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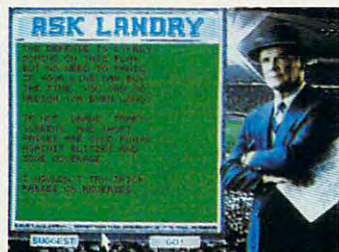
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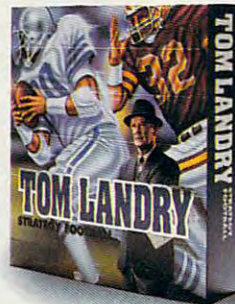


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Virtual Reality

Reality—what a concept!

B Y J E F F R E Y H S U

For the longest time, people have been searching for new realities—new worlds more interesting, more exciting, and more meaningful than the real world.

In the past, creating unreal worlds meant nothing more than daydreaming, wishful thinking, and simple fantasy. But recent developments in computer technology, graphics, and specialized hard-

ware have served to make fantasies come to life in a form that others can share, in a form that increasingly is indistinguishable from the other reality—the nonvirtual reality of ordinary life.

While the holodeck depicted on "Star Trek: The Next Generation" may be decades away, virtual reality—VR for short—is coming to be used for serious applications. Not just for games and recreation anymore, VR is now being taken seriously as a tool for creating environments that are either too difficult or too impractical to create in real life.

What Is Reality?

VR could be described as a type of advanced computer simulation in which the user doesn't passively view the artificial environment but, rather, interacts with it. The interactive nature of VR makes it possible for the user to become completely immersed in the environment.

Using VR techniques, a developer might create an opportunity to travel back in time and battle dinosaurs. Or an architect might construct a virtual kitchen where you could try out the stove, check the cupboards, and see if it's the kitchen you want in your new house. Or you might try your hand at surgery on a virtual patient. Or dock molecules together and actually feel the push and pull of atomic forces.

Using powerful, integrated computer systems that are capable of displaying



What you see with
your eyes,

what you touch with

your hands,

what you believe

to be true

may be real only to

you.

three-dimensional graphics and generating stereophonic sound, together with specialized equipment such as head mounts, data gloves, and other I/O devices, VR can give a realistic portrayal of new worlds not yet created. The head mounts submerge you in the virtual, three-dimensional world by presenting your eyes with realistic images that instantly adjust based on what you're looking at, together with realistic sounds to make you feel that you're actually there. Wearing data gloves, you can manipulate items in a virtual environment—open doors, pick up objects, or cut into virtual patients.

Feed Your Head

Mention VR, and many people will think of the movie *The Lawnmower Man*, which tells of a simpleminded gardener who is sent into VR to play Cyber Boogie and to experience teledildonics (virtual sex) and other unique pleasures. The plot turns on his inadvertent transformation into the malevolent and psychotic alter ego, CyberJobe.

While the experience portrayed in the movie is a far cry from current VR technology, the movie does hit on one truth: The most exciting work being done in VR is entertainment related. Instead of just watching television or guiding a tiny animated figure in a computer game, you can climb inside the experience of fighting opponents as a giant mechanized robot, crashing a car in a demolition derby, exploring in a world of

checkerboards and pterodactyls, and much more.

The Specter of Virtuality

One line of VR products that has begun to hit the entertainment scene is Virtuality. With Virtuality, you can enter a simulated or fantasy world and interact with the surroundings—fight opponents with swords or drive a car madly down a racetrack.

Virtuality units, including headgear and related devices to give you a 3-D VR effect, have become more and more common at entertainment centers around the country. Developed by Cyberstudio and marketed by Spectrum HoloByte, Virtuality offers VR game simulations are among the most realistic available.

Hook yourself into the headgear and data glove of the stand-up unit or take a seat in the sit-down driving unit, and off you go to another world. You can fight a space battle in *Battle Sphere*, go into an elf and wizard fantasy world in *Legend Quest*, smash up some cars in the virtual demolition derby *Total Destruction*, or go hang gliding in *HERO*. Want to fight opponents using a mechanized battle machine? Play *EXOREX*. Finally, for a truly out-of-this-world experience, fall into *Dactyl Nightmare* to explore an abstract environment of checkerboards



Realistic architectural designs can be "walked through" using Straylight's PhotoVR system.



Virtual reality promises pleasures undreamed of in real life.

and flying pterodactyls.

Virtuality promises to be a form of entertainment more realistic and exciting than anything previously created. These sophisticated multimedia systems contain a set of closely integrated components,

including Amiga-type processors, math coprocessors, graphic chips, CD-ROMs, microphones, motion tracking systems, and much more.

If you find Virtuality's *EXOREX* particularly exciting, you might want to

give Chicago's Battletech Center a try. Located in the North Pier section of town, the Battletech Center is a complete entertainment complex devoted to space warfare. Your \$7 buys a 25-minute experience including training, briefing, and 10 minutes of actual playing time. You learn how to operate a giant mechanized robot called a Battlemech, which involves responding to terrain changes, adjusting for heat dissipation, and laying out battle strategy.

The heart of the Battletech center is a room containing 16 podlike cockpits. Encased in a kind of futuristic spacecraft cockpit, you must learn to use over 100 controls while observing the battle on full-color viewing screens. (Despite the large array of controls, knowing how to use 4 main controls will allow you to play satisfactorily.) During ten minutes of intense play, you must make critical decisions while being deluged with information. You have to manage Battlemech movement and firing, decipher sound effects, and choose strategies.

What gives realism and challenge to the Battlemech experience is the fact that you play against living opponents rather than the algorithms of a computer program.

Battletech and Virtuality appear to be only the precursors of a flood of VR

Myron Krueger's Artificial Realities

Think of virtual reality, and the vision of a person fully suited up in headgear and data gloves comes to mind. However, many experts in VR circles believe that a person exploring virtual worlds should be free of the heavy burdens of technology. In other words, you should experience VR unencumbered.

Myron Krueger is one of these. One of *Life* magazine's 100 Most Important Americans of the 20th Century, he is considered the father of artificial reality. He is an advocate of experiencing artificial worlds without any kind of physical interface device.

In Krueger's artificial reality, art and science become interrelated, and the viewer interacts with and actually becomes part

of the new simulated environment. These interactive environments react to your movements, allowing you to communicate with both graphical images and other users. You use your hands, your head, your feet, or your entire body to interact with these artificial realities. You can play with an animated animal, engage new art form called body surfacing (in which every movement produces fan-

tastic colors and shadows), or compose music and draw pictures with your feet. Participants in separate rooms can tickle each other, create a collaborative finger-painting masterpiece, or perform free-fall gymnastics.

Part art form, part tool, Krueger's artificial reality provides a more enjoyable way to interact with virtual reality while introducing a more creative aspect to the artificial environment.

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options. VR theme rides and parks are being planned by Disney and Universal Studios, and similar attractions may soon appear in Japan.

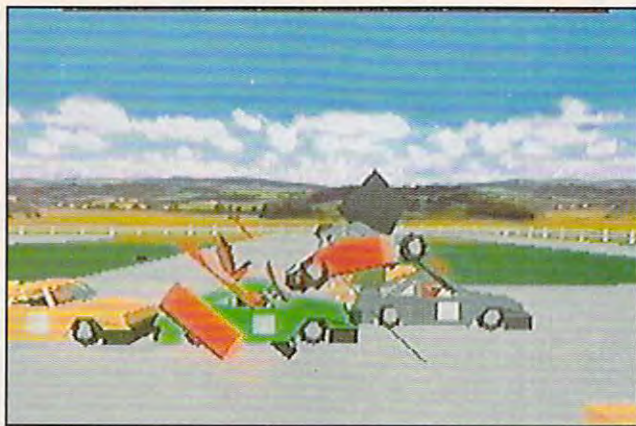
Molecular Reality

It's not all fun and games in the virtual world. Researchers Frederick Brooks and Henry Fuchs of the University of North Carolina at Chapel Hill are using VR to study how molecules and receptor sites interact. Employing computer-integrated head mounts and a mechanical grip, they set out to simulate the way molecules—and especially drug molecules and receptors—join and dock, and also to examine up close how different molecules would attract or repel each other.

This kind of research is normally accomplished using plastic models, but VR simulations give an entirely new perspective to understanding why certain drugs work or fail based on dynamic, visual models. VR is also being tested as a way to look at various radiation treatment options.

The Deepest Cut

Joseph Rosen, an associate professor of surgery at the Dartmouth Medical School, has developed a "surgery rehearsal" system that gives surgeons a virtual patient to work with, showing graphically what happens when parts of the



Virtuality provides vicarious thrills in Total Destruction.



Cyber Boogie is Hollywood's interpretation of virtual reality entertainment.

body are cut into. By using virtual scalpels and other instruments, surgeons can learn how the body reacts to certain procedures before moving on to perform them on a live patient.

Greenleaf Medical Systems, started by Walter

Greenleaf, has developed VR systems that allow aphasics (people who cannot talk, often as the result of a stroke) to communicate using hand gestures while wearing a data glove. These gestures are translated into printed

text or synthesized speech. The same firm offers a line of products that measure the motion range of a disabled patient, and other products that analyze how a person walks, which is useful to orthopedists.

Castles in the Air

VR's uses go far afield, and uses currently under development demonstrate that it's as protean as the computer that serves as its brain. Air-traffic controllers may one day take direct control of the planes on their radar scope through VR. You may've already read how architects and designers can place clients inside rooms that have yet to be built. But even when a space exists, VR can take you there through robot technology—a particularly useful feature if the location is remote or inaccessible. One day, you might walk through deadly landscapes like the surface of the moon or the bottom of the sea.

Portal to the Future

VR is still a very young field. The level of sophistication of many of the systems is high, but progress must still be made in the quality of the visual images. Once the technology arrives, each of us will be like Columbus or Marco Polo at the portal of a new world of our own making. Neither space nor time is the final frontier. We have yet to set foot on the territory of pure imagination. □

Virtual Reality Studio

Want to experience virtual reality firsthand? Well, now you have your chance. An innovative 3-D graphics system called Virtual Reality Studio (available from Accolade) gives you a taste of what VR is all about.

Virtual Reality Studio differs from other graphics packages in that it allows you to create 3-D environments and then move

around within them using your keyboard or mouse as a controller. The objects you create out of geometric solids can be animated and interactive. By putting these together, you can build a dream house, lay out a landscape of geometrical objects, or create your own interactive adventure games.

This power does not come without a price, however. Creating your own 3-

D environment takes time and practice, and it requires that you take time to learn how the system works. Also, in order to make your environment interactive, you need to use the programming language, which like any language, requires experience before you can apply advanced features easily.

Virtual Reality Studio does require some effort to learn, but it's a very

good program for exploring the power and promise of VR.

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64/128 VIEW

The future of Gazette depends upon the support of its readers. Also, send us your spreadsheet templates.

Tom Netsel

Now that *RUN* has joined such journals as *Ahoy*, *Commodore*, and *Transactor* in 8-bit heaven, a number of people have written or called asking about Gazette's future. As a matter of fact, I just got off the telephone with one concerned subscriber who called from Australia. I assured him that as long as readers support Gazette with their subscriptions, we'll provide them with information, articles, and programs for the 64 and 128. As a matter of fact, I have plans for something new, but I can't announce it until all the details are worked out.

We have quite a few readers in Australia and around the world, and I'm delighted by their continuing support of Gazette. Like my friend in Australia, subscribers in other countries have to pay about twice the price that U.S. subscribers pay. Postage accounts for much of that extra cost, and they get the magazine a month after the newsstand date. Looking at a subscription card in a recent issue, I see U.S. readers can order 12 issues for \$9.97. (Prices may be higher now.) I see ads on TV for a pizza that costs more! That's less than 85 cents an issue! I hope you'll inform any former *RUN* subscribers about COMPUTE's Gazette edition—or the multi-edition which includes 64/128 and Amiga sections for the same price. Pass the word on your local BBS, user group newsletter, or tell your friends in person to send in subscription cards from the magazine or call (800) 727-6937.

As Gazette Disk subscrib-

ers are aware, each month we provide one or two bonus programs that do not appear in the magazine. The December disk included a bonus called SpeedCalc Help. It's a help screen that loads into our popular spreadsheet program.

That started me thinking more about spreadsheets and how useful they can be. I then began wondering about all the ways our readers might be using SpeedCalc. I'm sure many of you have devised interesting and useful spreadsheet applications. How about sharing them with other 64 and 128 users? These files or spreadsheet templates might be stock analyzers, grade books, home budgets, conversion programs, or any useful application.

Send us a disk with a copy of your spreadsheet template that will load into SpeedCalc (or GemCalc, a compatible spreadsheet available on the Gazette PowerPak Disk). We'll publish a number of them as bonuses on future Gazette Disks. We'll pay \$100 for each program we use. A simple budget is provided on this month's disk as an example. Be sure to include enough instructions within the program itself. It must be a single self-explanatory program that users can load into their spreadsheets, filling in the blanks with their own data.

Send your templates—for SpeedCalc or GemCalc only—to SpeedCalc, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Sorry, but no disks will be returned. □

GAZETTE

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Every article and department from *Gazette*—July 1983 through December 1989 issues—is indexed: features, games, reviews, programming, "Bug-Swatter," "Feedback," and the other columns. Disk features pull-down menus, help screens, superfast searching/sorting capabilities, and much more.

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Fourteen of the most important utilities for the 64 ever published in *Gazette*. For serious users. Titles: *MetaBASIC*, *Disk Rapid Transit*, *Mob Maker*, *Ultrafont+*, *Quick!*, *Disk Editor*, *Basically Music*, *PrintScreen*, *1526 PrintScreen*, *Fast Assembler*, *Smart Disassembler*, *Comparator*, *Sprint II*, and *Turbo Format*.

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Gazette's best 13 programs for GEOS and GEOS 128 users. Selection includes utilities, applications, and games. Titles: *Super Printer Driver*, *Skeet*, *File Saver*, *Help Pad*, *Word Count*, *Directory Printer*, *Quick Clock*, *SlideShow*, *File Retriever*, *Screen Dumper*, *Font Grabber*, *GeoPuzzle*, and *GeoConverter*.

128 Classics

\$11.95

Thirteen of *Gazette's* best 128 programs, including utilities, games, and applications. Titles: *MetaBASIC 128*, *RAMDisk 128*, *80-Column Disk Sector Editor*, *MultiSort*, *Block Out*, *Miami Ice*, *The Animals' Show*, *Cribbage*, *XPressCard*, *Sound Designer*, *Video Slide Show*, *Math Graphics*, and *3-D BarGrapher*.

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Telecommunications is the magical process by which distant computers communicate with each other via telephone lines. For those just getting their feet wet in the sea of telecommunications, a primary concern is the speed at which modems communicate.

A modem is a device that converts (modulates) digital signals from a computer into audio tones that can be transmitted over phone lines. Another modem at the other end converts the tones back into their original digital form (demodulates). Transmission speed is measured in the number of bits sent per second (bps). Although a byte that represents one character contains eight bits, a usual telecommunication byte is ten bits long. It consists of eight bits for the information or data and two delimiting bits that separate contiguous data bytes.

Theoretically speaking, a 300-bps modem can send 30 characters per second. A typical double-spaced typed page of 1800 characters and spaces would need about a minute if transmitted at 300 bps. A modem operating at 2400 bps can send the same page in 7.5 seconds!

A 64's commonly used modem speeds of 300, 1200, and 2400 bps are in a sense analogous to the XT, AT, and 386 technologies familiar to PC users. XTs

BAUDS MEAN BUCKS

**Time is money
when you connect to
commercial
information services.**

By Ranjan Bose

are inexpensive and adequate for some uses, but they're slow. The AT is more efficient yet inexpensive, but it's neither here nor there—similar to 1200-bps modems. The 386s are fast, very well supported, and available at reasonable cost—as are 2400-bps modems. To carry the analogy further, the new super-

speed modems would be comparable to 486s.

Slower modems are the least expensive ones to buy, but they can cost you money if you use them on commercial online services. To give you an example of the savings you can achieve with a higher-speed modem, let's assume that an online service charges \$6.00 an hour for 300-bps access

and \$12.50 an hour for 1200- or 2400-bps access. If you were to access the service for an average of ten hours every month, you would be paying \$60.00 for 300-bps access and \$125.00 for 1200- or 2400-bps access. If you spend most of your online time downloading files or messages (and not chatting in forums), you could download four times as much at 1200 bps and eight times as much at 2400 bps as you could at 300 bps—for just over twice as much money.

This ideal scenario is obviously subject to several variables, such as the condi-

tion of the phone connection, the network load (ensuring error-free transmission), and the presence of either a DOS speed-up utility in your system or the ability to use an REU as a RAM disk.

If we consider the amount of data transferred at 300 bps over ten hours as an arbitrary data unit, each data unit at the above prices would cost \$60.00 at 300 bps, \$31.25 at 1200 bps, and \$15.63 at 2400 bps. For a little more than the difference in the cost of accessing our arbitrary data unit at 300 bps as compared to 2400 bps, you can buy a 2400-bps modem.

Also, while a PC user cannot buy an XT/AT/386 combo, a 2400-bps modem will let you telecommunicate at all three speeds when necessary. If a BBS you call operates at a slower speed, your 2400-bps modem can slow down. You could use 300 bps when chatting online or typing messages, or anything else that involves online waiting or keyboard entry. Then use 2400 bps when transferring files. The 1200-bps or slower speeds can come in handy for those occasions when a phone line is noisy.



Data transmission is less subject to error on noisy phone lines when transmitted at slower speeds.

In Praise of Speed

I cannot help but toot the 64's horn at this point. Electronic eons ago when 300 bps was the 64's telecommunication standard, people thought that reliable data transfer at 1200 bps and higher speeds was impossible because of idiosyncrasies in the Commodore Kernal routines. At any rate, 1200 bps became a reality, fought the gremlins, and is now aging gracefully.

There may not be as many 64 users telecommunicating at 2400 bps, but those who do are quite happy. With 2400-bps external modems selling for well under \$100, you need not shy away from using them because of price. Several commercial and shareware terminal programs exist which support 2400-bps access. NovaTerm, Terminal One, and Bell Term are just a few of them.

RS-232 Devices

Commodore decided on a different type of interface for its user port, rather than going with the industry standard RS-232. Therefore, connecting an RS-232 device, such as a modem, to a 64 used to be a problem. That's no longer the case. Aprotek makes a fine product called Com-Modem, which works well with external RS-232 modems. Several other RS-232 interfaces which plug into the 64's user port are also available from Aprotek, Creative Micro Designs, and other companies. Aprotek also sells a 2400-bps modem that plugs directly into the user port.

RS-232 modems supporting 2400 bps come in two varieties, a plain-vanilla modem which allows 300-bps to 2400-bps speeds and one which offers built-in protocols for error checking and data compression (MNP, V.42bis). These latter ones are great toll savers, but only if the modem at the other end also uses them.

Expedient or Exotic

CompuServe users, for instance, would not be able to use MNP5 or V.42bis because the online service does not yet support these protocols. CompuServe may eventually add these protocols, but a plain-vanilla 2400-bps modem is sufficient for several reasons. To a significant extent, a well-engineered modem can compensate for occasional line noise using adaptive equalization, line impedance

Time of day	Download time in seconds				Cost per 10K bytes
	#1	#2	#3	Mean	
8:00 a.m.	45.36	29.33	30.33	35.01	\$1.19
11:00 a.m.	33.09	39.51	33.29	35.30	\$1.20
10:00 p.m.	19.42	19.98	19.17	19.52	\$0.66
6:00 a.m.	16.93	17.40	18.95	17.76	\$0.60

matching, and other techniques.

To use MNP5 and V.42bis protocols effectively, your software should support 4800 or 9600 bps, neither of which is supported by any 64 telecommunication software. NovaTerm with the CMD Swiftlink is a combination of software and hardware that claims to do this. MNP protocols are very useful during ASCII (text) transfers, but their advantages vanish when transferring programs (binary) or files that are already compressed, such as ARC or LYNX.

Finally, these protocols interact variably with software error-checking protocols such as XMODEM and YMODEM. These software protocols are usually self-sufficient anyway. MNP and similar protocols are more

useful for transferring numerical business data where glitches could result in financial disaster. So instead of waiting for these sophisticated protocols and modems that can use them, go for it! The longer you postpone getting a 2400-bps modem, the more money you're losing online.

You may see an occasional garbled character in messages or bulletins that have been sent at 2400 bps, but you can easily correct them by using your parallel processing, multigigabyte supercomputer known as your brain.

Rush-Hour Blues

If you've ever used an online service, you may have noticed its slowing down at times. When large numbers of users are online simultaneously, the effective transmission of bits and bytes through the phone network becomes appreciably slower than that occurring during nonpeak hours. The delay is especially noticeable when using packet switching networks such as Tymnet or Datapac. For top-dollar values, try to download large files during nonpeak hours, usually early morning or very late at night. If you're calling from Japan, be aware of the time difference. You may stay up late only to run into bright-eyed, well-rested U.S. users—thousands of them!

Time Is Money

I recently ran a simple experiment in which I downloaded a certain file from CompuServe at different times of the day, with XMODEM at 1200 bps (using the Common Sense 1200 terminal program that is bundled with the Commodore 1670 modem). I downloaded each file three times during each online session. A digital chronometer allowed me to time the transfer of eight XMODEM blocks (1048 bytes). To rule out varying disk transfer delays, I always downloaded to a freshly formatted disk. Boy, was I surprised!

Note that the variations in rates of transfer between similar samples 1, 2, and 3 is less during the nonpeak hours. (See the above table.)

Are MNP Modems Necessary?

While shopping for modems capable of transmitting at 2400 bps, you come across many with choices such as MNP (Microcom Network Protocols) and V.42bis protocols. These modems can check and correct for errors during transmission arising from phone line noise and other interferences. They can compress data so that you get an effective transfer rate of 4800-9600 bps.

To be effective, however, the modem at the other end must also be an MNP or V.42bis type. You must also remember that most downloadable files are already compressed and do not benefit much from these procedures. Protocols which enable an apparently higher speed transmission (MNP5) cannot be used with a 64 because none of the terminal software allows for speeds greater than 2400 bps.

Finally, during downloading, you usually employ software-based error checking protocols such as XMODEM or Punter. So save your money. A plain-vanilla 2400-bps modem will suffice for most of your telecommunication purposes.

These transfer rates are not cast in stone and do vary somewhat depending on many factors, but they illustrate the point that the time of day does make a significant difference in telecommunication costs. During the day and in the early evening, there are longer delays and more errors (requiring repeated transmissions of blocks of data), possibly because of higher line noise and longer switching delays as a consequence of heavier usage.

Can Software Help?

If you examine the above values closely, you will observe that even at the best transfer rate of 1048 bytes in 17.76 seconds, only 59 bytes were getting transferred each second (1048/17.76=59). Since I was operating at 1200 bps, in theory, the transfer rate should have been 120 bytes per second. (Each telecommunication byte is ten bits long: eight bits for the data and two delimiter bits.) You cannot expect 100-percent efficiency in the real world, but I was getting less than 50 percent. Something was not right!

I wondered if my telecommunication program was using inefficient code. In order to figure that out, I fired up my computer and downloaded a certain file by first using Common

Why Use 2400?

If you access CompuServe at 300 bps, it costs \$6.00 an hour, whereas at 1200 or 2400 bps, the cost is \$12.50 an hour. The volume of data which can be sent at 300 bps, under ideal conditions, would cost approximately half as much at 1200 bps and one-fourth as much at 2400 bps. Over a short period of time, you could easily recoup the cost of the modem by stepping up from 300 to 2400 bps.

The savings are even more relevant for those who don't have local CompuServe nodes and must use Datapac or other packet switching

networks which charge \$10.50 per hour above regular CompuServe connect fees.

Higher speeds save you money when you're downloading files and programs, but at other times you may prefer a slower rate. In situations which involve online waiting, such as chats or conferences, 300 bps can be your best bet. Most 2400-bps modems also support 300 bps, so there's no need to have both.

So to answer the question of why we need 2400-bps modems, Scrooge says it best: "Money, money, money!"

Going one step further, I tried similar transfers using NovaTerm at 2400 bps. To my dismay, I found that when using a packet switching network such as Datapac, downloading with XMODEM was only a little faster at 2400 bps—not 100 percent faster as I had expected.

Reading Text

Does this mean that a 2400-bps modem is not really a big toll saver? Quite the contrary, since most of the online time is spent in ASCII transfers,

complex process. Gremlins such as network delays, disk drive delays, phone line noise, and other errors all contribute toward reducing the actual transfer of data.

Since all modem speeds are likely to be affected proportionately by these factors, a 2400-bps modem still represents a good investment if you do a fair amount of telecommunicating. This is especially true if you access online information networks or call BBSs in distant cities.

Maximum Efficiency

If you simply send data via phone line to another computer, you have no way of knowing whether that information arrives correctly or not. Noise and static on the line could alter the bits and bytes, garbling the data. To help insure error-free transmissions, most terminal programs utilize some form of error-checking technique called a protocol.

There are basically three kinds of software protocols used when uploading or downloading files. XMODEM is an example of a protocol which transfers small blocks (131 bytes) of data at a time. Another type, which includes XMODEM 1K and YMODEM, transfers a bigger block (1024 bytes). A third kind of protocol uses blocks of variable sizes. Examples of the third type are Punter and Kermit.

All of these protocols employ some form of checksum comparison between the sending and receiving computers. If an error is detected, the block is retransmitted. Even if only one error is detected, the computer must send that whole block of data.

If the phone line connecting the computers is clean and requires a small number of retransmissions, then protocols that support larger blocks are more efficient. If a lot of errors

	XMODEM 1200 bps		XMODEM 2400 bps	
	Datapac	CompuServe	Datapac	CompuServe
DL time	31.19	13.94	19.30	8.75
Bytes/sec	34	75	54	120
Efficiency	8.3%	62.5%	22.5%	50%

	YMODEM 1200 bps		YMODEM 2400 bps	
	Datapac	CompuServe	Datapac	CompuServe
DL time	12.08	10.64	11.83	6.09
Bytes/sec	85	96	87	168
Efficiency	70.8%	80%	36.2%	70%

Sense 1200 and immediately afterward using NovaTerm 9.3 (distributed by Aprotek). Since Common Sense 1200 doesn't support 2400 bps, the time in seconds required for downloading 1048 bytes at 1200 bps was measured for both programs. I ran and timed this test five times for each program.

With Common Sense 1200, the mean value of five downloads was 32.7 seconds, with the fastest transfer 27.54 seconds. With NovaTerm 9.3, the mean value for five downloads was 23.1 seconds, with the fastest value 20.15 seconds.

NovaTerm, therefore, proved to be 30 percent faster than Common Sense 1200 for XMODEM transfers under nearly identical conditions.

such as chatting or reading messages and bulletins. I decided to test this activity by reading text files instead of downloading them.

To do this, I called CompuServe and let data flow in as fast as it could. To avoid drive-induced delays, I used the buffer RAM disk that NovaTerm supports. I closed the buffer at 30 seconds. At 1200 bps, I managed to receive 3511 characters (117 characters per second). When I switched to 2400 bps, I received 7059 characters (235 cps) in 30 seconds. This is close to the theoretical limits of 120 and 240 characters per second for the two modem speeds.

Compared to straight ASCII transfers, protocol-controlled downloading is obviously a more demanding and

occur during transmission, then a protocol using smaller blocks gains an upper hand because it has to resend only 131 bytes instead of 1024. One YMODEM retransmission could, in theory, equal seven or eight retransmissions via XMODEM.

X or Y?

So is YMODEM really more efficient than XMODEM? Are transmissions affected by the network you use, such as a dedicated network versus a packet switching network?

To test these variables, I accessed CompuServe from my home in Canada through Datapac, which is a 128-byte packet switching network similar to Telenet and Tymnet, and by directly calling the dedicated CompuServe node in Toronto. The following table indicates the results of my test.

The DL time is the mean value in seconds to download either 1048 (XMODEM) or 1024 (YMODEM) bytes from CompuServe at 1200 and 2400 bps using the popular telecommunication program NovaTerm 9.3.

With clean phone lines, no errors occurred during these transmissions. The delays were primarily due to the way the data packets were handled by the networks. Bytes/sec indicates

the number of bytes downloaded per second. The efficiency figures represent the actual performance compared to the modem's theoretical maximum transfer rates of 120 and 240 bytes per second.

Several interesting things became obvious. Calling a CompuServe node directly resulted in more efficient transfers, although on those occasions when Datapac was working at its peak efficiency, it was almost at par with the CompuServe node.

If you compare the bytes-per-second transfer rates obtained at the two speeds in the Datapac columns, 2400 bps was faster than 1200 bps by 2-59 percent. XMODEM showed more improvement than YMODEM, but it was still lower than YMODEM in the total number of bytes transferred.

Looking at similar values, when CompuServe was accessed directly, we discover that 2400 bps was faster than 1200 bps by 60-75 percent. YMODEM was always more efficient than XMODEM.

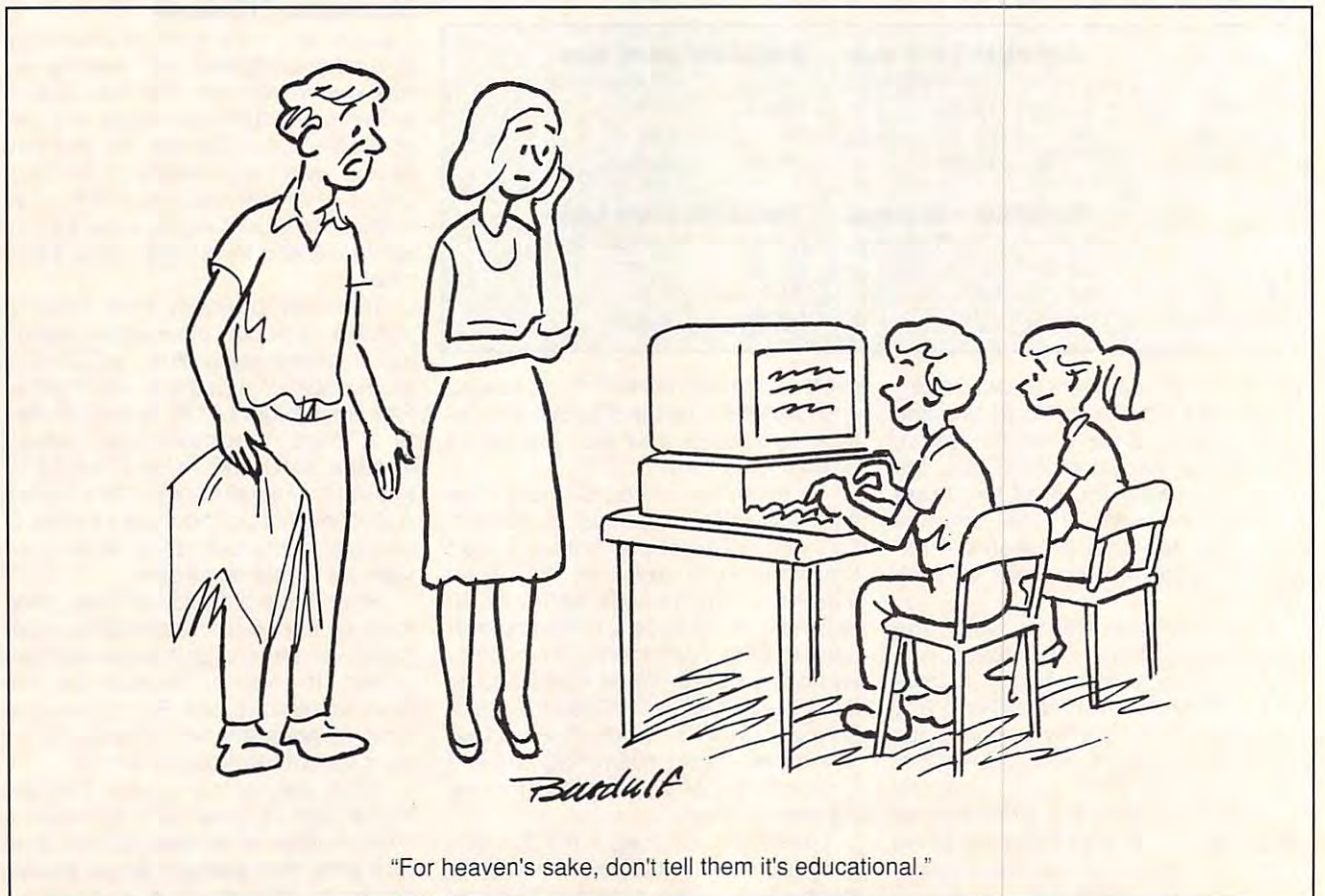
Assuming the theoretical 100-percent efficiency of transfer to be 120 bytes per second at 1200 bps and 240 bytes per second at 2400 bps, the actual performances observed for XMODEM ranged from 23-63 percent,

while performances for YMODEM ranged from 36-80 percent.

