quality and overall performance of the MX17F is more than acceptable, especially when the higher resolutions (1280 × 1024, 1024 × 768) are run with a video card capable of running in noninterlaced mode, such as the Renoir Ultra-SVGA I used. If there's a monitor in your future, the MAG InnoVision MX17F may fit the bill nicely.

TOM BENFORD

MAG InnoVision MX17F—\$1,499

MAG INNOVISION  
4392 Corporate Center Dr.  
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The MX17F from MAG InnoVision packs lots of helpful features into a 17-inch monitor that will plug into just about any machine.

necter (the familiar three rows of holes) is also present, but this one's used for connecting the MX17F to Apple Macintosh II computers! If you want even more flexibility for using the MX17F, you can also use the five discrete BNC connectors for inputting your video signals. A high/low (75-ohm) impedance selector switch is also located on the rear for tailoring the input signal strength.

All the real action takes place at the front of the monitor, however, since that's where you'll find all the user-adjustable controls. A flush-mounted power switch nestles comfortably beneath the

age adjustment controls.

The LCD keeps the user constantly informed of the currently active video mode, with the top line (16 characters) displaying either *Interlaced* or *Noninterlaced* and the lower line (also 16 characters) showing the resolution and frequency (for example, *1024 × 768 70 Hz*). This is a nifty feature that gives you instant confirmation of the mode you're running in.

The control panel next to the LCD contains a push-button switch for degaussing, along with eight additional push buttons divided into four pairs (decrease/increase) of controls. One pair

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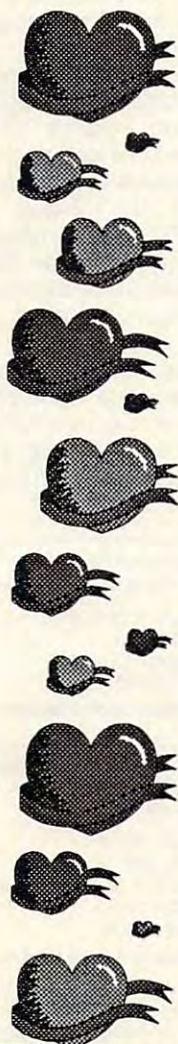
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# REVIEWS

## VIDEO POKER

Step into any Las Vegas or Atlantic City casino and prepare to be overwhelmed: video poker machines, as far as the eye can see, each adopted by a hopeful gambler looking for a lucky draw. Now, three software versions of this popular casino attraction allow players to hone strategies and have fun without risking the rent money.

Behind facades of flash and glitter, there's some intense number crunching going on. Each package takes the business of tracking odds, percentages, and payoff schedules very seriously. In addition, the simulations offer as much depth and detail as the user cares to indulge: fast and fun entertainment or meticulous tools with which to develop expert, workable strategies.

Features common to all three packages include Las Vegas and Atlantic City variations of the most popular casino machines: Draw Poker, Jokers Wild, and Deuces Wild. Most provide the option to change payback schedules and other values to create unique games. Other common features include multiplayer tournaments, on-screen strategic advice, hand evaluation tables, automated statistical play, and detailed game reporting. Each company has a Windows version of its product available or in development.

Of the three products reviewed, Stanford Wong's Video Poker makes the most effort to re-create the look and feel of a real casino machine. It's also the only game in the group to offer sound card support, adding atmosphere with digitized crowd noise and the incessant clinking of coins. On the other hand, the game's low-resolution, garishly colored graphics are authentic almost to the point of distraction. The game's many strengths include a unique split-screen, two-player tournament mode and the option to save multiple play sessions in progress. Another big asset is the ability to redefine and save custom machine configurations. Weaknesses are mostly cosmetic—cluttered screens and meager audiovisual feedback—coupled with a slow graphics display and poorly programmed mouse option.

