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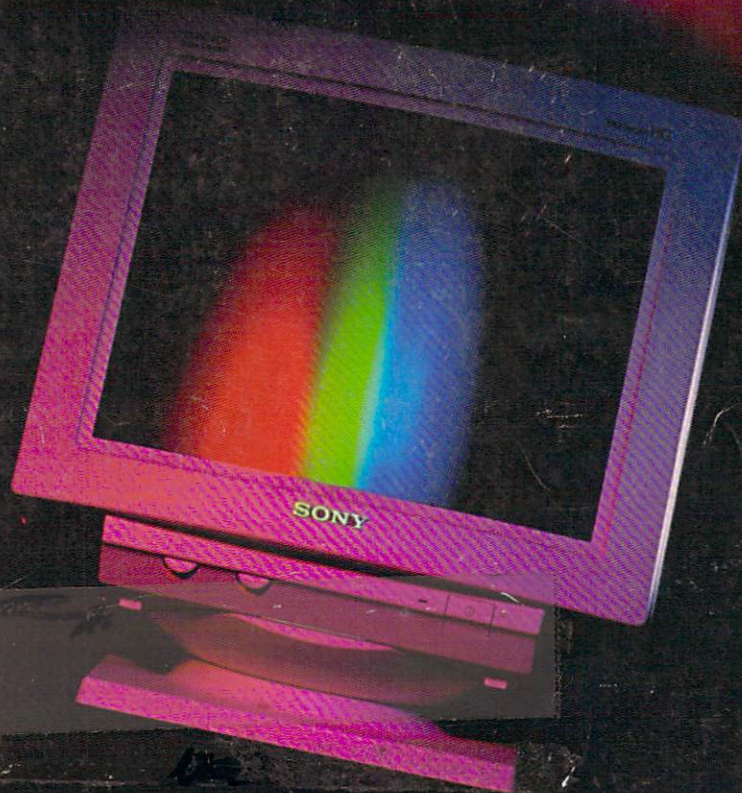
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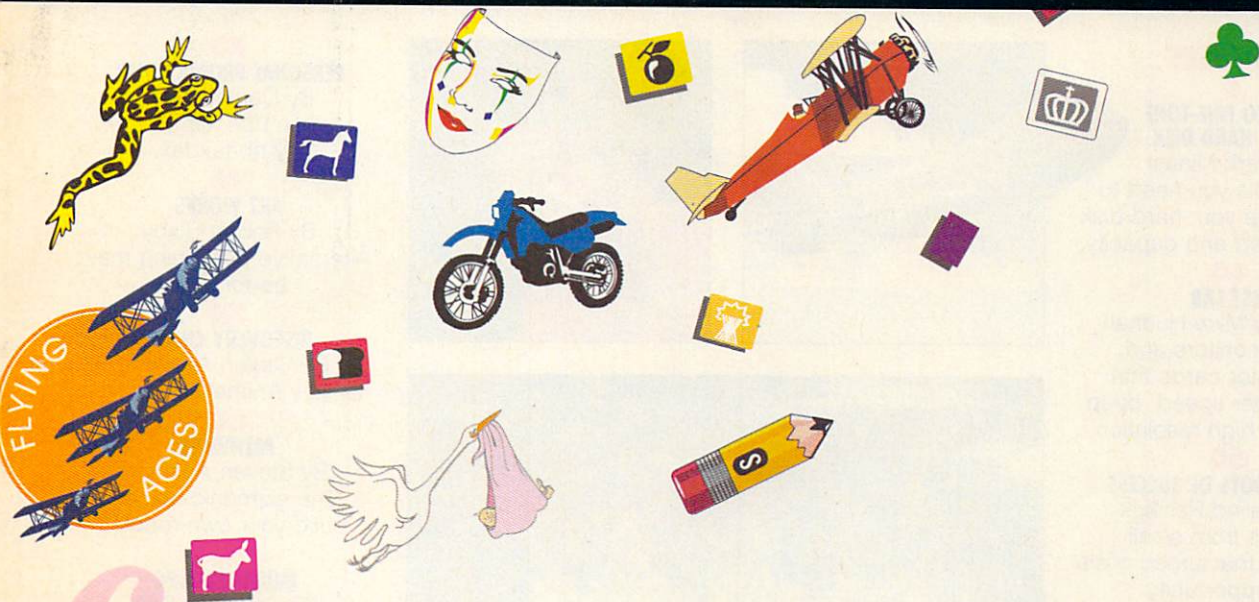


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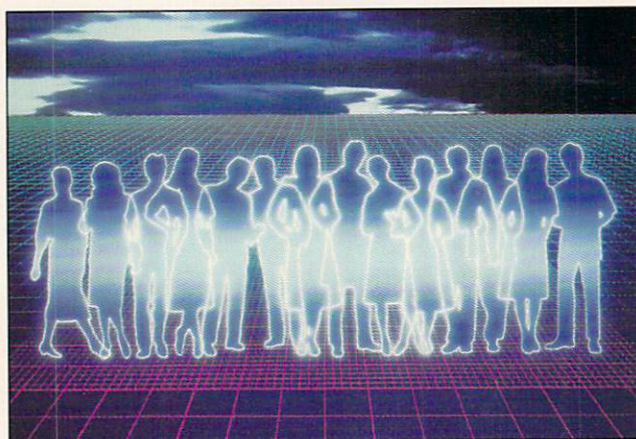
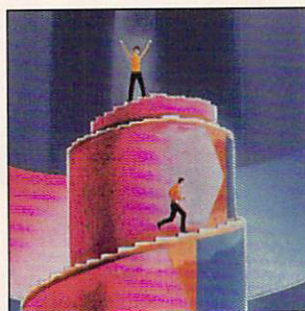
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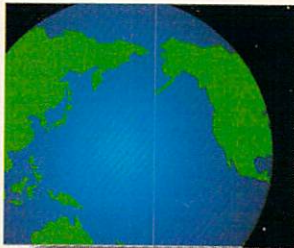
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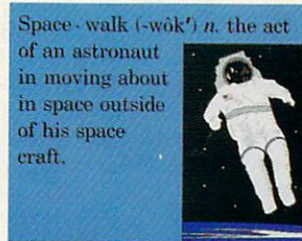
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Clifton Karnes

What is bandwidth, and where can I get some? That's the computer user's cry of the nineties. Though the term was originally coined to describe the frequency range of a communications channel, it's now used to describe the capacity of any channel to transmit information.

In the PC, there are several channels where bandwidth is an issue. The most important are those that connect the CPU to its peripherals (video, hard disk, and so on) and to networks (dial-up networks like GEnie, CompuServe, Delphi, and America Online as well as local area networks).

Unfortunately, simply increasing CPU speed won't solve the PC's bandwidth problem. Modern 33- and 50-MHz CPUs are certainly amazing speed demons that can transform raw data into useful information in a lightning flash, but the time it takes to move this

data across a network or to your screen or hard disk is still geological in comparison.

How do you increase bandwidth? There are three principal ways: You can make the channel wider, you can make it faster, or you can compress the information that travels through it.

Making the channel wider was the big innovation of the AT's 16-bit bus over the original PC's 8-bit bus. Although there have been other bus designs that offered wider channels (Micro Channel and EISA), none have really caught on, and most of us are still using the 16-bit AT bus designed ten years ago. And the fact that this bus is limited to 16 bits is not its worst problem. No matter how fast your CPU, your bus is running at 8 or 10 MHz, so information may fly out of the CPU at 33 MHz, but it nearly comes to a halt when it hits the bus.

One solution to the system bus problem is the local bus, which is hooked directly to the CPU. When a system is designed with peripherals on the local bus, they can run with a data path of 32 bits and at the CPU's speed—25, 33, or 50 MHz. Local bus promises to increase the speed of video and hard disks dramatically, and it does seem to be the solution to the PC's internal bandwidth crisis. Indeed, the local bus fights the bandwidth gremlin on two fronts because it makes the bus both wider and faster.

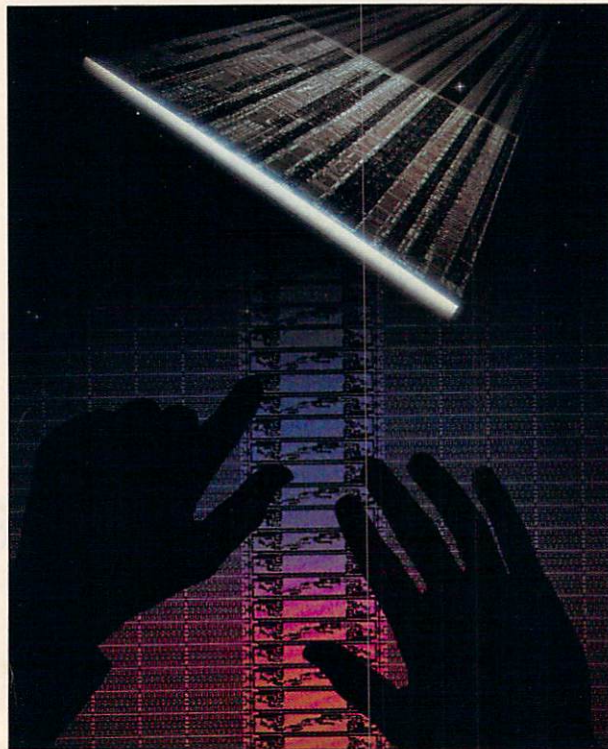
Although the local bus may be the solution for the future, what can we do now to increase bandwidth and improve our systems' performance? The best solution is compression. In telecommunications, which has had the most severe bandwidth problem of any channel, compression has been used since the

beginning. If you download or upload files from telecommunications services, you know what I'm talking about. To make transfers faster, a file or group of files is compressed before it's uploaded. Then, it's downloaded in its compressed state and decompressed so it can be used. This compression-decompression process effectively increases the bandwidth of the channel by moving more data in less time.

Although you may not have thought of it this way, your hard disk is a channel, too, just like your machine's local bus and system bus. Most of the time, however, data sits on your hard disk, so it's less dynamic than these other channels. But the size of your disk dictates the amount of data you can access via that disk, which makes it a channel. Compression can help here, too. With programs like Stacker, data is compressed and decompressed on the fly. Since the data is stored in a compressed format, the disk can hold more, hence increasing its bandwidth.

In this issue, you'll see the bandwidth problem addressed in hands-on, real-world terms in several places. First, check out Mark Minasi's "How to Fine-Tune Your Hard Disk" for ways to improve the speed, width, and capacity of that channel. The same author talks about communications bandwidth in his regular "Hardware Clinic" column. This issue's Test Lab looks at VGA systems, including accelerator cards that increase video speed—one of the PC's greatest bandwidth bottlenecks. And next issue, we'll take a look at hardware and software add-ons to help you blast through the most intractable bandwidth barrier of all—printers. □

When a system is designed with peripherals on the local bus, they can run with a data path of 32 bits and at the CPU's speed.

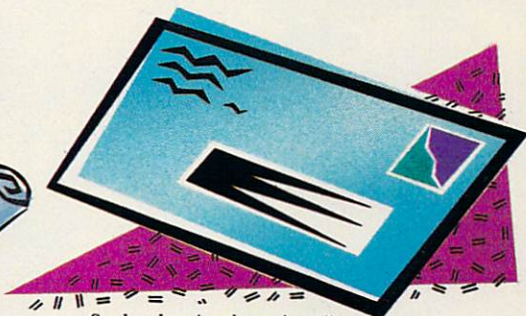


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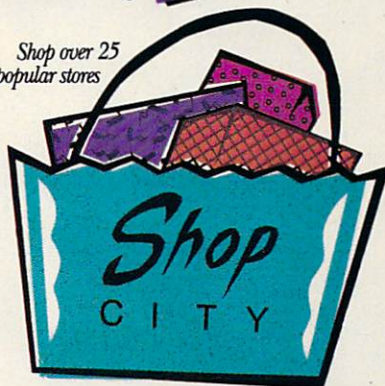
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HOW TO FINE-TUNE YOUR HARD DISK

FOUR EASY, INEXPENSIVE
WAYS TO MAKE YOUR HARD DISK
BIGGER AND FASTER

BY MARK MINASI

N

eed a faster disk? You could spend a pile of money on a new drive, but there may be a better way. Your PC's disk subsystem is characterized by bottlenecks, redundancy, and other inefficiencies. To enable you to fix those problems, we'll discuss four techniques for tuning your disk: using disk caches and track buffers, directory-structure caching with FASTOPEN, rearranging the order of your directories, and unfragmenting your disks.

Amazingly, a good part of the PC world still doesn't use a cache (pronounced "cash") program, though caches and track buffers have been around the computer world nearly since its inception. The reason may be that many people don't know what caches are. They're included in a class of programs that perform speed matching; that is, they try to imbue the relatively slow disk drive with the relatively high speed of the computer's RAM.

You probably know that disks are slower than memory, but do you know how slow? When your PC requests data from the hard disk, the disk must deliver the data in 512-

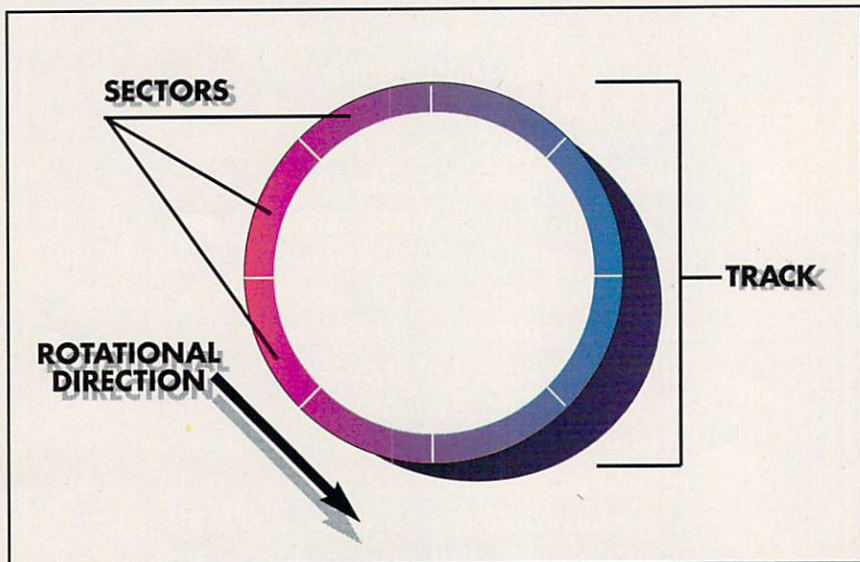
byte chunks called sectors. The disk typically locates and reads a particular sector in 10-100 milliseconds (ms); this number is the average seek time of the disk.

Ancient XT 10MB hard disks seek in around 100 ms. Newer drives typically seek in 10-20 ms. So if we say, for example, that a disk can transfer 512 bytes of data into the computer's RAM in 20 ms, how much time is required to transfer 512 bytes of data from RAM to RAM? In other words, what's the corresponding seek time for a block of data in RAM? A best-case scenario would be about 0.05 ms on a 20-MHz 386 computer, or 400 times faster. So every disk access seems painfully slow—geological, in fact—to the processor. This is where track buffers and caches come in.

Making Tracks

Look at the diagram labeled Tracks and Sectors; you'll see that sectors are grouped together into a structure called a track. The disk head floats over the track as the track spins beneath it at 3600 rpm. The disk spins whether or not the head is reading the disk's data.

The notion of a track buffer grows out of the idea that since sectors fly by the disk head while the head is waiting for the right one, we might as well read them. It's generally true that when DOS needs sector *x* on a particular track, the next sector it will need will be sector *x*+1 on that same track. So track buffer programs like Microsoft's SMARTDrive 3.0 and earlier (SMARTDrive 4.0, shipped with Windows 3.1, is a real cache)



Tracks and Sectors: Sectors are grouped together into a structure called a track.

WHAT NOT TO WORRY ABOUT: INTERLEAVES

If you've read anything about disk optimization, you've probably heard of the notion of setting the right interleave for your drive. Interleaving is the process of arranging sectors on a track in such a way that the entire track can be read quickly. PC gurus used to worry quite a bit about how to interleave a disk, largely because the period from 1983 through 1989 saw vendors selling computers with incorrectly interleaved disks. You won't need to worry about it for two reasons, however. First, today's drives are already interleaved in such a fashion that they provide data-transfer rates far in excess of what older drives could even hope for. The original XT's hard disk couldn't provide data to the system at a rate any faster than about 80K per second. Hard

disks nowadays commonly transfer data at rates of around 1200K per second and up, so there's no point in trying to improve things by tinkering with the interleave.

But the second reason to forget about interleaving is the really telling one. Today's drives tend to use a technology called IDE, or Imbedded Drive Electronics. (No, imbedded isn't spelled as you normally see it; this is the way the drive folks spell it.) IDE packs a lot of drive into a small and inexpensive package, but in doing so it cuts a few corners. One of those corners concerns reinterleaving. You can actually permanently damage some IDE drives by reinterleaving them, so don't get an interleave program off your local bulletin board and start messing with your drive.

If you really want a program that will adjust interleaves but can first determine whether or not it's safe to adjust them, get Spinrite II from Gibson Research. Spinrite has a street price of about \$70.

intercept the DOS request for a single sector and reformulate it into a request for all of the sectors on that track. When the disk hardware returns with all of the sectors on the track, the track buffer puts the copies of the disk data into an area of memory and passes to DOS the sector originally requested. Soon thereafter, DOS will probably want the next sector on that track. The track buffer, monitoring all disk activity, sees this request and shields the disk hardware from it. Then, it grabs the sector that already

has been read into its buffer area and passes the data to DOS. DOS has no idea that this has happened, only that the disk drive is suddenly fast. Obviously, track buffers work best when data is accessed in a nice, orderly, sequential fashion.

Caching Programs

There's a class of programs that are more generic in the way that they use extra RAM to increase apparent disk speed: disk cache software. Disk caches don't worry about sector and track read-aheads, although they may implement a bit of read-ahead for best performance. Instead, they focus on what, exactly, you use your disk for. If you're like most people, you use the same areas on your disk over and over. Say you get in and out of WordPerfect several times a day; that implies that your disk must reread the WP.EXE program and its attendant files every single time you start WordPerfect.

A disk cache improves on things in a manner similar to that of a track buffer by sitting quietly in memory and monitoring disk activity. As a file—say WP.EXE—is read, the disk cache makes a copy of the data that's been read from disk and puts it in the cache's memory area. Then, the next time that DOS needs WP.EXE, the disk cache program steps in, removing the need for the hardware to reread the WP.EXE file.

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It should be obvious that cache programs need a fair amount of memory in order to do any real good. Most cache programs use either expanded or extended memory. If you have RAM to burn, I'd recommend a cache of at least 512K.

If you're running Windows, don't put your cache in expanded memory; put it in extended memory. Memory-manager conflicts with Windows can cause any program that uses expanded memory to lose its data in expanded memory. If the program is a disk cache, parts of the disk may be affected, corrupting the disk's data. I found this out the hard way: Running an early memory manager with Windows caused the system to overwrite the first sector of my D drive's file allocation table. In common parlance, that means DOS no longer knew how to find the first 250 or so files on my D drive. Fortunately, I'd just finished writing a book on bringing dead hard drives back to life (*The Hard Disk Survival Guide*, published by Sybex), or those files would've been gone forever. So stick your cache in extended memory if you use Windows.

What to Cache

This leads to the next question about caches. If I allocate 1024K (1MB) of RAM to a cache (that's tiny when compared to the capacity of my hard disk), how does the cache program know what to put in the cache? Simple: It just keeps copying everything that you read into the cache until it runs out of cache space. Then it's got to make some decisions.

In order to accommodate new stuff, a cache throws out old stuff according to either LRU or LFU algorithms. With LRU (Least Recently Used), the cache throws out the oldest stuff. With LFU (Least Frequently Used), it figures how often something is used. Which is better? Truthfully, that's like asking, How many angels can dance on the head of a pin? Experts can argue the merits of one method over another, but for normal PC usage, there's no difference. I just mention LRU and LFU because you'll see references to them in the cache documentation or in marketing literature.

Three to Consider

OK, that's the techie stuff—how about some solid recommendations? First, there's SMARTDrive 4.0, the newest version of the cache that ships with Windows 3.1. In this incarnation, SMARTDrive is an EXE file that you

load in your AUTOEXEC.BAT file (previous versions of SMARTDrive are SYS files loaded in CONFIG.SYS), and it's a real cache. Not only does it allow you to change the size of the cache block, but it also caches writes (which gives it a big performance boost over previous versions), offers a raft of new configuration features, and comes free with Windows. If you opt to use the new SMARTDrive and cache writes, be sure to flush your cache before turning your machine off. To run SMARTDrive without caching writes, simply follow the SMARTDRV.EXE command with your drive letters.

Super PC-Kwik Disk Accelerator from Multisoft is my overall favorite, and it's under \$100. Unlike many other caches, it has been specifically designed to work with Windows and even includes a small Windows program that monitors what percentage of disk accesses have been satisfied from the cache. You'll typically find that 80-85 percent of your disk accesses are intercepted and handled by the cache. You can contact Multisoft at 15100 Southwest Koll Parkway, Suite L, Beaverton, Oregon 97006; (800) 274-5945.

The other cache to consider is HyperDisk, from HyperWare. When I last checked, it was a shareware product found on CompuServe, GENie, and the like.

Cheap Caches

Suppose you don't want to spend any money. (Yes, you're supposed to register—read pay—for shareware such as HyperDisk.) Assuming you've got DOS 5.0, there are three commands that will help. First is good old BUFFERS, a very simple system that, well, buffers sectors. Once upon a time, we all tried to keep our BUFFERS values to a minimum because each of them took a little over 500 bytes apiece from our precious conventional memory. But with DOS 5.0 and a 286 or higher, you just load the HIMEM.SYS device driver and specify DOS=HIGH in your CONFIG.SYS file, and all the buffers go live far away from your 640K conventional memory. Crank up your BUFFERS number as large as you like. It won't do much, but it may help some applications. On older, slower computers, this advice doesn't apply, as too many BUFFERS will slow things down.

Since version 3.3, DOS also has had a very small cache program that caches just one thing: the directory structure. FASTOPEN's only job is to prestore the information that DOS needs to traverse the subdirectory structure. You see, subdirectory information—what files are in a subdirectory, how big the files are, when they were created—is all kept in a special kind of file. Accessing a data file in a subdirectory, then, requires

ENLARGE YOUR DISK WITH STACKER

On the topic of running out of disk space, here's a quick and easy way to enlarge your disk: Stacker. This program works by compressing and decompressing files on your disk on the fly. For years, computer experts have used programs like PKZIP, LHARC, and ARC to compress computer files. Such programs can be quite effective, converting a file from, say, 100K down to 30K. That converted file cannot be used directly and must be decompressed to its original size of 100K.

The value of file compression is that you can store a lot of little-used stuff on your disk in compressed format, decompressing it as you need it. But the compression-decompression cycle takes time and is an annoying extra step.

That's where Stacker comes in. It compresses and decompresses transparently—you don't even know it's working, save that your disk accesses slow down a bit due to the compression-decompression overhead. And you can eliminate that delay by buying the Stacker disk coprocessor board.

Stacker is available from Stac at 5993 Avenida Encinas, Carlsbad, California 92008; (800) 522-7822. And, by the way, the latest versions come with a free file-unfragmenter program. The experience of my staff when installing Stacker indicates that it's best to start with a clean hard disk, install Stacker, and then reload your files rather than let the installation program install and squeeze all in one step.



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reading a bunch of files to understand the directory structure before we even get close to reading the data file. By prereading the directory structure into RAM, FASTOPEN speeds up the file-access process noticeably. A word to the wise, however: Be careful about using FASTOPEN in conjunction with disk caches, file unfragmenters, or any other disk utility. Check the disk utility's documentation before you use it with FASTOPEN.

In addition to BUFFERS and FASTOPEN, DOS also has, as already mentioned, the track buffer program SMARTDRV.SYS. If you're running SMARTDrive with Windows, be aware that the Windows and DOS installation programs are fairly dumb about the amount of memory they grant to SMARTDrive. On a 4MB system, the Windows 3.0 installation program gives 2MB to SMARTDrive—way too much, particularly since Windows desperately needs that memory.

Sort Your Directories

Reading files in subdirectories involves reading the files that are the subdirectory structure, and that brings up another problem. DOS doesn't keep files including subdirectories, in any particular order; it just puts them wherever seems good at the time the files are created. Then, when DOS needs a file or needs to find a subdirectory, it starts at the top of the directory and sequentially works down until it finds the file.

Note that word sequentially: It points out a weakness in the DOS disk structure. Say you've got 500 items in your root directory—495 files of various kinds and five subdirectories. Suppose further that the 495 files come before the five subdirectories. The result is that every time you need a file that's in one of those subdirectories, DOS must first find the subdirectory itself. To do that, it has to look through the 495 files. All of that searching takes time, and that's one reason why Microsoft wrote FASTOPEN and included it with DOS. But there's another way.

The Norton Utilities includes a program called DIRSORT, which is intended to sort your directories. There's really no point in sorting your

directories—who needs alphabetized subdirectory names? DIRSORT's value is that it allows you to throw out the alphabetizing nonsense and rearrange your directories by hand. When rearranging your directories, use two simple rules: Put the subdirectories above the files, and place the most-used subdirectories at the top.

Unfragment Your Files

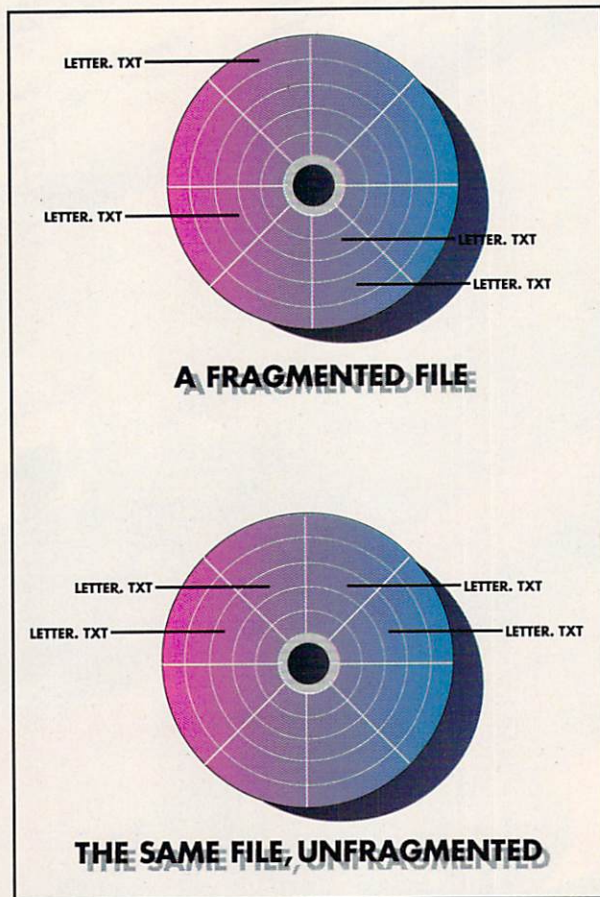
Running out of disk space? Hey, who isn't? Most of us have hard disks that are packed to the gills. It's a pain to

has no choice but to scatter your file; such a file is said to be fragmented. This isn't an error, as DOS can retrieve fragmented files when needed. But it's undesirable because reading fragmented files requires that the disk head move to and fro, requiring more time than would be necessary otherwise.

To alleviate this problem, software manufacturers have produced a slew of programs that will unfragment the data on your disk. The first was a program called Disk Optimizer, from SoftLogic Solutions. Although it's still available, the Big Three disk utility packages (Norton, Mace, and PC Tools) all now incorporate unfragmenter programs. Norton's is called Speed Disk, PC Tools has Compress, and Mace has Unfragment.

The best unfragmenter of all, however, is no longer available, as far as I know. Called FastTrax, this program first examines the dates on your files. Then, reasoning that the older files are the ones that won't be changed, it puts those files near the "bottom" of the disk space, leaving at the top a single pool of free space. As the newer files—that is, the ones most likely to change—all reside near the top, they aren't fragmented as much or as quickly when they grow. It's too bad that there doesn't seem to be a way to get in touch with the program's makers; FastTrax is a nice utility, and there's nothing on the market that works quite like it.

In any case, be sure to unfragment your disk now and then. But don't do it to



constantly have to remove one thing in order to put another on a disk. Worse yet, there's a nasty side effect: Your files get fragmented. Take a look at the accompanying figure to see what that means.

If it doesn't have enough room in one place, DOS scatters a file's data all over the disk.

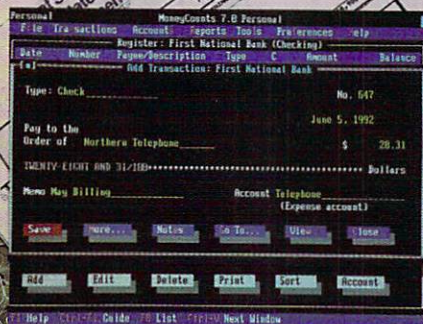
You see, when you ask DOS to put a new file on a mostly full disk, DOS would like to put the file all in one place, but it probably can't. Because the free space largely consists of empty spaces left behind by deleted files, it's not all one nice pool of unused space; rather, it's scattered all over the disk. So DOS

improve your disk's speed—you won't see that great an increase. You'll see the difference if you ever need to do some kind of data recovery on your disk. Think about it: If you had to use Norton or a similar program to piece a file back together, would you rather do so with the fragmented file pictured or with an unfragmented one? The unfragmented file would be much easier to reassemble.

There you have it—four ways to speed up your disk and save space. So get started: Unfragment your disk, rearrange your directories, and spend some cash on more memory so you can spend some extra memory on some cache. □

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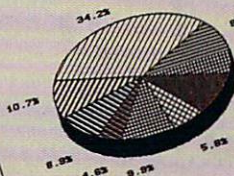
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TEST LAB

Faster, sharper, and less expensive new video technology is here. This is a great time to upgrade to a new monitor and graphics adapter.

Gone are the days of boring monochrome displays and blocky, hard-to-read CGA graphics. Today's monitors and graphics adapters display hundreds of colors at once, brilliantly rendered and at surprisingly high resolutions.

Software manufacturers are taking advantage of new video technology to make their products more exciting than ever. Entertainment software is faster and more realistic, presentation software is more persuasive, and applications of all kinds are more attractive and interesting. And you can use your monitor with less eye-strain, too.

The sometimes baffling statistics from manufacturers tell only part of the story. This month's Test Lab gives you the whole picture, so to speak, running an impressive series of benchmark tests on two categories of products, Super VGA monitors and accelerator cards.

With most modern software demanding more from your video system, a Super VGA monitor will be a logical upgrade for many of you. In this Test Lab, we examine Amdek, Mitsubishi, NEC, and Sony monitors, products with a variety of features and prices.

Video accelerator cards are hot because of the pervasiveness of Microsoft Windows. With these cards, you can increase your productivity and decrease the frustration that comes with waiting for Windows screen refreshes.

Here, too, you'll see a variety of features and prices from ATI Technologies, CSS Laboratories, Glad Systems, Number Nine Computer, STB Systems, and Weitek. It's not enough to look at video technologies. You have to know what to look for. With this month's reviews, benchmark tests, and sidebars, you can do just that.

MIKE HUDNALL

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(408) 473-1200
List price: \$599

AMDEK AM/738+

If your needs are moderate, the 14-inch Amdek AM/738+ may well be the Super VGA monitor for you.

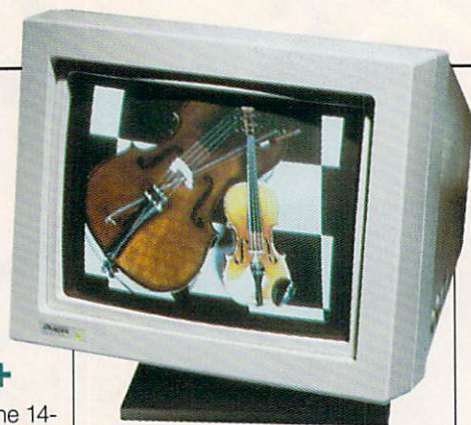
The monitor is a multiplatform unit, which means you can use it for IBM-compatible PCs as well as the newer Macintosh II-series computers.

You'll find no controls mounted on the front of the monitor; in fact, the only adornments on the unit's face are a small Amdek logo and a green LED power indicator in the lower left corner. Look for the power switch and the brightness and contrast controls on the right side of the monitor, close to the front. Instead of having the knob-type controls usually found on monitors, the AM/738+ uses rounded "trackball" controls for the contrast and brightness adjustments, while the power switch is a flush-mounted button about the size of a nickel.

At the rear of the unit, you'll find standard slotted-knob controls for adjusting vertical size, horizontal size, and horizontal position. There are no other user-accessible controls or adjustment mechanisms.

Amdek has a very stable and highly adjustable tilt-swivel base for altering the monitor's position so that it provides optimal viewing. However, the tilt-swivel base isn't detachable on the AM/738+ as it is with most other monitors I'm familiar with.

While in general the color and resolution of the AM/738+ video are very good, I did notice moiré patterns any time a fine dot pattern was present (as with the standard Windows Program Manager screen or in Microsoft Works' toolbars and borders). "Blooming" (thin lines getting thicker at their



ends, resulting in a nonuniform and slightly defocused image at these points) was another undesirable trait the AM/738+ exhibited in some applications. This was particularly noticeable whenever groupings of fine lines appeared in the video image, such as with intricate graphics or paint files.

I also found it impossible to run Windows 3.0 with the AM/738+ in the 1024 x 768 256-color mode when using my Truevision Video with VGA Overlay board; in this mode, what I saw was an unacceptable, severely darkened image devoid of color. I didn't have a problem, however, with the 800 x 600 mode. While this 1MB board with its Tseng 4000 chip set does incorporate some non-standard timings at the higher resolutions, other monitors I've used it with don't have any problem in the 1024 x 768 mode. The AM/738+ runs in the interlaced mode at 1024 x 768 resolution, but it runs in the noninterlaced mode at 800 x 600 resolution, which is undoubtedly the reason for the incompatibility I experienced at the higher resolution with this noninterlaced board. If you intend to use a noninterlaced video adapter in 1024 x 768 resolution, be forewarned that this monitor isn't capable of noninterlaced displays at that resolution.

If you're on a budget, work predominantly in text and numerical applications rather than graphics, and don't need 1024 x 768 noninterlaced resolution, the AM/738+ is worth a closer look.

TOM BENFORD

Circle Reader Service Number 304

ATI GRAPHICS ULTRA

ATI's products have enjoyed a well-deserved reputation for high quality, high performance, and innovation since the company first started. This reputation for excellence is more deserved than ever with its current series of graphics accelerator boards, especially the ATI Graphics ULTRA board.

This half-length graphics board is chock-full of features, starting with ATI's proprietary Mach 8 coprocessor, which relieves the PC's CPU of many of the normal video tasks and routines it usually performs. This dedicated graphics coprocessor contributes to significant speed increases in Windows applications.

The Graphics ULTRA contains separate memory sections for the coprocessor and the Super VGA video. You can buy the board with either 512K or 1MB of coprocessor VRAM memory; if you buy the 512K version and decide to upgrade to 1MB later, you can handle the job with SIPP (Single In-line Pin Package) RAM modules. The separate VGA RAM section comes outfitted with 256K of dedicated VGA RAM, which can be expanded to 512K.

A 400-dpi Microsoft-compatible mouse included with the Graphics ULTRA plugs into the bus port on the card's mounting bracket. The mouse is a three-button unit with a curved shape and flush-mounted buttons; while it may be Microsoft-compatible in operation, it's no match for the Microsoft mouse when it comes to comfort, control, and overall hand-shape ergonomics. The mouse may be a purchase point worth considering for some users, however, if they need a mouse and are interested in upgrading their system's video graphics capabilities at the same time.

One of the most unique and noteworthy features of the Graphics ULTRA package is ATI's Crystal Font package. Crystal Fonts are scala-

ATI TECHNOLOGIES
3761 Victoria Park Ave.
Scarborough, ON, Canada M1W 3S2
(416) 756-0718
List price: \$599 with 512K, \$699
with 1MB

ble compact font outlines that generate font images "on the fly" at incredibly fine resolutions and ultra-fast speeds (up to 40,000 characters per second). The video display refreshes itself almost instantly, and the definition and legibility of these fonts are truly impressive. According to ATI, using the Crystal Fonts technology is like having near-300-dpi laser resolution on the video display; after using Crystal Fonts, I must agree that this is an accurate analogy.

Driver, utility, and Crystal Font software comes supplied on two 5¼-inch floppies only; no 3½-inch disks are included in the package. Installing drivers for Windows as well as AutoCAD and several other popular application packages is a simple, almost totally automatic procedure requiring the user to answer a couple of questions or accept default answers throughout the process.

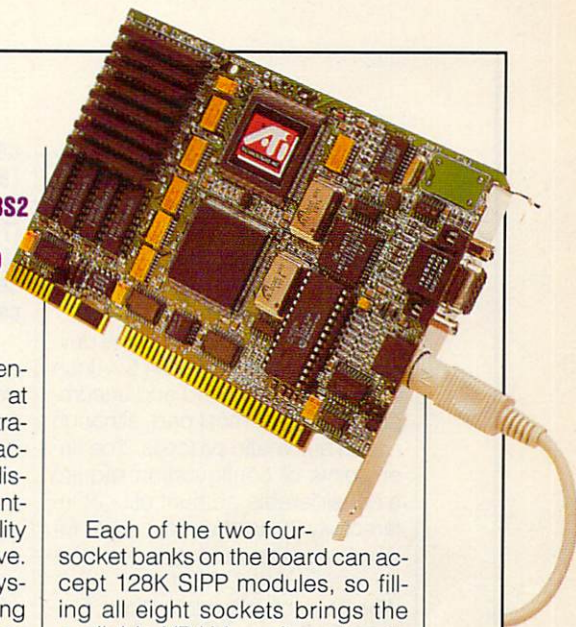
While I still preferred to use my Microsoft mouse during my review, I was very impressed with the Crystal Fonts and the overall speed of the board both in Windows applications and in DOS—the board is a screamer. Of all the boards reviewed here, the ATI Graphics ULTRA is my first choice for overall performance, features, and video fonts resolution.

TOM BENFORD

Circle Reader Service Number 305

CSS MAXGRAPHICS/16

The three-quarter-length CSS MaxGraphics/16 graphics accelerator card is American-made and comes with either 512K or 1MB of VRAM in SIPP (Single In-line Pin Package) RAM modules.



Each of the two four-socket banks on the board can accept 128K SIPP modules, so filling all eight sockets brings the available VRAM configuration to its 1MB maximum. It's important to note that this board, as well as some of the others reviewed here, imposes some video mode restrictions when only 512K of VRAM is available on the board. With the MaxGraphics/16, the restrictions of the 512K configuration are that the board won't function in 1280 × 1024 (16-color) mode, 1280 × 960 (16-color) mode, 1024 × 768 (256-color—the 512K version supports 16 colors) mode, 800 × 600 (256-color—the 512K version supports 16 colors) mode, high-color (16-bits per pixel) mode, and two-page mode. Adding the additional 512K of VRAM eliminates these problems, so if you want to use this board in the extended or high-color mode, plan on spending more for the extra memory.

One of the first things I noticed about this board was an edge connector at the top, which made me hope that the MaxGraphics/16 might have capabilities similar to those of the #9 board for coupling to and working with an existing Super VGA card. Generally, an edge connector such as this one is put on a board for just such a purpose, but I could find no mention of this connector or its purpose anywhere in the user's manual. It was merely referred to as "feature connector" in the manual diagrams.

Although it lacks an index and

TEST LAB

information about the feature connector, the manual is otherwise adequately written. At the end of the manual, you'll find a quasi-useful glossary of terms tied to video technology (such as *bitmap*, *driver*, and *palette*).

I found the installation of the driver and utility software (on 5¼-inch disks) straightforward and uncomplicated for the most part, although not an automatic process. The finer points of configuration require a considerable amount of user interactivity. In addition to a driver for Windows, the package provides drivers for AutoCAD, Lotus 1-2-3, WordPerfect, Microsoft Word, Generic CAD, and other applications.

The board has several jumpers that may require resetting if the factory defaults cause conflicts with other devices. The manual warns of such incompatibilities, stating that they're due to certain design characteristics of IBM AT-compatible systems, which require all boards to use a certain area of memory. While I didn't experience any problem using the board on a fairly "plain vanilla" 386SX/16, the documentation warns that "you may experience problems using the MaxGraphics/16 along with other peripheral cards." This would tend to make me feel uneasy about installing this board on a system with multiple peripherals like sound cards, a hand scanner, a video capture board, a SCSI or proprietary CD-ROM controller, or other such devices. With these

CSS LABORATORIES
1641 McGaw Ave.
Irvine, CA 92714
(714) 852-8161
List price: \$325 for 512K
configuration; \$395 for 1MB
configuration

devices in your system, you'd need to be ready to resolve interrupt and other conflicts that might arise with this card.

With the CSS MaxGraphics/16, as with the other boards, you need to assess your needs, study our Test Lab results, and determine how willing and able you are to tinker with the hardware.

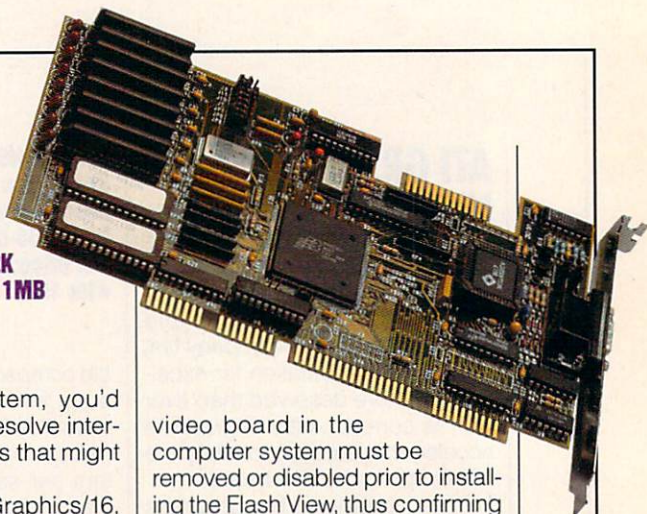
TOM BENFORD
Circle Reader Service Number 306

GLAD SYSTEMS FLASH VIEW

A three-quarter-length American-made board with 1MB of video RAM already installed, the Glad Systems Flash View offers affordable Windows/GUI acceleration.

Like the CSS MaxGraphic/16, the Glad Systems Flash View has an extra-edge connector on its top side. According to the Flash View documentation, this feature connector is an "auxiliary video connector which provides support for future video applications." A bold notation in the system-requirements section of the manual advises that any other VGA or non-VGA

GLAD SYSTEMS
404 S. Abbot Ave.
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(408) 456-8888
List price: \$295



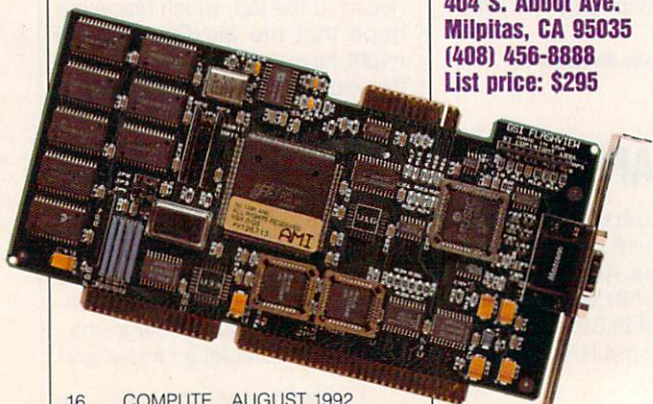
video board in the computer system must be removed or disabled prior to installing the Flash View, thus confirming that it cannot be used in concert with another video adapter. A single 15-pin D connector is located on the board's metal mounting bracket.

The software includes drivers for Windows as well as for AutoCAD, AutoShade, VersaCAD, Generic CAD, Microsoft Word 5.0, Ventura Publisher, WordPerfect 5.1, Lotus 1-2-3, Symphony, GEM 2.x/3.x, and several other applications. Setting up the drivers for Windows is simple and straightforward. But installing drivers for some of the other applications may require manually copying the required files from the driver disk into the application's subdirectory and then running the application's configuration utility to activate the newly installed drivers.

Jumpers are provided for adjusting configuration parameters to optimize the monitor and other system components and to resolve any device conflicts that might arise. To install the board, you simply insert it into any available three-quarter-length 16-bit slot and load the driver software.

The user's manual provided with the Flash View is among the best of those for all the boards covered here. It's well written, exceptionally well organized, and great in its troubleshooting advice. You'll also appreciate the plentiful technical information, component illustrations, and jumper-setting diagrams and charts.

With regard to performance, the Flash View was a pleasant surprise. Applications under Win-





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dows 3.0 typically ran two to three times faster with the Flash View card than with the review system's Oak Technology VGA board. Flash View is a no-frills board that comes in a plain package and does exactly what it claims: It significantly speeds up video processing and provides excellent image resolution without flicker even in the superextended video modes. These factors make the Glad Systems Flash View a highly attractive and affordable choice for those looking for more speed in Windows and other GUI applications.

TOM BENFORD

Circle Reader Service Number 307

**MITSUBISHI ELECTRONICS
AMERICA**
5757 Plaza Dr., P.O. Box 6007
Cypress, CA 90630-0007
(800) 843-2515
List price: \$599

MITSUBISHI DIAMOND SCAN 14

Mitsubishi's monitors have grown more attractive over the years, both in physical styling and technical advancement. The Diamond Scan 14 is a representative example of this continuing form-and-function evolution.

While the monitor makes a good viewing choice for the intermediate user, it also offers the superhigh resolutions often required by power users. The 14-inch monitor uses Mitsubishi's Diamond Scan screen-matrix technology to produce excellent color rendition and screen contrast, and it's mounted atop a removable tilt-swivel base that makes it easy to adjust the screen for the best viewing position and angle.

You'll find the power switch conveniently located at the lower right

corner of the screen and all of the viewing adjustment controls nestled comfortably under the video display. The usual complement of knobs to control horizontal size, horizontal position, vertical size, and vertical position are all located right up front for easy access.

The system I used with the Diamond Scan 14 was an i486-based PC running at 33 MHz with a 1MB Truevision Video VGA with Overlay board. The Truevision board is a high-end Super VGA card capable of the 1280 x 768 256-color mode as well as support for NTSC recordable video and overlay.

The Diamond Scan 14 had no problems running my Windows 3.0 applications with this hardware configuration in 1024 x 768 256-color mode, 800 x 600 mode, or other modes. Image clarity was very good, as was the color saturation and separation.

Moiré patterns were quite evident anytime a close grouping of vertical lines appeared on the screen, and this condition also affected the corner resolution on some images as well. The moiré patterns were particularly noticeable and visually annoying with

TIMED TESTS OF ACCELERATOR CARD PERFORMANCE

We ran this series of tests under Windows 3.0 in 640 x 480 mode. The Trident card is included by way of contrast to show how much faster our featured accelerator boards are. In these tests, the lower the numbers, the better the performance.

TEST	ATI Graphics ULTRA	CSS MaxGraphics 16	Glad Systems Flash View	Number Nine #9GX1 LITE	STB WIND X	Trident 256K VGA (default)	Weitek Power for Windows
Windows Write	4.50	4.57	4.63	4.62	4.60	10.28	5.28
Works Flyer	7.69	8.03	7.13	7.81	7.80	9.18	8.18
Works Spreadsheet	3.59	3.85	3.94	4.34	3.75	5.50	4.68
Spreadsheet Pie Chart	2.53	2.75	2.78	2.69	2.72	4.06	2.97
Spreadsheet Bar Chart	2.22	2.38	2.60	2.32	2.44	2.85	2.66
Desktop Published Document	7.06	7.25	7.59	7.47	7.35	15.60	7.47
Averaged Performance Index	4.60	4.81	4.78	4.88	4.78	7.91	5.21

DISPLAYMATE TESTS OF ACCELERATOR CARD PERFORMANCE

The figures below are display-speed indexes for text and graphics; they are weighted averages of a variety of video operations. These indexes indicate how quickly images can be accessed and drawn on the display. They also indicate performance relative to the performance of three systems: an IBM PC with CGA, an IBM AT (8 MHz) with EGA, and a PS/2 Model 70 (25 MHz) with VGA. Higher numbers indicate better performance.

PERFORMANCE RELATIVE TO	ATI Graphics ULTRA	CSS MaxGraphics 16	Glad Systems Flash View	Number Nine #9GX1 LITE	STB WIND X	Trident 256K VGA (default)	Weitek Power for Windows
IBM PC with CGA							
Text	11.7	12.7	12.4	9.0	16.1	8.8	11.3
Graphics	6.0	4.5	4.1	4.8	5.2	4.1	5.7
IBM AT with EGA							
Text	4.1	3.5	3.4	2.8	4.1	2.0	3.6
Graphics	2.7	1.9	1.7	2.1	2.3	1.7	2.6
PS/2 Model 70 with VGA							
Text	2.5	2.0	1.9	1.6	2.2	0.9	2.1
Graphics	1.9	1.2	1.0	1.3	1.4	1.0	1.8

fine dot patterns, as in the borders of many Windows applications such as Microsoft Works or Word. Screen flicker, otherwise unnoticeable, made these gray-border areas "strobe," which is a major cause of eye fatigue.

The Mitsubishi monitor also showed some image persistence with fast-moving, high-contrast graphics. Simply described, when a light-colored object moved quickly across a dark background (as in moving the mouse pointer), a slight ghost image, something like a short tail on a comet, followed the object.

Quickly switching from text to graphics mode and vice versa caused a noticeable screen

bounce, especially when switching from one view to another inside an application. With DOS applications such as Microsoft Works, this screen bounce was quite pronounced when switching a spreadsheet view from the worksheet to a bar graph representation of the same information in another window. Since everything runs under graphics mode in Windows, however, screen bounce wasn't a problem there.

If you're in the market for a good-looking Super VGA monitor capable of running in the extended video modes, take a look at the Mitsubishi Diamond Scan 14.

TOM BENFORD

Circle Reader Service Number 308

NEC MULTISYNC 4FG

The MultiSync 4FG features a 15-inch "flat square" screen that is certainly one of the best computer video displays I've ever seen.

The 4FG's screen is almost flat (or at least much less curved

than those of other monitors), and the screen's corners are at right angles rather than rounded as on other monitors. Consequently, you have a viewing perspective quite different from that of traditional CRTs with their curved screens and rounded corners.

Viewed directly from the center, the screen appears to bow in slightly at both sides, but if you move your head slightly to the right or left of center, the sides then appear to be perfectly straight. I found the video display very easy to view from any angle. A built-in, nonremovable tilt-swivel base facilitates positioning the monitor at the ideal viewing angle for any user.

You'll find all controls on the 4FG front-mounted for easy access. Look for the power switch with illuminated indicator at the lower right front corner; knobs for adjusting the brightness and contrast are bottom-mounted next to it. NEC provides 11 other controls for configuring the display; these are hidden from sight behind a door on the lower left portion of the front panel. Soft-touch push-button controls allow you to adjust the image size and position; four buttons laid out like a cursor keypad are provided for these functions.



NEC TECHNOLOGIES
1255 Michael Dr.
Wood Dale, IL 61019
(708) 860-9500
List price: \$949

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A special degauss button instantly demagnetizes the CRT, eliminating any accumulated static electrical charges that may have collected. A three-position N-1-2 switch, located next to the degauss button, selects normal, amber, or rose-tinted screen backgrounds to aid visibility under certain lighting conditions. To compensate for some nonstandard video adapters, you can use the monitor's sync switch, which adjusts the screen's synchronization signals.

I found the overall image quality of the 4FG superb, with very little "strobing" on those troublesome fine dot patterns and absolutely no moiré patterning at all. Although there was some slight image lag (also referred to as persistence) with fast-moving graphics on high-contrast backgrounds, this was negligible and much less noticeable than on most of the other monitors reviewed in this month's Test Lab.

The MultiSync 4FG can handle all video modes and resolutions up to and including 1024 x 768 with 256 colors, interlaced or noninterlaced, which makes it compatible with just about any video adapter available. I used a Truevision Video VGA with Overlay card which has 1MB of RAM and a Tseng 4000 chip set on it during my review of the NEC, and the video from this card never looked better.

The MultiSync 4FG's excellent color and resolution, luxurious 15-inch screen, and innovative technological features make it an excellent choice for anyone who needs—or wants—outstanding video even in the Super VGA modes.

TOM BENFORD

Circle Reader Service Number 309

All Benchmark/Performance Testing is conducted by Computer Product Testing Services (CPTS), an independent testing and evaluation laboratory based in Manasquan, New Jersey. Every effort has been made to ensure the accuracy and completeness of this data as of the date of testing. Performance may vary among samples.

DISPLAYMATE MONITOR EVALUATION TESTS

	Amdek AM 738+	Mitsubishi Diamond Scan 14	NEC MultiSync 4FG	Sony CPD-1304S
Pass=1 Fail=0				
Screen uniformity and flicker	1	1	1	1
Freedom from background interference	1	1	1	1
Dark screen	1	1	1	1
Geometric linearity	1	1	1	1
Circular test pattern	1	1	1	1
Horizontal vs. vertical line thickness	1	1	1	1
Line brightness vs. thickness	1	1	1	1
Defocusing and blooming test	0	1	1	1
Raster visibility	1	1	1	1
Resolution	1	0	1	1
Corner resolution	1	0	1	1
Normal and reverse video resolution	1	1	1	1
Line moiré pattern	0	1	1	1
Fine line moiré pattern	1	0	1	1
Dot moiré pattern	1	0	1	1
Fine dot moiré pattern	1	1	1	1
Horizontal color registration	1	1	1	1
Vertical color registration	1	1	1	1
Horizontal color registration blink test	1	1	1	1
Vertical color registration blink test	1	1	1	1
64 intensities for primary colors	1	1	1	1
Color timing	1	1	1	1
Digital color timing	0	0	1	1
White-level shift	1	1	1	1
Black-level shift	1	1	1	1
Two-dimensional streaking	1	1	1	1
Streaking and ghosting	1	1	1	1
Persistence test	0	0	0	0
Screen regulation	0	0	0	0
Local regulation distortion	0	0	0	0
Screen snow test	0	1	1	1
Scroll flicker test	1	1	1	1
Text-graphics mode switching	0	0	1	0
TOTAL TEST SCORES	25	24	30	29



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October 30, 1990
Software Carousel, Version 4.0



Software Carousel \$89⁹⁵

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SOFTLOGIC SOLUTIONS

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NUMBER NINE #9GXi LITE

Number Nine's #9GXi LITE is the most technically sophisticated graphics accelerator board reviewed here; it's intended for the serious power user who needs the advanced capabilities it delivers, particularly for CAD applications. With a price tag that starts at \$995 for the basic configuration, it's not for the casual or budget-conscious PC user. The review unit had a RAM option installed, adding to the price of the board.

Innovative is perhaps the best word for an overall description of the #9GXi LITE. At the heart of this half-length board is the Texas Instruments TI 34020 graphics

A NOTE ON PRICES

With computer products changing more rapidly than ever and with options more plentiful than ever, computer prices can be a tricky business.

It pays to keep the following points in mind:

Street prices can be considerably lower than list prices. Shopping around helps you find the best price.

Because computer technology evolves so rapidly, a product may have changed by the time our review sees print. Verify configuration details with manufacturers or vendors before you buy.

Because consumers are more sophisticated than ever about what they want in computer products and because manufacturers have responded with more options and configurations than ever, one computer model may be subject to dozens of variations, each with a slightly different price.

At COMPUTE, we make every effort to verify prices and differentiate between the price for a review configuration and the price for a standard configuration. It's still a good idea, however, to call the manufacturer or vendor to make sure that the configuration you want matches the price you have in mind.

NUMBER NINE COMPUTER

18 Hartwell Ave.
Lexington, MA 02173
(800) GET NINE
(617) 674-0009

List price: \$995 for Level 20 (1MB VRAM); \$1,024 for Level 21 (1MB VRAM and 1MB DRAM)

coprocessor chip. This special graphics processing unit (GPU) is optimized for graphics functions: At 10 MIPS (Millions of Instructions Per Second), it's faster than the CPU of the IBM PC, which runs at 9 MIPS. Because the GPU frees the CPU to do its work, your system can move right along.

The graphics processor is supported by several other processors and support chips, including the TI 40 MFLOP (Math Floating Logical Operations Processor) and 128K static RAM. The board supports up to 4MB of DRAM for offscreen bitmaps and instruction memory as well as up to 2MB of high-speed VRAM. Two proprietary Number Nine ASICs (Application Specific Integrated Circuits) and flash BIOS memory contribute to the overall speed of the board and make its amazing zoom, pan, scroll, and virtual screen capabilities possible.

In addition to being a high-speed graphics coprocessor, the #9GXi LITE has its own on-board Super VGA chip, so it can be used as the sole video board in a PC. One of the features I particularly like about the #9GXi LITE is its VGA pass-through connector, which permits you to use your own favorite VGA card instead of the on-board VGA, so your current video board doesn't have to become obsolete. This feature is especially appealing to me, since my standard video board is an expensive (about \$1,000) Truevision Video VGA with Overlay.

By using the included VGA loop-through ribbon cable to connect the #9GXi LITE to my Truevi-

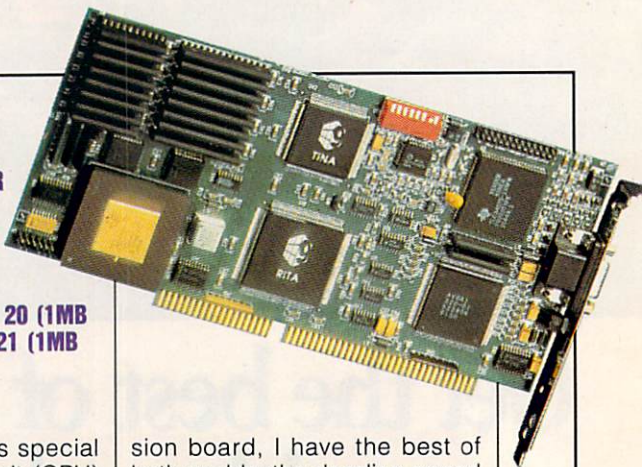
sion board, I have the best of both worlds: the dazzling speed and unparalleled image-manipulation capabilities of the #9GXi LITE and the Super VGA resolution and recordable video output of my Truevision.