The Bottom Line

Just a few short years ago, the price of a 1200-bps modem was several hundred dollars, and 2400-bps modems were even higher. When a modem could cost more than a computer, most users made do with 300-bps. Now that 1200- and 2400-bps modems are less than \$100, frugal users still want to cut costs where they can. When you're connected to an information network that charges by the minute, connect time is the obvious place to trim.

In conclusion, while accessing services which charge the same amount per hour for 1200- or 2400-bps access, it's more efficient to use the faster speed, coupled with YMODEM. Moreover, it's better to connect with the service through a dedicated node, rather than through a packet switching network, even if it means calling long-distance. And if you're willing to work between 12:00 a.m. and 7:00 a.m., the long-distance charges are usually lower, and the phone connections usually cleaner, further reducing your telecommunication costs. □



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FASTOFFICE

Most people consider the 64 to be a personal computer that's used mainly at home, but it's found its way into many offices as well. Word processing is undoubtedly its biggest use, but it's capable of much more.

Spreadsheets and databases are powerful and flexible programs that users can adapt to any number of office activities. They can be used for budgets, inventory control, managing customer lists, and dozens of other uses, depending on the skill and needs of their users.

Most of the commercial business applications have been designed for flexibility. Rather than targeting one specific business or performing one specific task, these programs are tailored to satisfy a variety of commercial needs. This flexibility enables the software to appeal to a wide audience, which in turn makes for sizable sales and profits for the software companies. When software is customized for one business, it can no longer appeal to a wide audience. As a result, its price normally jumps dramatically.

Fastoffice is such a piece of software, but it bucks the norm. It is designed for billing and practice analysis for physicians. To narrow its scope even more, it's designed for solo practitioners. Price is where Fastoffice differs from most customized software. To make a profit selling to a small number of physicians, most billing software costs thousands of dollars. Fastoffice costs \$50!

Fastoffice doesn't pretend to compete with full-featured billing and practice analysis programs, but it does handle a number of billing chores. And it does

them well. It was written by an ophthalmologist for his practice, and he's been using it for more than five years.

Fastoffice is menu driven and fairly simple to use. A physician who is used to billing patients, sending claims to insurance companies, and writing off certain amounts would probably have no difficulty using the program. That's probably why the review copy I received came with no documentation—just a few words of explanation in an accompanying letter.

From the opening menu, you have the option to view, print, or modify a record; create a new record; print bills; or move to another menu. I knew from the letter that I would need a separate data disk. By selecting another menu, I found the system utilities that let me format that disk. That menu also offers the options to compress or unpack data disks using a dual-drive system.

Once your data disk is ready, you can create new records. This is where you fill in a patient's name, address, insurance carrier, billing code, and billing history. Four lines allow you to enter procedures and fees. I discovered that payments can be entered in this area by placing a minus sign in front of the amount. Once basic information has been recorded, you can then enter another new patient or return to the menu.

After the basic information has been entered, you can print the patient's bill. One drawback that I noticed here is that while the program prints the patient's name and address, it doesn't print the physician's. That form of the bill might be sufficient to hand to a pa-

tient in the office; otherwise, I'd recommend using pre-printed billing statements.

Once you have a patient on record, you can then view or modify any information simply by entering the patient's last name. If more than one person with that name is in your data, the program tells you how many matches it's found and asks which patient you want. From there, you can delete a record, alter any line, return to the main menu, or move to another menu.

This other menu lets you print a bill or summarize the billing notes. A bill has space for four itemized lines of procedures and/or payments. You can summarize this data and bring the balance forward at any time. The balance then appears on the top line, freeing three lines for additional information regarding procedures and/or payments.

In many cases a physician's fee is paid in part by an insurance company with another portion billed to the patient. Depending on the circumstances, some portions of the fee must be written off. Fastoffice enables the physician to keep track of these write-offs. With a patient's bill on the screen, you have the option to convert to write-off format. You are presented with the patient's charges and asked if this amount is billable. If not, you can enter the billable portions and any insurance payments. The amount the patient owes is then presented as the new balance. The program then computes the write-off percentage and prints an updated bill.

Another menu lets you browse through each of the records, making any changes or printing them out. You can also view any write-offs.

This option prints the patient info with the amount and percent that has been written off. A summary prints the number of write-offs and the total percentage and dollar amount of the write-offs. A practice analysis prints an active account summary, listing the number of patients, the total amount receivable, and the percentage of patients covered by each insurance carrier. You can also see how much business is represented by each insurance company. Fastoffice computes the percentage owed to you by all the patients handled by a particular carrier.

Make sure your printer is on before you try to print bills or analyze your practice. Fastoffice crashes if it tries to print and your printer is turned off. One of its good points, though, is that it recognizes any files left open prior to a crash. It lets you close them properly when you reboot, saving any data that might have been jeopardized.

More and more physicians are turning to computers to handle their billing, and it's not uncommon for them to spend more than \$10,000 for software. I don't think Fastoffice will replace the heavy-duty systems that store CPT or ICD9 codes, fee schedules, referring physicians, and patient birthdays, but it certainly does offer a lot for \$50.

The program is easy to operate, but a page or two of documentation would help explain some of the program's finer points. I don't think that would boost its price too much. Perhaps if more physicians used Fastoffice on a 64, they could save on computer costs. Then perhaps they could pass the savings on to their

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DIEHARD

At a time when publications dedicated to 8-bit computers are about as scarce as brand-new 1581 drives, it's refreshing to see a new magazine on the newsstand. Well, *newsstand* isn't exactly the right word, because this bimonthly publication is available only by subscription.

This magazine is called *dieHard*, and it's billed as "the Flyer for Commodore 8biters." Its editor in chief, Brian L. Costhwaite, says *dieHard* supports most Commodore 8-bit computers, such as the VIC-20, C-16, Plus 4, 64, and 128. Its major focus is on the 64 and 128, however, but Costhwaite says he hopes the magazine will grow enough to support other 8-bit machines as well.

I don't know whether it's an editing quirk or if Costhwaite is taking a poke at Commodore for its minimal support of the 8-bit machines it created, but whenever Commodore's name appears in *dieHard*, Costhwaite spells it with a lowercase *c*.

The copy of *dieHard* that I saw for this review contains 33 pages in 8½ × 11 format. Two yellow sheets make up the front and back covers, with the whole publication held together by a single staple in the upper left corner. At first glance, *dieHard* looks like a user group newsletter that was printed with geoPublish. At second glance, you'll notice that there's a lot of information between its covers.

Up front is a call to writers for submissions. (Seems like I've often read that plea in newsletters.) As with many new publications, *dieHard* can't afford to pay its authors. They get free copies of the magazine. Since this is *dieHard*'s third issue, Costhwaite is still writing many of the articles himself.

The first article is a collection of word-processing tips and advice to writers. It stresses the importance of correct spelling, proper grammar, and having someone else proofread important documents. The article starts off with the word *editing* as a subhead in a large font—and, unfortunately, the

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REVIEWS

word is misspelled.

The article goes on to offer some good writing advice, and it even provides a short program that lets you read sequential files. That's a handy little program to have, since writers may submit articles as sequential files. Too bad no one caught one major mistake in the program before it hit the presses. The OPEN command is inadvertently omitted from the line of code that is supposed to open the file for reading. Typos in BASIC programs can be particularly annoying to novices who are trying to learn.

Another page of tips for GEOS is helpful, especially the information about formatting text in columns. Another short article offers good basic computer-related advice. There are tips warning against writing on disk labels with ballpoint pens, covering the vents in electronic equipment, and letting dust get into things. Humor is not a neglected commodity in this article, which offers a range of advice. For those of you whose tempers flare on occasion, Costwaite warns against throwing your computer out the window.

Costwaite has a two-page review of Final Cartridge III. He tells about its many features and ways it can aid programmers. I was all set to order one but discovered that the review doesn't supply ordering information. Guess I'll have to check an old copy of Gazette or RUN to find an advertisement for it. An article about public domain software is a bit more helpful, since it provides addresses for several sources of PD disks.

In an article called "Shhh It's A Secret," Costwaite provides some interesting programming tips. I knew that the Ctrl key could be used in conjunction with other keys to produce some surprising results, but this article lists a number of interesting combinations. Did you

know that Ctrl+; moves your cursor to the right? How about Ctrl+M? That's the same as hitting the Return key.

A feature article about the Commodore text screen provides a lot of PEEKs and POKEs, screen addresses, and animation routines for the 64, 128, VIC-20, and other 8-bit Commodore machines. This article goes on for several pages and provides some good solid programming examples.

What's a good Commodore magazine without type-in programs? Well, *dieHard* has those, too. About 10 of the 33 pages in this issue are devoted to programs. A 128 program that prints a grocery shopping list, complete with prices, looks useful. I'll have to confess that I haven't typed it in yet. No method for avoiding typos is offered (such as Gazette's Automatic Proofreader), but the listings seem to be in pretty straightforward BASIC and shouldn't be a problem.

The articles presented in *dieHard* seem accurate, entertaining, and informative. Its format is simple, not flashy. Let's face it—it's about what you'd expect from something published on a 64. Like any new venture, *dieHard* has some bugs to work out.

One problem I have is the magazine's typeface. A font shouldn't draw attention to itself, but *dieHard's* light eight-point GEOS font is tough to read in many instances. The dots make it look as though the type is fading from the page. I notice that text is much easier to read whenever an article is set in boldface.

Spelling errors also draw my attention away from the magazine's message. I'll have to say that the main articles contain very few errors. I'll attribute that to the author, editor, proofreader, and any spelling checker they might have used. This same care with the English language is absent, however, in many of the magazine's in-house ads. In one three-paragraph pitch to



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sell advertising space, I counted 11 misspelled words. In another half-column ad requesting articles and programs, the word *submissions* was spelled three different ways—and not one was correct!

In a time when Commodore-related information is hard to find, I laud Costhwaite and his 8-bit diehards for their publishing efforts. They've packed a lot of useful information into the magazine. I hope the magazine gets the support it deserves. In return, as publishers who want to sell their words to the public, they have a professional responsibility to make sure those words are spelled correctly.

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Bug-Swatters

James T. Jones of Klondike, Texas, pointed out two errors in our October 1992 issue. In "Beginner BASIC," we omitted the REM command in line 30. The line should be corrected to read as follows.

30 POKE 646,5: REM SET CURSOR COLOR

Also, to store labels in some other area of memory in LaBASIC, line 10 should be entered to read as follows.

10 TP=TP-32: POKE 49969,TP/ 256: POKE 49970,TP-INT (TP/ 256)*TP

John Nauman of Arden Hills, Minnesota, discovered an error in the listing that accompanied Jim Butterfield's November "Machine Language" column. The article mentions three machine language programs, but the program uses only two of them. Change the SYS address in line 460 to 8192, and the program should work correctly.

Nix Null Modems

In October's "Feedback," you answered a question about how to transfer files from a 64 to an IBM by using a null modem cable. There's another way without using a cable if both computers have modems, and it doesn't require calling a third computer. Simply unplug one modem's telephone cable from the wall and plug it into the other modem. Many modems have extra sockets built into them.

Next, run both terminal programs, making sure that their baud rate and other telecommunication parameters are the same. Then, on either machine, dial a number. This can be done by dialing any number you may have in a dialing directory or by using manual AT commands. Type

ATDP for pulse or ATDT for tone and at least one digit. Since you aren't connected to a telephone line, it doesn't matter which command or number you use. Do this so the computer will dial and generate an originate tone.

Quickly type ATA on the other machine to have it answer. You should see a message on both screens saying that they have connected. Then have the 64's program upload the files, and instruct the the Amiga or IBM to download them.

BOB KUBOTA
LOWELL, OH

Which Machine?

Since you changed Gazette's format, I've been dissatisfied with your leaving out a directory which references 64 programs clearly. In prior issues, each article showed what computer system the article pertained to. Also, since you lack a phone number, it's impossible for me to call in this complaint.

CHARLES J. JACKSON
ASTORIA, NY

We usually publish system information in the opening paragraphs of each article. If you find it helpful to have that information on the table of contents page, we'll reinstate it with this issue.

COMPUTE, like most other magazines, publishes its address and telephone number on its table of contents page. Advertising, distribution, and editorial information is listed. To contact the COMPUTE, Gazette, or Amiga editorial offices, write to 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Our phone number—which is not toll-free—is (919) 275-9809. Our 800 number handles subscriptions and changes of address. That number is (800) 727-6937.

Random Numbers

How can I generate random numbers on my 64 between 100 and 200 by steps of 5?

ALBERT WIGMORE
ORLANDO, FL

There are a couple of ways to do it. The range you need—100, 105, 110, and so on up to 200—contains 21 different numbers. If you generate a random number between 0 and 20, this will cover the range of 21. Then multiply this number by 5 to produce the steps, and add it to 100, which is your base of 100. This will give you the desired results. Here's a sample program to show how it's done.

```
10 N=INT(RND(1)*21)
20 N=N*5+100
30 PRINT N
```

Another method is to generate a random number between 100 and 200 and then check to see if it's one of the desired numbers. This can be done with a FOR-NEXT loop that is incremented by steps of 5. Here's how it works.

Generate a random number within your range of 100-200; then use a FOR-NEXT loop to check and see if it's equal to 100. If not, increment your loop by 5 and check to see if the number is equal to 105, and so on up to 200. If no equal condition is found, the program generates another random number and repeats the process. When the condition is equal, the number is printed, and the program jumps to line 50. You'll notice that this second method executes more slowly than the first example.

```
10 N=INT(RND(1)*101)+100
20 FOR B=100 TO 200 STEP 5: IF
   N=B THEN PRINT N: GOTO 50
30 NEXT
40 GOTO 10
50 PRINT"THAT'S IT!"
```

**Corrections for
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BEGINNER BASIC

Larry Cotton

PUT WAIT TO WORK

This month we'll look at the often-ignored WAIT statement—the last of the three BASIC statements that cause the 64 or 128 to wait for something to happen. In the case of GET and INPUT, discussed here over the last two months, the computer waits for the user to press a key on the keyboard. With WAIT, however, the computer waits for a particular memory address to have a particular value.

WAIT is a command, like LET, which really doesn't ever need to be used. It can be used, however, as a replacement for GET and PEEK.

WAIT's normal syntax is WAIT MA, A, B, where MA is a memory address and A and B are two masks. The WAIT statement takes the value in the memory location and performs a logical AND operation with the value in the first mask and then performs an exclusive OR on the result with the second mask. Now you can see why WAIT isn't BASIC's most popular statement.

Fortunately, WAIT's second mask is optional. The following is a common example.

```
10 PRINT“(CLR)(DOWN) PRESS ANY KEY.”
20 WAIT198,1: POKE198,0
30 PRINT“END OF PROGRAM.”
```

The 64 and 128 have a ten-character area in memory—a buffer—that holds keystrokes that are entered faster than the computer can process them. In SpeedScript, it's easy to see this phenomenon when trying to insert words near the beginning of a long document.

Memory register 198 contains the number of characters in that buffer. Line 20 waits until a key has been

pressed and then clears the buffer so that the keypress isn't displayed onscreen. This program runs infinitely.

```
10 PRINT“(DOWN)TYPE RUN, THEN PRESS ENTER”
20 WAIT198,4
```

The way to end this little mind-boggler is to type a syntax error (such as RUD) or hit Run/Stop-Restore. Here's how to use WAIT instead of GET in a subroutine.

```
10 PRINT“(CLR)”
20 FOR=54272TO54295:
   POKET,0: NEXT
30 POKE54296,15
40 FOR=1TO300: NEXT
50 POKE54277,8
60 PRINT“(DOWN)(2 SPACES)
   TURN UP VOLUME AND PRESS ANY KEY (DOWN)”
70 FORZ=1TO7
80 GOSUB200
90 READD1,D2,$$
100 POKE54273,D1:
   POKE54272,D2
110 POKE54276,16:
   POKE54276,17
120 PRINT$$;
130 NEXT: END
140 DATA25,30,“(2 SPACES)
   ONE”,18,209,“(1
   SPACE)BYTE'S”,18,209,“(1
   SPACE)THE”,19,239,“(1
   SPACE)SAME”
150 DATA18,209,“(1
   SPACE)AS”,23,181,“(1
   SPACE)EIGHT”,25,30,“(1
   SPACE)BITS.(DOWN)”
200 WAIT198,1: POKE198,0:
   RETURN
```

Lines 10–60 prepare the screen and the computer's sound chip, as we've seen in previous columns. Line 70 begins a FOR-NEXT loop that ends at line 130. Seven times, line 80 calls our WAIT subroutine at line 200. After a key is pressed, line 90 reads three pieces of data: two frequencies for the notes played and a word corresponding to each note.

Line 100 pokes the note frequencies to their appropriate memory registers, while line 110 turns the note off and then on. (In this case, the person pressing the keys controls the length of time the notes play; a FOR-NEXT delay loop wouldn't work. The voice's envelope thus helps control the notes' playing time.)

Line 120 prints the message, while line 130 closes the FOR-NEXT loop and ends the program.

Following are two other ways to write the keypress-waiting subroutine.

```
200 GETA$: IFA$="" THEN200
210 RETURN
```

or

```
200 IFPEEK(197)=64 THEN200
210 RETURN
```

The first alternative works better. Note that RETURN cannot be on line 200. The second alternative has been studied in another column. Memory register 197 holds keyboard matrix values; 64 is the value in 197 if no key is pressed. As soon as a key is pressed, control drops to the RETURN in line 210. If you try this, you'll notice that it really doesn't work very well. The keys must be tapped rather than pressed to avoid words spewing out too fast.

In the remaining space, let's discuss LET, a command to assign values to variables.

```
10 LET A = 5: LET F$ = "APPLE"
20 PRINT A, F$
30 LET A = A + 3: LET F$ = F$ +
   "SAUCE"
40 PRINT A, F$
```

LET makes code easier for novices to understand, but its use is entirely optional. This example shows how the same variable can be used on both sides of the equal sign. □

Put the often-ignored WAIT statement to work in your BASIC programs.

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MACHINE LANGUAGE

Jim Butterfield

FAST INTERRUPTS

People often ask me why they can't print directly from an interrupt routine. Well, you just can't—but more important, you shouldn't want to. Interrupts are fast if you don't bog them down with too many instructions. You can't get an interrupt from the IRQ while you're still servicing the last one. The NMI interrupt can break in while a prior one is being serviced. It's best to do whatever must be done and get out fast.

It's quite easy to have your interrupt code leave a signal that a background (noninterrupt) program can pick up and handle. Simple signals can be created by adding to or subtracting from a counter. The INC and DEC instructions are ideal for this. More complex data can be put into a rotating buffer; the background program will follow along, picking up remaining information.

This NMI program is a simple demonstration of how a high-level interrupt can pass a message to a background program. The exercise shows how to make the interrupt coding as fast as possible. All we do is perform an increment: INC \$2100. Address 2100 will hold the action counter. A nonzero value will signal the background program that work needs to be done. After the increment, the NMI interrupt returns to wherever its vector had been pointing.

The custom NMI code is linked by storing the address of that NMI vector. On the 64 and 128, the vector is located at \$318/9 (decimal 792/3). We keep the previous address in this vector in order to restore that address when our program is finished and to allow our own code to exit to this each time it's called.

The address held in an interrupt vector is two bytes

long. That can lead to danger if an interrupt strikes at the instant we've changed one byte but not the other. The computer could go to a wrong address. An IRQ can be locked out briefly with SEI to allow that vector to be safely changed. The NMI cannot be locked out, so our best bet is to make sure that the two bytes are changed at almost the same moment.

Starting at address \$2000, the program zeroes two counters: the interrupt counter at \$2100 and the loop counter at \$2101. This is done with LDA (LoaD A register) and STA (STore A register) commands.

At \$2008, the NMI vectors are copied from \$318/9 to \$2102 and \$2103. Then, we put the address of our NMI code into the vector at \$204C.

2014 LDY # \$4C
; low part of address
2016 LDX # \$20
; high part of address
2018 STY \$0318
201B STX \$0319
; store both parts quickly

The NMI code will now run independently of the program. All our background program needs to do is to keep watching address \$2100 until it's not a 0. One way of doing this is to loop and test address \$2100.

201E LDA # \$00
; test value
2020 CMP \$2100
; if it's 0
2023 BEQ \$0200
; go back and wait

The program falls through to \$2025 when a nonzero value is found in \$2100. That value is decreased with DEC \$2100, and our loop counter is incremented with INC \$2101. Now, the background program will print a message on the screen, using the usu-

al loop to pick the message from \$2052-\$2067.

While all this is going on, one or more new interrupts may have struck. That's no problem. We'll get to them when we've finished the current work. Our loop counter is checked. If it hasn't yet reached five, we'll go back and look for the next interrupt.

2038 LDX \$2101
; is the loop counter
203B CPX # \$05
; equal to five?
203D BNE \$201E
; no, go back

When five interrupt occurrences have been noted, it's time to restore the original NMI vector address. The usual sequence of LDY, LDX, STY, and STX will do this job. After the vector is restored, the program returns to BASIC with RTS.

After each cycle, the tiny NMI program links back to the normal address with an indirect jump. Here's its code, followed by the whole program as a BASIC loader.

204C INC \$2100
204F JMP (\$2102)

```
RQ 100 DATA 169,0,141,0,33,141,1,33,172,24,3,174,25,3,140,2,33
SK 110 DATA 142,3,33,160,76,16,2,32,140,24,3,142,25,3,169,0
GC 120 DATA 205,0,33,240,251,2,06,0,33,238,1,33,162,0,189,82,32
BH 130 DATA 32,210,255,232,224,22,208,245,174,1,33,224,5
GK 140 DATA 208,223,172,2,33,174,3,33,140,24,3,142,25,3,96
EJ 150 DATA 238,0,33,108,2,33
BJ 160 DATA 82,69,83,84,79,82,69,32,75,69,89
DR 170 DATA 32,68,69,84,69,67,84,69,68,33,13
QP 200 FOR J=8192 TO 8295
EJ 210 READ X:T=T+X
BP 220 POKE J,X
AE 230 NEXT J
SM 240 IF T<>8942 THEN STOP
SK 300 PRINT "INTERRUPT DETECT PROGRAM."
EG 310 PRINT "PRESS >RESTORE< {SPACE}FIVE TIMES!"
KG 320 SYS 8192
QH 330 PRINT "...END..."
```

Interrupts provide fast action, provided your code isn't long-winded.

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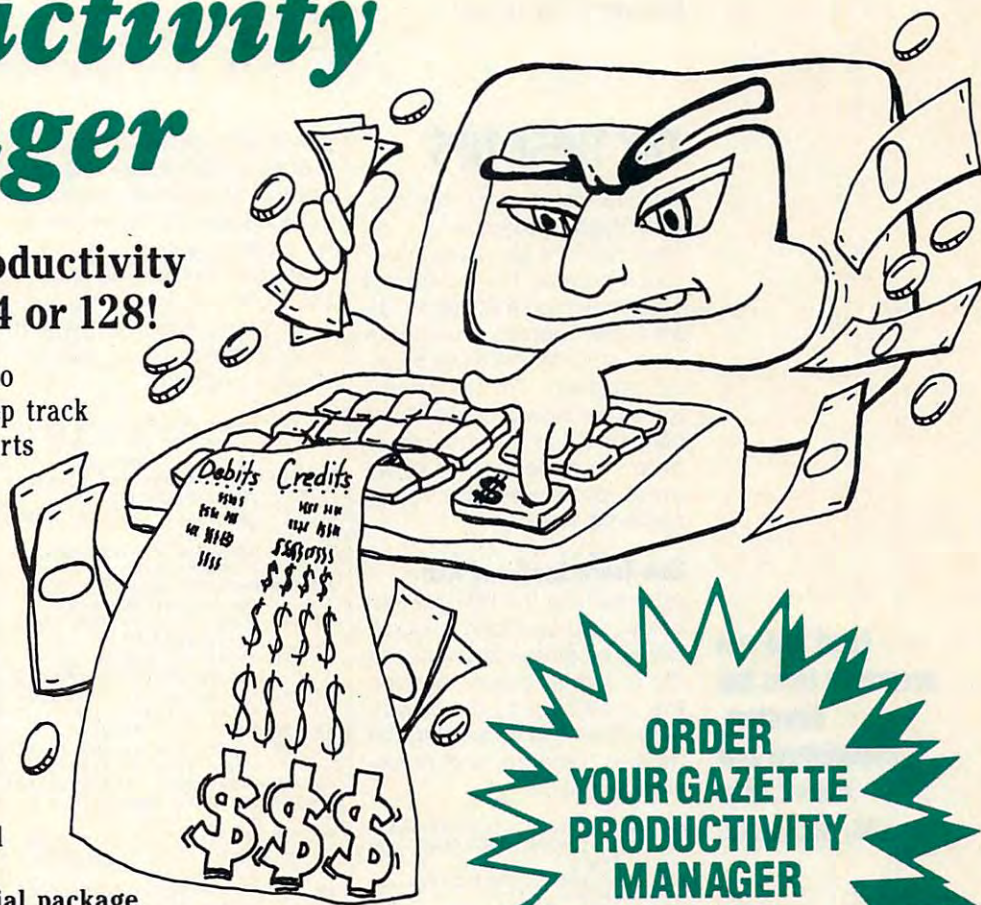
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PROGRAMMER'S PAGE

Randy Thompson

TRY THESE TIPS

Regular readers of this column might remember my recent request for raster interrupt programs. I've received a couple of good routines so far, and one appears this month (see Arthur Moore's More Colors program). I'm still looking for more, however, so don't hold back. In the meantime, here's a collection of other great programs that have come my way.

One-Touch Load and Run

After running the listing found below, you can load and run BASIC programs simply by listing a disk directory, moving the cursor up to the beginning of the line containing the desired filename, and pressing Restore.

```
ED 10 S=49152:V1=S+25:V2=S+67
BF 20 H1=INT(V1/256):L1=V1-(25
6*H1)
GX 30 H2=INT(V2/256):L2=V2-(25
6*H2)
CF 40 FOR I=0 TO 93:READ D:POK
E S+I,D:C=C+D:NEXT
QQ 50 IF C<>7825 THEN PRINT "E
RROR IN DATA STATEMENTS"
:END
RP 60 POKE S+14,L1:POKE S+19,H
1
DH 70 POKE S+26,L2:POKE S+28,H
2
KG 80 SYS S:PRINT "AUTO-RUN IS
READY."
ME 90 END
AJ 100 DATA 173,24,3,141,252,3
,173,25,3,141,253,3
GG 110 DATA 120,169,25,141,24,
3,169,192,141,25,3,88
GX 120 DATA 96,169,67,160,192,
32,30,171,169,13,141,11
9
QH 130 DATA 2,141,124,2,169,82
,141,120,2,169,85,141
HS 140 DATA 121,2,169,78,141,1
22,2,169,58,141,123,2
PP 150 DATA 169,6,133,198,108,
252,3,76,79,65,68,29
HA 160 DATA 29,29,29,29,29,29,
29,29,29,29,29,29
GR 170 DATA 29,29,29,29,29,29,
44,56,58,0
```

FRANCISCO FELIX
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More Colors

Add more colors to your programs with this machine language hack. Using a raster interrupt, the following program adds 240 simulated col-

ors to your 64's standard 16. It does so by rapidly alternating the screen's background color between 2 colors, thereby creating a shade that is a mixture of 2 of the computer's set 16 colors. To see this color blending in action, type in and run the following demonstration program.

```
BB 100 PRINT "[CLR]":DIM CS(15
):FOR I=0 TO 15:READ CS
(I):NEXT:GOSUB 240
QX 110 PRINT"[HOME]{19 DOWN}F1
/F7 BACKGROUND
{2 SPACES}[RETURN] TEXT
"
KE 120 DATA BLK,WHT,RED,CYN,PU
R,GRN,BLU,YEL
FQ 130 DATA ORG,BRN,LRED,DGRY,
MGRY,LGRN,LBLU,LGRY
EJ 140 POKE 251,PEEK(253):POKE
252,PEEK(254)
DP 150 PRINT "(HOME)":FOR I=0
{SPACE}TO 15:IF (PEEK(2
53) AND 15)=I THEN PRIN
T"[RVS]";
EP 160 PRINT CS(I)"[OFF]",
PX 170 IF (PEEK(254) AND 15)=I
THEN PRINT "[RVS]";
JQ 180 PRINT CS(I)"[OFF]":NEXT
FR 190 GET AS:IF AS="" THEN 19
0
BQ 200 IF AS="{F1}" THEN POKE
{SPACE}253,(PEEK(253)+1
) AND 15
BM 210 IF AS="{F7}" THEN POKE
{SPACE}254,(PEEK(254)+1
) AND 15
MC 220 IF AS=CHR$(13) THEN POK
E 646,(PEEK(646)+1) AND
15
QB 230 GOTO 140
KK 240 SA=679:FOR I=0 TO 73:REA
D D:POKE SA+I,D:NEXT
XS 250 A=SA+36:POKESA+30,A/256
:POKE SA+25,A-PEEK(SA+3
0)*256:SYS SA:RETURN
JJ 260 DATA 120,173,26,208,9,1
,141,26,208
HX 270 DATA 173,17,208,41,127,
141,17,208
RR 280 DATA 169,0,141,18,208,1
33,2,169,203
GJ 290 DATA 141,20,3,169,2,141
,21,3,88,96
BB 300 DATA 173,25,208,41,1,20
8,3,76,49
RF 310 DATA 234,166,2,181,251,
141,32,208
EP 320 DATA 181,253,141,33,208
,138,73,1
KF 330 DATA 133,2,173,25,208,9
,1,141,25
HE 340 DATA 208,76,129,234
```

Many color combinations can cause the screen to flicker (much like a Commodore Amiga in interlace mode). You can reduce the flickering by turning down your monitor's brightness and contrast, or by selecting more compatible colors.

To use More Colors in your

BASIC programs, simply extract the subroutine found in lines 240-340 from the listing above. After calling this subroutine, you set the two colors that you want the computer to mix by poking their numerical values into locations 253 and 254. For example, to alternate between red and brown, you might execute the commands POKE 253,2:POKE 254,9.

This subroutine currently stores its machine language code in memory starting at location 679. You can change this to another location, such as 49152, simply by changing the variable SA in line 240.

ARTHUR MOORE
ORLANDO, FL

Easier ML Loads

The standard method for loading disk-based machine language programs from BASIC is to start your program with a line such as this.

```
10 IF L=0 THEN L=1: LOAD "file-
name",8,1
```

You must place this code near the beginning of your program because loads from within BASIC cause your program to reexecute. The IF statement keeps the program from entering an infinite loop that loads the same file over and over again. There's another method, however, that uses a couple of your computer's ROM routines instead of BASIC's LOAD command.

```
10 POKE 147,0: SYS 57812 "file-
name",8,1: SYS 62631
```

You can use this line of code anywhere within your program without causing the computer to restart itself. This routine gives 64 owners the functional equivalent of the 128's BLOAD command.