Masque Video Poker trades bells and whistles for lightning speed and statistical prowess. As a token of its emphatic dedication to real-world strategy, the game simulates only "full pay" machines—units with unaltered payback schedules. Strong points include a detailed play history analysis, showing alternate outcomes to all hands

played against the computer's advice. The game is also highly configurable, with excellent mouse and hot-key controls. Beyond its narrow scope of machine simulations, the game's only weakness is its dour personality. If not for some rudimentary graphics and sound effects, you could almost mistake it for a spreadsheet.

Strategic Video Poker falls comfortably between a flashy arcade-style game and rigid statistical simulation. Featuring clean, high-resolution graphics and fast gameplay, this could be the one to beat. Strong points include the ability to play off credits—thus preserving your nest egg—and a unique "hand tester" to compute odds before committing to play.

The game also features 31 preset payoff configurations, players' session stats saved to disk, and the ability to print strategies for use in real casinos. Audio feedback is excellent, despite the program's having no sound card support.

Annoyed by the constant nagging of the computer strategist? Turn it off by playing smarter: The more you've learned, the less advice it gives. And unless you're a long-lost relative of "Diamond Jim" Brady, playing with a \$1,000 bankroll simply isn't realistic. Limiting your coffers to a reasonable amount adds excitement to winning and agony to defeat. As diehard gamblers say, "No threat, no thrills."

Overall, the only clear winners in this race are video poker enthusiasts. For both casual and serious players, all three products offer a wealth of entertainment and instructional value.

SCOTT A. MAY

Masque Video Poker: IBM PC or compatible, 256K RAM; mouse supported—\$49.95

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## REVIEWS

### MAKEUP FOR WINDOWS

A buddy of mine dropped by today to show me a promo flier for his wife's gift shop. He'd created it on his PC, using standard dry-as-dust type fonts, and he made the mistake of asking my opinion.

"It's boring as day-old toast," I said. Uh-oh. Mr. Subtlety strikes again.

"I guess it does need work," my friend said. Then he asked The Big Question.

"Can you help?"

"Sure," I said. "All it really needs is a little MakeUp!"

MakeUp is a typographic special-effects program from Bitstream. Remember what word processors did for writing? That's what MakeUp does for type. It lets your creativity run free, and all you need to make it sing is Windows and a 286-compatible PC.

MakeUp gives you complete control over basic type characteristics. No surprise there. But that's just the beginning. Imagine letters that seem to float above the page or appear embossed into it. Envision characters shaded so they appear to be made of polished metal. Picture words that stretch and twist and curve around complex shapes. The possibilities are endless, and MakeUp makes them happen.

Text entry—the first step—is easy. Simply draw a box and type in your characters. They're automatically fitted into the space you've outlined.

Then the fun begins. Want an embossed look? Click on the Emboss tool. Three-dimensional letters are equally easy. So is bending type around arches or circles or forming text blocks into complex shapes. You can even customize individual letters, perhaps to create a one-of-a-kind logo or a typeface of your own design. MakeUp gives you all the tools you need.

You can further enhance your creations by adding geometric shapes (circles, ovals, rectangles, polygons, and stars). There's even a Blend tool that transforms one word or shape into another, opening the door to some very unusual effects.

MakeUp also lets you "wash" type (individual letters or entire words) and objects with color or gray-scale washes. Colors can be specified using red-green-blue (RGB), cyan-magenta-yellow (CMY), and hue-saturation-value (HSV) values. Pantone process colors can also be specified. You can't print color separations, but you'll have no trouble exporting files to separation-capable programs. In addition, Make-

Up supports more than 20 different graphics formats.

Also very useful is MakeUp's support of Object Linking and Embedding (OLE), a Windows 3.1 feature that lets you edit and update objects directly from the application in which you placed the object.

MakeUp is supplied with an extensive clip art library and with five typefaces (Americana Bold, Bitstream Oz Handicraft, Poster Bodoni, Revue, and VAG Rounded) in three formats (Speedo, PostScript Type 1, and TrueType). Program setup automatically loads the Speedo fonts; you can load the PostScript Type 1 fonts with a font-scaling program such as Adobe Type Manager or load the TrueType fonts directly in Windows 3.1. Additional typefaces are available.