The unique features of the #9GXi LITE don't stop there, however. In addition to the 15-pin D connector, a multicolored status LED is located on the mounting bracket. This LED indicates flash memory loading as well as proper operational condition of the board.

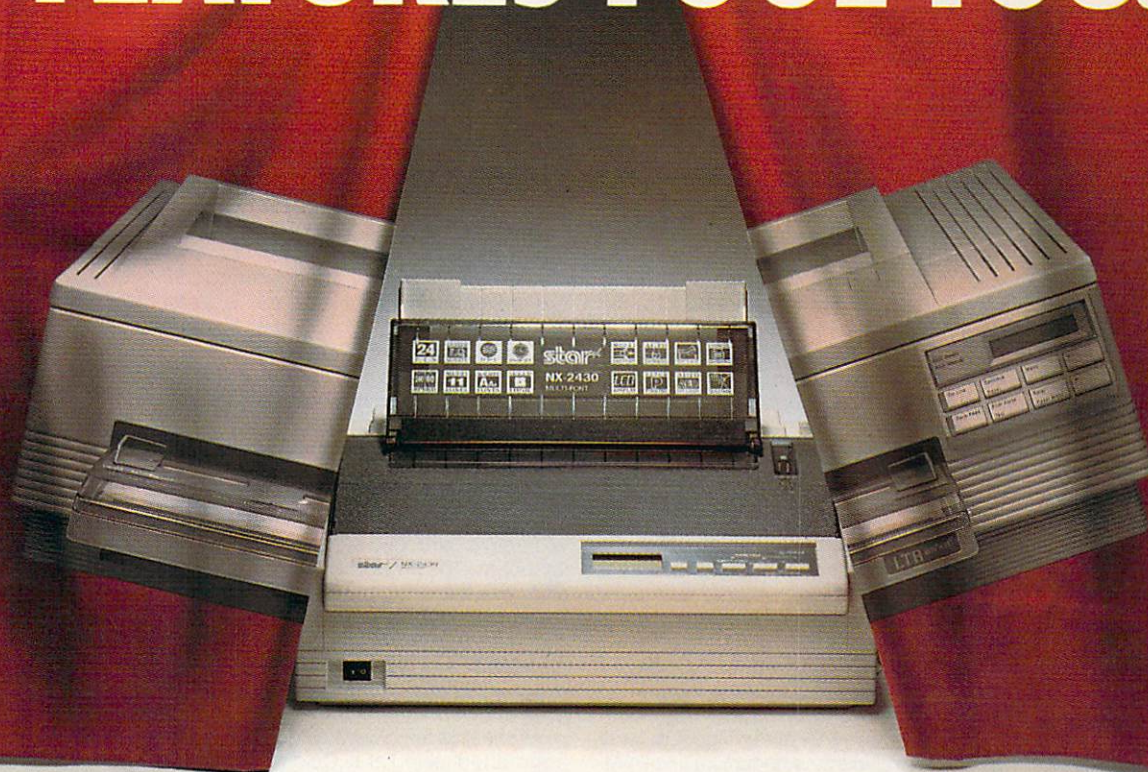
A monitor cable provided with the #9GXi LITE facilitates connecting the card to monitors with four discrete BNC jacks (a type of shielded cable connector). You also get a VGA terminator plug that works with the pass-through connector when it's used. Software comes on both 3½-inch and 5¼-inch disks. The user's manual is excellent.

Without a doubt, the video-manipulation features of the #9GXi LITE make it unique among this month's boards. For example, the board supports a superfast hardware zoom feature that increases or decreases screen magnification by two, four, or eight times; it takes but a single keystroke to activate the zoom and only 1/60 second for the screen to regenerate at the desired zoom level. Virtual screen panning and scrolling are also possible, since the board supports resolutions up to 2048 x 1024. In these resolutions, the screen becomes a movable "viewport" on a much larger picture that you can see by moving the cursor beyond the screen edge to scroll.

AutoCAD users will appreciate



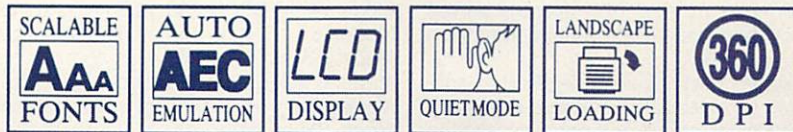
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IT TAKES A LITTLE EXTRA TO BE A STAR.

Circle Reader Service Number 113

TESTING METHODOLOGY FOR ACCELERATOR CARDS AND MONITORS

To test our accelerator boards, we used a 16-MHz 80386SX PC equipped with 5¼-inch and 3½-inch floppy drives, a 40MB hard drive, 4MB of RAM, and a multi-frequency Super VGA monitor. We used MS-DOS 5.0 and Windows 3.0 in Enhanced mode, and, for all tests, we used 640 × 480 16-color mode. For baseline comparison purposes, we ran our video adapter test suite on an Oak Technology VGA card with 256K of on-board RAM. Following are the results of our baseline testing:

Windows Write Test:	10.28 seconds
Flyer Document Test:	9.18 seconds
Spreadsheet Preview Test:	5.50 seconds
Pie Chart Graphics Test:	4.06 seconds
Bar Chart Graphics Test:	2.85 seconds
DTP Document Test:	15.60 seconds

Averaged Performance Index for the default system board: 7.91 seconds

The Windows Write Test measures the time required to create a WYSIWYG display of a Windows Write document incorporating one dozen Bitstream FaceLift fonts of various sizes. First we loaded the document into RAM, then we switched windows, and finally we timed the creation of the WYSIWYG display. The Flyer Document Test measures the time required to create a page view (full-page print preview) of a sample flyer document with borders, numerous Bitstream FaceLift fonts in several point sizes, and some bitmapped clip art.

The Spreadsheet Preview Test measures the time required to re-create a printed-page preview display after the spreadsheet data was already loaded in worksheet format. For this test we used a very dense spreadsheet with cell data created in six-point type.

The Pie Chart Graphics Test measures the time required to create a pie chart graphical representation of the numeric information. For this test we used a corporate profit/loss balance sheet spreadsheet file.

The Bar Chart Graphics Test measures the time required to create a bar graph representation of the data in a personal assets/liabilities spreadsheet file.

The DTP Document Test measures the time required to generate a page view of a single-page document incorporating multiple typefaces, type sizes, and nine bitmapped graphics, along with rules and filled-pattern boxes.

The Averaged Performance Index is an average of the elapsed times for these six tests. This average serves as an overall performance index number for comparison purposes.

Sonera Technology's DisplayMate Video Utilities software was also used for establishing software-independent performance indexes for text and graphics with the test adapters. The DisplayMate Speed Performance Test utility is a compendium of scores of various tests which run in fully automated mode. The 35-second test suite provides performance index measurements for both text and graphics operations relative to an IBM PC (4.77 MHz)

with CGA, an IBM AT (8 MHz) with EGA, and an IBM PS/2 Model 70 (80386 at 25 MHz) with VGA. Running DisplayMate from the DOS prompt, we used this test utility to measure the video adapter's ability and speed in processing text and graphics. These tests are useful for determining the hardware's raw processing power at the base level without any application software intervention.

To test the four SVGA monitors in this month's lineup, we used a 33-MHz i486-based PC equipped with dual 5¼-inch and 3½-inch high-density drives, an 85MB hard disk, a 105MB Plus HardCard IIXL, an internal NEC CDR-83 CD-ROM drive, a Trantor 8-bit SCSI interface card, a Creative Labs Sound Blaster Pro audio card, 8MB of RAM, 64K internal caching, a Computer Eyes/RT video capture card, and a Truevision Video VGA with Overlay board. The Truevision card has 1MB of video RAM and uses the popular Tseng 4000 chip set. In addition to generating all standard and extended VGA modes, including 1024 × 768 256-color, the Truevision board is also capable of generating recordable NTSC video (television) output as well as combining computer VGA video with NTSC video input.

All monitor tests were subjective in nature and were conducted using the DisplayMate Video Obstacle Course test suite. The Video Obstacle Course is a series of 33 test patterns designed to uncover video anomalies or substandard performance. Common video irregularities, including blooming, defocusing, geometric linearity, moiré patterns, flicker, streaking, ghosting, and other conditions, are diagnosed using the test patterns displayed. A "jury" of three CPTS staff members scrutinized each monitor for each test and voted either 1, signifying the monitor passed the test, or 0, designating failure. The votes of these three testers were compiled for all of the tests, and the results were totaled. A perfect score for the Video Obstacle Course is 33; none of the monitors tested achieved a perfect score, although two (the NEC and Sony) came close to achieving perfect marks.

Additionally, we put all the monitors through the DisplayMate Video Modes Test Suite to establish their ability to display the following modes correctly:

Modes 0, 1:	40-column color text
Modes 2, 3:	80-column color text
Modes 4, 5:	320 × 200 4-color graphics
Mode 6:	640 × 200 2-color graphics
Mode 7:	80-column monochrome text
Mode 13:	320 × 200 16-color graphics
Mode 14:	640 × 200 16-color graphics
Mode 15:	640 × 350 monochrome graphics
Mode 16:	640 × 350 4- or 16-color graphics
Mode 17:	640 × 480 2-color graphics
Mode 18:	640 × 480 16-color graphics
Mode 19:	320 × 200 256-color graphics

All of the monitors tested passed these tests satisfactorily and without incident.

—TOM BENFORD, PRESIDENT
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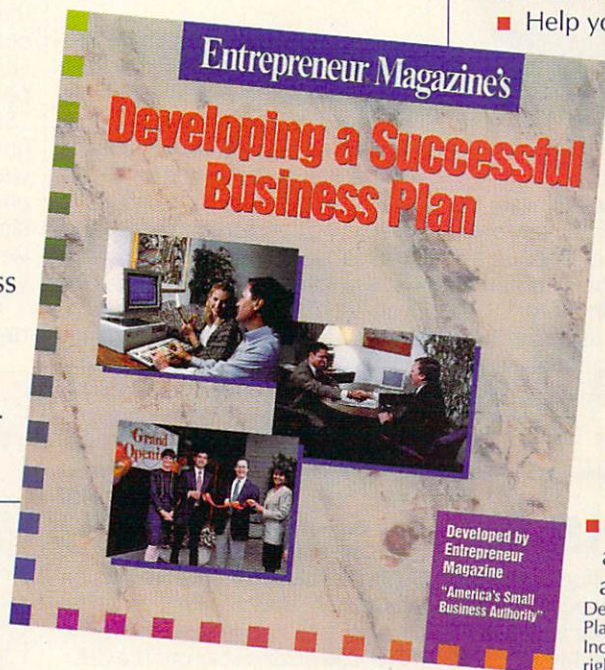
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the included Power9 software features, which present a menu of display options including pans and zooms, system fonts, definable macros, and much more.

For any power user with high-level graphic application demands, the #9GX_i LITE is the card of choice.

TOM BENFORD

Circle Reader Service Number 310

SONY CPD-1304S

Sony brings its Trinitron video technology, so popular with consumer televisions, to the world of PC computing with its 14-inch CPD-1304S Multiscan HG model. As with a Trinitron tube-based television, the CPD-1304S is a real treat for the eyes.

This Sony monitor is similar to the NEC Multisync 4FG, also reviewed here, in that its screen is almost flat and features squared corners rather than rounded ones. Also, as with the NEC, the sides of the video image seem to bow in slightly, but this is the result of the nonstandard screen curvature and actually improves viewing.

The removable tilt-swivel base makes adjusting the viewing angle easy, and you'll find all of the CPD-1304S's controls conveniently front-mounted.

The CPD-1304S appears very clean and uncluttered, with minimal adornments and controls to detract from its sleek look. Look for two knobs at the lower left front corner of the monitor, one for brightness and one for contrast. In the

SONY
Computer Peripheral Products
655 River Oaks Pkwy.
San Jose, CA 95134
(800) 352-7669
List price: \$1,029.95

lower right corner you'll find the power switch and illuminated indicator. These are the only controls provided on the front of the unit. The lower left side of the monitor houses the control knobs for adjusting horizontal size, horizontal shift (centering), vertical centering, and vertical size. An "auto size" switch is also located on this panel for use with PS/2 models. This switch, when set to the lock position, automatically adjusts the timing to the current VGA mode, thus locking out any manual adjustments to the picture size or position.

As with the other monitors covered here, I used a Truevision Video VGA with Overlay board in a 486 system running at 33 MHz as the test platform. The Truevision card has 1MB of video RAM on board and is capable of 1024 x 768, 256-color resolution. The CPD-1304S had no problems whatsoever in this mode, in 800 x 640 mode, or in any of the lower-resolution video modes. I found image clarity and color to be excellent throughout the various modes.

The CPD-1304S is capable of running the 1024 x 768 high-resolution video mode in either interlaced or noninterlaced mode, which makes it capable of simulating the IBM 8514a (interlaced) monitor standard as well as accommodating the numerous adapters designed to run in noninterlaced mode at this extreme resolution. Having this flexibility is a nice comfort feature, especially for PC owners who want to use the stock Windows 8514a drivers or who may be changing their video cards in the near future.

I noticed some image persistence with high-contrast, fast-moving subjects, although it was so slight as to be almost negligible.

Switching from text to graphics modes under DOS also caused some slight image bouncing, although I experienced no problems of this kind running applications under Windows.

Moirés weren't a problem with the CPD-1304S at any of the resolutions. Even tightly spaced vertical and horizontal line and dot patterns didn't produce moirés. "Strobing" occurred with some fine dot backgrounds, but it wasn't serious or pronounced enough to consider it a problem, since virtually every monitor reviewed here displayed some strobing with these patterns.

Overall, the CPD-1304S deserves very high marks. I

SOME NOTES ABOUT WINDOWS/GRAPHICS SPEEDS

While our tests show the relative improvement of changing from a standard Super VGA card to a Windows/GUI accelerator card, this is not the only way to improve the performance of Windows and other graphical applications.

A software product, WinSpeed, claims to increase display speed performance under Windows by 200-500 percent. This product works with over 85 percent of the Super VGA cards on the market, including cards from ATI, Paradise, and Trident, as well as all cards using Tseng 4000 video controllers. WinSpeed (\$79 list) comes from Panacea (800-729-7420).

A faster CPU also significantly increases video-processing speed under Windows and other GUIs. For example, an i486-based PC with a Super VGA card will, in most cases, actually be faster than a 386 machine with a GUI accelerator. This point is worth considering if you intend to upgrade to a more powerful PC platform in the near future. If, after upgrading, you decide you still want faster performance from Windows and other graphical applications, you can always install a GUI accelerator at that time.

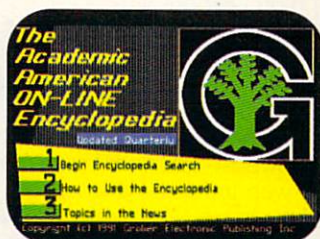
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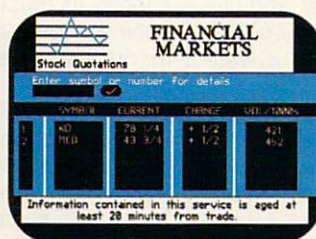
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TEST LAB

would select it as my second choice, after the NEC Multisync 4FG, for extended VGA and power user graphical applications.

TOM BENFORD

Circle Reader Service Number 311

STB WIND/X

The WIND/X is a half-length Windows and GUI (Graphical User Interface) adapter card from STB. The review unit came populated with 512K of on-board video RAM (VRAM), which can be upgraded to 1MB by adding four 128K SIPP modules to the vacant sockets on the board. The accompanying installation, driver, and utility software is supplied on 5¼-inch media along with a well-written user's manual.

The straightforward hardware installation consists principally of replacing the current video card with the WIND/X unit and installing the software. There are no switch settings to contend with on the board, although several jumpers are provided to change the default configurations if you find it necessary to resolve special hardware conflicts that may occur on some systems or with other peripheral devices. I didn't encounter any problems with the default settings on the review unit, but the excellent diagrams and explanations in the manual would've been invaluable in correcting them had they occurred.

The WIND/X card has a built-in bus mouse port on its mounting bracket, which also holds the 15-pin D connector for attaching the monitor cable. A Logitech MouseMan three-button bus mouse and Logitech mouse driver software are packed with the WIND/X card. The bus mouse port can be disabled by pin-cap position of jumper J8; I opted to disable the port in order to use my Microsoft mouse (connected via COM 1) for review purposes. (This also eliminated the need to change all my software configurations to tell them to look for the

STB SYSTEMS
P.O. Box 850957
Richardson, TX 75085-0957
(214) 234-8750

List price: \$339 for HC version;
\$399 for Ultra version with port
and Logitech MouseMan

mouse at the bus port instead of the serial port.)

The WIND/X board is a fast and capable performer, delivering excellent resolution and significant graphics speed improvement for Windows applications, although text-based applications didn't reflect the accelerated speeds as much. I didn't experience any performance improvements that even remotely approached STB's claim of speeds "up to 20 times faster than Super VGA for Windows 3.0 functions." It should be noted, however, that the WIND/X board was indeed faster than some of the more expensive boards reviewed here.

Like the other Windows and GUI accelerators covered here, the WIND/X is capable of supporting 640 × 480, 800 × 600, and 1024 × 768 resolutions without flicker. The WIND/X board also supports the high-color option of 65,536 colors at 640 × 480 resolution with the insertion of a special DAC (Digital-to-Analog Converter) chip into the socket on the board. The upgrade chip, sold separately, allows for a 16-bit or CEG (Continuous Edge Graphics) extended-range color palette.

You get an abundance of drivers, including those for Windows, AutoCAD, Microsoft Word, WordPerfect, Lotus 1-2-3, CADVANCE 3.50, Generic CAD 1.1, and other applications. Installing the drivers is an automated process for Windows and some of the applications, while others require you to manually copy the desired video display drivers into the appropriate application's subdirectory. Although they arrived too late to be part of testing and evaluation, new optimized drivers for

Windows 3.0 and 3.1 are available for this card.

The STB WIND/X makes a good choice for many users desiring faster performance for Windows or other graphics-intensive applications.

TOM BENFORD

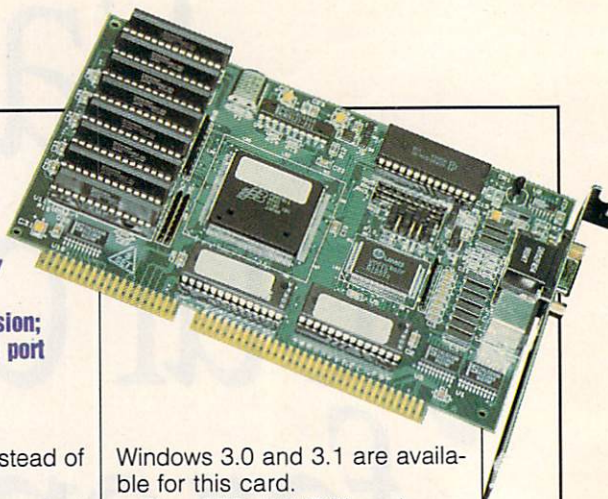
Circle Reader Service Number 312

WEITEK POWER FOR WINDOWS

Weitek is probably best known for its line of math coprocessor chips that speed up numeric calculations by several orders of magnitude. But Weitek is also a leading developer and manufacturer of graphics coprocessors, and the Weitek Power for Windows graphics board is its latest offering.

The half-slot board contains Weitek's single-chip graphics controller, the W5086, which effectively off-loads the PC's CPU operations dealing with certain graphics operations. It does this by incorporating the Microsoft Windows Graphic Device Interface (GDI), Bit-Block Transfer (BitBLT), and LineDraw functions in hardware (rather than system RAM) to increase performance.

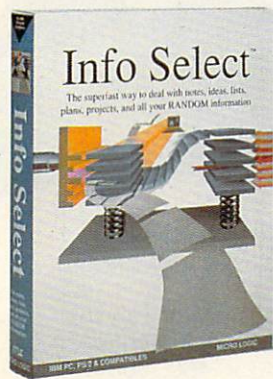
The board by itself can significantly speed up all Windows and AutoDesk applications (AutoCAD, AutoShade, and others), and it comes supplied with an assortment of drivers for Windows 3.0, ADI (AutoDesk), and other popular applications such as WordPerfect 5.0 and 5.1, Microsoft Word 5.0 and 5.5, Lotus 1-2-3, and Ventura Publisher (GEM version). Although they did not arrive in time for testing and review, new drivers for Windows



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PC Magazine

TEST LAB

3.0 and 3.1 are now available.

The Power for Windows card comes equipped with 512K of video RAM, and it's a fully functional and completely compatible VGA board. While video cards with 1MB of RAM are quite common, the Weitek board actually outperforms Super VGA cards with double the RAM, thanks to its dedicated W5086 User Interface Controller chip, even with DOS applications. Under Windows, the card typically runs applications from two to four times faster.

Installing the board consists of removing or disabling the present video card and replacing it with Power for Windows, connecting the monitor, and loading the supplied drivers. A single 15-pin D connector is provided on the board's mounting bracket.

The Weitek package includes driver software on both 3½-inch and 5¼-inch media. An automated installation program makes

WEITEK
1060 E. Arques Ave.
Sunnyvale, CA 94086
(408) 738-8400
List price: \$299

copying the required drivers and support files to the appropriate Windows directories a foolproof process, and a driver-removal program (for uninstalling the drivers) is also included. Along with the software, you get an excellent 58-page user's manual with all of the information that you'll need to get optimal performance for all Windows applications with this high-performance graphics board.

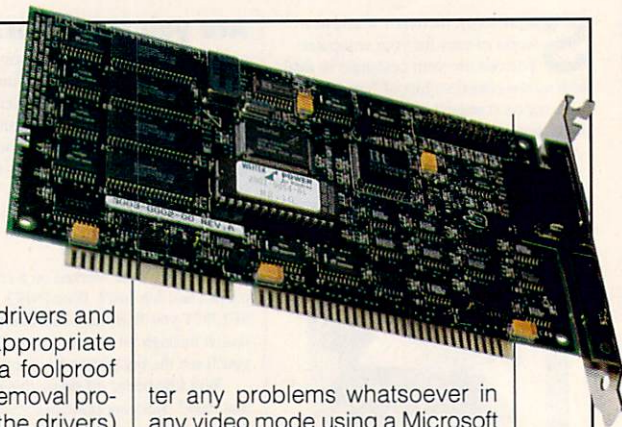
Although the disk-based README file warns of the possibility of mouse incompatibilities that may exist with some mice in the super-extended video modes (800 × 600 and 1024 × 768) because of nonstandardized mouse driver implementations, I didn't encoun-

ter any problems whatsoever in any video mode using a Microsoft serial mouse.

The Weitek board was a joy to use, producing crisp, flicker-free displays in 640 × 480, 800 × 600, and 1024 × 768 video modes, with excellent color and image resolution even when using a relatively inexpensive multi-frequency analog monitor. The product also lived up to Weitek's claims by producing a speed increase of more than 200 percent in the applications I used it with.

TOM BENFORD

Circle Reader Service Number 313



GLOSSARY

CGA. The IBM Color Graphics Adapter. One of the first video adapter standards to support color monitors, it displays as many as 16 colors (at 160 × 200 resolution); however, 4-color implementation is more common. These colors include black, dark gray, light gray, and white.

color depth. The maximum number of colors that a video board can display simultaneously. For example, a VGA card can display as many as 256 colors at a time.

driver. A series of instructions that the computer follows to reformat data for transfer to and from a particular device or expansion board. The specific requirements differ from one kind of device to another and from one application package to another.

EGA. Enhanced Graphics Adapter. The graphics standard that replaced CGA (Color Graphics Adapter) in the 1980s as the predominant color standard. With EGA, resolution is pushed up to 640 × 350 pixels, and 64 colors are available. EGA had a

rather short life as the major video standard, as VGA soon replaced it.

interlaced display. A monitor that refreshes every other scan line on every other pass of the screen, thus requiring two scans to completely refresh the screen. Interlaced displays characteristically show more flicker and "strobing" as a result of the extra passes. Contrast with **noninterlaced display.**

moiré. Shimmering waves of display distortion.

multisync display. Also known as variable frequency display (VFD). A monitor that is capable of displaying a wide range of resolutions because of its ability to scan at various horizontal and vertical frequencies.

noninterlaced display. A monitor that refreshes the entire screen (every scan line) on every pass of the screen. This feature greatly reduces flicker, "strobing," and user eyestrain. Noninterlaced displays are highly preferable to interlaced displays.

palette. The total number of colors that your computer's video board can take advantage of. Typically, a video board can display only a portion of its palette at one time. See also **color depth.**

resolution. The number of dots, or pixels, on the screen. The more pixels there are on the screen, the sharper the image. VGA can display 640 pixels horizontally by 480 pixels vertically. SVGA is capable of even higher resolution.

Super VGA. Also known as Extended VGA. The video standard that goes beyond the maximum resolution of standard VGA (640 × 480). Such modes as 800 × 600, 1024 × 768, and the new 1280 × 1024 are all in SVGA range.

VGA. Video Graphics Array, the video standard developed by IBM that supersedes EGA, pushing resolutions to 640 × 480.

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TEST LAB

ABOUT DISPLAYMATE

Sonera Technologies' DisplayMate was a valuable testing tool in this month's Test Lab. As you can tell from the grids on monitor and accelerator card testing, DisplayMate allowed us to compile detailed information. For those of you in search of this kind of detailed information on video performance, here's a rundown of the product.

DisplayMate is a set of utilities, tests, and performance benchmarks for checking the overall video performance of PC systems. Some of the tests are especially useful for rating the speed performance of video adapter cards in both text and graphics modes, while other tests are primarily intended for evaluating the image clarity, integrity, and resolution on video monitors.

The DisplayMate software is supplied on both 5¼- and 3½-inch disks and is accompanied by an outstanding 370-page user's manual.

Though truly industrial-strength in its capabilities, DisplayMate is also very easy to use, thanks to excellent function layout and strong online help. The program is so easy to use, in fact, that the manual is really more of a technical reference guide and primer on video technology in general than a user's manual. And, while it's a huge repository of information on the tests and utilities which comprise the software, many users will probably want to skip the pedantic material in the manual and get right into using the program.

Installation is an almost completely automated procedure which requires you to answer a few question prompts to establish which hard drive you wish to install to, whether the default subdirectory is satisfactory, whether you'd like a path statement added to your AUTOEXEC.BAT file, and whether you'd like a DisplayMate video test pattern automatically displayed for 20 seconds when the system is booted. Once you've answered these queries, the installation is complete, and you're ready to start using DisplayMate.

Two levels of tests are available: nontechnical and technical. The differ-

ence between the two levels is the amount of user intervention required. For example, the nontechnical performance test set is a fully automatic operation that conducts several hundred tests over a 35-second time period, compiles the data, and displays a comparative reference index of your system's overall performance for text and graphics. Your system's performance is compared to the performance of

The performance tests are particularly useful in evaluating the performance of different video cards, while the video obstacle course and different mode tests are especially useful for diagnosing monitor problems and gauging display quality. Though the performance tests produce objective performance data on the video hardware's speed performance, the monitor tests require the subjective evaluation of the user's own eyes.

The monitor tests are composed of scores of different test patterns at different resolutions to check the monitor's convergence, resolution, focus, edge clarity, ghosting/image lag, video refresh rates, and more. Different patterns are used to test for moirés, flickering, line bowing, reverse video, and other color/intensity/clarity attributes. The excellent online messages explain what each test does and how to interpret the results. If you prefer, the extended help screens can be toggled off with the F10 key once you become familiar with the program.

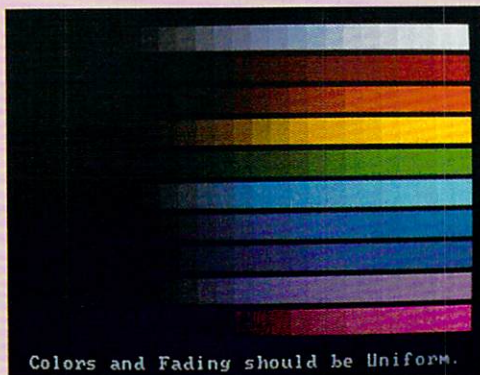
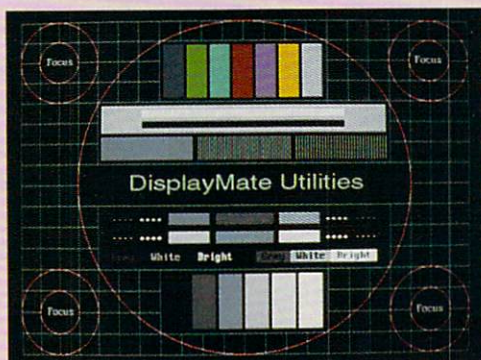
If you're shopping for a new video card, a Windows accelerator card, or a monitor, you'll be in a much better position to make an educated purchase if you use DisplayMate for your comparisons. Since the program is contained on a single floppy disk, it's easy to take along to your dealer for checking out your potential purchase. And if you're shopping for a laptop or notebook PC, DisplayMate is outstanding for testing and evaluating LCD

and gas plasma displays as well.

DisplayMate is also excellent for diagnosing potential monitor problems that may become progressively worse with age. It can be invaluable for directing a service technician to correct a particular problem as well. In other words, DisplayMate is an indispensable video evaluation and diagnostic tool that can do it all. To order DisplayMate (\$149), contact Sonera Technologies in Rumson, New Jersey, at (800) 932-6323 or (908) 747-6886.

TOM BENFORD

Circle Reader Service Number 314



three standard IBM platforms: an IBM PC, an 8-MHz IBM PC AT, and a PS/2 Model 70 (80386) running at 25 MHz. On the other hand, the technical performance tests require that you specify the desired video mode and other data. The detailed test results require four full screens to display, but unless there's a specific measurement you're looking for and you have very sophisticated technical knowledge, these tests will be more than you need. The nontechnical section provides plenty of meaningful information to compare with the three IBM configurations.

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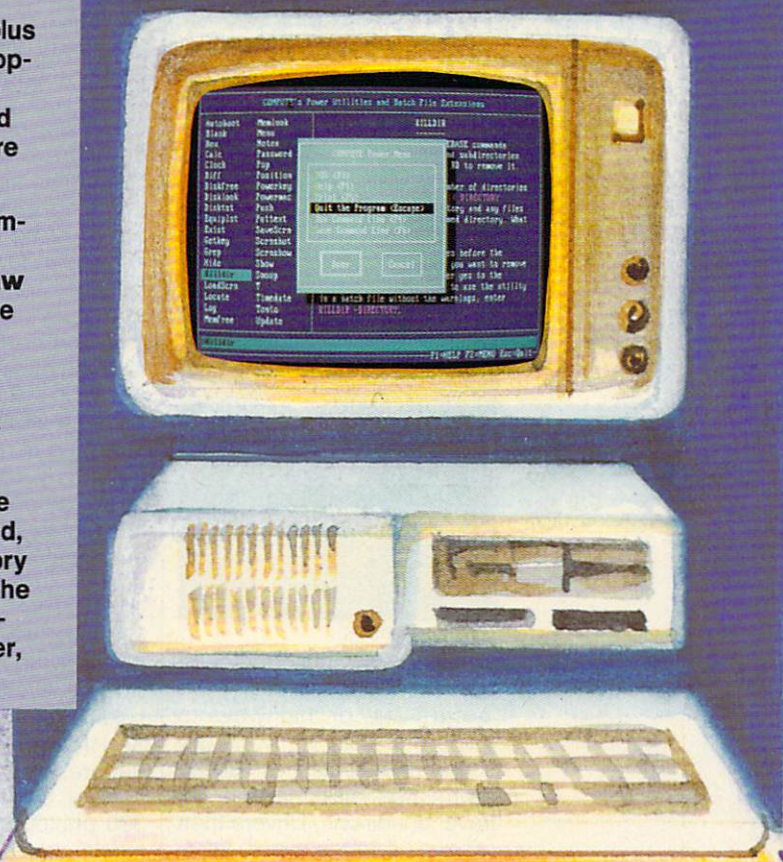
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NEWS & NOTES

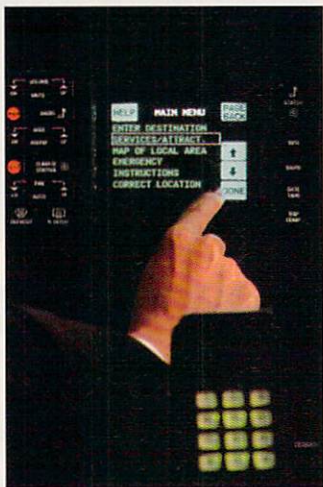
Jill Champion

Not Your Father's Oldsmobile

Highway travel of the future, or at least how some envision it, is getting a test run in Orlando, Florida, this year. Last March, the American Automobile Association, General Motors, the Federal Highway Administration, the Florida Department of Transportation, and the city of Orlando launched TravTek, a project involving the nation's most advanced intelligent vehicle/highway system (IVHS), on a one-year experimental basis.

IVHSs, also called smart car/smart highway systems, apply

Smart cars take the worry out of driving, find the best route, and alert you to hazards on the road ahead.



electronics, computer, and communications technology both in cars and on highways to guide motorists via sight and sound and, simultaneously, to inform area traffic managers of travel conditions. Drivers then receive up-to-the-minute information from the area's traffic management center.

The TravTek project in Orlando involves 100 Oldsmobile Toronados equipped with built-in microcomputers. Fingertip controls are located on the steering column and dashboard. When the driver selects a destination, TravTek calculates the fastest route, providing both visual and audio driving instructions. A mon-

itor built into the car's dashboard displays a map along with the driver's current location. The screen shows the fastest route to the destination chosen, turn-by-turn driving instructions, and realtime information on traffic jams, accidents, detours, weather, and road conditions.

TravTek Toronados communicate with "smart highway" apparatus, highway video cameras, traffic sensors, emergency vehicles, construction reports, and other TravTek cars, while magnetic compasses, satellite communications, and wheel sensors operate in tandem to pinpoint the car's location on the map display.

AAA members interested in participating in TravTek while in the Orlando area may contact their travel agents for information on renting a TravTek Toronado through the Avis rental car agency.

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Speaking of modern transportation, you can journey through ten of the globe's most interesting cities without ever leaving home. All you need is a CD-ROM-equipped PC and InterOptica's Great Cities of the World, Volume 2, to get moving through Berlin, Buenos Aires, Chicago, Jerusalem, Johannesburg, Rome, San Francisco, Seoul, Singapore, or Toronto.

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For more information, contact InterOptica Publishing, 300 Montgomery Street, San Francisco, California 94104; (415) 788-8788.

Number Crunching Made Easy

Professors, engineers, and others who use complicated math-

ematical equations take note: TK Solver 2.0 is an equation processor that does for equations what a word processor does for writing. The program taps the number-crunching power of virtually any major brand of PC running nearly any software.

Once your variables, rules, tables, and plots are organized into sheets, the Presentation View feature allows you to use any number and combination of sheets to create a presentation-quality interface. Release 2.0 is an update of TK Solver Plus 1.1. Suggested retail price is \$595. Upgrades for prior versions are available at a lower cost. For more information, contact Universal Technical Systems, 1220 Rock Street, Rockford, Illinois 61101; (800) 435-7887.

Interactive TV

Pretty soon your TV will be watching you. Interactive TV, two-way communication between the television set and viewer, recently crept from the Sacramento area into the San Francisco Bay area of California. Eventually, it will find its way into TV viewing areas all over the country.

Interactive Network (IN) is a two-way television entertainment system that allows TV viewers to play along with game shows, live sports events, and dramas, and to participate in polls and voice their opinions during live news shows and talk shows. The IN system uses a simple wireless, hand-held control unit that receives FM radio signals transmitted from the company's headquarters, where the information is produced and simulcast with local television signals.

IN's programs include major sporting events (NBA basketball and major-league football and baseball), game shows ("Wheel of Fortune"

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Every month, from now until November, you'll have the chance to win fabulous prizes by playing the Compute SearchStakes. You'll also have the chance to win the SearchStakes Grand Prize by submitting the solution to any two monthly SearchStakes, plus the solution to the Grand Prize SearchStakes, to be featured in our upcoming December issue.

IT'S FUN TO PLAY

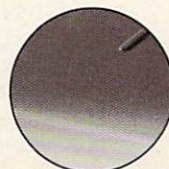
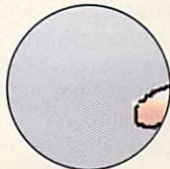
Each of the six picture disks displayed below is a portion of a photo or illustration taken from an ad in this issue. To

solve the August SearchStakes, locate the ads from which these disks were taken and note the page number for each. If the ad has no page number, simply count that page or cover as zero. Then add up all six page numbers. That is the solution to this month's SearchStakes.

IT'S EASY TO ENTER

Once you find the solution, you may enter the August SearchStakes automatically on a touch-tone phone by calling 1-900-454-8681 by 9/30/92. The cost for the call is \$1.50 for the first minute, \$1.00 for each additional minute. Average call is estimated to be 2-3 minutes. Callers must be 18 or older. You may also enter by mailing your answer on a 3" x 5" piece of paper, along with your name, address, and phone number, to: "August Compute SearchStakes," 324 West Wendover Avenue, Suite 200, Greensboro, N.C. 27408 by 9/30/92. No purchase necessary. For more information on how you may win this month's prize, valued at more than \$1,500, turn to page 40.

U.S. Robotics, CompuServe and *Compute* magazine! So enter early... and enter often!



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and "Jeopardy!"), drama (CBS's "Murder, She Wrote"), and documentary and news programs ("60 Minutes" and "NBC Nightly News").

The Mountain View, California, company that developed the system says the patented technology is capable of eventually reaching every home in the United States. If you happen to be a couch potato in the Sacramento or San Francisco Bay area, however, price is something to consider: The control unit costs \$199, in addition to a \$15-per-month subscriber fee, which allows you to interact with whatever's offered. To compete

**Interactive Network
lets you interact
with your television.
Coming soon
to selected viewing
areas.**



against *other* subscribers costs an additional 50 cents per game for freestanding games, \$1 per game for game shows, and \$2 per game for sporting events. An extra \$30 per month buys unlimited competitive play.

If you would like more information, contact Interactive Network, 1991 Landings Drive, Mountain View, California 94043; (415) 960-1000.

Video Blaster

You're probably already familiar with Sound Blaster, the sound system for PCs from Creative Labs. Now the same company brings you Video Blaster for displaying, editing, and frame-capturing full-motion video on standard PC

monitors. Competitively priced at \$495, Video Blaster lets you combine full-motion video from NTSC or PAL with computer-generated graphics and animations. The resulting images are captured in freeze frame; saved in one of a variety of formats, including bitmap, Targa, M-motion, TIF, and encapsulated PostScript; manipulated by adding titles or changing colors; and exported to other applications.

For more information, contact Creative Labs, 1901 McCarthy Boulevard, Milpitas, California 95035; (408) 428-6600.

Future Naders of America

Fed up with the feds? Then take a closer look at Personal Advocate, a new program from Parsons Technology for the consumer advocate in you. The software is designed to help you cut through red tape to get action, receive information, and express your views. Designed in conjunction with a team of attorneys, Personal Advocate generates nearly 40 of the most commonly written letters to creditors, corporations, elected officials, consumer organizations, and government agencies. A free-form letter lets you create personalized documents.

Personal Advocate also provides an expandable address book of approximately 2500 consumer contacts: names, addresses, and telephone numbers of major corporations, Better Business Bureaus, offices of attorneys general, consumer groups; and numerous other organizations. A small built-in word processor lets you record details each time you make a contact. By tagging notes to address book entries, you can chronicle the date of a conversation, what the outcome was, and future actions still required.

Suggested retail price is

\$69. For more information, contact Parsons Technology, One Parsons Drive, P.O. Box 100, Hiawatha, Iowa 52233-0100; (319) 395-9626.

What Price Speed?

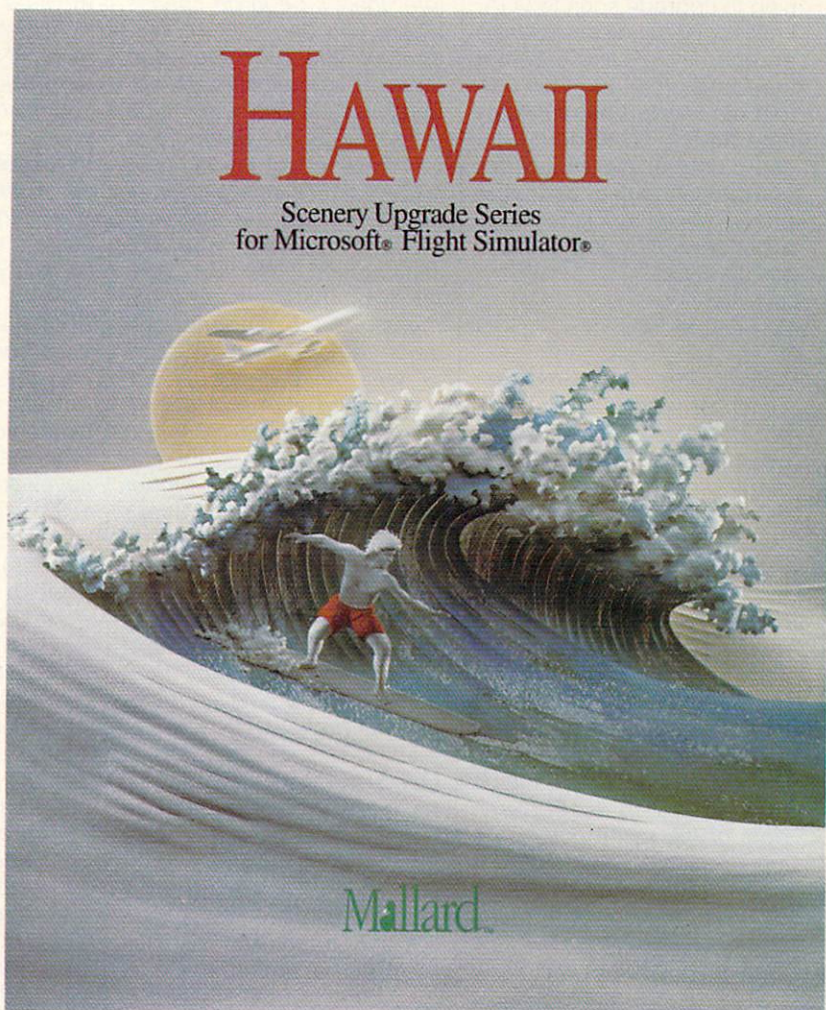
You can get fast for less, if you're looking for 50-MHz performance. Intel's speed demon chip, the Intel486 DX2 microprocessor, makes lower-priced systems perform like 50-MHz machines. Intel's "speed-doubler" technology allows the internal frequency of the processor to operate at double that of the rest of the system, combining the high performance of the advanced 50-MHz Intel486 DX CPU with the cost-effective 25-MHz system design.

The DX2 comprises an integrated central processing unit, a floating-point unit, and a complete on-chip cache, all of which execute at a rate twice that of the CPU bus due to the speed-doubler technology. CPU performance increases significantly without requiring a new generation of supporting components. If you're in the market for a new computer, look for competitively priced systems based on the Intel486 DX2. They're popping up all over the place.

For more information contact Intel at (800) 548-4725 or write for the Intel Literature Packet #JB-47, P.O. Box 7641, Mount Prospect, Illinois 60056-7641.

Companies with items of interest suitable for "News & Notes" should send information along with a color slide or color transparency to News & Notes, Attn: Jill Champion, COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Although space is limited, all items will be considered for publication. □

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FLYING SOON TO TAHITI

The Right Pitch

I am still a novice and am planning to upgrade soon to VGA. I called a local discount dealer regarding buying a 28-dpi standard VGA monitor. He told me I would have a hard time finding a 28-dpi, yet I see plenty of big mail-order companies with reasonably priced 28-dpi monitors. Does a standard VGA get 16 colors or 260 colors?

JOHN R. MAHONEY
LINCOLN PARK, NJ

Actually, the measurement for a monitor screen is dot pitch, not dots per inch (dpi). You would use dpi to express how many distinct dots a printer can lay side by side. You'll also see dpi applied to mouse resolution, though we prefer the emerging term Mickeys to indicate the distance the mouse pointer moves on the screen and points per inch (ppi) to indicate the minimum motion of the mouse that can be detected by the software. Dot pitch (dp) refers to the diagonal distance between dots of the same color on a monitor screen.

We don't know why your dealer is having a hard time finding a 28-dp monitor. It's not hard. Go with a mail-order company you already know about and skip your dealer. And stick to your guns—28 dp is definitely the way to go, especially if you do a lot of text work.

As you probably know, the color image on your screen is made up of individual pixels, or dots, and each of these dots is made up of three smaller colored dots (one each of red, green, and blue). In most monitors these pixels are laid out diagonally so that the individual pixels don't form vertical stacks.

Imagine trying to cover the bottom of a rectangular box with Ping-Pong balls. If you

line them up horizontally and vertically in a Cartesian pattern, there'll be large spaces where you can see the bottom of the box between them. If you allow the Ping-Pong balls to take their natural positions, they'll come to rest in a sort of honeycomb pattern. You'll see far less of the bottom of the box and pack more balls into the same space if you align them this way. That's why dot pitch measures the diagonal distance rather than the vertical or horizontal distance.

Standard VGA provides 16 colors at 640 x 480 resolution and 256 colors at 320 x 200 resolution. Anything higher than that is called Super VGA, and there are untold numbers of Super VGA standards and resolutions. There was some hope that IBM's XGA or 8514A standard would replace Super VGA and result in a new standard, but that hope was in vain.

Life Sentence

I want to write a program to generate random sentences from small lists of words. It should pull a verb from a verb list, a noun from a noun list, and so on, and then link them into a sentence. Could you talk about the RANDOMIZE command?

J. P. MYERS
DOWNEY, CA

RANDOMIZE is used to prepare the computer to generate random numbers. Keying this command to the timer causes whatever value is currently in the hardware clock to be the seed value. If you don't use RANDOMIZE before generating random numbers, you'll generate the same list of random numbers each time the program runs. The numbers are really random, but they're generated by a formula. If you use the

same seed value to start the process, the numbers will always be the same sequence.

RND is then used in a formula. RND will give you a random value between 0 and 1. You multiply this by the range you want and then add to it the lowest value you want. For example, if you want random integers between 5 and 20, you would use this formula: $INT(RND * 15 + 5)$.

The following program goes a step further. Defining a function (DEF FN) in the second line allows you to use fna anywhere in the program where you want a random integer between 0 and 10. This saves space and typing.

The first value in the parenthesis in the string array word\$() is the part of speech (0 = adjective, 1 = noun [person], 2 = verb, 3 = adverb, 4 = preposition, 5 = noun [thing]). To keep the sentence simple, one of each part of speech is used, the nouns are always singular, and the verb is always intransitive and past tense.

You can easily make this sentence-generating program as complex as you desire. Increasing its vocabulary would be the simplest improvement. Note that the way it's currently designed, there have to be equal numbers of each part of speech, but this was done to keep the program short. There's no reason why you couldn't have different numbers of nouns and verbs, for example. Just create separate loops to load the different parts of speech into their respective arrays.

```
RANDOMIZE TIMER
DIM word$(5, 10):DEF fna =
  INT(RND * 11)
FOR i = 0 TO 5
FOR j = 0 TO 10
  READ wordfromlist$
  word$(i, j) = wordfromlist$ + ' '
NEXT
```

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(PC Games: The Complete PC Gamer's Guide, Spring/Summer 1992)

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(MPC World, April/May 1992)

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Alternate Entry Method: Print your name, address, and phone number on a 3" x 5" piece of paper. (1) To enter the monthly drawings, print the *Compute* issue date (month) and solution for that month on your entry and address your envelope to include the issue date (month), for example: "June Compute Searchstake." (2) To enter the Grand Prize drawing, print the words "Grand Prize," the Grand Prize solution, plus the solution to any two previous monthly SearchStakes on your entry. Address your envelope: "Compute SearchStakes Grand Prize." Mail all entries, addressed as directed above, to: 324 West Wendover Avenue, Suite 200, Greensboro, N.C. 27408. Enter as often as you wish; each entry must be mailed separately. All write-in entries must be postmarked by 1/31/93 and received by 2/15/93.

For the solution(s), complete rules, and detailed description of prizes including prize values, send a self-addressed stamped envelope to Compute SearchStakes Solutions, Dept. RRS, 1965 Broadway, NY, N.Y. 10023-5965 by 12/31/92; no return postage required for solutions of VT and WA. Solutions and prize information will be provided through the issue date in which the request is received.

Odds determined by number of entries received, for example, 10,000 entries make odds 10,000 to 1. Prizes/Values: Grand Prize (1), minimum value \$15,000-maximum value \$40,000. Monthly prizes (6), one for each of the following *Compute* 1992 issue dates: June, July, August, September, October, and November, minimum value \$1,500-maximum value \$7,500. Maximum total prize value: \$85,000. A description of each prize, including its approximate value, will appear in *Compute* prior to the first entry date for that prize. Prizes are not transferable or redeemable for cash. No substitution of prizes except as necessary, due to availability. Licensing, transportation, registration, and dealer charges, if applicable, are winner's responsibility. Winners may be required to pick up some prizes from the nearest dealership. Travel prizes must be from a major airport nearest winner's home and must be used within 12 months of award date. Additional restrictions may apply, i.e., local ordinances. Taxes are the winner's responsibility.

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This sweepstakes is subject to the Official Rules and Regulations. For a list of winners, send a self-addressed stamped envelope to: Compute SearchStakes Winners, Dept. RRW, 1965 Broadway, NY, N.Y. 10023-5965 by 3/31/93. Requests will be fulfilled after the sweepstakes ends.

FEEDBACK

NEXT

FOR i = 0 TO 10

PRINT 'The ' + word\$(0, fna) +
word\$(1, fna) + word\$(2, fna) +
word\$(3, fna) + word\$(4, fna) +
'the ' + word\$(5, fna)

NEXT

END

DATA red,blue,tall,fat,smart,
worried,hungry,persistent,
wet,elegant,happy

DATA man,child,tenor,accountant,
plumber,dog,gorilla,machinist,
florist>window washer,fry cook

DATA ate,sang,worked,hid,
paraded,read,flew,ran,
harvested,welded,talked

DATA loudly,quietly,proudly,
unceasingly,frantically,
methodically,intently,
poignantly,sloppily,hesitantly,
pointlessly

DATA in,under,over,around,out
of,inside,with,beside,far
from,through,along with

DATA airplane,house,car,diner,
college dormitory,machine
shop,school,roof,cellar,
attic,barn

Capturing the Image

I have a computer card designed to display images captured from video recorders. I have several image-capturing programs for capturing PCX and TIF images, such as PC Partner from DAK, but none of them can capture images in VGA mode. I contacted DAK, but PC Partner is several years old, and the technician told me it won't capture images at VGA resolution. Are you aware of any other capturing software that can capture images at VGA resolution?

Another question I have concerns hardware and software for my internal fax/modem. Each time I load the fax software, I get problems such as neither the mouse nor the fax working properly. I've written the manufacturer, but it's been three weeks, and I've not heard from the company. Can internal fax/modems work with other fax software, or are they restricted to their own software?

LEO FRENCH
MODESTO, CA

HiJaak (Inset Systems, 71 Commerce Drive, Brookfield, Connecticut 06804; 203-740-2400) can capture a maximum resolution of 1024 x 768 pixels in 256 colors. Collage Plus (Inner Media, 60 Plain Road, Hollis, New Hampshire 03049; 603-465-3216) can capture up to 800 x 600 pixels in 16 colors in DOS.

The maximum resolution and number of colors for a Windows capture

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with Collage Plus is a little more complicated. If you're running in 386-enhanced 386 mode, it can capture whatever is on the screen, regardless of the resolution or number of colors. In real or standard mode, you'll need to have about 1MB of free RAM above whatever programs you're running to capture a 1024 x 768 256-color screen.

None of these programs should have any trouble saving to disk whatever is captured by your card.

Your fax problem is probably due to a serial-port conflict between your mouse and your fax card. If you have at least two serial ports, try moving your mouse to the other serial port. (This will require rerunning your mouse setup in DOS and Windows.)

If that doesn't work or if you have only one serial port, you'll have to dig through your fax/modem manuals to figure out how to set your DIP switches and jumpers so the devices aren't trying to use the same IRQ. Remember that serial port 1 is interrupt 4 and serial port 2 is interrupt 3. Technically, you can have two additional serial ports, but serial port 3 must use interrupt 4 and serial port 4 must use interrupt 3. There's probably a reason for this other than to mystify and confuse people.

Regarding your question about fax software, there's hope but only if your fax supports a common file format. Many older fax machines don't—they employ their own file formats and thus force you to use their software. Many, however, can create PCX or TIF files, so any fax software that reads these files should work. Also, give the manufacturer a call (or fax your question in, if there's a fax number in the manual). Most manufacturers are responsive to telephone contact.

The Doctor Is In

We'd like to update our item Getting Better on Dr. Schueler's Home Medical Advisor that ran in the June 1992 issue's "News & Notes." According to Pixel Perfect, the program's publisher, the referral database mentioned in the article has been discontinued and, due to popular demand, is being replaced with a health and diet section in the database. Second, although the story highlights some of the new version's features, there are several others the company thinks our readers might like to know about. The program now has full print capability, first-letter-sensitive menus for fast referencing, a newly formed specialty review board consisting of 40 Board Certified Medical Specialists, and continuing updates for registered users at cost. A major new version of Schueler's Home Medical Advisor is also in the works.

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Circle Reader Service Number 189

ZEOS 486-33 Pricing

A number of COMPUTE readers have called ZEOS hoping to purchase the 486 system featured in the April Test Lab section of the magazine for the price listed, only to be told that the system isn't available for that price. The \$1,795 list price that appeared in our product box was supplied by ZEOS, but it isn't the price for the review configuration. Also, the review refers to a hard drive that's no longer available from ZEOS. We at COMPUTE regret the confusion and offer the following explanation.

A footnote at the beginning of Test Lab explains the difficulty of coming up with a list price for a "standard" system: "Prices for this computer system and the others vary according to the configuration/options chosen. Contact the manufacturer for further information." Because consumers are more sophisticated than ever, companies like ZEOS offer a menu approach to pricing. Even when a manufacturer offers a "standard" system, there are usually a number of options. The price ZEOS supplied us is for the base configuration, which includes, for example, a monochrome monitor rather than an SVGA monitor.

In the future, we will make every attempt to indicate whether the price is for the base configuration or for the re-

view configuration. However, our advice still stands: You should call the company in question for current pricing on the configuration of your choice. Computer technology is changing more rapidly than ever, and occasionally, despite all our efforts, a system configuration will change between the time we receive a system and the time the issue hits the stands. Also, prices for components like hard drives and microprocessors can change according to market demands.

Finally, remember that street prices (for products not sold directly by the manufacturer) are frequently well below list prices. For current pricing, it pays to consult our advertisements and make some calls.

Readers whose letters appear in "Feedback" will receive a free COMPUTE's PC clock radio while supplies last. Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to COMPUTE's Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We regret that we cannot provide personal replies to technical questions. □

POINT & CLICK

Clifton Karnes

FIVE ALIVE

There are five Windows utilities that I couldn't live without. I use three of these constantly, so they're all but invisible to me. I use one of the others just a few times a week, and the last one I only use a few times a year. Buy they're all essential to my productivity and well-being.

The first of these must-haves is Stacker AT/16 (Stac Electronics, 5993 Avenida Encinas, Carlsbad, California 92008; 800-522-7822; \$249.00). Stacker AT/16 is a

size for any font I have. And it gives me real WYSIWYG on-screen display for these fonts. Version 2.0 of this outstanding program uses 32-bit access in 386-enhanced mode, and it's fast. A type manager is essential if you do anything beyond the simplest document formatting. It's true that Windows 3.1 comes with its own font manager, TrueType, but ATM is for PostScript fonts, and I, like many others, already have a large investment in PostScript. Also, PostScript is what service bureaus use. ATM has turned my inexpensive HP LaserJet into a printer that offers most of the benefits of a PostScript printer.

The last of the three all-but-invisible products I use is Software Workshop's Icon Paks (Software Workshop, 75 South Mountain Way,

Orem, Utah 84058; 800-762-9550; Icon Pak I, \$39.95; Icon Pak II, \$99.95; both, \$135.95). These two packages contain beautiful, handcrafted icons for almost every imaginable application. They're naturals for DOS apps, and with an editor that can edit icons inside EXEs and DLLs (such as the same company's Icon Creator), you can actually replace a Windows application's original icon with one that you like better from an Icon Pak. Most of the DOS apps on my desktop are represented with Software Workshop icons. If you get in the mood to redecorate your desktop, these two icon collections are the place to start.

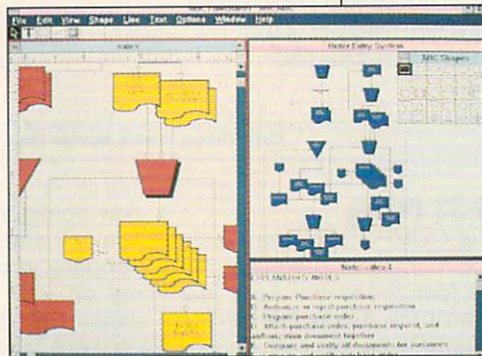
The essential utility that I only use a few times a week is WinFax Pro (Delrina, 6830 Via del Oro, Suite 240, San Jose,

California 95119; 800-268-6082; 119.00). This program is a special Windows printer driver that, combined with a supported fax modem, lets you send a fax by simply printing from any Windows app. It's a snap to use, and since the faxes don't have to be scanned before they're sent, the output is the highest quality you can get with a fax.