MATT ZEILENGA
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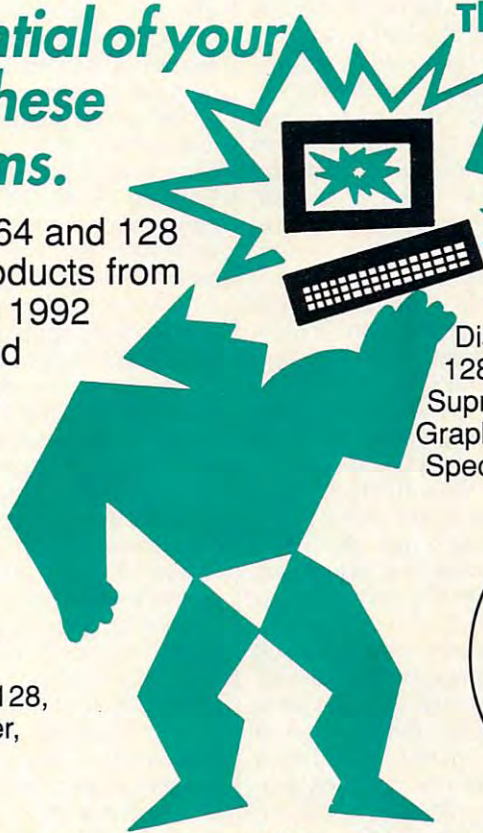
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So what does Q-Link offer that other services don't? Plenty. And if you're a GEOS fan, you simply can't afford to pass up the incredible treasures waiting for you there. Let me give you a GEOS-specific tour of QuantumLink, and you'll see what I mean.

We'll start with the GEOS support area itself, which you locate from the main menu by choosing Commodore Software Support. Here you'll find a wide range of services designed to help you with all of your GEOS needs, and it doesn't matter if you're a GEOS novice or an ace programmer. The folks who run things in the GEOS area are very friendly and willing to help any user who drops by. These are experts, many wearing the GeoRep or GeoHost hats, and they're intimately familiar with GEOS. If you have problems with your equipment, for example, you're sure to find someone who uses a setup similar to yours and can offer advice on keeping everything running smoothly.

Probably the most active section of the GEOS area is the message base. There are sections devoted to GEOS in general; printer support; geoProgrammer; geoFile and geoCalc; geoPublish; and even GeoWorks Ensemble, the PC

version of GEOS. Each of these sections has its own representative who takes the lead in answering questions and offering advice. In the general area, you'll find nice people such as Dave Ferguson and Jim Collette lending their considerable expertise to users with questions, problems, or ideas to share.

The printer support area is masterfully monitored by George Wells under the name GeoRep GHW. George is a printer expert par excellence who can tell you the dip switch settings for just about any interface and printer combination you might want to use with GEOS. George is the author of some of the finest printer drivers available for GEOS. If you have questions about your printer setup—which driver to use, how to make it do what you want it to do, or whatever—George is standing by to give you the most informed answers you'll get anywhere.

Another popular place for GEOS users is the GEOS Chat Room. Every evening from 9:00 to 11:00 Eastern time, a GeoHost shoots the breeze with all who wander in. The conversation can occasionally roam into some pretty esoteric realms, but no matter where the conversation flits to, you'll be able to get quick answers to your GEOS questions. You'll get a chance to meet some of the experts in the Chat Room, too.

Now comes the really exciting part: the software libraries. Q-Link's GEOS libraries are brimming with great files, just waiting for you to download them. The libraries are divided into several categories: BSW Applications, User Applications, Printer/Input Drivers, geoWrite Files, geoPaint Files, geoPublish/Clip Art Files, and Fonts. You'll be delighted and amazed with what you'll find there. Of course,

with all those files available, you might become lost. Don't worry. Once again, you can get some good advice on which files are worth your time from the message area or the Chat Room.

The GEOS support area isn't the only place where you'll find GEOS information on Q-Link. Other excellent places to poke around are the software libraries of the now-defunct *RUN* magazine. I hope these files will remain available on Q-Link, since many of them are particularly good. The download will cost you an extra \$1.50, but for programs such as Import Runner or geoTerm, it's worth it.

Another place to check is the graphics area, which you'll find in the Commodore Information Network under Computing Support Groups. Here you can ask for GEOS graphics advice and be assured of a prompt reply—very likely from me. There are GEOS-format graphics in the picture libraries here.

Probably the best source of GEOS information outside of the GEOS area itself is the Creative Micro Designs support area. That's in the Commodore Information Network area under Hardware Support. CMD is easily the most enthusiastic 64/128 GEOS supporting company left, and it provides plenty of technical advice and support for its GEOS products in its message areas. The libraries contain some GEOS files that you'll want if you buy RAM-Link or RAMDrive.

So what do you do to join? Give QuantumLink a call at (800) 827-8444 for more information. The service costs \$9.95 a month, with additional charges for many areas (including the ones I've been talking about) at the rate of \$4.80 an hour. No other service can offer so much for GEOS and for such a reasonable cost. □

If you're a GEOS fan, you can't afford to pass up the incredible treasures waiting for you on Q-Link.

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D'IVERSIONS

Fred D'Ignazio

HIS MASTER'S VOICE

When the phone rings and I answer, I sometimes get a peculiar or aggravating response. I might hear "Oh, hi, Janet! I was looking for Fred." (I have a high tenor voice, and callers frequently mistake me for a female.) My favorite is "Hi, honey. Is your mommy or daddy at home?"

Over the years, I've tried to change my telephone voice. The best I've managed to achieve is that of a feeble old man. But I shouldn't despair. Thanks to modern technology, I don't have to stick with my normal falsetto or toddler-like peep. Help is on the way.

A recent issue of *The Wall Street Journal* reported on a booming business in phone machines that electronically alter your voice. Security consultants are making a killing selling these machines to businesses and residents who want to alter their voice to something new.

Some machines are really voice computers. You can program them to change your voice into any of 250 different voices—from barroom brawler to violin virtuoso. If you are a person living alone or a security guard anchoring a company's graveyard shift, it's just the thing. You can make your voice so frightening and overpowering that even professional hit men would shiver at the sound of it.

Computerized voice boxes are still too expensive to be popping up in every home, but not for long. New, inexpensive voice chips are appearing, and high-speed digital signal processors (DSPs) and voice-compression algorithms are being perfected that will soon put synthetic speech inside every residential telephone for just pennies a pop.

Virtual voices may not have found their way into every home, but they have already taken over most offices. Company voice mail is a must for corporations which aim to survive lean-and-mean downsizing. Who hasn't called a company recently, only to tumble into the labyrinthine bowels of a computerized answering machine?

This is the way most user-friendly voice-mail systems handle customer calls.

"Hi, this is Fred D'Ig—"

"You have reached the Pygmy Bungee Jumping Society. If you have a rotary phone, please stay on the line, and an operator (at some far-off distance in the future) will (eventually) be on the line."

"But I just—"

"Press 1 if you wish to speak with customer services to order our new products. Press 2 if you would like our mail-order catalog. Press 3 for technical support. . . . Press 993 if you would like a salesman for our voice-mail company to pay you a visit. Press 994 if you would like to speak with our attorneys about suing us for the cruel and unusual punishment inflicted by this voice-mail message. Press . . ."

Think about it. Electronic voices may sound like science fiction, but they're also a very real part of life. During an average day, how many times do you talk to a computer or hear a computer's voice? Let's face it: Do you really know if there's a computer or a person at the other end of the line?

Computerized voices are not always a blight, either. Electronic voices are a godsend for visually handicapped people, for semiliterate and illiterate people, and for anyone who needs to keep his or her eyes on something else.

Here are some of the computer voices you are liable to hear during an average day.

- Your car nagging you to fasten your seat belt
- A digital telephone answering machine
- A talking clock
- A Jiminy Cricket watch
- A singing greeting card
- An electronic telephone operator
- Your electronic bank teller or stockbroker
- A computerized telephone salesperson
- Talking animatrons at Chuck E. Cheese, Disney World, and museums
- Videogames
- Home and automobile security systems
- An electronic conductor on a subway car
- Talking tech data computers in hospitals, labs, factories, and elsewhere

One of the geniuses of the computer revolution, Alan Turing, created a seemingly impossible intelligence test for computers over 50 years ago. He said computers would be truly intelligent when a human judge couldn't tell if he or she were conversing with a human or a computer.

Maybe we've already reached that point—and passed it.

How many robotlike waiters, bank tellers, telephone operators, and supermarket cashiers have you run into? In comparison, a computerized voice often sounds warm, friendly, and personable. The computer can sound truly human—something that people in rote, mechanical jobs have difficulty imitating.

On the other hand, even with the eclipse of the Cold War, we still may not survive the future. Instead of perishing through global holocaust, we may wink out slowly, one person at a time, through terminal boredom produced by listening to interminable computer phone messages! □

Are you sure that the voice you hear on the phone belongs to a human being?

PROGRAMS

ROGUE SUNBATHERS

By Alain Tremblay

The sun that shines on this distant planet is a potent and powerful source of energy. The natives of this planet take advantage of its power by erecting tall stone columns that they can use to bask in the rays high above the ground. Your task in this amusing one- or two-player game is to surpass the other sunbathers by building the tallest column.

Rogue Sunbathers 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, respond with the following values.

Starting address: 0801

Ending address: 1838

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

Playing the Game

At the start of the game, use the joystick to select how many computer opponents you wish to play against. You can select up to four. Also select the number of human players and the game's speed factor. Confirm each selection by pressing the fire button.

When the game begins, each player (including the computer opponents) starts at the foot of a short column. Move the joystick up and down to climb a column; move it left and right to run. You'll notice that each player has a distinctive hair color. This color matches a color bar at the bottom of the screen that indicates the status of that player's health.

Gather Rocks

Your first objective is to gather stones that you can pile on top of your column to make it higher. One way to get stones is to kick at an opponent's column. Stand beside a column, push the joystick button, and then move the joystick in the direction you want to kick. Keep pressing the joystick button.

If you're successful in your kick attempt, a stone will be freed from the base of the column. To pick it up, move to it and push the joystick up. The stone will disappear, but you'll notice that your movements are slightly

slower. Take the stone and climb to the top of your column where it will be automatically added.

To drop a stone, move the joystick down. Stones are also found just outside the left and right screen borders. Run until you almost leave the screen. Keep running even if you're not actually moving. You'll automatically pick up a stone after a short time. Take it back to your tower.

If a player builds a column taller than your own, you can climb to the top of it and kick several stones off. You can dislodge stones by pushing the joystick button and moving the stick left or right.

Be aware that the owner of a column objects to this behavior and has the right to push you off on your head. Each fall from the top of a column cuts your health by half. You won't be allowed to kick if your health status falls to 0.

You may recover and even gain extra health by climbing your column and sitting in the sun's powerful rays. Also, watch out for falling rocks. If a stone hits you on the head, it not only smashes you a little, but it's also harmful to your health.

The Winner

The game ends when the sun reaches the right side of the screen. The player with the tallest column wins. Health status is also taken into account for establishing the winner.

To change the game's color settings, type in the following POKEs after loading the game but before running it. POKE 4390, X will change the border color. POKE 4391, X will change the screen. POKE 2063, X will alter the stone color. For X, enter any Commodore color code number (0-15).

ROGUE SUNBATHERS

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:32 00 00 00 00 A9 08 8D 76
0811:21 D0 8D 86 02 A9 93 20 FD
0819:D2 FF 20 D9 10 20 92 12 6C
0821:A0 11 8C 13 D4 88 8C 14 7E
0829:D4 A9 27 8D 0D D4 A9 0F E9
0831:8D 18 D4 8D 03 D4 A9 7F BF
0839:8D 06 D4 A2 07 A9 0A 95 DE
0841:C0 CA 10 FB 20 1B 15 18 D5
0849:65 0A 0A 0A 85 FF A9 20 10
0851:E5 0C E5 0C E5 FF 85 06 15
0859:20 7B 13 20 6D 15 A4 0C D1
0861:98 0A AA A9 AF 9D 01 D0 F6
```

```
0869:A9 00 85 02 B9 00 9B 0A 2E
0871:0A 0A 26 02 69 1E 20 55 47
0879:10 A9 C0 99 F8 07 A9 02 E6
0881:99 27 00 88 10 DA 8C 15 CA
0889:D0 A6 0A 20 45 0E CA 10 F6
0891:FA 20 6F 09 20 89 14 20 15
0899:7D 15 A6 0C B5 80 F0 1E F2
08A1:86 FF A9 00 95 80 B4 C0 03
08A9:8A 18 69 14 AA 20 E1 14 21
08B1:A6 FF F6 C0 A9 44 91 D1 53
08B9:C0 27 D0 02 D6 C0 CA 10 8D
08C1:DB A5 3B C9 27 D0 C2 A6 D5
08C9:0C 86 94 B5 C0 4A 7D 20 B9
08D1:9B 9D 20 9B CA 10 F2 20 71
08D9:33 0B 98 09 30 8D 42 09 2F
08E1:C8 84 7F A0 08 A2 27 20 AA
08E9:EE 08 4C 3C 08 A9 00 85 2D
08F1:08 A5 08 10 FC BD 05 09 63
08F9:29 3F F0 07 99 C8 04 C8 BD
0901:E8 D0 F2 60 4E 55 4D 42 C4
0909:45 52 20 4F 46 20 43 4F D3
0911:4D 50 55 54 45 52 20 4F D0
0919:50 50 4F 4E 45 4E 54 53 95
0921:20 28 31 2D 34 29 3F 3A 45
0929:20 31 00 54 48 45 20 57 CB
0931:49 4E 4E 45 52 20 49 53 92
0939:20 50 4C 41 59 45 52 20 B1
0941:23 58 21 00 4E 55 4D 42 C3
0949:45 52 20 4F 46 20 50 4C 2B
0951:41 59 45 52 53 3A 20 31 1D
0959:00 53 50 45 45 44 20 46 60
0961:41 43 54 4F 52 28 31 2D 27
0969:34 29 3F 20 31 00 A6 0C AC
0971:E8 CA 86 FF 8A 0A 85 11 14
0979:E4 0A F0 87 D6 36 10 F1 B8
0981:A5 06 95 36 B4 50 F0 0A D0
0989:4A C0 04 B0 01 4A 75 36 CE
0991:95 36 B5 4B F0 05 20 19 5C
0999:0E D0 D6 B5 68 D0 D2 B5 FE
09A1:3C F0 D0 D6 3C D0 CA B5 8D
09A9:58 F0 05 A9 C8 9D F8 07 15
09B1:B5 27 10 1F 4A 90 03 4C 43
09B9:73 0A B5 46 15 58 F0 2B 3A
09C1:B5 58 F0 03 20 91 0D B5 2A
09C9:60 C5 FF F0 0E 20 7A 0C 7E
09D1:4C 72 09 B5 50 F0 19 B5 51
09D9:46 F0 10 20 7E 0C B5 58 37
09E1:F0 06 A9 00 95 27 95 50 E7
09E9:4C 72 09 A4 FF 4C DB 0A 1D
09F1:B4 27 F0 2E 88 F0 7B B5 DD
09F9:46 F0 03 4C AC 0A B5 31 BA
0A01:C9 14 A9 FF 90 02 A9 01 15
0A09:85 02 20 A7 0E 20 96 0B 08
0A11:20 05 0B F0 07 A9 FF 85 4B
0A19:03 20 BC 0D 20 49 0B 4C A7
0A21:72 09 B5 C0 C9 04 90 0F 02
0A29:20 17 0B F0 2D 20 33 0B DE
0A31:D0 0B B9 20 9B C9 3C A9 CF
0A39:02 90 17 0B 1A B9 20 9B F3
0A41:4A DD 20 9B A9 01 B0 0A 6C
0A49:A5 08 C9 C0 A9 02 B0 02 30
0A51:A9 01 95 27 20 91 0D 4C 4D
0A59:72 09 B5 A0 D0 F9 B9 F8 84
0A61:07 C9 D0 A9 01 B0 02 A9 98
0A69:FF 85 02 A9 78 95 A0 4C 61
0A71:79 0F B5 46 15 58 F0 3E 4B
0A79:B4 60 C4 FF F0 2D B5 58 98
0A81:F0 19 B5 85 F0 0F A5 08 7A
0A89:29 F0 D0 09 95 85 95 75 04
0A91:A9 02 4C 53 0A A9 01 95 48
```


1129:00 00 F9 F0 F7 F0 F1 F5 F6
1131:F4 F8 F8 F8 A9 80 8D 0B 30
1139:D4 8D 12 D4 A6 0C B5 A0 2A
1141:F0 02 D6 A0 CA 10 F7 AD 75
1149:1E D0 C9 20 90 38 A2 FF 94
1151:E0 03 F0 32 4A E8 85 07 ED
1159:90 F6 B4 4B D0 F2 B4 46 CE
1161:F0 EE B4 60 B9 A0 00 F0 95
1169:19 8A D5 60 F0 14 A9 C2 69
1171:95 4B A9 06 85 0F 8A 0A 4E
1179:A8 A9 AF 99 01 D0 A9 00 88
1181:95 46 A5 07 D0 CA E6 08 AC
1189:D0 18 A5 94 D0 14 A4 3B 73
1191:A9 20 99 00 04 A9 44 C8 DB
1199:99 00 04 A9 07 99 00 D8 1B
11A1:84 3B A5 08 29 3F D0 11 03
11A9:A4 7F F0 0D 88 98 0A AA 52
11B1:AD 15 D0 5D 60 10 8D 15 53
11B9:D0 A5 08 0A D0 3C A6 0C 20
11C1:F6 7A A4 3B C0 12 90 0D C2
11C9:C0 16 B0 09 F6 7A F6 7A 82
11D1:A9 02 99 FF D7 8A 0A A8 22
11D9:B9 01 D0 38 E9 2C 20 74 6B
11E1:10 98 D5 7A B0 11 8A D5 49
11E9:60 D0 0C B5 58 15 46 F0 E1
11F1:06 95 80 A9 00 95 7A CA 3D
11F9:10 C6 A5 08 29 07 D0 03 15
1201:8D 88 14 A6 0C DE 00 9A 71
1209:D0 25 AD 12 D0 29 1F 09 28
1211:08 9D 00 9A BD F8 07 A8 D2
1219:29 0F C9 08 F0 06 C9 02 84
1221:90 07 D0 0B 98 49 10 D0 F4
1229:03 98 49 01 9D F8 07 CA D7
1231:10 D3 A2 07 B5 68 C9 80 7A
1239:D0 24 8A 0A A8 B9 01 D0 BF
1241:69 01 99 01 D0 C9 AF D0 7B
1249:15 A9 00 95 68 E0 05 90 1D
1251:05 99 01 D0 0B 08 A9 C2 47
1259:95 4B A9 06 85 0F CA 10 BE
1261:D3 A6 F0 30 0E BD 7A 12 6C
1269:8D 01 D4 BD 81 12 8D 04 7E
1271:D4 C6 0F AD 0D DC 4C 81 64
1279:EA 00 02 07 02 07 08 10 10
1281:10 41 21 41 11 41 11 A8 8E
1289:00 00 38 00 00 18 00 00 15
1291:14 A9 0F 85 2D A9 16 85 CD
1299:23 A9 30 8D BD 12 A2 00 14
12A1:A0 00 A9 01 85 FF B1 22 0D
12A9:C8 D0 02 E6 23 C9 FB D0 1E
12B1:09 B1 22 85 FF F0 12 C8 14
12B9:A9 00 9D 40 30 E8 D0 03 34
12C1:EE BD 12 C6 FF D0 F3 F0 97
12C9:D9 A2 3E A0 00 BD 40 30 FC
12D1:9D 00 30 BD 00 32 99 00 A2
12D9:33 A9 00 9D 40 33 9D C0 A6
12E1:33 C8 CA 10 E8 A2 09 BD CD
12E9:88 12 9D 07 30 CA 10 F7 BF
12F1:A0 00 A2 07 BD 00 3A 99 27
12F9:67 33 BD 08 3A 99 68 33 13
1301:BD 20 3A 99 E7 33 BD 28 9E
1309:3A 99 E8 33 C8 C8 CA C8
1311:10 E2 A9 10 85 05 A9 C0 82
1319:85 26 A9 2F 85 23 A5 26 DD
1321:18 69 40 85 26 85 25 1F
1329:24 A5 23 69 00 85 23 09 2B
1331:04 85 25 E6 24 E6 24 A0 73
1339:00 A9 15 85 04 A9 03 85 17
1341:03 B1 22 85 06 A9 01 85 50
1349:02 4A 06 06 90 02 05 02 BC
1351:06 02 90 F6 AA 29 AA 4A 16

1359:85 02 8A 29 55 0A 05 02 85
1361:91 24 E6 22 C6 24 C6 03 AF
1369:D0 D7 A5 24 18 69 06 85 DC
1371:24 C6 04 D0 C8 C6 05 D0 25
1379:A5 60 20 F0 14 A0 27 A9 B8
1381:46 99 D0 06 A9 05 99 D0 11
1389:DA 88 10 F3 8C 0F D4 A6 71
1391:0C 86 FF AC 1B D4 C0 27 FE
1399:80 F9 C0 07 90 F5 A2 02 C2
13A1:20 E1 14 A2 07 B1 D1 C9 69
13A9:20 D0 E8 88 CA D0 F6 C8 0A
13B1:C8 C8 A6 FF 98 9D 00 9B 1A
13B9:8A 0A 0A 0A 0A 0A 69 60 35
13C1:85 02 A9 10 85 03 A5 02 E6
13C9:91 D1 18 69 10 C8 91 D1 5F
13D1:E6 02 A6 D6 E8 88 20 E1 B9
13D9:14 C6 03 D0 E9 C6 FF 10 A3
13E1:B2 A4 0C 98 0A 0A 0A 2C
13E9:0A AA A9 0F 85 03 A9 04 75
13F1:85 02 D0 0F C6 02 F0 15 9B
13F9:AD 1B D4 29 03 F0 F5 C9 7C
1401:03 D0 02 A9 04 9D 00 9C EC
1409:E8 C6 03 D0 EB A9 00 9D 68
1411:10 9C 88 10 CE A6 0C 20 BB
1419:21 14 CA 10 FA 4C 9F 10 89
1421:86 0E 8A 0A 0A 0A 0A 98
1429:85 FE A5 0E 69 3B 85 23 CF
1431:85 25 A9 00 85 22 85 FD 58
1439:A9 80 85 24 A0 7F A6 FE 98
1441:A9 04 85 0B BD 00 9C F0 B8
1449:21 AA BD 82 14 E0 04 AA 63
1451:90 02 06 0B BD 00 3A 91 A7
1459:22 BD 08 3A 91 24 CA 88 E1
1461:E6 FD C6 0B D0 EE E6 FE 15
1469:D0 D4 A9 00 91 22 91 24 C0
1471:88 10 F9 A6 0E A5 FD 9D 2C
1479:20 9B A5 FE 29 1F 9D 10 4E
1481:9B 60 07 17 3F 27 3F 00 F6
1489:AD 88 14 D0 38 A6 0C 8E 3D
1491:88 14 B5 8A F0 2C 8A 0A B9
1499:0A 0A 0A A8 B9 00 9C F3
14A1:F0 1D C9 05 F0 04 C9 03 41
14A9:D0 12 85 FF B9 01 9C 99 14
14B1:00 9C 95 8A F0 10 A5 FF 6F
14B9:99 01 9C C8 C8 D0 DE 20 76
14C1:21 14 CA 10 CD 60 B5 8F C4
14C9:F0 F5 38 E9 01 0A 8A A5 B4
14D1:BF C9 05 A9 04 90 01 0A 16
14D9:79 01 D0 99 01 D0 D0 DF 7F
14E1:BD 00 9F 85 D1 BD 20 9F 9A
14E9:85 D2 86 D6 84 D3 60 A2 9E
14F1:00 A9 20 9D 00 04 9D 00 AD
14F9:05 9D 00 06 9D E7 06 E8 ED
1501:D0 EF 8A A0 04 9D 00 9F 21
1509:18 69 28 48 98 9D 20 9F 3E
1511:68 90 01 C8 E8 E0 1A D0 10
1519:EC 60 A2 00 A0 79 20 EE 40
1521:08 20 3E 15 85 0C A2 40 52
1529:A0 A9 20 EE 08 A9 01 20 0A
1531:40 15 85 0A C6 0A A2 55 0B
1539:A0 D1 20 EE 08 A9 03 85 8D
1541:0D 85 FE 84 FF A2 00 20 26
1549:7D 10 A4 FF A5 02 F0 12 F3
1551:B9 C7 04 18 25 FE 69 31 75
1559:99 C7 04 0A 85 08 A5 08 03
1561:10 FC 8A D0 E0 B9 C7 04 B2
1569:38 E9 30 60 A2 90 A9 00 E0
1571:95 2F 9D 37 3A 9D 80 CF 72
1579:CA D0 F5 60 C6 12 10 52 F2
1581:A5 06 4A 4A 85 12 A2 07 AE

1589:B5 68 F0 43 C9 80 F0 3F 6C
1591:B5 98 38 F5 C8 95 98 10 01
1599:04 A0 01 94 C8 20 74 10 17
15A1:98 D5 A8 F0 0D 95 A8 8A 4C
15A9:0A A8 B9 01 D0 75 C8 99 D1
15B1:01 D0 D6 B0 10 10 A9 05 8F
15B9:95 B0 8A A8 0A AA B9 68 8D
15C1:00 20 36 10 98 AA B4 98 2D
15C9:C8 D0 04 A9 80 95 68 CA 9D
15D1:10 B6 60 00 00 00 00 00 BD
15D9:00 00 00 1F 3F 1F 00 00 6C
15E1:00 00 00 7C FE BC 00 00 BE
15E9:00 00 00 1F 7F 3B 00 00 EE
15F1:00 00 00 D8 FC FD 00 00 75
15F9:1F 0D 1F 1F 1F 00 00 E0 DA
1601:F8 F8 78 B8 F8 E0 5C FF 86
1609:00 00 00 00 00 00 FB 07 34
1611:0A 80 00 0B 00 00 09 00 25
1619:00 05 00 00 04 00 00 55 FB
1621:00 01 55 00 01 55 40 01 17
1629:14 40 01 14 40 00 55 00 7D
1631:00 3C 00 00 1C 00 00 14 61
1639:00 00 14 00 00 14 00 00 38
1641:14 00 00 14 FB 27 2A 00 89
1649:00 2C 00 00 24 00 00 14 B5
1651:00 00 10 00 00 54 00 01 D1
1659:55 00 05 FD 40 01 75 FB 9D
1661:07 08 00 00 08 00 0A 88 EF
1669:00 0B 08 00 09 08 00 05 C6
1671:08 00 04 08 00 15 08 00 73
1679:15 14 00 15 50 00 15 40 07
1681:00 05 00 00 0F 50 00 0D B5
1689:50 00 02 14 00 02 04 00 6F
1691:02 00 00 00 00 00 08 00 4F
1699:00 08 00 00 A0 FB 04 08 CC
16A1:00 0A 88 00 0B 08 00 09 E2
16A9:00 00 05 04 00 04 14 00 F2
16B1:05 50 00 15 40 00 15 80 72
16B9:00 55 00 00 55 00 00 15 FA
16C1:10 00 0F 54 00 0D 44 00 D9
16C9:09 40 00 08 50 00 08 10 AD
16D1:00 02 10 00 02 00 00 08 98
16D9:00 00 20 FB 09 0A 80 00 3B
16E1:0B 00 00 09 00 00 05 00 2E
16E9:00 04 00 00 55 40 00 55 18
16F1:40 01 55 00 01 14 40 01 03
16F9:14 50 00 54 00 00 F0 00 6B
1701:00 70 00 01 54 00 01 04 04
1709:00 04 04 00 00 04 00 00 C8
1711:04 FB 0C 0A 80 00 0B 00 75
1719:00 09 00 00 05 00 00 04 B5
1721:00 00 15 00 00 55 00 00 47
1729:55 00 00 55 40 00 55 40 44
1731:00 14 00 00 3C 00 00 1C 62
1739:00 00 14 00 00 14 00 00 3A
1741:50 00 00 10 00 00 10 FB B4
1749:0C 0A 80 00 0B 00 00 09 71
1751:00 00 05 00 00 04 00 00 30
1759:55 00 00 55 00 01 55 10 46
1761:01 15 50 01 15 40 00 14 2D
1769:00 00 F0 00 00 74 00 01 88
1771:44 00 15 04 00 00 01 00 A6
1779:00 01 00 00 01 FB 18 2A 3A
1781:00 00 2C 00 00 24 00 00 C5
1789:14 00 00 10 00 00 54 00 6B
1791:01 55 00 01 55 00 01 55 A7
1799:00 04 54 04 04 54 40 55 4E
17A1:FD 40 05 75 40 01 55 FB 83
17A9:0C 0A 80 00 0B 00 00 09 D1
17B1:00 00 05 00 00 04 00 00 90

PROGRAMS

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17B9:15 00 00 55 40 00 55 40 B4
17C1:01 54 40 01 14 50 01 14 95
17C9:00 00 3C 00 00 1C 00 00 EF
17D1:15 00 00 05 00 00 05 00 E4
17D9:00 14 00 00 04 FB 0C A8 DD
17E1:00 00 B0 00 00 90 00 00 68
17E9:50 00 00 40 00 00 54 00 EC
17F1:01 55 00 05 51 50 04 50 6A
17F9:00 10 54 00 10 14 00 00 87
1801:3D 50 00 1F 55 00 14 00 A8
1809:00 04 00 00 04 00 00 10 6A
1811:00 00 10 FB 24 14 00 00 7A
1819:55 A0 03 55 60 03 D4 60 EA
1821:01 44 20 00 55 00 00 51 E2
1829:00 00 50 00 01 44 00 01 7D
1831:04 FB 05 FB 00 00 00 00 C2
  
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Alain Tremblay does his sunbathing in Sainte-Foy, Quebec, Canada.

SPACE TREK

By Bob Yu

The space adventure continues with Space Trek. Boldly go where no computer has gone before in this fast-paced, one- or two-player arcade-style game for the 64.

As captain of a space vessel, you have a mission to explore the final frontier of space. Your mission for this part of the adventure is to guide your ship through dangerous asteroid fields to reach the other side of the Alpha sector.

Getting Started

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

Starting address: 0801

Ending address: 1638

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

Playing the Game

Space Trek loads and runs like a BASIC program. At the menu prompt, move joystick 1 left for a one-player game or right for a two-player game. Your task is to guide your ship through an asteroid belt, trying to avoid collisions. Your shields have only enough power to resist three hits from the asteroids. You can either fly around the asteroids or destroy them with blasts from your ship's phaser. Also be

on the alert for enemy ships.

Control your ship with either the keyboard or joystick. Joysticks are required for the two-player game. Use a joystick to guide your ship left or right, and press the fire button to launch a phaser blast. From the keyboard, move your ship to the right by pressing the 2 key. Press Ctrl to move to the left. Press the space bar to fire the ship's phaser. Press the Commodore key to pause the game and then press the Shift key to resume play.

Game levels are determined by the length of time you successfully avoid collisions. At higher levels your ship will increase its speed. There are six levels in all. Watch out for the last level; it's a killer.

Scoring

Each rock that you hit with your phaser earns you 150 points. You earn 250 points for hitting an enemy ship. Nothing will shoot at you, but watch out for those fast-approaching rocks. Each asteroid hit causes you to lose one shield factor. Warning: this game may look simple, but it's addictive.

SPACE TREK