MakeUp's documentation is outstanding. The 276-page manual is highly readable, carefully organized, and lavishly illustrated. Also included is MakeUp Techniques, a separate guide which illustrates several effects and explains step by step how each was done.

If you've ever felt there's a type designer inside you, give MakeUp a try. Once it's installed, you can be doing real work in less time than it takes to read this review. Who knows? It might be just what you need to unleash your typographic talents on the world!

STEVE HUDSON

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## REVIEWS

word for *dog*. Select English as the source language, type *dog*, and you have your translation: *cane*. You also receive the appropriate words in French (*chien*), Spanish (*perro*), and German (*Hund*), all with their respective genders noted. Lookup times pass without notice; in spite of decompression work, Berlitz Interpreter offers instant results. To make keyboard entry of those pesky alien characters—tildes and umlauts, for example—possible, Berlitz Interpreter allows you to choose them via cursor keys. Once selected, the appropriate character appears on the text entry line.

Berlitz Interpreter installs in less than 1MB of hard drive space, making it a prime candidate for notebook travels. The program even sports a quiz feature. Just choose a source language and type in your best guess for the word that appears. As you build your command of foreign languages, you'll see that they're not quite so foreign anymore (and not quite so enervating as hour-long games of laptop solitaire).

You may also summon the interpreter from within other programs: Lotus Works, Microsoft Works, Microsoft Word, WordPerfect, and WordStar. With helpful Berlitz Interpreter to prod your imagination, *love* soon turns to *amore*, and *nausea* gives way to *Übelkeit*. You need hardly stop typing to include these little gems, and your writing—at least your correspondence and your fiction—may profit by your exotic word gathering.

If you've ever studied a second language, chances are that some of that vocabulary remains locked in your memory. Berlitz Interpreter might just jog loose some key words while teaching you more than a few new ones.

For foreign-language first-timers, the sheer volume of available words might overwhelm, presenting choices too sweet. Limpid text files overburdened by inept locutions will surely litter the hard drive. Practice some caution, though, and the glamour passes, replaced by a strong sense of utility. In short, we can all profit from the exposure to new words, and Berlitz Interpreter provides a tireless tutor and worthwhile word fetcher for those of us who use computers.

DAVID SEARS

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Circle Reader Service Number 447

## GUY SPY AND THE CRYSTALS OF ARMAGEDDON

As if the world needs another threat, despicable Baron Von Max lacks only the elusive Crystals of Armageddon to power his doomsday device. The worst fears of pulp heroes could come true unless Guy—the spy who never sleeps—can shoot and slug his way through a series of adventure vignettes to beat the evil baron to the punch.

You'll immediately recognize the visual similarities between Guy Spy and the Crystals of Armageddon and *Dragon's Lair*. Knowing a good thing when it has one, Readysoft has pursued the interactive movie approach to gaming for some time now, and Guy Spy, while more or less as linear as its predecessors, offers much more action within each of its constituent episodes. At the Berlin train station, for example, Guy must dodge bullets and fire his own—arcade style. A life meter gauges his proximity to death, and when it comes, Guy reappears to blithely try again. That's a far cry from the make-one-mistake-and-you've-lost-a-quarter mentality of the original *Dragon's Lair*.

Guy's travels also bring him face to face with an animate mummy and take him on ski runs down grenade-pocked slopes, headlong into bar brawls, and, finally, to the Doomsday Tower for a vicious altercation with Von Max. Multiple backdrops and ample animation make these excursions into serial vérité a cartoonish pleasure; the engaging action renders this less an exercise in memorization than a playable game. Of course, to make Guy Spy more playable still, the designers might rethink the interface for the next installment—some system of movement allowing for simultaneous attacks would act as proof positive of Guy's superspy status.