WinFax Pro also receives faxes (with boards that support this option), and it offers scads of neat features including a phone book, scheduled calling, send and receive logs, and page preview. The latest version of the program supports a very large number of fax modems. If you've used DOS fax programs, you'll be amazed at just how easy it really can be. I don't fax from my PC every day, but when I do, I use WinFax Pro.

The last utility I can't live without is one that I don't use very often, but when I need it, it's a superb performer. I'm talking about ABC FlowCharter (Micrografx, 1303 Arapaho, Richardson, Texas 75081; 800-733-3729; \$295.00). This program makes it a snap to design all kinds of flow charts, organizational charts, and so on. It supports all your fonts (it works perfectly with ATM), and it has automatic drop shadows, intelligent connections between flow-charting objects, page preview, and lots of other functions that make designing charts quick and easy. You can even fax your flowcharts directly from ABC FlowCharter with WinFax Pro. And the results are stunning. You can use conventional drawing programs to create a flow chart, but it can be a frustrating experience. Don't try it. Get ABC FlowCharter and have some fun. Your charts will get some respect, and they'll look so good that people might even read them. □

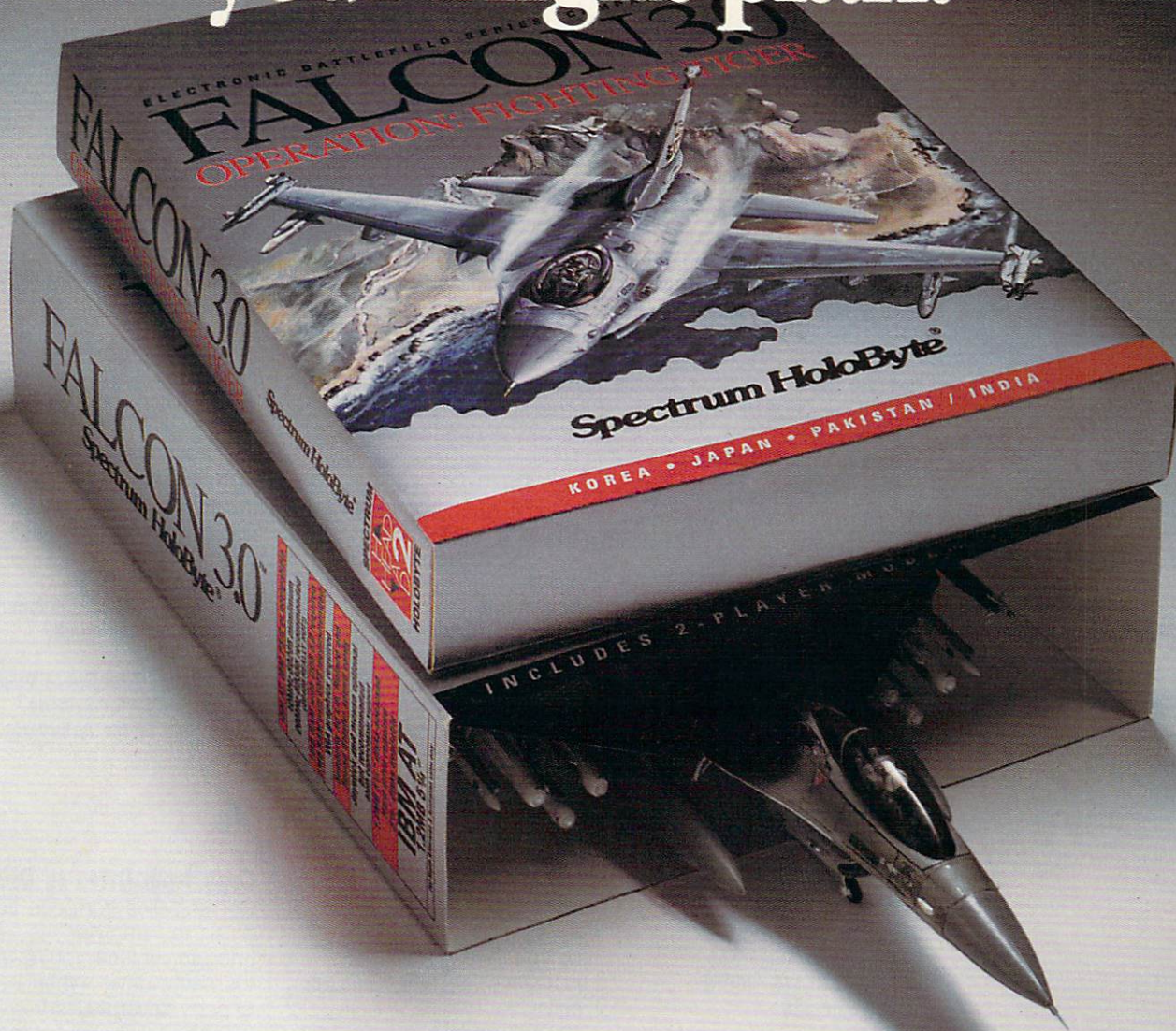
With ABC Flowcharter, your charts will get some respect, and they'll look so good that people might even read them.



16-bit coprocessor card and software driver that uses on-the-fly compression and decompression to effectively double the size of your hard disk. It's turned my 110MB disk into a 220MB jumbo and made it easy for me to live with the mega sizes of most Windows programs. And with the 16-bit coprocessor version of the product, there's no performance degradation. Stacker is completely transparent, and it works with all my Norton and PC Tools disk utilities. Stacker's something of a miracle.

Next on my list is ATM, the Adobe Type Manager (Adobe Systems, 1585 Charleston Road, P.O. Box 7900, Mountain View, California 94039; 415-961-4400; \$99.00). As the name suggests, ATM is a type manager. It uses PostScript fonts and prints in any point

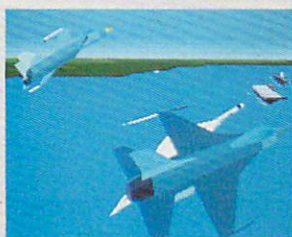
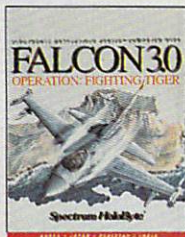
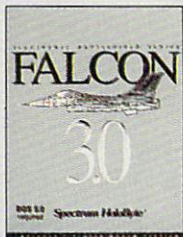
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TIPS & TOOLS

Edited by Richard C. Leinecker

Easy Viewing

Now you can display several files consecutively using two batch files. The main batch file is called SEE.BAT. To use it, type SEE and the files you want to view (you can use wildcards in your file list). The SEE.BAT file calls a second batch file named SEE_TYPE.BAT to type the file.

```
@ECHO OFF
IF (%1) == ( ) GOTO ERROR
:BEGIN
FOR %%F IN (%1) DO CALL
SEE_TYPE%%F
ECHO"
SHIFT
IF (%1) == ( ) GOTO END
GOTO BEGIN
:ERROR
ECHO Usage: SEE <file>
ECHO"
ECHO You can specify as many
files as you want and use
wildcards, too.
:END
```

The second part of the system is SEE_TYPE.BAT.

```
@ECHO OFF
ECHO %1 > TEMP.$$$
ECHO >> TEMP.$$$
TYPE %1 >> TEMP.$$$
TYPE TEMP.$$$ | MORE
DEL TEMP.$$$
ECHO"
PAUSE
```

The character before the MORE command in line 5 is the vertical bar.

GIAMPAOLO LADOMATO
SCOTTSDALE, AZ

Conserving Disk Space

If you don't mind a short wait while running some programs, you can save as much as 50 percent of your drive space with a batch file, PKZIP, and PKUNZIP.

Every time you run a program using this method, there'll be a delay. The amount of delay depends upon the size of the program

and its support files. For example, 3MB will usually decompress in about ten seconds.

First, make sure you have a copy of PKZIP and PKUNZIP in your path. Then, create a directory called ARCHIVES. Next, use PKZIP to compress each directory into a single file, copy the ZIP files to the ARCHIVES directory, and delete the contents of the directories of the files you just compressed. You should also remove the directories.

Here is an example batch file. The routines :SQ, :XY, and :TP decompress and run Space Quest IV, XyWrite, and TurboPaint, respectively.

```
@ECHO OFF
IF (%1) == ( ) GOTO ERROR
IF "%1" == "SQ" GOTO SQ
IF "%1" == "sq" GOTO SQ
IF "%1" == "XY" GOTO XY
IF "%1" == "xy" GOTO XY
IF "%1" == "TP" GOTO TP
IF "%1" == "tp" GOTO TP
GOTO NOTFOUND
:SQ
CD \
MD SIERRA
CD SIERRA
MD SQ4
CD SQ4
PKUNZIP C:\ARCHIVES\SQA.ZIP
SQ4
CD \SIERRA\SQ4
ECHO Y | DEL *.*
REM The character before DEL is
the vertical bar.
CD ..
RD SQ4
ECHO Y | DEL *.*
REM The character before DEL is
the vertical bar.
CD ..
RD SIERRA
GOTO END
:XY
CD \
MD XY
CD XY
PKUNZIP C:\ARCHIVES\XYA.ZIP
EDITOR
CD \XY
DEL C:\ARCHIVES\XYA.ZIP
PKZIP C:\ARCHIVES\XYA.ZIP *.*
```

```
ECHO Y | DEL *.*
CD ..
RD XY
GOTO END
:TP
CD \
MD TPAINT
CD TPAINT
PKUNZIP C:\ARCHIVES\TPA.ZIP
TPAINT
CD \TPAINT
DEL C:\ARCHIVES\TPA.ZIP
PKZIP C:\ARCHIVES\TPA.ZIP *.*
ECHO Y | DEL *.*
CD ..
RD TPAINT
GOTO END
:NOTFOUND
ECHO Incorrect specification.
GOTO :VALIDARG
:ERROR
ECHO Usage: USEPACK <compressed archive name>
:VALIDARGS
ECHO Type SQ for Space Quest IV.
ECHO Type XY for XyWrite.
ECHO Type TP for TurboPaint.
:END
```

GORDON B. NEWSTROM
LAKEWOOD, CA

Copy from Drive to Drive

Copying files from one floppy disk to another is easy enough, unless you're using the same drive. When I need to copy several files from one 3½-inch disk to another, it takes several steps. I copy the files from the source disk into the temporary directory. Then, I swap disks and copy the files to the destination drive.

You can avoid this hassle by using DOS's DRIVER.SYS. Here's how you load it in your CONFIG.SYS file for the four floppy disk types.

Low-density 5¼-inch drives:

```
DEVICE=C:\DOS\DRIVER
.SYS /d:0 /f:0 /h:2 /s:9 /t:40
```

High-density 5¼-inch drives:

```
DEVICE=C:\DOS\DRIVER
.SYS /d:0 /f:1 /h:2 /s:15 /t:80
```

Read consecutive files with a single command, and use your precious hard disk space more efficiently.



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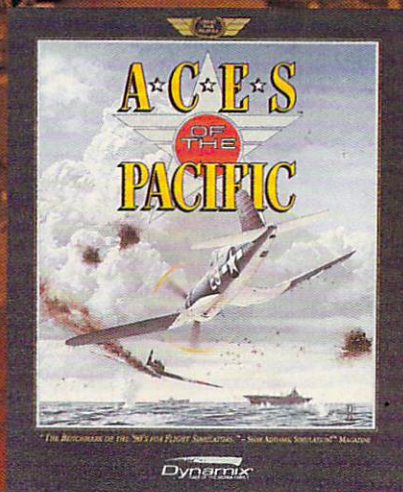


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Computer Gaming World.

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Circle Reader Service Number 224

TIPS & TOOLS

Copy files from disk to disk on a single drive, and access 256-color PCX graphics files from BASIC.

Low-density 3½-inch drives:

```
DEVICE=C:\DOS\DRIVER
.SYS /d:0 /f:2 /h:2 /s:9 /t:80
```

High-density 3½-inch drives:

```
DEVICE=C:\DOS\DRIVER
.SYS /d:0 /f:7 /h:2 /s:18 /t:80
```

The /d:0 switch specifies the device number. For drive A it's /d:0; for drive B it's /d:1. DRIVER.SYS uses the next empty logical drive it finds for DRIVER.SYS. If I load it for drive A on my system, drive D becomes the logical equivalent of drive A. The first time I call for a directory of drive D, DOS gives me the prompt *Insert diskette for drive D: and press any key when ready.* DOS uses my first drive as drive D until I access A. When that happens, I will see the prompt *Insert diskette for drive A: and press any key when ready.*

If I add another DRIVER.SYS in my CONFIG.SYS file for the second drive, it becomes drive E. Don't worry if you've already got a drive D; the system will keep looking until it finds a logical drive that's available. DOS defaults to five available drives: A-E. If you plan to use a disk drive beyond drive E, you'll have to add a line to your CONFIG.SYS file (before you load DRIVER.SYS) that tells DOS the last drive you'll be using. If, for instance, drive H is the last drive you need, you'll have to add the line LASTDRIVE=H.

Now you can use the COPY command without the need for a temporary directory on your hard drive. If I wanted to copy all EXE files from one disk to another, I would type COPY A:*.EXE D:*.EXE. I'd be prompted for the appropriate times to swap disks.

MIKE CHATEL
WALLACEBURG, ON

BASIC PCX Files

This program loads a PCX file in BASIC. It works only for 320 × 200 256-color MCGA pictures. You'll have to make changes for other picture types and video modes.

The major points of the PCX file format are the 128-byte header, the picture data, a single byte indicating that a palette follows (in MCGA and Super VGA), and a 768-byte palette.

The picture data uses a simple encoding system called run length encoding. There are two signals you get when decoding a PCX file: single bytes and repeating bytes.

If the highest two bits of a byte are set, then the lowest six bits contain the number of repetitions of a repeat sequence. The next byte in the file is the data that's put into screen memory multiple times. Otherwise, each byte is a single bit of data that goes directly into screen memory.

After the picture data, MCGA or Super VGA has a single byte followed by 768 bytes of palette data.

You should be aware that PCX pictures can contain images that are smaller or larger than the visual screen. For these you'll have to examine the 128-byte header and adjust the code.

I'm opening a file called TEST.PCX. Change this to match your filename.

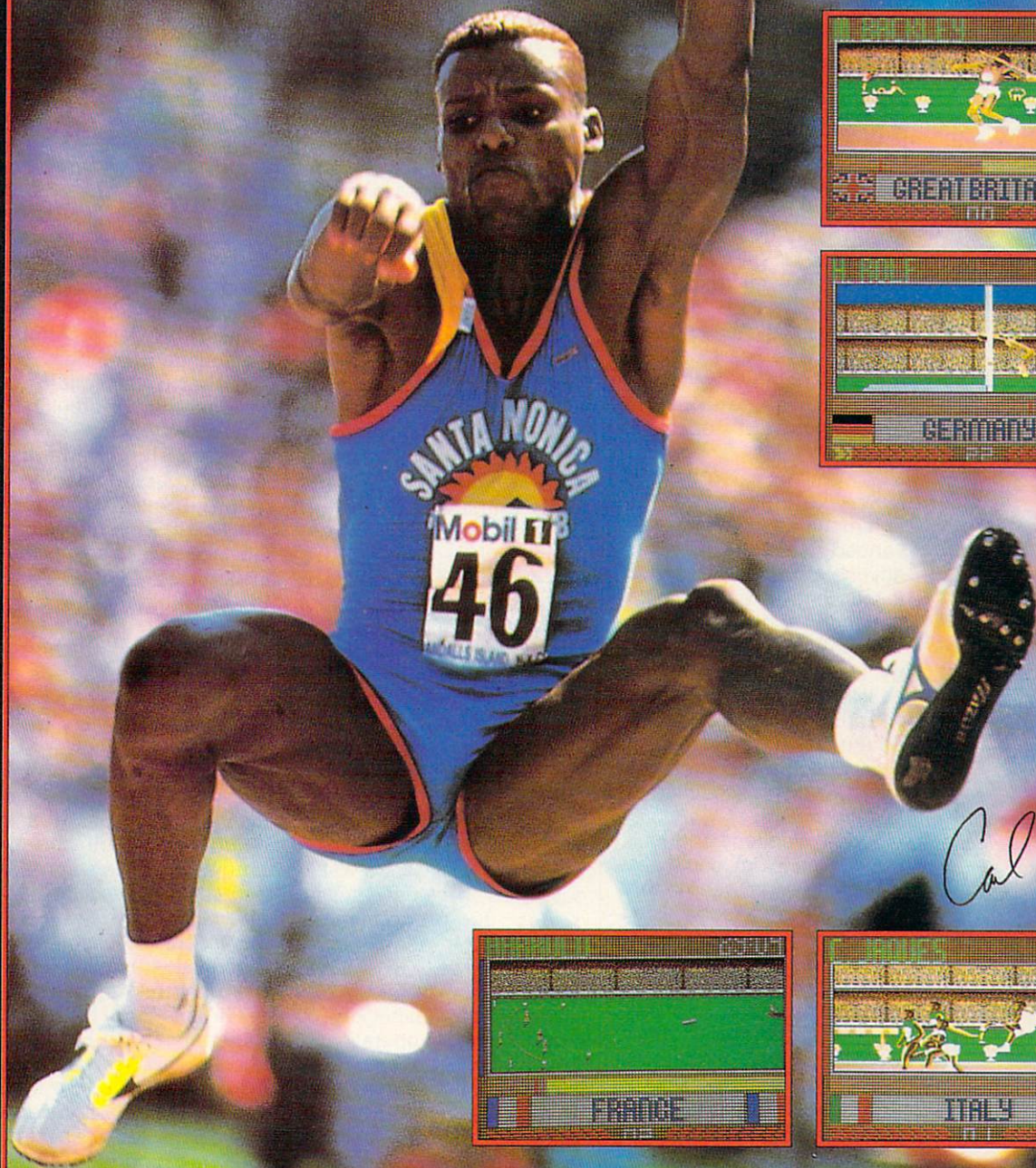
```
REM PT will count the
pokes into screen memory until
we get to 64000.
PT = 0
a$ = SPACE$(128)
DEF SEG = &HA000
REM Open the file TEST.PCX.
OPEN "TEST.PCX" FOR
BINARY AS #1
REM Get the header (128 bytes).
GET #1, , a$
REM Set a$ to a length of 1 so we
can read one byte at a time.
a$ = " "
```

```
REM Set MCGA mode.
SCREEN 13
WHILE PT < 64000
GET #1, , a$
CT% = ASC(a$)
IF (CT% AND 192) <>
192 THEN
POKE PT, CT%
PT = PT + 1
ELSE
CT% = (CT% AND 63)
REM Get the byte to repeat.
GET #1, , a$
DAT% = ASC(a$)
WHILE CT% AND (PT < 64000)
CT% = CT% - 1
REM Poke data into memory.
POKE PT, DAT%
PT = PT + 1
WEND
END IF
WEND
REM Get the byte that tells us a
palette follows. It should
be 192.
GET #1, , a$
REM Tell the hardware to start
with palette register 0.
OUT &H3C8, 0
REM Read and set 768 palette
registers.
FOR I% = 1 TO 768
GET #1, , a$
OUT &H3C9, ASC(a$)
NEXT I%
CLOSE #1
a$ = ""
WHILE a$ = "": a$
= INKEY$: WEND
SCREEN 0
WIDTH 80
```

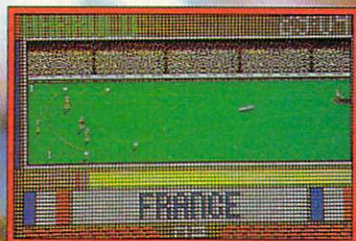
RICHARD C. LEINECKER
MIAMI, FL

If you have an interesting tip that you think would help other PC users, send it along with your name, address, and Social Security number to COMPUTE's Tips & Tools, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. For each tip we publish, we'll pay you \$25-\$50 and send you a COMPUTE's PC clock radio while supplies last. □

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COMPUTE/NET

Troy Tucker

GROWING BY LEAPS AND BOUNDS

Electronic publishing is fast becoming a commonplace in our high-tech world of computers. Many popular publications, such as COMPUTE, have turned to this emerging medium to broaden their coverage.

Progress has been relatively slow in past years because the technology wasn't in place and because people simply didn't think of modems as necessary computer peripherals. But things have changed. Now, with high-speed data communications and advanced computer hardware, anyone can quickly connect to thousands of popular publications and databases. Where will this new technology take us? We've already heard metaphors like "global village" and "electronic mall." As the online world expands, it will bring everyone closer. I think we've only scratched the surface.

Video telephony and multimedia technology could easily become parts of online services. Imagine interactive videogames featuring high-resolution graphics and digitized sounds being transmitted via modem or perhaps a slick chat line that allows you to view the person on the other end—in realtime! These ideas aren't as farfetched as they sound. Video telephones are already in place in Europe. Interactive online videogames are also in operation. Both, though in early stages of development, could mark the beginning of things to come. Who knows what to expect from online services in the future? You can bet that whatever comes along, COMPUTE will be in the thick of it.

This month on COMPUTE/

NET we're featuring a large variety of programs in our software library. You'll find everything from games to virus checkers. Here's what to look for in the New Uploads library: Directory Master, Quick Type, Skullduggery, MathMagic, Fastbuffer, Flu Shot, PC-KWIK, and Cshow. All of these programs have been pretested. Some of the programs are shareware, so I ask that you please honor the hardworking developers by paying the registration fees.

To find these programs, log on to GENIE or America Online. Use the menus or type the keyword *COMPUTE* to get to the COMPUTE/NET area. Once in COMPUTE/NET, enter the software library (it's called Files from COMPUTE on America Online). From there, enter the New Uploads area. If you have trouble finding the programs, please drop me a line, and I'll be glad to help you.

For all you power users, we have a healthy collection of programs that will add muscle to your computing. First up is Directory Master. This full-featured DOS shell allows you to customize an interface that includes 30 programmable keys. You can access commands such as COPY, MOVE, and DELETE with a single keystroke or program hot keys to perform multiple operations.

Next, if you're tired of waiting for slow key repeats, then we have just the remedy. Fastbuffer speeds up key-repeat rates and saves your monitor from burnout with a screen blanker. This memory-resident program comes complete with source code. While you're at it, you may want to speed up your hard drive, too. PC-KWIK is a transparent program that turbocharges file access by keeping frequently used files in memory, which results in fewer delays.

If you're in the market for educational programs, look no further. Quick Type is a valuable tool for those who are all thumbs when it comes to typing. Unique graphics entertain you while you improve your typing skills. Varying levels provide a challenge for all typists. Are you a little rusty on your math? Try MathMagic. This program tests your mathematical abilities with four educational games: MathCatch, MathRun, MathLander, and MathShoot. They'll hone your skills in addition, subtraction, multiplication, and division.

Looking for a new way to view all our popular online graphics files? Cshow is just the ticket. This high-quality GIF viewer will show pictures in Hercules, CGA, EGA, and VGA graphic modes. Cshow automatically adjusts to use the graphics card that you have installed. I use this program all the time—it's great!

Looking for mystery and adventure? Skullduggery is a game of intrigue that provides hours of brain-teasing entertainment. Look for clues in various text-based maps and diagrams, and then solve the puzzles that reveal the secret of Skullduggery.

Last but not least, we have a superb virus-checker program for you. Ward off computer viruses and the anxiety they cause with Flu Shot. It checks hard drives for uninvited code. Just add a line to your AUTOEXEC.BAT file, and you're protected. Suspected viruses are reported not only at boot-up but also while the program is running.

If you have any questions or comments about COMPUTE/NET, you can write to me here at COMPUTE in Greensboro or send E-mail to me on GENIE, address TROYGT, or on America Online, screen name TROY GT (that's with a zero). See you online! □

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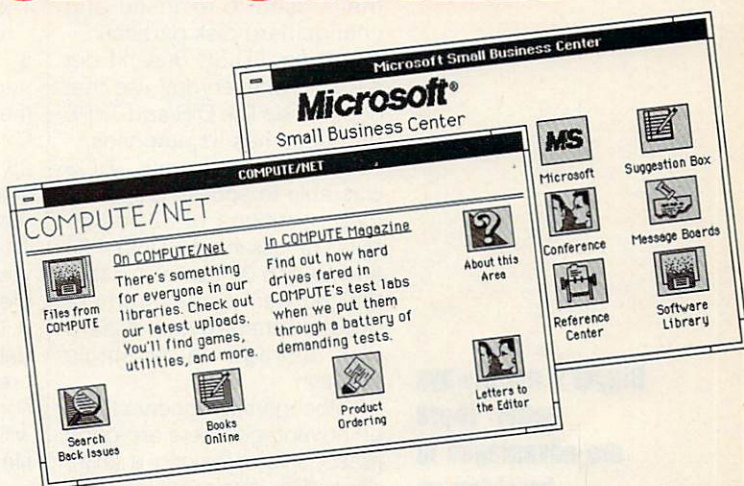
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INTRODOS

Tony Roberts

ORGANIZE YOUR DISK WITH FDISK

DOS's FDISK is the utility that's used to examine and change hard disk partition information. FDISK doesn't get the kind of everyday use that commands like DIR and TYPE get, but it has its purposes.

In earlier versions, DOS was able to access only hard disk partitions of 32 megabytes or less in size. DOS 4.01 and DOS 5.0 have eliminated that barrier, permitting hundreds of megabytes of hard disk storage in a single partition.

Although this appears to be an advantage, there are good reasons for breaking a large hard disk into smaller segments. You may want to isolate game files from business files, or Bob's files from Mary's. If you have a large hard disk that needs partitioning—or a partitioned hard disk that you'd like reorganized—FDISK is the tool to use.

First, be warned that FDISK is a powerful utility. It's designed to give you a clean slate—to wipe out everything on your hard disk. Before you undertake any FDISK experimentation, make sure you have a full and verified backup of all your hard disk's data.

Also, make sure you have plenty of time. Repartitioning a hard disk requires backing up the data, repartitioning, formatting the new partitions, and then restoring all the data.

FDISK is careful, though, about not destroying information without demanding your confirmation. You can run FDISK and display partition information, for example, without being concerned about wiping out your disk.

Let's say that you want to partition your hard disk into three logical drives—C:, D:, and E:. Make your backups and create

a boot-up disk that includes the operating system files as well as FORMAT, FDISK, CHKDSK, and whatever programs you'll need to restore your backups. Then run FDISK.

Let's assume that we have a 100-megabyte disk that needs to be partitioned into these areas: 50 megabytes for C:, 25 megabytes for D:, and 25 megabytes for E:. Start by selecting the Delete option to remove the current partitions. This will render the data on your hard disk useless, so double-check those backups.

Once all the partitions are deleted, choose the option to create a primary DOS partition. This is the partition that will contain your DOS startup files—your boot drive. When you're asked whether this partition should be made the maximum possible size, answer no. Select a 50-megabyte partition. The partition you've just created will be known as drive C:, the name given to the primary partition on the first hard disk in any system.

Follow the FDISK menu selections to create an extended DOS partition. FDISK will suggest using all of the remaining space for the extended partition, and you should agree. Even though you're going to create two more logical drives, you're permitted to create only one extended DOS partition per drive.

Once the extended DOS partition is created, you can choose the option to create logical drives. You can have as many as 23 logical drives, but all the logical drives you create will exist within the one extended DOS partition. Specify sizes for the logical drives, and FDISK will assign a drive letter in sequence to each logical drive you create.

Once the disk is partitioned, there's one final step to take. You must use option 2 from the main FDISK menu—

Set Active Partition—to make your primary DOS partition active. This is crucial; without it, you won't be able to boot from the hard disk.

When all the changes are made, exit FDISK, restart the system from the startup floppy, and reformat each of your new drives. Use the FORMAT command with the system switch (FORMAT C:/S) to copy the system files to the C: drive and to make it bootable. Then format the other drives normally.

After formatting, restore your programs and data files from the backups, and you're in business. If you add a second hard drive to your system, be prepared for some confusion with logical drive names on your first hard disk's extended DOS partition.

As I mentioned earlier, the primary DOS partition on the first hard disk is always designated with the C: label. Similarly, a primary DOS partition on a second hard disk is always designated with the D: label. If your first hard disk originally included logical drives D: and E:, those designators will be changed to E: and F: when the D: designator is assigned to the primary DOS partition on the second drive.

This change in drive designators will cause you to rework any batch files, scripts, or program startup icons that refer to the original names.

You can avoid this problem of logical drive name switching by not creating a primary DOS partition on the second hard disk. Just create an extended DOS partition and fill it up with as many logical drives as you want. These new storage areas will be given names that follow the names of the logical drives on the first hard disk.

It isn't easy to repartition a hard drive. It's worth doing if the resulting setup will make it easier for you to do your work or protect your data. □

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HARDWARE CLINIC

Mark Minasi

HOW MODEMS WORK, PART 3

For the last two months, we've looked at some of the things we need to know in order to get the fastest, most reliable file transfers out of our existing modems. This month, I want to wrap up the topic of improved protocols, talk about setting modems and software to handle varying error climates, and look at modems that are inexpensive and fast.

We saw last month that a checksum is calculated for every block of data sent via XMODEM. The receiver uses that checksum to ensure that the data in the block was transmitted without damage from phone noise. The checksum's a good tool, but there are some cases where line noise could change two bits in a 128-byte message but the noise wouldn't be detected by the checksum procedure on the receiver side. While such a thing is unlikely, it's still too likely for my taste. The checksum is only 99 percent effective—that is, it only detects line noise in 99 percent of the cases where it occurs. Most modern protocols don't use checksum but instead employ a more complex mathematical function called a cyclical redundancy check (CRC), which is 99.9926 percent effective.

It would often be nice to use a wildcard character when transferring data. Unfortunately, with XMODEM you have to specify each file, one by one. YMODEM Batch and ZMODEM are among the newer protocols that offer batch transfer. I particularly like ZMODEM; it lets me specify a list of files and then asks if it should hang up after the transfer. I then walk away for a while, return, and find that ZMODEM has transferred all of the files for me.

Even more amazing, if ZMODEM detects that one of the files was only partially transferred, perhaps because I was disconnected in midtransfer during my last transfer session, ZMODEM will actually pick up where it previously left off! Late at night, when phone charges are at their lowest, I can queue up several megabytes for transfer and go off to bed without worrying about staying connected all night. Along the same lines, XMODEM requires that you specify twice the name of the file you want to transfer—once for the sender and once for the receiver. YMODEM and later protocols transfer not only the file but also the filename. All you need to do is to tell your communications software to receive the file, and it gets the filename from the sending BBS.

Squeezing the Last Bit

There are many data-compression techniques in use these days; the most popular are the ones used by the PKZIP, ARC, PAK, and LHARC programs. If you've ever pulled a file off a computer bulletin board system (BBS), it probably had a ZIP, ARC, PAK, or LZH extension, requiring that you have the appropriate decompressing program.

The idea with file-compression programs is simple: The more time required to do a file transfer, the more the transfer costs, whether from CompuServe charges, long distance charges, or whatever. File-compression programs can often compress files to one-tenth of their original size, so a 1MB file would compress to a 100K file.

That's why many of today's modems include the ability to compress and uncompress data on the fly. With such a system, you'd never have to bother with the whole compress-

ion and decompression process; you'd just leave bloated, uncompressed files on your BBS and let the modems handle the compression. You'll recall from last month that two terms stand out in the error-correction area: *MNP*, for Microcom Networking Protocol, and *V.42*, an international standard. Both standards have been augmented to include data compression in addition to error correction. *MNP's* Level 5 includes data compression, as does *V.42 bis*. These days, many modems come with these features.

If you download images from bulletin boards, you've probably heard of GIF (Graphic Interchange Format). GIF files don't benefit from modem compression, because GIF files are already compressed.

Since ZIP, ARC, PAK, LZH, and GIF files are in formats that don't lend themselves to further compression with normal compression techniques, it should be obvious that modems with built-in compression capabilities are of very little value to most of us. Not only are they of little value, but they're often downright undesirable, since modems with built-in compression can waste time trying to compress uncompressible data, slowing down file transfers. Given that ZIPs and GIFs are what most of us are downloading, look for a modem with the ability to turn off compression.

Communications Coprocessor

An inexpensive chip that can increase the speed of your file transfers has been around for years. Called the 16550, it's a member of the class of chips called UARTs (Universal Asynchronous Receiver/Transmitters). A UART is the heart of any serial port. If you're curious, pop the top on your PC and pull out the

How data compression, faster protocols, and the 16550 UART chip can affect your online communications



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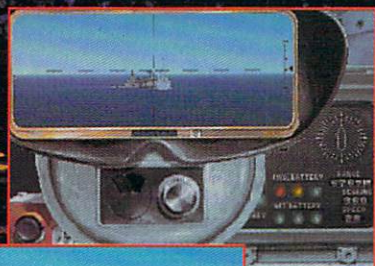
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Given the choice, let the modem do the error checking.

board that has your serial port on it. (Some computers may have the serial-port electronics right on the computer's motherboard.) You'll probably see a large 40-pin chip on the board. Look for the numbers 8250, 16450, or 16550. They may be wrapped up in some other characters, such as INS8250AP or the like.

The 8250 was the original UART used in PCs and XT's. It was fine for communications up to 2400 bps, but it couldn't keep up with faster computers and communications. So the 16450 was developed, and it's fairly prominent on the serial ports of computers in the 286 and higher class. A complete internal redesign makes it up to ten times faster than the 8250 for some applications. Part of that speed comes from a one-byte buffer that makes life easier for multitasking systems. Multitaskers like buffers because serial devices need nearly constant attention or data gets lost. Buffers hold the data for a few extra milliseconds, making the process of juggling tasks a bit simpler. OS/2, in fact, insists on 16450 UARTs, and serial ports with 8250s aren't recognized at all. Fortunately, the 8250 and 16450 are pin compatible, so I've been able to convert a number of old parallel/serial cards to OS/2 compatibility by just swapping a single chip. The task is further simplified by the happy fact that many UARTs are socketed, removing the need for soldering.

OS/2 works well with the 16450 because it has to deal only with well-behaved programs that were designed to be multitasked. Unfortunately, DOS multitaskers such as DESQview and Windows don't have that luxury. It can take so much time to swap

multiple DOS applications that background communications can be a real pain under most DOS multitaskers; in fact, I use background file transfers as one of my basic tests of DOS multitaskers. There's where the 16550 comes in. The next member of the UART family, it includes a 16-byte buffer that turns out to be just perfect for communicating with DOS multitaskers. It even smooths out file transfers at 9600+ bps for slower PCs. And, best of all, it's pin compatible with its older siblings, the 8250 and the 16450, so you can upgrade easily if your current UART is socketed. And you'll need just one more thing: a program to turn on the 16550. Some applications do that automatically, but just to be sure, you can grab a program called 16550 off CompuServe.

But all isn't good news here. You'd think that a multitasking platform such as Windows would benefit from the 16550 and would use it if present. To the contrary, Windows will likely lock up if your 16550 buffers are enabled. The Windows COMM.DRV and virtual driver *combuff must be rewritten in order to use the 16550; Microsoft says it will take care of this "in a future release of Windows."

Tips for Maximum Transfers

Assuming you have a fast computer and 9600-bps or faster modem, how do you squeeze the maximum file-transfer rate out of your system? First and foremost, choose a protocol that allows large block sizes, as that will net the greatest transfer rate. Make sure only one part of the system handles error checking: either the modem or the protocol. That means either diving into your modem manual to find the code to

turn error checking off or leaving the modem alone and finding and using a protocol that won't try to do error checking. The preferred protocol here from my experience is YMODEM-G. The G is the important part; regular old YMODEM does error checking. Given the choice, let the modem do the error checking. It's faster, more robust in the case of noisy lines, and more thorough in its discovery of transmission errors. The main problem is finding a host that supports YMODEM-G.

Install a 16550 if you can, or think about replacing your current parallel/serial board with one that sports the newer chips. You won't see a difference with a 16550 unless you're multitasking, transferring data at 9600+ bps, or both.

And whenever possible, use COM2 rather than COM1. Why? You'll get a slightly better response from COM2 because it's driven off interrupt 3 (so is COM4, so you could alternatively use COM4), whereas COM1 and COM3 are driven by interrupt 4. The interrupts in the PC are prioritized, meaning the items with the lower interrupts get higher priority. Assuming your PC is monitoring both COM1 and COM2—if, for example, you had a serial mouse on one COM port and a modem on the other—you'd do better to put the mouse on COM1 and the modem on COM2.

If you're using Windows, that's the preferred arrangement anyway, since Windows deals best with communications ports when it sees them in order. It sees the mouse first, so put that on COM1. Then it sees the modem on COM2 whenever you get around to starting up the communications application. And remember to turn off compression in most cases. □

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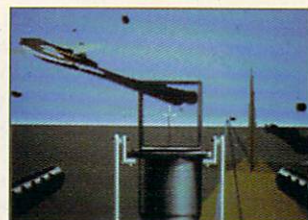


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PROGRAMMING POWER

Tom Campbell

DEVELOPMENT ENVIRONMENTS FOR WINDOWS

This month we'll walk through a couple of significant Borland products, Borland C++ & Application Frameworks 3.0 and ObjectVision 2.0. Each will probably have a column of its own in the future, as each has a wildly divergent means of creating applications.

Because there's so much to cover, this column won't have any code this month. Check out COMPUTE/NET anyway because I've uploaded the source code to a number of utilities I use constantly.

Borland pulverized its competition when it entered the C++ market last year, simultaneously legitimizing what was—hard as it is to believe now—an uncertain future for that language. The company's flagship product is now Borland C++ & Application Frameworks 3.0, a gigantic development system for both DOS and Windows. It includes the latest version of Turbo Debugger, Turbo Assembler, Turbo Profiler, a C compiler, a C++ compiler, integrated environments for both DOS and Windows (finally), the Turbo Vision (for DOS) and ObjectWindows (for Windows) development libraries, the Whitewater Resource Toolkit, a Windows help compiler, a C++ container class library, support for C++ version 2.1 including some proposed extensions (notably templates), a ton of utilities, and the best example programs in the business.

It's become my preferred development environment for both C and C++, but it's not without problems. The integrated Windows environment is actually Turbo C++ for Windows, which also sells as a \$149.95 product on its own; more on it

in a moment. You still don't get a Windows-style debugger; Turbo Debugger runs under Windows, true, but in character mode. While it's a vast improvement over Microsoft's CodeView, which is no fun to use in Windows unless you have two monitors, it's no fun to snap in and out of graphics mode each time you step over a function call.

Debugging Windows apps is hard enough as it is. Turbo C++ for Windows, which is the first C++ integrated editor/compiler that runs under Windows, is a wonderful development environment. It has everything you'd expect in a Windows-based editor and the increasingly trendy toolbar for quick selection of common actions, but my favorite part is the ObjectBrowser. It's a visual representation of your program's function calls in a tree format, the programmer's equivalent of an outliner. My version of Turbo C++ is much buggier than a first release should be; I hope a .01 release fixes some of the bugs. Plan on saving your files *all* the time.

If you're on a budget, either Turbo C++ for Windows or Turbo C++ 2.0 for DOS is a great buy. Another recent Borland release is ObjectVision 2.0, a Windows database builder that straddles an uncomfortable line between being an end-user tool and a development environment—but it straddles it well. Nowhere does Borland have a quotable sentence or two describing just what ObjectVision *is*, so I'll try to do it.

ObjectVision is a visual design tool that lets you create Windows data-entry forms and the databases behind them with little or no programming. A form isn't limited to one database or even one format. Unbeknownst to you, a single form window can simultaneously be updating dBASE, Paradox, Btrieve, and

ASCII databases while you enter data. OV lets you create stand-alone Windows databases, and you're allowed to distribute all the support files required to create turnkey systems for redistribution.

Whew! While that paragraph may not be pretty, it does the job. OV looks somewhat like a drawing program or forms-design program, but what you draw is the "live" data-entry form itself. Borland tends to view this as a front end to other databases, but I have nothing but praise for its use on a single-user system.

You can create complex data-validation procedures and filters without any programming at all, and a *novel* (if you haven't used such Macintosh products as Double Helix) visual "decision tree" lets you program using 1-2-3- or Quattro Pro-style @functions as a rudimentary, foolproof programming language. As a programmer, I found it a less-than-perfect environment; as a user, I must confess it's easy to learn and very fast to program in. A poorly documented but effective DLL interface allows plenty of access to OV's innards and a seamless way of extending its already considerable abilities. An obvious idea would be a DLL that lets you modify the access to dBASE memo fields, which are limited to 4096 characters through OV's editor. OV doesn't pretend to create reports or offer debugging facilities, but what it does, it does magnificently.

Should you buy it? At \$100 (street price), if you need to create Windows data-entry forms of simple-to-medium complexity, it can't be beat. I imagine forward-thinking MIS departments are going wild about ObjectVision because it allows a naive user to update many, disparate databases from what appears and behaves like any other data-entry form. □

You can create complex data-validation procedures and filters without any programming at all.

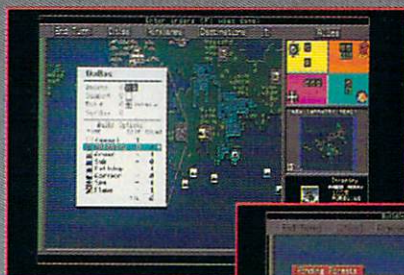
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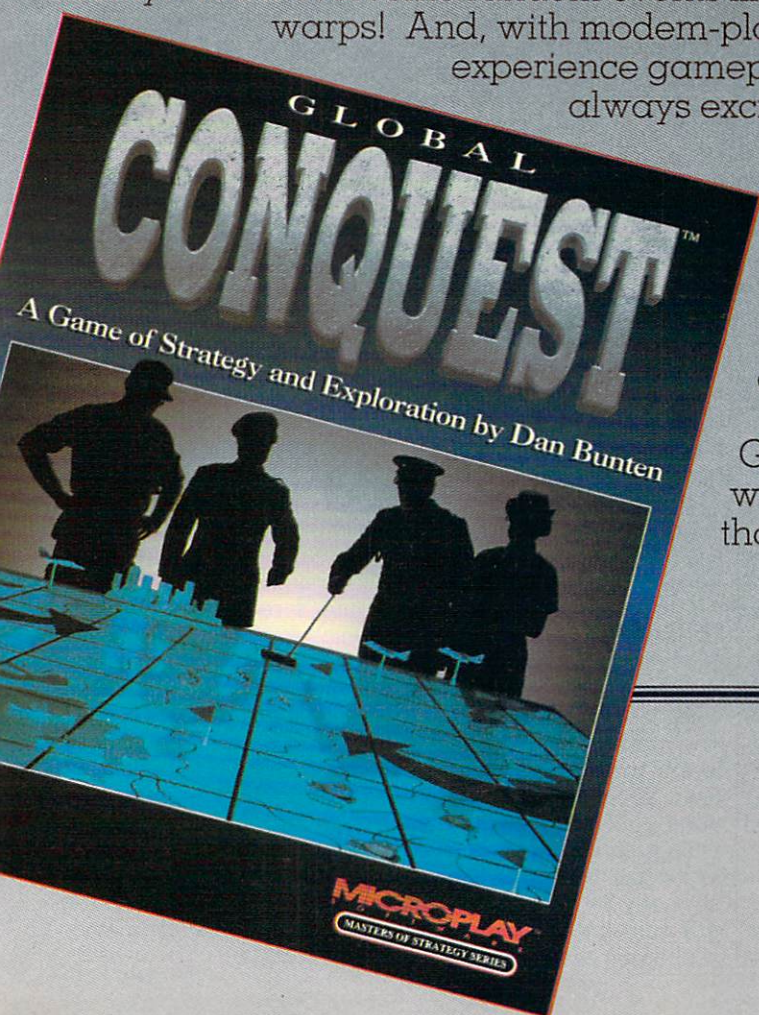
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SHAREPAK

Steve Draper

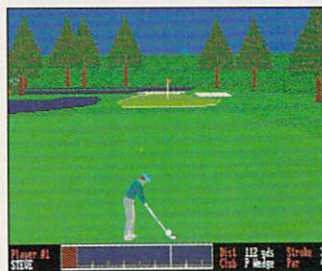
A WINNING COMBINATION

The long days of summer are winding down, and fall is approaching. To help all you sportsmen out there get through this winter, we present Tournament Golf 1.5. This simulation is so much like the real thing that you'll feel the hot sun beating down on you even on the coldest day. And to help you keep up with Tournament Golf and all the other files on your computer, we offer QFILER 3.2A. It's one of

August's SharePak features fun and functionality.



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QFILER 3.2A

QFILER is designed to make the management of your hard

disk files much easier. Two different, sorted directories are displayed side by side, allowing you to select both individual files and groups of files for QFILER to act on. You can easily copy and delete files, find a file on any drive, rename files and directories, move files from one directory to another, run other programs from within QFILER, display files in sorted order, define a file mask to display only certain files, back up files, and much more.

Most of the features in this impressive list can be performed from the DOS command prompt. However, with QFILER's dual directory display, tasks become much easier than with DOS, and more intuitive. You don't have to worry about the confusing syntax of DOS commands or about not being sure of what each command will do. You can see exactly what you're doing as it happens.

For the advanced DOS user, QFILER offers a number of file-management tools, allowing you to set or clear file attributes, change the file time and date stamps of files, rename disk volume labels, use file-compression utilities, and locate duplicate files. You may never want to use DOS again.

QFILER runs on any IBM PC or compatible with 256K RAM and any monitor. The registration price is \$20.

TOURNAMENT GOLF 1.5

Tournament Golf is an excellent simulation of one of the world's most popular sports. The game is very easy to learn, with only a few keys used to control all of the options, yet it's challenging enough to keep you involved for months. This game surpasses many of the commercial golf games in quality, ease of use, and playability.

The action takes place on the Augusta International course, the site of the Masters golf tournament. The course is beautifully rendered with 3-D graphics, and the motions of the player's swing and the ball's flight are smoothly and realistically animated.

Up to four players can play at a time, or you can practice your golfing skills solo. Either way, you'll see why the tournament that is played on this course is called the Masters. There are numerous obstacles to overcome. Trees line the fairways, sand surrounds many of the greens, and water hazards are abundant and strategically placed. These obstacles combine to make every shot a challenge.

When you're ready to play, the program gives you an overhead view of the hole that you're currently on. Use this view to plan your strategy for the hole. When you're done, hit the space bar, and you're ready to tee off. Select the club you want to use and get ready to start swinging. Use the space bar to control the swing Power Meter. The Power Meter determines how hard you hit the shot and also how accurate the shot will be. Be careful when you make contact with the ball; it's easy to put a slice or hook in your shot—just like in the real thing.

Another great feature of Tournament Golf is the computer's realistic scorecard, which frees you from having to keep track of bogies and birdies. You can relax and concentrate on the game itself, instead of worrying about hanging on to the little pencil.

To run this program, you'll need an IBM PC or compatible, a monitor with EGA or better, and a hard disk or a high-density floppy drive. The registration price for Tournament Golf is \$9.50. □

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IT TAKES MORE THAN TALENT,
SWEAT, AND IRON
DETERMINATION TO SUCCEED.

THE TAPROOTS OF SUCCESS

BY ROSALIND RESNICK

When it comes to running a business from home, there's no sure-fire recipe for success. Although computerization is virtually essential to compete, it takes a lot more than a trusty PC to start a successful business. Toss in raw ambition, add hard work, stir in a pinch of market savvy, and in the end you could still be stuck with a money-losing flop. That's because no amount of ambition, hard work, and market savvy can guarantee that your biggest customer won't go belly up, your competitors won't slash their prices, or somebody else won't come along with a better mousetrap.

Even so, these unavoidable business problems aren't always the things that sink a new company. More often than not, small businesses fail not because they lack good products but because their owners lose sight of the fundamentals: cash flow, marketing, collections, and long-term planning. Interestingly, not only shortsighted businesses run into trouble. Successful com-

panies have the same kinds of problems. The difference is that successful businesses tend to spot these problems early on and correct them long before they get too big to handle.

Of course, it's entirely possible to sidestep many of these pitfalls if you know what to expect beforehand. To that end, we've interviewed three successful home-based entrepreneurs. We asked them to talk about some of the mistakes they made along the way—and how they managed to turn lemons into lemonade. Essentially, what we've asked them is this: If you had it to do all over again, what do you wish you had known before you took the plunge and started your own business?

How to market my services. Robert McElwain, 51, once a stockbroker with some of the nation's leading brokerage firms, dropped out of the corporate rat race in 1984 to launch North American Capital Management in Shawnee Mission, Kansas. Though Shawnee Mission is a long way from Wall Street,

the Kansas money manager and his stock-picking prowess have rated favorable mentions in *Money*, *Wealth*, and other national magazines. McElwain now manages more than \$12 million for clients nationwide and says his company's annual billings are comfortably "in the six figures."

When McElwain first went out on his own, he very nearly became a victim of his own success. "In the beginning, we were very fortunate because we were featured in *Money*, *U.S. News & World Report*, *Wealth*, even the local newspaper," the money manager recalls. "The effect was that I got spoiled, and I forgot that you're supposed to market your services. It was not until a year or so ago that we realized we needed to get back to the basics and start doing some marketing."

McElwain's solution: an information-packed newsletter targeted at affluent individuals and pension managers nationwide. Thanks to McElwain's renewed emphasis on marketing, he's seen his business grow from \$10 mil-



Getting on the customer's wavelength was key to Turkel Advertising's success.

lion in assets under management—the commonly used benchmark for the money-management field—to over \$12 million since he launched the newsletter in November.

How to speak my customers' language. Bruce Turkel, 34, quit a good job at a Miami advertising agency to freelance from home eight years ago. Today, Turkel is president of Turkel Advertising, which employs 14 staffers and racked up \$8.6 million in billings last year, thanks to clients like American Express and Turbana, one of the world's largest fruit companies. Turkel says that his billings are up 42 percent over last year and that his company now ranks 32nd out of approximately 260 Miami-area ad agencies.

When Turkel quit his job as an art director to start his own agency, he often found himself trying to explain to his business-owner clients the creative concepts behind his ads. It wasn't long before he realized that he was wasting his breath. "Advertising is not what they know," Turkel says. "They know about widgets. Now, I speak to what my clients want to know: that we're going to boost their image and expand their business. How we do it doesn't matter to them."

With a bit of chagrin, Turkel notes that, while his ad agency has snared a number of prestigious industry awards, many of his clients remain unimpressed. "One client said to me, 'I just want you to win me green awards,'" Turkel recalls. "As long as you win me green awards, I don't care what you do."

How to diversify my customer base. Donna Partow, 30, owner of Syntax Services in Barrington, New Jersey, is a marketing consultant and freelance copywriter. Partow, who had previously worked at a bank, opened her home business shortly before her daughter, Leah, was born three years ago. Working from home allows Partow to spend the day with her child without sacrificing her career. Last year, she raked in \$22,000 in revenues—not bad for 20 hours a week of work.

Partow says it's easy to get hooked on a single client, especially when you're just starting out. But, while that regular income stream can be a lifeline, it can also become a dangerous addiction that saps the strength of a growing company. Partow recalls, "One client wanted me to call on clients, do business development, all kinds of things. I began spending most of my time developing his business, not mine. One day, I actually heard myself referring to him as my boss. That's when I knew the relationship was over."

Partow's solution: informing the client that she wouldn't be available to work more than five to ten hours a week for him. "It's better to have multiple clients rather than just one big one," Partow says now. "I think that's a mistake a lot of people make. You get one client and just lean on him. That's not wise."

How to get my customers to pay me. Early on, Turkel, who started his business at the tender age of 25, also

learned some costly lessons about handling receivables. "I believed that if you do the work, you get paid," Turkel recalls. "It was what my dad called 'the confidence of ignorance.'" At the beginning of his second year in business, Turkel got a rude awakening: A client that had always paid on time before stuck the fledgling agency with \$40,000 in unpaid bills. Though Turkel took the client to court and won, he wasn't able to collect his judgment. That left Turkel on the hook to pay all the outside vendors he had hired to help him with the job.

Now, Turkel says, his agency estimates every job up front and sets a "comfort level" for unpaid receivables beyond which the agency will call a halt to its work. With one client, that level may be as low as \$2,000; with another, \$10,000 or higher. "It has nothing to do with trust; it has to do with business," Turkel says. "It's a lot better to do it this way than to do the work and have the client not pay us."

But Turkel admits he still occasionally gets burned. Recently, a client filed for bankruptcy protection—owing Turkel's company \$20,000.

How to manage my cash flow. In the burst of excitement that comes with finally going out on their own, many home business newcomers forget that they probably won't see any money from their labors for at least 30 to 60 days. That's how long customers typically take to pay their outside vendors (often longer in these recessionary times). A good strategy is to moonlight, as Turkel did, before quitting your job to go out on your own or, at least, to sock away enough cash to get you through a couple of lean months.

Advises Partow: "Don't quit your day job until you have thoroughly researched your business, analyzed your market, and completed a detailed business plan. I quit my job, opened up shop, bought a computer, and said, 'Now what?' As a result, I had to wait months before seeing any cash flow." Also, she adds, "Don't bank on showing a profit the first year."

How to find my niche. Some of the more fortunate home-based entrepreneurs have a skill or a customer base that they can take with them from their old office jobs. McElwain, for example, had spent years as a stockbroker, and Turkel had three years' experience at various ad agencies. But for people without those ready-made connections, finding a niche can be much more difficult.

Partow was an English major who had honed her writing skills by writing booklets, brochures, and articles while an investment banking rep at Mellon Bank. But when she launched her mar-

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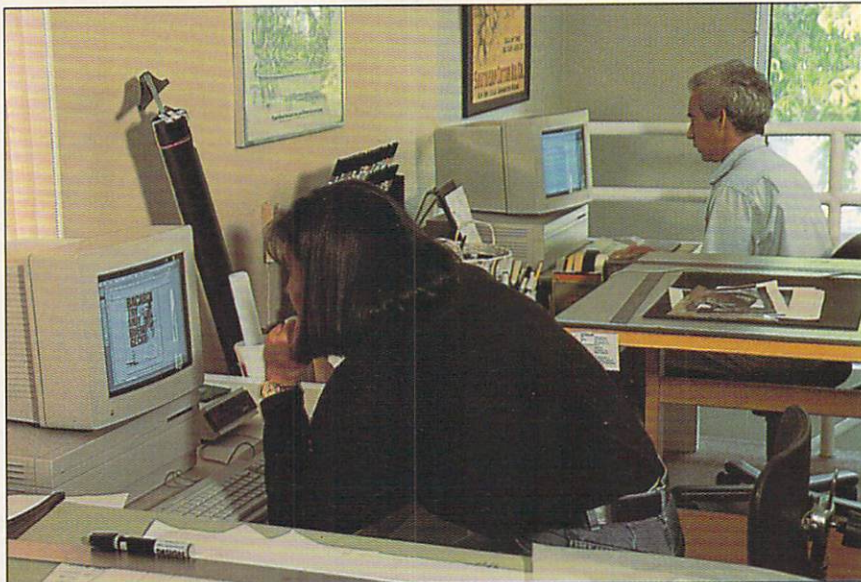
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keting and copywriting firm, she realized she needed to be more of a specialist to get where she wanted to go. While she hasn't reached her goal yet, she's gaining a reputation as a home business expert by teaching a class at a local university, writing books on the subject, and contributing to a newsletter for people who work from home. Her book on starting a home business, *Homemade Business: A Woman's Step-by-Step Guide to Earning Money at Home*, is now available; ordering information can be found in the product box accompanying this article.

"You need to find your niche and stay focused," Partow says. "Clients are willing to pay you more if you're a specialist."

When to reach out for help. Running a home-based business doesn't necessarily mean going it alone. Though the work force of the typical home business consists of a self-employed individual or couple, farming work out to independent contractors with different but complementary skills isn't unusual.

McElwain, the money manager, is unusual in that he has four part-time employees, including his wife, who all work in his home office. One is a freelance computer programmer; another customizes software for Harvard



Technology is leverage in a small business, letting a few workers do the work of many.

Graphics. McElwain's wife works at the company two days a week to handle the bookkeeping. Fortunately for McElwain, his office is large enough to accommodate a staff that size. It measures 1400 square feet, has its own entrance, and houses five desks and three computers.

"The employees can come in in

blue jeans and fix themselves a cup of tea or have a Coke," McElwain says. "It's very informal and relaxed."

How to leverage my business through technology. These days, it's hard to imagine a home business that doesn't have a personal computer. Add on a printer, modem, fax machine, and some basic desktop publishing software, and your fledgling business has most of the tools it takes to compete with the pros. Nevertheless, how much technology to buy, which technologies you need, and how to get them to do what you want them to can still be a struggle.

"I wish I'd known more about computers before I started my business," says Partow, who still has the same IBM XT clone she started out with. "I think the people at WordPerfect know me by name."

Keeping up with technological change can also be a challenge for more sophisticated users like McElwain, who runs his business on an old IBM PC and two newer 286 AT clones. "Each time I've bought a computer, I've bought it based on what I thought I needed at the time, but each time the software packages have been upgraded to operate at far greater speeds. Now, I'm planning to get a 486 machine with a math coprocessor to help me crunch the numbers."

How to delegate responsibility. Once you get your home business up and running, you may find that it literally spills across your living room and out the door. Unlike McElwain, who employs people at his home, most home business owners who hire employees eventually break down and lease office space. But while hired workers can help expand your business by multiply-

YOU'RE NOT ALONE

If you're thinking of starting a home business (or have done so already), it's reassuring to know you're not alone.

LINK Resources, a New York-based research and consulting firm, estimates that close to 12 million self-employed people work from home these days. Part of the phenomenon can be attributed to advances in personal computers, modems, and fax machines that let people create their own offices outside the corporate whirl. In 1991, nearly half of all homemaker households owned a personal computer, compared to fewer than 25 percent five years ago.