```

0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 20 9F 08 20 61
0811:7D 0A 20 44 E5 20 7D 0A 5F
0819:20 E5 0D 20 C8 13 20 7D A6
0821:0A 20 E9 12 20 90 0B 20 16
0829:2F 12 20 09 12 A9 00 85 A6
0831:A1 20 AA 0B 20 CA 0B AD 10
0839:15 D0 29 01 F0 03 20 EA FB
0841:0B AD 15 D0 29 04 F0 03 30
0849:20 1B 0C 20 B1 0D 20 CB 81
0851:0D 20 4C 0C 20 7A 0C 20 5D
0859:A8 0C 20 C3 0E 20 31 10 64
0861:20 3B 13 20 E0 0F 20 A6 DE
0869:0E 20 B0 13 AD C7 13 18 9A
0871:69 F9 AA 20 9D 0B A5 A1 12
0879:48 AD 8D 02 C9 02 D0 07 E9
0881:AD 8D 02 C9 01 D0 F9 68 50
0889:85 A1 AD C7 13 C9 06 D0 93
0891:03 4C 59 14 AD 15 D0 29 2F
0899:05 D0 96 4C 19 08 A2 00 26
08A1:BD BA 08 9D 00 30 E8 E0 8D
08A9:00 D0 F5 A2 00 BD BA 09 4C
08B1:9D 00 31 E8 E0 C0 D0 F5 E6
08B9:60 00 20 00 00 20 00 00 7E
08C1:A8 00 00 A8 00 00 A8 00 02
08C9:00 A8 00 00 A8 00 00 A8 F1
08D1:00 00 A8 00 02 AA 00 02 B3
08D9:AA 00 0A AA 80 0A AA 80 2D
08E1:00 30 00 00 FC 00 00 FC E2
08E9:00 00 FC 00 00 FC 00 00 8D
08F1:FC 00 00 30 00 00 00 00 83
08F9:00 00 20 00 00 20 00 00 8E
0901:A8 00 00 A8 00 00 A8 00 43
  
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0909:00 A8 00 00 A8 00 00 A8 33
0911:00 00 A8 00 02 AA 00 02 F4
0919:AA 00 0A AA 80 0A AA 80 6E
0921:00 30 00 00 FC 00 00 FC 24
0929:00 00 30 00 00 00 00 00 41
0931:00 00 00 00 00 00 00 00 43
0939:00 00 00 00 20 00 02 CD
0941:A8 20 28 AA A0 23 A8 20 62
0949:2B E8 AA 2F 2E A2 AB 03 C9
0951:88 8E EF AA BF FF 22 2E 64
0959:FB FA BE CE CA AF 83 02 0B
0961:83 E3 28 BA A3 F8 FF 87 67
0969:A8 2E 8E 88 0A 2A A0 0C FB
0971:82 80 00 28 00 00 00 00 67
0979:00 00 00 00 20 00 02 0E
0981:A8 00 08 A2 00 03 8A 00 34
0989:0B EE 80 0E 2F 80 2B F2 92
0991:80 2E FF 80 2A FE 80 08 CD
0999:EE 80 0A EA 00 02 A8 00 8C
09A1:00 80 00 00 00 00 00 00 D3
09A9:00 00 00 00 00 00 00 00 BB
09B1:00 00 00 00 00 00 00 00 C3
09B9:00 00 20 00 08 20 00 08 98
09C1:00 08 82 22 08 20 28 80 D9
09C9:2B B2 80 02 BF 80 22 FF 92
09D1:00 28 2C 00 0B FA 80 83 3C
09D9:F8 28 83 A2 80 02 38 00 89
09E1:02 22 80 08 02 A0 A0 20 02
09E9:20 20 20 28 00 00 00 00 9A
09F1:00 00 00 00 00 00 00 00 04
09F9:00 00 00 00 00 00 00 00 0C
0A01:00 00 00 00 00 00 14 00 3D
0A09:00 55 00 01 55 40 2A 55 D7
0A11:A8 AA AA AA AA AA AA 02 7B
0A19:FF 80 00 3C 00 00 00 00 11
0A21:00 00 00 00 00 00 00 00 35
0A29:00 00 00 00 00 00 00 00 3D
0A31:00 00 00 00 00 00 00 00 45
0A39:00 00 00 00 00 20 00 00 CD
0A41:20 00 00 20 00 00 20 00 A7
0A49:00 20 00 00 20 00 00 20 86
0A51:00 00 20 00 00 00 00 00 69
0A59:00 00 00 00 00 00 00 00 6D
0A61:00 00 00 00 00 00 00 00 75
0A69:00 00 00 00 00 00 00 00 7D
0A71:00 00 00 00 00 00 00 00 85
0A79:00 00 00 00 A9 00 8D 21 17
0A81:D0 8D 20 D0 A9 01 8D 86 65
0A89:02 A9 8E 20 16 E7 A9 08 88
0A91:20 16 E7 20 66 E5 A0 00 46
0A99:A9 07 8D D0 0A A2 00 A9 87
0AA1:00 8D CF 0A A9 1D 20 16 CB
0AA9:E7 EE CF 0A AD CF 0A C9 92
0AB1:21 D0 F1 BD D1 0A 20 16 B1
0AB9:E7 E8 EC D0 0A D0 F4 AD D1
0AC1:D0 0A 18 69 07 8D D0 0A 74
0AC9:C8 C0 17 D0 D2 60 00 00 7A
0AD1:20 53 50 41 43 45 20 20 78
0AD9:20 54 52 45 4B 20 20 20 EC
0AE1:20 20 20 20 20 20 20 20 F5
0AE9:20 20 20 20 4C 45 56 45 85
0AF1:4C 3A 30 20 20 20 20 20 A4
0AF9:20 20 50 4C 41 59 45 52 41
0B01:31 20 53 43 4F 52 45 20 C4
0B09:30 30 30 30 30 30 30 20 0F
0B11:20 20 20 20 20 20 20 53 5A
0B19:48 49 45 4C 44 20 20 20 16
0B21:33 20 20 20 20 20 20 20 C0
0B29:20 20 20 50 4C 41 59 45 BF
0B31:52 32 20 53 43 4F 52 45 77
  
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PROGRAMS

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11C9:03 9D 37 03 CA E0 28 D0 E6
11D1:F2 8A C9 28 90 05 E9 28 60
11D9:4C D3 11 C9 00 D0 04 8A AB
11E1:E9 08 AA 60 A0 00 20 72 0E
11E9:0B C9 38 B0 F9 E9 18 AA 68
11F1:A9 2E 9D 00 04 C8 C0 03 EF
11F9:D0 EC 60 A2 00 A9 20 9D 7A
1201:00 04 E8 E0 20 D0 F6 60 E3
1209:A9 00 8D 2E 12 20 FC 11 B2
1211:20 E5 11 20 88 11 20 B1 5D
1219:0D 20 CB 0D EE 2E 12 AD 18
1221:2E 12 C9 1A D0 E7 20 FC 1F
1229:11 20 E5 11 60 00 A9 0F 11
1231:8D 18 D4 A9 4F 8D 13 D4 03
1239:A9 10 8D 14 D4 A9 11 8D 26
1241:12 D4 A9 FF 8D 0E D4 A9 D0
1249:59 8D A2 12 A2 F8 20 9D C9
1251:0B EE A2 12 AD A2 12 8D D5
1259:0F D4 C9 66 D0 EE A2 0A 6B
1261:20 9D 0B A9 65 8D A2 12 B1
1269:A2 F8 20 9D 0B EE A2 12 66
1271:AD A2 12 8D 0F D4 C9 80 10
1279:D0 EE A2 32 20 9D 0B A9 70
1281:81 8D A2 12 A2 F8 20 9D 16
1289:0B CE A2 12 AD A2 12 8D 06
1291:0F D4 C9 73 D0 EE A2 0F 79
1299:20 9D 0B A9 10 8D 12 D4 E0
12A1:60 00 A2 0F 8E 18 D4 A2 5C
12A9:4F 8E 05 D4 A2 10 8E 06 7F
12B1:D4 8C 04 D4 A2 FF 8E 00 63
12B9:D4 8D 01 D4 60 8D 01 D4 29
12C1:60 8C 04 D4 60 A2 0F 8E 41
12C9:18 D4 A2 4F 8E 0C D4 A2 69
12D1:10 8E 0D D4 8C 0B D4 A2 6D
12D9:FF 8E 07 D4 8D 0B D4 60 66
12E1:8D 08 D4 60 8C 0B D4 60 0A
12E9:A9 03 8D AE 13 8D AF 13 81
12F1:A9 C2 8D 85 11 8D 86 11 82
12F9:8D 87 11 A9 00 8D 7F 11 C9
1301:8D 80 11 8D 81 11 8D 82 F6
1309:11 8D 83 11 8D 84 11 8D CA
1311:1A 0C 8D 4B 0C 8D C7 13 E6
1319:A2 00 9D 79 0E 9D 9F 0E 10
1321:E8 E0 07 D0 F5 A2 00 9D B9
1329:AC D0 E8 E0 05 D0 F8 A2 14
1331:00 9D D2 0F E8 E0 0E D0 C1
1339:F8 60 AD DE 0F F0 34 CE 0B
1341:AE 13 AD AE 13 18 69 30 20
1349:8D DC 05 AD AE 13 C9 00 3E
1351:D0 21 A9 02 8D 21 D0 A9 B9
1359:C4 8D F8 07 A2 E6 20 9D 63
1361:0B AD 15 D0 49 01 8D 15 A6
1369:D0 A9 C0 8D F8 07 A9 00 8A
1371:8D 21 D0 AD DF 0F F0 34 EC
1379:CE AF 13 AD AF 13 18 69 93
1381:30 8D F4 06 AD AF 13 C9 3E
1389:00 D0 21 A9 02 8D 21 D0 FB
1391:A9 C4 8D FA 07 A2 E6 20 CF
1399:9D 0B AD 15 D0 49 04 8D 99
13A1:15 D0 A9 C0 8D FA 07 A9 D7
13A9:00 8D 21 D0 60 03 03 A5 1F
13B1:A1 C9 0F 90 10 A9 00 85 B2
13B9:A1 EE C7 13 AD C7 13 18 61
13C1:69 30 8D C7 04 60 00 20 98
13C9:09 12 A2 00 BD 19 14 9D 65
13D1:6E 05 E8 E0 10 D0 F5 A2 ED
13D9:00 BD 29 14 9D BB 05 E8 A4
13E1:E0 19 D0 F5 AD 01 DC 29 8C
13E9:0F C9 0B F0 07 C9 07 F0 D8
13F1:0E 4C E5 13 AD 15 D0 09 8C

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13F9:01 8D 15 D0 4C 08 14 AD 0C
1401:15 D0 09 05 8D 15 D0 20 DB
1409:09 12 A2 00 BD 42 14 9D 4B
1411:6B 05 E8 E0 17 D0 F5 60 A3
1419:0D 0F 16 05 20 0A 0F 19 FE
1421:13 14 09 03 0B 20 23 31 79
1429:0C 05 06 14 20 06 0F 12 E3
1431:20 31 20 0F 12 20 12 09 E8
1439:07 08 14 20 06 0F 12 20 1C
1441:32 17 05 0C 03 0F 0D 05 1D
1449:20 01 02 0F 01 12 04 2C 77
1451:20 03 01 10 14 01 09 0E 30
1459:AD 15 D0 29 05 8D 15 D0 A3
1461:20 09 12 A2 00 BD BD 14 CE
1469:9D 6D 05 E8 E0 12 D0 F5 D1
1471:A2 00 BD CF 14 9D BE 05 39
1479:E8 E0 10 D0 F5 20 2F 12 FD
1481:20 2F 12 20 2F 12 20 09 D4
1489:12 A2 00 BD DF 14 9D 6B 35
1491:05 E8 E0 15 D0 F5 20 90 13
1499:0B A0 81 A9 03 20 A3 12 2C
14A1:A9 02 20 C6 12 A9 00 8D 54
14A9:F4 14 A2 0A 20 9D 0B EE C2
14B1:F4 14 AD F4 14 C9 1E D0 33
14B9:F3 4C 19 08 03 0F 0E 07 0A
14C1:12 01 14 15 0C 01 14 09 9C
14C9:0F E0 13 21 21 21 09 22
14D1:13 13 09 0F 0E 20 03 0F 60
14D9:0D 10 0C 05 14 05 14 08 43
14E1:01 0E 0B 20 19 0F 15 20 C0
14E9:06 0F 12 20 10 0C 01 19 E8
14F1:09 0E 07 00 FF 00 FF 00 03
14F9:FF 00 FF 00 FF 00 FF 20 42
1501:00 FF 00 FF 00 FF 00 FF 2B
1509:00 FF 00 FF 00 02 00 FF 3B
1511:00 FF 00 FF 00 FF 00 FF 3B
1519:00 FF 00 FF 00 FF 00 FF 43
1521:00 FF 00 FF 00 FF 00 FF 4B
1529:00 FF 00 FF 00 FF 00 FF 53
1531:00 FF 00 FF 00 FF 00 FF 5B
1539:00 FF 00 FF 00 FF 00 FF 63
1541:00 FF 00 FF 00 FF 00 FF 6B
1549:00 FF 00 FF 00 FF 00 FF 73
1551:00 FF 00 FF 00 FF 00 FF 7B
1559:00 FF 00 FF 00 FF 00 FF 83
1561:00 FF 00 FF 00 FF 00 FF 8B
1569:00 FF 00 FF 00 FF 00 FF 93
1571:00 FF 00 FF 00 FF 00 FF 9B
1579:00 FF 00 FF 00 FF 00 DD 81
1581:FF 00 FF 00 FF 00 FF 00 AB
1589:FF 00 FF 00 FF 00 FF 00 B3
1591:FF 00 FF 00 FF 00 FF 00 BB
1599:FF 00 FF 00 FF 00 FF 00 CB
15A1:FF 00 FF 00 FF 00 FF 00 CB
15A9:FF 00 FF 00 FF 00 FF 00 D3
15B1:FF 00 FF 00 FF 00 FF 00 DB
15B9:FF 00 FF 00 FF 00 FF 00 E3
15C1:FF 00 FF 00 FF 00 FF 00 EB
15C9:FF 00 FF 00 FF 00 FF 00 F3
15D1:FF 00 FF 00 FF 00 FF 00 FB
15D9:FF 00 FF 00 FF 00 FF 00 04
15E1:FF 00 FF 00 FF 00 FF 00 0C
15E9:FF 00 FF 00 FF 00 FF 00 14
15F1:FF 00 FF 00 FF 00 FF 00 1C
15F9:FF 00 FF 00 FF 00 FF 22 46
1601:00 FF 00 FF 00 FF 00 FF 2D
1609:00 FF 00 FF 00 FF 00 FF 35
1611:00 FF 00 FF 00 FF 00 FF 3D
1619:00 FF 00 FF 00 FF 00 FF 45
1621:00 FF 00 FF 00 FF 00 FF 4D

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1629:00 FF 00 FF 00 FF 00 FF 55
1631:00 FF 00 00 00 00 00 00 5D

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Bob Yu is working on a sequel to Space Trek. He lives in Lawrenceville, New Jersey.

PUSH BUTTON 64

By Matthew D. Boardman

Graphic environments such as GEOS are popular with users because they make ordinary computer tasks simple and fun to do. A menu-driven program is easy to learn, since there are no commands or complex keystrokes to remember. The trouble, however, is that the easier it is for the person to use the program, the more difficult it is for the programmer to write. With GEOS, for example, programmers have to use machine language and must acquaint themselves with the complex algorithms built into the GEOS system.

Push Button 64 lets any BASIC programmer create complex menu-driven applications for the 64. It uses machine language routines for speed, but you don't need to know any machine language to use the program. With Push Button 64, the most complex commands can be accessed with a simple arrow on the screen controlled with a joystick.

Typing It In

Push Button 64 consists of two parts—the actual program and a demonstration. The first is written in machine language. It must be entered using MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts you for the starting and ending addresses, respond with the following values.

Starting address: C000

Ending address: C267

Be sure to save a copy of this program before exiting MLX. Use the filename Button64.ml so that the second program can load it properly. The second program is a BASIC demonstration that shows how to incorporate the routines into your programs. To help you avoid typing errors, it should be entered with The Automatic Proofreader. Again, see "Typing Aids," and remember to save a copy of the program.

The Pointer

To see the demonstration, plug a joystick into port 2. Load the BASIC program and type *RUN*. The machine language code will be read from the disk and then an arrow will appear on-screen. Moving the joystick up, down, left, or right will make the arrow on-screen move accordingly. Pressing the fire button selects something on-screen. A clicking noise will confirm that the button was pressed.

The second line on the screen consists of four menus. To make the program shorter to type in, only the first two menus are functional. Maneuver the arrow onto the File menu and click the button. A sample menu pulls down.

Pointing and clicking the button on one of these menu items activates an associated routine. Click anywhere else and the menu closes. Click on the Load menu item. A box appears in the center of your screen indicating the item you selected. This box is called a dialog box, since it confirms choices or gets information from the user. For demonstration purposes, the selections activate dialog boxes rather than perform actual tasks. Point and click on the Continue box to go on.

The three buttons on the right of the screen activate dialog boxes that indicate which button you pressed. On the bottom of the screen is a slider. This is a graphical way for the user to input information, in this example a number from 0 to 26. Point and click on the left or right triangle on either side of the slider to decrease or increase the number respectively. The red slider moves to the left or right, and the number on the right of the slider changes accordingly. If you point and click on an empty part of the slider, the red indicator moves to that position, and the number changes. To leave the program, click on the Files menu and select Quit.

Your Own Menus

The machine language program contains several routines that are accessed through the following SYS calls and memory locations.

Activate Arrow (SYS 49152)

This command causes an arrow to appear on the screen. You can control it

by moving the joystick.

Deactivate Arrow (SYS 49633)

This removes the arrow from the screen and deactivates the analysis program, but the following two commands can still be accessed.

Save Screen (SYS 49653)

This saves the characters and colors on the screen to two special buffers. It is included in order to make the pop-up menus easier to manipulate.

Load Screen (SYS 49709)

This retrieves the characters and colors from the buffers and restores the screen as it was when the screen was saved. The technique for using these two commands is explained below.

Flag (location 49572)

This is a variable which allows your BASIC program to tell the machine language routine whether or not it is accepting button presses. If the location contains a 1, then the computer will ignore all button presses. If you poke a 0 into the location, this tells the machine language routine to process button presses normally.

Xchar (49571)

This is the x coordinate of the screen character in which the arrow was present when the button was last pressed, a number from 0 to 39.

Ychar (49570)

This is the corresponding y coordinate of the screen character, from 0 to 24. These two locations help to determine which object the user is pointing to.

Xdot (49568)

This is the actual x coordinate of the arrow in pixels. This is useful if you need more accuracy than just a character coordinate or if you are working in high-resolution mode.

High (49569)

This is the most significant byte of the sprite's x coordinate; see the 64's user's manual for a more detailed explanation of sprite coordinates. The location either contains a 0 or a 1, regardless of the positions of all other sprites. It makes Xdot a 16-bit number.

Ydot (49567)

This is the corresponding y coordinate of the sprite.

How It Works

When the machine language routine is activated (SYS 49152), it puts two sprites on the screen to create the arrow. The first sprite is a white arrow, and the second is a black outline directly underneath. These two colors allow the sprite to show up on all background colors. The actual coordinates used when the user clicks the button are those of the tip of the white part of the arrow.

The activation routine also sets up a machine language interrupt that calls the routine to move the arrow sprite with the joystick. The deactivation routine turns off this interrupt and the sprite. You can turn the arrow on and off as often as you need with successive calls of the activation and deactivation routines.

When the routine detects a press of the button, it stores the current sprite coordinates in Xdot, Ydot, and High. It then converts these coordinates into character coordinates and stores them in Xchar and Ychar. A 1 is then placed in Flag so that no more clicks will be processed until the BASIC program has determined what to do. The BASIC program must poke a 0 into Flag in order for the machine language routine to analyze more coordinates.

The Demo Program

You don't have to know all of this to use the routines, however. The BASIC demonstration shows how to use them in terms of menu manipulation. The program has numerous comments in the form of REM statements that show the operation of the program, which you can take note of as you type it in. The program's plan of attack is as follows.

1. Load in the machine language routines and run the activation sequence (SYS 49152).
2. Draw the screen, showing all buttons, menus, and sliders. Save the screen to the buffers (SYS 49653).
3. Wait until Flag contains a 1.
4. Determine if the Xchar and Ychar coordinates show a point that the program recognizes and jump to the ap-

PROGRAMS

appropriate subroutine if so. If not, type *POKE FLAG,0* and repeat step 4.

5. When the routine has finished, load the old screen back in from the buffers (SYS 49709) and continue with step 3.

Examine the routines in the BASIC demo to get ideas for your own programs, or modify this one to suit your needs. The machine language routines will not interfere with BASIC programs.

The demonstration program contains other routines that may be useful. One is for drawing dialog boxes. You can include those routines in your own programs to make your programming easier. For example, step 3 is actually a subroutine (lines 1570-1630) that puts Xchar into variable X and Ychar into variable Y. The dialog box is drawn by another routine (lines 1500-1550).

Since the routine that moves the arrow works in the background, you can type in BASIC programs while the arrow is onscreen. If you position the arrow and then peek the Xchar and Ychar coordinates, you can position the buttons onscreen more easily.

You are not limited to BASIC, however. Since the machine language routines are called by the SYS command, machine language programmers can call the routines with a JSR command. Feel free to experiment.

PUSH BUTTON 64

```
C000:78 AD 14 03 8D C8 C0 AD 9A
C008:15 03 8D C9 C0 A9 CA 8D F2
C010:14 03 A9 C0 8D 15 03 A9 0E
C018:C0 8D F8 07 A9 C1 8D F9 56
C020:07 A9 03 8D 15 D0 A9 00 08
C028:8D A4 C1 AD 10 D0 29 7C 3F
C030:8D 10 D0 A9 01 8D 27 D0 8E
C038:A9 00 8D 28 D0 A9 65 8D 48
C040:00 D0 8D 01 D0 A9 64 8D 3B
C048:02 D0 8D 03 D0 A2 00 A9 9B
C050:00 9D 00 30 E8 E0 81 D0 DA
C058:F8 A2 00 BD 86 C0 9D 00 4D
C060:30 E8 E0 1D D0 F5 A2 00 C5
C068:BD A3 C0 9D 40 30 E8 E0 19
C070:23 D0 F5 A9 00 8D A0 C1 4A
C078:8D 9F C1 8D A1 C1 8D A3 8C
C080:C1 8D A2 C1 58 60 80 00 FB
C088:00 60 00 00 78 00 00 3E 24
C090:00 00 3C 00 00 1E 00 00 12
C098:17 00 00 03 80 00 01 C0 9C
C0A0:00 00 80 C0 00 00 B0 00 9F
C0A8:00 4C 00 00 43 00 00 20 77
C0B0:80 00 21 00 00 10 80 00 D7
C0B8:14 40 00 0A 20 00 01 10 08
C0C0:00 00 A0 00 00 40 00 00 57
C0C8:00 00 EA AD 00 DC 29 01 49
C0D0:C9 01 F0 10 AD 01 D0 C9 73
```

```
C0D8:33 B0 03 4C E4 C0 CE 01 0E
C0E0:D0 CE 03 D0 AD 00 DC 29 3C
C0E8:02 C9 02 F0 10 AD 01 D0 37
C0F0:C9 F9 90 03 4C FD C0 EE E2
C0F8:01 D0 EE 03 D0 AD 00 DC 57
C100:29 04 C9 04 F0 33 AD 10 52
C108:D0 29 02 C9 02 F0 0A AD B0
C110:02 D0 C9 18 B0 03 4C 39 E6
C118:C1 AD 00 D0 D0 08 AD 10 07
C120:D0 29 7E 8D 10 D0 CE 00 60
C128:D0 AD 02 D0 D0 08 AD 10 DE
C130:D0 29 7D 8D 10 D0 CE 02 52
C138:D0 AD 00 DC 29 08 C9 08 62
C140:F0 2D AD 10 D0 29 01 C9 35
C148:01 D0 0A AD 00 D0 C9 57 CA
C150:90 03 4C 6F C1 EE 00 D0 F7
C158:D0 08 AD 10 D0 09 01 8D 37
C160:10 D0 EE 02 D0 D0 08 AD A5
C168:10 D0 09 02 8D 10 D0 AD 65
C170:00 DC 29 10 C9 10 F0 03 C4
C178:4C 7E C1 6C C8 C0 AD A4 0A
C180:C1 C9 00 D0 F6 A9 01 8D 52
C188:A4 C1 AD 01 D0 8D 9F C1 52
C190:AD 00 D0 8D A0 C1 AD 10 55
C198:D0 8D A1 C1 4C A5 C1 00 B4
C1A0:00 00 00 00 00 AD 9F C1 DB
C1A8:E9 32 4A 4A 8D A2 C1 2B
C1B0:AD A1 C1 29 01 C9 01 D0 40
C1B8:15 A9 01 8D A1 C1 AD A0 3A
C1C0:C1 69 03 4A 4A 4A 69 1C EE
C1C8:8D A3 C1 4C 7B C1 A9 00 2F
C1D0:8D A1 C1 AD A0 C1 E9 17 8D
C1D8:4A 4A 4A 8D A3 C1 4C 7B 6E
C1E0:C1 78 AD C8 C0 8D 14 03 0D
C1E8:AD C9 C0 8D 15 03 58 A9 B5
C1F0:FC 8D 15 D0 60 A2 00 BD 51
C1F8:00 04 9D 65 C2 BD 00 D8 6D
C200:9D 65 C6 BD 00 05 9D 65 17
C208:C3 BD 00 D9 9D 65 C7 BD 4C
C210:00 06 9D 65 C4 BD 00 DA 19
C218:9D 65 C8 BD 00 07 9D 65 77
C220:C5 BD 00 DB 9D 65 C9 E8 B4
C228:E0 00 D0 CB 60 A2 00 BD 40
C230:65 C2 9D 00 04 BD 65 C6 75
C238:9D 00 D8 BD 65 C3 9D 00 F8
C240:05 BD 65 C7 9D 00 D9 BD 3F
C248:65 C4 9D 00 06 BD 65 C8 20
C250:9D 00 DA BD 65 C5 9D 00 59
C258:07 BD 65 C9 9D 00 DB E8 A7
C260:E0 00 D0 CB 60 A3 00 00 BE
```

BUTTON DEMO

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
DR 10 REM LOAD AND RUN PROGRAM
AB 20 IF X=0 THEN X=1:LOAD"BUT
TON64.ML",8,1
MM 30 SYS 49152:POKE 53280,0:P
OKE 53281,15
HF 40 REM SETUP SCREEN AND MEN
US
HJ 50 PRINTCHR$(14)"{CLR}{RVS}
{BLU}MENU{SHIFT-SPACE}TE
MPLATE{27 SPACES}";
CG 60 PRINT"{WHT}{RVS}FILE
{3 SPACES}{M}LAYOUT {M}T
OOLS{2 SPACES}{M}OPTIONS
{9 SPACES}{OFF}";
```

```
CJ 70 PRINT"{DOWN}{5 SPACES}
{BLK}↑{DOWN}{LEFT}-
{DOWN}{3 LEFT}{WHT}CLICK
ON THESE TO TEST MENUS.
"
SS 80 PRINT"{2 DOWN}CLICK ON T
HESE":PRINT"TO TEST BUTT
ONS {BLK}***"
CF 90 PRINTTAB(21)"{2 UP}{CYN}
{A}*****{S}"
KJ 100 PRINTTAB(21)"{CYN}-
{BLK}{RVS}{@}{WHT}{OFF}
BUTTON #1{CYN}-"
EG 110 PRINTTAB(21)"{CYN}-
{BLK}{RVS}{@}{WHT}{OFF}
BUTTON #2{CYN}-"
DF 120 PRINTTAB(21)"{CYN}-
{BLK}{RVS}{@}{WHT}{OFF}
BUTTON #3{CYN}-"
SX 130 PRINTTAB(21)"{CYN}{Z}**
*****{X}"
CS 140 PRINT"{3 DOWN}
{2 SPACES}{CYN}{A}*****
*****"
KD 150 PRINT"{2 SPACES}{CYN}-
{SPACE}{BLK}{RVS}<{OFF}
{WHT}*****
{RED}+{WHT}*****
{BLK}{RVS}>{OFF}{WHT}1
5{CYN}-"
MM 160 PRINT"{2 SPACES}{CYN}
{Z}*****
*****{X}{BLK}"
CP 170 PRINT"{DOWN}{4 RIGHT}↑
{DOWN}{LEFT}-{DOWN}
{LEFT}-{DOWN}{3 LEFT}
{WHT}CLICK ON THIS TO T
EST SLIDER."
DB 180 SL=15
HM 190 SYS 49653 : REM SAVE SC
REEN TO BUFFER
SP 200 GOSUB 1570 : REM GET A
{SPACE}POINT
AP 210 REM TEST FOR KNOWN POIN
TS
QE 220 IF Y>1 THEN 270
HH 230 IF X<8 THEN 320:REM FIL
ES
BB 240 IF X>7 AND X<16 THEN 84
0:REM LAYOUT
KJ 250 IF X>15 AND X<24 THEN 9
90:REM TOOLS
SR 260 IF X>23 THEN 1070:REM O
PTIONS
AM 270 IF X=22 AND Y=9 THEN 11
50:REM B1
PK 280 IF X=22 AND Y=10 THEN 1
230:REM B2
EG 290 IF X=22 AND Y=11 THEN 1
310:REM B3
KK 300 IF Y=17 THEN 1390 : REM
SLIDER
CJ 310 GOTO 190
AG 320 REM FILE MENU WAS CHOSE
N
MS 330 PRINT"{HOME}{2 DOWN}
```