For now, Guy Spy will capture the interest of anyone not already exhausted by other Readysoft adventures, and it stands well above the company's earlier efforts. Scads more fun than secret ciphers and far more heroic than selling atomic secrets, Guy Spy and the Crystals of Armageddon could give espionage a good name.

DAVID SEARS

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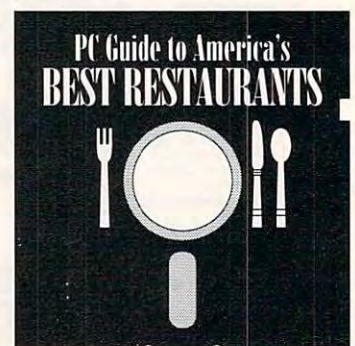
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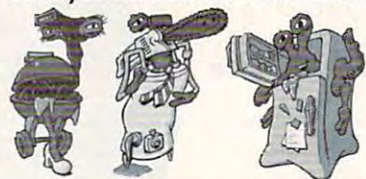
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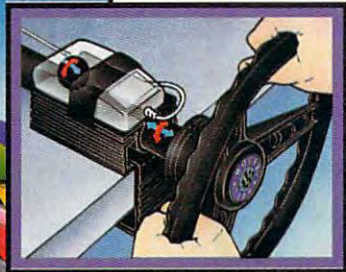
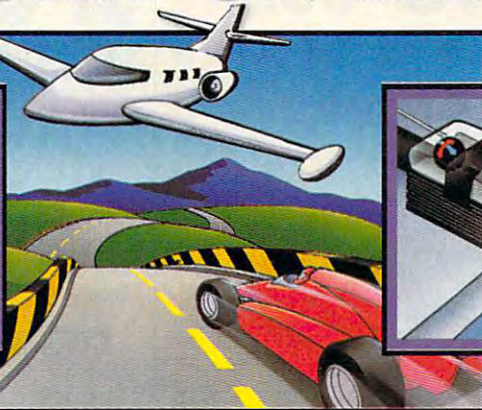
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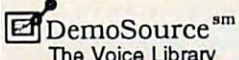
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## DRAM Dumping Accused

Last October, the U.S. Department of Commerce announced a preliminary determination that dynamic random access memory (DRAM) semiconductors from the Republic of Korea were being sold in the U.S. at less than fair value, a process known as dumping. The investigation was prompted in April 1992 by a complaint raised by Micron Technology.

Already, since the initial announcement, the prices of 1MB and 4MB chips have nearly doubled in the U.S. If

the Commerce Department finds that Korean DRAM chips were dumped, the International Trade Commission will have 45 days to determine whether the imports materially injured or threatened injury to the U.S. industry. If the ITC's findings are affirmative, the Commerce Department will order the U.S. Customs Service to collect antidumping duties that can run as high as 87 percent of the current DRAM price. The Commerce Department's final determination is expected this month. Stay tuned.

## Intel-ligent Notebooks

Intel announced a family of Intel486 SL microprocessors that give PC manufacturers highly integrated, high-performance, power-efficient solutions for "next-generation" notebooks. The microprocessors allow full-featured notebook computers to convert to true 486 performance.

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Intel's 25-MHz version, currently in production, operates at 11 million instructions per second (MIPS); a 33-MHz version, which should be in production by the end of this month, operates at 14.5 MIPS. For more information, contact a local Intel sales office or the Intel Literature Center, Packet #D8P03, P.O. Box 7641, Mt. Prospect, Illinois 60056-6741; (800) 548-4725.

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Under the agreement, Cray's developmental T3D MPP computers will be installed at Los Alamos and Livermore by fall 1993 and will be connected over a high-speed data network to each other and to a system located at the Cray Research headquarters. The network will serve as a "distributed computing environment" for tackling industry problems, resulting in solutions that will increase productivity, reduce R&D costs, and improve manufacturing techniques for American companies. That will allow the U.S. to bring higher-quality products to market faster. □

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491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510
511	512	513	514	515	516	517	518	519	520
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