Here are some of the findings of LINK's latest (1991) homemaker survey:

- Of the 122.9 million Americans in the adult work force, some 38.4 million (31 percent) work from home at least some of the time, and that number is expected to grow at a 12.7-percent annual clip. Roughly one-third of the United States' 94.4 million households have at least one person earning a living—or trying to—at home.
- There are 11.8 million people running full-time businesses from home, up 5.4 percent from 1990.
- People juggling multiple jobs by working part-time, or moonlighting, from a home office number 10.5 million. This segment, composed primarily of baby boomers looking for extra income, grew by 12 percent from 9.4 million in 1990.
- The telecommuting population has

reached 5.5 million people. These workers are company employees who work at home part- or full-time during normal business hours. This figure is up 38 percent from 1990. Roughly 900,000 telecommuters now log 35 or more hours a week at home, thanks to corporate belt-tightening and shifting management attitudes.

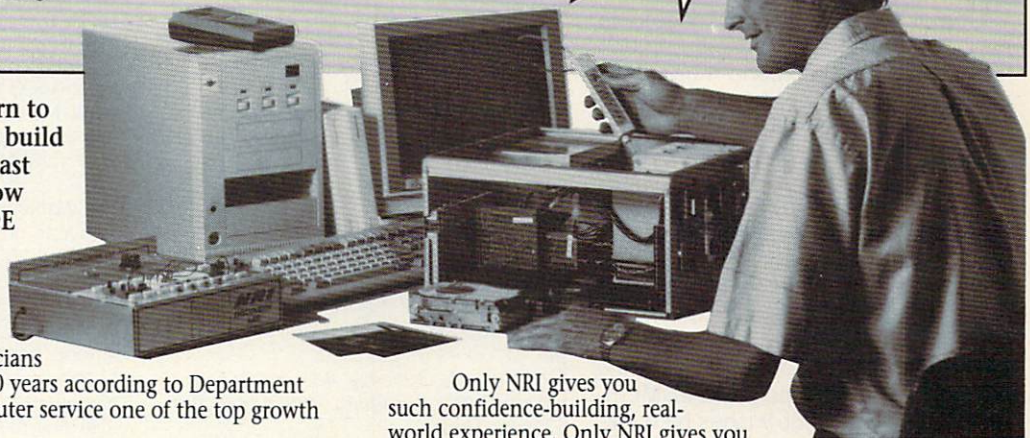
- People routinely bringing work home from the office to do after hours number 10.6 million. Actually, LINK estimates that closer to 29 million employees bring work home at least some of the time but don't meet the "homeworker" definition.
- By 1995, 50 million or more Americans may do some or all of their work at home, LINK predicts.

How does LINK know all of this? LINK collects data by conducting its National Work-at-Home Survey each year, polling a randomly selected group of 2500 households nationwide. To qualify for "homeworker" status according to the criteria in LINK's survey, households must indicate that one or more adults age 18 or older either "perform income-producing or job-related work at home, part- or full-time," and/or "use one or more of the following for business purposes at home: personal computer, modem, fax, multiple phone lines."

For more information, contact LINK Resources at 79 Fifth Avenue, New York, New York 10003, or call (212) 627-1500.

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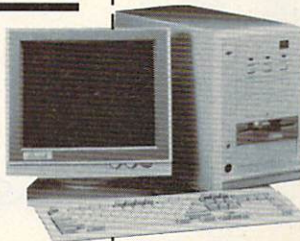
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ing the amount of work you can take on, they can also pose new problems as the individualist entrepreneur is forced to become a team player again, this time as the boss.

"When I started hiring creative people, I would give them the concept of a job, and they would give me back the copy," Turkel says. "I learned that it doesn't have to be done the way I would do it. It just has to be done well."

One of Turkel's main challenges, he says, has been keeping his employees motivated. "I think I spend more of my time getting my people excited than anything else," he says. "People love to work if they're doing something they believe in."

How much I'd enjoy having my own business. Though the prospect of cutting the corporate umbilical cord and starting your own business may seem scary at first, it's amazing how many home business people say they wish they'd gathered the courage to strike out on their own long before. McElwain, for one, says he wishes he'd taken the plunge ten years ago. Partow, too, says she wishes she'd started her home business sooner.

"Now I can work where I want and when I want," she says. "That's about as good as life gets." □

RESOURCE BOX

Thinking of starting your own home business? Here are some helpful resources to speed you on your way:

Working from Home: Everything You Need to Know About Living and Working Under the Same Roof

Paul and Sarah Edwards
\$14.95

ISBN 0-87477-582-5

Jeremy P. Tarcher
5858 Wilshire Blvd., Ste. 200
Los Angeles, CA 90036

The Self-Employed Woman: How to Start Your Own Business and Gain Control of Your Life

Jeannette R. Scollard
\$7.95

ISBN 0-671-68407-8

Simon & Schuster Trade Books
A Division of Simon & Schuster
1230 Avenue of the Americas
New York, NY 10020

Homemade Business: A Woman's Step-by-Step Guide to Earning Money at Home

Donna Partow

\$11.00

ISBN 1-56179-043-5

Syntax Services
P.O. Box 82
Barrington, NJ 08007

How to Run Your Own Home Business

Edited

\$7.95

ISBN 0-8442-6666-3

VGM Career Horizons

A Division of NTC Publishing Group

4255 W. Touhy Ave.

Lincolnwood, IL 60646

The New Small Business Survival Guide:

Winning at Business in the '90s

Bob Coleman

\$10.95

ISBN 0-393-30750-6

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The Working from Home Forum

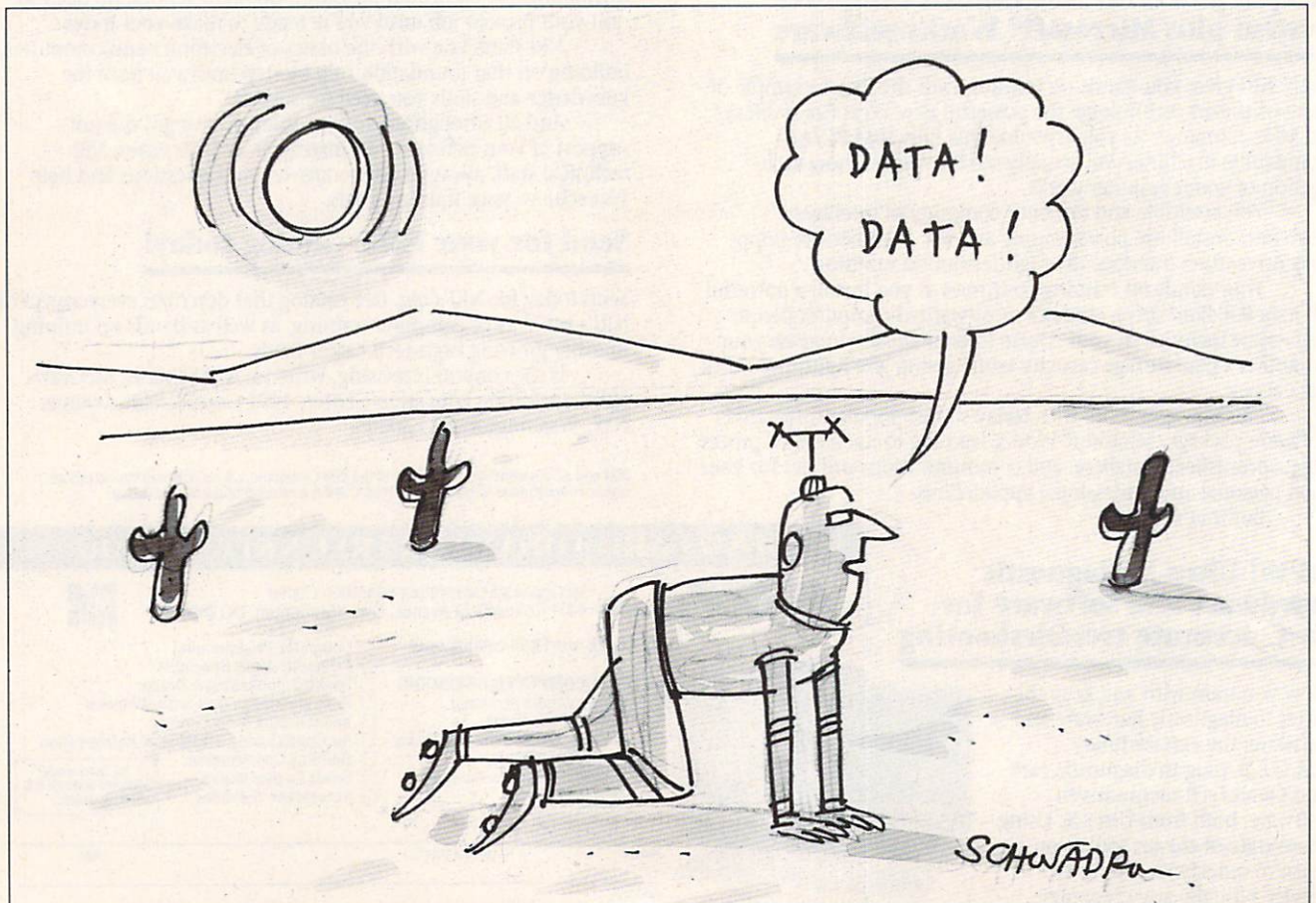
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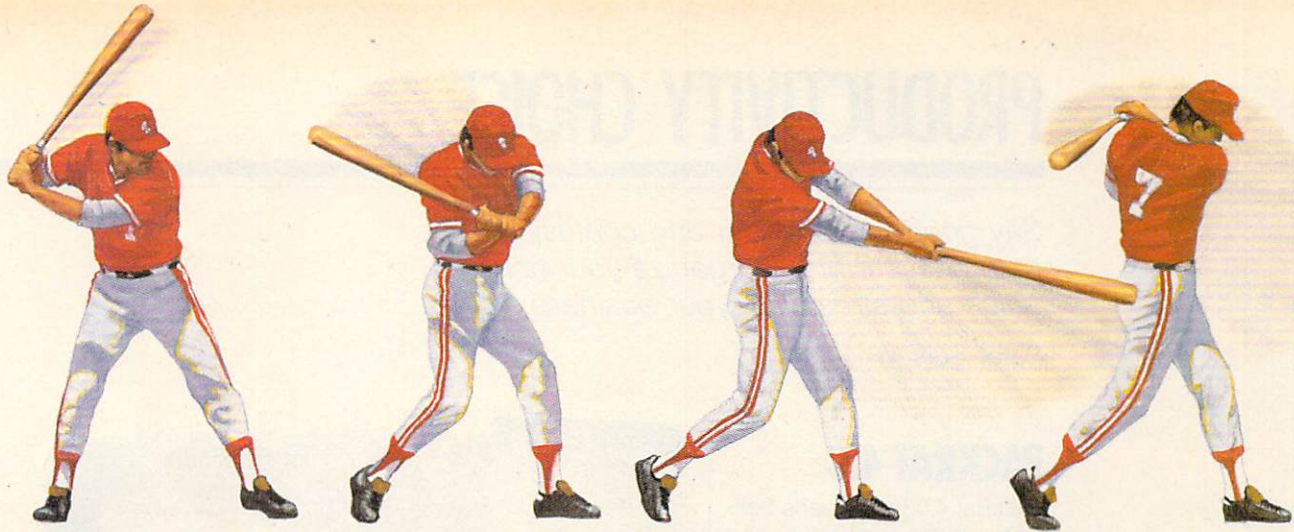
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Provides a place for online networking among home office entrepreneurs. Also contains information about home office management tips, resources, laws, tax benefits, and marketing approaches. Paul and Sarah Edwards (coauthors of the book *Working from Home* listed above) are sysops. The Working from Home Forum is not surcharged, though CompuServe itself charges an access fee.





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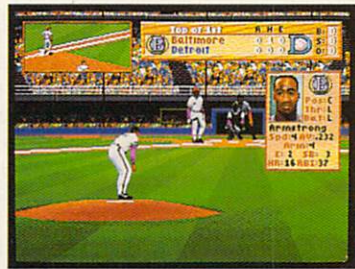
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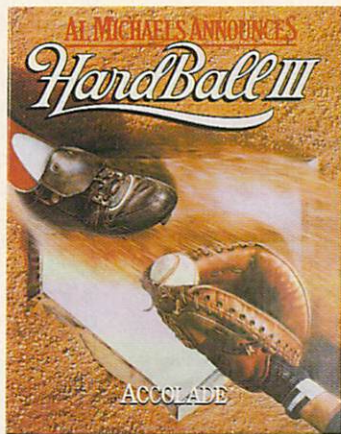
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PRODUCTIVITY CHOICE

Say goodbye to clutter and confusing notes: This PIM will organize your home office and streamline your business.

Peter Scisco

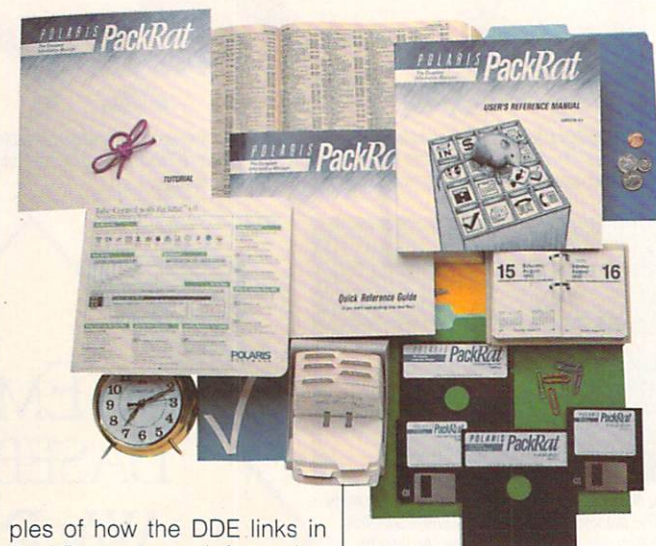
PACKRAT 4.0

PackRat 4.0 from Polaris Software stores, organizes, and provides easy access to every detail of your office. While several personal information managers (PIMs) fly the Windows banner, PackRat 4.0 ranks as the premier implementation of this application group. No other PIM quite matches its scope or capabilities, yet it doesn't ask you to sacrifice a lifetime in learning. The program's overall integration, intuitive functionality, and well-developed links to other Windows applications make it a natural leader.

Comprising 15 separate activities, called facilities, PackRat can be configured to be as simple or as complex as you want. This eases the way for first-time users, while offering the expandability that a growing business requires.

For users who fear such an armada of applications, one of PackRat's best features is its ability to display only those facilities that you want or use regularly. Customize the interface to streamline it and keep the screen simplified. This is especially important in the beginning, for too many options at the start may intimidate you too much to allow you to make the most of PackRat's many features.

The facility to which most users will immediately gravitate is Phone Book, an excellent database for telephone numbers, addresses, and contact names. PackRat even accesses your fax software—so you don't have to keep a separate directory of fax numbers. Windows word processors can use macros to gain access to addresses stored in Phone Book. These are simple exam-



ples of how the DDE links in PackRat manage information across all of your applications.

Phone Book's companion is Phone Log, which tracks calls you make or receive. You'll find such a log invaluable if you must track phone costs from a home business or bill a client for phone calls related to a particular project.

PackRat's To Do and Agenda facilities are comparable to similar features in most other PIMs. Each keeps track of appointments and projects, supports repetitive and custom scheduling, and displays scheduling conflicts.

Besides these fairly straightforward facilities, PackRat offers more exotic but still useful options. For example, the Financial module lets you track expenses and account balances for any number of accounts. While not a replacement for a dedicated financial package, the Financial module can be designed to perform most of your accounting functions.

Index Card is a free-form card file for storing miscellaneous information. Use Index Card to store information for proposals, for brainstorming ideas, or for lists. Think of it

as an electronic equivalent of Post-it Notes.

Track the history of documents created in other Windows applications and launch documents with their associated applications with Disk File. You can also launch DOS files with accompanying applications, provided you've defined the document extension and its accompanying application in your WIN.INI file.

PackRat's Resource Management facility is designed for people who monitor the use of company equipment or bill clients for the use of special resources. You may define each resource item (conference room, computer, and so on) and its billing amount. As you attach a particular resource to a project, the billed amount is automatically calculated for the accrued time of the project.

PackRat attachments are particularly significant, for they govern the way information can be retrieved and linked. A Phone Book item linked to a project gives you a means of tracking who has been contacted for

each stage of a project. Any facility item can be linked to any other.

Project Management tracks projects and the tasks associated with them. Tasks can show dependencies, and prospective completion dates can be calculated and refined as the project proceeds. Like the Financial facility, Project Manager isn't meant for large projects better served by dedicated applications. But for small projects requiring the completion of smaller tasks, this manager performs nicely.

PackRat's Time Management module tracks the elapsed time spent on user-defined projects, tasks, clients—anything to which you want to assign a timed task. This facility can double as a time/billing module, as each Time item can be assigned a resource rate, which is then multiplied by the elapsed time for billing purposes. It's a very workable and elegant solution for home office workers or small businesses that want to track the amount of billable time spent on particular tasks.

An Alert facility allows you to schedule reminders for any task, call, or appointment. A pop-up window will occur in any other Windows application once an Alert has been activated. If you're using a DOS application in a windowed environment, the program will automatically be minimized, and you'll drop to the PackRat Alert screen.

A Global facility allows instant access to a variety of informational tidbits stored throughout PackRat. This can be very helpful when you're trying to pull together all of the information for a particular task. You can also use

Scratch Pad to assimilate information from different databases as you work toward the next stage in a project.

Essentially, all of these separate facilities act as modules for a simplified, intuitive database. As such, PackRat provides ample opportunity for you to define each entry you make in a way that allows you to search and retrieve that information easily.

For example, in a simple module like Phone Book, you can enter all the basic information: name, address, title, position, company, business phone, and so on. In addition, you can fill four User Key fields to refine your entry. If you needed a report on all of your suppliers located in the Northeast, you'd type *supplier* in one of the User Key fields and *northeast* in another. Then, before traveling to the Northeast, you'd search using those criteria and the Boolean search routines that PackRat provides. The intuitive and powerful search routines are a major part of PackRat's power.

As another indication of its powerful database activities, PackRat can issue a variety of reports based on parameters defined in a similar way to the search parameters. It includes several standard reports and provides tools for defining and designing your own. You can save your reports as a Print Catalog that you can call up later—so you have to define the report only once.

Is PackRat the perfect personal information manager? Almost. There's still room for improvement, especially in the program's manuals. A more thorough examination of each of the intricate and varied functions is needed. Certainly, instructions for report-

POLARIS PackRat
The Complete Information Manager

NEW!
PackRat 4.0

PC MAGAZINE
EDITORS' CHOICE
November 27, 1990
Review issue 12

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The PackRat 4.0 kit does, and you don't! Each kit contains the production; you can return it for full refund.

ing functions, printing, and the Resource and Project Management modules all need to be more detailed.

A second caveat is the power you really need for this incredibly disk-intensive application. I've been using the program for several months on a machine with 4MB of memory, but I feel the distinct need to double that amount of RAM to accommodate this program, the Windows environment, and Ami Pro 2.0.

Still, you'll have to look pretty hard to find a program that does so many things so well. PackRat is billed as a "complete information manager," and it lives up to this claim in grand style. If your work requires you to balance several projects, think creatively, and stay in contact, PackRat 4.0 might be as perfect as it gets in this world. □

IBM PC and compatibles (80286 or faster); 1MB RAM; EGA, VGA, or Hercules; Windows 3.0 or higher (running in standard or enhanced mode)—\$395; network version (three users)—\$695; each additional node—\$175

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PERSONAL PRODUCTIVITY

Daniel Janal

FAX FROM ANYWHERE

"What's your fax number?" seems to be the catch phrase of the 1990s among business people. If you have a computer, you don't need to buy a fax machine to jump on the fax bandwagon. All you need is a modem, a phone line, and software—and perhaps an account with an online service like MCI or CompuServe.

Like a fax machine, most computer alternatives can

- Send any ASCII, graphics, or binary file
- Keep a directory of people you send faxes to
- Provide a transcript of faxes you have sent
- Broadcast faxes to groups of people in your directory, so you don't have to retype all the information
- Redial the number if the recipient's machine is busy

However, these alternatives do have drawbacks. Software and online solutions won't receive faxes. Hardware solu-

tions will eat a lot of disk space and could monopolize your computer. In all cases, if you want to transmit hard-copy, such as newspaper articles and contracts, you'll have to buy a scanner.

Here is a look at several popular alternatives to help you join the fax vanguard

Online services, like MCI and CompuServe, will send your ASCII document to any fax machine. You establish an account with the service, sign on, upload the files, and provide the recipient's fax number. The service will send the file to the fax machine.

CompuServe Information Services (CIS) charges a \$7.95 monthly connect charge, for which you receive a nine-hour credit for basic services (including faxes). After the nine-hour credit is exhausted, CompuServe charges \$0.75 for the first 1000 characters faxed and \$0.25 for each additional 1000 characters. Joining the service costs \$39.95 (free memberships are available with several modem and software packages). CompuServe can send ASCII files only and can't broadcast faxes.

With MCI, you pay only the cost of sending the message inside the U.S. There's no annual fee or startup charge. And with MCI you can broadcast faxes.

On the GoFAX from Ibis Software is a software alternative. You send the files to a service bureau, as you do with MCI and CIS, which in turn transmits the files to the recipient. But unlike MCI and CIS, On the GoFAX will transmit virtually any file format, including pictures and spreadsheets.

Mastering the software takes about ten minutes. You need only seven keystrokes to navigate through the system. The phone call is free, but your credit card will be billed \$2 for each page.

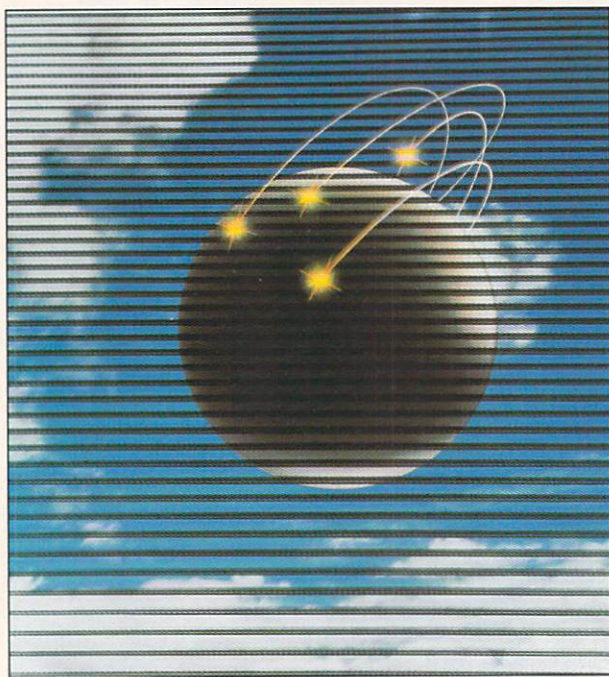
On the GoFAX saves you time on file conversions. Imagine having to spend several minutes converting a file and then hearing the busy signal when you finally reach the recipient's line. You'll have to do it all over again later—with no guarantee that the line will be free then. A system that doesn't require file conversion has a major advantage over hardware systems, which tie up your machine while converting text and graphics files.

If you want to receive faxes as well as send them, you must have a fax card and software. Consider the Frecom Fax96 from Fremont Communications, which allows you to send and receive faxes directly through its combination of fax/modem and software. One caveat: Most fax/modems are not regular modems. Unless you see a statement on the box that the modem will function as both a fax/modem and a standard modem, it won't let you sign on to your favorite online service to send E-mail. The Frecom Fax96 has both modem and fax/modem, thus freeing a slot on your machine.

The hardware alternative is less expensive than a fax machine. The Frecom Fax96 costs about \$150, discounted from \$250. Another advantage is that you will receive the file into your computer, so you can print the fax onto plain paper instead of flimsy fax paper offered by fax machines.

Each system offers advantages and disadvantages, so determine what your needs are. If you send only ASCII files, MCI does the job at the lowest price. If you send many graphics files, then the On the GoFAX software might be the way to go. If you need to send and receive, the hardware option is most viable. In any case, if you can't afford a stand-alone fax machine, let your computer do the dialing. □

If you have a PC, you have most of your faxing needs covered. Send and receive faxes without a fax machine, thanks to modems, special software, and online services.



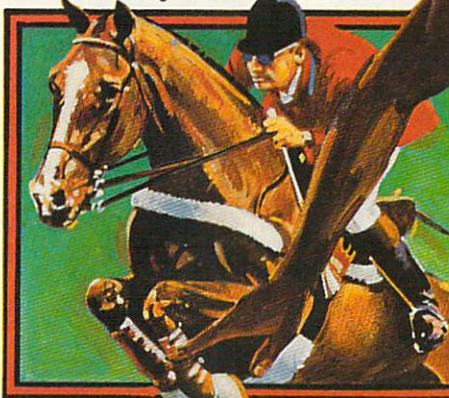
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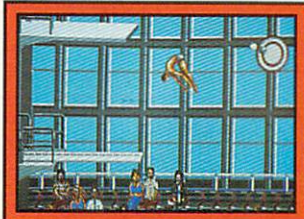


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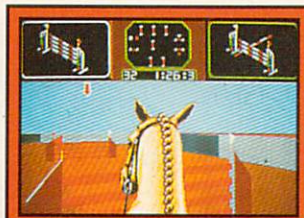


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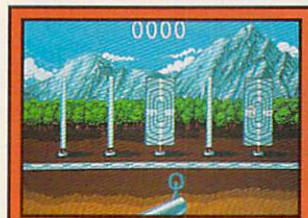
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RUN, JUMP, SWIM, KICK

NOW YOU'RE LEARNING HOW TO TYPE!

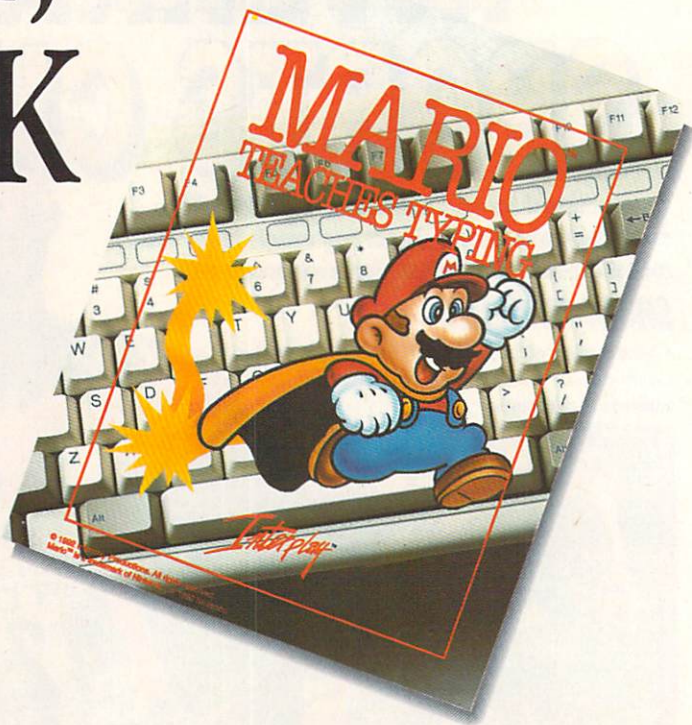
Mario's not just the world's king of adventure—he's your personal typing teacher!

All the great Mario characters and scenes that you've come to know are here. Start by choosing your own identity—Mario, Luigi or The Princess. Then go at your own pace through each adventurous level:

Level 1— Hit the blocks, kick the turtles, and jump as high as you can while graphic hand visuals help you learn to find all of the letters on the keyboard without looking.

Level 2— Plunge underwater to escape the chasing fish while you learn to easily type full words.

Level 3— Head for the castle—but watch for falling blocks and treacherous quicksand—as you quickly become skilled at typing complete sentences and paragraphs.



- Convenient on-screen and picture-oriented icons

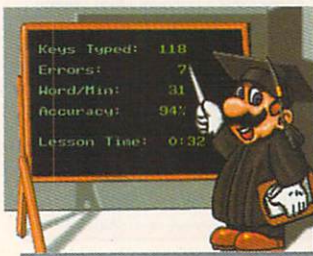
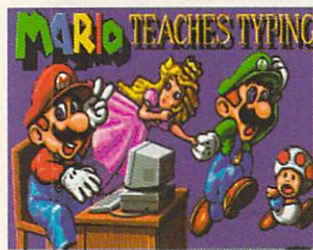
- Individually charts and records progress for entire family

- Follows progress from beginning through advanced levels

- Straight typing tutor option to eliminate game elements

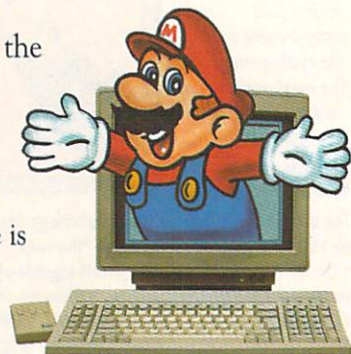
- Full 256 color VGA graphics

- Sound effects throughout, including famous Mario music



And when you reach the end, Mario says congratulations by printing out his special completion certificate—just for you!

Learning how to type is boring ...not! At least not with Mario and the gang.



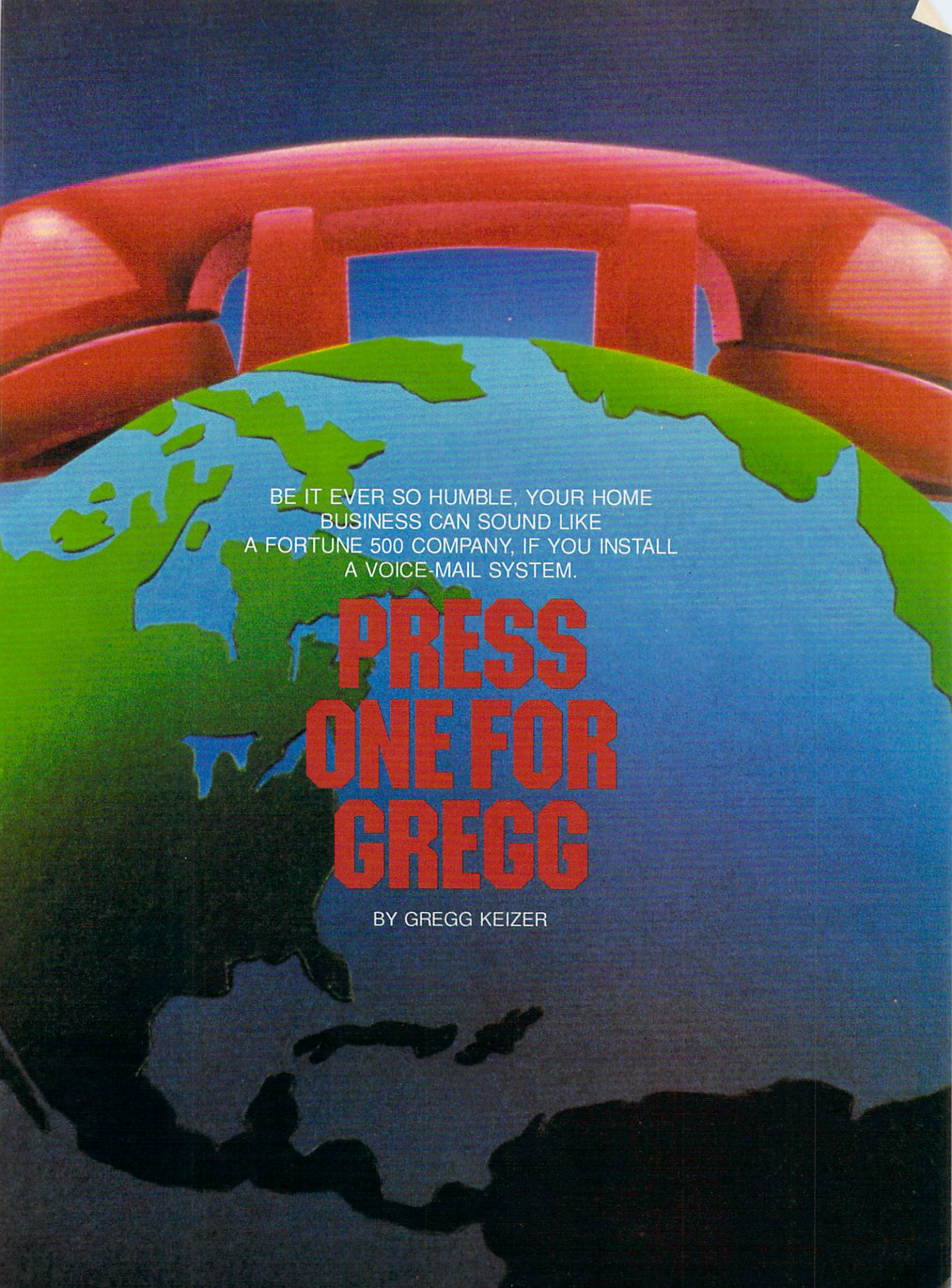
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MS-DOS Screens Pictured.

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BE IT EVER SO HUMBLE, YOUR HOME
BUSINESS CAN SOUND LIKE
A FORTUNE 500 COMPANY, IF YOU INSTALL
A VOICE-MAIL SYSTEM.

PRESS ONE FOR GREGG

BY GREGG KEIZER

"Hello. Welcome to Wordcraft's automated voice-mail system. If you know the extension of the party you wish to reach, enter that number now on your touch-tone telephone. If you would like to leave a message for the Editorial Services Group, press 1. For Research, press 2. For Marketing and Public Relations, press 3. Press 4 if you'd like to send a fax. If you wish to speak with an attendant, press 0 now. If you have a rotary-dial phone, stay on the line, and an attendant will pick up shortly. Thank you, and have a nice day."

Callers to large companies—particularly in the world of electronics—hear messages like that all the time. Byzantine in their layers, obscure in their operation, voice-mail systems have captured the imagination of corporate America and the attention of cost-cutters. It's hard not to run into such automated phone services.

Now you can have your own voice mail, making incoming callers think your operation is huge, though it may be only you and your computer. By adding voice mail with its around-the-clock efficiency, your business can benefit from multitudes of options and appear to be as large as any downtown corporation.

All you need is a PC with an empty slot in the expansion bus.

The Silicon Receptionist

No question about it—voice mail can be impersonal. And it can be frustrating to navigate, if it's improperly designed. But if you keep voice mail courteous and succinct, it can actually draw *in* business, not turn off potential customers. Its potential payoffs for the small business or home office can be dramatic.

Answering machines, the low-tech solution to catching calls, may spout a message, record incoming calls, and even mark calls with the time and date, but they're limited. An answering machine can play only one outgoing message at any given time; it can't organize incoming calls; and if you don't work alone, its replay isn't private. A voice-mail system, however, lets you compose multiple messages, direct calls to specific mailboxlike destinations, and route calls to other extensions; it can even serve as an automated telemarketer.

While your answering machine has a single personality, a voice-mail system is a veritable Proteus, ready to take on any number of personae. If, for instance, part of your home office time is spent providing desktop publishing services and another part is spent in organizing motivational seminars, a PC-based voice-mail system can assume

a different personality for each business activity you engage in.

Hello, This Is the Home Office

Most voice-mail systems try to do two things: replace an answering machine with a feature-packed digital substitute and distribute voice messages within a company.

It's unlikely that you'll need the latter within a home office. Even in a small business, such voice memos may be overkill. Concentrate, then, on the answering machine-like qualities of a voice-mail board.

You have to factor other considerations into the voice-mail equation, too. Some boards require a dedicated computer as a robotic receptionist while others work in the background on your primary PC. If you have only one system in the office, your decision is simple. But if you've recently upgraded to a more powerful PC and have an older model gathering dust, you can opt for a dedicated voice-mail system. What better way to put that lazy computer to work?

Does your home office rely on more than one phone line? Because the most affordable voice-mail boards are single-line devices, you'll have to limit incoming calls to one number if you want things to work.

And though you can set up a voice-mail system to transfer fax calls, don't expect it to automatically route faxes directly to the machine. You may have to eschew automatic fax reception if you don't have a separate telephone line committed to the fax. This might be preferable anyway, since people tend to become confused when you list the same number for telephone and fax.

Can I Take a Message?

Among the voice-mail systems that make sense for the home office, three stand out: Natural MicroSystems' Watson, Talking Technology's BigMouth, and The Complete PC's The Complete Answering Machine. Ranging in price from \$249 to \$399, these three single-line voice-mail cards snap into your PC and turn it into a telephone assistant without peer.

Watson, the least expensive voice-mail board, works in the background, a boon to single-PC offices. Based on a card-file system, Watson's software not only plays outgoing messages and records incoming messages but also offers a phone book for autodialing, a dictation file for recording voice memos, and an appointment calendar.

You can set up as many as 750 mailboxes for people calling in, each with its own ID code and message. You give potential callers the codes you've

assigned, they call and enter their codes, and they're immediately transferred to their mailboxes. Incoming calls are recorded to your PC's hard drive (Watson can store about an hour of messages in 10MB) and then displayed in chronological order when you later retrieve them. If you want, Watson will even switch the outgoing message based on the current time according to the PC's internal clock.

Watson's card-style interface makes it easy to set up and use as either a single-mailbox answering machine or a multibox voice-retrieval system.

BigMouth may cost a bit more than Watson, but it provides far more voice-mail flexibility. It easily handles the basics—setting up a single-user answering system with several personal mailboxes is a snap—but the card really struts its stuff when you begin exploring its more advanced features. Want to create an automated telemarketer? Simple. You can configure BigMouth to ask your callers questions and then record their answers, a godsend if you want the computer to take orders for the products you sell. Want to set up an outbound calling system to contact your clients periodically and send them a personalized spiel about your new services? You can do that with BigMouth, too.

BigMouth's biggest home office problem is that it demands the full attention of a PC. You can't run voice mail *and* work with the computer at the same time. That effectively adds the price of a PC to the cost of setting up voice mail.

The Complete Answering Machine may, as its name implies, be only a replacement for your telephone's answering machine, but its ease of use—especially to people calling in for messages—marks it as an ideal home office add-on. Like Watson, The Complete Answering Machine (CAM) operates behind the scenes, letting you keep to one PC. In fact, CAM can set a limit on the amount of hard drive space it uses for messages so that you won't return from a trip and find a packed drive with no room for other applications.

Out of the box, CAM works as a single-mailbox answering system, complete with a prerecorded greeting and voice prompts. You can, of course, add more mailboxes—up to 999—as you grow into the system.

One of CAM's most impressive features is its voice prompting, which greets mailbox owners and steps them through such things as remote message retrieval and recording. It sure beats memorizing commands. Something else to note is CAM's connection to The Complete Fax, a fax board sold by the same company. As-

sign The Complete Fax its own mailbox, and callers can send faxes through CAM to the board, so you get double use from a single phone line.

Voice-Mail Etiquette

Whatever voice-mail system you choose, you'll want to make it friendly. One of the most important attributes of voice mail—its professional distance—is also its principal weakness. Here are some ways to avoid making your answering system into voice-mail hell for your callers.

- Personalize messages whenever possible. Although voice-mail boards generally come equipped with pre-recorded messages, personalize them whenever you can. It adds your personality to an inherently impersonal technology.
- Keep menu choices to a minimum. You'll lose callers (and prospective clients) if they have to listen to long lists of possible choices. Pare the possibilities to the minimum.
- Don't hide behind voice mail. Callers should still be able to get through to you, either by pressing a button on their touch-tone phones or by briefly waiting. If you're out, make sure that your own mailbox is ready to take messages.
- Return calls. There's nothing more infuriating to a caller or potential customer than an unreturned call.
- Keep your messages up-to-date. It's rude to make people listen to out-of-date messages. If you're pushing a seasonal sale in an informational mailbox, change or delete the message as soon as the sale's over.

Avoid Voice-Mail Pitfalls

Moving to voice mail is a big change, almost like hiring a new employee. And like any foray into the unknown, using voice mail presents its share of risks. Here are some ideas that will make voice mail simpler and more practical.

- Get a big hard drive. Digitizing incoming and outgoing messages takes a lot of disk space. If your PC has a hard drive with less than 60MB, voice mail will cramp your regular work.
- Don't try too much too soon. Set up a simple voice-mail system at first—a standard greeting and perhaps a couple of personalized mailboxes. As you become familiar with the voice-mail system, gradually expand its capabilities.
- Try out any changes. Whenever you change the voice-mail prompts or the paths that lead to new mailboxes, try them out yourself. See if there

are any dead ends and ensure that all calls will be captured.

- Erase old messages. Although voice mail makes it easy to store the messages you've received, those messages will quickly eat hard drive space. If you want to keep old messages, get a tape recorder. Cassette storage is much less expensive than hard disk storage.
- Consider a dedicated voice-mail machine if calls pour in. The typical home office may be able to get by with The Complete Answering Machine or Watson running in the background, but set aside a PC for voice mail if the call volume starts affecting your ability to get work done on the computer. Frequent background voice-mail activity will slow down your PC and your work.

Putting It to Work

As with every technological advance, the users of voice mail have shown themselves to be more creative than the developers, putting it to work in unexpected ways. For example, voice mail eliminates telephone tag if properly used. When you contact someone, you can leave much more than your name and number. Many software companies accept beta test results via voice mail. Contracts have been negotiated this way, too, with representatives from both sides leaving messages on each other's voice mail to indicate unacceptable language and to make changes.

Writing in COMPUTE, Daniel Janal quotes Terry Kalil, public relations manager of Great Plains Software, observing that voice mail can be an important adjunct to communications. When it comes to adoption of technology and the changes it causes in the corporate structure, "a lot depends on corporate culture. The company must be flexible and informal." Kalil's supervisor even conducted her performance review through voice mail. "It was not uncomfortable because our communication skills have adapted. It feels like we are talking face to face."

As it grows ever harder to catch a person at the right time and place to talk on the telephone, voice mail can take up the slack. It allows the parties to think things through before replying, more like the process of actual letter writing, but conducted over telephone lines, and with the added value of your being able to hear the speaker's inflection, which can be as important as the words themselves.

Hold On

Which voice-mail system is the best one for you and your home office?

For single-PC home offices that receive relatively few calls, The Complete Answering Machine is the best choice. It works in the background, sets up simply, and has advanced options to cover everything but telemarketing tasks. It may carry the highest list price, but you can buy it by mail for roughly the same price as the others—\$235-\$245.

Once the number of calls climbs, though, you're going to hate The Complete Answering Machine. It steals RAM (about 80K is needed for the memory-resident answering module) and drive time as it answers calls and processes messages. You'll want a dedicated system on a separate PC.

If that's the case, then BigMouth is your voice-mail maven. Any of these three programs can work as a dedicated voice-mail system, of course, but BigMouth's extraordinary flexibility guarantees that you can accomplish any voice-mail task. It's especially attractive if you want an inbound or outbound automated telemarketer to take and (if you're really audacious) make calls.

No matter what voice-mail system you decide to add, you'll boost the image of your home office in the world outside. No one will ever suspect that you're running the next highflying multinational corporation from the back corner of the downstairs bedroom. □

VOICE-MAIL PRODUCTS

Here are the products you need to set up your first voice-mail system.

The Complete Answering Machine—\$399

The Complete PC
1983 Concourse Dr.
San Jose, CA 95131
(800) 229-1753
(408) 434-0145

IBM PC or compatible, 512K RAM, hard disk, analog touch-tone phone, full-length expansion slot

Watson—\$249

Natural MicroSystems
8 Erie Dr.

Natick, MA 01760
(800) 533-6120
(508) 650-1300

IBM PC or compatible, 256K RAM, 20MB or larger hard drive, full-length expansion slot

BigMouth—\$295

Talking Technology
1125 Atlantic Ave., Ste. 101
Alameda, CA 94501
(800) 934-4884
(510) 522-3800

IBM PC or compatible, 256K RAM, 1.5MB hard disk space, full-length expansion slot

ART WORKS

Robert Bixby

PUBLISHING PROJECTS

I've run across many interesting publishing projects, and I thought August would be a good time to talk about a couple of them. Many of the ideas I'll be talking about in this and future columns are appropriate for use in schools. Others would be fun for families looking for computer activities.

The first is the compiled book. As nearly as I can determine, this idea was invented by Richard Kostelanetz. Belinda Subraman, whose Vergin' Press publishes *Gypsy* magazine, has updated the form in two compilation issues of that magazine. The technique is to contact a number of writers and artists and request from each of them 300 copies of a page with literary work or artwork printed on both sides. (A class could do with a much smaller number—perhaps 50–100 copies.)

Many simply sent in 300 copies of a page of poetry run through a mimeograph, a copy machine, or an offset

press. But some, such as Joan Payne Kincaid and I, took the time to paint each of the 300 copies individually, which makes each book something midway between a unique artwork and a mass-produced item. Since the artists were left to choose their own work, some of it is very risqué, verging on the objectionable. Subraman collated the work as it came in; created a cover, table of contents, and copyright page; perfect-bound the booklets; and sold them as publications of her press. "When I flip through the compilation issues, it's like visiting a museum of modern art," Subraman says. "All different colors and textures. There's a feeling of excitement." In fact, she's thinking of putting together another issue. If you'd like more information about past compilations or if you'd like to be considered for publication in a future compilation, send a stamped, self-addressed envelope and a sample of your work to Vergin' Press, 10708 Gay Brewer, El Paso, Texas 79935.

Another unique publishing venture is the Alternative Press, run by Ken Mikolowski, who is currently teaching at the University of Michigan. Mikolowski purchased an old-fashioned letterpress in the late 1960s. He uses it to create beautifully designed broadsides (poems suitable for framing), bookmarks, and postcards. By purchasing dingbats and typefaces from other presses that are moving from letterpress to electronic and other printing media, he has been able to assemble an impressive array of obsolete typographic elements, including the buffalo that serves as the press's colophon. Anne Mikolowski, Ken's wife, is a graphic artist. She often designs beautiful wood engravings and linoleum blocks for

use in the press (one of her current projects outside of the press is a graphic for an Absolut vodka advertisement).

A few times a year, Ken Mikolowski sends 500 postcard blanks (with the "business side"—the side for the stamp and address—preprinted on his letterpress) to poets like Robert Creeley and Faye Kicknosway and to graphic artists like Archie Rand and Brenda Goodman. The writers and artists prepare something for the back of each individual postcard—a poem, an idea, an essay, a pen-and-ink sketch—and return the postcards to the Alternative Press. Twice a year, subscribers receive mailings which include these unique artworks in addition to the current run of other Alternative Press offerings (the rate is \$15 per year). You never know what you're going to get, but you can bet it will be absolutely unique and astounding.

Art in use seems to be the guiding principle of the Alternative Press. Mikolowski says that sometimes these postcards are mailed by subscribers to friends or to the originating artist and then returned to him for archival purposes, completing a cycle of creativity. If you'd like more information about this, write to the Alternative Press, 1207 Henry, Ann Arbor, Michigan 48104.

Following this model, a teacher might have each student in a class of 25 make 25 greetings. The teacher could then collate the cards and give each student a folder that contains work from all of the other members of the class. It would be easy to incorporate the electronic aspect into the project by designing (or having the group design) different kinds of cards on the computer, printing them out, and then distributing them for painting. □

Ken and Anne Mikolowski with their low-tech letterpress.



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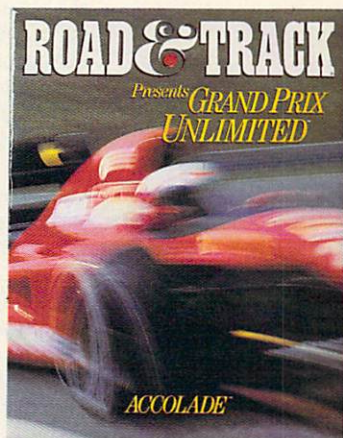
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DISCOVERY CHOICE

Create cartoons—complete with sound—that surpass Saturday morning favorites with this beginning animator's package.

Steven Anzovin

DISNEY ANIMATION STUDIO

"An unending voyage of discovery in the realms of color, sound, and motion." That's what Walt Disney called the art of animation. This vision of animation as an adventure led Disney to make some of the greatest animated classics of all time.

Now you can use your PC to learn the master's techniques—without the tedium. Disney Animation Studio, from Walt Disney Computer Software, uses a tightly knit group of four modules—Pencil Test, Exposure Sheet, Ink & Paint, and a supervisor program called DAS—to re-create the traditional process of cel animation used in all Disney cartoons.

The Pencil Test module includes drawing tools for creating black-and-white outline drawings of your characters. But instead of drawing on pieces of paper, you work on a succession of screens, called cels (after the pieces of clear celluloid that animators paint on in traditional animation). A click of the mouse button allows you to move back and forth between cels and play your pencil test at any time.

One of the best parts of Pencil Test is the Onionskinning feature. With Onionskinning turned on, you can see the faint outlines of previous cels behind the current cel as though you were looking through tracing paper at other drawings beneath. This is incredibly helpful in aligning your drawings from cel to cel so your characters move smoothly and believably.



Another useful Pencil Test feature is Cleanup. At Disney's Mouse Factory, this task was assigned to apprentice animators, who tediously cleaned up pencil tests by tracing over them to eliminate unnecessary lines. In Disney Animation Studio, however, removing extra pixels can be achieved with a single mouse click.

Disney Animation Studio's Exposure Sheet, accessible from the Pencil Test, works rather like an animation spreadsheet. Each cel in the animation is given a line in the Exposure Sheet, showing the cel number, assigned sounds, timing, and other information. You can rearrange cels of an animation in the Exposure Sheet by cutting, pasting, or deleting their lines, which is much easier than cutting and pasting cels in Pencil Test.

The Exposure Sheet is also where you can add sound to your cartoon. Disney Animation Studio supports Sound Blaster, Sound Source, and Tandy sound. With one of these, you can attach digitized or synthesized sounds to any

cel or block of cels using the Exposure Sheet to synchronize sound and motion.

Syncing simple sound effects isn't too difficult, but drawing a character so that it actually appears to be speaking takes a lot of practice. The excellent manuals give some helpful hints for drawing mouth movements and matching them to the phonetic elements of your character's speech. However, because you can hear sound only when playing back your animation in the included Flick player utility program, not in Disney Animation Studio, adjusting sounds requires jumping back and forth between the two programs.

Disney Animation Studio's Ink & Paint module is where you add color to your pencil test and put it over a background. The program's extensive palette and area fill tools make it easy to define new colors and apply them, without having to worry about accurate mixing or painting over the outlines. Every cel can have its own palette of colors, though in most cases you'll use one palette throughout.

Backgrounds can be created right in Ink & Paint, or they can be imported from other paint programs and inserted behind your characters by using the Frisket feature. This masks the colors in your characters so they won't be affected by the background or any thing done to it. If the colors in an imported background don't match the ones in your animation, the colors can be quickly remapped.

Once you've assembled all the elements, you're ready to play your cartoon. Animations run entirely from memory, so they play fast—up to 30 frames per second. Playback is smooth, without the flicker in large moving objects seen in some other animation programs. However, the length of an animation is determined by the amount of expanded memory in your system. Even with 640K standard RAM and 1MB expanded memory in my 386, there still wasn't enough memory to play the color Donald Duck sample cartoon that comes with the program. You'll want at least 3MB of expanded memory to do substantial color animations.

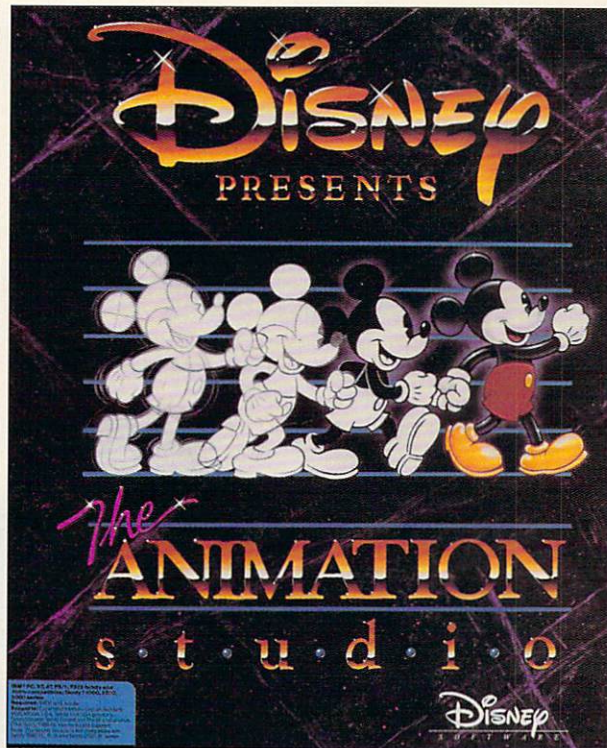
Disney Animation Studio is well thought out and a pleasure to use. But that doesn't mean it's the perfect animation environment for everybody. Because it adheres so closely to the traditional process of film animation, it doesn't take advantage of all the possibilities of computer animation. Even though it manages cels, mixes colors, and allows easy cutting and pasting of images, you still have to do a lot of repetitive manual labor, just as Disney's animators did (and do). In Ink & Paint, for example, you have to color every part of every

character in every frame by hand—a real chore for long, complex animations.

Experienced computer animators will chafe at the program's other limitations, too. I know I was disappointed when I discovered that there's no way to move characters automatically along paths or turn them smoothly into other shapes. I also wish that the program provided a storyboarding feature or a more powerful scripting utility for playing completed animations in sequence, complete with wipes, dissolves, and other transitions. These capabilities, which can be found in other animation and presentation programs, make it easier to create more professional-looking 'toons.

Even if you accept that the traditional film-animation process makes sense for computer animation, Disney Animation Studio doesn't give you everything you need to make your own *Bambi*. There's no way to do camera moves—the zooms, pans, trucks, and scrolling backgrounds that give film animations the feeling of taking place in a real three-dimensional world. Nor can you achieve multiplane effects in which layers of animation appear to be taking place at various distances from the audience. Part of the problem, of course, is that few home PCs have the power and speed to perform such calculation-intensive effects at typical animation speeds.

But a lot of these criticisms are beside the point for this program's main audience, beginning animators. With that in mind, I asked my ten-year-old son, Raf, an animation enthusiast, to evaluate the pro-



gram. He quickly taught himself to use the software and informed me that Disney Animation Studio passed muster. He especially liked the Onion-skinning effect and the fact that he could work in VGA resolution (640 x 480), which some other animation programs don't support. The other day he spent three happy hours in front of the screen, animating his own creations and planning future cartoon epics.

Disney Animation Studio may not make everyone an ace cartoonist; you still have to know how to draw and be willing to work hard. But it's definitely the best way to learn at home the techniques of character animation that have brought the world so much enjoyment since Steamboat Willie first whistled a tune. □

Circle Reader Service Number 301

IBM PC and compatibles; 640K RAM (2MB or more expanded memory recommended); CGA, EGA, MCGA, VGA, or Tandy; hard disk with at least 3MB free; mouse or other pointing device; supports Sound Source, Sound Blaster, and Tandy Digital sound boards—\$129.95

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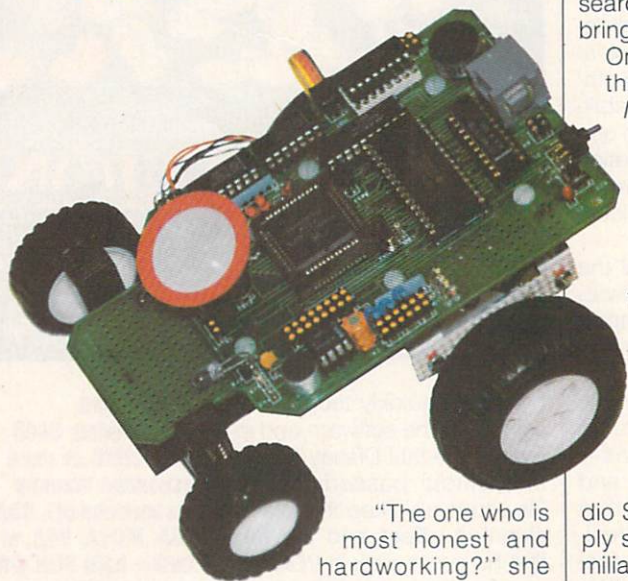
Steven Anzovin

THE RUG WARRIOR

In Czech playwright Karel Capek's 1922 satire *R.U.R.* (the work in which Capek coined the term *robot* and invented many of the other ideas about robots that we take for granted today), a young, idealistic woman visits a company that builds human-like artificial workers.

"What sort of worker do you think is the best from a practical point of view?" a company executive asks her.

This build-it-yourself robot has a brain and the ability to find its way around.



"The one who is most honest and hardworking?" she guesses.

"No," says the executive, "the one that is cheapest. Young Rossum [the robots' inventor] rejected everything that makes man more expensive. In fact, he rejected man and made the Robot. Mechanically they are more perfect than we are, they have an enormously developed intelligence, but they have no souls." But later it turns out that the robots do have souls, and in anger over being exploited they rise up and destroy their masters.

The fear of vengeful robots has been around since well be-

fore the Terminator movies or even Mary Shelley's *Frankenstein*. In Jewish folklore, an artificial man called a golem protected the Jews of sixteenth-century Prague, but he had to be destroyed when he could no longer be controlled.

For all our anxiety about robots, in the real world they aren't at all like us, nor are they ready to rebel against their creators. Given the current level of robot research, that future, if it ever comes, is comfortably far away. But if you're a handy hardware hacker, you can do mobile robot research at home—and possibly bring that future a step closer.

One source to check out is the book *Mobile Robots: Inspiration to Implementation* by Anita Flynn and Joseph Jones (Jones & Bartlett Publishers, 1 Exeter Plaza, Boston, Massachusetts 02116; 800-832-0034; \$29.95; slated for a fall 1992 release). It contains complete instructions for creating an autonomous mobile robot from parts costing about \$200, all of which can be purchased at your local Radio Shack and electrical supply store. For readers less familiar with a soldering iron, the authors plan to offer both a kit and a fully assembled 'bot. The little beast, called the Rug Warrior, will zip around obstructions, tag after you as you move around the room, and come when you call.