```

{RIGHT}{WHT}{RVS}LOAD
{4 SPACES}{DOWN}
{8 LEFT}SAVE{4 SPACES}
{BLK}{WHT}{DOWN}
{9 LEFT}";
SH 340 PRINT"NEW{5 SPACES}
{BLK}{WHT}{DOWN}
{9 LEFT}DIR{5 SPACES}
{BLK}{WHT}{DOWN}
{9 LEFT}";
JE 350 PRINT"QUIT{4 SPACES}
{BLK}{WHT}{DOWN}
{9 LEFT}";
FA 360 PRINT"{BLK}{RIGHT}
{8 SPACES}{OFF}{WHT}"
DB 370 GOSUB 1570
FP 380 IF X<1 OR X>8 THEN 440
QF 390 IF Y=2 THEN 450 : REM L
OAD ROUTINE
BJ 400 IF Y=3 THEN 520 : REM S
AVE ROUTINE
EF 410 IF Y=4 THEN 590 : REM N
EW ROUTINE
CE 420 IF Y=5 THEN 660 : REM D
IR ROUTINE
MM 430 IF Y=6 THEN 730 : REM Q
UIT ROUTINE
KK 440 SYS 49709 : GOTO 190
DB 450 GOSUB 1500
JF 460 PRINT"{HOME}{7 DOWN}
{12 RIGHT}{RVS}{WHT}YOU
PRESSED THE"
QS 470 PRINT"{11 RIGHT}{RVS}LO
AD ROUTINE."
QK 480 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
AK 490 GOSUB 1570
XO 500 IF Y<>11 OR X<19 OR X>2
8 THEN 490 XQ
MR 510 SYS 49709:GOTO 190
QF 520 GOSUB 1500
KB 530 PRINT"{HOME}{7 DOWN}
{12 RIGHT}{RVS}{WHT}YOU
PRESSED THE"
FE 540 PRINT"{11 RIGHT}{RVS}SA
VE ROUTINE."
QF 550 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
BR 560 GOSUB 1570
AG 570 IF Y<>11 OR X<19 OR X>2
8 THEN 490
XA 580 SYS 49709:GOTO 190
JJ 590 GOSUB 1500
PR 600 PRINT"{HOME}{7 DOWN}
{12 RIGHT}{RVS}{WHT}YOU
PRESSED THE"
GR 610 PRINT"{11 RIGHT}{RVS}NE
W ROUTINE."
PB 620 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
DB 630 GOSUB 1570
BC 640 IF Y<>11 OR X<19 OR X>2
8 THEN 490
SE 650 SYS 49709:GOTO 190
KQ 660 GOSUB 1500
XJ 670 PRINT"{HOME}{7 DOWN}
{12 RIGHT}{RVS}{WHT}YOU
PRESSED THE"
PG 680 PRINT"{11 RIGHT}{RVS}DI
R ROUTINE."
HS 690 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
CF 700 GOSUB 1570
GS 710 IF Y<>11 OR X<19 OR X>2
8 THEN 490
BX 720 SYS 49709:GOTO 190
PA 730 GOSUB 1500
SF 740 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}ARE
YOU SURE YOU"
KA 750 PRINT"{11 RIGHT}{RVS}WA
NT TO QUIT THE"
PE 760 PRINT"{11 RIGHT}{RVS}PR
OGRAM?"
CX 770 PRINT"{DOWN}{11 RIGHT}
{BLK}{RVS} YES
{9 RIGHT} NO "
CP 780 GOSUB 1570
AS 790 IF Y<>11 THEN 780
PP 800 IF X>10 AND X<16 THEN 8
30
KD 810 IF X>24 AND X<29 THEN S
YS49709:GOTO 190
JM 820 GOTO 780
XK 830 SYS 49633:POKE 53280,14
:POKE 53281,6:PRINT"
{CLR}{7}"CHR$(142);:END
SE 840 REM LAYOUT MENU
XF 850 PRINT"{HOME}{2 DOWN}
{9 RIGHT}{RVS}{WHT}LAYO
UT 1{DOWN}{8 LEFT}LAYO
UT 2{BLK}{WHT}{DOWN}
{9 LEFT}LAYOUT 3{BLK} "
;
CX 860 PRINT"{WHT}{DOWN}
{9 LEFT}LAYOUT 4{BLK}
{WHT}{DOWN}{9 LEFT}LAYO
UT 5{BLK}{WHT}{DOWN}
{9 LEFT}LAYOUT 6{BLK} "
;
JM 870 PRINT"{WHT}{DOWN}
{9 LEFT}LAYOUT 7{BLK}
{WHT}{DOWN}{9 LEFT}LAYO
UT 8{BLK}{DOWN}
{8 LEFT}{8 SPACES}"
MB 880 GOSUB 1570
JS 890 IF X<9 OR X>16 THEN 980
GH 900 IF Y<2 OR Y>9 THEN 980
JX 910 L=Y-1
KQ 920 GOSUB 1500
GG 930 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}LAY
OUT #"L
MQ 940 PRINT"{RVS}{11 RIGHT}WA
S SELECTED."
HX 950 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
XE 960 GOSUB 1570
MM 970 IF Y<>11 OR X<19 OR X>2
8 THEN 960
AS 980 SYS 49709:GOTO 190
XR 990 REM TOOLS MENU
XD 1000 GOSUB 1500
MS 1010 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}TH
E TOOLS MENU"
PH 1020 PRINT"{RVS}{11 RIGHT}W
AS SELECTED."
CF 1030 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} C
ONTINUE "
HP 1040 GOSUB 1570
XQ 1050 IF Y<>11 OR X<19 OR X>
28 THEN 960
CQ 1060 SYS 49709:GOTO 190
SG 1070 REM OPTIONS MENU
HK 1080 GOSUB 1500
MJ 1090 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}TH
E OPTIONS MENU"
EM 1100 PRINT"{RVS}{11 RIGHT}W
AS SELECTED."
GA 1110 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} C
ONTINUE "
DS 1120 GOSUB 1570
QH 1130 IF Y<>11 OR X<19 OR X>
28 THEN 960
KH 1140 SYS 49709:GOTO 190
DB 1150 REM BUTTON #1 WAS PRES
SED
DQ 1160 GOSUB 1500
KD 1170 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}YO
U PRESSED"
CX 1180 PRINT"{RVS}{11 RIGHT}B
UTTON #1."
SK 1190 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} C
ONTINUE "
QF 1200 GOSUB 1570
AD 1210 IF Y<>11 OR X<19 OR X>
28 THEN 960
FP 1220 SYS 49709:GOTO 190
QM 1230 REM BUTTON #2 WAS PRES
SED
QD 1240 GOSUB 1500
QJ 1250 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}YO
U PRESSED"
XJ 1260 PRINT"{RVS}{11 RIGHT}B
UTTON #2."
BF 1270 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} C
ONTINUE "
EP 1280 GOSUB 1570
JQ 1290 IF Y<>11 OR X<19 OR X>
28 THEN 960
BS 1300 SYS 49709:GOTO 190
ME 1310 REM BUTTON #3 WAS PRES
SED
JG 1320 GOSUB 1500
AF 1330 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}YO
U PRESSED"
DC 1340 PRINT"{RVS}{11 RIGHT}B

```

```

UTTON #3."
FA 1350 PRINT "{2 DOWN}
      {19 RIGHT}{BLK}{RVS} C
      ONTINUE "
AS 1360 GOSUB 1570
RH 1370 IF Y<>11 OR X<19 OR X>
      28 THEN 960
JH 1380 SYS 49709:GOTO 190
QC 1390 REM SLIDER
FX 1400 GOSUB1450
JA 1410 IF X=4 AND SL>0 THEN G
      OSUB 1460:SL=SL-1:GOSU
      B1470:GOTO 1480
EC 1420 IF X=32 AND SL<26 THEN
      GOSUB 1460:SL=SL+1:GO
      SUB1470:GOTO 1480
KQ 1430 IF X>4 AND X<32 THEN G
      OSUB1460:SL=X-5:GOSUB1
      470:GOTO1480
QJ 1440 GOTO 190
MR 1450 PRINT "{HOME}{17 DOWN}
      {3 RIGHT}";:RETURN
DA 1460 GOSUB1450:FORT=0TO SL+
      1:PRINT "{RIGHT}";:NEXT
      :PRINT "{WHT}*";:RETURN
HF 1470 GOSUB1450:FORT=0TO SL+
      1:PRINT "{RIGHT}";:NEXT
      :PRINT "{RED}+";:RETURN
JQ 1480 GOSUB1450:PRINT "{DOWN}
      {10 LEFT}{WHT}";:IF SL
      >9 THEN PRINTSL "{LEFT}
      {CYN}-":GOTO 190
SX 1490 PRINT " "SL"{LEFT}{CYN}
      -":GOTO 190
AB 1500 REM DRAW DIALOG BOX
BA 1510 SYS 49709 : REM LOAD S
      CREEN
GP 1520 PRINT "{HOME}{6 DOWN}
      {10 RIGHT}{RVS}{WHT}
      {20 SPACES}"
QE 1530 FOR T=1 TO 6:PRINT "
      {10 RIGHT}{RVS}
      {20 SPACES}{BLK} {WHT}
      ":NEXT
CM 1540 PRINT "{11 RIGHT}{RVS}
      {BLK}{20 SPACES}"
ED 1550 RETURN
CG 1560 REM -----
      -----
QP 1570 REM GET A SCREEN COORD
      FROM ML
KF 1580 POKE 49572,0
PP 1590 IF PEEK(49572)=0 THEN
      {SPACE}1590
SJ 1600 X=PEEK(49571):Y=PEEK(4
      9570)
RX 1610 POKE 54296,15:POKE 542
      96,0
ME 1620 IF PEEK(56320)<>127 TH
      EN 1620
JH 1630 RETURN

```

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EZ-LOADER

By Joe Votour

Finding files on disks can be quite a chore. Just ask anybody who has more than a couple of disks on hand. It's especially true if you're a programmer. Once you find the disk you're looking for, you'll then probably have to search through the directory about five times before you finally hit on the right file.

A menu program is especially helpful for finding your frequently used programs. This is where EZ-Loader comes in. EZ-Loader is a menu program for the 64 that will read a disk directory and let you select a file using the cursor keys and the Return key. It'll also do more.

Typing It In

EZ-Loader 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, respond with the following.

Starting address: 0801

Ending address: 1380

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

Drive Compatibility

EZ-Loader will work with any 1541, 1571, or 1581 drive. In fact, it'll work with any combination of drives (device numbers 8-99, drive number 0 only) that support Commodore's DOS commands U1 and B-P. A 1581 drive has two limitations, however. EZ-Loader supports partitions, but it locates only the first 255 files in the main directory or partition. Also, the disk ID will be read incorrectly since EZ-Loader checks track 18, sector 0, the track and sector used for a 1541/1571 ID code.

Using EZ-Loader

Although EZ-Loader is written in machine language, it loads and runs like a BASIC program. The title screen is displayed as the directory of the current drive is loaded. Note that the directory loaded is the one of the disk drive from which EZ-Loader was loaded.

On the main screen, a blue bar indicates the current file to be selected. To move the bar, use the cursor keys to

move up and down the directory listing. To load the highlighted file, press the Return key.

The function keys are defined for special purposes. Press f1 to see a directory in the usual format. It's like using the LOAD "\$",8 command, with the program type and block size listed. Press any key and EZ-Loader will return to its title screen and reload that directory.

Press f3 to change disks in the current drive. You will then be returned to the title screen, and EZ-Loader will read the directory as usual.

Press f5 to enter a DOS command to the current drive. Any standard DOS command can be issued. This will allow 1581 users to change partitions by simply typing /O:PARTITION NAME. Also, EZ-Loader offers a new DOS command, #aa, where aa is a two-digit drive number such as 09 or 10. The number must be a two-digit number; otherwise, EZ-Loader will lock up while trying to read the number.

Press f8 to boot the first file on any drive. You will be asked which device to boot from (8-11 only). To change the device number, use the cursor keys. Then the program will load and run from the device you selected.

Additional Notes

EZ-Loader will convert to question marks any control characters that appear in a filename. These include any non-ASCII values, color codes, and so on. For example, if you have a Koala Paint file called A, it will appear in the directory listing as ?PIC A. If you have files that have the same filename except for a control character, EZ-Loader may get confused. Not too many programs use filenames such as these, however.

EZ-Loader can load only BASIC programs or machine language programs that start with a SYS statement. This is because the program is loaded using the ,n extension, where n is the device number of the drive. A RUN command is executed from the keyboard buffer.

EZ-LOADER

```

0801:0B 08 90 06 9E 32 30 34 5D
0809:39 00 A0 00 78 E6 01 B9 E4
0811:C9 12 99 40 03 C8 D0 F7 96
0819:4C 40 03 98 FB 91 FD 93 FE
0821:82 E6 FE 17 02 D8 D0 EF 82

```


0829:A9 37 85 01 58 8E 16 76 3C
0831:00 16 10 20 B9 42 24 BD A7
0839:00 17 14 21 49 FF 9D 00 29
0841:25 E8 D0 E7 20 16 D9 15 D8
0849:66 09 20 4A A9 DA 0A 88 CC
0851:0A BC C2 62 20 F5 E1 E5 96
0859:22 0C 20 E4 FF C9 85 59 5B
0861:9F 0C C9 86 03 6A 21 B0 9A
0869:87 72 35 0D C9 8C D0 83 F6
0871:DA 17 76 E0 11 1F C9 91 BB
0879:F0 37 C9 0D D0 D5 4C F7 48
0881:36 F6 36 63 CD 8F 90 06 3B
0889:8C 64 70 C3 CE F7 DB D0 22
0891:06 0C CB 4C 86 08 92 62 C1
0899:07 B0 03 29 49 38 E9 E0 2C
08A1:42 20 39 0C E9 B6 07 3E 39
08A9:4C 83 08 48 DF 8D 3F 34 2E
08B1:56 61 8D 21 41 06 E4 36 2B
08B9:10 19 8D 18 D0 A9 B4 61 43
08C1:0D 22 06 85 FB A9 A2 74 3A
08C9:FC FC A9 A9 20 91 FB 74 1B
08D1:F9 E6 FC A5 FC C9 39 EE 03
08D9:EC 60 85 02 84 29 4D 81 2E
08E1:B1 02 C0 A7 0B 20 D2 FF 5C
08E9:E6 02 D0 F1 E6 03 D0 74 80
08F1:E7 02 A6 BA 27 89 BA FF CB
08F9:07 F1 FE A9 06 A2 1F A0 1E
0901:0F 20 BD B2 15 C0 3F 09 B8
0909:C8 F4 43 9D ED F3 47 10 DC
0911:F5 AC CC 09 A5 FE 43 2D 50
0919:D0 22 EE 4E 91 C9 FF 0B 9D
0921:5C 29 FA 08 9A CA 64 C4 FA
0929:C0 91 FC C8 98 DD B9 86 62
0931:6C 9C 8F 09 AD 2D B5 18 B4
0939:69 01 8D 1A 0F A9 38 EB 0F
0941:C3 DC CC 39 5D 6E A2 02 85
0949:23 1A 96 1A EC D0 F4 20 9C
0951:CF 51 6A FD 09 B0 0E 33 27
0959:9D E8 C9 22 F0 18 20 14 0C
0961:0A 8A 96 EA E6 FE A2 01 16
0969:20 C6 FF 60 18 AA A5 90 8A
0971:D0 02 8A 60 38 60 98 48 80
0979:20 F7 09 68 6A FE BE 9D AB
0981:00 28 60 A0 A6 DD 2F 09 C7
0989:9A 67 27 99 A7 02 9A 4C 08
0991:3F 4C 20 0A 4B C1 FD AE 07
0999:C0 DA 86 FC 18 E7 20 06 0A
09A1:FC 26 FD A5 FD 69 29 85 43
09A9:FD 8E EB 85 90 14 64 FF D1
09B1:B0 5F 8A F2 3B A9 23 04 3F
09B9:A2 B0 32 6C F7 EA 9C 3A 35
09C1:6F AE C3 B9 78 2B FA 00 B1
09C9:F0 06 20 DD ED C8 D0 F3 DF
09D1:7E 6B 86 09 8D 62 20 C7 5D
09D9:ED 4A 21 20 13 EE 99 A6 C9
09E1:30 7B D8 CF F5 20 EF 89 9C
09E9:08 9C E2 A1 19 A5 EC 0C E2
09F1:ED A9 EF 20 B9 ED 20 FE 2A
09F9:ED 60 D7 EE 50 20 86 6C 81
0A01:A0 11 3A 6F A6 BA 16 A6 DA
0A09:53 A4 D5 20 65 0B 2A CF 28
0A11:34 03 C0 B3 73 96 6F 18 40
0A19:ED 67 08 B4 99 D9 CF CA E8
0A21:50 67 0F 70 F5 D9 27 0F 94
0A29:F0 10 75 F5 40 AF 9E E5 AB
0A31:70 05 D0 E9 4C 40 BA 22 72
0A39:20 4C 30 D3 A5 F4 53 AE 0A
0A41:1A 0F E0 00 D0 05 65 B9 61
0A49:4C 55 0B 9F 4F 83 A9 F2 03
0A51:A0 12 A1 C9 13 80 5D CD 2E

0A59:F2 EE 0D DC EE 74 72 1B 5B
0A61:8D 11 12 E9 6F 19 A9 82 17
0A69:63 E2 0B 74 E2 60 2E 19 9E
0A71:94 93 63 A9 C8 8D 16 94 F8
0A79:06 F6 19 A0 5D 88 D0 8C B6
0A81:46 0E 60 A2 D7 E8 85 E3 C3
0A89:00 E4 84 C9 93 28 27 C5 55
0A91:50 D8 BD 91 69 9D 78 D8 60
0A99:F3 28 D0 E3 6D 06 0B AD 51
0AA1:1E 59 8D 12 D0 4C 31 EA F2
0AA9:EE CE 2E 60 C9 02 D0 1B C7
0AB1:D2 90 1C 7C 35 48 2 00 AE
0AB9:BD 83 0F 26 36 E8 E0 30 19
0AC1:D0 F5 68 CA 9D 82 61 1B 4A
0AC9:30 36 DC 01 8D C5 B1 02 18
0AD1:96 8D F2 A9 A2 09 A0 1A 22
0AD9:18 20 F0 59 80 20 8D 82 D7
0AE1:53 83 05 8D 84 05 AD 1E AB
0AE9:0F AE 1D 0F EC 4E 60 AD D4
0AF1:1B 26 27 07 B0 46 0A 80 A5
0AF9:ED 92 5E A9 CA 8D 26 0F F7
0B01:50 4D 29 0A 19 27 82 A9 6C
0B09:0B 85 D6 2E 25 A9 0C 85 31
0B11:D3 2B 2A B1 FC 32 96 4F 69
0B19:C0 10 D0 F6 4C 5D 0C A5 B2
0B21:FC 18 69 10 85 FC A5 F5 53
0B29:69 F4 E5 FD 94 EE B5 A3
0B31:AD 25 0F C9 08 D0 D1 60 6D
0B39:7B B8 05 8D 1A 1C 59 31 58
0B41:8D 14 03 A9 EA 8D 15 03 D8
0B49:58 20 A3 FD 20 18 E5 E7 FC
0B51:1B 8D 20 D0 8D 21 D0 A9 A5
0B59:19 8D 18 D0 60 B9 17 28 AF
0B61:20 ED B2 90 A2 08 8C 95 46
0B69:BA 79 02 A2 9B E4 E4 BD 9D
0B71:C8 0C FF 4B 64 D3 B4 11 BD
0B79:85 FB 24 86 05 FB F0 35 6D
0B81:A9 0D 81 25 AD 63 DB 01 E5
0B89:4C B1 36 14 03 F0 1F A2 F6
0B91:24 2A C6 76 87 AA 56 20 38
0B99:CD BD A9 20 A8 07 00 F0 8F
0BA1:C5 82 72 4C FF C1 01 20 77
0BA9:C3 D6 F4 CC F8 FA 79 1F 88
0BB1:D2 F0 FB 70 94 9D 3D 2A B3
0BB9:5B C1 F1 4C F0 A0 14 29 4A
0BC1:A2 93 19 CF BE 28 F0 06 AC
0BC9:9D C9 E8 D0 F3 E8 A4 6B D9
0BD1:AD 0F C9 23 F0 7A C9 00 F2
0BD9:8B ED 4C 07 0E 9B 85 85 9A
0BE1:90 A3 58 70 08 62 DD ED AE
0BE9:48 10 03 86 09 4D 6F 20 6D
0BF1:C7 ED 96 BA 20 13 EE 99 AA
0BF9:A5 6B A5 90 29 40 D0 03 6A
0C01:C8 B3 68 8C 6F 16 03 93 AD
0C09:EF D8 26 A9 3F 31 24 15 CA
0C11:D3 B9 5F B0 D1 CC E9 BC CA
0C19:48 1F E7 92 0D D0 F4 C2 2F
0C21:10 08 1B F6 C1 01 AD E7 6B
0C29:29 C8 A1 F6 AD 9C 0C 08 15
0C31:0A 6D 15 53 75 A9 03 8D 67
0C39:00 4C 91 49 8D 01 89 30 DE
0C41:8D 02 29 A9 3A 8D 03 29 97
0C49:4C 5F 0D F4 F2 20 0C ED 6E
0C51:A9 FF 20 B9 ED 20 FE ED B9
0C59:4C 7E 0D 8D EF 55 F8 AC 25
0C61:29 1E D3 D8 45 80 3A AF ED
0C69:20 E4 FF C9 20 F0 26 C9 42
0C71:11 F0 13 C9 91 D0 F1 C6 C7
0C79:E6 EB 07 D0 D4 A9 0B 50 A1
0C81:75 E6 BA A5 BA C9 0C D0 A5

0C89:C5 A9 08 85 BA 4C 1A 0E 91
0C91:4A BE 15 A9 A0 31 24 59 27
0C99:1C 8A B3 A6 BA A9 00 20 DF
0CA1:CD BD 54 16 25 31 36 4A A0
0CA9:7F 20 7A 0C 20 A3 FD 20 45
0CB1:18 E5 AD B2 DD 18 03 AD 33
0CB9:B3 0F 8D 19 03 20 29 0A A7
0CC1:A9 4C A0 15 20 4E 09 AE 22
0CC9:1B 0F CA 64 7E 45 A0 00 1D
0CD1:B1 FC 45 17 C8 98 DD 00 80
0CD9:28 D0 F4 A9 22 B6 04 2C 93
0CE1:4D 10 A3 D2 FF A9 13 8D A0
0CE9:77 B1 23 78 1A 52 8D 79 C4
0CF1:99 55 8D 7A C8 44 4E 8D 07
0CF9:7B 26 D0 8D 7C 02 A9 06 19
0D01:85 C6 4C 74 A4 B2 3B 56 7C
0D09:24 30 3A 2A 3D 50 00 92 E8
0D11:00 01 02 03 04 05 06 07 23
0D19:08 09 0A EC 3B D0 0E 0F C2
0D21:10 11 12 13 14 15 16 17 33
0D29:18 19 1A 1B 1C 1D 1E 1F 3B
0D31:80 81 82 83 84 85 86 87 43
0D39:88 89 8A 8B 8C 8D 8E 8F 4B
0D41:90 91 92 93 94 95 96 97 53
0D49:98 99 9A 9B 9C 9D 9E 9F 5B
0D51:B1 85 2F 40 2A 55 31 C9 62
0D59:30 B0 38 20 30 00 42 2D F3
0D61:50 3A 32 20 31 36 32 00 41
0D69:0B 0C 73 BE AE CE 0F 0C 41
0D71:08 E6 06 0E 02 BE 01 7E F7
0D79:0E 06 8A 0B 02 0A 07 0F 7A
0D81:01 0F 07 0A 02 DB 86 0D FA
0D89:03 07 01 07 03 D0 05 B4 82
0D91:00 00 05 08 93 11 D5 B8 12
0D99:52 EF C9 FB 0C B3 60 48 0A
0DA1:B2 5C 4A 40 01 09 C9 B0 ED
0DA9:C0 38 6D 92 93 2A 24 E2 79
0DB1:D0 1C BC CC 99 86 D5 C4 F6
0DB9:0E 21 EA 0C 93 B3 3C AB D0
0DCL:C0 20 AB B2 8C AA 47 CE 51
0DC9:C0 41 CA A9 2C 10 32 0C 9A
0DD1:A1 C9 FB 59 46 72 0C 82 DD
0DD9:21 41 00 82 79 CB FE A0 96
0DE1:CB 87 B1 57 C4 DD CA 10 B2
0DE9:30 CB 11 99 BF 2C 2B A6 76
0DF1:E1 39 58 69 0D 9E 10 C8 B8
0DF9:24 D6 4D 45 44 D2 2B 0D AA
0E01:96 39 14 50 59 81 B8 47 C7
0E09:48 54 20 28 43 29 20 31 15
0E11:39 39 EF 02 43 4F 4D 9D C5
0E19:54 45 21 C9 44 55 42 4C B9
0E21:9B 62 4C 54 44 93 11 9C A1
0E29:2D 5A AC 89 49 4E 47 E3 96
0E31:44 0D 0E 2E C0 36 C3 BF 7D
0E39:97 49 57 41 49 54 4C 2E D4
0E41:D0 00 05 93 B0 41 AC 4D EE
0E49:7E AE 9F 95 B8 5A 2D 78 9F
0E51:97 56 31 2E 33 20 42 61 D7
0E59:9C 4A 4F E2 56 4F 2A 42 8B
0E61:55 3D 5A 67 DD 35 18 2D 5A
0E69:3D 20 54 48 D5 A4 45 41 48
0E71:53 53 50 52 4F 47 52 E7 5F
0E79:FA 20 4C 4F 41 37 95 52 FD
0E81:20 3D 2D 99 02 20 DD AD 36
0E89:94 C0 C0 BD 9A BE AC 2A 67
0E91:3A F4 83 53 16 45 CF C5 D8
0E99:43 BF 42 00 FB 44 52 49 6E
0EAL:56 4C 97 05 30 99 92 79 C5
0EA9:41 9B 37 F3 A4 F8 41 4D 4C
0EB1:A8 90 2C 04 F9 5C 44 FF D5

PROGRAMS

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0EB9:1F 9A 12 00 92 14 E8 AF B4
0EC1:99 87 29 F4 8E 49 74 B2 36
0EC9:71 94 C6 28 46 49 4C 45 54
0ED1:20 23 B3 72 4F 46 09 F9 04
0ED9:00 0D 91 4E 20 1D 99 29 22
0EE1:0D 9A 5F 05 FA B7 05 21 49
0EE9:D0 A4 6F 20 11 1B E8 A3 F1
0EF1:77 AB A8 46 31 8D 2D 0C 54
0EF9:52 72 C0 30 33 46 33 23 33
0F01:18 26 F0 41 6C DD 9B 15 0E
0F09:86 46 35 62 5C 61 44 4F 09
0F11:88 43 4F 4D 4D 32 1D 53 C3
0F19:0D 0D AE 12 D1 46 38 20 30
0F21:92 49 4A 57 F1 A1 5F 92 01
0F29:52 73 20 46 49 9C D8 20 44
0F31:4F 4E CF AF 13 00 9E 95 EA
0F39:3B C5 E1 B9 11 3E AD A5 C0
0F41:D4 EB D1 F5 B0 C4 1B 3C 69
0F49:53 48 49 46 8C F2 4C 84 FD
0F51:DE 53 45 2C 1D 27 55 4E 9D
0F59:2F CF CE 4F 50 20 54 4F CC
0F61:2B 58 80 07 21 99 32 96 16
0F69:C5 B0 94 2D 47 59 20 4B 27
0F71:45 59 E2 0A 2E D0 18 24 8E
0F79:30 63 C4 76 53 57 49 54 67
0F81:43 48 D8 55 89 08 8E 45 92
0F89:49 4E D0 52 EB C1 4E 45 67
0F91:57 CE B9 49 53 4B F9 56 EC
0F99:9C 85 18 B7 05 5C B2 95 7A
0FA1:9B B4 97 12 48 9B 20 02 C1
0FA9:5F 44 4F 91 43 4F 4D 4D CA
0FB1:49 79 62 9B 20 98 20 97 14
0FB9:20 0D 11 9E EC 96 75 63 47
0FC1:05 07 C2 09 99 09 99 52 83
0FC9:4E 28 02 2E 4C D0 99 53 59
0FD1:54 41 54 55 70 36 62 76 E1
0FD9:49 C4 00 9A 93 12 08 11 7D
0FE1:08 87 60 53 45 4C 45 43 50
0FE9:5A 45 42 4F 4F 54 20 44 14
0FF1:45 56 49 6E CB 20 3A 20 CB
0FF9:9E 00 0D 9A 66 01 70 20 EA
1001:41 4E 44 20 50 52 45 53 89
1009:53 20 3C 53 50 41 43 45 EA
1011:3E 0D 00 93 4C 4F 41 44 33
1019:22 3A 2A 22 00 BE 80 3B 77
1021:CE 6E 60 01 1A 25 A3 EE FB
1029:30 3E C9 43 46 60 DE 63 33
1031:26 2C 9B E5 C0 8B DC 0F 3E
1039:87 60 D8 7C B9 C4 98 C1 EB
1041:62 E6 44 1E 4F 9F 45 6C A6
1049:78 6C 2C 1F 02 E0 F5 02 B9
1051:11 16 76 7E 6E B1 7C 91 FA
1059:C3 35 0F 60 CB CE 6E 36 3D
1061:8B C0 66 1F 7A 67 24 F3 E3
1069:74 63 1E 62 8E 22 B9 2C 23
1071:26 27 32 7E 98 8F 8C C2 7B
1079:82 17 4E 7E 6B B3 78 8A F7
1081:4B 98 1C 36 78 30 25 4A 6D
1089:94 3C B6 08 AB 98 EB 24 16
1091:4A 10 30 7F 7F 30 10 82 38
1099:05 00 B6 1C C1 03 E3 29 DF
10A1:C1 98 09 FF 66 C0 13 6A B0
10A9:B6 3C F3 7A 62 57 33 63 94
10B1:0C 2E 85 38 6C 6C 3E 74 9D
10B9:6D E3 95 0C F6 5A D6 30 FB
10C1:FE AD 24 3E 24 58 7E A9 5E
10C9:6D 96 A7 D8 44 4F 02 60 8C
10D1:3C 02 D6 26 61 93 FC 21 42
10D9:AC 37 18 38 C2 84 1D 60 67
10E1:D9 15 49 3C E9 4F 66 66 E0
10E9:7E E5 A9 7E 5E 7A 3E 60 99
10F1:7C 55 3E 7C 35 80 33 12 59
10F9:66 3C 80 07 E4 3E 06 7C 85
1101:E6 A1 79 20 22 2B 95 06 1F
1109:F2 0C 06 55 34 48 7E 38 B5
1111:00 60 30 18 30 60 00 00 D5
1119:3C 66 0C 18 00 18 00 80 D6
1121:7C C8 C8 C8 A9 00 85 10 C1
1129:A6 FB 30 0D 06 FA 2A 26 0B
1131:10 C6 FB 88 D0 F2 AA 18 D4
1139:60 48 A1 FF 85 FA A2 07 36
1141:86 FB E4 FF A6 FE D0 02 17
1149:C6 FF C6 FE 68 90 DD E0 B9
1151:E7 D0 D9 A9 37 85 01 58 9B
1159:4C A2 01 A9 10 85 04 AA 4E
1161:BC D8 07 20 32 07 A6 04 F9
1169:7D C7 07 48 A5 10 69 00 E1
1171:E0 0F 69 00 A8 68 A6 02 2B
1179:D0 08 C0 00 D0 04 C9 10 58
1181:F0 D9 18 65 FC AA 98 65 15
1189:FD 85 49 A4 11 F0 20 8A 96
1191:38 E5 11 B0 03 C6 49 38 74
1199:85 48 A5 FC E5 11 B0 02 EB
11A1:C6 FD 85 FC B1 48 88 91 78
11A9:FC C6 01 EE 20 D0 E6 01 5E
11B1:98 D0 F1 60 44 4D 26 12 8E
11B9:4F 00 04 0C 1C 3C 7C BC 4C
11C1:FE 00 08 10 20 41 81 C5 34
11C9:00 80 02 03 04 05 06 06 C2
11D1:06 07 03 03 04 05 06 06 8F
11D9:06 07 07 00 0B 08 C4 07 AA
11E1:9E 20 28 32 30 36 34 29 6F
11E9:F1 05 00 AD 31 8D B2 14 5A
11F1:CF 06 8D B3 8A 80 86 BF 8D
11F9:F1 90 EA 8D 19 03 B4 71 1F
1201:85 FD A9 D0 A2 8D F7 78 5D
1209:C0 78 A9 33 4F 55 BE 00 61
1211:00 18 21 11 B9 0F 11 99 36
1219:1C 07 C8 D0 F7 20 31 07 DC
1221:F0 46 20 31 07 D0 30 20 62
1229:30 07 69 02 C9 04 90 27 1B
1231:D0 07 20 31 07 69 04 D0 4D
1239:1E 20 2F 07 69 06 C9 0D CE
1241:D0 11 C8 20 2F 07 69 0D A2
1249:C9 0D D0 07 A0 05 20 32 AB
1251:07 69 1D EE 00 04 EA 85 51
1259:11 A6 FE A5 FF 20 97 07 A0
1261:A5 49 85 FF A5 48 85 FE B3
1269:20 31 07 85 02 F0 14 0A 29
1271:2C A9 03 85 11 20 2F 07 3D
1279:A6 02 D0 02 69 08 20 6B C2
1281:07 F0 9A 20 31 07 F0 E9 2C
1289:20 30 07 69 04 C9 06 90 25
1291:E2 D0 07 20 30 07 69 06 B4
1299:D0 D9 A0 05 20 32 07 69 42
12A1:0A C9 D0 F0 0D C9 12 D0 72
12A9:CA A0 02 20 32 07 69 2A 48
12B1:D0 C1 A0 06 D0 F5 A9 00 D4
12B9:85 2D A9 18 85 2E 4C 10 30
12C1:08 A9 18 85 2E 4C 10 08 7A
12C9:C6 01 58 A7 A2 CD 12 D0 58
12D1:D0 34 A2 06 A9 FF 95 F8 91
12D9:BD 90 03 95 F7 CA CA 10 4B
12E1:F3 A2 12 BD A0 03 4D 5E D0
12E9:03 9D E8 07 CA 10 F4 A9 AE
12F1:13 A2 E8 A0 07 20 97 03 5A
12F9:A9 0F A8 A2 08 20 94 03 E2
1301:20 9A 03 20 9D 03 29 00 8B
1309:A8 78 E6 01 B9 0F 12 99 56
1311:FA 00 C8 D0 F7 4C 00 01 CC
1319:BA BD C0 E7 6C F7 00 6C 52
1321:F9 00 6C FB 00 6C FD 00 3F
1329:4D 7D 77 0E 02 01 1A 14 81
1331:03 62 19 05 08 6D 0B 02 F2
1339:1F 0E 08 1A 1A 1A 1A 9C
1341:1A 1A 1A 1A 1A 1A 1A 67
1349:1A 1A 1A 1A 1A 1A 1A 6F
1351:1A 1A 1A 1A 1A 1A 1A 77
1359:1A 1A 1A 1A 1A 1A 1A 7F
1361:1A 1A 1A 1A 1A 1A 1A 87
1369:1A 1A 1A 1A 1A 1A 1A 8F
1371:1A 1A 1A 1A 1A 1A 1A 97
1379:1A 1A 1A 1A 1A 00 00 51

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Joe Votour keeps track of his files in Hanmer, Ontario, Canada.

STOCK ANALYSIS 128

By Philip Addeo

Stock Analysis 128 is a full-fledged stock advisory program, not a simulation program or a game. Although admittedly not as sophisticated as the programs the big boys use, this program can be very useful in evaluating your stock portfolio or in tracking the stock market as a whole.

This 128 program is written entirely in BASIC 7. It's easy to use and requires the 128 to be in 80-column mode. To help avoid typing errors, enter the program with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before exiting Proofreader.

What You Need

To use Stock Analysis 128, you'll need the weekly closing stock prices printed in larger daily newspapers, usually on Saturday or Sunday. You'll also need the total stock price advances and declines and Standard & Poor's (S&P's) 500 closing price.

Before using the program, you must decide which stocks you'd like in your file. You can have any number of stocks in a file, but I'd suggest a maximum of 20. Things can get a little cumbersome if you have more than that. Of course, you can have any number of different files. The program requires three weeks of stock data to start, and data must be entered on a weekly basis for the program to be useful.

Getting Started

The opening menu of Stock Analysis 128 gives you four options: update an existing file, analyze an existing file,

open a new file, and quit.

To start, choose option 3, open a new file, and follow the prompts for entering the filename and stock data. Use option 3 to open as many new files as you need. Use option 1 to update your files weekly. Use option 2 to analyze your files.

The program's main body consists of three screens. The first one displays general market trends for the past three weeks, which include advances, declines, and an advance/decline index. The second screen displays S&P's 500 data for the past three weeks, which include short-, medium-, and long-term trends; the trend's direction; and a market indicator. The third screen is the main analysis screen and displays the name of the stock, three weeks of data, trends, and a recommendation for each individual stock in your file.

STOCK ANALYSIS 128

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
SA 10 FAST
QA 20 L$="":A$=CHR$(176):B$=CHR
R$(99):D$=CHR$(174):E$=C
HR$(98):Z$=E$
DS 30 I$=CHR$(173):K$=CHR$(189
)
DD 40 L1$="*****
*****
*****
*****"
DK 50 L2$=".....
.....
....."
XF 60 DIMA(250):Z$=CHR$(13)
FJ 70 PRINT"{CLR}{RVS}
{9 SPACES}{SHIFT-SPACE}
{20 SPACES}STOCK MARKET
{SPACE}ANALYSIS
{29 SPACES}{OFF}"
CR 80 PRINT"{DOWN}":GOSUB2190
CK 90 PRINTTAB(31)"{RVS}1.
{OFF} UPDATE FILE"
AR 100 PRINTTAB(31)"{RVS}2.
{OFF} STOCK ADVISOR"
XK 110 PRINTTAB(31)"{RVS}3.
{OFF} OPEN NEW FILE"
CA 120 PRINTTAB(31)"{RVS}4.
{OFF} QUIT"
QP 130 PRINTTAB(35)"{2 DOWN}CH
OICE";:INPUT I
XQ 140 IFI<10RI>4THENPRINT"
{4 UP}":GOTO130
PS 150 IFI=4THEN170
PJ 160 ONIGOTO410,1060,180
RA 170 END
SG 180 PRINT"{CLR}{RVS}
{11 SPACES}CREATE NEW F
ILE{14 SPACES}"
FX 190 INPUT"{DOWN}WHAT IS THE
NAME OF NEW FILE";NFS
JE 200 INPUT"{DOWN}HOW MANY ST
OCKS IN FILE";M
MA 210 DOPEN#1,(NFS),W
QA 220 INPUT"{CLR}{2 DOWN}ENTE
R WEEKS CLOSING ADVANCE
S, DECLINES{5 SPACES}";
A,D
MA 222 INPUT"{DOWN}ENTER LAST
{SPACE}WEEKS CLOSING AD
VANCES, DECLINES
{2 SPACES}";A1,D1
EB 224 INPUT"{DOWN}ENTER WEEK
{SPACE}BEFORE CLOSING A
DVANCES, DECLINES ";A2,
D2
PR 230 INPUT"{DOWN}ENTER WEEKS
CLOSING PRICE OF S&P 5
00{9 SPACES}";S
FR 240 INPUT"{DOWN}ENTER LAST
{SPACE}WEEKS CLOSING PR
ICE OF S&P 500
{4 SPACES}";S1
EM 250 INPUT"{DOWN}ENTER WEEK
{SPACE}BEFORE CLOSING P
RICE OF S&P 500
{3 SPACES}";S2
HD 260 FORJ=0TO3:A(J)=A-D:NEXT
AR 270 FORJ=4TO13:A(J)=S:NEXT
FF 280 PRINT#1,M
SD 290 PRINT#1,A(0);Z$;A(1);Z$
;A(2);Z$;A(3);Z$;A(4);Z
$;A(5);Z$;A(6)
EQ 300 PRINT#1,A(7);Z$;A(8);Z$
;A(9);Z$;A(10);Z$;A(11)
;Z$;A(12);Z$;A(13)
PE 310 PRINT#1,S1;Z$;S2;Z$;A;Z
$;A1;Z$;A2;Z$;D;Z$;D1;Z
$;D2
PX 320 FORK=1TOM
AQ 330 PRINT"{CLR}{2 DOWN}ENTE
R NAME OF STOCK NUMBER
{SPACE}"K"{DOWN}":INPUT
A$
GJ 340 INPUT"{DOWN}ENTER END O
F WEEK CLOSING PRICE :
{SPACE}";X
JG 350 INPUT"{DOWN}ENTER LAST
{SPACE}WEEKS CLOSING PR
ICE{2 SPACES}":X1
SG 360 INPUT"{DOWN}ENTER WEEK
{SPACE}BEFORE CLOSING P
RICE : ";X2
CF 370 FORJ=1TO10:A(J)=X:PRINT
"{HOME}{6 DOWN}":NEXT
QG 380 PRINT#1,A$;Z$;A(1);Z$;A
(2);Z$;A(3);Z$;A(4);Z$;
A(5);Z$;A(6)
QJ 390 PRINT#1,A(7);Z$;A(8);Z$
;A(9);Z$;A(10);Z$;X1;Z$
;X2
QD 400 NEXT:DCLOSE:RUN
GK 410 INPUT"{CLR}{4 DOWN}WHAT
IS NAME OF FILE YOU WI
SH TO ANALYZE";F$
FP 420 PRINT"{CLR}{RVS}
{8 SPACES}UPDATE STOCK
{SPACE}PRICES
{13 SPACES}{OFF}"
GG 430 DOPEN#1,(F$)
CG 440 INPUT#1,M,A(0),A(1),A(2
),A(3),A(4),A(5),A(6)
INPUT#1,A(7),A(8),A(9),
A(10),A(11),A(12),A(13)
,S1,S2,A,A2,A3,D,D1,D2
KD 460 S2=S1:S1=A(4):A3=A2:A2=
A:D2=D1:D1=D
AK 470 PRINT"{DOWN}{7 SPACES}
{RVS}GENERAL MARKET INF
ORMATION{OFF}"
PP 480 INPUT"{2 DOWN}ENTER ADV
ANCES, DECLINES, S&P 50
0";A,D,S
GM 490 PRINT"{2 DOWN}"A,D,S:Y=
1:N=0:INPUT"{DOWN}ANY
{2 SPACES}CHANGES Y/N";
X$
DR 500 IFX$="Y"THEN480
DB 510 A1=A-D
QS 520 A(0)=A(0)+A1:A(3)=A(2):
A(2)=A(1)
MS 530 A(1)=.875*A(2)+.125*A(0
)
MQ 540 A(4)=S:A(7)=A(6):A(6)=A
(5)
MB 550 A(5)=INT(66.67*A(6)+33.
33*S)/100
CM 560 A(10)=A(9):A(9)=A(8)
JG 570 A(8)=INT(87.5*A(9)+12.5
*S)/100
BJ 580 A(13)=A(12):A(12)=A(11)
ED 590 A(11)=INT(95*A(12)+5*S)
/100
DP 600 GOTO660
QM 610 FORJ=0TO13:PRINTJ,A(J):
NEXT
EF 620 INPUT"{DOWN}ANY
{2 SPACES}CHANGES Y/N";
X$
KD 630 IFX$="N"THEN660
PE 640 INPUT"{DOWN}ITEM # AND
{SPACE}CHANGE";J,A(J)
RQ 650 GOTO600
FG 660 DIMB$(M):FORI=1TOM
BH 670 L=12*I+1
QA 680 INPUT#1,B$(I),A(L+1),A(
L+2),A(L+3),A(L+4),A(L+
5)
QR 690 INPUT#1,A(L+6),A(L+7),A
(L+8),A(L+9),A(L+10)
RE 700 INPUT#1,A(L+11),A(L+12)
XC 710 A(L+12)=A(L+11):A(L+11)
=A(L+1)
PS 720 PRINT"{CLR}{DOWN}STOCK:
";B$(I)
RK 730 PRINT"{DOWN}LAST WEEKS
{SPACE}PRICE WAS";A(L+1
)
GH 740 INPUT"{DOWN}ENTER THIS
```

PROGRAMS

```

{SPACE}WEEKS PRICE";P
DQ 750 INPUT"{DOWN}ANY
{2 SPACES}CHANGES Y/N";
XS
SX 760 IFX$="Y"THEN720
JP 770 A(L+1)=P:A(L+4)=A(L+3):
A(L+3)=A(L+2)
JG 780 A(L+2)=INT(66.67*A(L+3)
+33.33*P)/100
JG 790 A(L+7)=A(L+6):A(L+6)=A(L
+5)
BD 800 A(L+5)=INT(87.5*A(L+6)+
12.5*P)/100
DK 810 A(L+10)=A(L+9):A(L+9)=A
(L+8)
MF 820 A(L+8)=INT(95*A(L+8)+5*
P)/100
FQ 830 GOTO890
PG 840 FORJ=1TO12:PRINTJ,A(L+J
):NEXT
BG 850 INPUT"{DOWN}ANY
{2 SPACES}CHANGES Y/N";
XS
XH 860 IFX$="N"THEN890
AA 870 INPUT"{DOWN}ITEM # AND
{SPACE}CHANGE";J,A(L+J)
PQ 880 GOTO830
MM 890 NEXT
CB 900 DCLOSE
BS 910 PRINT"{CLR}{DOWN}THAT'S
ALL THE STOCKS IN THE
{SPACE}FILE{2 SPACES}"
FJ 920 FORT1=1TO2000:NEXT
SB 930 DOPEN#1,"@"+(FS),W
CQ 940 PRINT#1,M
BP 950 PRINT#1,A(0);Z$;A(1);Z$
;A(2)
SR 960 PRINT#1,A(3);Z$;A(4);Z$
;A(5);Z$;A(6);Z$;A(7);Z$
;A(8);Z$;A(9);Z$;A(10)
BA 970 PRINT#1,A(11);Z$;A(12);
Z$;A(13);Z$;S1;Z$;S2;Z$
;A;Z$;A2;Z$;A3
MQ 980 PRINT#1,D;Z$;D1;Z$;D2
JJ 990 FORI=1TOM
HA 1000 L=12*I+1
ED 1010 PRINT#1,BS(I);Z$;A(L+1
);Z$;A(L+2);Z$;A(L+3);
Z$;A(L+4);Z$;A(L+5)
MM 1020 PRINT#1,A(L+6);Z$;A(L+
7);Z$;A(L+8);Z$;A(L+9)
;Z$;A(L+10)
JE 1030 PRINT#1,A(L+11);Z$;A(L
+12)
BQ 1040 NEXT:DCLOSE
HA 1050 PRINT"{DOWN}ALL DATA H
AVE{2 SPACES}BEEN RECO
RDED":FORZ=1TO2000:NEX
T
JC 1060 M=0:K=0
GX 1070 DB$="{YEL} DON'T BUY
{OFF}{21 SPACES}"
JE 1080 DBB$="{YEL} DON'T BUY
{SPACE}(BEAR) {OFF}
{14 SPACES}"
CG 1090 HSS="{PUR} HOLD STOCK
{SPACE}{OFF}
{20 SPACES}"
CH 1100 ASS="{YEL} AVOID STOCK
{OFF}{19 SPACES}"
GD 1110 SSS="{CYN} SELL STOCK
{SPACE}{OFF}
{20 SPACES}"
KJ 1120 BSS="{CYN} BUY STOCK
{OFF}{21 SPACES}"
KF 1130 SFS="{YEL} STAY FULLY
{SPACE}INVESTED (BULL)
{OFF}{4 SPACES}"
FH 1140 UCS="{WHT} UNCERTAIN--
DON'T BUY {OFF}
{10 SPACES}"
JH 1150 INS="{WHT} INCONCLUSIV
E {OFF}{18 SPACES}"
RF 1160 WAS="{YEL} WAIT FOR CL
EARER MARKET TRENDS
{OFF}"
AB 1170 INPUT"{CLR}{4 DOWN}WHA
T IS NAME OF FILE YOU
{SPACE}WISH TO ANALYZE
";FS
QQ 1180 DOPEN#1,(FS)
FF 1190 PRINT"{CLR}{WHT}{RVS}
{18 SPACES}PERSONAL ST
OCK ADVISOR GENERAL MA
RKET TRENDS{18 SPACES}
{OFF}"
GC 1200 PRINTTAB(29)"{DOWN}
{RVS} ADVANCES AND DEC
LINES {RVS}":PRINT
CF 1210 GOSUB2280
KE 1220 PRINTL$
BE 1230 INPUT#1,M,A(0),A(1),A(
2),A(3),A(4),A(5),A(6)
,A(7),A(8),A(9),A(10),
A(11),A(12)
SX 1240 INPUT#1,A(13),S1,S2,A1
,A2,A3,D,D1,D2
KF 1250 Y=0:IF(A1>A2)AND(A2>A3
)THENY=1:A=Y
JD 1260 IF(A1<A2)AND(A2<A3)THE
NY=-1:A=Y
RA 1270 FORJ=1TO3:A(J)=INT(A(J
)):NEXT
KM 1280 PRINT"{DOWN}ADVANCES";
TAB(21);:PRINTUSING"##
###";A1;:PRINTSPC(10);
:PRINTUSING"#####";A2;
:PRINTSPC(10);:PRINTUS
ING"#####";A3;:GOSUB21
60
QP 1290 Y=0:IF(D>D1)AND(D1>D2)
THENY=1:A=Y
SP 1300 IF(D<D1)AND(D1<D2)THEN
Y=-1:A=Y
JQ 1310 PRINT"{DOWN}DECLINES";
TAB(21);:PRINTUSING"##
###";D;:PRINTSPC(10);:
PRINTUSING"#####";D1;:
PRINTSPC(10);:PRINTUSI
NG"#####";D2;:GOSUB216
0
AD 1320 Y=0:IF(A(1)>(A2))AND(A
(2)>A(3))THENY=1:A=Y
CQ 1330 IF(A(1)<A(2))AND(A(2)<
A(3))THENY=-1:A=Y
FR 1340 PRINT"{DOWN}A/D INDEX"
;TAB(21);:PRINTUSING"#
###";A(1);:PRINTSPC(1
0);:PRINTUSING"#####";
A(2);:PRINTSPC(10);:PR
INTUSING"#####";A(3);:
GOSUB2160
JG 1350 PRINT"{DOWN}"L2S
QR 1360 PRINTCHR$(158)TAB(30)"
{2 DOWN}ANY KEY TO CON
TINUE"
HA 1370 GETKS:IEF$="THEN1370
FK 1380 PRINT"{CLR}{WHT}{RVS}
{18 SPACES}PERSONAL ST
OCK ADVISOR GENERAL MA
RKET TRENDS{18 SPACES}
{OFF}"
DP 1390 PRINTTAB(35)"{DOWN}
{RVS} S & P 500 {RVS}"
:PRINT
QB 1400 GOSUB2280
KA 1410 PRINTL$
DG 1420 Y=0:IF(A(1)>A(2))AND(A
(1)>A(3))THENY=1:A=Y
IF(A(1)<A(2))AND(A(2)<
A(3))THENY=-1:A=Y
DR 1440 FORJ=1TO3:A(J)=INT(A(J
)):NEXT
XM 1450 Y=0:IF(A(5)>A(6))AND(A
(6)>A(7))THENY=1
QQ 1460 IF(A(5)<A(6))AND(A(6)<
A(7))THENY=-1
KG 1470 PRINT"{DOWN}{YEL}SHORT
"TAB(19);:PRINTUSING"$
####.##";A(5);:PRINTSP
C(7);:PRINTUSING"$###.
.##";A(6);:PRINTSPC(7)
;:PRINTUSING"$####.##
";A(7);
HF 1480 GOSUB2160
FK 1490 Y=0:IF(A(8)>A(9))AND(A
(9)>A(10))THENY=1
GD 1500 IF(A(8)<A(9))AND(A(9)<
A(10))THENY=-1
MA 1510 PRINT"{DOWN}{CYN}MEDIU
M"TAB(19);:PRINTUSING"
$####.##";A(8);:PRINTS
PC(7);:PRINTUSING"$###
.##";A(9);:PRINTSPC(7
);:PRINTUSING"$####.##
";A(10);
XH 1520 GOSUB2160
BA 1530 Y=0:IF(A(11)>A(12))AND
(A(12)>A(13))THENY=1:L
=Y
KQ 1540 IF(A(11)<A(12))*A(12)
<A(13))THENY=-1:L=Y
AJ 1550 PRINT"{DOWN}{6}LONG"TA
B(19);:PRINTUSING"$###
.##";A(11);:PRINTSPC(
7);:PRINTUSING"$####.##
";A(12);:PRINTSPC(7);
:PRINTUSING"$####.##";
A(13);
DJ 1560 GOSUB2160
DP 1570 Y=0:IF(A(4)>(S1))AND((

```

```

S1)>(S2))THENY=1:A=Y
DA 1580 IF(A(4)<(S1))AND((S1)<
(S2))THENY=-1:A=Y
MR 1590 PRINT"{DOWN}{WHT}LEVEL
"TAB(19);:PRINTUSING"$
####.##";A(4);:PRINTSP
C(7);:PRINTUSING"$####
.##";S1;:PRINTSPC(7);:
PRINTUSING"$####.##";S
2;
KB 1600 GOSUB2160:PRINTL2S
GD 1610 PRINT"INDICATION:
{RVS}";
RJ 1620 IF(A=0)AND(L=0)THENPRI
NTINS:B=0:GOTO1730
SF 1630 IF(A=1)AND(L=1)AND(A(8
)>A(11))THENPRINTSF$:B
=1:GOTO1730
MS 1640 IF(A=1)AND(L=1)AND(A(8
)<A(11))THENPRINTUC$:B
=0:GOTO1730
RB 1650 IF(A=-1)AND(L=-1)AND(A
(8)>A(11))THENPRINTUC$:
B=0:GOTO1730
SS 1660 IF(A=-1)AND(L=1)AND(A(
8)<A(11))THENPRINTDBB$:
B=-1:GOTO1730
RS 1670 IF(A=-1)AND(L=-1)AND(A
(5)<A(11))AND(A(8)<A(1
1))THENPRINTDB$:B=-1:G
OTO1730
FG 1680 IF(A=1)AND(L=-1)AND(A
(5)>A(11))AND(A(8)<A(1
1))THENPRINTBS$:B=1:G
OTO1730
MB 1690 IF(A=1)AND(L=-1)AND(A(
5)<A(11))AND(A(8)<A(11
))THENPRINTBS$:B=1:GOT
O1730
HH 1700 IF(A=1)AND(L=-1)AND(A(
5)>A(11))AND(A(8)<A(11
))THENPRINTBS$:B=1:GOT
O1730
KS 1710 IF(A=1)AND(L=-1)AND(A(
5)>A(11))AND(A(8)>A(11
))THENPRINTBS$:B=1:GOT
O1730
CE 1720 B=0:PRINTINS
PE 1730 PRINTCHR$(158)TAB(30)"
{2 DOWN}ANY KEY TO CON
TINUE"
RJ 1740 GETK$:IFK$=""THEN1740
EP 1750 PRINT"{CLR}{CYN}{RVS}
{30 SPACES}PERSONAL ST
OCK ADVISOR{28 SPACES}
{OFF}"
JS 1760 FORK=1TOM
CP 1770 INPUT#1,A$,A(14),A(15)
,A(16),A(17),A(18)
PR 1780 INPUT#1,A(19),A(20),A(
21),A(22),A(23),A(24),
A(25)
BA 1790 PRINT"{HOME}{2 DOWN}"T
AB(8)"{57 SPACES}"
BB 1800 PRINTCHR$(2)"{HOME}
{2 DOWN}{CYN} STOCK:
{WHT}";A$:PRINT"{CYN}"
:GOSUB2280
MG 1810 PRINT"{CYN}"L1$
FA 1820 Y=0:IF(A(15)>A(16))AND
(A(16)>A(17))THENY=1
QE 1830 IF(A(15)<A(16))AND(A(1
6)<A(17))THENY=-1
QB 1840 PRINT"{DOWN}{YEL}SHORT
"TAB(19);:PRINTUSING"$
####.##";A(15);:PRINTSP
C(8);:PRINTUSING"$####
.##";A(16);:PRINTSPC(9)
;:PRINTUSING"$####.##";
A(17);
BM 1850 GOSUB2160
AS 1860 Y=0:IF(A(18)>A(19))AND
(A(19)>A(20))THENY=1
SH 1870 IF(A(18)<A(19))AND(A(1
9)<A(20))THENY=-1
PM 1880 PRINT"{DOWN}{CYN}MEDIU
M"TAB(19);:PRINTUSING"$
####.##";A(18);:PRINTS
PC(8);:PRINTUSING"$####
.##";A(19);:PRINTSPC(9
);:PRINTUSING"$####.##"
;A(20);
RS 1890 GOSUB2160
SC 1900 Y=0:IF(A(21)>A(22))AND
(A(22)>A(23))THENY=1:L
=Y
RH 1910 IF(A(21)<A(22))AND(A(2
2)<A(23))THENY=-1:L=Y
FD 1920 PRINT"{DOWN}{6}LONG"TA
B(19);:PRINTUSING"$####
.##";A(21);:PRINTSPC(8
);:PRINTUSING"$####.##"
;A(22);:PRINTSPC(9);:P
RINTUSING"$####.##";A(2
3);
EB 1930 GOSUB2160
GD 1940 Y=0:IF(A(14)>A(24))AND
(A(24)>A(25))THENY=1:L
=Y
HF 1950 IF(A(14)<A(24))AND(A(2
4)<A(25))THENY=-1:L=Y
XJ 1960 PRINT"{DOWN}{WHT}PRICE
"TAB(19);:PRINTUSING"$
####.##";A(14);:PRINTSP
C(8);:PRINTUSING"$####
.##";A(24);:PRINTSPC(9)
;:PRINTUSING"$####.##";
A(25);
AC 1970 GOSUB2160
XM 1980 R=INT(100*(A(11)/A(21)
)* (A(15)/A(5))+.5)
FQ 1990 PRINTL2$:PRINTTAB(18)"
{DOWN}{6 SPACES}"
GQ 2000 PRINT"{UP}RELATIVE STR
ENGTH: ";R;TAB(30);"REC
OMMENDATION: {RVS}";
QH 2010 IF(L=1)AND(A(15)>A(21)
)AND(A(18)>A(21))THENP
RINTHSS$:GOTO2120
MA 2020 IF(L=-1)AND(A(15)<A(21)
)AND(A(18)<A(21))THEN
PRINTASS$:GOTO2120
SK 2030 IFB=0THENPRINTWAS$:GOTO
2120
DJ 2040 IF(B=1)AND(L=1)AND(A(1
8)>A(21))AND(A(15)<A(1
8))THENPRINTHSS$:GOTO21
20
HH 2050 IF(B=-1)AND(L=1)AND(A(
18)>A(21))AND(A(15)<A(
18))THENPRINTSS$:GOTO2
120
BK 2060 IF(B=1)AND(L=1)AND(A(1
8)>A(21))AND(A(15)<A(2
1))THENPRINTHSS$:GOTO21
20
DG 2070 IF(B=-1)AND(L=1)AND(A(
18)>A(21))AND(A(15)<A(
21))THENPRINTSS$:GOTO2
120
GA 2080 IF(B=1)AND(L=-1)AND(A(
18)<A(21))AND(A(15)>A(
21))THENPRINTBS$:GOTO2
120
DR 2090 IF(B=-1)AND(L=-1)AND(A
(18)<A(21))AND(A(15)>A
(21))THENPRINTDB$:GOTO
2120
SS 2100 IF(B=1)AND(A(18)>A(21)
)THENPRINTBS$:GOTO2120
EX 2110 PRINTINS
CA 2120 PRINTCHR$(158)TAB(30)"
{3 DOWN}ANY KEY TO CON
TINUE"
MK 2130 GETK$:IFK$=""THEN2130
MG 2140 NEXT
BH 2150 DCLOSE:PRINT"{CYN}":RU
N
HG 2160 IFY=1THENPRINTTAB(72)"
UP ":RETURN
DH 2170 IFY=-1THENPRINTTAB(72)
"DOWN":RETURN
GD 2180 PRINTTAB(72)"NONE":RET
URN
XQ 2190 REM{3 SPACES}BOX MAKER
PA 2200 PRINT"{HOME}{3 DOWN}"
KB 2210 FORI=1TO18:L$=L$+B$:NE
XT
GK 2220 Z1$=A$+L$+D$:PRINTTAB(
29)Z1$
XQ 2230 FORI=1TO18:Z2$=Z2$+" "
:NEXT:Z2$=Z2$+E$
XF 2240 FORI=1TO4:PRINTTAB(29)
Z2$:NEXT
CQ 2250 X$=I$+MID$(Z1$,2,18)+K
$
JC 2260 PRINTTAB(29)X$:PRINT"
{HOME}{4 DOWN}"
PS 2270 RETURN
AH 2280 PRINTTAB(22)"{WHT}THIS
"SPC(11)"LAST"SPC(11)"
WEEK"
AA 2290 PRINT" TRENDS"SPC(15)"
WEEK"SPC(11)"WEEK"SPC(
10)"BEFORE"SPC(12)"DIR
ECTION":RETURN

```

Philip Addeo is a biomedical engineer who lives in Roselle, New Jersey. He enjoys electronics, programming the 128, and classical guitar. □

THE AUTOMATIC PROOFREADER

Philip I. Nelson

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

Type in Proofreader exactly as listed. Because the program can't check itself, be sure to enter each line carefully to avoid typographical errors or other mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy of the program before running it.

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

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

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

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

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

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

AUTOMATIC PROOFREADER

```
0 CLR
10 VE=PEEK(772)+256*PEEK(773):
   LO=43:HI=44:PRINT "{CLR}
   {WHT}AUTOMATIC PROOFREADER
   {SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
   6:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+
   6:FOR J=SA TO SA+166:READ B
   :POKE J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*E
   RROR* CHECK TYPING IN DATA
   {SPACE}STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,L
   B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
   RROR* RELOAD PROGRAM AND CH
   ECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
   ,22:POKE SA+18,23:POKESA+29
   ,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE
   SA+150,PEEK(773):PRINT"
   {CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:
   POKE (PEEK(LO)+256*PEEK(HI)
   )-1,0:NEW
120 DATA120,169,73,141,4,3,169
   ,3,141,5,3,88,96,165,20,13
   3,167
130 DATA165,21,133,168,169,0,1
   41,0,255,162,31,181,199,15
   7,227
140 DATA3,202,16,248,169,19,32
   ,210,255,169,18,32,210,255
   ,160
150 DATA0,132,180,132,176,136,
   230,180,200,185,0,2,240,46
   ,201
160 DATA34,208,8,72,165,176,73
   ,255,133,176,104,72,201,32
   ,208
170 DATA7,165,176,208,3,104,20
   8,226,104,166,180,24,165,1
   67
180 DATA121,0,2,133,167,165,16
   8,105,0,133,168,202,208,23
   9,240
190 DATA202,165,167,69,168,72,
   41,15,168,185,211,3,32,210
   ,255
200 DATA104,74,74,74,74,168,18
   5,211,3,32,210,255,162,31,
   189
210 DATA227,3,149,199,202,16,2
   48,169,146,32,210,255,76,8
   6,137
220 DATA65,66,67,68,69,70,71,7
   2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,13
   6,137
```

ONLY ON DISK

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

Ezee Design

By Frank Kirsch
Milwaukee, WI

If you're an electronics hobbyist or professional, you'll use this outstanding reference program often. Ezee Design fills more than 125 blocks with problem-solving electronic formulas. It'll help you calculate problems dealing with Ohm's Law; capacitors, resistors, and inductors in series and parallel circuits; and more.

Use it to determine time constants, coil-winding specifications, resonant frequency, and wavelength calculations. It solves simultaneous equations and even illustrates the color code for resistors—26 different equations in all.

Budget

Use this SpeedCalc spreadsheet program to help you manage your own finances. Then send Gazette your own spreadsheet templates. We'll pay \$100 for each program we use. See "64/128 View" on page G-1 for details.

Get the February Gazette Disk for only \$9.95 plus \$2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

TYPING AIDS

MLX, our machine language entry program for the 64 and 128, is a utility that helps you type in Gazette machine language programs without making mistakes. To make room for more programs, we no longer include this labor-saving utility in every issue, but it can be found on each Gazette Disk and is printed in all issues of Gazette through June 1990.

We'll send you a free printed copy if you send an SASE to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

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LOTUSWORKS 3.0

New computer owners, facing a confusing profusion of competing software products, often start with an inexpensive program that combines the basic productivity applications. An early contender in that market was AlphaWorks, which Lotus Development bought and renamed LotusWorks. Lotus recently improved, updated, and released LotusWorks as version 3.0 (there was no version 2.0, in case you're wondering).

LotusWorks features word-processing, spreadsheet, database, and communications programs. The first three are considerably stronger than those usually found in Works-style programs. (They also fill almost 8MB of hard disk space and require a full 640K RAM to run.)

The programs are tightly integrated; you can pull data from one program into another. You can, for instance, merge names and addresses from the database into a word-processing letter template to produce a series of personalized form letters.

The powerful new interface is a character-based version of Windows, with individually resizable program windows. You can open several windows at once, clicking back and forth between them with the mouse.

The program has a modern, colorful look to it, and it's a pleasure to use. I have a few complaints about its slightly unusual interface, however. For instance, each basic program screen has a menu bar across the top, with the first letter of each pull-down menu item highlighted. In most programs, you access such menus by hitting the Alt key

and the highlighted letter. It's that way in Windows, DOS 5.0, and zillions of other programs that support IBM's CUA (Common User Access) standard. Not so in LotusWorks. Here, you must hit F10 to activate the menu bar and then hit the highlighted key. (There are other pro-

grams that use F10 in this manner, but not many.) Five years ago, this wouldn't have raised an eyebrow, but today it's surprisingly non-standard. I also found the system for typing values into fields in dialog boxes unusual and awkward.