I talked with coauthor Joseph Jones, who works at Artificial Creatures, a division of Intelligent Systems Robotics (238 Broadway, Cambridge, Massachusetts 02139; 617-876-2999). He described some of the issues involved in making robots truly autonomous and mobile. Interestingly, the problems aren't so much mechanical as conceptual.

Most autonomous mobile robots work by comparing the current environment as perceived by the robot's sensors with a software-based "world model" contained in its controlling computer. The more complete and detailed the rules contained in the world model are, the more autonomy the robot can achieve, but checking every movement against the rules requires lots of processing power and slows the robot down. It's as if you had to think about the global consequences of every step whenever you walked around the house. Jones, however, is working with a different model of robot autonomy called subsumptive behavior, which was developed at Rod Brooks's Mobot Lab at MIT. Mobile robots using subsumptive behavior don't follow a world model at all; instead, each sensor directly triggers a behavior.

Jones believes that building such reflex behaviors into robots is the way to create responsive mobile 'bots capable of practical tasks. What's the one innovation that Jones thinks will bring us into the Robotic Age? "There are plenty of problems to work on," he chuckles, "but I've got a little kid, and a robot that could clean up under the kitchen table would make a big difference."

Another useful resource is *The Robot Builder's Bonanza* by Gordon McComb (TAB Books, 13311 Monterey Avenue, Blue Ridge Summit, Pennsylvania 17294; 717-794-2191; \$14.95). This book includes tips on choosing motors, building power supplies, constructing metal and plastic bodies, and designing locomotion and arm systems.

Bear in mind that one day our mechanical creations might refuse to clean up after us and head out the door to join others of their kind. Let's hope they think well of us. □

Andrew Visscher's and Bruce Williams Zaccagnino's ...

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MULTIMEDIA PC

David English

TRIPPING THE LIGHT FANTASTIC

Where's the best place to learn what's hot and what's not in multimedia? The seventh annual CD-ROM conference (now called The International Conference & Exposition on Multimedia and CD-ROM). Over the past seven years, many of the major CD-ROM announcements have been made at this event. It's also a great place to tap into emerging technologies, such as realtime video compression, home delivery of

Sony unveiled a portable CD-ROM XA player at The International Conference & Exposition on Multimedia and CD-ROM.



multimedia using fiberoptic cables, and commercial applications for virtual reality.

Even though MPC is clearly the fastest-growing CD-ROM format, the conference provided equal time to the alphabet soup of competing platforms, including Mac CD-ROM, CD-ROM XA, CD-I, CDTV, Photo CD, and UNIX CD-ROM. The wide scope of today's multimedia was reflected by the eclectic mix of attendees. They included traditional information publishers, such as Compton's, Grolier, and World Book; traditional hardware manufacturers, such as Altec Lansing, Panasonic, and Sony; and tra-

ditional computer-based consumer companies, such as Brøderbund, Access, and Creative Labs. The products reflected a similar divergence, including everything from a new \$199 parallel-port audio card (the Audioport from Media Vision) to \$50,000 video-editing systems.

Which were the most interesting new multimedia products? In addition to the Audioport, Media Vision announced its new 16-bit multimedia sound card, the Pro Audio-Spectrum 16 (Media Vision, 47221 Fremont Boulevard, Fremont, California 94538; 800-348-7116; \$349). This card has true 16-bit audio for CD-quality sound. The Pro Audio-Spectrum 16 also uses the new Yamaha OPL-3 chip for high-quality synthesized sounds and has full compatibility with the Ad Lib, Sound Blaster, Windows 3.1, and MPC sound standards.

Grolier announced its New Grolier Multimedia Encyclopedia (Grolier Electronic Publishing, Sherman Turnpike, Danbury, Connecticut 06816; 203-797-3500; \$395). It contains all 21 volumes of the Academic American Encyclopedia, plus high-quality maps, color photographs, illustrations, sounds, video, and animation—all on a single CD-ROM.

The marooned-on-a-desert-isle-and-can-choose-only-one-CD-ROM award would have to go to Library of the Future Series Second Edition (World Library, 12914 Haster Street, Garden Grove, California 92640; 714-748-7198; \$399). It's a first-rate selection of 500 great works of literature, religion, science, and government. A close second for the same award would be the upcoming Oxford English Dictionary (Second Edition) on Compact Disc (Oxford University Press, 200 Madison Avenue, New York, New York 10016; 212-679-7300; \$895). With over

2,400,000 illustrative quotations and a powerful search engine, it's the perfect gift for any PC-savvy word lover.

Speaking of massive amounts of information in compact form, Sony displayed a prototype of its new portable CD-ROM XA player. Somewhat larger than the diminutive Discman (this one's seven inches wide, two inches high, and six inches deep), it plays standard XA discs that have been altered to accommodate the smaller screen (320 x 200 pixels).

Interested in creating your own CD-ROMs? You can with Philips's new CDD 521 Compact Disc Recorder (Philips Consumer Electronics Company, One Philips Drive, Knoxville, Tennessee 37914; 800-722-6224; \$5,995). Not only can it record standard CD-ROMs, but it can also write in XA, Photo CD, CD-I, and CD-audio formats. If \$6,000 sounds like a lot, consider that this model sells for one-third the price of previous units. At this rate, you'll be able to afford your own CD-ROM recorder in just two or three years.

IBM was also making a strong pitch for the high-end multimedia buyer. The company has turned its Ultimedia computer into yet another CD-ROM platform. In effect, it's a higher-level MPC, with a minimum IBM 386 SLC processor, 4MB of RAM, CD-ROM XA drive, 2.88MB 3½ floppy, XGA graphics, and 16-bit audio card. According to IBM, it can also run your MPC titles. As you can imagine, this is no home computer. Expect to pay \$4,500–\$10,000. On the other hand, once you've seen multimedia CD-ROMs designed specifically for this platform (including such eye-popping titles as Columbus: Encounter, Discovery, and Beyond), you can see why the future of multimedia will include a generous helping of wonder and excitement. □

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ENTERTAINMENT CHOICE

Anything goes in this latest version of the famous falling blocks game.

David Sears

SUPER TETRIS

Tetris has captivated audiences of all ages ever since its arrival in this country in 1988 (it was designed in Russia). How appropriate that Super Tetris incorporates the Russian Circus as a theme—like the circus, it's fun for children of all ages. Though Super Tetris differs in presentation from Tetris only in its backgrounds and bouncy music, these differences will stun first-time players. Lions, clowns, and elephants—mainstays of the circus—enliven the screen. For you Super VGA owners, the 256-color paintings alone justify purchasing the game.

Maybe you don't have Super VGA yet, and maybe you intend never to upgrade. Forget the sound card, too, while you're at it; Super Tetris doesn't need all the frills Spectrum HoloByte generously offers. It's the quality of the gameplay that makes a game great, not the graphics and soundtrack.

Like so many other incredulous Tetris veterans, you may wonder what could've changed. After all, haven't there been more than a few Tetris sequels already? Blocks fall, you rotate them, you build lines, the machine beeps, and eventually blocks fall too fast for you to drop them into just the right slots. Play begins again, right?

Besides the innumerable public domain clones, Tetris was officially reincarnated three times. First came Welltris, a truly perplexing twist on the fill-the-grid theme. Not only do players have to contend with the usual falling-block formations, but

they have to look down a three-dimensional well—four walls and a bottom, too—while they do it. This version probably finds its most avid fans among the mathematically minded, though any Tetris pro can do well enough for a while.

Faces showed up next. Instead of fitting blocks, players mix and match strips containing the eyes, noses, mouths, and so on of various historical figures. Many players thought that this went too far from the original design and reverted to playing the earlier versions.

Then WordTris debuted, and wordmongers had a field day. Blocks were falling again, but this time they contained letters. Building words instead of horizontal lines proves not only educational but surprisingly addictive. With the game's built-in 60,000-word dictionary, players can score points with all sorts of accidental spellings.

The designers might have stopped there, and everyone could've been happy playing a favorite variation. After all, Tetris had expanded in three diverse areas: strategy, visual effects, and words. Like Tetris addicts, though, the design-

ers couldn't stop. In an ingenious feat of redesigning, Spectrum HoloByte has delivered a sequel that does justice to its auspicious title.

What's different about Super Tetris? The playfield runs deeper, divided in half by a "water line." Each level begins with a pit of scattered blocks, none of which make complete lines. To clear this rubble away and move to the next level, you must find open spots for the descending blocks and neatly stack them above the water line. Piece by piece, you work your way through the debris; every time you complete a line, the rubble scrolls up to meet you. A small display window to the left of the actual Super Tetris action slowly reveals a pattern in the debris; when you complete this picture, you move on to the next challenge.

Granted, all the rubble might seem to pose a bit of trouble. In the original Tetris, a big pile of disconnected blocks means trouble and often a quick end to the game. Don't worry, though; Super Tetris is much more forgiving. For



every line you complete, you're rewarded with a bomb cluster. The more lines you clear at a time, the more bombs you earn—and you'll certainly make use of them, blowing away obtrusive blocks or activating special squares.

The special squares can greatly affect play. One square fills all the empty spaces between itself and the water line with blocks; another removes all the blocks above itself. Yet another square annihilates all the blocks within a 3 x 3 area. Blowing up a square with a bomb icon in it turns the next falling piece into a cluster of bombs shaped like that piece. Detonating still other squares can add blocks to the total number allotted to you per game; Super Tetris imposes a preset block limit. In most games, you'll need to earn a few extra blocks to clear away all the rubble, so go for those special squares.

Bombs and treasures make a tremendous difference in the psychology of the game. Instead of being the hapless victim of poorly placed shapes, you can act on your frustration and remove those bothersome pieces. In the original Tetris, a mistake can remain a mistake for a long while; in Super Tetris, it's just part of the gameplay.

Ask Tetris players about strategy. You'll receive ready answers, perhaps something like "I try to fit pieces in the middle last" or "I tend to stack pieces on the left and right." They've rationalized long ago why the longest pieces should remain vertical and why the perfect squares belong on the left. In Super Tetris, however, anything goes. Special blocks seem random-

ly scattered throughout the rubble, and the bombs make powerful equalizers. The save-game feature works wonders for timid players, allowing room for some freewheeling gameplay. You can return to the same level again and again, to the same situation, just as you saved it.

As mentioned earlier, Super Tetris has a competitive mode—you use your bombs and falling pieces to prevent your opponent from completing lines. There's also a cooperative option, which allows players to work together. Each of these two-player modes expands the width of the pit to increase block maneuverability.

In the head-to-head competition, you race against one another to clear away rubble. This two-person mode requires two copies of Super Tetris and a null modem cable or Novell local area network to function. Simpler single-player game variants include 5-, 10-, and 15-minute timed games.

As super as Super Tetris is, however, you'll often wonder just when that vital long, skinny piece might turn up. Super Tetris can display an almost malicious streak in withholding necessary pieces, and you might see eight red squares before you encounter the long purple one you so desperately require.

Also, Windows users must consider whether they want the Windows or the DOS version. Super Tetris for Windows makes excellent use of a 640 x 480 256-color display; the DOS-based display, though still quite attractive, drops the resolution to 320 x 200. Moreover, because of the problematic nature of Windows' relationship to sound

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cards, the Windows version of Super Tetris supports only Sound Blaster. And while the Windows version does multitask properly, it doesn't offer a head-to-head play option. The differences between the two versions balance out, forcing you to choose between two equally superb variants. Some players will no doubt gladly purchase both versions and alternate play between them.

No computer gamer can live by Tetris alone, not even Super Tetris. But given Super Tetris's unadulterated appeal to all age groups, both sexes, and yes, even computer-phobes and computer haters, no one who sees it will want to live without it. □

Circle Reader Service Number 302

IBM PC and compatibles; 640K RAM (2MB for Windows version); VGA, EGA, VGA, Tandy 16-color, or Hercules (VGA or Super VGA for Windows version); supports Ad Lib, Sound Blaster, Tandy 1000, or Roland sound (Windows version supports only Sound Blaster); joystick and mouse optional (Microsoft-compatible mouse required for Windows version)—\$49.95

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GAMEPLAY

Orson Scott Card

ATTRACTIVE NUISANCES

Last month I talked about the Windows games from Symantec (Symantec Game Pack) and Microsoft (Windows Entertainment Pack Two and Windows Entertainment Pack Three). All the games are fun, and some are wonderful.

But these games can also be a problem. First, they're all quick. Some of them take no more than five minutes to play to the end. Memory Blocks, Tripeaks, and WordZap, for in-

column. In their quiet, pleasant little way, they're like time vampires, sucking away years of my life.

I've come up with a name for games of this genre that reflects their true character. I call them *nuisance games*. They're the Windows equivalent of a dish of M & M's. You never take more than a couple, but before you know it, they're gone. And it was you who ate every one of them.

Nuisance games, yes, but remember that in law there's a principle called attractive nuisance. This is the concept in

It's Risk, from Virgin Games (licensed from Parker Brothers). Much better than the DOS version, which only shows you a small part of the globe at any one time, the Windows version always shows a full view of the world map. You can decide whether your computer opponents are good, fair, or passive; or you can, with easy adjustments, play with a mix of human and computer opponents. Yet the Windows version faithfully reproduces everything good about the board game.

I never realized, in all my years of Risk playing in my adolescence, how much of the game was taken up with the sheer mechanics of counting out armies and moving them from place to place around the board. Games would last hours. But this computer implementation is so smooth that you waste no time at all on housekeeping. It's all strategy and battle. It's the Platonic ideal of Risk.

You can wipe out a computer opponent without worrying about making an enemy. So, for the first time, I get to play the game the way it was designed to be played.

Risk is so much fun and so fast that I forgive little infelicities, such as the way that every now and then the game decides that you're a computer player, too, and plays all your turns for you or the way that the white numbers sometimes blend in with the white borders so that you can have 18 armies in England but it looks like you have only 1.

Do I recommend Risk? Sure. Just the way that I recommend that you climb over the fence and swim in your neighbor's pool at 2:00 a.m., alone and in the dark.

It's not my fault if it steals hours from your life. I'm not the one who programmed such an attractive nuisance. □

Risk promises the world—and provides it on a single screen in the Windows version.



stance, can be played out in less than three minutes every time. Now, that should be a recommendation, especially if you tend to play these games at work. But it doesn't always end up that way. Because they take only a few minutes, it's easy to talk yourself into playing just once more.

Second, because they're Windows games, they aren't hiding in some dark corner of DOS where you can forget they're there long enough to get some useful work done. Instead, they're waiting a couple of mouse clicks away every time you come back to your desktop.

And there I am, three hours later, switching from FreeCell to Tetravex, from Tetris to Stones. Endlessly. Unproductively. Heck, I've played these games instead of writing this

your pool is an attractive nuisance.

Someday, I'm going to bring suit against Microsoft and Symantec, demanding that they pay me for all the hours of writing time they stole from me with their attractive nuisances. I'll demand that they reimburse me for the novels I didn't write, the columns that were late, and my ill health because of sleep I missed. And I know I'll win. All I'll have to do is get the judge to let me provide the jury members with computers loaded with these games, and after they've had time to get hooked (20 minutes tops), they'll award me millions.

Having said that, let me now tell you about my favorite Windows game, knowing full well that I'm leading my fellow compulsives to self-destruction.

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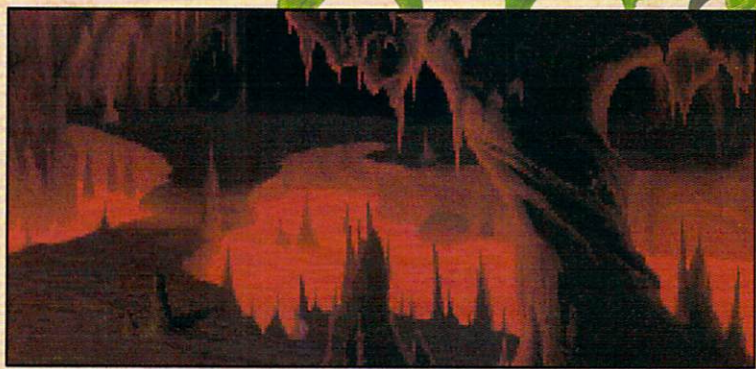
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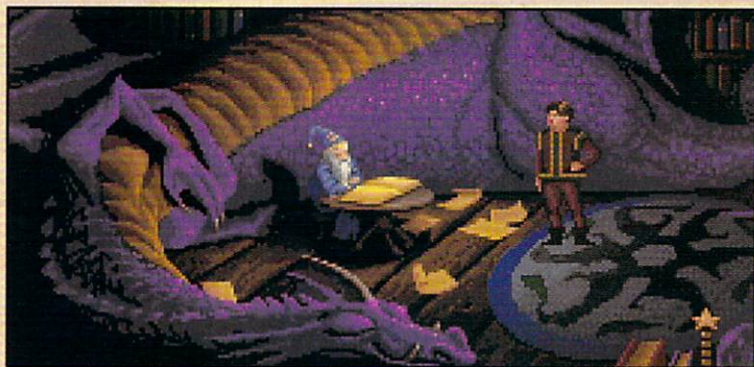
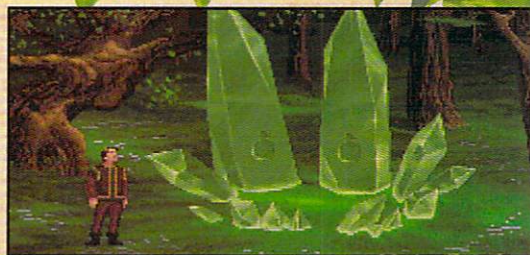
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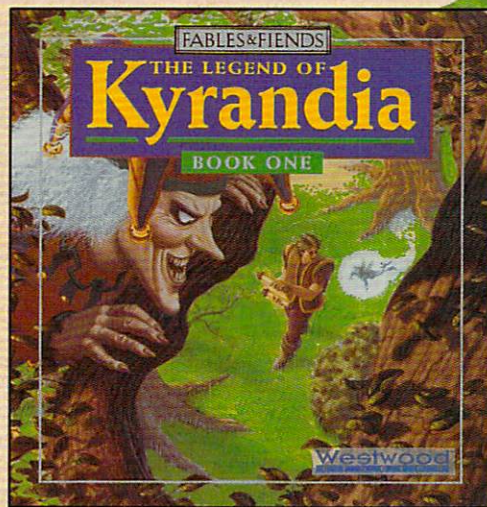
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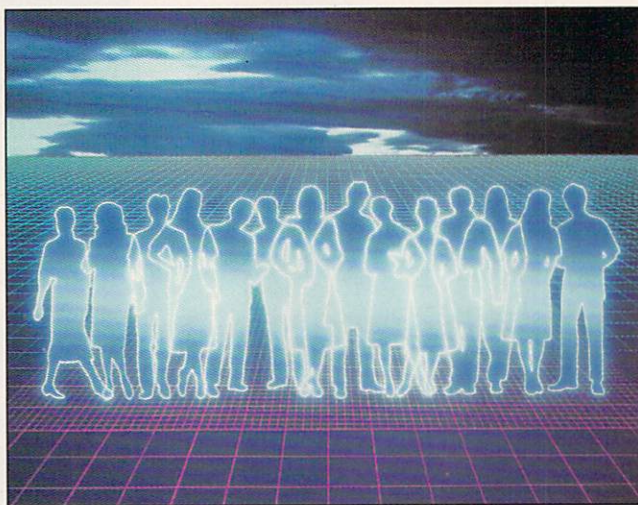
Circle Reader Service Number 158

THE ELECTRONIC MEET MARKET

BY ROSALIND RESNICK

For many of us, the idea of meeting new people can be a daunting prospect. Whether you're out on a date in hopes of putting the single life behind you or at a trade show trying to lasso new customers, in-person salesmanship can be difficult for all but the most thick-skinned. Despite their much-vaunted reputation as social animals, most human beings would just as soon run, not walk, from any situation that involves someone other than the familiar circle of family, friends, and coworkers. Often, we'd rather sit home and mope than risk an all-too-personal rejection.

That's where online networking comes in. A cross between old-fashioned letter writing and high-tech electronic communication, online networking lets you work a room without actually being there. By logging on to an online service or bulletin board, you can use your computer and modem to send E-mail to that intriguing person across the way, carry on uninhibited chats about the most intimate of topics, and log off if the situation gets too hot for you to handle. Not only is mo-



dem-to-modem communication a boon for the painfully shy, but it's also a great way to find a job, start a business, get free advice, and hobnob with like-minded people you'd never meet at the neighborhood block party. And, of course, there's no need to dress up, make small talk, or pass out business cards.

Though online networking has been widely touted as a powerful home business tool, it's also gaining popularity with people looking for romantic and sexual liaisons—in the age of AIDS

and other sexually transmitted diseases, perhaps the riskiest of all interpersonal encounters. By logging on to one of hundreds of bulletin boards, anyone with a PC and a modem can hook up with an interesting stranger without ever leaving the comfort and safety of home. And if you do decide to make your fantasies a reality, you can always arrange to chat by phone or meet in person. In fact, dozens of online dalliances have already led to matrimony.

These days, romance is popping up all over the on-

line world—on America Online, with its racy realtime Romance Connection, on DELPHI, GEnie, and Prodigy, the somewhat stuffier IBM-Sears venture, which has started to run personal ads in its classifieds. Then there's CompuServe's CB Simulator, another realtime chat channel that boasts the famous story of the couple that met online and eventually married—with the bride, groom, and minister typing their parts of the ceremony into the communal PC.

For those desiring less serious relationships, there are plenty of bulletin boards that offer electronic meeting places for people looking to explore their fantasies—and perhaps set up a rendezvous later on. *Penthouse*, a sister publication of COMPUTE's, has launched an online service called Petline that lets you chat with Penthouse Pets and special guests from around the world, swap erotic E-mail with the service's other members, and download photos for private enjoyment. (Call 212-254-3838 to download the software necessary to gain access to Petline. Remember that you must be

WHATEVER YOU NEED, WISH, OR DESIRE

18 or older to use Petline.)

Max K., 42, who's single and works as a consultant on the West Coast, says he logs on to America Online to find partners willing to share their fantasies over the phone. Though Max says he has been in a monogamous relationship with the same woman for the last four years, he typically logs on to the service four or five times a week to find the fantasy partners that give his life spice. He says his girlfriend knows all about his online adventures and sometimes joins in herself.

"I'm living in sin in a [monogamous] relationship," Max explains. "I've always been into fantasy, and this is the ultimate in safe sex."

Not all online relationships are as risqué as Max's, of course. Many are downright conventional—people exchange messages, meet in person, and decide to form an ongoing relationship—maybe even marry. That's pretty much what happened to Kathie Fields and Kevin Morley, two novice online networkers who met on Prodigy. Kevin, 31, a never-married electrician in Spring, Texas, ran a classi-

fied ad in September 1991 that went like this: "White male, age 30, 6 foot 1, 210 pounds, looking for a female with a sense of humor for companionship and possibly more? I like to read, watch movies, computers and many, many other things. I can't tap-dance or tightrope-walk, and skydiving is against my religion. What? (Signed) Texas No Can't Dance."

The ad soon piqued the interest of Kathie, 36, a long-haul trucker and divorced mother of one, and the rest is history. They tied the knot on New Year's Day. "It started with this friendly chit-chat," Kevin recalls. "We would go online and type letters back and forth." Says Kathie: "Then the letters got more intense. We found out that there was a lot we had in common."

But online networking isn't limited to people looking for love. It's a medium that unites people of all ages, occupations, interests, lifestyles, and parts of the world. In the realm of business, CompuServe's Working from Home Forum lets home office professionals swap notes on everything

from marketing tips to health insurance. GENie's Computer Press Association RoundTable features a bulletin board where editors can post help-wanted notices and writers can download business leads. America Online posts job listings on its Teacher's Information Network and lets entrepreneurs get help from the Service Corps of Retired Executives at the Microsoft Small Business Center.

Jeff Freeman, 25, of Front Porch Computers in Chatsworth, Georgia, says his fledgling business never could've taken off the way it has without the help of online networking and advertising. Started as a home business in May 1991, Front Porch expects to rake in gross revenues of more than \$500,000 this year and sell its homemade IBM clones to customers as far away as Europe and South America. Freeman, who says he has met a number of prospects through CompuServe's Working from Home Forum, spends less than \$200 a month on an ad in the CompuServe classifieds and reaches as many as 800,000 people world-

wide. No one would complain about that kind of return on an investment.

Take away his online connections, Freeman says, and his booming business would be "nowhere." Chatsworth, population 5000, is 100 miles north of Atlanta, he explains, and his computer store is the first and only one the town has ever had—and is ever likely to have. "With a store in a town like this, you may sell one computer at a time, but on CompuServe you may meet somebody who wants to buy multiple computers for his business. Our store is a small thing here, but with CompuServe I can reach the world."

Online networking is also becoming increasingly popular with people who suffer from chronic illnesses and other disabilities—people who, in some cases, can't leave their homes or hospital beds to find the support and companionship they desperately need. For this purpose, CompuServe offers a wide variety of support groups and resource centers, such as the Diabetes and Hypoglycemia Forum, the Cancer Forum, and the

Living with AIDS Section of the Human Sexuality Forum.

"The typical reaction of new diabetics is basically one of horror and fear and uncertainty," says David Groves, 46, a longtime diabetic and former bank executive in Bedford, Texas, who manages the Diabetes and Hypoglycemia Forum. "Our typical reaction is to be comforting. What we tell people is that no matter what they've heard about diabetes, they can take care of it, and we'll help teach them how."

Groves's forum appears to be attracting a wide following. More than 5000 people have visited the forum so far

from places as far afield as France, New Zealand, Japan, and Belgium. Groves estimates that 30 percent of the new members are people who've recently been diagnosed with diabetes.

The Kid Connection

But online networking—with the exception of Petline and other X-rated services—isn't just for adults. Prodigy, for example, has the Club (for Kids), which lets the under-18 crowd swap notes about everything from the hottest rock groups to their feelings about the snooty cliques who rule the school. The good news for parents: Prodigy

charges a flat monthly fee, so the kids can talk as long as they like without busting the family bank account.

In the Club forum not long ago, a couple of junior high school kids became involved in a discussion about dissection, a hot topic in these days of animal-rights activism. "I oppose the dissection of animals," declared a member named Julie. "There is no reason to dissect many animals when the whole class could watch one on a video and possibly learn even more. It is understandable for medical students to dissect, but I really don't believe it's necessary to have seventh graders

DON'T GET BURNED

Online is the hottest new way to meet people. Friendships, business relationships, and even matrimony can result. But that's not all that can happen. Unscrupulous and unbalanced people sometimes work the online world, looking for vulnerable people to use and abuse. Don't be afraid of the online world, but treat it as you'd treat the personals in a big city newspaper: A certain amount of caution will pay off.

What kinds of troubles can you expect online? Any service that provides for instant communication and E-mail also provides a channel for harassing communication that can be more trouble than fun. If your name and telephone number are known to many people online, then it won't be difficult for an abusive person to get that information—after all, you can't count on a casual acquaintance to protect your interests and privacy as carefully as you do.

One day, knocking around on a BBS service, I asked people whether they had been harassed online. Virtually all the people I contacted said either that they had been harassed or that they knew someone who had. Usually, the harassment takes the classic form of sexual harassment everywhere—men pursuing women beyond the point that women want to be pursued. But there are plenty of female harassers, too.

How can you protect yourself?

1. Never, never reveal your password. Not even to a friend or to a spouse or to a loved one. It not only allows someone to use your account without your knowledge—perhaps racking up hundreds of dollars in charges before you can detect the abuse—but also allows another person to speak as if he or she were you, making it look to other members of the service as if you are being abusive or inappropriate.

2. If you're using a service that lets you hide behind a handle (a fictitious name), select one in keeping with the kind of interaction you want to have. If *sexy* or *foxy* is part of the name, you're going to get a fairly predictable stream of messages whenever you log on. If you don't want that kind of message, change your handle to something more sedate. I have it on good authority that any handle that sounds feminine invites abuse. And if you're in the habit of sending lewd messages to anyone with a

feminine handle, remember that there are plenty of men online masquerading as women and vice versa.

3. Try not to get too involved with someone you haven't gotten to know. Some people online tell too much about themselves too soon. One man said, "I couldn't believe how much some of these women were willing to reveal about themselves—their names, addresses, telephone numbers. I tell them that they shouldn't give out that information the first time they talk to someone. It's just plain dangerous." But also remember that the barrage of information might not be truthful. Just as you can't tell the sex of a person sending a message, it's difficult to check on whether a person is actually married and only pretending to be divorced, separated, or single.

4. Watch for red flags. If a person tells you one day that she is a florist and another day that she is a veterinarian, that person is probably lying to you and has probably told you other lies, too. If information about a person doesn't add up, perhaps it's time to look for other interests online. When you stop responding to people and they continue to send you messages, that's another danger sign. Don't be surprised if the messages you receive become increasingly abusive. If that happens, consider changing your handle or going to another online service.

5. Don't forget that the sysop is your best friend. If you find yourself in an abusive relationship, let the sysop or someone in authority know. An abusive person is often a compulsive person. It's likely that abusing you is part of a pattern of abuse and the abusive person might already be on probation for this behavior. The sysop will probably want to know that it's going on and should take measures to stop it.

6. If you're getting information from someone that's just too good to be true, check the person out with people you trust. Abusive people get reputations quickly in the small world online. One person I heard about used a macro to send salacious messages to anyone online with a feminine handle. He made people so uncomfortable that they discussed his behavior among themselves and demanded his ouster.

7. If you're even mildly famous—an au-

thor, an actor, or an entertainer—you might run into fans online. If your handle is too transparent, you'll invite abuse. "People think they own you," one woman said. "Like you're their private celebrity." It's no secret that most of the computer and science-fiction publishing business is online, from freelancers to publishers. Other celebrities like William F. Buckley and Timothy Leary are also avid users of online services. Romance and other genre writers are also discovering online services. As computers become more widespread, television and movie stars are appearing on the services. If you're famous, protect yourself with a well-chosen handle and a vague air of mystery. Don't let anyone pin you down. If you're a fan, remember that celebrities are just people like yourself and that unless you have something specific to impart, perhaps it's best not to send messages at all.

8. You can avoid getting a reputation as a harasser by never saying anything online that you wouldn't want said to you, or to your mom. And never say anything that you can't take full responsibility for. Remember that an E-mail message can be printed, copied, and sent to your boss or your spouse or the sysop. If the message is abusive, slanderous, or sexually inappropriate, it could be embarrassing later (and there might even be serious consequences—freedom of speech doesn't extend to threats). If you stop getting replies to your E-mail, stop sending it. Don't forget that other people have lives, too. There may be very good reasons why you haven't heard from people. Let them go. You serve no purpose by becoming hostile or abusive.

9. Treat all messages in good humor. Remember the adage "A soft answer turneth away wrath." Just because someone has been beastly to you, that doesn't mean you have to respond in kind. And there's always the possibility that you misinterpreted what the person was saying—that it was a joke or a simple miscommunication.

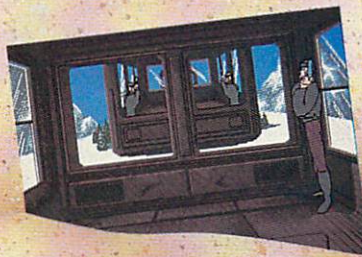
10. If you find someone who interests you and you want to meet that person, plan to meet in a neutral location where there are plenty of people around—a restaurant or mall, for example. Meeting at your residence is an enormous gamble.

—ROBERT BIXBY

Guy Spy™

and the Crystals of Armageddon

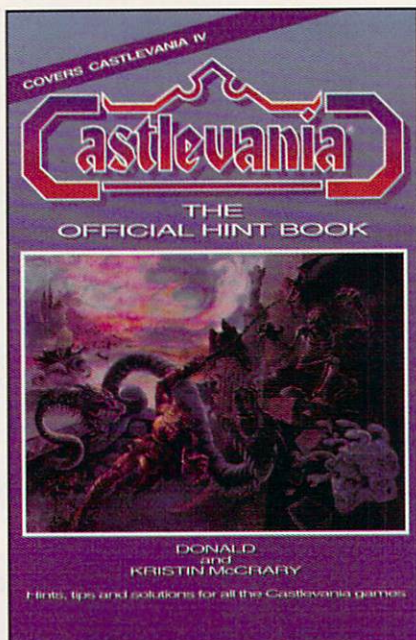
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pair off and go at innocent frogs and worms. What important lesson does that teach?"

Richelle, another member, disagreed and didn't hesitate to say so. "What is so wrong with dissecting?!!" she asked. "It is the best way to observe and learn the complexity of a multicellular organism."

Like any other form of human interaction, of course, online networking is

not without its risks. One is the chance that, just as in offline relationships, the online pal you give your phone number or address to can harass you with late-night phone calls or visits and generally make your life miserable. There's also this danger: When you chat online, it's harder to tell if the people you're talking to are really who they say they are. Larry Zinn, 39, a rock-'n'-roll tour manager who lives in New York City, says

GETTING TOGETHER

People who meet and get to know each other online like to get together in person. For example, the Trivia Club on America Online often holds parties so people in various parts of the country can meet, at least regionally. A general grouping like this is a perfect setting to meet a person you might hesitate to meet individually.

Be prepared to meet people who don't match your impressions. The fact that you can't see a person's face when you interact online means that all you have to go on is your imagination. Don't be disappointed. Getting to know a person face to face is a completely different experience—after all, that's the purpose of the meeting.

Checking with the party animals on a couple of online services only turned up two online party horror stories. One involved a person who was "a stuffed shirt and a workaholic," and the other involved an obsessive character who later harassed people on the telephone and in person. But the online crew is generally stable, highly intelligent, and fun loving. Regardless of other specialized interests, they like conversation and wordplay.

Share pictures. If you have a snapshot of yourself, scan it in, convert it to GIF, and upload it to the people who will be coming. Get a commitment from the others to upload snapshots as well, so everyone will recognize each other on sight. Locating a specific person in a public place might otherwise be difficult.

Be honest, at least with people you're going to become involved with. In the online world, it's so easy to mask your identity that people do it almost without thinking. When you meet people face to face, you won't be able to lie about your height, your weight, your age, or your IQ, though you might be able to prevaricate about at least a couple of these online.

Meet in a neutral place. Since you probably can't know in advance all of the preferences of the people attending, avoid bars or places that might offend the sensibilities of one of the members unless you have cleared it in advance with everyone who's expected to attend.

A restaurant with a conference or banquet room would be a perfect meeting place except for one thing: You also want to make it easy for people *not* to join the group. A person who walks into a banquet room has to all intents and purposes committed himself to joining the group. That fact alone might be enough to make him turn around and walk out of the restaurant.

You want to make it possible for people to see the group as they approach. Therefore, it would be an even better idea to meet in some open, public place before adjourning to the restaurant at an appointed time. That way, latecomers will be able to locate the group, and more hesitant people will have the opportunity to approach or walk by, whichever they wish. Therefore, a mall or a large hotel lobby is a good initial meeting place.

Arrange your meeting via E-mail. By not making a general announcement, you maintain control over the guest list. Remember that there are very few really private areas online and a general announcement might attract people who aren't members of the group and people that you don't want to attend for whatever reason.

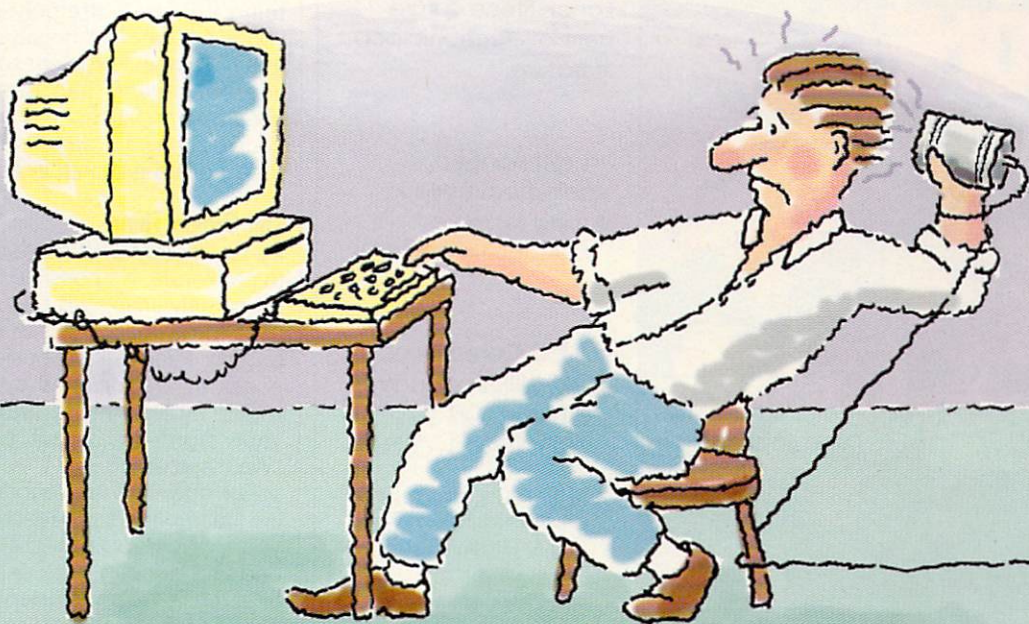
Another approach would be to have a group grow from a small circle of friends. Limit the initial meeting to four people, or perhaps four couples. Then, as a group, put together a larger guest list. By first including people that you know well, and then people that *they* know well, you reduce the anxiety of the new people.

Most groups coalesce around a specific activity—online gaming, trivia, sports, politics, religion—and these activities dictate the focus of the group. But many groups of people have no central interest. Writers, for example, are a particularly centrifugal group—independent, opinionated, and often egotistical—and any gathering not devoted to a single purpose might turn into a nightmare. Therefore, if there is no focus, you should give more thought to an agenda.

You might consider inviting yourself to one of the parties being arranged at any given time. If you're interested in seeing how it's done, check out La Pub or use the keyword *QUE* on America Online to see the get-togethers being arranged and the conversation among the party-conscious. On DELPHI, create a custom forum to announce a party. GENIE doesn't have any specific area for announcing or finding out about parties online, but you can discuss anything you like in a chat area. In CompuServe, parties are usually arranged within forums in conjunction with trade shows and events of special interest to forum members. For example, within the Macintosh forum (MAUG), the Club forum is used for arranging get-togethers and accommodations at Mac shows and often contains "official" party lists.

—ROBERT BIXBY

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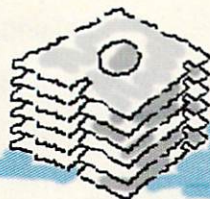


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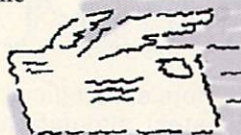
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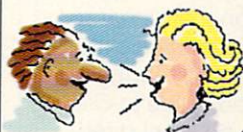


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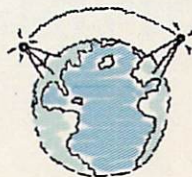


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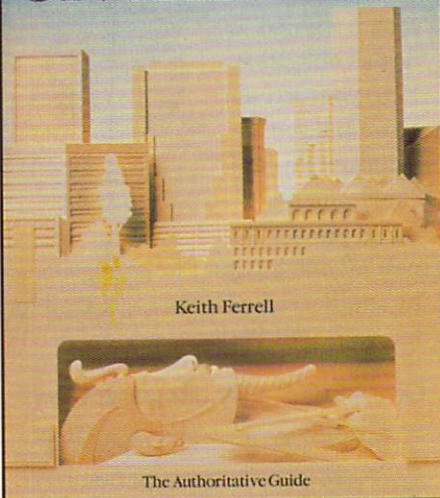
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he once fell hard for a woman he met on America Online only to discover—the day before he'd planned to fly to Florida to visit her—that she was married. Though he was upset at the time, he says he's gotten over it and has since gone out with someone else he met through the service. "The online thing can be extremely addictive if you're not careful," he says, explaining that his biggest problem so far with online networking has been trying to keep a lid on his monthly online charges. Currently, he spends several hundred dollars a month in access fees.

The Online Thing

As computers and modems continue to proliferate, it's possible that one day online networking will become as common as business lunches and cocktail parties. Face-to-face business conferences will be replaced by forums and round tables. In the future, "What's your sign" may well give way to "What's your log-on?"

For now, online networking offers a unique opportunity to reach out to a universe of computer-literate strangers and find a friend, a lover, a customer, or even a fellow student with some strong feelings about dissecting frogs. Whatever your need, wish, or desire, from business relationships to human relationships, there's probably someone in front of a computer somewhere waiting to share it with you. □

Linking Up

America Online
8619 Westwood Center Dr., Ste. 200
Vienna, VA 22182
(703) 448-8700

CompuServe
P.O. Box 20212
Columbus, OH 43220
(800) 848-8990

DELPHI
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Cambridge, MA 02138
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(617) 491-3393

GEnie
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Rockville, MD 20850
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Petline
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New York, NY 10023-5965
(212) 254-3838 (Modem)

Prodigy
445 Hamilton Ave.
White Plains, NY 10601
(800) 284-5933

64/128 VIEW

Define your computing goals.
Then see if your computer—dinosaur
or not—can get the job done.

Tom Netsel

Take time to flip through the pages that surround Gazette in this issue, and you'll see a section comparing the latest Super VGA monitors and accelerator cards.

If you're impressed by the sweeping changes in monitors, try keeping abreast of the latest features packed into computers themselves. One COMPUTE editor is planning to buy a PC for use at home, but just as he decides on a system, something newer and faster pops over the silicon horizon. Prices are dropping, but buying a new system is still a major investment. Like any consumer, this editor would hate to decide on a computer, fork over the cash, and then find a new improved model hitting the streets a few days later.

The PC market is volatile. What's new and hot today soon becomes yesterday's technology. As Bill Ihlenfeldt said recently in the *The Wall Street Journal*, "I bought the latest computer; it came completely loaded. It was guaranteed for 90 days, but in 30 days it was outmoded."

I spotted something similar the other day as I browsed through some user group newsletters. I came across an article written by Bjo Ashwill in "The Computer Group" of Eugene, Oregon. Ashwill, in a vein similar to his *Journal* colleague's, made a tongue-in-cheek gibe about the way today's technology changes so rapidly. He mentioned his old laptop computer. People called his six-pound laptop a dinosaur, a mere 8086 with a 20-meg hard drive, poking along at a pedestri-

an 8 MHz. "You couldn't prove it by me," Ashwill said. "I'm still starry-eyed about my Commodore 64."

Ashwill knows how easy it is to get carried away by new toys and the latest megaspeed gizmo. SVGA monitors may appeal to many enthusiasts, but many 64 owners still don't own monitors. They hook their computers to TV sets.

No matter how unglamorous the 64 may seem when compared to today's electronic speedsters, the little 8-bitter still gets the job done. That point was illustrated nicely by Max P. Feld, who's one of the Miami Individuals with Commodore Equipment (M.I.C.E.). He wrote in "M.I.C.E. News" about a member who was having trouble with her securities program. It wouldn't produce the financial data she needed. Group members recommended that she define her goals and then look for a way to accomplish them. Instead of trying to coax pertinent data from a fancy but temperamental program, they suggested she use a simple spreadsheet to accomplish the task.

Feld sees a lesson in this for all of us. "What do we expect to get out of our computers?" he asks. "Just why do we use the 64 or 128?" Once we ask ourselves these questions and define our computing goals, we should take another look at our 64s and 128s. They may not be today's pride of Silicon Valley, but can they still handle our needs? If so, it might come as a surprise to discover that our 64s and 128s are not the dinosaurs some folks say they are. □

GAZETTE

64/128 VIEW **G-1**

So it's a dinosaur! Your 64 still works, doesn't it?
By Tom Netsel.

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Questions and answers about machine language monitors, memory limitations, and printouts of program listings

Monitor or MLX?

What is the difference between a machine language monitor and MLX, the Gazette utility program that we use for entering machine language programs? I have noticed that with a monitor we must enter eight codes, but in MLX we must enter nine codes.

MAURIZIO GEREVASI
QUITO, ECUADOR

A machine language monitor is a versatile program for entering and editing raw computer code. Its main feature is an assembler for writing programs in assembly language.

LDA # $\$41$;load the accumulator register with the value 65 (\$41)

JSR \$FFD2 ;jump to the subroutine for printing the accumulator value

For example, the code above is a simple two-line assembly program for printing the letter A. (The text following the semicolons consists of remarks and isn't part of the code.)

The assembler takes these mnemonic instructions and turns them into machine code, a set of numbers that tells the processor what to do. LDA # $\$41$ is converted to the numbers 169 and 65 (\$A9 and \$41) and JSR \$FFD2 becomes 32, 210, and 255 (\$20, \$D2, and \$FF). In addition to letting you write assembly language programs, a machine language monitor can move blocks of code, search for a specific string of values in memory, and display the assembly language equivalent of machine language.

It also does one more thing. It can perform a hex dump. A hex dump displays the hexadecimal values in memory and allows you to alter them. In a sense, the MLX program works in the same

manner as a hex dump. The difference is that MLX works with specific program data, while the monitor hex dump deals with data in a direct and raw form. Like the 40-column machine language monitor, the 40-column MLX displays eight bytes at a time, too. The ninth byte is a checksum, helping to ensure that the real program data in the other eight bytes was correctly entered. If you use the hex dump capability of a machine language monitor to enter MLX program listings from Gazette, just ignore the ninth (final) character in each row.

Out of Memory

For the past few years I have been using a program called Free-Form Filer (June 1987). It has worked without a flaw since I first typed it in until now. When I try to add another file, I get a message that states I am low on memory. Checking the disk directory, I notice that I have 11 blocks of another program, 152 blocks of the Free-Form Filer program, and 501 blocks of free space. How can I change the program in order to use the remaining blocks on the disk?

G.P. WINDAU
FOSTORIA, OH

It's true that you have 152 blocks of memory remaining on the disk, but you have exhausted your computer's memory. Free-Form Filer grows itself each time you add a record, and you must load the entire program each time you use it. After five years, you have added enough material to fill the 64's memory.

If you notice your opening screen when you first turn on your 64, it says you have 38911 BASIC bytes of free memory. Now load your version of Free-Form Filer, but do not run it. Once the program

has loaded, enter the following to determine how much RAM you have remaining.

FRE(0) - (FRE(0)-0) * 65536

You should see that you have less than 2K of free memory. You can add a few more files, but you've just about pushed the 64 to its memory limit with all the records that you've added over time. You might consider either breaking up your file into smaller sections or deleting records that you no longer need.

Remember, you must use a separate copy of Free-Form Filer for each database you create, and you can use only one copy of the program on a disk. I hope you saved a master copy that contains no data. You can then use it to create working copies on any number of disks.

BASIC Printouts

I wish to point out a serious oversight which occurred in the December 1991 "Feedback." The published tip for skipping folds in fanfold paper will not work with MPS801, MPS803, and 1525 printers. These printers do not support paging. Six years ago, Gazette offered a solution for skipping folds in computer paper that works with these printers. Check out List Pager, December 1985. I use this utility with my MPS803, and it works great.

RANDY CLEMMONS
SAN DIEGO, CA

Thanks for the reminder, Randy. Readers who don't have access to that back issue may want to try a similar utility that's found in this issue. It's a type-in program called Formatted List. It's also available on this month's Gazette Disk, which can be ordered for \$9.95 plus \$2.00 shipping and handling.

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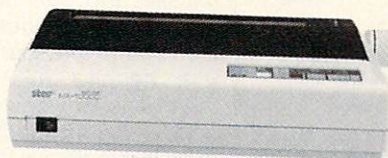
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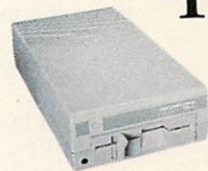
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Mode Detection

You recently had a letter in "Feedback" (April 1992) asking how to distinguish between the various 128 modes of operation. I have compiled a list of PEEKs that can distinguish between most 8-bit Commodore computers. (See table printed at right.)

Location 65288 is the place to start. This location can distinguish between all the major variations of the different machines. After determining the variation, you can then find out the specific ROM version it is using by checking other locations. Because of hardware and software considerations native to certain machines, you must first poke in the values at the bottom of the table before peeking the addresses listed for those machines.

WILLIAM LEVAK
ANN ARBOR, MI

All at Once

I've tried and tried to figure out how you can play music in the background, move sprites around the screen, animate background sprites, and read a user's joystick all at once in BASIC. It seems impossible. Is machine language needed?

JON LANE
PLANT CITY, FL

Computer games might seem to be doing many things at once, but they're actually doing only one thing at a time. It's just that they do things quickly. Computers follow instructions sequentially.

To give your program the appearance of simultaneous action, you need to plan ahead. Separate the actions into subroutines. An IF-THEN statement can decide whether or not you want to use GOSUB to go to the appropriate routine. It might help to write the conditions and their

BASIC Version	Address					
	47727	50003	50575	58480	65288	65408
PET 1.0		0	1 ¹	238	169	64
PET 1.0r		0	152 ¹	238	169	64
PET 2.0		1	47	72	6	167
CBM 2.0		1	47	72	6	167
CBM 4.0	4	160	135	170	170	170
PET 4.0	4	160	135	170	170	170
8032 4.0r	234	160	135	176	170	170
PET-12 4.0r	234	160	135	196	170	170
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64 2-02	133			69	149	0
64 2-03	133			69	149	3
4064 2.0	133			69	149	100
SX-64 2.0	133			69	149	67
PLUS/4 3.5					255	
C128 7.0	161 ³	14 ³	211 ³	229 ³	72 ³	0 ³

¹ POKE 1018,173: POKE 1021,133: POKE 1022,2: POKE 1023,96
POKE 1019,143: POKE 1020,197: SYS 1018: PRINT PEEK(2)
² POKE 599,15
³ POKE 981,15

consequences in plain English. For example, if the fire button is pressed, then launch missile and set the missile flag. If the joystick moves, then move the ship sprite. If one second has passed, then play another note of the song. If the missile flag is set, then move the missile sprite again. Repeat the loop.

First, you check for the joystick fire button. If it's pressed, use GOSUB to go to the appropriate routine. If it's not pressed, forget about launching the missile until the next time through the loop. Once you've launched the missile, you want it to continue moving, which is the reason for the missile flag. Next, PEEK the joystick to see if the player wants to move. If so, update the ship's position. Third, check the jiffy clock, the variable T1 or T1\$, to see how much time has gone by. If a second (or whatever time period you've chosen) has passed, play the next note of the song. Next, if the flag is still set, move the missile sprite. Then go back and do it all again.

The program loops around

and around, taking necessary actions one at a time. The computer works quickly, and if the individual actions are coordinated, they appear to happen simultaneously.

By the time you create a few more subroutines to make your game more playable, the computer will have to execute numerous instructions. Converting these instructions from BASIC can take too much time for a fast-paced game. If you want speed, it's a good idea to switch to machine language.

Another technique, which is even closer to simultaneous action, requires an intermediate-to-advanced knowledge of machine language. Sixty times a second, the computer stops what it's doing and redraws the image on the screen. The main program is being constantly interrupted. Using a wedge, or redirection, you can divert the interrupt to your own ML program, which could play music, move sprites, or whatever you choose. Such interrupt-driven routines are sometimes difficult to implement but can be very effective. □

Here's a way to detect modes of operation on any Commodore 8-bit computer, and a look at what's happening while a program runs.

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HAVE TO DO A LOT OF DIGGING BEFORE YOU FIND THE GEMS.

BURIED TREASURE

BY HENNING VAHLENKAMP

The wealth of public domain and shareware programs available to 64 and 128 users can be accurately referred to as buried treasure. Thousands upon thousands of these programs have been written over the years, and they span the spectrum from entertainment to productivity. Best of all, these programs are available for the taking.

Unfortunately, many 64/128 users don't take advantage of these programs, since the sheer volume of them makes it difficult to separate the gems from the duds. Also, like finding buried treasure left by pirates of yesteryear, locating these treasures can sometimes be a problem.

In this article, you'll find a survey of what I've found to be excellent public domain and shareware programs. Don't simply take my word for it, however; download some of these programs and try them for yourself. Plus, I'll show you where and how to dig up some of these treasures as well.

PD or SW?

First, let's clarify our terms. A public domain (PD) program is one which you can use and distribute freely. It's also the oldest type of noncommercial software available to the public. Like PD programs, shareware (SW) can be freely distributed, but the author requests a donation (usually a modest one) if you find the software useful. In many cases, SW authors will provide enhanced versions, written

documentation, and updates to users in return for payment.

Software Sources

Both PD and SW programs are more readily available than you might think. For instance, most major online services have enormous selections of Commodore software. The only charge for the programs is the service's connect-time charge. Many services have a listing of available programs that you can download to get an idea of what's available. Others may have a printed catalogue. If you need a program to do a specific job, leave a message online, and someone will probably offer a suggestion or two.

Local BBSs and user groups also can be treasure troves of wonderful programs. Even if a BBS is running on an Amiga or IBM, it may have a large selection of PD and SW programs for the 64 and 128. Most user groups have hundreds of programs available, charging only a modest fee to cover the cost of the disk.

Downloading more than a few programs from a local BBS can take quite some time, even at 2400 bps. Connect charges for online services and telephone bills for long-distance calls to BBSs can add up. If you're looking for a large number of programs to build your library in a hurry, mail-order disk services may make more sense. Disk services typically offer hundreds of PD and SW disks at reasonable prices. The on-

ly downside is that their collections are rarely as up-to-date as those of networks and BBSs. Check the listing at the end of this article for several popular commercial sources for PD and SW programs.

Best of the Bunch

Now that we've touched on where to find programs, here are some outstanding ones to watch for. Since a significant number of PD and SW programs are of high quality, it's impossible to mention all of the outstanding ones in one article. Nevertheless, I've selected several in a variety of categories that are among the best. They are definitely worth having. Now, on to the treasure!

CREATIVITY

Demo Designer 2

If you've ever wanted to make a professional-quality graphics and sound demo on your 64, Demo Designer 2 is an excellent choice. First, you select a font and musical selection from the many available ones and enter a Koala picture filename. Next, write your scrolling message with the built-in editor. Your stand-alone demo is then saved to disk. What could be easier than that?

Fun Graphics Machine V3.42

Fun Graphics Machine is unique SW for the 64. It's a powerful monochrome hi-res graphics editor, not a paint program. FGM features the ability to use Print Shop graphics,



text fonts, rotation and flipping, reduction and enlargement, reversing, scrolling, and rudimentary drawing. The finished product can be exported to a paint program for further embellishment.

Graphics Assault System

GAS (by COMPUTE's Bruce Bowden) provides more graphics-manipulation capabilities. This useful PD program can compress, magnify, flip, rotate, scroll, diagonally shift, and invert hires and multicolor pictures. Best of all, it can convert hi-res to multicolor and vice versa. GAS is available in separate 64 and 128 40-column versions. If you're into graphics, you must have this one.

DEMOS

Batmania

This outstanding demo was inspired by the Batman movie of a few years ago. Batmania begins with an introduction to the dark knight and then erupts with a wonderfully arranged soundtrack from the movie. Minor animation plus topnotch graphics add the finishing touches to this fine demo.

El Gato

You need a 1764 or 1750 REU to run El Gato, an animation of a cat. The cat is shown walking in a rectangular plane, which simultaneously rotates about a vertical axis. This produces a realistic 3-D effect. Pressing various keys lets you change the speed of the animation. PD versions of this 141K program are available for both the 64 and the 40-column 128.

Eyesoteric

What makes this PD program for the 64 unique is the subject. A large eye opens and closes as it bounces around the screen. Other spheres bounce, too, resulting in 20 sprites on-screen at once—an amazing accomplishment! The music has a nice high-tech sound to it.

Juggler

Perhaps the finest 64 animation ever done, Juggler is based on the famous Amiga animation of the same name. Run this PD program on your 64, and you'll see a robotic figure standing on a checkerboard floor, juggling three reflective glass spheres. Numerous superb multicolor frames make this animated demonstration appear almost as impressive as its Amiga predecessor.

Outspace

Upon loading this PD program for the 64, you'll be treated to a graphics and

sound extravaganza. Highlights include impressive use of sprites and raster interrupts, creating all sorts of movement. On the final screen is an astronaut/alien backed up by superb digitized music. You can select a picture and music with a joystick.

Reticulate

This PD program for the 64 does the seemingly impossible. It presents an unprecedented 320 x 400 pixel interlace on the composite screen. The effect isn't fake, and interlace flickering is no worse than on the Amiga. A variety of great pictures can be loaded by pressing the space bar after the introductory screen. The program won't run from a 1581 because of its custom fastloader. The music is excellent as well. A must-have!

Space Movie

Space Movie is another classic demo for the 64. Although small in size (43 blocks), it's a lengthy minimovie with an equally long soundtrack. It consists of a tribesman beating a drum while a space drama with aliens unfolds on the other side of the screen. All of this is in rhythm with the music.

Swinth

Swinth is by far the most well-known 64 demo of all. A combination of Swish and Synth Sample, it features a colorful, symmetrical kaleidoscope of lines synchronized to music. Most parameters such as colors, display attributes, and music are user-selectable. Viewing it is a relaxing, almost hypnotic, experience that you shouldn't miss.

GAMES

128 Invaders

Taking advantage of the 128's often neglected 80-column screen, 128 Invaders, a Space Invaders clone, delivers a lot of fun. This PD game also features smooth animation and full color! Although the theme is nothing new, its implementation makes 128 Invaders shine.

Adventure/80

Here's another superb 80-column PD game. Players can look forward to an excellent condensed version of the original mainframe Adventure game by William Crowther. All the key elements are preserved in this text journey through Colossal Cave. Fans of the Infocom classics will especially like this one.

CeviuZ

CeviuZ is an automated helicopter assigned to dangerous missions. With it you fly over large, detailed landscapes

while avoiding enemy fire. Program options in this SW package for the 64 include three day or night missions, several levels, high-score saves, an indestructible mode, and a terrain editor for added replay value.

Krakout

Krakout, a commercial-quality game, at least equals its inspiration, Arkanoid. Distinguishing this PD 64 program are great graphics and sound, real playability, and a multitude of options such as bat speed, ball speed, number of bats, and type of background. This one's a winner.

Mah-Jongg

Mah-Jongg is a high-quality clone of Shanghai by Activision. The object of this 128 PD game is to remove all the tiles by clicking on matching pairs with the onscreen pointer. This ancient Chinese game is addicting and requires good strategy. It runs in 40-column mode and supports a joystick or mouse.

Qix

This PD clone of a Taito hit scores high marks for fun with a 64. You guide a diamond and try to cut off sections of the screen to trap the enemy in the smallest space possible. You must also avoid two little bugs that try to get you. The time limit makes Qix all the more challenging.

Rotations!

Once again, a commercial game (Tetris) inspires a good PD clone for the 64. In Rotations!, you manipulate different falling pieces to form horizontal lines on the playfield. Graphics are clean, multiple levels add challenge, and the pause feature comes in handy.

GEOS

Blue Pencil

If you do a lot of writing at home, school, or work, you need Blue Pencil, a PD program for the 64. It's a complete geoWrite document analyzer that counts words, sentences, paragraphs, pages, and graphics. Plus, it figures a variety of averages to help you analyze your writing. The only shortcoming is that it has trouble working with very large documents.

Combiner

Combiner is a SW program that lets you combine two geoWrite documents in many different ways. If you're working on one document, for example, a second document can be appended to it, inserted, or merged as part of your original document. Versatility and



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the ability to handle different geoWrite versions make Combiner for 64 users an indispensable utility around the home, school, or office.

Convert 2.5

With this PD program, 64 users can convert documents from GEOS format to SEQ or PRG text files and vice versa. Conversion is a snap. It's a must-have for serious writers who use multiple word processors or GEOS fans who want to send text on disk to people who don't use GEOS.

Graphic Storm

A graphics importer, Graphic Storm will convert standard hi-res screens or Doodle pictures into geoPaint format. This SW program converts Print Shop, Print Master, and Newsroom graphics into photo album graphics like Graphics Grabber does. This is another useful program that should be in every GEOS user's library.

GRAPHICS

CSlide5

This SW viewer displays both compressed and uncompressed Koala and Doodle pictures. CSlide5 also compresses and decompresses them, which is a very useful feature, and it's lightning fast.

Disp/Lace

Imagine a 640 x 600 pixel interlace on the 80-column screen! That's what this incredible PD program can accomplish if you have 64K VDC RAM in your 128. It takes any six Doodle pictures and displays them simultaneously with their colors intact. Graphics fans shouldn't miss this unbelievable feat of programming.

Artwork

Here's a sampling of beautiful Commodore artwork to watch for. Each of these compressed Doodle files has a GG prefix: BOTTLE, CABIN, CASTLEJS, EGO, FROG.LILY.PAD, GRAYLIBR, HALOWAYN, IGARDEN, KINGFISHER, SERENE, LINCOLN, SCHLOS.CASTLE, SPAZOZ, and URCHINOD. These pictures and JJ MIDDLE EARTH, which is a Koala file, reflect the talent of a few of the best artists in the Commodore community.

MUSIC

StereoPlayer 10.3

Without a doubt, this is the best SID player available in the public domain. A huge program, StereoPlayer plays both mono and stereo SIDs, features a keyboard and animated band, and has

almost every conceivable musical option. The opening screen is spectacular. In fact, this whole program is thoroughly professional. It's PD software at its best.

SID Player Music

There are many outstanding SID player songs. These songs usually have a MUS suffix. Here are a select few: BACK FUTURE, BADMEDICINE, BLAZER THEME, BLESS USA, ETERNL FLAME, GALACTICA, LEAN ON ME, LIKE A PRAYR, MISSION IMP, MY/DREAMS, NEVERENDING, OLD TME ROCK, STAR WARS, WILD/WEST, and YEARS. All are magnificently arranged. These are just a few of the many excellent musical works available for downloading.

PRODUCTIVITY

Power Budget

Similar to a spreadsheet, this SW budgeting program for the 64 is quite versatile. It allows you to enter and change data quickly, and the computer handles the calculations. Furthermore, budget projections can be calculated for an entire year. Clear instructions are included with this easy-to-use financial program.

The Data Base

This SW program is a superb flat-file database that possesses as much power and flexibility as some commercial ones. All the expected features are here, including multiple records, sorting by several keys, report writing, SEQ translation, searching, and so on. This program is excellent for most database needs. There are separate versions for the 64 and 128, and the 128 version has both 40-column and 80-column versions available.

UTILITIES

CS-DOS

CS-DOS is more than a DOS shell; it's an entire operating system similar to MS-DOS. For instance, this SW program for the 128 features a command line, batch files, and so on. A number of programs are available to run under CS-DOS. I think you'll find this to be quite an interesting offering.

Vector Drive

Disk editing requires good tools, and Vector Drive is a PD program that fills those needs. It packs as much power as its many commercial competitors. This menu-driven program for the 64 features search and replace, sector fill, copy, memorize, and BAM display, plus all the other options you'd expect

on an outstanding disk editor. It works with any 1541 or compatible drive.

MISCELLANEOUS

Star Trek

Commodore owners who have a 1764 or 1750 REU will get a real treat with this one. This PD program for the 64 fills an entire disk and utilizes digitized sound. You'll hear the entire introduction to the original "Star Trek" TV series, beginning with "Space, the final frontier. . . ." Very impressive! □

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TEENAGE MUTANT NINJA TURTLES—THE ARCADE GAME

Hey, man! That Shredder creep is back in town with the Foot Clan! Yeah, dudes! And he's got April! We've got to rescue her! He's holding her somewhere in New York. Let's go! Cowabunga!

Sound familiar? What could be the start of an outline for a Teenage Mutant Ninja Turtles screenplay is actually the premise for the latest in Turtle games from Konami—and a hot game it is. Based on the arcade game, this game follows the Turtles through eight levels of battle against Shredder and his henchmen, including key figures Bebop and Rock Steady as well as the highly trained Foot Clan.

You can choose to be any one of the four Turtles: Leonardo, Donatello, Michaelangelo, or Raphael. Then take off after the bad guys. Your first stop is April's flaming apartment. You battle member after member of the Foot Clan. Some are armed, while others have only their ninja skills as weapons. If you defeat all of them and outlast Rock Steady, then it's on to Times Square.

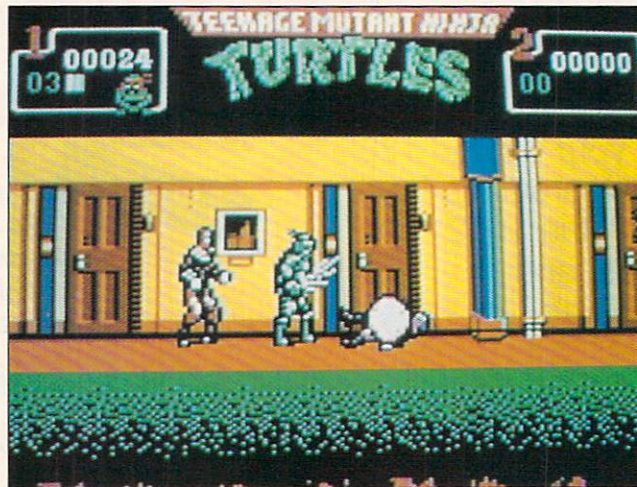
Pick up a pizza for an extra life; watch out for Bebop by the convertible! Next, it's the SoHo Sewers, complete with rats and robots! Then, Vinnie's Valet Parking Garage, Madison Square Avenue, Rock-a-fella Expressway, the Rock Quarry Factory (lair of the Stone Warrior), and finally, level 8, the Technodrome! This is where you meet all your opponents for the ultimate showdown.

As you take on a Turtle

persona, you need to realize that each Turtle prefers a different weapon. This means that each fights a little differently. Experimentation will tell you which Turtle best fits your style of gameplay. One hint: Each Turtle has an awesome side drop kick.

We found a lot to like

Robin, age of discretion: "The graphics are good; the sound, even better. I don't have to go blind to find the password, since it's printed on white paper. I like the fact that the Turtles have different abilities. It makes things more individual and less boring. Donatello is my



Raphael, armed with a pair of Sai daggers and a bad attitude, takes on Shredder's goons in April's burning apartment.

about this game. There is something in Teenage Mutant Ninja Turtles for everyone. We'll let the players speak for themselves:

Michael, age 4: "I like the Turtles! It's my new Turtle videogame. I'm Michaelangelo, and I get rid of those guys! Even the robots. I got 67 points—all by myself!"

Katelyn, age 6: "I like this game 'cause it's fun. I think it's a little hard, though. I like using Leonardo because he has longer swords."

Meaghan (our family's top scorer), age 10: "I like the Turtles Arcade Game. I like Raphael the best. The graphics are great. It's easy, too. Not complicated. But it's a challenge to really win."

preferred hero. The game is challenging, but not so much so that you give up on it. But I have to admit that it makes my hand sore."

David, age 40 or so: "It's one of the few arcade games I like. Maybe because it's one of the few I find playable. Great graphics and sound. Now, if I could just outscore my daughter!"

Kacey and Kelsey, age 15 months, are twins of few words. We can only go by their reaction whenever they hear the music. They love it. They bob, dance, grin, and clap their hands.

OK, so much for the family's individual opinions. We like a game that gives the little kids a chance. Many ar-

cade games require too much coordination for small hands. This can be frustrating to a little guy who's just trying to have some fun. This game has familiar characters, exciting battles, and an ease of play that enables little people to play like the big kids. I'm not advocating that such a game should take the place of an educational game, but everyone likes something that's just plain fun.

Konami is generally pretty thorough in what it does. This program is no exception. One manual serves all versions, with an insert to amend instructions to accommodate Commodore differences. The manual is just what you need to get going. It's concise, informative, and entertaining. However, it is misleading in one item. The manual claims that after your last Turtle life ends (you get three), you are offered two options, Continue or End Game. The Continue option allows you to pick up at the scene where you left off, and you're allowed to do this up to three times. It doesn't happen this way, however, in the 64 version. The death of the last Turtle means the end of the game. There's no explanation of why the 64 doesn't have this option. It's a shame, because such a feature would be a terrific plus.

This misinformation in the manual seems to be the only negative point in a game that is otherwise exciting and lots of fun. When an arcade game is translated into a computer videogame, it can bring the fun home—and even save a few quarters. Teenage Mutant Ninja Turtles—The Arcade Game does this in a very capable, enjoyable fashion that appeals to those aged 4 to 40

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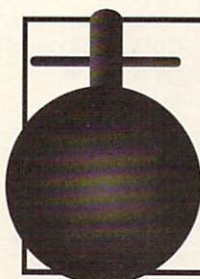
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THE SIMPSONS ARCADE GAME

Hey, dudes! Grab your skateboards and get ready for action with *The Simpsons Arcade Game* by Konami. Homer, Marge, Bart, and Lisa will lead you on a wild chase through the streets of Springfield. They're trying to rescue little Maggie Simpson from the jewel thieves who kidnapped her after she accidentally swallowed a valuable jewel.

Simpsons fans will enjoy the colorful graphics and lively music in the opening animation sequence, which sets the scene for the game. You can bypass the animation with a click of your fire button.

The game has two double-sided disks that offer you eight increasingly difficult levels of play. On each level you'll meet a variety of foes who attempt to prevent you from finding Maggie.

You'll face off against ghosts, zombies, tavern thugs, yes-men, and other foes too numerous to mention. The bad guys seldom appear alone. Since the game offers you a two-player option, you can team up with another player and use tag-team tactics against the bad guys.

The Simpson characters are easily recognizable, even though the game re-

lies more on color than on detail to portray them. Other characters from the popular television show, like Krusty the Clown, Mr. Burns, and Smithers, will join in the campaign to stop you from advancing in your search.

Each Simpson is equipped with a special



Each Simpson is equipped with a special weapon to help him or her fight any villains who block the way.

weapon to help him or her fight any villains who block the way. Lisa lashes with her jump rope, Bart bashes with his skateboard, Homer hammers with his fists, and Marge is a maniac with her vacuum cleaner and towering hairdo.

Each Simpson begins the game with four lives, but you should plan to lose a few until you get the hang of the game. You'll have fun testing each character's fighting skills alone and in combination until you find the single character or team that suits you best.

A status window at the bottom of the screen will keep you advised of how well you're doing throughout the game. It shows how many villains you've defeated, the number of lives you have left, and the amount of ener-

gy remaining for your character (or characters). The energy level tells you when it's time to look for burgers and other goodies to restore some of your strength.

From time to time, comments from your character appear in a message balloon that's also in the status

much damage your blows have inflicted on these super bullies. In most cases, you'll find it takes 1-3 hits to best an ordinary bad guy and about 20 hits to finish off a boss. When you've defeated 50 bad guys, your character earns another life.

Don't expect the instruction manual to offer you much help. This is one of those games that you'll learn while you play it. In fact, there are times when the manual is a bit misleading. For example, the pictures of level 2 and level 5 are reversed in the manual. It also tells you that since the undead creatures on the cemetery level can't be killed, you must try to find an escape route. However, it doesn't offer any clues as to which enemies are undead and which are living.

Appearances are deceiving, too. The ghost dangling from a rope isn't a ghost at all. It's a bad guy hiding in a tree. (Jump up and hit the tree to knock him down.)

As for that escape route, you'll quickly discover that you can't run away from the enemies. You'll be unable to move beyond the end of any screen as long as there are foes alive onscreen. Don't toss the manual away, though; you'll need it for the passwords that are printed in the back to start the game. After that you're on your own.

The more you play *The Simpsons Arcade Game*, the more you learn! That's part of the appeal of this challenging game.

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REVIEWS

**S.E.C. CHECK
REGISTER 128**

My biggest complaint with Commodore computers is their slow loading time, but S.E.C. Check Register 128 overcomes that problem beautifully. Within five seconds of turning on my 128, the menu selection is on the screen. Less than a minute later, the program has loaded and is ready to go.

This particular check register program is designed for small businesses, yet it will also keep your personal check register and files balanced and in order. With this program you'll be able to keep a current and accurate check register, print checks and register data, and maintain a recurring payee file. Even with all these options, data entry is fast and relatively easy.

Check Register's main menu is extensive, but easy to use and understand. From there you can enter check information, record deposits and withdrawals, check off transactions that have cleared the bank, print checks, load files, and perform numerous other functions. Most selections are made by pressing a function key.

Each selection has its own menu, which allows you to carry out specific tasks easily. Any transaction can be edited at any time, making the correction of errors hassle-free. You can edit and delete transactions, insert memos, and swap transactions. Check Register also allows you to format new data disks from within the program, a feature I appreciate in any software.

Before setting up your business or personal checking files, it would be wise to browse through the sample files that come with the program. These are the files of a Mr. Jones, which include his check register, recurring payee file, and check format file. Read through these and experiment with the program's various functions to become familiar with them.

Depending on how large your files are, entering your records can be time-consuming. This doesn't need to be done at one sitting, however; you can save your files and add to them or edit them at a later time.

Check Register can do more than simply keep track of your checking account; it can write checks as well. If your bank doesn't supply form-feed checks, you can order checks and other computer forms from the address given in the manual.

A computer printout ruler, available in most office supply stores, will prove

useful when setting up your check format file. This ruler can help you determine the exact spacing required for printing out your checks. Check Register is quite flexible, limited only by your printer and interface features.

Check Register also offers the feature of printing out reports, useful for tax or budgeting purposes. Your register data may be printed out by transaction and reference numbers, by reference numbers and date, by date only, or by payee.

Two other routines allow you to address large and small envelopes for recurring payees with addresses on file. This saves you the trouble of switching to a program to print out labels or addressing them by hand.

The check register portion of the program is easy to use. The initial setup will be the most difficult part of using the program. One minor item to note: When first signing on, you're asked to enter the date in MMDDYY format. Don't put spaces between the numbers; the program won't accept them.

The second part of this program is the S.E.C. Financial Loan Consultant. There's no mention of this section in the manual. Although this part of the program is easy to use, a few words of guidance would've been appreciated.

There are six parts to this section, with room for expansion. When you supply financial information at the prompts, the program will determine the amount of your recurring loan payment and the amount of the final payment. It will also determine terms of a loan, the balance of a loan, and what the total cost would be to borrow an amount of money. It will also analyze the loan and provide amortization information. This feature can help you decide whether or not to buy a car or equipment for your business.

I'd like to see two items improved in future releases. My first request would be for a bit more guidance in the manual; I like lots of detailed instruction. Although Check Register is a very easy program to use, there were a couple of times when I had to stop and decipher what was happening. My other suggestion would be to let the user alter the black and green screen colors.

Otherwise, I consider this a well-thought-out program that can take some of the time-consuming burden out of running a small business or managing your personal checking account.

CHERYL TURNER

Commodore 128 with 80-column monitor—\$16

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PROGRAMMER'S PAGE

Randy Thompson

REAL PROGRAMMERS OWN 64S

Computing has changed in the last few years. It used to be that owning a computer meant learning about how it worked and how to program it. In fact, you couldn't even run a program without first getting acquainted with BASIC's LOAD and RUN commands.

This isn't true anymore. Today's software boots automatically, and programming languages such as BASIC are considered optional. The computer industry believes that the less you have to know about a computer the better. Beware this user-friendly attitude that ignorance is bliss.

If you want to be a hot programmer, learn how your computer works. Learn all you can. Learn its capabilities and its limitations. Most important, learn its hardware. Why? Because when you know this, you'll know what your computer can do and how to do it.

Commodore 64 programmers understand this. With a built-in BASIC that lacks commands even to change the screen's colors, 64 owners learn quickly what a hardware register is and where it's located in memory. For example, how many of you don't know the function of location 53280? What about 53281 or 54296? And what true Commodore hacker doesn't know what's stored in memory between 1024-2023 or what important value is kept in location 646?

Those who program the 64 don't care if their computer is considered crude by the rest of the industry. That's because they realize that hacking the bare metal is what programming is all about. Experimenting with the computer's

operating system, interrupts, and video chips is what makes owning a computer so much fun. Sure, the 64 may be primitive compared to the Amiga, but it's still one of the greatest machines around for the hobbyist.

Today's more powerful computers come with high-level languages that take the work out of programming. Ironically, I believe that programmers are losing their edge because of it. You no longer need to understand what binary is to display a bitmapped picture, or how your computer's DOS works to open a file, or where your video registers are located to darken your screen. Unfortunately, too many programmers aren't bothering to try. They're spending more time learning about programming languages than learning about the computers they program on.

I think you should understand your computer first. Whatever programming language you choose to learn is, for the most part, incidental. If you know how your computer operates, you'll know the most efficient ways to control it, no matter what language you select. High-level languages are good as long as you don't forget the computers they're designed to control.

There's also a trend toward writing generic, abstract code. This type of programming produces software that can be easily maintained and transferred to other computers. This is fine (and crucial) for many business applications. But these types of programs are, by nature, bigger and slower than programs that have been written specifically for one computer by a programmer who takes advantage of what that machine has to offer. In my opinion, the best programs don't run on other brands of computers without significant modifications to

the programs' codes.

Whether you own a 64, 128, Amiga, or MS-DOS clone, it's your duty to understand the hardware you program. Let's push these machines to the limit. After all, isn't that what owning a computer is all about?

Stepping down off my soapbox for a second, I'd like to make a request. I'm looking for some neat raster interrupt routines. I'd like to publish a column of impressive raster video tricks. Such routines may display a multitude of sprites, change video modes on the fly, animate the screen's borders, or whatever else you can imagine. Your program should be as short as possible (certainly no larger than what can be listed on this page) and preferably submitted on disk. If possible, try to make your routine something that can be easily included in a BASIC program. This way, all programmers will be able to make use of your efforts. As usual, we'll pay you for any tip we publish.

In the meantime, try running the following pseudo raster interrupt program on your 64. (Your 128 can run this, too, but the effect will be different). Enter it exactly as shown here, with no spaces. Watch carefully. Enter a comma, a period, and 18 colons after the first POKE53280. Also, notice that there's no line number after the GOTO command. Sure, it's weird looking, but try it anyway. It might surprise you.

```
0 POKE53280,.....:
POKE53280,7:GOTO
```

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

If you want to be a hot programmer, learn how your computer works. Learn all you can.

BEGINNER BASIC

Larry Cotton

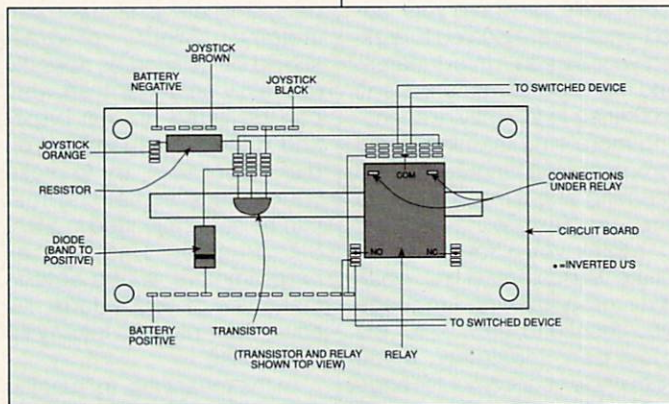
MORE JOYSTICK OUTPUT

Last month we saw how to use a joystick port as a miniature user port. With a short BASIC program, we controlled an LED connected to a joystick cable. Now let's expand on that idea so that we may control a small electrical device. To do this, we'll build an interface on a Radio Shack IC breadboard that will connect the 64 and the device. The interface will use the fire button wire to control a small relay.

the common contact; the other two are the normally open (NO) and normally closed (NC) contacts.

2. Make three small inverted-U loops of bare connecting wire approximately one-half inch long. Use these to connect the three main relay switching contacts to the circuit board.

3. Solder the tops of the inverted-U loops to the three main relay leads, with the six short (one-fourth inch) leads pointing down.



WARNING: You must be thoroughly familiar with electronic construction techniques and associated safety precautions before attempting this project. The relay must switch only small electrical circuits operating on voltages safe to handle. In no case should switched currents exceed 1 amp (1000 milliamperes). Use adequate-sized wiring from the relay to your appliance, or use several wires in parallel. Carefully follow these step-by-step instructions based on the parts list printed at the bottom of the page. Also, refer to the accompanying diagram.

1. Of the five relay leads, bend the three thick ones to a horizontal position. The center lead at one end of the relay is

4. Plug all six leads into the circuit board so that the common contact is in one group of socket holes and the normally open/normally closed contacts are in another. (The two groups of holes are electrically divided by the channel that runs down the middle.) Ensure that the two small coil contacts under the relay are plugged into the same group of holes as the common switching contact. Make sure that any wire or wires running from the relay contacts to your electrical device are of adequate size to handle the associated current.

5. Solder short pieces of connecting wire to the nine-volt battery connector; plug them into the two outside rows of holes on the board carefully noting

polarity. Don't connect the battery yet.

6. Plug in the transistor with the flat face as shown in the diagram printed above.

7. Connect the diode from the transistor to the positive edge of the board. The band on the diode should be toward the positive terminal.

8. Connect the resistor between the transistor and an unused row of holes.

9. Connect wires from the transistor and the positive edge of the board to the two hidden relay coil leads.

10. Connect a short jumper from the transistor to the negative edge of the board.

This completes the construction of the interface. Now run last month's program and make sure that the LED still flashes. Turn off the computer and unplug the joystick cable from the computer. Remove the LED; plug the orange, black, and brown wires into the circuit board as shown; and then enter this program.

```
AS 10 PRINT "{CLR}"
DM 20 PRINT "{2 DOWN} PLUG
      CABLE INTO PORT 1
      {DOWN}"
HH 30 NT=400:FT=400:B=3:
      REM ON TIME, OFF T
      IME AND NUMBER OF
      {SPACE}BLINKS
BS 40 IFPEEK(56321)=255T
      HEN40
QP 50 POKE56323,17
CS 60 POKE56321,16:PRINT
      "ON"
EH 70 FORT=1TONT:NEXT
RK 80 POKE56321,0:PRINT"
      OFF"
MD 90 FORT=1TOFT:NEXT
CM 100 IFPEEK(56321)=238
      THEN120
CP 110 GOTO60
PX 120 POKE198,0
QB 130 POKE56323,0
```

Connect the nine-volt battery and run the program. At

Build this simple interface, and you can use your 64's joystick port to control small electrical devices.

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the prompt, plug the joystick cable into port 1. The relay should now start clicking regularly. Its contacts are alternately opening and closing, with their status printed on the computer screen. Note that the keyboard won't respond as long as the joystick cable is plugged in.

Now unplug the cable. The program ends, the relay stops clicking, and the keyboard again responds normally. Disconnect the battery. If you are experiencing any problems at this point and your circuit isn't performing as described, check your wiring carefully and make sure you have a good battery.

Use the common contact and either the normally open or the normally closed contact of the relay to switch a small electrical device. Observe the precautions stated above. Always use electrical tape or shrink tubing to insulate live leads from each other, yourself, and others.

Of course, this project only hints at your computer's potential for controlling electrical devices. The two basic categories of devices which can be controlled are those which need sophisticated timing and those which sense external events. By modifying the program and adding more interfaces, up to five circuits can be controlled independently from one joystick port.

In the first category, your computer can control devices such as solenoids. Timing can be implemented by using either the TI function (the most accurate) or by using FOR-NEXT loops. I had fun building a model of a "drummer boy" which uses low-voltage relays and small solenoids to control its drumsticks. By paying careful attention to its construction, I was able to make the model look realistic. With a few changes in the program, I was able to make his marching drum patterns varied and sound even more authentic.

In the second category, the computer can sense various parameters of the environment. The other joystick (or user) port could be connected to sensors which detect electrical resistance changes or on/off signals. Resistance can vary by light with photoresistor cells or by heat with a thermistor. It can also be changed manually by using a potentiometer, such as that found in computer paddles. By using your imagination and a little knowledge of electronics, you can have your 64 controlling any number of sophisticated appliances and gadgets.

The following list of parts has Radio Shack stock numbers listed as a convenience. Similar items should be available at any well-stocked electronics store for less than \$20.

PARTS LIST

- Circuit board, RS 276-175
- 2A SPDT nine-volt coil relay, RS 275-005
- MPS2222A transistor, RS 276-2009
- 1N914 diode, RS 276-1122
- 1000-ohm resistor, RS 271-023
- Nine-volt battery connector, RS 270-325
- Nine-volt battery
- Joystick cable
- 24-gauge solid wire
- Electrical tape or shrink tubing for exposed wires

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MACHINE LANGUAGE

Jim Butterfield

SCREEN EFFECTS

When a program is doing a great deal of computation, it may step the border color to indicate that the computer is active. Machine language programs can do this with a single instruction: INC \$D020. Since this instruction doesn't affect the A, X, or Y registers, it's easy to slip it into a program loop. It'll produce a dazzling color display.

The address shown above produces a whole-screen effect by means of a single data store to memory. Sometimes, however, we have good reason to go after the individual characters on the screen. Modifying a thousand distinct character positions in a reasonable amount of time calls for machine language speed.

The character cells of the 64's screen can be referenced directly. Each character occupies a byte of memory. Screen memory usually starts at address \$0400 (decimal 1024), with the last byte at \$07E7 (decimal 2023). There are also 1000 color nybble locations starting at \$D800 (decimal 55296). If we wish to perform screen work without flicker, it's best to wait until retrace time. The video screen is "painted" 60 times a second (50 in Europe). After drawing the screen, the video beam moves back to the top, or retraces. That's the moment we've been waiting for. Our program may then go to work without screen jitter. The action must be performed quickly, but machine language is fast enough for the job.

Our program is called Wipe, and it'll run through the screen 40 times. Each time it'll reverse one column of screen data. The effect is that of a video wipe effect, moving from left to right.

The 40 separate runs are counted in the Y register. The

contents of Y also serve to specify the column to be modified on each pass.

```
2000 A0 00 LDY #$00
2002 . . .
202F C8 INY
2030 C0 28 CPY #$28
2032 D0 CE BNE $2002
2034 60 RTS
```

Within each pass of the loop, we wait until screen retrace takes place. This serves two purposes: It keeps the screen free from flicker and slows down the wipe effect so that it looks better. To check for retrace, watch the two highest bits of location \$D011; when its value goes down, we know that the screen has just begun to retrace.

```
2002 AD 11 D0 LDA $D011
2005 29 C0 AND #$C0
2007 CD 08 21 CMP $2108
200A 8D 08 21 STA $2108
200D B0 F3 BCS $2002
```

Note that there's an instruction sandwiched between the test (CMP for CoMPare) and the Branch (BCS for Branch Carry Set). This STA instruction doesn't affect the flags produced by CMP.

As our program goes down the screen a line at a time, it sets the top-of-screen address, \$0400, into the indirect address at \$FC and \$FD. After each line has been handled, the program adds 40 to this address, moving to the next line. Before looping, the program tests the address to see if it's reached the end of the screen address area.

```
200F A2 04 LDY #$04
2011 A9 00 LDA #$00
; store a screen line pointer in FC/
FD
2013 86 FD STX $FD
2015 85 FC STA $FC
. . .
; move to next screen line (add 40
to FC/FD)
```

```
201D A6 FD LDX $FD
201F A5 FC LDA $FC
2021 18 CLC
2022 69 28 ADC #$28
2024 90 01 BCC $2027
2026 E8 INX
; compare pointer to end-of-
screen
2027 E0 07 CPX #$07
2029 90 E8 BCC $2013
202B C9 E8 CMP #$E8
202D 90 E4 BCC $2013
```

The code for the innermost loop is quite simple. The start-of-line has been stored in indirect address FC/FD; the column to be modified is in Y. To reverse the character, use the EOR (Exclusive OR) instruction to flip the high-order bit.

```
2017 B1 FC LDA ($FC),Y
2019 49 80 EOR #$80
201B 91 FC STA ($FC),Y
```

That's the whole machine language program. To put the program into a more convenient form for BASIC entry, a complete demonstration called Screen Wipe is supplied below.

```
BD 100 DATA 160,0,173,17
,208,41,192,205,8
,33,141,8,33,176,
243
BQ 110 DATA 162,4,169,0,
134,253,133,252,1
77,252,73,128,145
,252
JE 120 DATA 166,253,165,
252,24,105,40,144
,1,232
XG 130 DATA 224,7,144,23
2,201,232,144,228
,200,192,40,208,2
06,96
HA 200 FOR J=8192 TO 824
4
DP 210 READ X
CG 220 T=T+X
FQ 230 POKE J,X
QF 240 NEXT J
HP 250 IF T<>7508 THEN S
TOP
BQ 300 PRINT "SCREEN WIP
E!"
FF 310 SYS 8192
GH 320 FOR J=1 TO 1000:N
EXT J
RH 330 SYS 8192
```

Modifying a thousand distinct character positions calls for machine language speed.

WORLD VIEW

Steve Jarratt

VIEW FROM THE U.K.

Few (if any) utilities are now released for the 64 in the U.K., so serious users look elsewhere for their software. Here are some sources.

A useful contact for hardened keypunchers is the Independent Commodore Products User Group. If you want more from your 64 than just a high score, write to Jack Cohen at ICPUG, P.O. Box 1309, London N3 2UT. For a fee of under \$30, you get a bimonthly magazine, contact with other like-minded 64 users, and access to a massive library of public domain software.

Alternatively, you could try FSSL Computer Software, which stocks everything from video digitizers to GEOS-compatible programs—all for the 64. I don't have the address, but from the U.S., pick up the phone and dial 011 44 386-553153. (Remember the time difference!) Ask for its catalogue and then gasp in awe at its amazing range of peripherals and utilities.

Even though the 64 is a lowly 8-bit machine, that doesn't mean that you can't teach the old dog some new tricks. The most recent acquisition on the serious side of 64 software is Intro, a starter pack for electronic musicians. If you possess a MIDI-compatible synthesizer but have fingers like a gorilla, this sequencing software lets you use the 64 as an interface between you and the synthesizer's brain. Basically, it's like a word processor for music.

The package includes a hardware MIDI interface with a MIDI-In and two MIDI-Out ports, two five-foot MIDI cables, and version 2 of Dr. T's Keyboard Controlled Sequencer on disk. It's all good stuff, but then for around \$250 (U.K. prices) it ought to be.

While the pack is ostensibly aimed at beginners, its user-friendliness is on a par with that of a four-year-old Doberman called Adolf. If you're not daunted by its alphanumerical tables and machine language-like instructions, then you're obviously from the planet Zog. The kit, however, is very powerful and covers an extensive range of editing and sequencing functions. I won't give you that bull about its making you the next Rick Wakeman (aged hippy keyboarder), but at least it'll keep you off the streets or give your joystick a rest. Intro is already available in the U.S., so if you're interested, write to Dr. T's Music Software, 100 Crescent Road, Needham, Massachusetts 02194 or call (617) 455-1454.

That's one for the musicians, so what about one for the artists? Well, there are enough paint packages around for the 64, but what about trying to create your own 3-D environment? Domark's 3-D Construction Kit enables you to do just that.

Using the Freescape 3-D modeling system pioneered by Incentive Software, this kit allows the user to build houses, rooms, spaceships—even small worlds—given enough time and patience. Once the modeling is finished, you can move around your construction and examine it in 3-D space. (I refuse to use anything as pretentious as virtual reality.)

There are special functions included that enable you to dictate what happens under certain criteria. For instance, you can fire a laser beam at a block, causing it to disappear, move sideways, or fall on top of your 3-D character! These functions are there as the foundation stones of puzzles, and while the kit is primarily designed as an interactive game-making package, the more

ingenious modelers can indulge in all sorts of CAD-based diversions.

The 3-D Construction Kit, which includes a tutorial video, costs about \$40 and can be obtained from Domark, Ferry House, 51-57 Lacy Road, London SW15 1PR.

One of the treats of being in touch with so many 64 users is the constant influx of demos. I'm not sure if this phenomenon is as big in the States, but in Europe there are hundreds of small bands of coders who like nothing more than making the 64 do things it was never designed to do.

These punk programmers push the beige box to its limit, producing visual and aural extravaganzas. Demo teams can create dozens of sprites on screen, rapid 3-D vector graphics, full-screen images without borders, pictures with more than three colors per character block, crisp sampled tunes, and clever raster line tricks. Sometimes it's difficult to believe that the 64 is responsible for such feats of computing prowess!

There are thousands of such demos in British PD libraries, but be warned: Since America's television system and electricity differ from Europe's, some demos won't work. For instance, it's a lot more difficult to put sprites in the border on a U.S. 64 because of the screen timing. For those that do work, however, it's well worth the cost of the airmail. You'll make your 64 sing and dance like never before.

Try dropping these guys in England a note: Binary Zone, 153 Farriers Corner, Westlands, Droitwich, Worcestershire WR9 9EX; Kingsway Computer Services, 72 Glencoe Road, Sheffield; Phoenix, 64 Plumberow, Basildon, Essex; and Silver Wing Software, 185 Callowbrook Lane, Rubery, Birmingham B45 9TG. □

Serious products and exciting new demo programs are still available for the 64 in England. Here are some sources for both.

Steve Vander Ark

GEOS GRAB BAG

Well, it's been a year now since I first wrote this column. Over the past 11 months—remember that little “hiccup” in April?—I've covered a lot of GEOS ground. I've also heard from many of you, either via the U.S. Snail Mail or E-mail on QuantumLink. It's been interesting, to say the least.

A lot of the mail lately has been in response to the December column, in which I discussed Susan Lamb's geoStore. Susan has been unable to make a go of geoStore, unfortunately, and as a result hasn't been answering the many requests she's received for a catalog. It's always sad to see this kind of thing happen, especially since it means that most of you will never get to see any of Susan's excellent graphics.

If you're in the market for exceptionally high-quality clip art for GEOS, however, there's another place to turn. The folks who run a company called DigiClips (1401-7235 Salisbury Avenue, Burnaby, British Columbia, Canada V5E 4E6) have been proving themselves lately on Q-Link, where they go by the name Fasung Jai. These guys are dedicated to the Commodore computer; they pledge to support GEOS until their equipment melts down. They've been backing up their promise with exceptionally high-quality clip art uploaded to Q-Link. Their work includes line art, such as you'll find on a Newsroom disk, and highly detailed gray-scale images. Their graphics are some of the best I've seen for the Commodore, easily on a par with the kind of art files you'd find in a Mac or IBM package. Q-Link's libraries have a nice selection of DigiClips files available.

This brings up the subject of uploading and download-

ing files for GEOS, which is the best way to get the new utilities, graphics, fonts, and so on that come from other GEOS users. (It's also about the only way!) A new utility recently made available on Q-Link called geoPack (filename GEOPACK, uploaded by PeterMC3) lets you not only convert files back and forth between GEOS and standard Commodore formats, which is essential for any transfer of GEOS files via modem, but also archive (combine into one large file) groups of files for easier transfer. GeoPack does all this from within GEOS itself, which is a treat for people like me who hate to leave GEOS and stumble around, typing in clumsy DOS commands.

A lot of you have written to ask where you can find all these great GEOS files I talk about if you don't happen to be a Q-Link user. Last year, I published a phone number of a BBS in Grand Rapids, Michigan (where I live), that had an extensive GEOS file section. Unfortunately, the sysop of that board has decided to no longer support GEOS, so I've had to switch my allegiance to another local BBS. This board, Rogue River BBS, is one of the longest-running BBSs in the area. It's running on an Amiga, but the sysop, Jim Foley, cheerfully supports our local Commodore users group and has agreed to let me print his number. I'll be uploading to his board all of the public domain and shareware files that I've mentioned in my columns. Now, any GEOS fan can download them for the price of the long-distance call. The sysop assures me that you should have no trouble downloading on the first call since his BBS has no ratios or file points. Rogue River BBS can be reached 24 hours a day at (616) 361-8267.

Several other new products have been showing up in demo form on Q-Link. (Demo form means that all the features of the programs are not enabled, but users have a chance to sample before buying.) One eagerly awaited program is geoCanvas, a new paint program that allows you to open several windows on one or more documents.

GeoCanvas features many excellent drawing tools for creating high-resolution bitmaps, including some not available in geoPaint. As of this writing, geoCanvas is in Beta testing and is available to the public in demo form only.

Dave Ferguson, whose Dweezil Disks are a must for any GEOS user, has recently released Dweezil Label, a label-making program for GEOS. A new version of his popular geoStamp program, called GeoSTAMPbig, is also available. This new version will allow stamps that are four times the size of the old stamps. The stamp file-handling routines have been improved to make it a cinch to move through your collections and choose a stamp. Each of these great programs is available on Q-Link in demo form. You can order the Dweezil Disks direct from Quincy Software, 9479 East Whitmore Avenue, Hughson, California 95326-9745. Disk 1 (\$17.95) features NewTools, and Disk 2 (\$15.95) includes UltiPatt, the ultimate pattern editor. While you're at it, send Dave \$4.00 for his *GeoPublish Compendium*, a ten-page booklet with supplemental sheets telling you everything you need to laser-print documents from GEOS, even if you don't own a laser printer.

Send your GEOS-related questions to Steve Vander Ark in care of COMPUTE. He can also be reached on QuantumLink as SteveV14. □

Here's a look at a variety of old and new products and services of interest to GEOS users.

The Gazette Productivity Manager

(Formerly PowerPak)

Harness the productivity power of your 64 or 128!

Turn your Commodore into a powerful workhorse, keep track of finances, generate reports in a snap, manage your money in minutes—all with the new 1991 Gazette Productivity Manager! Look at all your 64/128 Productivity Manager disk contains.

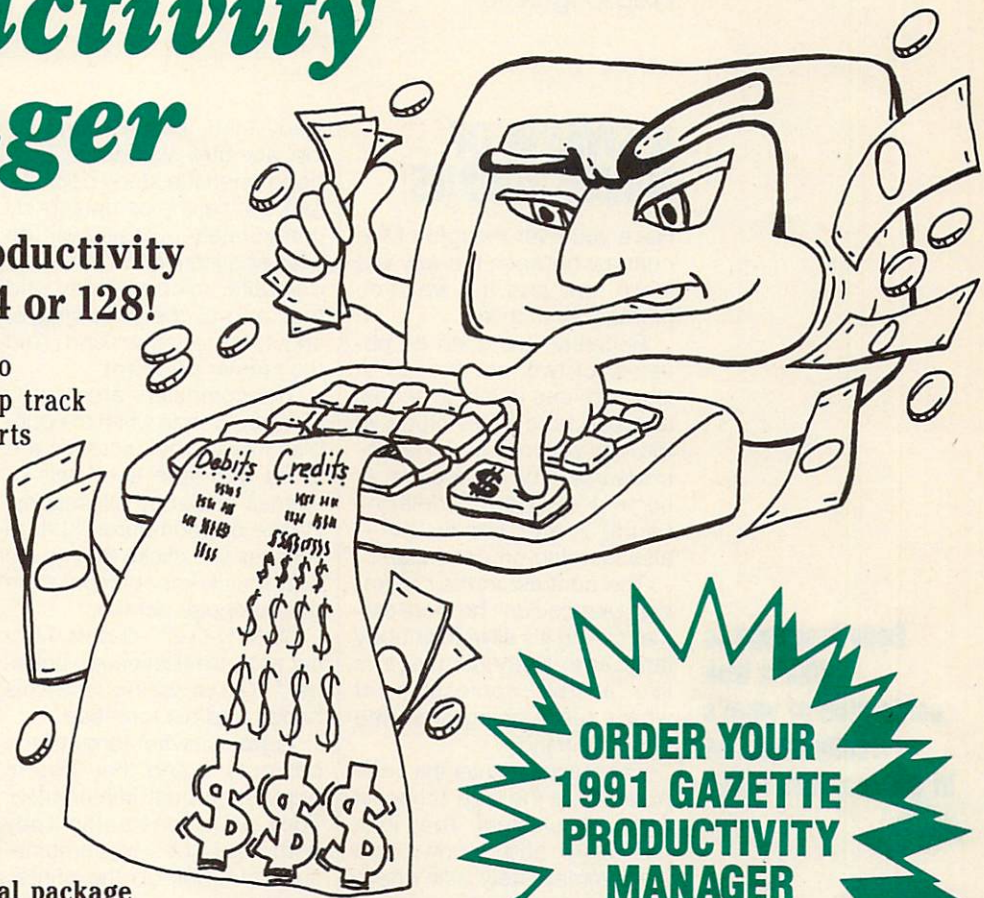
GemCalc 64 & 128—

A complete, powerful, user-friendly spreadsheet with all the features you'd expect in an expensive commercial package (separate 64 and 128 versions are included). Most commands can be performed with a *single* keypress!

Memo Card—Unleashes the power of a full-blown database without the fuss! **Nothing's easier**—it's a truly simple computerized address file. Just type in your data on any one of the index cards. Need to edit? Just use the standard Commodore editing keys. Finished? Just save the data to floppy. What could be easier?

Financial Planner—Answers all of those questions concerning interest, investments, and money management that financial analysts charge big bucks for! You can plan for your children's education and know exactly how much it will cost and how much you need to save every month to reach your goal. Or, decide whether to buy or lease a new car. Use the compound interest and savings function to arrive at accurate estimates of how your money will work for you. **Compute the answer at the click of a key!**

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Send your order to Gazette 1991 Productivity Manager,
324 W. Wendover Ave., Ste. 200, Greensboro, NC 27408.

D'IVERSIONS

Fred D'Ignazio

A SWARM OF NAKED PUPPIES

Have you ever thought of the contrast between the way you learn now and the way you learned as a child?

Recently, I've been an observer of two laboratories of learning: one in a high school and one here in my study. In the high school, I watch teachers learning on computers. At home, I watch two toddlers—Laura, 3, and Tommy, 2½—also learning on computers.

The contrast in their learning styles couldn't be more dramatic. And it's all in their body language. Body language is like a true confession of what's really going on in the learner's mind.

The teachers enter the computer lab at the high school in tight little clusters. They joke nervously and loudly, and they immediately ask where the rest rooms are and how soon they can have their first coffee break. When they sit at the computers, they push their chairs as far away from the tables as possible, sometimes so far that it's impossible to reach the computer keys.

Once the class begins, the teachers are supposed to begin team projects that encourage them to get up and move about. However, most teachers stay glued to their chairs, as if to say, "This is where we are supposed to learn. We are the audience; you are the performer. You jump up and down and be interesting, and we'll stay seated."

Tommy and Laura enter the study in a slightly different manner, more like shock troops, gangbusters, and tornadoes! By the time they get to the study, they have managed to lose most or all of their clothing and have become "naked puppies." And these puppies don't just mosey into the

study—they swarm, they gallop, and they stampede! They bang open the study door; attack both of the computers by immediately pressing all the keys and jerking the poor little computer mice this way and that; and all the while giggle, shout, and jump around. And they never sit down!

The computers are usually in "sleep" mode when the puppies arrive. Their screens are lit up with little fishbowls or scenes of sleepy cityscapes. "Wake up, computer!" Laura yells, as she clicks the mouse and knock-knock-knocks on the computer screen.

"L-M-N-O-Z!" shouts Tommy, as he simultaneously presses 11 keys, using both his hands and his forehead.

Puppies swarm around the computers, and they love to print. They print immediately. They print constantly. They both know the key combinations to crank up the printer, and within a moment after they've entered the study, the printer starts spitting out pictures of crabs, cats, moons, and unicorns on skateboards.

As the puppies' teacher, I try to maintain a semblance of order in the classroom and break up fights. But, overall, the puppies get along pretty well, and I never have to remind them to stay on task.

What is their task? As their teacher, I try to lead them through their early learning programs, beginning at the beginning of the manuals and working toward the end. For some reason, this isn't the way puppies learn. While I'm still at the beginning of a manual, Laura is somehow in the icon-edit section of chapter 33, zooming in on icons, painting red hair on the sun ("See, Daddy. It's a happy face!"), and drawing legs on a pine tree. Meanwhile, Tommy is supposed to be using a music program, but he's found a key combina-

tion that turns the musical keyboard into a talking parrot. A moment later, he and Laura are talking into the computer microphone, trading insults with the parrot.

The teachers in the high-school lab spend six hours in a workshop, trying to learn more like naked puppies learn. And the miracle is that they succeed. Sometimes it takes the entire six hours, sometimes not. By the time they leave the lab, they, too, are swarming over the machines, talking, laughing, pressing buttons a mile a minute, making mistakes, and doing crazy, unpredictable, wonderful things.

Their body language tells all. As they transform from audience to performers, the teachers begin standing, walking, crouching, and crawling under tables, examining wires and cables. They carry a video camera up onto a table and shoot the classroom from a lofty angle, or they fall to the floor and adopt a toddler's eye view. As they begin to imitate my two little puppies, their excitement goes up, their enthusiasm goes up, and their noise goes up. And their learning. And their self-confidence. And their self-esteem. And their independence from their teacher.

I like adults who act like puppies. At the end of a long, exhausting workshop day, if I have a room full of big puppies (all with their clothes on, thank goodness!), I consider the workshop a success. And the teachers do, too. In fact, at this point, they don't care a bit what I think. They're too busy running around the room with video cameras, microphones, magic markers, and colored construction paper, working on projects galore. They're too busy to notice whether they even have an instructor.

That's when I know I've been a good teacher. □

Body language is like a true confession of what's really going on in the learner's mind.

SUPERWINDOWS

By Cameron Kaiser

A problem with most computers is that your work is limited to one screen. That is, you have to deal either in text only or graphics only. Some programs offer double screens, but, invariably, one is too large and one is too small. Or they won't act like you want them to. In most cases, they're just a hassle. On the 64, the only way to circumvent this one-screen rule is through raster interrupts, but who wants to do all that work? With SuperWindows, you might not have to.

SuperWindows is a patch that forks into your VIC chip, giving you three screens instead of one. Each screen carries its own attributes, its own background color, its own screen memory (if you want it), and its own screen mode (the screens handle hi-res, too). Each screen can also be shrunk and enlarged to fit your program's needs.

Entering the Program

SuperWindows consists of two programs, Windowboot and Windows. Windowboot is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. When you've finished entering this short boot program, save it to disk before exiting Proofreader.

The main program, Windows, is written in machine language. To enter it, use MLX, our machine language entry program; again, see "Typing Aids." When MLX prompts, respond with the following.

Starting address: C000

Ending address: C10F

Be sure to save a program copy with the filename WINDOWS, because this is the name the boot program expects to load.

For some ideas on how to use SuperWindows effectively, examine Windows Demo. By following this demonstration program closely, you can discover many of the more extraordinary features of SuperWindows. It's written entirely in BASIC. Once again, enter it with The Automatic Proofreader to help avoid typing errors. Save it and Windows on the same disk.

Running the Program

To get SuperWindows up and running, run Windowboot. It loads and executes the main program and then returns you to BASIC. Four SYS codes control SuperWindows. SYS 49170 turns it on.

SYS 49346, *SM,MP,MB,SP,SC,EW* is the syntax for editing Window 1. *SM* is screen mode, the value normally going into location 53265. For text this value is 27; for hi-res, the value is 59.

MP is memory pointer, the value normally going into location 53272. Usually this value is 21 or 23.

MB is memory block, the value normally going into location 56576. Usually this value is 151.

SP is screen page, the value normally going into location 648. Usually this value is 4.

SC is screen color, the value normally going into location 53281. Set this value to whatever color you wish (0-15).

EW is end of window. For Window 1, the default value is 100. Any value less than 49 will go offscreen. Conflicts will result if the value exceeds the end of Window 2's value. Press Run/Stop-Restore if you have problems.

Window 2

SYS 49306, *SM,MP,MB,SP,SC,EW* is the syntax for editing Window 2. Note that the SYS code is less than that for Window 1. Watch out! The codes work the same as those in Window 1, with the exception that the default value for end of window is 192. Again, any value less than 49 will go offscreen and probably conflict with Window 1. Also, the end of window value for Window 2 mustn't exceed that of Window 3.

Window 3

SYS 49383, *SM,MP,MB,SP,SC,EW* is the syntax for editing Window 3. The default value for end of window is 255. Again, the end of window value should be greater than 49. It doesn't matter if the end of window value doesn't cover all the screen; Window 1 will wrap around to fill in the rest. Should you need to turn SuperWindows off, simply press Run/Stop-Restore. The values for the window parameters can be 0-65535; however, the high byte of the values provided, if any, will be stripped off.

One warning: Never use the disk

drive while SuperWindows is active. Disable SuperWindows first, or disk damage could result.

WINDOWBOOT

```
CP 1 REM COPYRIGHT 1992 - COMPUTE PUBLICATIONS INTL LTD
  - ALL RIGHTS RESERVED
FH 5 IFA=0THENA=1:LOAD"WINDOWS",8,1
FX 10 SYS49170:SYS49346,27,23,151,4,6,100:SYS49308,27,23,151,4,6,192
QD 20 SYS49383,27,23,151,4,6,255:PRINT"{CLR}SUPERWINDO
WS3.2 ENABLED"
HB 30 PRINT"DO NOT USE DISK DRIVE WHILE ONLINE";:NEW
```

WINDOWS

```
C000:00 00 00 00 00 00 00 00 81
C008:00 00 00 00 00 00 00 00 89
C010:8E C0 78 A9 7F 8D 0D DC DB
C018:A9 01 8D 1A D0 A9 03 85 BA
C020:02 A9 1B 8D 11 D0 AD 7C EC
C028:C0 8D 12 D0 A9 38 8D 14 1A
C030:03 A9 C0 8D 15 03 58 60 54
C038:AD 19 D0 8D 19 D0 29 01 29
C040:F0 19 C6 02 10 04 A9 02 5F
C048:85 02 A6 02 BD 7F C0 8D FC
C050:11 D0 BD 82 C0 8D 18 D0 AB
C058:BD 85 C0 8D 00 DD BD 88 86
C060:C0 8D 88 02 BD 8B C0 8D 02
C068:21 D0 BD 7C C0 8D 12 D0 5F
C070:8A F0 06 68 A8 68 AA 68 5F
C078:40 4C 31 EA 5A 38 01 1B D2
C080:1B 1B 17 17 17 97 97 97 88
C088:04 04 04 04 03 06 00 00 FD
C090:20 FD AE 20 9E AD 20 F7 5D
C098:B7 A5 14 60 20 90 C0 8D 3A
C0A0:7F C0 20 90 C0 8D 82 C0 21
C0A8:20 90 C0 8D 85 C0 20 90 4F
C0B0:C0 8D 88 C0 20 90 C0 8D 65
C0B8:8B C0 EA 20 90 C0 8D 7C AE
C0C0:C0 60 20 90 C0 8D 80 C0 C5
C0C8:20 90 C0 8D 83 C0 20 90 5F
C0D0:C0 8D 86 C0 20 90 C0 8D 45
C0D8:89 C0 20 90 C0 8D 8C C0 72
C0E0:20 90 C0 8D 7D C0 60 20 57
C0E8:90 C0 8D 81 C0 20 90 C0 15
C0F0:8D 84 C0 20 90 C0 8D 87 9E
C0F8:C0 20 90 C0 8D 8A C0 20 39
C100:90 C0 8D 8D C0 20 90 C0 EE
C108:8D 7E C0 60 9E 9E BE BE BB
```

WINDOWS DEMO

```
FX 1 IFPEEK(49170)<>120THENLOAD"WINDOWS",8,1
XE 10 PRINT"{CLR}{BLK}{N}{H}";:SYS49170:SYS49346,27,23,151,4,3,100:POKE808,237
MK 20 SYS49308,27,23,151,4,14,192:SYS49383,27,23,151,4,1,255:POKE53280,14
CM 30 PRINT"{HOME}{3 DOWN}"TAB
```

```
(14)"SUPERWINDOWS"
GA 40 PRINT"(7 DOWN)"TAB(6)"COPYRIGHT 1992 COMPUTE INT'L"
JM 50 PRINTTAB(10)"ALL RIGHTS {SPACE}RESERVED."
JX 60 PRINT"{8 DOWN}"TAB(6)"PROGRAMMED BY CAMERON KAISER"
MA 70 FORX=8192TO10240:POKEX,0:NEXT
CH 80 POKE53280,15:SYS49346,27,23,151,4,15,100:SYS49308,27,23,151,4,15,192
QB 90 SYS49383,27,23,151,4,15,255
QE 100 POKE53280,12:SYS49346,27,23,151,4,12,100:SYS49308,27,23,151,4,12,192
PB 110 SYS49383,27,23,151,4,12,255
ER 120 POKE53280,11:SYS49346,27,23,151,4,11,100:SYS49308,27,23,151,4,11,192
KB 130 SYS49383,27,23,151,4,11,255
DD 140 POKE53280,0:SYS49346,27,23,151,4,0,100:SYS49308,27,23,151,4,0,192
KS 150 SYS49383,27,23,151,4,0,255:FORX=1TO900:NEXT
EX 160 PRINT"{CLR}{5}{8 DOWN}NORMALLY YOU'VE GOT ONLY ONE SCREEN TO {2 SPACES}WORK WITH."
FM 170 FORX=10240TO12288:POKEX,0:NEXT
GH 180 PRINT"THAT'S THE IDEA BEHIND SUPERWINDOWS."
GD 182 FORX=12288TO14336:POKEX,0:NEXT
EK 190 PRINT"IT GIVES YOU THREE SEPARATE SCREENS TO {2 SPACES}CONTROL."
RD 200 FORX=14336TO16383:POKEX,0:NEXT
RA 210 PRINT"{CLR}SEE?";
BR 220 SYS49308,59,29,151,4,0,230:SYS49346,27,23,151,4,0,60:GOSUB63000
RS 230 PRINT"{CLR}SCREENS CAN {SPACE}BE RESIZED TOO.. EVEN SHRUNK!";
BA 240 FORX=1TO84:SYS49308,59,29,151,4,0,230-X:SYS49346,27,23,151,4,0,X+60:NEXT
DF 250 SYS49308,27,23,151,4,0,230
HK 252 SYS49346,27,23,151,4,0,60
QB 253 PRINT"{CLR}AND THE SCREENS ACT INDEPENDENTLY OF {4 SPACES}EACH OTHER!"
QJ 254 FORX=1TO2500:NEXT
AJ 260 PRINT"{CLR}THIS SCREEN {SPACE}WON'T CHANGE...":FORX=1TO1000:NEXT
```

```
QH 270 PRINT"{HOME}{8 DOWN}... BUT THIS ONE WILL!"
FH 280 FORX=1TO100:SYS49308,27,21,151,4,11,230:SYS49308,27,23,151,4,0,230:NEXT
CQ 290 PRINT"{CLR}SO MANY EFFECTS ARE POSSIBLE THAT THIS {2 SPACES}DEMO CAN'T POSSIBLY SHOW";
HA 300 PRINT"THEM ALL!"
CC 310 FORX=1TO128:SYS49346,27,23,151,4,X,100:SYS49308,27,23,151,4,X+1,192
XD 320 SYS49383,27,23,151,4,X+2,255:NEXTX:PRINT"{CLR}";
EB 330 SYS49308,27,23,151,4,0,192:SYS49383,27,23,151,4,0,255:FORX=1TO1000:NEXT
DS 340 PRINT"PRESS D TO SEE THIS DEMO AGAIN."
KS 350 PRINT"PRESS RUN/STOP-RESTORE TO QUIT."
EJ 360 WAIT198,1:GETA$:IFAS<>"D"THEN360
QA 62999 RUN
DR 63000 FOR X=0 TO 289 STEP1.5
KQ 63010 Y=INT(90+80*SIN(X/10))
XM 63020 CH%=X/8:RO%=Y/8
RX 63030 LN=Y AND 7
FP 63040 BY=8192+RO%*320+CH%*8+LN
FX 63050 BI=7-(X AND 7)
SP 63060 POKE BY,PEEK(BY) OR 2
SR 63064 IFX=60THENPRINT"{CLR}{WHT}EXCITING! {6 SPACES}":SYS49346,27,23,151,4,14,60
PX 63065 IFX=120THENPRINT"{CLR}{BLK}PRETTY, RIGHT?":SYS49346,27,23,151,4,4,60
DB 63066 IFX=240THENPRINT"{CLR}{5}BUT THERE'S STILL MORE!":SYS49346,27,23,151,4,0,60
AC 63067 IFX=180THENPRINT"{CLR}{WHT}A POWERFUL {SPACE}UTILITY!":SYS49346,27,23,151,4,3,60
KP 63070 IFX=60THENPRINT"{HOME}{23 DOWN}{BLK}IT CAN'T BE!"
JM 63071 IFX=60THENSYS49383,27,23,151,4,15,255
AA 63072 IFX=120THENPRINT"{HOME}{23 DOWN}{WHT}THIS IS AMAZING!"
BQ 63073 IFX=120THENSYS49383,27,23,151,4,2,255
BH 63074 IFX=180THENPRINT"{HOME}{23 DOWN}{CYN}THIS DEMO IS GREAT!"
```

```
GG 63075 IFX=180THENSYS49383,27,23,151,4,11,255
XS 63076 IFX=240THENSYS49383,27,23,151,4,0,255
FX 63079 NEXT
HF 63080 RETURN
```

Cameron Kaiser lives in La Mesa, California. He's the author of Batch File 64 (May 1992).