2.01, slightly altered to fit the pull-down menu interface minus a few of the advanced functions. Need I say more? It's an outstanding spreadsheet for this kind of program.

The small relational database is surprisingly powerful. Its native file format is

LotusWorks format or ASCII. I found it to be an extremely handy feature.

LotusWorks comes with five hours of 5- to 15-minute tutorial lessons, teaching all aspects of the programs. The context-sensitive help is extensive and usually useful, although there were a few things I couldn't find. The manual is written for beginners, explaining such things as memory and hard disks. It's thorough and clearly written.

LotusWorks isn't without minor irritations, but on the whole, it's a powerful suite of basic applications that will handle anyone's ordinary daily home computing needs. Small businesses might find themselves limited, but only if someone on the staff turns out to be a computer nut. With all its features, it's no surprise that Lotus has sold a million and a half copies of LotusWorks.

RICHARD O. MANN



LotusWorks combines strong word processing, an excellent spreadsheet, a powerful database, and skeletal communications.

grams that use F10 in this manner, but not many.) Five years ago, this wouldn't have raised an eyebrow, but today it's surprisingly non-standard. I also found the system for typing values into fields in dialog boxes unusual and awkward.

The word processor can embed graphics or spreadsheets in documents, so when you change the source file, it changes the document. It has full support for text styling, including bold, italic, and underlining for a variety of fonts. It comes with a large set of downloadable Bitstream fonts that work with both dot-matrix and laser printers. There's a thesaurus, spelling checker, and print preview function.

The spreadsheet appears to be Lotus 1-2-3 release

DBF, the dBASE standard. You can draw data input forms on screen (nine per database) and validate field data as you enter it. It has calculated fields and large memo fields. The only drawback is that it's not particularly easy to learn. The extensive tutorial helps.

The bare-bones communications program offers only four communications protocols and four terminal emulations, although they're the most common ones. Its simple learn-mode recording of log-on scripts is refreshing, but it doesn't have a built-in phone directory. (You can autodial from database records, however.)

The dialog box for opening files has a fast file viewer that peeks into the file highlighted on the directory list, if it's in the native Lo-

IBM PC or compatible (80286 compatible), 640K RAM, EGA or VGA, hard disk; mouse supported—\$149

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C. ITOH CI-8E

The C. Itoh CI-8E desktop laser printer is much more than an enhanced, beefed-up version of the C. Itoh 4. In addition to the CI-8E's being endowed with more speed, there are several other noteworthy features which set it apart from its sibling.

The CI-8E comes with 1MB of RAM standard, but this can be expanded to a maximum configuration of 5MB. The review unit was equipped with 3MB of RAM, a comfortable amount for all

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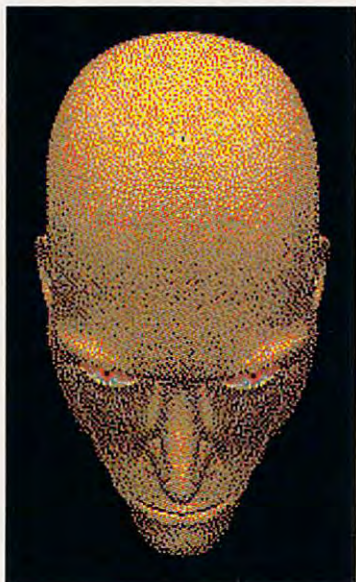
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REVIEWS

but the most grueling DTP or graphics applications utilizing many soft fonts.

Fourteen bitmapped and eight scalable fonts are resident in the CI-8E, and additional fonts can be added using HP-compatible font cartridges (there are two slots provided) or down-



The CI-8E goes beyond the C. Itoh 4, offering many fonts and easy setup and use.

loadable soft fonts. The CI-8E also incorporates C. Itoh's EEG (Edge Enhancement Technology) which smooths out the jaggies that are often present in curved areas of text or graphics. The EEG circuitry redefines the curved areas and remaps them, producing a smoother overall appearance. The scalable fonts consist of CG Times Medium in roman, italic, bold, and bold italic and Universe Medium in roman, italic, bold, and bold italic; the bitmapped fonts resident in both portrait and landscape orientations are 10- and 12-point Courier in roman, bold, and italic and 8.5-point Line Printer.

Parallel, RS-232C serial, and RS-422 serial interfaces are standard equipment on the CI-8E. Standard emulation capabilities for the CI-8E include HP LaserJet Series III (PCL5), Epson FX-850, and IBM ProPrinter XL24e emulations. A PDL cartridge is also available as an option for PostScript capability, and this cartridge adds 35 PostScript-compatible fonts which can be scaled or rotated.

A soft-touch control panel comprised of eight function buttons, four colored LEDs, and a 16-character LCD message display permits changing the printer's settings and also provides a window on the CI-8E's operational status. Setting up and using the CI-8E are very easy and uncomplicated; the menu-driven LCD panel is augmented by an excellent user's manual.

This eight-page-per-minute laser printer is conservative in the amount of desktop space it requires, measuring a compact 15.5 x 15.9 x 8.6 inches and weighing just under 31 pounds.

A 250-sheet multipurpose paper

tray feeds paper into the CI-8E, while an output lever selects either faceup or facedown delivery modes. An optional second bin paper feeder which holds 300 sheets (list price, \$175) and a 20-sheet faceup output tray (list price, \$30) are also available as optional items. Transparencies, envelopes, and label stock can be manually fed into the CI-8E.

The C. Itoh CI-8E puts the features wanted by most users into one package, and it offers additional features as options for those users who need them—a most sensible arrangement. The CI-8E's 8-ppm output speed, relatively small footprint, EEG technology, good assortment of standard fonts, and serial or parallel interfacing combine to make it a printer worthy of serious consideration.

TOM BENFORD

C. ITOH CI-8E—\$1,695

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Circle Reader Service Number 435

HEAVEN & EARTH

Heaven & Earth is the first software offering produced by the newly formed Buena Vista Software to target a wider audience than Disney Software, another Disney computer products unit. It's been called an antiarcade game in that it provides a respite from the standard shoot-'em-ups and kill-the-evil-wizard games.

Heaven & Earth is a peaceful grouping of three games: The Pendulum, the Heaven & Earth Card Game, and The Illusions, which in turn can be combined to form the Pilgrimage, patterned after the Buddhist path of 108 steps to enlightenment. Oriental concepts for seasons organize and provide structure to the games. Earth, air, fire, and water are paired with winter, spring, summer, and fall to form the 12 seasons used for the 12 suits in the Heaven & Earth Card Game, the four levels of The Illusions, and the backgrounds for The Pendulum.

The first and most obscure of the antiarcade games is The Pendulum. The pendulum can only be persuaded to move in the needed direction to strike the positive stones, which will remove stones from the geometric design below the pendulum. If the negative gravity vortexes, or stones, are hit by the pendulum, more stones appear. As with all the games, there's no way to lose The Illusions game, and you can keep playing until you win, no mat-

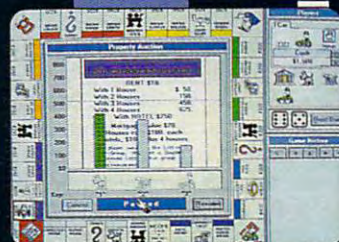
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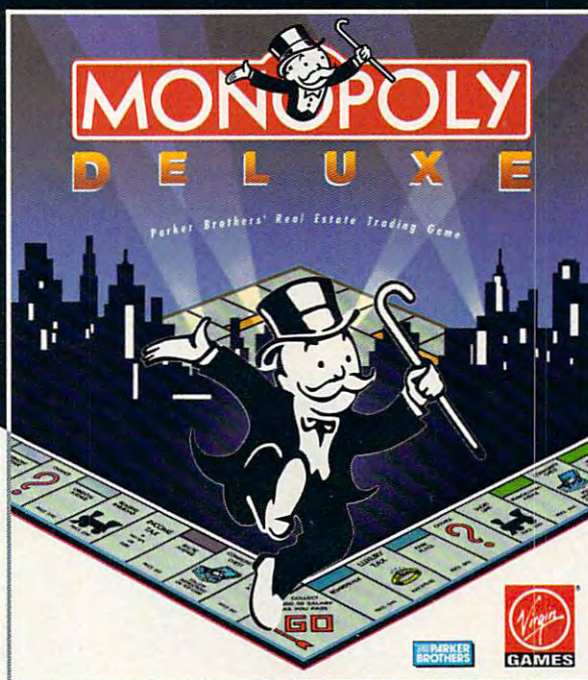
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IBM PC version



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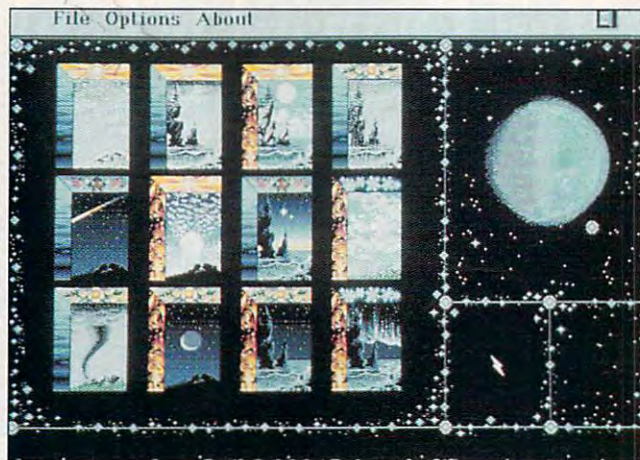
ter how long it takes.

The Heaven & Earth Card Game uses 12 suits to match up two-, three-, and four-of-a-kind suits of the same month or the same central pattern of ocean, mountain, desert, or sky. Points are gained by getting more similar cards, having no cards left over, and having animations on the paired cards. Animations are special cards that combine animation with digitized sound, creating, among other things, the star Betelgeuse, a tornado, and lightning.

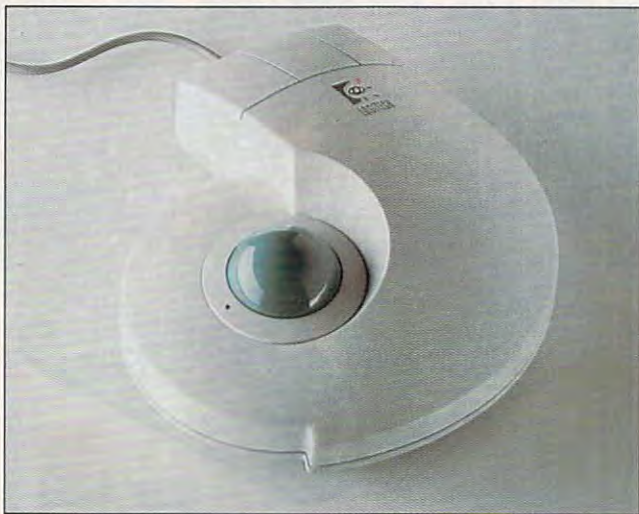
The 576 illusions are divided into 12 types of four difficulty levels, with 12 illusions per type. The Illusions, which basically consists of computer-based puzzles, gets progressively more difficult as the game progresses. The illusion types include antimaze, identity, grouping, and "fit fall," a Tetris-like game puzzle. These are further classified into four increasing difficulty levels of ocean, desert, mountain, and sky. Each difficulty level brings a change of rules that makes the next set even harder.

The Pilgrimage is a combination of The Heaven & Earth Card Game, Illusions, and Pendulum, with 26 unique and different puzzles that allow you to save your progress in a kind of marathon of Heaven & Earth. You must complete the current game before you can move on to the next, in contrast to the free access of all the individual games.

Production values are high on Heaven & Earth, as evidenced in the high-gloss, heavy-paper manual. The 640 x 480 VGA resolution is really in 16 colors with advanced dithering (shading) techniques, making the limited palette look



Take the PC path to software enlightenment with Heaven & Earth, the first offering from Disney's Buena Vista Software.



The Logitech Trackman offers a stationary alternative to a mouse, eliminating the need for scurrying room.

more like 256 colors. Installation into 6.5MB of hard disk space is quick and easy. The Pilgrimage supports six save games, as well as pause and load functions. The digitized music, gongs, and whistles have a definite oriental flavor, giving away the fact that some of the designers worked on Shanghai and Ishido.

Heaven & Earth has an intangible beauty about it, something inscrutable and mystifying. That's not just an

illusion, if the large number of sales to women—a group that traditionally avoids computer games—is any indication.

On the surface, the game appears to be simply another game that combines three lesser games to give substance to the product. On closer inspection, though, you see that each of the game modules is a full game in itself, needing no support from the others. All of which makes Heaven

& Earth a most unusual—and rewarding—game.

ALFRED C. GIOVETTI

IBM PC or compatible (10-MHz 80286 or faster); 640K RAM; EGA, MCGA, VGA, VGA gray scale, or Tandy 16-color; hard drive with 6.5MB free; mouse recommended; supports Sound Source, Thunderboard, Sound Blaster, Ad Lib, IBM PS/1 audio card, and Tandy DAC sound—\$49.95

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LOGITECH TRACKMAN

The Trackman trackball from Logitech is a terrific alternative to a mouse. It looks something like a three-fingered hand, and for good reason: The widths of the buttons on this three-button device (the three "fingers") fit your real fingers well. The thumb is the trackball itself, which can be easily manipulated by your real thumb.

Of course, since your thumb must be trained to do what your whole hand (and arm) previously did, it takes some getting used to when quick pointing is required. Even so, for applications where moving the pointer isn't time critical, adaptation is almost automatic. Generally speaking, the ergonomic design is excellent. Of course, the real advantage of the Trackman—what Logitech calls a stationary mouse—is that it sits in one place, whereas a mouse needs room to move. Everyone with a crowded workspace should look closely at this product.

Because this trackball is as large as an adult hand (about 5½ inches long and 1½ inches high), it may not be convenient for packing when space is tight. It might not work well

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“Likely to set a standard for multimedia entertainment products.”
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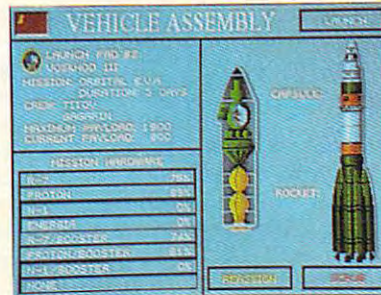
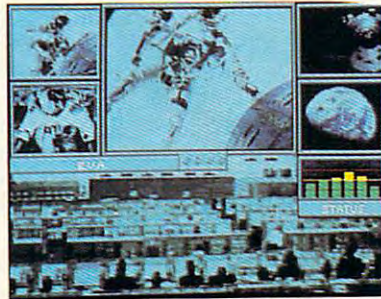
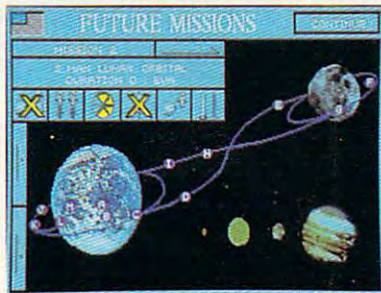
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MS-DOS Screens Pictured.

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for a small child, either. In most cases, however, size shouldn't be a problem.

The Trackman comes with the same versatile MouseWare software that accompanies all of Logitech's mouse products. This makes it adaptable to virtually any system configuration. Also included with the trackball is a 9-to-25 pin serial adapter, a 9-to-6 pin mouse port adapter, and a thorough and well-written manual.

If you're looking for a sturdily built, versatile alternative to a mouse, you might consider giving your hand to the Trackman.

BRUCE M. BOWDEN

Logitech Trackman—\$139

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MEGAHERTZ T396FM

A decent modem should do three things: run at 9600 bps, support V.42bis data compression, and send and receive faxes. A year ago, such a modem would've cost you more than \$1,000. Today, you can expect to spend much less.

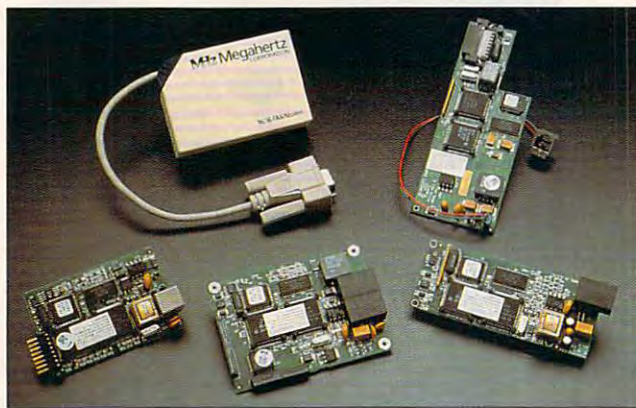
If you need this kind of modem for your laptop computer, take a look at Megahertz's new line of internal laptop fax/modems. These include the AR196FM (for the AST Premium Exec 386SX/20, 386SX/25, and 386SX/25C), the C596FM (for the Compaq Portable 486c and LTE 386s/20, Lite/20, and Lite/25), the T396FM (for the Toshiba T1000, T1200, T1600, T2000, T3100, T3200, T4400, and T6400 series), and the Z396FM (for

the SlimsPort, Zenith MinisPort, and MastersPort 386SL). Each is \$569, except for the Toshiba and Zenith models, which are \$599.

You can also buy the same circuitry in a small external unit about the size of a deck of cards. It's called

the SlimsPort, Zenith MinisPort, and MastersPort 386SL). Each is \$569, except for the Toshiba and Zenith models, which are \$599.

the company also includes a DOS-based modem program from MagicSoft, called MTEZ, that supports the XMODEM and



Laptop users looking for a good internal or external modem can get a top-quality Megahertz model for a reasonable price.

the P296FMV pocket fax/modem (\$599); it plugs into your serial port and can run on either AC power or two AA batteries. With batteries, it weighs only 6.8 ounces.

I tried out the T396FM internal fax/modem with a Toshiba T6400 laptop, and it worked just fine. When communicating with a system that supports both V.32 protocol (this allows you to transmit at 9600 bps) and V.42bis (this gives you a 4 : 1 rate of data compression), you can send and receive data at an effective rate of 38,400 bps. I also tested the unit with my usual fax software, WinFAX Pro, and it worked again without a hitch.

Megahertz thoughtfully includes two batch files that let you quickly switch back and forth from V.42bis to a stripped-down 9600-bps mode without any error correction or data compres-

YMODEM protocols. You can also use MTEZ to send and receive faxes. In addition, you get a coupon that you can send in for an unnamed Windows-based fax software package.

When I first tried to use the T396FM with Crosstalk for Windows, I wasn't sure which modem to choose. Because the modem is new, it wasn't listed on my older version of Crosstalk. Fortunately, Megahertz provides toll-free technical support, and a technician walked me through the initialization string for Crosstalk's custom-modem setup.

If you have an AST, Compaq, Toshiba, or Zenith laptop, this is currently the best deal in town for a fax/modem (9600-bps fax and modem) with V.42bis. If you're looking for a small external fax/modem with the same capabilities, you won't go wrong with the pocket

model, either. Top quality, excellent price, toll-free support, and a five-year unlimited warranty—who could ask for anything more?

DAVID ENGLISH

Megahertz T396FM—\$599

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SIMCITY FOR WINDOWS

Regular COMPUTE readers almost certainly know about SimCity. Since its introduction to deservedly wild accolades in 1989, it has won nearly every award in the industry, been featured in *Newsweek* magazine, sold a quarter of a million copies, and won a place in the hearts of the computing public. It's a classic in the truest sense of the word.

The big news on the SimCity front this year is the new SimCity for Windows. Windows users will love having SimCity available at the click of an icon. Windows brings several new capabilities to the game, not the least of which is the ability to leave your city growing and developing in the background while you go about your other multitasked Windows business.

Just in case you're new here, though, let's go over what SimCity is all about. It won't hurt you veteran city planners to be reminded of the charms of running the mayor's office. I have to admit that until this new Windows version came in, it had been months since I visited Rich's Ridge. Now I'm hopelessly hooked again.

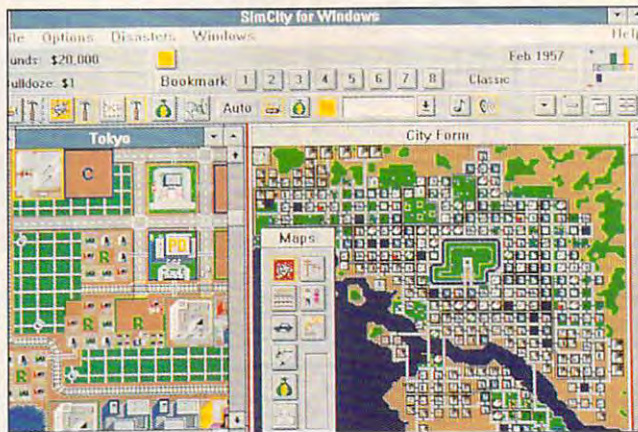
SimCity puts you in charge of a simulated city.

Starting with an undeveloped expanse of land along a large waterway, you establish the zoning for industrial, residential, and commercial areas. You build power plants, roads, tracks for light rail, parks, police and fire stations, airports, and a stadium. Then you string the power lines to your zoned areas so construction can start.

That's all there is to it. Really. The amazingly intricate and realistic programming takes it from there. You zone a sector residential, you provide power and transportation, and the sims (simulated citizens) take over. You'll see tiny houses going up and minuscule automobiles appearing on the roads. Of course, you'll need industrial and commercial zones nearby, or no one will move in—sims need places to work and shop, you know.

You'll need to fine-tune things, which is the essence and joy of the game. If you build too much industry and rely on automobiles entirely, you'll soon learn the consequences of pollution. If you skimp on police protection, crime rates will skyrocket. These and a dozen other negative outcomes result in unhappy citizens, who move out and leave you presiding over an empty, decaying city.

As in real life, money makes all this work. The more citizens and businesses in your city, the larger the tax base. You start with seed money, but you have to earn tax revenues to build anything, maintain the infrastructure, and pay police and firefighters. As in real life, it's a delicate juggling act to keep the services going without increasing taxes beyond the citizens'



SimCity for Windows, the latest version of the popular software game, lets you build and maintain your own city.

willingness to pay.

There are joyous touches of delight in the game: The tiny stadium fills up periodically with pinpoint-sized sims, and Lilliputian football players move up and down the inch-long field. A traffic-reporting helicopter shares the sky with airplanes, which occasionally crash into the city. Earthquakes and a nuclear meltdown (if you've been adventurous enough to choose a nuclear power plant) may blight your city. A monstrous Godzilla creature may appear and stomp parts of your city to rubble.

The Windows version adds floating toolboxes, giving you access to more of your map windows. You can open multiple maps and information windows at once, and a ribbonlike master toolbar has been added. Access to game controls and information is much easier.

If you already have SimCity, you probably don't need to upgrade to the Windows version—that is, unless you're hooked on the game and use Windows most of the time. Then you'll love it. If you haven't joined the ranks of fledgling mayors yet, run (don't walk) to your

nearest software outlet and buy one of the SimCity versions. You're in for a challenging, addicting experience. Games simply don't get any better than this.

RICHARD O. MANN

IBM PC or compatible (80286 compatible), 1MB RAM, EGA or VGA, hard disk, Windows 3.0 or higher; mouse recommended—\$59.95

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Circle Reader Service Number 439

CALCULUS EZ-FAXIT

Computerized faxing is becoming mainstream. So much so that Calculus, which specializes in network fax solutions, has introduced sophisticated models for home offices.

While the Calculus EZ-FAXit board and Windows software deliver beautiful graphics in a manner that's as easy to use as creating and printing documents, the price might make you think twice about the many advantages packed into this kit.

The version I tested carries a \$299 list price for 4800-bps fax and Windows

software. The company's 9600-bps fax kit costs \$499. These prices compare unfavorably to the \$169–\$279 price range found for comparable fax cards at two computer stores in my area—and those prices include 9600-bps fax and 2400-bps modem. Calculus does not have a modem—a distinct disadvantage, since you have to dedicate a phone line to the fax and give up a card slot to a modem so you can use your autodialer and online services.

The EZ-FAXit half-width card has two coprocessors that can send and receive faxes in the background, so you can work without interruption—a major advantage.

Installing the half-width card couldn't be easier. EZ-FAXit prevents headaches by automatically configuring itself during software installation. This is an advantage, because if you incorrectly set switches on other fax boards, not only will the fax not work, but other devices will also fail.

Using EZ-FAXit is also simple. Unlike other programs that require you to convert files to ASCII, exit your application, and load their fax software, EZ-FAXit works completely inside your application. For instance, if you create a document in Microsoft Word for Windows and select Print, a pop-up menu asks for the recipient's name and phone number. You can type it or select information from a phone directory which can hold an unlimited number of names. You can also select when to dial, saving money by scheduling phone calls during low-rate periods. Moreover, you can broadcast faxes to groups of colleagues, thus eliminating the need to re-create faxes or wait through the

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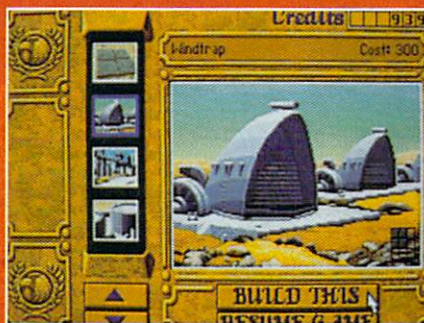
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conversion process. These high-end features begin to justify the price of EZ-FAXit.

People who have received my faxes say the 24-point Times Roman fonts and boxes printed beautifully. This is a major advantage over other fax boards that strip out your formatting to present legible yet bland displays of information, usually in 10-point sans-serif type.

EZ-FAXit sends faxes in the background, so you quickly get back control of your machine to work on other projects. It even has clever sound effects: A successful fax yields a sound like Teddy Roosevelt charging up San Juan Hill; a failed transmission sounds like you gave the wrong answer on a TV game show.

The board also receives faxes automatically. This is a bonus I appreciate when I think of colleagues who must demand prior notice so they can set up their machines to receive faxes.

EZ-FAXit does have problems. A graphics-heavy fax refused to print on my Hewlett-Packard LaserJet III. Received documents can't be easily viewed onscreen. Transmission takes about two minutes per page. And EZ-FAXit appears on your cover sheet, detracting from your company's image.

I wouldn't let those problems overwhelm the program's other worthwhile qualities, however. It may not be perfect, but EZ-FAXit is easy to install and use, and it delivers crisp graphics.

DANIEL JANAL

Calculus EZ-FAXit—\$299

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Circle Reader Service Number 440

116 COMPUTE FEBRUARY 1993



Calculus EZ-FAXit costs a lot but provides plenty of features—if only it didn't print EZ-FAXit on your cover sheet.

COMPOSER QUEST

Don't be fooled by Composer Quest's title. This multimedia exploration may dream of snaring game players by simply doing some name-dropping, but that won't work. *Quest* isn't always synonymous with *game*.

Instead, appreciate Composer Quest for what it really is—a miniature musical encyclopedia that plays snippets of famous classical pieces, offers up a few facts about the periods, and displays a smattering of biographical information. Sure, there's a game here, one with a time-traveling motif and a game-show, name-that-tune mentality, but it's nothing more than an unnecessary diversion from the

real work at hand. What's that? Learning, of course.

You'll need a CD-ROM drive and a sound card before you can hear a peep from Composer Quest, which runs under Windows. Unfortunately, it doesn't take advantage of resolutions above the 640 x 480 of standard VGA, so you can't expand Composer Quest's display to fill the entire screen in 800 x 600 mode. A pity.

But looks aren't everything, as you'll quickly learn. Covering seven classical and three jazz periods, this CD-ROM title lets you point and click your way from time line to historical period to composer in a matter of moments.

Most of the 35 composers are represented by several of their most memora-

ble pieces. Want Wagner? You can play his "Ride of the Valkyries." Bach? Listen to Brandenburg Concerto no. 2. The selections are all too brief (30 seconds or so) and leave you wanting more. Even worse, the most modern composers, including jazz greats such as Armstrong and Ellington, are without music. Their work hasn't fallen into the public domain—the obvious reason Composer Quest fails to include much of anything from this century.

Historical tidbits from the period, and even some on-screen images of art and architecture, help to put the music in perspective. You can, if you want, take quizzes to see how well you know the biographical and historical material.

Or you can, if you must, play the time-travel game. You listen to the music and then try to guess its creator by traveling to the right period, finding the right person, and identifying the right piece. This gets old faster than it takes to read this description.

Stick with Composer Quest's free-form exploration, and you'll be much happier. You won't drown in facts—you get little more than a wet toe. Composer Quest is an affordable and even entertaining way to learn something about the Western world's most famous musical creators.

GREGG KEIZER

IBM PC or compatible (80386 compatible); 2MB RAM; VGA; CD-ROM drive; Windows 3.1 or Windows 3.0 with multimedia extension; Sound Blaster, Ad Lib, or compatible sound board—\$99

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The box is covered with advertising and prices comparing the prices charged by Intuit and other software companies for computer checks to American Check Printers' prices. The price may be the best part of the deal, since the kit price is much lower than the prices offered by banks and software companies for computer checks. The quoted prices show savings of as much as \$10 over Intuit's prices and \$20 over the bank prices for 250 pin-feed checks or 250 laser "trippies." (A trippie is three checks on one 8½" x 11-inch piece of laser paper.)

You save an additional \$5 keypunch fee when you use the ordering disk to place your first order, saving the company the trouble of inputting the information. People are more careful about spelling when typing in information about their own checks

than your average key-punch technician.

The software is keyboard-directed, with an adequate use of function keys to move the product along. An order cannot be written until all the necessary information is put in. One area the company double-checks for the

toward any first order of checks, making the program virtually free. (Since 250 personal checks cost \$29.95, taking the \$20 credit and buying the extra 150 checks for \$9.95 is a better deal than the 100 free checks.) Checks can be printed in three styles: Tradi-

ent account or to change the style of the checks, will require that you supply your own disk, disk mailer, and postage. But reorders can also be accomplished by calling a toll-free number. The documentation is brief, but it tells you all you need to know to run the software.

This new way to order computer checks is very quick, easy, and economical when compared to other alternatives. It allows the computer user to customize his or her checks and to save money at the same time. Anyone who uses a computer to keep books with any of the 11 programs listed above should look into this inexpensive product.

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customer is the bank codes. You must include a voided check with the order so that American Check Printers can double-check the bank numbers and codes that you have entered, at no additional charge. The program's error checking is quite sophisticated and corrected me several times when I tried to enter a fictitious bank number. After all the error-checking parameters have been reviewed, the program prompts you to check the numbers one more time.

The software retails for \$20, with a lower price at discounters, and you get 100 free checks or a \$20 credit

tional, Professional, and Premier. The Premier, which uses laser color shading and a script style, is recommended for architects and designers. The Professional style uses parchment paper and Old English type and is recommended for accountants, attorneys, and physicians. The Traditional checks use a color border with block lettering and are recommended for those who require less elegant checks. Most checks are available in green, blue, maroon, or gray.

After the first order, the software can be copied to your hard drive with DOS. Additional orders, for a differ-

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The Kodak Diconix 180si ink-jet printer packs a lot of power in a small package. It's manufactured by the same people who make that film in bright yellow boxes.

Kodak has entered the mobile printer market. These printers—like the 180si and its bigger brother, the 701—are lightweight but powerful computer printers working from internal batteries or AC power. Kodak's aim is to support the mobile office concept, where you take your laptop computer home or out on trips to continue working. A new-generation portable computer and a 180si together weigh about ten pounds.

The basic printer weighs



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only 2.9 pounds, but batteries, printhead cartridge, and power adapter add a little more. It's only 2 inches high x 6.5 inches deep x 10.8 inches wide.

Power is provided by the AC adapter or by five C-cell nickel-cadmium batteries (not included). The batteries go in a unique place—inside the platen. Lifting the cover of the printer and rotating the platen reveal the battery compartment. The batteries are automatically recharged when the AC adapter is plugged into the printer.