REVELATION

By Matthew Spinks

Most people who are familiar with the 64's graphics capabilities have used sprites at one time or another. They may have used one to create a pointer in a graphic-driven menu system or to display alien spaceships in a game. In most cases when sprites are used, they are high-resolution or multicolored objects, which contrast well against the background color. In some situations, however, sprites need not be visible to be effective. For example, setting a sprite to the background color enables it to reveal on-screen text smoothly, a pixel at a time.

To achieve this, an unexpanded sprite is created as a solid block measuring 8 x 8 pixels, or one character in size. The color of the sprite is set to that of the background color, and the sprite is then placed on the screen where the first character of the text is to be displayed. The first character is poked into the screen position where it's hidden by the sprite. As the sprite moves across the screen, the character is slowly revealed, pixel by pixel. When the character has been completely displayed, the next character is poked into position beneath the sprite. As the sprite continues to move across the screen, it reveals the text as it goes. This process is repeated until all the text has been displayed. The overall effect is that the text has been revealed pixel column by pixel column.

are patterned or shaped. Thus, by having a sprite shaped as a right-angled triangle, characters could reveal a pixel a row at a time, pixel column by pixel column. By making use of sprite priorities, sprites could reveal first each other and then text, thereby producing a three-dimensional effect. Sprites can work together to reveal text in different places on the screen simultaneously or to reveal text vertically instead of horizontally.

Entering the Program

Revelation 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: CDDC

Ending address: D003

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

A demonstration program is also provided to show off some of Revelation's features. It's written in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; again, see "Typing Aids." To use the demonstration, first load Revelation with the .8,1 extension and then type NEW. Then load and run Demo.

Other Techniques

These are only some of the ways you can use Revelation. The technique can be adapted for all sorts of purposes. The only limitations on the process are those imposed by your own ingenuity. To use Revelation in your own programs, give the command SYS 52700,X,Y,SP,A\$. After the SYS call, X and Y are the x and y coordinates of where the text is to be placed on the screen (ranges 0-39 and 0-255 respectively), SP is the speed at which the text is to be revealed (0 is the fastest speed, 99 is the slowest), and A\$ is the text string to be revealed. Be sure to put A\$ text in quotation marks. For example, SYS 52700,0,0,0,"HELLO THERE" would print those words in the upper left corner of the screen at the fastest possible speed.

Revelation has considerable scope and flexibility. First, Revelation occupies the upper portion of the area

\$C000-\$CFFF (49152-53247) so that the lower part of the area is still available for use by other programs.

Interrupts

Revelation is interrupt-driven as well. After you've given the SYS command to activate Revelation, you're free to continue with other processing. Revelation also has a latch mechanism so that if you give two Revelation SYS commands in succession, the computer will wait until the first command has finished before it attempts to process the second. This is useful if you only want to reveal text and do nothing else. (See the demonstration program for an example of this.)

Revelation will, as nearly as possible, emulate the standard PRINT command. All color codes, as well as reverse on and off, are supported. All parameters are fully evaluated. Thus the command SYS 52700,0,0,0,CHR\$(5)+CHR\$(18)+"HELLO THERE" will reveal the text in white reversed characters at the top left hand corner of the screen, at the fastest possible speed. Note that you must use plus signs to connect the character strings and text in this mode.

If a Y value of more than 24 is specified, Revelation will cause the screen to scroll, with the text being revealed on the bottom line of the screen. This is to allow scrolling of the screen, similar to the ordinary PRINT command.

Error checking is another supported feature. If any unprintable characters are entered—CHR\$(0), for example—they won't be printed. This includes any cursor or other control characters not previously mentioned. Also, if the text to be revealed would wrap around onto the next screen line, either because the text to be printed is more than 40 characters long or because the specified x coordinate is too large, then an ILLEGAL QUANTITY error will be generated, because Revelation will reveal only one screen line at a time.

Revelation also includes a facility that allows you to define your own sprites. This is useful if you wish to employ one of the more complex revealing methods outlined above, such as using a shaped sprite, or if you need to use a VIC bank other than bank 0: Simply poke location 52916 with a 1 to use

your own sprite.

Revelation expects you to use sprite 0. It's entirely up to you to specify sprite size, color, data location, and so on. Revelation will handle sprite positioning for you, however. Use POKE 52916,0 to return Revelation to its normal mode of setting up the invisible sprite for you.

Revelation should also peacefully co-exist with any other software interrupt programs you may wish to use, so long as they aren't raster based. If you're using other software interrupt programs, enable them first and Revelation last. This will ensure that all programs receive their fair share of interrupts. Revelation also uses memory from the cassette buffer to store sprite and character data, so avoid this area while Revelation is in use.

REVELATION

```

CDDC:AD 15 03 C9 CF D0 07 AD 0F
CDE4:14 03 C9 35 F0 F2 20 00 6B
CDEC:E2 E0 28 90 03 4C 48 B2 CC
CDF4:8E F4 CF 20 00 E2 E0 19 77
CDFC:90 05 20 EA E8 A2 18 8E 65
CE04:F5 CF 20 00 E2 E0 64 B0 A8
CE0C:E4 8E F7 CF 8E F6 CF 20 CB
CE14:FD AE 20 9E AD 20 A6 B6 3C
CE1C:C9 00 F0 47 8D F8 CF A0 C1
CE24:00 8C FA CF 8C FF CF B1 F6
CE2C:22 A2 11 DD E0 CF D0 05 70
CE34:8A 09 80 D0 1A CA 10 F3 86
CE3C:C9 FF D0 02 A9 7E 48 4A 1B
CE44:4A 4A 4A 4A AA 68 38 FD EC
CE4C:D8 CF 90 0C EE FA CF AE CE
CE54:FF CF 9D 80 03 EE FF CF 45
CE5C:C8 CE F8 CF D0 C9 AD FA 32
CE64:CF D0 01 60 18 6D F4 CF 74
CE6C:C9 29 B0 81 AD F4 CF C9 12
CE74:1D 90 0C 48 AD 10 D0 09 23
CE7C:01 8D 10 D0 68 29 DF 0A BE
CE84:0A 0A 69 18 8D 00 D0 AD 14
CE8C:F5 CF 0A 0A 0A 69 32 8D E2
CE94:01 D0 AE F5 CF AD F4 CF 0B
CE9C:18 7D F0 EC 85 F9 85 F7 A9
CEA4:B5 D9 29 03 69 D8 85 FA 9D
CEAC:29 27 0D 88 02 85 F8 A9 94
CEB4:00 D0 31 A2 3F A9 00 9D 15
CEBC:40 03 CA 10 FA A2 15 A9 CB
CEC4:FF 9D 40 03 CA CA CA 10 29
CECC:F8 AD 17 D0 29 FE 8D 17 B9
CED4:D0 AD 1D 00 29 FE 8D 1D 74
CEDC:D0 AD 21 D0 8D 27 D0 A9 D3
CEE4:0D 8D F8 07 AD 15 D0 09 68
CEEC:01 8D 15 D0 AD 86 02 8D 37
CEF4:FD CF A9 00 8D FB CF 8D 44
CEFC:FC CF 8D FE CF 8D F9 CF 27
CF04:78 AD 14 03 8D 9F 02 AD 9A
CF0C:15 03 8D A0 02 A9 35 8D 61
CF14:14 03 A9 CF 8D 15 03 A9 21
CF1C:7F 8D 0D DC 2D 11 D0 8D 2B
CF24:11 D0 A9 FF 8D 12 D0 AD B9

```

PROGRAMS

```
CF2C:1A D0 09 81 8D 1A D0 58 15
CF34:60 AE F7 CF F0 08 CE F6 E7
CF3C:CF 10 55 8E F6 CF CE FC EC
CF44:CF 10 3B AC F9 CF CC FF AA
CF4C:CF F0 57 BE F9 CF B9 80 EC
CF54:03 10 16 29 7F C9 10 90 A2
CF5C:0B 29 EF AA BD F2 CF 8D 5B
CF64:FE CF B0 DF 8D FD CF 90 20
CF6C:DA AC FB CF 0D FE CF 91 B6
CF74:F7 AD FD CF 91 F9 EE FB 86
CF7C:CF A9 07 8D FC CF AD 12 BC
CF84:D0 D0 FB EE 00 D0 D0 08 1C
CF8C:AD 10 D0 09 01 8D 10 D0 E0
CF94:A9 01 8D 19 D0 AD 0D DC C0
CF9C:29 01 F0 03 6C 9F 02 4C 91
CFA4:BC FE AD 15 D0 29 FE 8D 20
CFAC:15 D0 A9 00 8D 00 D0 8D DB
CFB4:01 D0 AD 10 D0 29 FE 8D 76
CFBC:10 D0 20 84 FF AD 1A D0 A0
CFC4:29 7E 8D 1A D0 AD 9F 02 6A
CFCC:8D 14 03 AD A0 02 8D 15 B0
CFD4:03 4C 94 CF FF 00 40 20 39
CFDC:FF 40 80 80 90 05 1C 9F 15
CFE4:9C 1E 1F 9E 81 95 96 97 4F
CFEC:98 99 9A 9B 12 92 80 00 28
CFF4:00 00 00 00 00 00 00 94
CFFC:00 00 00 00 00 00 00 9C
```

DEMO

```
MQ 100 REM COPYRIGHT 1992 - CO
      MPUTE PUBLICATIONS - AL
      L RIGHTS RESERVED
CE 110 REM WRITTEN BY M. SPINK
      S
HJ 120 :
MK 130 REM MAKE SURE LOADER IS
      IN MEMORY
XK 140 :
XA 150 V=53248:SA=52700:POKEV+
      32,0:POKEV+33,0:PRINTCH
      R$(147);:POKE646,14
AX 160 BL=52916:SYSSA,0,1,0,"T
      HIS DEMONSTRATION SHOWS
      HOW TEXT CAN BE"
RG 170 SYSSA,0,3,0,"REVEALED S
      MOOTHLY":SYSSA,27,3,0,"
      ON THE SCREEN"
MD 180 SYSSA,18,3,0,"ANYWHERE"
      :SYSSA,3,5,0,"TEXT CAN
      {SPACE}BE DISPLAYED IN
      {SPACE}ANY":A$=""
CJ 190 BS="COLOR":FORT=LTOLN(
      BS):READX:A$=A$+CHR$(X)
      +MID$(BS,T,1):NEXT
BG 200 SYSSA,32,5,0,A$:A$=CHR$(
      18)+CHR$(158)+"OR WITH
      REVERSE ON AND OFF"
QB 210 SYSSA,7,7,0,A$:SYSSA,0,
      0,0,"":POKE646,4:POKEBL
      ,1:POKEV+39,5:POKEBL,1
QF 220 POKEV+39,4:SYSSA,5,9,0,
      "TEXT CAN ALSO BE CURSO
      R DRIVEN":SYSSA,0,0,0,"
      "
SF 230 POKEBL,0:SYSSA,4,11,0,"
      AND CAN BE REVEALED AT
      {SPACE}ANY":A$="SPEED"
BG 240 FORT=LTOLN(A$):SYSSA,3
```

```
0+T,11,T,MID$(A$,T,1):N
EXT
QG 250 SYSSA,2,13,0,"TEXT CAN
      {SPACE}SCROLL LIKE NORM
      AL AS WELL":POKE646,10
SR 260 Y=14:FORT=3.14T06.28STE
      P.2:C=COS(2*T)+SIN(T):X
      =6*C+12:Y=Y+1
GE 270 SYSSA,X,Y,0,"SCROLLING"
      :NEXT:SYSSA,X,Y,0,"":FO
      RT=0T01E3:NEXT:POKE646,
      3
FG 280 PRINTCHR$(147);:SYSSA,0
      ,1,0,"DISPLAY OF TEXT I
      S INTERRUPT DRIVEN TOO:
      "
MA 290 POKE646,13:A$=CHR$(18)+
      "THAT'S ALL FOLKS !!!":
      SYSSA,10,3,3,A$
XC 300 FORT=0T04:PRINTCHR$(17)
      :NEXT:END
PH 310 DATA158,30,31,153,150,5
```

Matthew Spinks lives in Erica, Victoria, Australia. He's the author of Medium-Density Driver (September 1991).

FORMATTED LIST

By R. Markland

Formatted List is a programmer's utility designed to create more manageable hard copies of BASIC program listings for the 64. Formatted List produces uniform page breaks, rather than printing program lines over page perforations, and prints an identifying header and page number at the top of each page.

Typing It In

Formatted List 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: C000

Ending address: C3B7

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

Compatibility

In general, Formatted List is compatible with any printer, with or without an interface, that will normally print a program listing with OPEN4,4: CMD4: LIST and recognizes CHR\$(12) as a one-byte form feed. Should you need another form-feed command, you may poke appropriate decimal values to

49424 and 49549 after Formatted List is loaded. Because Formatted List cannot recognize every conceivable printer/interface combination, it processes 50 BASIC program lines per page and then sends a standard ASCII form feed before starting the next page. You may also need to determine if your printer/interface must be set with linefeeds on or off. When some interfaces encounter cursor control or character color symbols, they automatically convert the symbols into words (*up*, *down*, *blue*, and so on). An 80-character BASIC program line may thus require more than one printer line. Usually, Formatted List can compensate for this. On rare occasions a program may contain a series of lines packed with control characters that, when expanded, will corrupt the page formatting. If you can set your interface to print the actual Commodore characters, it's advisable to do so to eliminate the potential problem. After Formatted List is loaded, you may adjust the number of BASIC lines per page by poking 49415 with a decimal value less than 50.

Features and Conventions

Formatted List should be loaded at the beginning of a programming session immediately after power-up by typing LOAD"FORMATTED LIST",8,1. Press Return and then type NEW and press Return again. Now load a program to be edited or begin work on a new program. To use Formatted List, in direct mode type SYS49152 and press Return. Screen prompts will ask for a header line, remind you to check the printer, and inform you that the listing may be aborted by pressing Run/Stop.

Formatted List will print a listing of virtually any BASIC program, from a single line up to more than 30K in length. The listing requires tractor feed paper and should be started with the print-head centered on a perforation if your interface expands lines. Otherwise, you may prefer to adjust the paper to center the text top and bottom. It's advisable to turn the printer off and on after the paper is aligned to establish proper page length.

In the interests of simplicity and compactness, Formatted List assumes that there's a BASIC program in memory and that a printer is connected, on-

line, and loaded with paper. If you run the program without these conditions in place, Formatted List is likely to crash and/or lock up the keyboard. The title line may consist of 1-32 characters and may contain any combination of characters with CHR\$ values in the range of 32-95 decimal values.

Formatted List will list the entire program from beginning to end. If you wish to list only a portion of a program, formatting is unnecessary. A range of lines may be specified in a standard CMD4:LIST *range* command. Should you decide that you need Formatted List after you have a BASIC program in memory, in direct mode, type PRINTPEEK(45);PEEK(46) and press Return. Record the values displayed. Then type LOAD"FORMATTED LIST"8,1 and press Return. Then enter POKE45,v1: POKE,v2 and press Return (v1 and v2 are the values previously recorded).

Here's an important note: If you're test running a BASIC program that loads to or uses memory from address 49152, you'll overwrite Formatted List. Should this happen, reload Formatted List using the alternate loading method described immediately above. Keep in mind that if Formatted List has been overwritten or corrupted, any SYS 49152 call will no doubt send you on a one-way trip into the Silicon Cosmos, so be sure to save your work first as a precautionary measure.

FORMATTED LIST

```
C000:A9 01 85 CC A9 20 20 D2 F4
C008:FF A9 0D 20 D2 FF A2 00 73
C010:A9 20 9D 91 C3 E8 E0 20 DE
C018:D0 F8 A2 00 BD 71 C2 C9 97
C020:00 F0 06 20 D2 FF E8 D0 D9
C028:F3 A9 0D 20 D2 FF 20 D2 5B
C030:FF A9 20 20 D2 FF A2 00 FD
C038:8E 8E C3 86 CC AD 86 02 B1
C040:8D 87 02 20 E4 FF C9 0D 74
C048:F0 34 C9 14 D0 10 AC 8E 78
C050:C3 C0 01 90 E8 CE 8E C3 70
C058:20 D2 FF 4C 3D C0 AC 8E 38
C060:C3 C0 20 F0 D8 C9 20 90 C5
C068:D4 C9 60 B0 D0 20 D2 FF 8A
C070:AC 8E C3 99 91 C3 EE 8E 0E
C078:C3 AC 8E C3 D0 BF A9 01 EE
C080:85 CC A5 C7 C9 00 D0 FA 14
C088:A9 20 20 D2 FF A9 0D 20 F8
C090:D2 FF 20 D2 FF 20 D2 FF D2
C098:A2 00 BD F1 C2 C9 00 F0 70
C0A0:06 20 D2 FF E8 D0 F3 A9 A3
C0A8:0D 20 D2 FF 20 E4 FF F0 98
C0B0:FB A9 30 8D B1 C3 A9 31 9A
```

```
C0B8:8D B2 C3 A5 2B 85 FB A5 8D
C0C0:2C 85 FC A0 02 B1 FB 8D BF
C0C8:B3 C3 C8 B1 FB 8D B4 C3 8C
C0D0:A9 00 AA A8 20 BD FF A9 A8
C0D8:04 A2 04 A0 00 20 BA FF 85
C0E0:20 C0 FF A2 04 20 C9 FF 01
C0E8:20 A0 C1 A9 00 8D B5 C3 DA
C0F0:20 E1 FF D0 03 4C 91 C1 36
C0F8:20 1A C1 A9 0D 20 D2 FF 72
C100:EE B5 C3 AD B5 C3 29 32 3E
C108:D0 E6 A9 00 8D B5 C3 A9 57
C110:0C 20 D2 FF 20 A0 C1 4C 4F
C118:F0 C0 AD B3 C3 85 14 AD 3F
C120:B4 C3 85 15 20 13 A6 A5 31
C128:5F 85 FB A5 60 85 FC A0 4A
C130:00 B1 FB 8D 8F C3 C8 B1 47
C138:FB 8D 90 C3 AD 8F C3 85 24
C140:FB AD 90 C3 85 FC A0 02 DE
C148:B1 FB 8D B3 C3 C8 B1 FB 31
C150:8D B4 C3 A0 00 B1 FB D0 D9
C158:43 C8 B1 FB D0 3E 20 FF 65
C160:C1 A9 0D 20 D2 FF 20 D2 7C
C168:FF 20 D2 FF A2 00 A9 20 D6
C170:20 D2 FF E8 E0 21 D0 F8 6D
C178:A2 00 BD E2 C2 C9 00 F0 61
C180:06 20 D2 FF E8 D0 F3 A9 85
C188:0D 20 D2 FF A9 0C 20 D2 85
C190:FF A9 04 20 C3 FF 20 CC 2C
C198:FF 4C 74 A4 20 FF A1 60 EC
C1A0:A2 04 20 C9 FF A9 D0 20 F7
C1A8:D2 FF 20 D2 FF A2 00 BD 0F
C1B0:B2 C2 C9 00 F0 06 20 D2 2A
C1B8:FF E8 D0 F3 A2 00 BD 91 F1
C1C0:C3 20 D2 FF E8 E0 20 D0 64
C1C8:F5 A2 00 BD C0 C2 C9 00 70
C1D0:F0 06 20 D2 FF E8 D0 F3 B8
C1D8:AD B1 C3 20 D2 FF AD B2 BE
C1E0:C3 20 D2 FF A9 D0 20 D2 3D
C1E8:FF 20 D2 FF EE B2 C3 AD 46
C1F0:B2 C3 C9 3A D0 08 EE B1 D1
C1F8:C3 A9 30 8D B2 C3 60 A0 AD
C200:01 84 F0 B1 5F F0 40 20 83
C208:2C A8 C8 B1 5F AA C8 B1 EA
C210:5F C5 15 D0 04 E4 14 F0 33
C218:02 B0 2C 84 49 20 CD BD BC
C220:A9 20 A4 49 29 7F 20 47 7A
C228:AB C9 22 D0 06 A5 0F 49 75
C230:FF 85 0F C8 F0 11 B1 5F 14
C238:D0 0E A8 B1 5F AA C8 B1 C2
C240:5F 86 5F 85 60 D0 B8 60 73
C248:10 DC C9 FF F0 D8 24 0F 88
C250:30 D4 38 E9 7F AA 84 49 C1
C258:A0 FF CA FF 08 C8 B9 9E 0C
C260:A0 10 FA 30 F5 C8 B9 9E 81
C268:A0 30 B7 20 47 AB 4C 65 2A
C270:C2 20 20 20 20 20 20 20 47
C278:45 4E 54 45 52 20 54 49 18
C280:54 4C 45 20 46 4F 52 20 22
C288:48 45 41 44 45 52 20 49 EC
C290:44 2E 0D 20 20 20 20 49
C298:20 20 20 20 20 28 31 20 60
C2A0:54 4F 20 33 32 20 43 48 3C
C2A8:41 52 41 43 54 45 52 53 6F
C2B0:29 00 4C 49 53 54 49 4E B5
C2B8:47 20 46 4F 52 3A 20 00 63
C2C0:20 20 20 20 20 20 20 20 46
C2C8:20 20 20 20 20 20 20 20 4E
C2D0:20 20 20 20 20 20 20 20 56
C2D8:20 20 50 41 47 45 20 23 47
C2E0:20 00 45 4E 44 20 4F 46 8B
```

```
C2E8:20 4C 49 53 54 49 4E 47 9B
C2F0:00 20 20 20 20 20 43 48 D4
C2F8:45 43 4B 20 50 52 49 4E 0A
C300:54 45 52 20 41 4E 44 20 3B
C308:50 41 50 45 52 20 53 55 75
C310:50 50 4C 59 0D 20 20 20 3C
C318:20 20 20 20 20 20 20 20 9F
C320:20 20 20 20 20 20 54 DB
C328:48 45 4E 0D 20 20 20 20 A1
C330:20 50 52 45 53 53 20 41 E3
C338:4E 59 20 4B 45 59 20 54 1A
C340:4F 20 50 52 49 4E 54 20 F2
C348:4C 49 53 54 49 4E 47 0D 17
C350:0D 20 20 20 20 20 20 20 4E
C358:20 20 20 20 20 20 20 44 04
C360:55 52 49 4E 47 20 50 52 E2
C368:49 4E 54 0D 20 20 20 20 65
C370:20 20 48 4F 4C 44 20 44 06
C378:4F 57 4E 20 52 55 4E 2F FC
C380:53 54 4F 50 20 54 4F 20 C6
C388:41 42 4F 52 54 00 00 00 F2
C390:00 00 00 00 00 00 00 00 18
C398:00 00 00 00 00 00 00 00 20
C3A0:00 00 00 00 00 00 00 00 28
C3A8:00 00 00 00 00 00 00 00 30
C3B0:00 00 00 00 00 00 00 00 38
```

R. Markland, who lives in Rawlins, Wyoming, has seen listing questions in Gazette many times and says it's time for a definitive solution.

BLANKER

By Charles W. Bozarth

Even with today's newer monitors, there's still a concern about burning a screen image into the picture tube. This can occur if the image on the monitor stays the same for long periods of time. IBM computers have a variety of utilities for blanking the screen while the computer isn't being used. Blanker is a similar screen-blanking utility for GEOS on the 64. It provides various ways to blank the screen from any GEOS program that uses desk accessories.

Entering the Program

Blanker is written 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: 0247
Ending address: 076E

Be sure to save two copies of the program to a GEOS work disk before exiting MLX. Since you can't enter GEOS

PROGRAMS

programs directly, Blanker must be converted to GEOS format before it can be used. One copy of Blanker will be converted by GeoConverter 2.0 into a desk accessory. Keep the other copy as a backup in case something goes wrong with the conversion.

If you don't already have a copy of GeoConverter, we've included the listing here. The converter can be found on COMPUTE's GEOS Collection disk, and it was printed in "The GEOS Column," March 1990. Be sure to use "The Automatic Proofreader" (again, see "Typing Aids") to help prevent typing errors when you enter the program. Save a copy of GeoConverter to the disk that contains Blanker.

To prepare Blanker for use with GEOS, load and run GeoConverter. When prompted for a filename, enter the name you used to save Blanker. GeoConverter will then convert the file into a GEOS desk accessory format. Those who get Gazette Disk should copy Blanker to a work disk before making the GEOS conversion.

Using the Program

To start Blanker in most programs, select it either from the deskTop, or from the GEOS menu in other programs. A dialog box appears on the screen with four choices to blank the screen. Selecting Cancel will return to the application without blanking. Select one of the choices and then click on the OK icon to start the process.

Each option has its own unique way of clearing the screen. For example, Blank is the option that goes directly to blanking the screen with the border color. This is most effective if the border is a dark color such as the GEOS default of black. The Blank option has the same effect as turning off the monitor. Tilt, Dissolve, and Drip are additional choices. Drip is an especially amusing and realistic effect. You'll probably want to touch the screen to make sure it isn't wet. All of these options have the effect of turning off the monitor once the screen is erased.

While the screen is being erased, the mouse pointer moves to the bottom right corner of the screen. The blanking process can be stopped at any time and control returned to the application by pressing any key or clicking

the mouse button.

Blanker was written for the 64 version of GEOS 2.0 using geoProgrammer software.

BLANKER

```
0247:0F 03 15 BF FF FF FF 80 B2
024F:00 01 BF FF FD B0 00 0D 4B
0257:A0 00 05 A0 00 05 A0 00 AB
025F:05 A0 00 05 A0 00 05 A0 0E
0267:00 05 A0 00 05 A0 00 05 70
026F:A0 00 05 A0 00 05 B0 00 E3
0277:0D BF FF FD 80 00 01 FF D7
027F:FF FF 4F FE 72 20 00 04 75
0287:3F FF FC 83 05 00 00 04 2F
028F:BA 2C 00 04 53 63 72 6E B7
0297:20 42 6C 61 6E 6B 65 72 3E
029F:56 31 2E 30 00 00 00 00 E3
02A7:43 68 61 72 6C 65 73 20 BA
02AF:57 2E 20 42 6F 7A 61 72 AD
02B7:74 68 20 0F 2C 00 00 44 AA
02BF:65 73 6B 20 61 63 63 65 87
02C7:73 73 6F 72 79 20 66 6F FF
02CF:72 20 62 6C 61 6E 6B 69 2D
02D7:6E 67 20 74 68 65 20 47 98
02DF:45 4F 53 20 73 63 72 65 3A
02E7:65 6E 2E 0F 34 00 00 20 B2
02EF:4E C1 20 B7 C1 00 60 99 73
02F7:08 40 1F 20 53 C2 00 C8 64
02FF:00 00 40 01 A9 80 85 2F A5
0307:20 B7 C1 1F 85 1E 29 9C C8
030F:03 20 B6 06 20 31 07 20 C9
0317:E6 06 A5 02 C9 02 F0 38 57
031F:A9 00 85 39 A9 04 8D A2 59
0327:84 A9 69 8D A1 84 A9 04 56
032F:8D A4 84 A9 69 8D A3 84 9D
0337:A9 01 85 3B A9 3F 85 3A 46
033F:A9 C7 85 3C A5 16 0A A8 C2
0347:88 88 B9 29 07 8D 9B 84 A7
034F:C8 B9 29 07 8D 9C 84 80 06
0357:AD 11 D0 09 10 8D 11 D0 CC
035F:A9 30 85 01 20 B7 C1 1E 88
0367:29 1F 85 9C 03 20 A5 C1 E9
036F:00 C8 00 00 40 01 20 B7 A5
0377:C1 99 08 00 60 40 1F 4C 54
037F:3E C2 A9 00 8D 9C 84 A9 1C
0387:00 8D 9B 84 A9 35 85 01 DA
038F:AD 11 D0 29 EF 8D 11 D0 06
0397:60 A9 04 8D 9C 84 A9 C7 A3
039F:8D 9B 84 A9 A0 85 03 A9 49
03A7:00 85 02 A9 00 85 05 85 8F
03AF:06 A9 5A 85 07 60 A6 05 D2
03B7:A4 06 B9 28 05 A8 B1 02 7B
03BF:3D 20 05 91 02 20 0A 05 CF
03C7:18 A9 0A 65 02 85 02 90 96
03CF:02 E6 03 A5 03 C9 BF D0 DA
```

GEOCONVERTER 2.0

```
BA 10 REM COPYRIGHT 1992 COMPUTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
SE 20 IF (PEEK(772)+PEEK(773)*256)=42364 THEN 40
PD 30 LIST0,1:LIST4,1:LIST6,1:SA=PEEK(4625)*256+PEEK(4624):GOTO50
SX 40 POKE56,PEEK(46)+40:CLR:P
```

```
OKE53280,0:POKE53281,0:S
A=PEEK(56)*256+PEEK(55)
QQ 50 PRINT "{CLR}{8}{N}{DOWN}"
TAB(12) "{RVS}GEOCONVERTER 2.0{OFF}{GRN}{3 DOWN}"
:PRINTTAB(13) "COPYRIGHT {SPACE}1992{DOWN}"
KR 60 PRINTTAB(7) "COMPUTE! PUBLICATIONS INC.{DOWN}":PRINTTAB(11) "ALL RIGHTS RESERVED{2 DOWN}"
MK 70 N=8:PRINT"DRIVE NUMBER "N"{4 LEFT}";:INPUTN:IFN<8ORN>1THEN70
QE 80 K$="N":PRINT"IS DRIVE"N"A 1581?"K$"{3 LEFT}";:INPUTK$:IFK$<>"N"ANDK$<>"Y"THEN80
SB 90 T$=CHR$(18):S$=CHR$(1):IFK$="Y"THEN T$=CHR$(40):S$=CHR$(3)
RS 100 INPUT"FILE TO CONVERT";NM$:OPEN15,N,15:OPEN1,N,8,"0":"+NM$+",P,R"
BX 110 GOSUB440:IFEN<>0THENPRINT"{RVS}"EN$ "EM$ET$EE$GOTO400
FF 120 GET#1,K$,V$:IFK$<>CHR$(71)ORV$<>CHR$(2)THENCLOSE1:CLOSE15:GOTO220
BR 130 PRINT"{DOWN}DECOMPRESSION...":Z$=CHR$(0):GET#1,ESC$:ESC=ASC(ESC$+Z$):AD=SA
RQ 140 GOSUB170:IFV<>ESCTHENPOKEAD,V:AD=AD+1:GOTO140
PP 150 GOSUB170:CT=V:GOSUB170:CT=CT+V*256:GOSUB170:GOSUB160:GOTO140
DH 160 FORI=1TOCT:POKEAD,V:AD=AD+1:NEXTI:CT=0:RETURN
PK 170 GET#1,V$:S=ST:V=ASC(V$+Z$):IFST=0THENRETURN
SJ 180 IFS<64THEN GOSUB440:PRINT"{DOWN}LOAD ERROR - {RVS}"EN$ "EM$ET$EE$GOTO400
AF 190 IFCT<>0THEN GOSUB160:AD=AD-1
DG 200 PRINT"{DOWN}WRITING...":CLOSE1:PRINT#15,"S0":"+NM$:CLOSE15
EF 210 OPEN1,N,8,"0":"+NM$+",P,W":FORI=SATOAD:PRINT#1,CHR$(PEEK(I));:NEXTI:CLOSE1
GP 220 PRINT"{DOWN}CONVERTING...":HD$="":FORI=1TO4:READHE:HD$=HD$+CHR$(HE):NEXTI
CF 230 FORI=1TO5:READIE:ID$=ID$+CHR$(IE):NEXTI
DR 240 NL$="":OPEN15,N,15,"I0":OPEN2,N,2,"#"
MM 250 GOSUB410:GET #2,NT$,NS$:FORE=0TO7:D$=NL$:GET#2,B$:I=1:IFB$=NL$STHEN310
PE 260 IF ASC(B$)<>130 THEN310
```



```

AE 270 GET#2,HT$,HS$:I=3:IFHS$
      ="THENHS$=CHR$(0)
DJ 280 GET#2,B$:I=I+1:IFB$="T
      HENB$=CHR$(0)
BM 290 IF(ASC(B$)=160)OR(I=19)
      THEN310
SF 300 D$=D$+B$:GOTO280
EB 310 FORI=ITO31:GET#2,B$:NEX
      TI:IFD$=NM$THEN340
JX 320 NEXTE:IFNT$=NL$THEN340
CH 330 T$=NT$:S$=NS$:GOTO250
GA 340 IFD$=NL$THENPRINT"
      {DOWN}DISK ERROR!":GOTO
      400
PD 350 DT$=T$:S$=S$:T$=HT$:S$
      =HS$:GOSUB410:GET#2,MT$
      ,MS$:IFMS$="THENMS$=CH
      R$(0)
GF 360 FORI=0TO65:GET#2,B$:NEX
      TI:GET#2,CT$,GT$:GOSUB4
      10:PRINT#2,HD$,:GOSUB42
      0
RX 370 T$=DT$:S$=S$:GOSUB410:
      FORI=1TO32*E+2:GET#2,B$
      :NEXTI:PRINT#2,CT$,MT$;
      MS$;
MB 380 FORI=0TO15:GET#2,B$:NEX
      TI:PRINT#2,HT$,HS$:CHR$
      (0);GT$;ID$,:GOSUB420
GR 390 PRINTNM$" CONVERTED!"
HB 400 CLOSE1:CLOSE2:CLOSE15:EN
      D
DQ 410 U$="U1":GOTO430
CS 420 U$="U2"
PA 430 PRINT#15,U$,2;0;ASC(T$+
      "0");ASC(S$+"0"):RETURN
JJ 440 INPUT#15,EN,EM$,ET,EE:EN
      =STR$(EN):ET$=STR$(ET
      ):EE$=STR$(EE):RETURN
EH 450 DATA 0,255,3,21,87,10,1
      ,0,0

```

Charles W. Bozarth, who lives in Kalamazoo, Michigan, began programming on a VIC-20. He recently earned a degree in mechanical engineering, but continues to program as a hobby.

SUPERSAVE

By Jason P. Lewis

Saving your work periodically is a concept that looks great on paper, but applying it is a whole different matter when at the computer. Some programmers avoid it, saying, "I'll never lose any files. It could never happen to me." Others complain that saving takes too much time when they're busy.

SuperSave is a short utility that will greatly assist you in saving your BASIC programs or BASSEM source code files. In the case of a power outage, your chances of recovering most of your file would

be greatly improved with SuperSave.

Typing It In

SuperSave is a two-part program. The main program is written in machine language. To type it in, you'll need MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts you, enter the following values.

Starting Address: \$CF64

Ending Address: \$CFFF

When you've finished entering the program, save it with the filename SuperSave.ML before you exit MLX.

The second part of SuperSave is a BASIC loader or boot program. It's quite short, but you may want to use The Automatic Proofreader to help avoid typing errors. Again, see "Typing Aids." Be sure to save a copy of Boot on the same disk as SuperSave.ML. When you run Boot, it automatically loads and runs SuperSave.ML.

Using SuperSave

When you load and run SuperSave, you'll see a message that the program has been enabled. You'll also see the READY prompt.

In order to use SuperSave, you must either load a program you wish to work on or save a file. This will make that filename active for a short period of time. That filename will remain active from the time the save or load was performed until any other BASIC command is executed. During this time, press Ctrl-Restore. This will make the filename permanently active, at least until you reset or turn off the computer.

Once you have an active filename, you can use SuperSave as many times as you wish. This is done simply by pressing Restore. Each time you've made some changes and want to update the file on your disk, simply press Restore.

SuperSave actually performs two functions during a save. First, it scratches the old version of the file, bypassing the save-with-replace bug on older 1541 and 1571 drives. Then, SuperSave performs a normal BASIC save.

When you press Restore, you won't see the usual message indicating that a file is being saved. In fact, the only

visual sign that you should notice is the drive light coming on to indicate that something is happening. By not printing a message, nothing on the screen is corrupted. After the SuperSave process, you should notice no difference in your program whatsoever.

This permits you to update your file whenever you like, giving you no excuse for losing valuable data during a power outage or similar occurrence. SuperSave will also save you several key-strokes (pun intended).

How It Works

Each time you press Restore, the 64 executes the machine language instructions pointed to by locations 792 and 793. The actual address of the ML program is the contents of 793 multiplied by 256 and then added to location 792 (LC=PEEK(792)+PEEK(793)*256).

SuperSave changes these locations to make the computer execute SuperSave rather than its normal routine. If SuperSave doesn't recognize a keypress in conjunction with Restore, it'll ignore it. Instead, it'll execute the 64's normal Restore routine. This means Run/Stop-Restore retains its usual function and it will disable SuperSave. To enable it again, enter SYS 53092.

Customizing the Boot Program

You may want to customize the boot program for each program you work on. You can replace the new statement in line 40 with a LOAD statement to load your program. For example, if your program's name were HELP, then you would change line 40 to LOAD "HELP",8.

Then, whenever you execute the SuperSave boot program, your working program will automatically load. Press Ctrl-Restore to make that filename active, and you'll be ready for another work session.

SUPERSAVE.ML

```

CF64:AD 18 03 8D E8 CF AD 19 15
CF6C:03 8D E9 CF A9 7B 8D 18 99
CF74:03 A9 CF 8D 19 03 60 AD 16
CF7C:8D 02 C9 04 F0 4F 20 E1 C3
CF84:FF F0 60 AD EA CF 18 69 77
CF8C:03 A2 EC A0 CF 20 BD FF 78
CF94:A9 01 AE EB CF A0 0F 20 1D
CF9C:BA FF 20 C0 FF 20 C3 FF B1
CFA4:A9 01 AE EB CF A0 FF 20 0F
CFAC:BA FF AD EA CF A2 EF A0 97

```

PROGRAMS

```
CFB4:CF 20 BD FF A9 00 20 90 1A
CFBC:FF A9 2B A6 2D A4 2E 20 0F
CFC4:D8 FF A9 C0 20 90 FF 20 75
CFCC:E7 FF 4C E7 CF A5 B7 8D 7A
CFD4:EA CF A5 BA 8D EB CF A0 9A
CFDC:00 B1 BB 99 EF CF C8 C4 0F
CFE4:B7 D0 F6 4C 01 00 00 00 40
CFEC:53 30 3A 20 20 20 20 20 6D
CFF4:20 20 20 20 20 20 20 20 94
CFFC:20 20 20 00 00 00 00 00 B8
```

BOOT

```
MM 5 REM COPYRIGHT 1992 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
FE 10 IF A=0 THEN A=1:LOAD"SUP
ERSAVE.ML",8,1
GP 20 SYS 53092
DD 30 POKE 53281,0:POKE 53280,
15:PRINT"{WHT}{CLR}{RVS}
SUPERSAVE ENABLED."
KG 40 NEW
```

Jason P. Lewis is a junior in high school in Ascutney, Vermont. He wrote SuperSave to help him with his other programming efforts.

BALLOON POP

By Maurice Yanney

If you're the kind of person who gets a kick out of popping balloons, you'll love this game for the 64. You can either drop pins on the balloons as they rise toward the top of the screen or go for the extra points by intercepting the balloons with your pin-dropper. It slides left and right across the top of the screen, and you can control it in an effort to pop any elusive balloons before they slip by you. Pop them all and move to a more difficult level. See how many levels you can complete in this fast-paced game.

Getting Started

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

Starting address: 0801

Ending address: 11C0

Be sure to save a copy of the program before exiting MLX. The program works with a joystick in either port or

from the keyboard with cursor keys and space bar.

Playing the Game

The object of the game is to pop all the rising balloons without letting any get by. You control a pin-dropper, which is located at the top of the screen. Use the pin-dropper to pop the rising balloons by dropping pins on them, or maneuver it so that it breaks balloons as they reach the top of the screen.

To move the pin-dropper to the left, use the Crsr up/down key; to move to the right, use the Crsr left/right key. A joystick (in either port) may also be used to move. Press the space bar or the joystick button to fire a pin downward toward the rising balloons. Only one pin can be fired at a time.

When a pin hits a balloon, you receive 10 points, and the number of popped balloons increases by 1. If the balloon hits the pin-dropper, you receive 50 points, and the number of hits is incremented by 1. To complete the first level, the number of hit and popped balloons must be 10; an additional 5 balloons are needed for each subsequent level (up to 50).

The score, the level, the number of popped balloons on the current level, the number of hit balloons on the current level, and the extra balloons are displayed at the bottom of the screen. Initially, there are five extra balloons. When a balloon reaches the top without being hit or popped, an extra balloon is lost. When there are no more extra balloons, the game is over. An extra balloon is awarded for each 500 points reached.

Complete a level, and you'll get 10 bonus points for each popped balloon and 50 points for each hit balloon. Each level becomes more difficult with the addition of another balloon to the number of balloons that are approaching your pin-dropper. Level 1 begins with three balloons simultaneously rising. The pin-dropper is positioned closer to the rising balloons on higher levels, and five more balloons are required to complete each level.

To quit playing the game, press the Q key. To pause the game, hold down the Shift key or press the Shift Lock key. To continue playing, release the Shift key or the Shift Lock key.

BALLOON POP

```
0801:0B 0B 0A 00 9E 20 32 30 A4
0809:36 32 00 00 00 A9 64 A0 D0
0811:11 20 1E AB A9 80 8D 91 2C
0819:02 A9 00 8D 20 D0 8D 21 ED
0821:D0 20 A6 08 20 33 09 20 F6
0829:AE 0C AD 01 DC 29 10 F0 F5
0831:0D AD 8D 02 C9 01 D0 06 FE
0839:20 E0 0E 4C 2B 08 20 81 53
0841:0B 20 16 0A AD 27 12 D0 41
0849:06 20 21 0E 4C 5E 08 AE 04
0851:27 12 E0 01 F0 03 20 91 0B
0859:0F CA 8E 27 12 AC 26 12 89
0861:C8 8C 26 12 98 29 03 D0 1F
0869:0F 20 90 09 20 16 0A 20 39
0871:78 0A 20 16 0A 20 36 0A EC
0879:AD C2 11 C9 FF D0 06 20 3F
0881:CF 0C 4C 2B 08 AD C1 11 44
0889:18 6D C0 11 CD 1E 12 90 C5
0891:06 20 42 0D 4C 2B 08 A5 8A
0899:C5 C9 3E D0 8D 20 E0 0E 90
08A1:A9 00 85 C6 60 A9 30 85 33
08A9:34 85 38 AD 0E DC 29 FE 4C
08B1:8D 0E DC A5 01 29 FB 85 2C
08B9:01 A0 00 A9 00 85 FB A9 C4
08C1:D0 85 FC A9 00 85 FD A9 91
08C9:30 85 FE A2 00 A0 00 B1 91
08D1:FB 91 FD C8 D0 F9 18 A5 D4
08D9:FC 69 01 85 FC 18 A5 FE CD
08E1:69 01 85 FE E8 E0 10 D0 43
08E9:E6 A5 01 09 04 85 01 AD 6D
08F1:0E DC 09 01 8D 0E DC 18 E7
08F9:AD 18 D0 29 F0 69 0C 8D 66
0901:18 D0 A2 00 A0 00 8E BA 84
0909:11 BD DE 10 99 C0 37 C8 F6
0911:E8 98 29 0F D0 F3 AD BA 40
0919:11 18 69 02 8D BA 11 AA 2B
0921:E0 08 D0 E5 A0 00 B9 44 DA
0929:11 99 A0 37 C8 C0 20 D0 0C
0931:F5 60 A2 17 A0 00 18 20 71
0939:0A E5 A9 F4 A0 10 20 1E F1
0941:AB A9 A0 8D E7 07 60 A9 46
0949:01 8D BB 11 A9 32 8D 24 1D
0951:12 8D 22 12 A9 00 8D C3 61
0959:11 8D C4 11 8D BF 11 8D 1C
0961:C2 11 8D 27 12 8D 18 12 46
0969:8D 19 12 8D 1B 12 8D 25 05
0971:12 8D 23 12 20 5E 0F A2 B0
0979:05 20 AF 10 CA D0 FA 60 FC
0981:A0 00 20 74 0F A9 79 91 D2
0989:FB C8 C0 28 D0 F9 60 A5 3B
0991:C5 C9 07 D0 03 20 EE 09 66
0999:A5 C5 C9 02 D0 03 20 01 1D
09A1:0A A5 C5 C9 3C D0 03 20 C2
09A9:56 0B AD 00 DC 8D 1F 12 CC
09B1:29 04 D0 03 20 EE 09 AD 20
09B9:1F 12 29 08 D0 03 20 01 59
09C1:0A AD 1F 12 29 10 D0 03 77
09C9:20 56 0B AD 01 DC 8D 1F 73
09D1:12 29 04 D0 03 20 EE 09 44
09D9:AD 1F 12 29 08 D0 03 20 09
09E1:01 0A AD 1F 12 29 10 D0 C4
09E9:03 20 56 0B 60 AC BC 11 41
09F1:F0 FA 20 25 0A AC BC 11 1F
09F9:88 8C BC 11 20 2D 0A 60 46
0A01:AC BC 11 C0 27 F0 E5 20 B1
0A09:25 0A AC BC 11 C8 8C BC 15
0A11:11 20 2D 0A 60 A0 00 A2 24
0A19:00 20 BA 0A C8 C8 E8 E0 49
```


PROGRAMS

```
10B1:11 C0 0A F0 09 C8 8C C2 22
10B9:11 A9 FE 99 DC 07 60 AD B7
10C1:1B 12 D0 18 20 A8 0E AC FB
10C9:C2 11 F0 08 A9 20 AC C2 18
10D1:11 99 DC 07 C0 FF F0 04 D8
10D9:88 8C C2 11 60 00 00 00 CD
10E1:00 00 00 3C 66 C3 C3 66 F5
10E9:3C 0C 06 00 00 00 00 EB
10F1:00 00 00 12 20 53 43 4F 57
10F9:52 45 3A 20 20 4C 45 56 F0
1101:45 4C 3A 20 20 50 4F 50 53
1109:3A 20 20 48 49 54 3A 20 09
1111:20 45 58 54 52 41 3A 20 11
1119:20 20 20 20 92 30 30 35
1121:30 30 30 12 20 20 92 54
1129:20 20 20 20 20 12 20 2F
1131:20 92 20 20 20 12 20 D3
1139:20 92 20 20 20 12 20 DB
1141:20 92 00 3C 18 18 18 00 2D
1149:00 00 00 00 00 00 00 3C A7
1151:18 18 18 00 FF FF FF C3 4C
1159:00 00 00 00 FF FF FF 7B
1161:18 18 18 8E 1C 93 00 42 F2
1169:41 4C 4C 4F 4F 4E 20 50 02
1171:4F 50 00 54 4F 20 50 4C 7C
1179:41 59 00 50 52 45 53 53 39
1181:20 41 4E 59 20 4B 45 59 75
1189:20 4F 52 20 4D 4F 56 45 75
1191:20 4A 4F 59 53 54 49 43 97
1199:4B 00 1D 47 41 4D 45 20 63
11A1:4F 56 45 52 00 45 4E 44 C4
11A9:20 4F 46 20 4C 45 56 45 E3
11B1:4C 00 42 4F 4E 55 53 3A DF
11B9:00 00 00 00 00 00 00 DB
```

Maurice Yanney used Fast Assembler from the Gazette Power Tools disk to write this program. He lives in Lebanon, Pennsylvania.

SUB ATTACK II

By Tai Bush

If you like underwater arcade-style games, you're going to love Sub Attack II. This fast-paced game for the 64 can accommodate up to eight players. Enemy targets include submarines, airplanes, trawlers, and helicopters, and you can play on any of 40 levels. Scenarios are played in different combinations of clear or murky waters and clear or cloudy skies.

Entering the Game

Sub Attack II is written entirely in machine language, but it loads and runs like a BASIC program. To enter it, you'll need 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: 1B18

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

Prepare for Action

From the opening menu, select the level and number of players desired. Press f1 to start the game. You control the black ship in the center of the screen. Use a joystick to move the ship left or right. Press the fire button to fire straight up. Tilt the joystick left or right and press the fire button to fire toward the sides. Pull back on the joystick and press the fire button to drop a depth charge. Each level lasts approximately one minute.

Enemy Forces

You'll face a formidable fleet of enemy forces. Here are some important facts about their weapon systems.

Blue submarines fire torpedoes randomly toward the top of the screen. These torpedoes are deadly if they hit your ship or if your ship plows into a water spout created by their explosions.

Airplanes drop bombs as they pass directly over your ship. They also drop bombs whenever they're hit. If you shoot one down, avoid it as it crashes into the water.

Trawlers travel half the distance across the screen, then turn and leave. They drop mines that explode at random intervals.

Helicopters have unlimited ammunition. They drop bombs above your ship. Be careful whenever they hover—they drop bombs continuously.

Turtles are replicas of the first operational submarine, built in 1776 by David Bushnell and called the *Turtle*. These Turtles are black and white, and they fire yellow missiles that explode when they reach the surface.

Gray submarines fire missiles that enter the atmosphere, turn, and explode when they fall back to the surface.

Jet planes drop parachute bombs.

Scoring

Blue submarines, airplanes, and trawlers earn you 10 points each when hit; all other enemies are worth 20 points each. Levels 1-10 are played in clear waters and are considered easy. Levels 11-20 are played in murky waters

and are moderate. Skies are clear in these levels. Levels 21-30 are played in clear waters and cloudy skies, and levels 31-40 are played in murky waters and cloudy skies. These last 20 levels are difficult.

Press P at any time to pause the game. Press it again to continue.