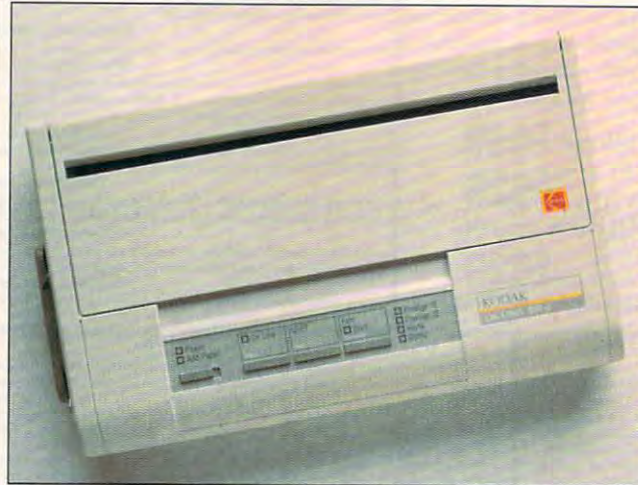
The 180si has a built-in tractor feed to use fanfold paper and forms. You can also print sheets of paper without perforations, like letterheads.

Print quality approaches that of a laser printer—and it costs you less money and weight. There are two print-quality settings. Draft is the faster: between 145 and 180 characters per second, depending on the size of the characters. Elite or 12-character-per-inch fonts print fastest, such as the Prestige 12 selection on the 180si's control panel. Draft text is 96 x 96 dots per inch; draft graphics are 192 x 96 dpi.

The quality setting is slower—down to 36 cps for Prestige 12, and slower for larger type. But it gives much better quality, with both text and graphics at 192 x 192 dpi, rivaling laser printers (usually 300 x 300 dpi). Four quality fonts are built in, with draft mode for each.

The 180si emulates the Epson FX-85 and IBM ProPrinter. Many programs use the 180si easily, since those two printers are often supported.

I installed and tested the 180si with a number of programs. It worked perfectly. Installing the printer driver included for Windows let me (using Adobe Type Manger)



With the Diconix 180si from Kodak, you get a powerful, versatile printer that's easy to take on the road with your laptop.



The Flashdrive 25 offers portable hard drive storage, working well despite its relative slowness and battery-saving shutdowns.

print more than 200 fonts to the 180si using Windows 3.1—not bad for such a small printer.

There are two reasons you might want to purchase a 180si: if you take your portable computer out of the office and need a powerful—but equally portable—printer, or if you want a printer that has graphics and text quality approaching that of a laser, but you would prefer not to mortgage your house to get it. At \$399 suggested retail, the 180si is a good solution to both requirements. It's a nice *little* printer.

RALPH ROBERTS

Kodak Diconix 180si—\$399 (parallel), \$419 (serial)

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FLASHDRIVE 25

Weighing in at 1½ pounds with a battery life of about five hours, the Flashdrive 25 is an excellent choice for those needing extra portable hard drive storage or those who use portables without built-in hard drives.

Although I expect most

users will attach the Flashdrive to their portables or notebooks, I found it most convenient for transferring large blocks of files and applications from my notebook to my desktop. I simply installed the drive onto both computers and moved it from one to the other. It also saved me the trouble of installing the same applications on both machines. In this way I created exactly the same environment on both machines. For those of us who travel or who have large amounts of data to move—between our home and office computers, for instance—the Flashdrive offers a convenient alternative to floppies.

Although the documentation could be better (I found it to be skimpy, and not as clear as it could've been), most users will be able to connect the drive through the parallel port and install the necessary software. The drive comes preformatted and partitioned as two 32MB drives and one 19MB drive. On my system they installed as drives D, E, and F. It's possible to reconfigure the Flashdrive using the software provided. Even though the Flashdrive connects to the parallel port, you can still connect your printer through the standard parallel connector built into the Flashdrive.

I tried the Flashdrive on two notebooks, a Magnavox 386 and a Gateway 2000 Nomad 386SXL, with no problems. I also attempted to install it on four desktops with mixed results. I successfully installed and used the Flashdrive on a Tandy 4825 SX Multimedia 486SX and an old no-name 286 clone. I never was able to get the Flashdrive to operate on a Gateway 386SX/16 or a

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REVIEWS

Wyse Decision 386/40, however.

Since the Flashdrive operates through the parallel port, you'll find the drive a bit slower than internal drives. And since the Flashdrive uses the battery-saving technique of shutting down when it's not being accessed, you'll find the same delay as when re-starting the drive if you're running it on battery power.

Although I found the Flashdrive quite satisfactory and can recommend it to those who need portable hard disk storage, my experience suggests that if you're thinking about buying the Flashdrive, you should be sure to purchase it with the right to a full refund if you discover that it's not compatible with your computer.

STEPHEN LEVY

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ROBOSPORT FOR WINDOWS

Ever since Muse Software released Robot War for the Apple II computer ten years ago, computer gamers have had a love affair with computer robots, competing against each other in nationwide tournaments. RoboSport by Maxis, the creators of SimCity, SimEarth, SimLife, and SimAnt, is the newest entry in this love affair with computer robots. The technology has changed enough that RoboSport has a chance of clanking its way to the forefront and becoming the new robot tournament software.

RoboSport is a strategy game that provides for the robot-programming commands to be made in advance of the battle, which proceeds in a simultaneous combat mode. RoboSport pits as many as four teams, composed of up to eight robots each, against one another. Robots can be controlled by computer or human. The computer-controlled robots can be set to any of four levels of artificial intelligence, from stupid to ferocious. The human-controlled robots are programmed or edited; then you can watch an animated "movie" of how the conflict turned out using the game's VCR feature. Cycles of editing and viewing results can continue until the time set for the game runs out or one team is declared

the winner. You win by completing the game goal or incapacitating all enemy robots.

RoboSport provides for up to five types of games, or "sports," with different goals, such as survival, capture the flag, hostage rescues, treasure hunt, and even a baseball variant, which requires the robots to touch all four bases in the corners of the battlefield in or-



With RoboSport for Windows, Maxis tosses its sensors into the robot battle ring.

der to win. RoboSport has three basic battle sets: the suburbs, rubble, and computer. It can be played on seven types of terrain, with four levels of robot intelligence, five types of robots, eight types of weapon systems, five sports, five beginning formations, four game lengths, up to four teams, and up to eight robots per team, giving the game an impressive variety of conditions to interest the most discerning robot warrior.

The eight increasingly destructive and longer-ranged RoboSport weapons systems include rifle, burst, auto, grenade, missile, zap (a high-energy, low-frequency burst), time bomb, and kamikaze. The five types of robots have different armor protection and weapons systems. The stealth robot is unique in that it cannot be seen unless moving or scanned from an adjacent square. Hitting a robot when firing is determined by the length of the scan and the speed of the target. Damage is calculated from the range, angle of fire, and armor protection of the target; it's subtracted from the total remaining damage points of the robot.

The mouse-controlled window interface makes use of Windows 3.1 sound support; no DOS version of the game is planned. The Super VGA graphics support gives 800 x 600 resolution and a 256-color palette. The documentation indicates that you can experience a performance decrease if you have a number of programs running when in 386-enhanced mode. RoboSport can be played with up to four human players on the same computer, on two computers over a null modem or telephone modem, and on up to four machines on a network. Modem

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REVIEWS

play from Macintosh to IBM is supported, as well.

RoboSport is not a realtime arcade game, nor is it your traditional war game. RoboSport may take a long time or a short time to play. Purchase with caution, though: Many will enjoy the process of programming computers for viewing the outcome, while others may find it a tedious process.

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HONEYWELL OPTO-MECHANICAL

A mouse is a mouse. Or is it? Usually, there isn't much you can say to separate one mouse from another. Is the mouse easy to install? Today, most mice are simple to install, and most new mice are both PC and Windows compatible.

Such is the case with the new Honeywell Opto-Mechanical mouse. How does the mouse feel in your hand? Is it easy to control? Again, the Honeywell mouse passes muster with a comfortably rounded shape that contours nicely to the hand. Its buttons aren't too stiff when clicking, handling smoothly.

In other words, this serial mouse passes all the tests. But what separates it from others I've tried is the new x-y axially inclined transducer technology that is used instead of the standard ball mechanism. Unlike other mice, the Honeywell mouse doesn't get contaminated by surface dirt, which often causes mice to become less reliable. In place of the usual ball, the Honeywell mouse has two small, round, plastic sensors which detect the x-y position and move the cursor. This mouse doesn't need to be cleaned! It can be used with or without a mouse pad on almost any surface you're likely to use.

I used this mouse with several applications, including Quattro Pro, PageMaker, Word for Windows, Excel, Windows, and GeoWorks (and its various applications). I also used the Opto-Mechanical mouse to play games, including Links golf, Solitaire's Journey, Lemmings, and King's Quest. For

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REVIEWS

each of these, the mouse functioned as expected.

Although I found the Honeywell mouse to be reliable and easy to install, it wasn't noticeably more sensitive or less sensitive than others I've put to the test. The use of sensors rather than a ball means the mouse will probably last longer than the standard ball mouse. Although I wouldn't recommend that you run out and immediately replace your standard mouse with this new technology, you'd be wise to consider the Honeywell Opto-Mechanical mouse when you need a new or replacement serial mouse.

STEPHEN LEVY

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QUEST FOR GLORY I

Released in 1989, Hero's Quest is arguably the most ambitious Sierra On-Line undertaking and probably the most satisfying game in the Sierra family. Hero's Quest effectively combines the statistical character development features of a role-playing adventure with the basic side-scrolling, third-person perspective, interconnected scene-based interface of a graphic adventure. Quest for Glory I, the completely reworked remake of the original game—rotoscoped and icon driven, with 20-frame clay animation, 256-color VGA graphics, and enhanced stereo sound—is in many ways a significant improvement.

To the chagrin of some and the delight of others, gone is the original text parser, now replaced with an icon-directed "conversation tree" communication system. One general question leads to many additional,

more specific choices of topics to discuss, which are added to the conversation tree. After experimenting with the intuitive graphic icon mouse pointers, the game player should discover the correct location to click with the right combination of icon and object to get the desired result. The emphasis in the game is still firmly rooted in conversations and puzzles, not combat, even though combat opportunities abound if you're so inclined. The only real disappointment is that the chance of getting a speaking CD-ROM version is considered remote, considering both the already ambitious Sierra CD conversion schedule and the 80 actors and more than 6000 lines of conversation needed to be professionally recorded.

The three-dimensional, clay animation, rotoscoped graphics are the most striking feature of this game (and will be used in future games). Each of the more than 40 characters or creatures is molded—in both full torso and "talking head" versions—with modeling clay, which is photographed by a stop-action movie camera in black-and-white, giving the characters a realistic and believable three-dimensional effect, complete with shadows and nuances of expression. Each character has been given a little personality of its own, dedicated to the purpose of entertainment. Photographed at 20 frames per second, the film, which provides smooth and realistic animation, is then rotoscoped onto the computer, where the image is colorized with a 256-color palette by a computer artist, pixel by pixel. To quote one previously skeptical Sierra artist, "The results are amazing." Even Stefan Spielberg (the strangely familiar name of the baronial ruler of the town and its surrounding countryside, the setting for the game) would be happy with the results.

Even if you've played through the original Hero's Quest, you should look at



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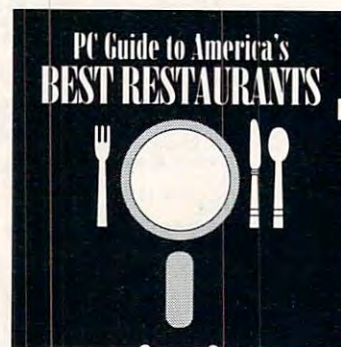
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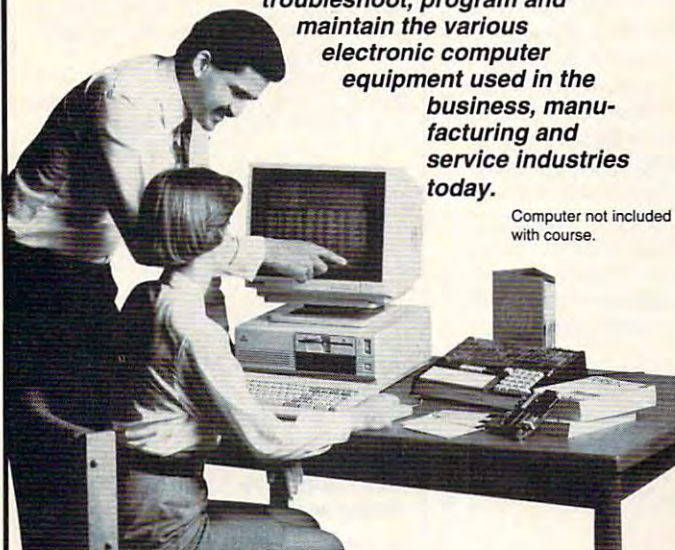
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REVIEWS

this exceptional total remake of the game. The art is fantastic. The new stereo music soundtrack is wonderful (except for the glitch that turns off the music in the last few scenes of the game). The plot remains as delightful and interactive as in the original. The totally rewritten text by the original design team of Corey and Lori Cole, who have very deep roots in the pen, pencil, and dice role-playing games, is more fun, more witty, more suspenseful, and better written than that of the original.

Whether or not you bought the original, there are many features that make this hybrid role-playing-cum-graphic adventure a must-buy for your collection. When you consider the new discounted prices, the updated highly intuitive interface, the stunning graphics, the new script, the updated soundtrack, and the high quality of the upgrade, it's hard to resist.

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TEMPEST

Housekeeping is a chore in any sense of the word, and computer housekeeping is no exception. Your hard disk has grown bigger and bigger, and it holds lots of files, many that you've probably forgotten. Every now and then, a little cleanup and management is called for, and even with the improvements in DOS 5.0, file management from the DOS command line is a tedious, time-consuming task. The TEMPEST program is designed to ease that task for you, and it does a very nice job.

The program presents you with a screen containing three windows, a menu bar, and a toolbar. Two of the windows show icons representing the contents of your computer. At the highest level, you see your drives, both floppies and the partitions of your hard disk. Double-click on a drive, and the window changes to show the contents of the root directory of that drive. Double-click on a subdirectory, and you see its contents. When an icon is selected by a single click, another click

on the Information tool of the toolbar brings up information on that item. For a drive, you see the type, capacity, free space, and number of files and subdirectories. For a directory, the information is name, number of files and subdirectories, byte size, and date and time of creation. For a file, you see name, size, date, and time.

A very powerful feature of the program is that the two icon windows are independent and you can switch between them simply by clicking. You can have a different drive in each window, at any level, or you can have different levels of the same drive. The third window presents the tree structure of the selected drive or directory.

One of the tools of the toolbar copies or moves a file or directory. To use it, you select an item in one icon window, bring up the destination directory in the other icon window, click on the tool to select Move or Copy, and drag the icon to be moved from one window to another. TEMPEST gives you a progress report as the action takes place; it will show an error message if the destination has too little space for the item to be moved. A very convenient aspect is that if you're moving, copying, or deleting a directory, TEMPEST will act on the entire contents.

An attractive feature of the program is the variety of its icons. Default icons are provided to show the two types of floppy drives and a hard drive, a directory symbol, and different representations for the various types of files. TEMPEST assigns icons to files based on the file extension and will portray exe, com, sys, and bat files differently. There is a generic icon for files with an unassigned extension. If you wish to be creative, you can draw your own icon and assign it to a file extension.

With all its attributes, TEMPEST deserves better documentation. While there are numerous help files—and with a little persistence you *can* discover what you need—it would be much more convenient if the manual offered such information as a description of the function of the tools in the toolbar.

Aside from that, I consider the program a very valuable utility. Modest in its appetite for disk space—about 1MB—and selling at a very modest price, its file management capability compares well with that of Windows.

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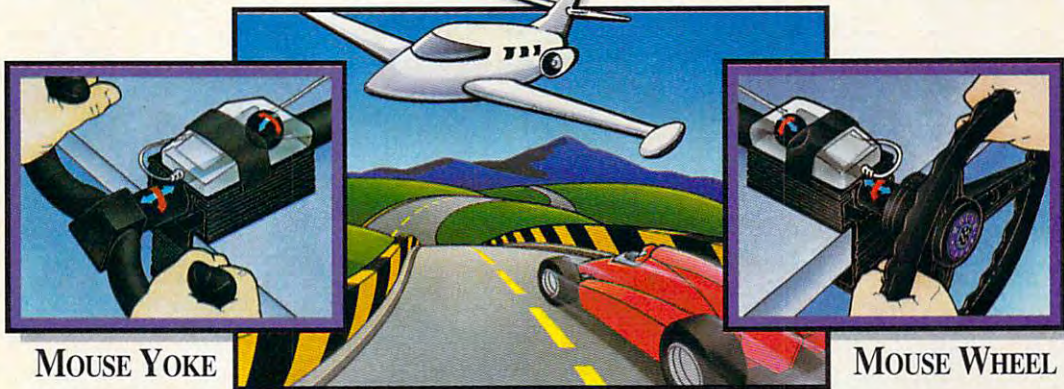
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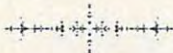
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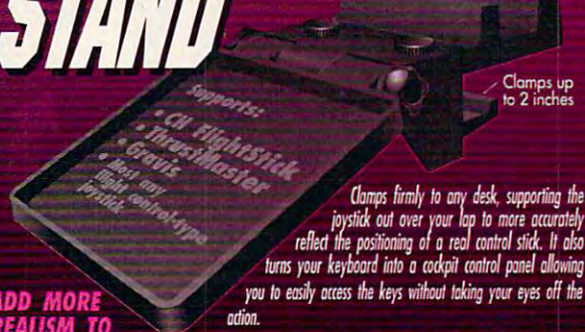
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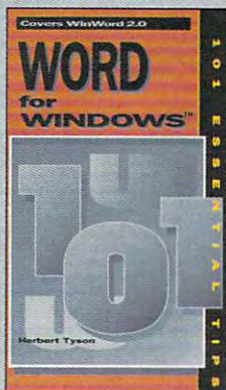
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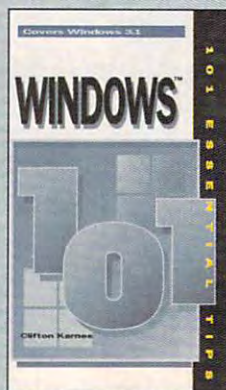
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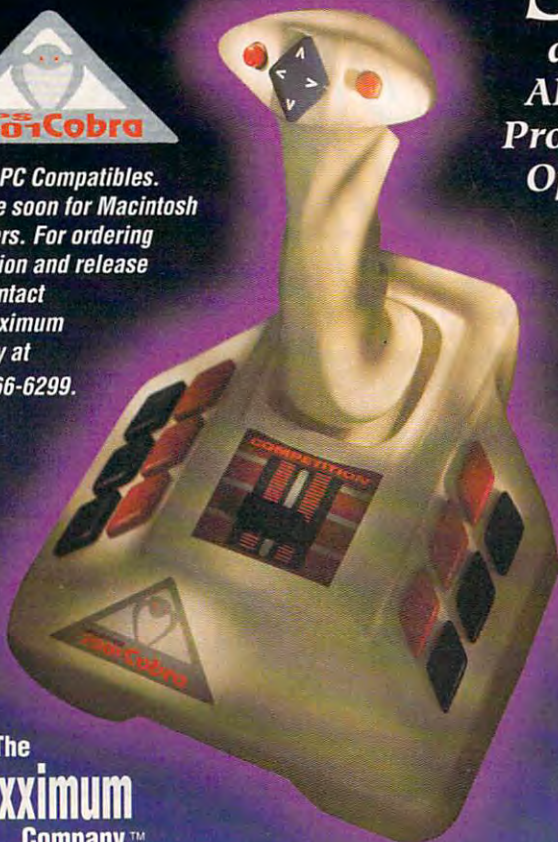
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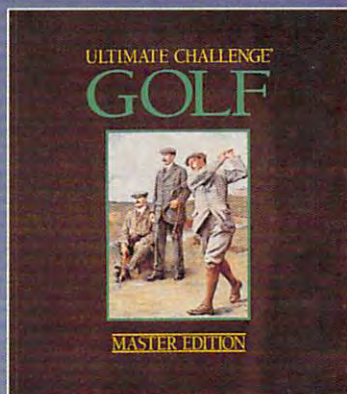


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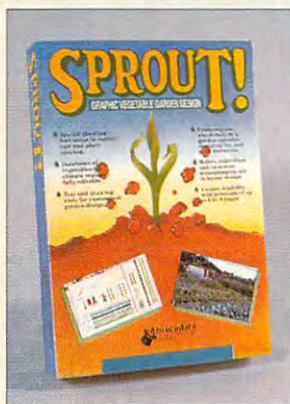
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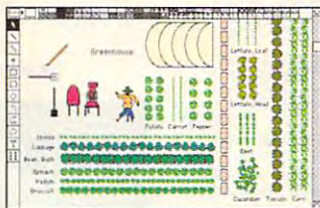


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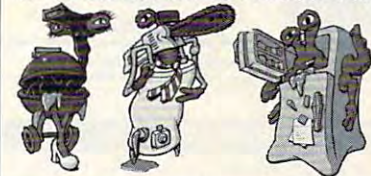
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The new breed of notebook is a 486-powered machine with a large hard disk (as large as 200MB), lots of RAM (4MB is standard), and eye-pleasing color. Leading the pack at COMDEX was the TravelMate 4000 WinDX2/40 Color. This screamer boasts a 40-MHz DX2 CPU, a 640 x 480 screen with 256 colors, 8MB of RAM (expandable to 20MB), a 200MB hard disk, a Microsoft BallPoint with a QuickPort connection, and Windows 3.1 installed and ready to go. (See "News & Notes" for more information about the TravelMate 4000 computer.)

Following the trend of smaller and more powerful, the PCMCIA interface gives notebooks near desktop power by putting all the electronics that normally fit on a full-sized expansion board into a credit card-sized device.

PCMCIA has always been an exciting technology, but at COMDEX, we saw the most innovative PCMCIA card to date. MiniStor was demonstrating a PCMCIA card-based 64MB 1.8-inch IDE hard disk that offered amazing performance and durability. This MiniStor drive has a seek time of 18 ms, can withstand an impact of nearly 300 G's, and will run 250,000 hours before failing.

Not a new product but a new technology ripe for licensing, QSound promises to add new dimensions to multimedia audio. Using DSP technology, QSound makes a simple pair

of speakers generate sound so realistic and accurately placed stereophonically that many people swear that they can locate sounds coming from behind and above them (though QSound spokespersons only claim 180-degree placement).

IBM, Texas Instruments, and Intermetrics have incorporated this technology into a chip set that will eventually be installed on IBM motherboards. To fill the gap until that time, Texas Instruments has created a soon-to-be-released sound card, identified as Mwave, that will use the QSound DSP technology. Mwave is compatible with Ad Lib and Sound Blaster and is capable of far more than simple entertainment sound.

Already well known in the recording industry, QSound has garnered tributes from recording artists such as Sting and Roger Waters.

Desktop publishers know that the best color proofing is achieved with thermal transfer technology, and until very recently this technology was limited to a few very-high-end printers. But now Fargo Electronics, a small printer manufacturer that formerly specialized in bar-code printers, has announced the Primera Color Printer, a 200-dpi color thermal transfer printer for under \$1,000. Using special paper and a waxlike material, it generates color printouts that have unusual color density. It can generate a page with 100-percent coverage every two minutes at a cost of 45 cents per page. The Fargo unit is designed for "Windows printing"—printing from its own Windows driver. If you want PostScript printing with the same unit, you have to go to LaserMaster, which will market the upgraded printer in late spring for \$1,795.

It's not often you see a prod-

uct with the potential to shake up an industry. One such product, FontChameleon (shown privately at COMDEX by Ares Software) can not only combine any two fonts in a variety of ways, but it can also provide just about every popular font.

Because the program needs less than 2K to store the parameters for a complete font, FontChameleon will ship with hundreds of popular fonts on a single disk. In fact, Ares can ship any font with the program—including fonts owned by other companies—as long as the font ships as a set of parameters and Ares doesn't use the copyrighted name of the font (Ares gets around the name problem by using a pull-down menu that says "Similar to...").

Observing the FontChameleon demo was a representative from one of the large type houses. He said that the program is legal and his company is looking for a way to cash in on Ares' new technology.

Years from now, we may look back on the fall 1992 COMDEX as the time when video came to Windows in a big way. Just a week before COMDEX, Microsoft announced Video for Windows. At COMDEX, Apple previewed a similar, though incompatible, product called QuickTime for Windows, based on its Macintosh program called QuickTime. You can now buy feature films on CD-ROM for the Mac, including *A Hard Day's Night* and the X-rated *House of Dreams*. Similar CD-ROMs should be available soon for the PC.

To capture your own software movies, you'll need a video-capture board, such as Brown-Wagh's Studio Master (\$499), Media Vision's Pro MovieSpectrum (\$399), or Creative Labs' Video Blaster (\$495). The booths for all three companies were overflowing with eager buyers. □

Fall COMDEX had its share of surprises. Here are some products and technologies to watch in the coming months.

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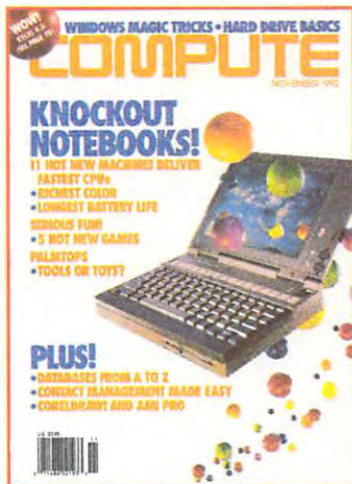
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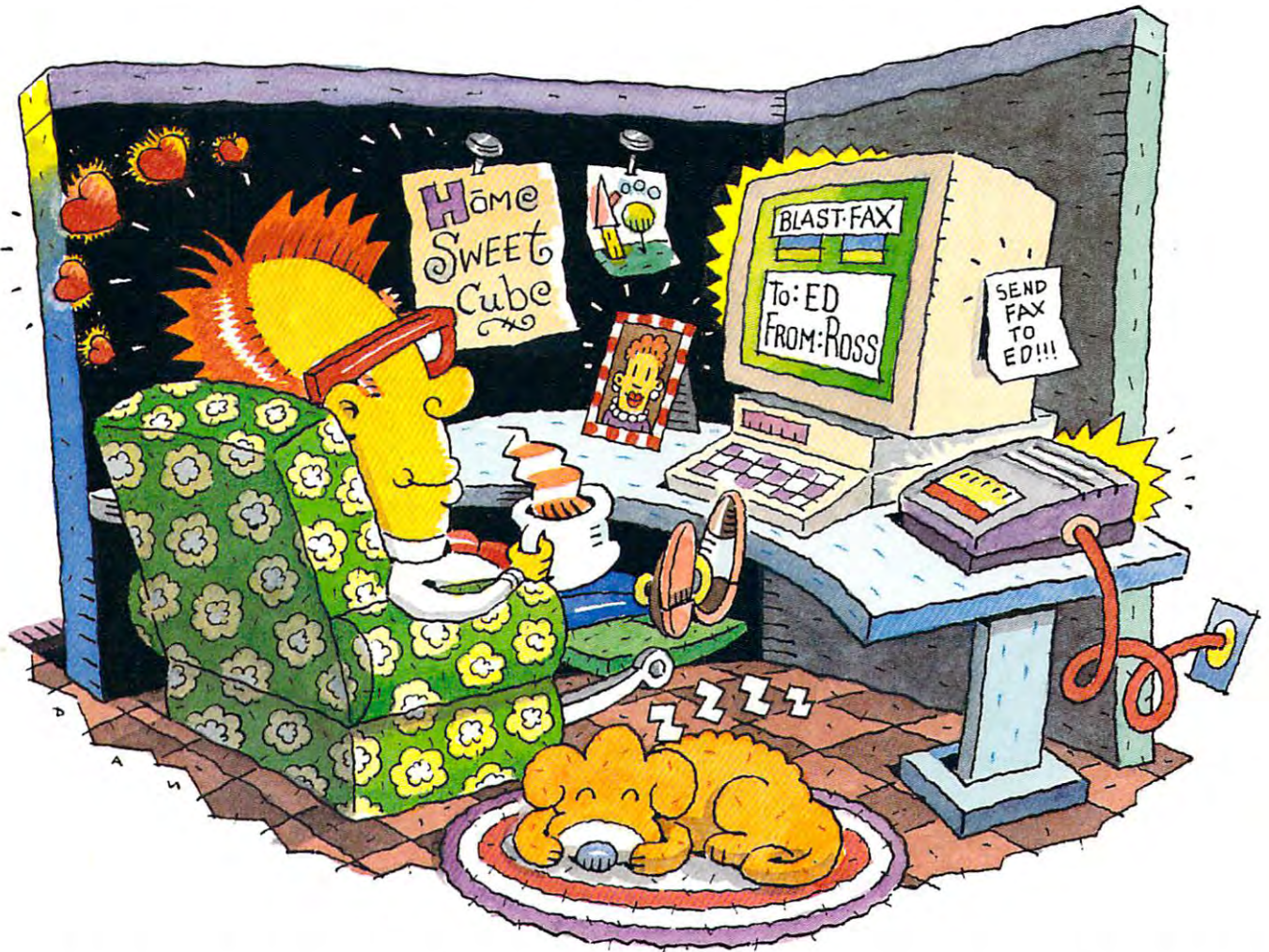
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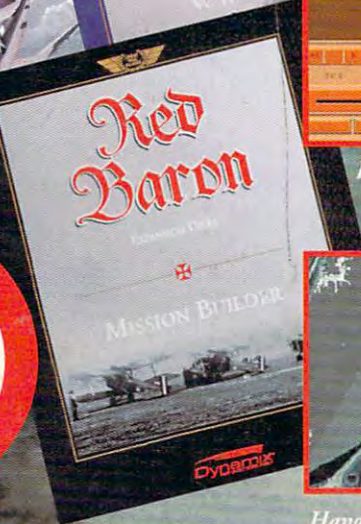
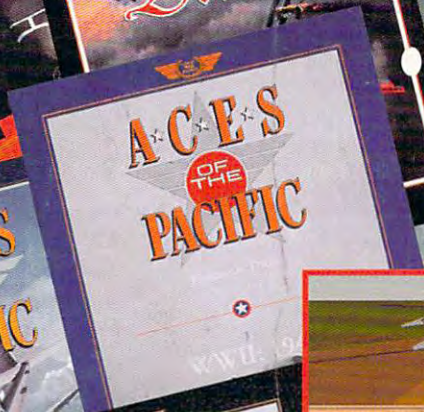
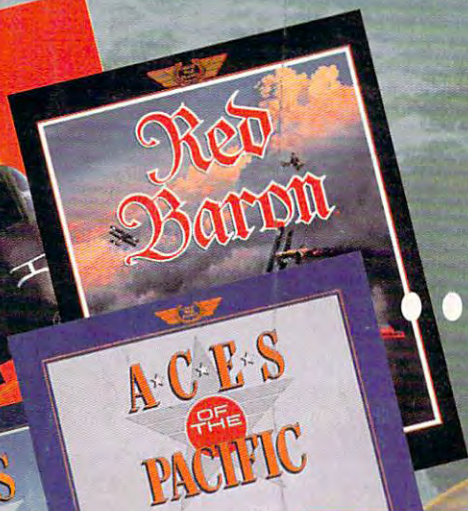
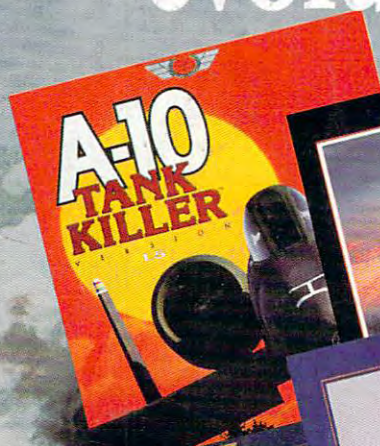
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