SUB ATTACK II

```
0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 96
0811:20 20 20 20 20 A0 C4 B9 06
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 E1 85 2D A9 1F 85 10
0839:2E 4C 00 01 14 E0 00 E1 89
0841:1F 8F 19 B9 6E 09 99 E8 37
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 FC 65 A6 85 F7 58
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 0C 20 34 C3
08D1:03 E6 A7 4C 5C 01 E8 20 AF
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 D0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
0909:26 A7 C6 FB CA D0 F2 A8 D8
0911:60 48 B1 FE 85 FA A9 08 FE
0919:85 FB 68 A4 FE D0 02 C6 4A
0921:FF C6 FE C0 E7 D0 DE A4 B5
0929:FF C0 07 D0 D8 A9 37 85 BA
0931:01 58 4C 0D 08 A4 A8 F0 49
0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 42
0959:A9 F0 0A B1 F7 C6 FD C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 0C 08 75
0971:01 00 9E 32 30 36 31 E3 9B
0979:25 A9 1C 47 09 18 A9 80 EC
0981:8D 8A C9 0F 8D 18 65 51 10
0989:A0 9E 20 23 19 20 07 09 2A
0991:6D 04 84 7E 8D BA 03 20 51
0999:AC 0B 20 7F 0E 20 38 10 32
09A1:20 D5 0C D1 C1 0D 20 C0 1B
09A9:15 20 9F FF 81 1B C4 DB 20
09B1:73 45 50 D0 F9 4C 27 B8 ED
09B9:59 AA F3 78 6D 04 15 44 13
09C1:BD DA 15 05 D4 04 35 C1 3F
```

09C9:86 02 A9 F8 99 06 B0 05 AF 0BF9:09 0F 49 0F F0 0D 5F F0 DD 0E29:CA D0 FA AD 5D F0 0E 00 E3
09D1:E9 52 01 D4 BD F8 08 99 56 0C01:AB 80 14 83 FE 2E 1A 20 CE 0E31:1A 06 D0 11 5C 49 BD 37 C1
09D9:00 D4 20 FC 99 42 2E A6 CD 0C09:6D 0B A6 FB A4 FC 60 A2 AB 0E39:09 17 A9 09 20 56 08 4C 1C
09E1:FC A4 FB 60 94 66 5A A7 BB 0C11:C4 3F 91 00 05 A9 90 2C A9 0E41:20 0E A9 0A 20 8F 08 A9 BF
09E9:65 23 AA A5 FC C3 2E E6 61 0C19:88 A2 2E 5D 03 B0 7A 81 0B 0E49:06 8D 20 D0 88 D0 D1 51 59
09F1:BD CB 08 32 99 12 63 A2 78 0C21:90 04 9E 0B 0A 1A 04 D0 98 0E51:77 16 04 D4 8D 0B D4 AE 6D
09F9:00 86 FC 8A D9 BD EE 67 01 0C29:F5 88 34 E1 A2 50 28 05 AE 0E59:A2 7F FE 44 BD 40 10 E0 BA
0A01:21 E0 8D 04 D4 4C 8A 08 C4 0C31:D2 FF A9 04 C0 10 0A 20 A2 0E61:58 05 99 C3 54 03 20 95 DE
0A09:84 FB A0 07 4C B4 08 E5 0E 0C39:9A 9F 98 1E 90 A3 63 64 B9 0E69:0C F6 69 4C 07 09 60 90 E8
0A11:01 90 50 18 11 21 D0 81 85 0C41:65 66 92 83 DC 49 FF A8 E4 0E71:4E 45 58 54 29 7E B2 00 FE
0A19:21 21 81 1C 12 A0 E4 0C E0 0C49:20 B8 0B 4C 06 C0 18 AF 06 0E79:AD 70 11 F0 04 CE BB E0 6D
0A21:64 04 0B 0B 60 A0 03 02 08 0C51:82 04 20 08 28 C9 08 F0 99 0E81:B2 1B D4 A8 C9 38 B0 10 83
0A29:02 01 17 10 57 1C 21 0C DB 0C59:25 73 49 36 28 8A 86 18 FD 0E89:4A 4A 4A 0A 0A 18 6D 5D
0A31:19 19 86 0D 12 F4 F6 7 0C 89 0C61:86 A4 10 CE 68 48 C9 FE CB 0E91:11 BD AA BD 65 03 1B 1F 63
0A39:FA B5 F6 23 31 87 92 1E 34 0C69:D0 F6 AA 01 77 AA 37 74 56 0E99:C0 20 90 1C C0 28 B0 18 12
0A41:1E 1E 4E D1 72 C1 4F BE CA 0C71:F0 72 8A E1 C9 40 80 30 8E 0EA1:AD 05 3A 7E 30 07 CF 41 83
0A49:06 09 D9 8D 22 D0 18 A0 DB 0C79:0A 81 EE 46 00 24 F0 DD 89 0EA9:AD 09 D0 C9 9A BC 5D 86 9E
0A51:10 A2 C1 65 E1 F1 00 19 94 0C81:AA 9E C2 29 61 68 10 1A 68 0EB1:FB 41 09 AE 15 54 4B 29 E1
0A59:B1 AD 1E D0 AD 1F B6 3F 19 0C89:58 20 8C B0 23 38 0B EC 6F 0EB9:02 05 09 00 92 B0 08 D0 71
0A61:4C CA 2E A4 6C 2B 09 00 80 0C91:8D C6 AD B8 10 02 C6 72 EB 0EC1:05 A2 01 4C E4 0E 8A 29 8B
0A69:01 02 03 04 05 08 07 1F 94 0C99:C3 0A 0D 95 04 C0 3A 30 D8 0EC9:C7 13 BE A2 02 2C 26 E4 82
0A71:70 6C 61 79 65 72 AB 3F 28 0CAL:08 E0 A0 D8 10 09 9D 98 10 0ED1:B4 61 0C B4 03 9D B7 03 6E
0A79:11 11 D0 40 46 9D 9D 9D F9 0CA9:0C 6A 0C F0 10 C9 04 95 20 0ED9:AE 18 8D BB 03 8A A6 FB C9
0A81:67 65 74 A0 A0 72 65 61 36 0CB1:D8 66 91 10 8D A8 A8 60 C3 0EE1:DE 65 03 AA AA 57 0D 86 25
0A89:64 79 00 80 73 69 21 3C F5 0CB9:98 29 0C DA F0 06 A8 45 CD 0EE9:CE AD 0E 02 94 8D 1C 3C 0A
0A91:71 8D A7 05 A9 5B 99 A4 99 0CC1:8D 01 60 93 C7 20 1C 8D AA 0EF1:0E 0A AA B9 B4 58 04 20 B7
0A99:A0 90 82 13 39 A4 07 A9 B7 0CC9:77 30 2C 3D 08 94 62 43 9D 0EF9:43 EC 12 05 D0 8A 4A AA 75
0AA1:AC 8D 00 B3 99 8D 01 D0 80 0CD1:AD 74 28 19 0E 99 C8 E7 C4 0F01:98 AE 0F C8 38 E9 04 B0 42
0AA9:A0 01 8C 15 D0 88 8C 01 F3 0CD9:59 01 81 EE 66 60 40 04 37 0F09:FA B9 91 21 DD FA 07 B9 F9
0AB1:79 5E 1B 8D 11 D0 B9 9D 33 0CE1:CE 1A 01 AD 03 1A 6B D0 0B 0F11:2A 02 07 20 F8 34 22 10 94
0AB9:09 F0 35 C8 73 9C E5 91 2D 0CF9:23 D5 C4 10 29 70 A2 14 07 0F19:D0 98 4A A8 B9 AD 0F 9D D9
0AC1:09 93 90 11 71 15 36 26 D4 0CF1:89 18 63 30 28 40 20 30 F6 0F21:29 3A 8E 00 42 A0 51 04 6F
0AC9:46 C3 61 43 61 83 78 34 90 0CF9:64 04 14 43 32 38 E9 AA EC 0F29:04 44 91 03 1D 4C 43 9F FC
0AD1:16 8A 84 42 FA E1 05 20 D1 0D01:86 8C 6B 21 08 49 E4 01 34 0F31:3C 0D F0 B1 B1 2A 44 B9 62
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0BC9:9D 6C D8 90 8B 33 7A 14 20 1029:2F B0 15 4C 64 11 BD E6 3E
0BD1:4C E4 62 34 1E 86 8C 8B 86 1031:16 0B F0 06 3D FF 4C C6 E6
0BD9:35 7A 14 60 04 2E E2 36 86 1039:10 4C 63 36 D3 4E 14 D9 1E
0BE1:61 C8 98 12 4A 46 21 37 F3 1041:1A 85 95 13 C9 E0 52 A1 CB
0BE9:04 BD 3C 03 29 0F 18 69 48 1049:E3 51 A6 68 8C DB 44 A1 09
0BF1:30 8D 38 04 98 5D 44 03 90 0E21:0E A0 0D A2 06 20 7C 13 F4 1051:DF 51 1D 68 14 E4 44 A1 3E

PROGRAMS

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1071:CC 51 D3 68 14 71 12 C9 A1	12A1:C0 60 C0 FD 09 41 01 74 F9	14D1:DB 0F B9 04 D0 CD AD F0 2D
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10F1:B7 03 1C 0A 10 A1 A4 E1 05	1321:02 44 9C A1 C2 0D D0 98 8B	1551:A9 02 20 E3 8A 41 41 C9 B8
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1129:03 40 8B C1 13 30 32 03 2B	1359:F0 B6 4C 41 15 E0 F1 ED 41	1589:20 E5 0A A9 0E 4C 56 08 6F
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1149:4C 6B 12 A9 11 6A 45 C0 C6	1379:84 07 39 00 A9 E3 2A B7 B3	15A9:CD 07 D0 F0 05 CD 09 D0 E7
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1181:C0 D2 F0 0D FE 94 04 D0 CA	13B1:BD 0D 16 99 26 38 60 81 AA	15E1:86 38 E9 0A 99 0B D0 4C 3A
1189:26 0C 30 0E 96 08 20 6F 2D	13B9:F1 7C C2 20 C9 40 C8 00 B3	15E9:8D 12 80 B8 44 21 20 5C 3E
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1199:9C 8C 08 C8 99 23 0E 72 A2	13C9:C2 20 03 01 3C 8D 50 21 A3	15F9:65 C9 ED F0 B6 FE FD 07 CA
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11A9:50 25 8C 84 8D A1 22 27 75	13D9:C9 DB F0 18 93 F3 0E E4 E8	1609:4C F8 18 DE 01 B8 BD B1 A2
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11B9:B0 59 25 22 7D E8 60 B1 53	13E9:22 75 8E 78 08 0A 0C 1D 75	1619:A0 00 80 72 90 A9 33 0A 68
11C1:B9 91 02 38 E5 FB 13 90 BE	13F1:C0 82 26 30 18 60 73 98 A2	1621:03 0A D0 A4 28 40 0A D1 5D
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11D1:28 80 2D 20 98 07 23 00 F6	1401:DF E6 39 07 E7 2C E0 20 3C	1631:00 F8 EB A9 37 85 01 C8 4E
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1209:F0 F9 4B 8D 0E DC 60 C9 D4	1439:80 41 9A F0 25 BD 51 12 29	1669:E6 FC C9 FD F0 0F C9 DD B4
1211:D6 E0 20 21 C0 44 A6 07 5A	1441:40 4E 10 19 60 E2 20 56 D5	1671:F0 E4 91 FD E6 FD D0 EA 1D
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1229:C9 D8 F0 5F A3 D7 CF 12 AA	1459:03 4C FB 04 1F 85 BF 10 74	1689:BA B0 8D C5 C2 07 10 FF 9F
1231:93 18 74 84 88 A9 05 56 47	1461:7A FE DB 16 B2 FE E5 72 33	1691:85 FB 38 33 D0 A0 D0 E8 A7
1239:7D 06 D0 3F FE 81 3D C1 E5	1469:FE EA 07 F9 8B C3 21 AC A6	1699:18 20 F0 FF E6 FB A6 FB 68
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1251:48 59 A9 D9 E5 23 16 1E C8	1481:32 78 59 D0 39 5C 25 32 D0	16B1:FF C9 86 F0 34 C9 87 F0 F8
1259:BC 41 E1 31 14 18 3B 81 74	1489:F1 3C E6 E6 48 02 86 62 BE	16B9:4D C9 88 F0 46 C9 85 D9 5D
1261:06 53 37 18 4C 83 A5 F3 75	1491:C6 66 61 94 21 07 D2 6C 63	16C1:29 00 A9 02 EC 4A 16 F0 85
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1271:58 41 98 00 12 A9 02 A7 08	14A1:59 8B 00 04 CF 6A D1 60 C5	16D1:E8 E0 08 D0 ED A2 07 E9 AA
1279:16 C4 5A 96 E0 A4 42 5D 0A	14A9:DC 50 80 1C 0E 70 01 4C A6	16D9:30 9D 8D CA D0 FA A9 93 3D
1281:35 E0 D4 05 D9 0B D6 E6 F2	14B1:E5 11 78 59 71 14 C3 01 1A	16E1:20 D2 FF 4C B4 8A F1 5C A7

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1711:EE 34 02 AD B2 C9 3A D0 E0
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1729:11 9A 53 40 4D 20 41 54 B6
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1751:4C 2E 00 11 B0 31 82 28 B9
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1761:E3 50 4C 41 59 45 52 53 0B
1769:20 20 DC 21 35 C7 4C 45 04
1771:56 45 4C 20 20 30 31 00 CB
1779:3C 46 37 3E 20 51 55 49 5C
1781:54 A9 09 8D C1 BB CE 80 59
1789:14 20 C5 1A AD 60 D0 F5 AA
1791:60 AC 5C 03 B9 54 03 AA A6
1799:BD C9 81 F2 02 65 03 BD E1
17A1:F1 1E 99 6D 03 98 E2 04 9E
17A9:08 A8 8A 18 69 28 AA 90 AA
17B1:E8 60 27 30 AC 30 EC 30 84
17B9:2C 31 6C 31 77 31 AC 31 F5
17C1:B8 31 EA 31 2A 32 6A 32 2A
17C9:AA 32 B6 32 EA 32 F6 32 14
17D1:3A 33 7A 33 B7 33 F4 33 14
17D9:2E 34 74 34 B7 34 E5 34 8C
17E1:0D 35 4F 35 A4 35 CC 35 E9
17E9:11 36 76 36 B7 36 EB 36 05
17F1:2E 37 71 37 DC 37 24 38 EA
17F9:64 38 A4 38 F7 38 1A 39 8E
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1821:D0 20 D0 08 3C 10 86 7E 0A
1829:61 7F FF FE 3F FF FC EF 0B
1831:13 19 10 C5 44 40 53 55 AE
1839:AA 96 41 AA 48 50 4F DC 3F
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1849:06 CE C0 4E 41 1C 0A 88 44
1851:88 59 0A 19 EF 81 40 08 FC
1859:08 DD C0 DD 80 C1 5F 83 48
1861:C2 03 B1 28 96 AA 55 2A A0
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1881:6A 61 03 11 08 53 20 01 7F
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1899:58 C0 38 D8 30 05 DD 18 24
18A1:6A 18 49 26 C0 9A 3F B0 38
18A9:07 30 EE A6 B0 E6 B0 90 C4
18B1:33 F8 03 17 AF 8C 8E 0B 63
18B9:8F 88 62 21 A3 FA B9 80 2F
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18C9:60 A5 47 25 40 28 40 63 55
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18D9:5F 0A 40 12 81 45 F8 A5 1E
18E1:A0 10 B9 54 20 65 50 29 43
18E9:33 05 55 30 15 56 C0 15 3B
18F1:53 B5 70 01 4C 59 03 04 29
18F9:1C 8A 00 14 03 C0 D0 0E 14
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1951:B1 5C BC 8C 37 02 3E 00 12
1959:01 8C DD 63 2C F9 20 04 AE
1961:63 D2 90 64 A3 B0 71 B0 C5
1969:61 56 9C 16 01 60 0C 05 7D
1971:19 02 45 05 24 01 4C F0 58
1979:0A 90 3A AA 94 F0 02 95 C8
1981:5C 9C A8 44 32 00 0F FC 0F
1989:DD C6 30 A0 03 16 06 A0 89
1991:0F 16 AA AC 56 80 0F 2A ED
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19D9:15 55 55 DD 42 B8 60 7E A8
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1A09:A2 8E 54 28 2E 74 15 00 AC
1A11:6A A4 AA AA A9 0A 55 A9 6D
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1A39:82 22 50 10 7C 48 43 06 D3
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1A49:08 08 14 50 03 DD 55 46 8B
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1A61:19 02 50 00 1C C5 40 51 76
1A69:08 00 41 03 19 01 CC 33 93
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1A89:72 12 DF 28 68 A0 08 00 CF
1A91:84 14 C6 03 10 0F 04 21 FB
1A99:23 AB 40 C8 48 C8 08 14 68
1AA1:10 D6 38 4E 20 25 19 47 8E
1AA9:A3 40 D9 40 DA 05 B1 28 75
1AB1:10 0A 93 05 26 B3 88 80 C4
1AB9:A2 28 7A 28 37 F0 EA 08 76
1AC1:DC 40 C8 B8 83 CF E2 11 4B
1AC9:84 EE 88 88 A3 64 C3 03 CE
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1B01:20 61 14 0A 0A 19 33 61 3F
1B09:8E 83 05 46 A0 00 00 00 71
1B11:0A 00 0F 05 E0 00 00 00 85

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Tai Bush, a computer science student at the University of Colorado at Colorado Springs, enjoys radio-controlled boats, electronics, and classical music.

TAG IT

By Farid Ahmad

While working on a specific area of a program, you may find it necessary to list the same lines repeatedly. You must either hunt through the entire listing until you find the lines you need or remember and enter the proper numbers each time.

There's an easier way. Tag It is a handy, relocatable utility that makes it possible to list different parts of a BASIC program with a single keystroke. With Tag It you can mark different parts of a listing with different tags and list them easily.

Tag It offers other features as well. These include definable function keys, editing keys, and an escape key to cancel quote or insert mode.

Entering the Program

Tag It is written in machine language. To enter it, you'll need 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: 1330

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

Using the Program

When you load and run Tag It, it'll install and activate a machine language routine. Tag It will display the memory area where it has put the routine and then ask if you want to create an object file. For now, answer no. Any response other than Y is taken as a no.

Now hold down the Commodore key and press any of the following keys: Z, P, R, A, S, D, or F. Each combination lists a different portion of the program. You can quickly move the cursor for editing by using other combinations with the Commodore key.

Press Commodore-< to move the cursor to the beginning of a line. Press Commodore-> to move the cursor to the end of a line. Press Commodore-? to move to the middle of a line. Commodore-Crsr Down moves the cursor to the bottom left corner of the screen.

Enter the quote or insert mode. Press the Ctrl key to confirm that you're in this mode. To escape from the

PROGRAMS

quote mode, press the Ctrl key and Commodore key simultaneously.

Tags

A tag consists of a REM statement and a letter of the alphabet. You saw a demonstration of a tag if you pressed the Commodore key and one of the letters listed above. For an example, list line 10. If you have entered the line correctly, you should see REM-A. The letter is the tag identifier. You can use any letter of the alphabet as an identifier. Now hold down the Commodore key and press A. You'll notice that the program lists from line 10 onward. Suppose you want to list your program from line 600 onward. Add the following line to your program.

599 REM-T

By using different letters for different lines, you can create up to 26 tags. Note that there's no space between REM, the minus sign, and the letter. This is important.

Tips and Caveats

Most programs are written with many subroutines, each with a specific job. You can use descriptive tags to list them. If a subroutine starting at line 1000 produces a display, you might add 999 REM-DISPLAY to your program. Commodore-D will list this subroutine. Note, however, that Tag It uses only the first letter in the word for identification.

For another example, if in the same program you added 2000 REM-DRAW TITLE, Commodore-D would still list the program from line 999 onward. This is because Tag It reads only REM-D in both of the above lines; and since line 999 is found first, the listing starts from there. In general, whenever the same letter is used in two or more tags, the listing starts from the first occurrence of that tag. If you press Commodore-D with Tag It on the screen, you'll see the program list Data statements that begin with line 480.

Normally, when you press the Commodore key along with a letter key, a graphic character is displayed. These characters are generally typed within print statements. Tag It checks for the quote and insert modes. If either of

these is active, the normal graphic character is displayed. If a tag isn't found in the listing, nothing happens.

Tag It will be disabled when you press Run/Stop-Restore. Reactivate it with SYS and the starting address.

Function Keys

Now, hold down the Commodore key and press any of the function keys. The default function key definitions will be displayed. These can be altered.

List the program to see the default function key definitions in lines 220-250, or press Commodore-F if Tag It is active. You can change these definitions at will. However, the total length of the text of the four function keys (including carriage returns, if used) must not exceed 250 characters. A warning is given if this happens.

Relocation

The BASIC loader puts Tag It at location 49152. This can be changed easily by assigning a new address to variable SA in line 30. The amount of memory used will depend upon the length of the function key definitions.

If you answer yes when the program asks if you want to create an object file, you'll be asked for a filename. After that, a machine language file of Tag It is saved on disk. You can install Tag It from the object file by using the following commands.

LOAD"TAG IT",8,1

NEW

SYS starting address

Before saving the object file, you may want to change the function key definitions to your liking.

If you plan to use Tag It from the BASIC loader, add the following line to it: 395 NEW. When you run this new version of Tag It, you'll not be asked if you want to create an object file. The program will then execute the NEW command after it installs the machine language in memory.

Compatibility

Tag It is compatible with BASSEM and MetaBASIC. If you use Tag It with MetaBASIC, the 8 function keys provided by MetaBASIC will still be active, giving you a total of 12 function keys.

TAG IT

```
0801:09 08 0A 00 8F 2D 5A 00 BE
0809:3F 08 14 00 97 35 33 32 67
0811:38 30 2C 30 3A 97 35 33 9F
0819:32 38 31 2C 30 3A 97 36 09
0821:34 36 2C 33 3A 99 22 93 A1
0829:54 41 47 20 49 54 20 12 8C
0831:57 4F 52 4B 49 4E 47 2E FF
0839:2E 2E 2E 2E 22 00 4C 08 46
0841:1E 00 53 41 B2 34 39 31 E8
0849:35 32 00 5A 08 28 00 45 4C
0851:41 B2 53 41 AA 33 37 35 F2
0859:00 6B 08 32 00 8F 2D 50 51
0861:4F 4B 45 20 49 54 20 49 BB
0869:4E 00 8B 08 3C 00 81 49 C0
0871:B2 53 41 A4 45 41 3A 87 4D
0879:20 44 3A 43 4B B2 43 4B 1D
0881:AA 44 3A 97 49 2C 44 3A 76
0889:82 00 B8 08 46 00 8B 43 FE
0891:4B B3 B1 34 36 31 33 39 C3
0899:A7 99 22 45 52 52 4F 52 49
08A1:20 49 4E 20 44 41 54 41 F0
08A9:20 53 54 53 54 45 4D 45 F5
08B1:4E 54 53 22 3A 80 00 C7 26
08B9:08 50 00 8F 2D 52 45 4C 64
08C1:4F 43 41 54 45 00 D5 08 95
08C9:5A 00 46 4B B2 53 41 AA 94
08D1:33 37 36 00 FD 08 64 00 E8
08D9:48 31 B2 B5 28 28 53 41 D5
08E1:AA 31 33 29 AD 32 35 36 63
08E9:29 3A 4C 31 B2 28 53 41 D7
08F1:AA 31 33 29 AB 48 31 AC 2A
08F9:32 35 36 00 27 09 6E 00 71
0901:48 32 B2 B5 28 28 53 41 3F
0909:AA 33 34 31 29 AD 32 35 70
0911:36 29 3A 4C 32 B2 28 53 94
0919:41 AA 33 34 31 29 AB 48 ED
0921:32 AC 32 35 36 00 51 09 6E
0929:78 00 48 33 B2 B5 28 28 98
0931:53 41 AA 33 34 32 29 AD 30
0939:32 35 36 29 3A 4C 33 B2 27
0941:28 53 41 AA 33 34 32 29 07
0949:AB 48 33 AC 32 35 36 00 47
0951:7B 09 82 00 48 34 B2 B5 E1
0959:28 28 53 41 AA 33 37 36 CE
0961:29 AD 32 35 36 29 3A 4C 24
0969:34 B2 28 53 41 AA 33 37 CE
0971:36 29 AB 48 34 AC 32 35 D0
0979:36 00 93 09 8C 00 97 53 90
0981:41 AA 30 32 2C 4C 31 3A 37
0989:97 53 41 AA 30 37 2C 48 0E
0991:31 00 AB 09 96 00 97 53 79
0999:41 AA 35 36 2C 4C 32 3A 32
09A1:97 53 41 AA 35 37 2C 48 4E
09A9:32 00 C3 09 A0 00 97 53 65
09B1:41 AA 36 31 2C 4C 32 3A 1A
09B9:97 53 41 AA 36 32 2C 48 5A
09C1:32 00 DB 09 AA 00 97 53 D0
09C9:41 AA 36 36 2C 4C 33 3A 84
09D1:97 53 41 AA 36 37 2C 48 86
09D9:33 00 F3 09 B4 00 97 53 BC
09E1:41 AA 39 36 2C 4C 34 3A FE
09E9:97 53 41 AA 39 37 2C 48 B6
09F1:34 00 0D 0A BE 00 97 53 D8
09F9:41 AA 31 30 37 2C 4C 34 B7
0A01:3A 97 53 41 AA 31 30 38 49
0A09:2C 48 34 00 13 0A C8 00 1E
0A11:3A 00 21 0A D2 00 8F 2D E9
0A19:46 4E 20 4B 45 59 53 00 D2
```


0A21:56 0A DC 00 46 24 28 31 C2
 0A29:29 20 B2 22 50 4F 4B 45 ED
 0A31:35 33 32 38 30 2C 31 3A 45
 0A39:50 4F 4B 45 35 33 32 38 1A
 0A41:31 2C 32 3A 50 4F 4B 45 7E
 0A49:36 34 36 2C 33 22 AA C7 4E
 0A51:28 31 33 29 00 72 0A E6 83
 0A59:00 46 24 28 32 29 20 B2 2F
 0A61:22 46 55 4E 43 54 49 4F F4
 0A69:4E 20 4B 45 59 20 32 22 3C
 0A71:00 8B 0A F0 00 46 24 28 42
 0A79:33 29 20 B2 22 4C 49 53 C8
 0A81:54 3A 22 AA C7 28 31 33 B1
 0A89:29 00 A3 0A FA 00 46 24 CF
 0A91:28 34 29 20 B2 22 52 55 06
 0A99:4E 3A 22 AA C7 28 31 33 C6
 0AA1:29 00 A9 0A 04 01 99 00 77
 0AA9:CC 0A 0E 01 81 20 52 B2 5C
 0AB1:31 20 A4 20 34 20 3A 8B 1F
 0AB9:46 24 28 52 29 B2 22 22 9E
 0ACL:A7 46 24 28 52 29 B2 22 01
 0AC9:20 22 00 D2 0A 18 01 82 D8
 0AD1:00 0D 0B 22 01 81 20 52 4D
 0AD9:B2 31 A4 34 3A 4C B2 4C 20
 0AEL:AA C3 28 46 24 28 52 29 35
 0AE9:29 3A 82 3A 20 20 20 8B 62
 0AF1:4C B1 32 35 30 A7 99 22 A7
 0AF9:46 4E 20 4B 45 59 53 20 D3
 0B01:54 4F 4F 20 4C 4F 4E 47 84
 0B09:22 3A 80 00 1F 0B 2C 01 4D
 0B11:54 54 B2 AB 31 3A 81 20 0D
 0B19:52 B2 31 A4 34 00 31 0B 84
 0B21:36 01 81 49 B2 31 A4 C3 BE
 0B29:28 46 24 28 52 29 29 00 75
 0B31:58 0B 40 01 54 24 B2 CA B1
 0B39:28 46 24 28 52 29 2C 49 D4
 0B41:29 3A 54 54 B2 54 54 AA 84
 0B49:31 3A 97 46 4B AA 54 54 DF
 0B51:2C C6 28 54 24 29 00 5F 9E
 0B59:0B 4A 01 82 49 00 74 0B 0E
 0B61:54 01 54 54 B2 54 54 AA EB
 0B69:31 3A 97 46 4B AA 54 54 FF
 0B71:2C 30 00 7B 0B 5E 01 82 B7
 0B79:52 00 89 0B 68 01 45 41 AD
 0B81:B2 45 41 AA 4C AA 35 00 8C
 0B89:98 0B 72 01 8F 2D 41 43 04
 0B91:54 49 56 41 54 45 00 A0 5B
 0B99:0B 7C 01 9E 53 41 00 BE BC
 0BA1:0B 86 01 99 22 13 1D 1D 4D
 0BA9:1D 1D 1D 1D 12 41 43 02
 0BB1:54 49 56 41 54 45 44 20 83
 0BB9:20 20 20 22 00 E1 0B 90 3C
 0BC1:01 99 3A 20 99 22 4C 4F 45
 0BC9:43 41 54 45 44 20 41 54 2A
 0BD1:20 3A 22 3B 53 41 3B 22 B6
 0BD9:20 2D 20 22 3B 45 41 00 E2
 0BE1:15 0C 9A 01 99 3A 99 22 F3
 0BE9:53 41 56 45 20 4F 42 4A 2D
 0BF1:45 43 54 20 46 49 4C 45 36
 0BF9:20 28 59 2F 4E 29 20 3F DE
 0C01:22 3A 97 31 39 38 2C 30 F1
 0C09:3A 92 31 39 38 2C 31 3A AB
 0C11:A1 41 24 00 24 0C A4 01 6A
 0C19:8B 41 24 B3 B1 22 59 22 F1
 0C21:A7 80 00 3A 0C AE 01 99 87
 0C29:3A 20 85 22 46 49 4C 45 6E
 0C31:4E 41 4D 45 22 3B 46 24 6D
 0C39:00 4E 0C B8 01 8F 2D 53 E5
 0C41:41 56 45 20 4F 42 4A 20 72
 0C49:46 49 4C 45 00 85 0C C2 A5

0C51:01 9E 35 37 38 31 32 46 DC
 0C59:24 2C 38 3A 97 31 37 33 5C
 0C61:2C 53 41 AD 32 35 36 3A 74
 0C69:97 31 37 32 2C 53 41 AB 80
 0C71:C2 28 31 37 33 29 AC 32 58
 0C79:35 36 3A 97 37 38 30 2C A1
 0C81:31 37 32 00 AF 0C CC 01 8E
 0C89:97 37 38 32 2C 45 41 AD 0C
 0C91:32 35 36 3A 97 37 38 31 B5
 0C99:2C 45 41 AB C2 28 37 38 59
 0CA1:32 29 AC 32 35 36 3A 9E 6B
 0CA9:36 35 34 39 36 00 BA 0C 77
 0CB1:D6 01 8F 2D 44 41 54 41 4B
 0CB9:00 08 0D B0 01 83 31 32 2E
 0CC1:30 2C 31 36 39 2C 30 31 92
 0CC9:31 2C 31 34 31 2C 31 34 BF
 0CD1:33 2C 30 30 32 2C 31 36 72
 0CD9:39 2C 31 39 32 2C 31 34 2C
 0CE1:31 2C 31 34 34 2C 32 C2 E9
 0CE9:38 38 2C 30 39 36 2C 1E E0
 0CF1:37 33 2C 31 34 31 2C 30 F9
 0CF9:30 32 2C 32 30 31 2C 30 2E
 0D01:30 32 2C 32 34 30 00 53 1E
 0D09:0D EA 01 83 20 20 30 31 CF
 0D11:33 2C 32 30 31 2C 30 30 E3
 0D19:36 2C 32 30 38 2C 30 30 A5
 0D21:36 2C 31 36 39 2C 30 30 F5
 0D29:30 2C 31 33 33 2C 31 9F
 0D31:32 2C 31 33 33 2C 32 31 A8
 0D39:36 2C 30 37 36 2C 30 37 EC
 0D41:32 2C 32 33 35 2C 31 36 EB
 0D49:35 2C 32 31 32 2C 32 30 39
 0D51:38 00 9E 0D F4 01 83 20 FE
 0D59:20 32 34 39 2C 31 36 35 F1
 0D61:2C 32 31 36 2C 32 30 38 6A
 0D69:2C 32 34 35 2C 31 36 35 C7
 0D71:2C 31 35 37 2C 32 34 30 CA
 0D79:2C 32 34 31 2C 31 36 35 97
 0D81:2C 32 30 33 2C 31 33 33 37
 0D89:2C 30 30 32 2C 31 36 39 BA
 0D91:2C 30 36 34 2C 31 33 33 97
 0D99:2C 32 30 33 00 E9 0D FE 50
 0DA1:01 83 20 20 31 36 35 2C 1C
 0DA9:30 30 32 2C 32 30 35 2C D9
 0DB1:30 38 33 2C 31 39 33 2C 1C
 0DB9:32 34 30 2C 32 32 36 2C B5
 0DC1:31 34 31 2C 30 38 33 2C 5F
 0DC9:31 39 33 2C 31 36 30 2C E2
 0DD1:30 30 30 2C 31 38 35 2C D9
 0DD9:30 38 34 2C 31 39 33 2C 64
 0DE1:31 39 37 2C 30 30 32 00 33
 0DE9:34 0E 08 02 83 20 32 D1
 0DF1:34 30 2C 30 31 32 2C 32 97
 0DF9:30 30 2C 31 39 32 2C 30 EB
 0E01:33 34 2C 32 30 38 2C 32 59
 0E09:34 34 2C 31 36 35 2C 30 F3
 0E11:30 32 2C 31 33 33 2C 32 5B
 0E19:30 33 2C 30 37 36 2C 30 BD
 0E21:37 32 2C 32 33 35 2C 31 06
 0E29:39 32 2C 30 30 34 2C 31 D2
 0E31:37 36 00 7F 0E 12 02 83 AE
 0E39:20 20 30 34 38 2C 31 36 C1
 0E41:32 2C 32 35 35 2C 32 30 0A
 0E49:30 2C 31 33 36 2C 32 34 DC
 0E51:30 2C 30 31 31 2C 32 33 7B
 0E59:32 2C 31 38 39 2C 31 31 51
 0E61:38 2C 31 39 33 2C 32 30 3D
 0E69:31 2C 30 30 30 2C 32 30 F8
 0E71:38 2C 32 34 38 2C 31 33 46
 0E79:36 2C 32 30 38 00 CA 0E 6A

0E81:1C 02 83 20 20 32 34 35 06
 0E89:2C 32 33 32 2C 31 38 39 A1
 0E91:2C 31 31 38 2C 31 39 33 85
 0E99:2C 32 30 31 2C 30 30 30 24
 0EA1:2C 32 34 30 2C 30 32 30 A0
 0EA9:2C 32 30 31 2C 30 31 33 39
 0EB1:2C 32 34 30 2C 30 30 37 B3
 0EB9:2C 30 33 32 2C 32 30 32 3E
 0EC1:2C 32 34 31 2C 32 33 32 DC
 0EC9:00 15 0F 26 02 83 20 20 ED
 0ED1:30 35 36 2C 31 37 36 2C DB
 0ED9:32 33 38 2C 31 36 39 2C A6
 0EE1:30 31 33 2C 31 34 31 2C 74
 0EE9:31 31 39 2C 30 30 32 2C A7
 0EF1:31 36 39 2C 30 30 31 2C EE
 0EF9:31 33 33 2C 31 39 38 2C AF
 0F01:30 37 36 2C 30 37 32 2C 7D
 0F09:32 33 35 2C 31 39 32 2C 75
 0F11:30 30 38 00 60 0F 30 02 FB
 0F19:83 20 20 31 37 36 2C 30 33
 0F21:38 39 2C 31 33 32 2C 30 2D
 0F29:30 32 2C 31 36 35 2C 32 95
 0F31:30 37 2C 32 34 30 2C 30 C8
 0F39:31 32 2C 31 36 35 2C 32 26
 0F41:30 36 2C 31 37 34 2C 31 B1
 0F49:33 35 2C 30 30 32 2C 31 AA
 0F51:36 30 2C 30 30 30 2C 31 EA
 0F59:33 32 2C 32 30 37 00 AB 50
 0F61:0F 3A 02 83 20 20 30 33 23
 0F69:32 2C 30 31 39 2C 32 33 D6
 0F71:34 2C 31 36 35 2C 32 31 2E
 0F79:31 2C 31 33 33 2C 32 35 78
 0F81:31 2C 31 36 39 2C 30 30 D7
 0F89:30 2C 31 33 33 2C 32 31 04
 0F91:32 2C 31 33 33 2C 32 31 0D
 0F99:36 2C 31 33 33 2C 31 39 1D
 0FA1:39 2C 31 33 33 2C 32 31 A0
 0FA9:31 00 F6 0F 44 02 83 20 81
 0FB1:20 31 36 34 2C 30 30 32 EA
 0FB9:2C 31 39 32 2C 30 30 34 3B
 0FC1:2C 32 30 38 2C 30 30 33 C1
 0FC9:2C 30 35 36 2C 31 37 36 DE
 0FD1:2C 30 33 32 2C 31 39 32 66
 0FD9:2C 30 30 35 2C 32 30 38 36
 0FE1:2C 30 30 37 2C 31 36 39 67
 0FE9:2C 30 33 39 2C 31 33 33 E3
 0FF1:2C 32 31 31 00 41 10 4E 5F
 0FF9:02 83 20 20 30 35 36 2C EE
 1001:31 37 36 2C 30 32 31 2C E9
 1009:31 39 32 2C 30 30 36 2C F3
 1011:32 30 38 2C 30 30 37 2C FC
 1019:31 36 39 2C 30 31 39 2C 2E
 1021:31 33 33 2C 32 31 31 2C B4
 1029:30 35 36 2C 31 37 36 2C 37
 1031:30 31 30 2C 31 36 39 2C 7F
 1039:30 32 34 2C 31 33 33 00 04
 1041:8C 10 58 02 83 20 20 32 E5
 1049:31 34 2C 30 33 32 2C 31 83
 1051:30 38 2C 32 32 39 2C 30 3F
 1059:37 36 2C 30 37 32 2C 32 38
 1061:33 35 2C 31 36 35 2C 32 12
 1069:35 31 2C 32 30 31 2C 30 E7
 1071:34 30 2C 31 34 34 2C 30 4B
 1079:30 37 2C 30 32 34 2C 31 F3
 1081:36 35 2C 32 31 31 2C 31 8A
 1089:30 35 00 D7 10 62 02 83 1E
 1091:20 20 30 34 30 2C 31 33 DA
 1099:33 2C 32 31 31 2C 30 37 89
 10A1:36 2C 30 37 32 2C 32 33 3B
 10A9:35 2C 31 35 32 2C 30 32 BD

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10B1:34 2C 31 30 35 2C 30 35 10
 10B9:37 2C 31 33 33 2C 32 35 BD
 10C1:33 2C 31 36 35 2C 30 34 FE
 10C9:33 2C 31 33 33 2C 30 30 C2
 10D1:32 2C 31 36 35 00 22 11 9E
 10D9:6C 02 83 20 20 30 34 34 81
 10E1:2C 31 33 33 2C 30 30 33 B3
 10E9:2C 31 36 30 2C 30 30 30 E8
 10F1:2C 31 37 37 2C 30 30 32 83
 10F9:2C 31 33 33 2C 30 30 34 CC
 1101:2C 32 30 30 2C 31 37 37 9A
 1109:2C 30 30 32 2C 31 33 33 36
 1111:2C 30 30 35 2C 32 30 30 69
 1119:2C 31 37 37 2C 30 30 32 AC
 1121:00 6D 11 76 02 83 20 20 A6
 1129:31 33 33 2C 32 35 31 2C CE
 1131:32 30 30 2C 31 37 37 2C 42
 1139:30 30 32 2C 31 33 33 2C 71
 1141:32 35 32 2C 32 30 30 2C B1
 1149:31 37 37 2C 30 30 32 2C 4E
 1151:32 30 31 2C 31 34 33 2C 6E
 1159:32 30 38 2C 30 35 36 2C 59
 1161:32 30 30 2C 31 37 37 2C 72
 1169:30 30 32 00 B8 11 80 02 03
 1171:83 20 20 32 30 31 2C 30 53
 1179:34 35 2C 32 30 38 2C 30 96
 1181:34 39 2C 32 30 30 2C 31 80
 1189:37 37 2C 30 30 32 2C 31 71
 1191:39 37 2C 32 35 33 2C 32 C7
 1199:30 38 2C 30 34 32 2C 31 5E
 11A1:36 39 2C 31 34 31 2C 30 B4
 11A9:33 32 2C 32 30 32 2C 32 6F
 11B1:34 31 2C 31 36 39 00 03 6C
 11B9:12 8A 02 83 20 20 30 37 19
 11C1:36 2C 30 33 32 2C 32 30 1A
 11C9:32 2C 32 34 31 2C 31 36 6C
 11D1:39 2C 32 30 31 2C 30 33 B2
 11D9:32 2C 32 30 32 2C 32 34 44
 11E1:31 2C 31 36 36 2C 32 35 2D
 11E9:31 2C 31 36 35 2C 32 35 2D
 11F1:32 2C 30 33 32 2C 32 30 48
 11F9:35 2C 31 38 39 2C 31 36 7E
 1201:39 00 4E 12 94 02 83 20 80
 1209:20 30 34 35 2C 30 33 32 DD
 1211:2C 32 30 32 2C 32 34 31 C4
 1219:2C 31 36 39 2C 30 35 38 E4
 1221:2C 30 33 32 2C 32 30 32 AD
 1229:2C 32 34 31 2C 31 36 39 55
 1231:2C 30 31 33 2C 31 34 31 90
 1239:2C 31 31 39 2C 30 30 32 E2
 1241:2C 31 36 39 2C 30 30 31 D5
 1249:2C 31 33 33 00 99 12 9E 92
 1251:02 83 20 20 31 39 38 2C 68
 1259:30 39 36 2C 31 36 35 2C 66
 1261:30 30 34 2C 31 33 33 2C DB
 1269:30 30 32 2C 31 36 35 2C B3
 1271:30 30 35 2C 32 34 30 2C 12
 1279:30 30 35 2C 31 33 33 2C 14
 1281:30 30 33 2C 30 35 36 2C E1
 1289:31 37 36 2C 31 35 39 2C 9A
 1291:30 39 36 2C 30 36 34 00 68
 1299:E4 12 A8 02 83 20 20 30 F6
 12A1:30 34 2C 30 30 35 2C 30 52
 12A9:30 36 2C 30 30 33 2C 30 D2
 12B1:34 37 2C 30 34 34 2C 30 41
 12B9:35 35 2C 30 30 37 2C 30 35
 12C1:31 30 2C 30 32 38 2C 30 0E
 12C9:32 30 2C 30 31 38 2C 30 8E
 12D1:31 34 2C 30 32 31 2C 30 03
 12D9:32 36 2C 30 32 39 2C 30 2C

12E1:33 33 00 2F 13 B2 02 83 4A
 12E9:20 20 30 33 34 2C 30 33 45
 12F1:37 2C 30 34 32 2C 30 33 DB
 12F9:36 2C 30 33 39 2C 30 33 8B
 1301:38 2C 30 34 31 2C 30 36 68
 1309:32 2C 30 31 37 2C 30 31 68
 1311:33 2C 30 32 32 2C 30 33 DA
 1319:30 2C 30 33 31 2C 30 30 66
 1321:39 2C 30 32 33 2C 30 32 F4
 1329:35 2C 30 31 32 00 00 00 F4

Farid Ahmad says he'd still love Gazette even if we didn't publish Tag It. He lives in Islamabad, Pakistan. □

TYPING AIDS

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

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

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

Gazette is looking for utilities, games, applications, educational programs, and tutorial articles. If you've created a program that you think other readers might enjoy or find useful, send it on disk to

Gazette Submissions Reviewer
COMPUTE Publications
324 W. Wendover Ave.
Ste. 200
Greensboro, NC 27408

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

ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, *Gazette Disk* offers bonus programs. Here's a special program that you'll find only on this month's disk.

Pyramid

By Robert Cook
 Watertown, MA

This month's bonus program, *Pyramid*, is a commercial-quality solitaire card game that is actually two games in one: *Pyramid1* and *Pyramid9*. In both games, cards are stacked to form a pyramid. The object of both games is to remove as many cards as possible.

In *Pyramid1*, you must remove from the bottom of the pyramid-shaped pile a card whose number is one more or one less than that of the top card in the discard pile. Draw from the deck when you have no play.

In *Pyramid9*, you are to select two cards whose numbers total 9. Both cards may be from the pyramid, or one from the pyramid may be combined with the top card on the discard pile. Once again, you must pull cards from the bottom of the pyramid.

Both of these games are simple, addictive, and a lot of fun. They're ready to play on this month's *Gazette Disk*.

You can have this program and all the others that appear in this issue by ordering the August *Gazette Disk*. The price is \$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.

THE NORTON ANTIVIRUS

One of the most frightening catastrophes that can befall serious computer users is the introduction of a virus into their systems. Since the very first time I heard whisperings of viruses (a topic too terrible to utter aloud), I've been using one form of virus protection or another.

Virus programs come in many different forms. Some require a tremendous amount of setup effort, such as entering the names of all executable programs on your system and giving each of them "permissions." Others track your system and stop you each time any read or write occurs. Predictably, the inconvenience of either of these strategies would probably keep you from using a virus-protection program: If you can't install the program easily or if it interrupts your work, you aren't going to use it. The Norton AntiVirus sidesteps both of the usual problems.

The installation is so simple that even the most inexperienced user can do it quickly and easily. The instruction pamphlet is clear, concise, and to the point. I installed the program and was ready to go in about ten minutes. If you start the install program and choose only the defaults, your system will be protected from most, if not all, infection scenarios. If you have Microsoft Windows on your system, you only need to add NAVW.EXE to any program group, and The Norton AntiVirus will be installed for Windows.

Once the program was installed, I was able to continue with my work as if nothing in my system were differ-

ent—until I placed a floppy disk in my A: drive and tried to get a directory. The disk had the FORM virus on it and The Norton AntiVirus Intercept quickly alerted me to the fact that the disk in drive A: had a boot-sector virus. I then launched The Norton Virus Clinic and

the floppy, and copy the files back onto the floppy.

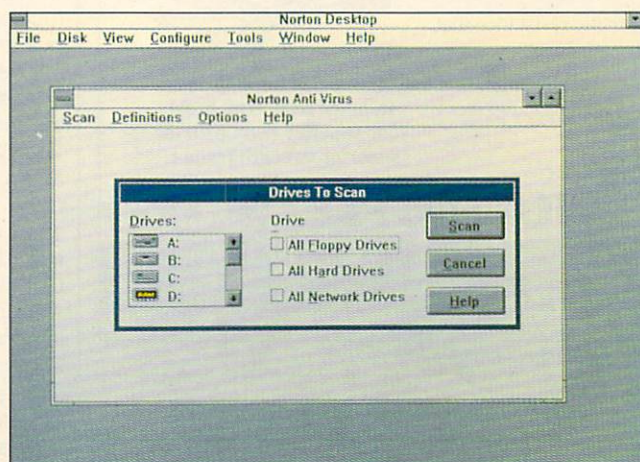
There are not only many different viruses but also many different strains of certain viruses. No product can possibly detect and fix every single one. Many new viruses are found weekly, which would lead you to be-

tions that you can install by typing them in. The latter may not sound optimal, but if you happen to have a particular virus on your system and you need a new definition for only that one, it won't take more than five to ten minutes for even the worst hunt-and-peck typist to update that particular definition.

After using The Norton AntiVirus, I can clearly see that Symantec has taken great pains to create a program capable of preserving data. It will work well on almost any system and in most cases will provide the protection you need. It's easy to install, convenient to use, and simple to update.

In these days of both software and hardware being shipped already infected with viruses, the virus problem is no longer the exclusive province of the modem enthusiast. Everyone needs virus protection, and The Norton AntiVirus is a good place to get it.

BRADLEY M. SMALL



Practice safe computing with The Norton AntiVirus, which finds viruses, alerts you to their presence, and helps you remove them.

scanned the disk. The Virus Clinic confirmed that the disk indeed had a virus, identifying the FORM virus by name.

Unfortunately, selecting the Repair option failed to remove the virus—although the program did inform me that the virus hadn't been removed. I called customer support and learned there was a way to remove the virus "by hand." Norton's customer-support staff talked me through the procedure. If the virus is on a hard drive or bootable disk, all you have to do is boot with a clean DOS disk and reissue the DOS command SYS.COM. In my case, however, the virus was on a non-bootable floppy disk. I was told to do the following: Copy (using COPY or XCOPY, not DISKCOPY) the files from the disk, reformat

lieve that any product you buy will be useless in about a month. Fortunately, The Norton AntiVirus can also overcome those difficulties. The program works by using virus "definitions"; these are like little pictures of the virus's signature. For support, there's a free bulletin board service from which you can download new virus definitions as needed. These definitions can easily be installed into your existing program, making your system as current as the technology at Symantec.

For those of you without a modem, there are two alternate ways to update your virus definitions. First, for the cost of shipping and handling, Symantec will send you a disk containing update information. Second, it has a fax service from which you can get defini-

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AST ADVANTAGE!

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Circle Reader Service Number 246

the functionality, performance, and ergonomics of a full-size computer, there's little justification for most people to give up the top of their desks to a mammoth PC.

No, the Advantage! doesn't have expansion slots, a CD-ROM drive, or a 4-billion-color graphics card. What it does have, though, is a set of features that will probably satisfy all the computing needs of a large percentage of the PC-using public, all packed into a case that's small enough to slide over to a corner of your desk. And since the Advantage! is sold through mass-market outlets such as Circuit City, its street price should be competitive with prices of brand-name desktop PCs.

When you go on the road, you don't have to settle for a stripped-down machine to get the advantage of portability. With a 20-MHz 386SX processor, a 40MB hard drive, 4MB of RAM (expandable to 8MB), an internal 2400-bps modem, and VGA graphics, the Advantage! packs a lot of utility into a six-pound package.

The machine is solidly constructed, with a heavy-gauge plastic case. In three months of use, including numerous airplane trips, I never experienced a problem with it. Its size is just about

right to fit on an airline tray table, although it's a little deep; you'll find the keyboard pretty close to your belly if you're sitting in coach.

The Advantage! has one of the best laptop keyboards I've used. The keys have a deep throw, and their feel is very similar to the feel of a desktop's keys. A PS/2-style keyboard port on the back of the machine allows you to connect a full-size keyboard (or a separate numeric keypad) when using the machine in the office. The same port can also accommodate a PS/2-style mouse.

The gray-scale LCD screen on this laptop is sharper and clearer than that of any other laptop I've ever used. It exhibits none of the ghosting problems of earlier-technology laptop screens. The onscreen clarity of the sharp black-on-white text was the primary reason I chose to do all my writing on the Advantage! instead of my desktop PC. If you do need color, the Advantage! has a monitor port on the back that supports all standard VGA modes. Also present are parallel, serial, and power-adaptor ports.

The Advantage! has a host of power-saving utilities built in, including the automatically timed shutdown of both backlighting and the hard disk. The mo-

dem and speaker can be shut off if they're not needed, and a sleep mode slows the processor to a crawl if the computer is idle for a period of time, saving even more power. On average I was able to get about three hours of usage from a single charge. If you buy an extra battery, you'll find swapping batteries a literal snap. Just open the battery cover, pull out the old battery, and slide in the new one—a welcome change from the days of removing nicad battery wires with a screwdriver. Using a standard bulky power brick, charging takes only 3 hours when the Advantage! is turned off and 10–16 hours when it's on. If you need more portability, you can purchase a trickle charger—a small, light unit that charges the machine overnight with the power off. You can't run the computer from the trickle charger, though. You can also buy an automatic adapter and an external battery charger for the unit.

The only really negative aspect of the machine is its poor documentation. The 38-page user's guide is probably all an experienced computer user will need to get up and running, but its short, one-line definitions of DOS commands will do little to help the novice. Considering that this model is designed to be sold in mass-market outlets, where the sales staff's computer knowledge is inconsistent at best, AST should have included more thorough documentation.

That minor caveat aside, the Advantage! is a real winner. Its speedy performance, power-saving features, and crystal-clear LCD screen make it a standout among laptops. All but the most power-hungry PC users will find the Advantage! a better choice than either underpowered notebook computers or desk-hogging PCs.

DENNY ATKIN

AST Advantage!—\$1,899

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Circle Reader Service Number 362

HARE RAISING HAVOC

Remember what it was like to go to the movies to see a Disney feature-length animated film, such as *Snow White*, *Pinocchio*, or *Who Framed Roger Rabbit*? Disney's new computer game, *Hare Raising Havoc*, may be too short to merit comparison to a feature film, but the Disney style and quality are there. It may be trite to say so, but a great computer game requires the same attention to detail needed with a movie production.

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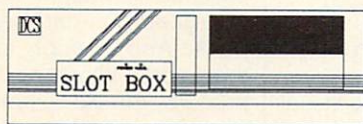
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Sam Palahnuk assembled a team who worked on the game for almost two years. Charles Fleischer and other voice talents from the cartoons re-created the voices that were digitized for the game from a script written especially for the production. It really sounds like Roger Rabbit when he reminds you, "I had better get moving," as you race to beat the clock. A movie sound-effects company digitized more than 240 effects, so when Roger gets hit on the head with an ironing board, it's a totally different sound from when he breaks dishes. The soundtrack of opening, ending, and transition music was composed and arranged by a movie composer and digitized from a sound-studio performance, so the game sounds like a Maroon Cartoon. Stings—short music pieces designed to evoke emotion—have been digitized to punctuate the action. The 1MB+ audio portion of the game is remarkably effective.

Animation is what Disney does best. The Hare Raising Havoc animation started at the Disney storyboard with pencil drawings. The pencil drawings were expanded to detailed action drawings, which were approved by the animation department before being digitized into computer graphics. Video footage from *Who Framed Roger Rabbit* was captured, modified, and digitized for the animation sequences, such as Roger's authentic and goofy 16-stage walk cycle. The animated characters were then layered over detailed, realistic, and believable backgrounds as in all Disney animated features. The drawings and backgrounds were painted with a computer paint program. The result is

some of the best computer animation seen in a game of this type. Remarkably, the action is smooth and runs surprisingly fast on a slow 386 machine.

Beyond the dazzle and glitz of Hollywood and Disney animation technology, the Disney design team had

a race against the ever-moving hands of the clock. The seeming lack of time is corrected by repeating certain actions that earn Roger extra time. The solution to the Roger game is a difficult sequence of arcade events which, when combined with the lack of a save-game fea-

Roger back for a longer and more involved romp in a sequel to this excellent game.

ALFRED C. GIOVETTI

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Circle Reader Service Number 363



Hare Raising Havoc offers Disney animation, but the game is difficult and, with no save-game feature, potentially frustrating.

to tackle a new area of interactive silicon-based entertainment. Hare Raising Havoc is accurately described by Palahnuk as a "puzzle and arcade game." As a game, it differs significantly from the other animation-based productions, such as the Dynamix adventure game Willy Beamish. Roger's puzzles are obscure, at best, and their solution requires imagination and the ability to think like a "toon." Roger must be squashed, pounded, tripped, and burned to complete the episode, all as

ture, leave no margin for error. Many will find this game too frustrating, but its visual and audio features will keep others coming back for more.

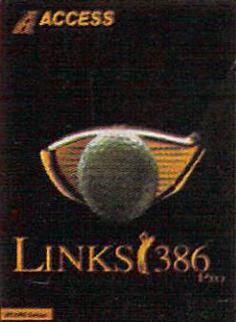
In spite of the short length, lack of locations to explore, and difficult and obscure puzzles, Hare Raising Havoc emerges as a landmark in the production of computer games. The animation, detailed backgrounds, wonderful music, elaborate sound effects, and voice track make me hope that producer Palahnuk will bring

CANON BJ-5

Canon's BJ-5 printer is nearly indistinguishable from the other entries in its portable BJ line. It uses the same bubble-jet technology that brought ink-jet printers out of the closet and put them in the briefcases of mobile executives and on the desks of home office workers. In fact, except for the color of the case—a traditional computer cream, rather than the dark gray of the BJ-10e—you won't be able to tell much difference between this and the original.

Like the other BJ printers, the BJ-5 draws power from either an AC adapter or a rechargeable ni-cad battery pack. And, though larger than some other portable printers, the BJ-5 makes a good traveling companion for sales personnel or anyone else needing access to high-quality printing while on the road. But don't sell this unit short if you're looking for a desktop printer. The compactness—12.2 x 8.5 x 1.9 inches—that makes it such a good traveling companion also serves well in a home office, where space is at a premium. When coupled with the automatic sheet feeder, the BJ-5 rivals

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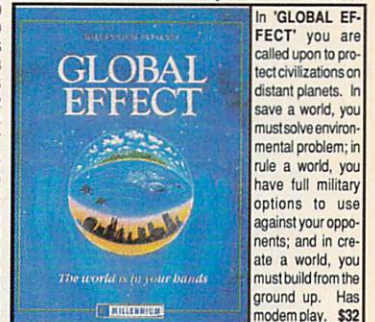
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many more expensive printers, including low-cost laser printers.

The BJ-5 setup procedure is simple and is aided by clear instructions from the brief but complete manual. The process of installing a ribbon cartridge and printing a test pattern takes about eight minutes. Characters come out clean and without smearing, though not quite as dark as characters printed from a laser printer. The quality of the BJ-5's printing certainly offers competition to 24-pin printers, however. The BJ-5 is much quieter than either a laser printer or a dot-matrix printer.

It took me about ten minutes to print a five-page, 14K text file using Ami Pro 2.0 under Windows, with a standard Helvetica typeface and the printer set to IBM ProPrinter emulation (other emulation modes include Epson 24-pin and BJ-130e). A file of the same size took six minutes using a DOS-based word processor in a Courier typeface. Both speeds are acceptable for home office and other light-duty print jobs. For Windows applications, there is a driver available from Canon (call 800-423-2366); alternatively, you can download the file BJWIN.ZIP from the Canon forum on CompuServe. With the Windows driver, you can take full advantage of the printer's 360 x 360 dpi resolution for graphics printing.

Clearly labeled touch-panel controls are located on the front of the printer. From here you can set the top of form, adjust the line and form feeds, set pitch for condensed or regular spacing, and switch back and forth between the two printing modes: Economy and High Quality. Economy saves ink

but is no faster than High Quality.

Paper can feed into the printer from the top or bottom. Envelopes or thick paper should move through the bottom slot, as it has the straightest paper path and is least susceptible to jamming. An optional sheet feeder holds about 30 sheets of paper, is very simple to operate, and installs in less than five minutes (including time spent reading the directions). In weeks of testing, the BJ-5 didn't jam once, either from the sheet feeder or in the main printer mechanism. Plain bond typewriter paper is recommended.

The BJ-5 makes a solid component for the home office desktop. With simplicity of operation and very good print quality, low noise levels, portability, reliability, and low maintenance requirements, this printer is very easy to work with. And that makes it easy to live with.

PETER SCISCO

Canon BJ-5—\$499, \$589 with sheet feeder

CANON U.S.A.
One Canon Plaza
Lake Success, NY 11042
(516) 488-6700

Circle Reader Service Number 364

MICROCAMP 2.0

Planning a family camping trip to Yosemite this summer? How about the Grand Canyon? With MicroCamp at your fingertips, you can stop worrying about whether you'll find a suitable campground and start dreaming about those hiking trails and fishing holes.

MicroCamp is a campground directory from Corinthian Concepts which finds the campgrounds and RV parks of the West that meet your needs. No longer do you

have to search through piles of brochures and information sent from your local travel agency. Just pop in the MicroCamp disk, install it on your hard drive, and decide where you want to go.

Twelve states are included in the database: Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. You simply select the state you'll be visiting and begin narrowing your search.

MicroCamp allows you to decide whether you're interested in campgrounds within a certain geographical region or recreation area, or campgrounds close to a specific town. Then, you consider whether you prefer to stay in federal, state, or private campgrounds—or whether you're interested in them all.

Next, you determine what sort of accommodations you require. Are RV hookups and disposal important to you? You can decide whether you want a campground that has boating, fishing, or hiking trails, or one that lies at a certain elevation. If you'll be traveling in the fall, winter, or spring, you'll want MicroCamp to help you find campgrounds open then. There are 14 options on the Features screen to help you limit your search.

My fiancé and I are planning a trip to New Mexico and Yellowstone. MicroCamp found many campgrounds in north-central New Mexico that met our basic requirements: open by May 20, pets allowed, and 15 or more tent sites, with flush toilets, drinking water, and showers available. Five of the campgrounds are right on our intended route, so I printed their reports.

Now, when we get close to our destinations, we'll have directions to the campgrounds, their phone numbers, and other helpful information.

I repeated the search in Colorado and Wyoming, finding several campgrounds along the route we'll be taking. It was so easy that I had all the reports printed out an hour after I opened the MicroCamp package.

The program is menu driven and very easy to negotiate. Context-sensitive help is available at every screen, but the program is so intuitive that you probably won't need the help. If you dislike the screen colors and have a color monitor, it's easy to change them. You can adjust screen contrast if you have a monochrome monitor or an LCD screen—handy if you plan to take MicroCamp with you on your laptop.

The only fault I find is that there aren't enough states in the database. Traveling from the East Coast, we have a lot of miles to cover before reaching the part of the West included in MicroCamp 2.0. But begging for more is a compliment rather than a complaint.

We leave on our trip in a week, and yesterday we were concerned about being able to find appropriate campgrounds. Today, our MicroCamp reports are packed with our maps, and all we have left to do is load the car. Westward ho!

KAREN LEE SIEPAK

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QUANTUM PASSPORT XL

There's an old adage about not needing something until you don't have it—and then needing it real bad. That adage might well describe the Quantum Passport XL disk drive system. Not everyone needs a removable hard drive, but those who do *really* do. For about 1½ to 2 times the cost of a nonremovable hard drive, you can have a removable one. That expense may seem like a lot, but consider the justification for it.

There are several scenarios in which a removable hard drive is necessary. Absolute data security, such as being able to lock your data in a safe—or at least take it with you upon leaving your work area—is one. Then there's convenience—the ability to have exactly the same setup at home and at your office, or simply to take massive files home. A removable hard drive would work better than a remote control program which operates your office computer. You may also need a mirrored (exact working duplicate) file system.

The Quantum Passport XL drive system takes care of those needs, and it's easy to install, as well. When it comes to hardware installation, I usually experience only one emotion: fear! This feeling was quickly alleviated when I began installing the Quantum Passport XL. As a matter of fact, within about 12 minutes I not only had the drive installed but also had my complete 40MB hard drive copied over to it. The instructions were thorough, clear, and concise.

The system I have come

with a SCSI card, an external chassis, and a 240MB disk drive. The list price for the system I tried is \$1,787, but I've been informed that the street price is more like \$1,429. My system came with the external chassis; this was necessary because my computer lacked an open exposed drive bay. This accounts for some of the external system's cost. If you have a free exposed drive bay, you can install the internal chassis and save \$110.

There are a few things worth noting about a SCSI interface. Many SCSI devices can be daisy-chained (each connected to the previous) without a second card. Since the SCSI interface has its own BIOS, it can coexist with other interfaces and even other disk controllers. It should also be noted that even though a SCSI interface does carry a greater cost, the cost may be offset by its ability to run devices not necessarily designed for the microcomputer industry, such as many of the very large hard drives, as well as most nine-track (reel-to-reel) tape drives.

Changing a drive controller address for the Quantum Passport XL was as simple as reading a diagram and moving one jumper. Beyond that minor adjustment, I was able to install the card without much thought or effort.

The chassis installation was actually fun. The chassis has ingenious little feet that can be configured so that it will sit up either vertically or horizontally. The instructions even explain that there is a "right side up" in both configurations. After putting the feet on, all I had left to do was connect the external SCSI cable from the back of the SCSI card to the

back of the chassis and turn the disk drive on.

On the back of the disk drive are two switches. One of them is labeled BOOT, and the other PROTECT. The BOOT switch determines whether or not to boot from the removable disk, and the PROTECT switch is like the write protect tab on a floppy disk. I set them both to OFF and placed the drive in the chassis (it only fits in one way unless you really force it). I then turned on the computer, placed the installation software in my A: drive, and ran the installation program; it asked all the right questions and did all the work itself.

After the installation was through, I set the BOOT switch to ON and rebooted the computer. The only difference was a crucial one: This disk is extremely fast—perhaps *crisp* would be a better adjective. It's a 9-ms drive that leaves everything else I've tried in the dust.

BRADLEY M. SMALL

Quantum Passport XL—\$449 (50MB), \$629 (105MB), \$799 (120MB), \$949 (240MB) AT internal kit with adapter—\$578 Microchannel internal kit with adapter—\$688 AT external kit with adapter—\$688 Microchannel external kit with adapter—\$798

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MYBUSINESS-CHECKBOOK

Don't be fooled by the name: MyBusinessCheckbook is more than a simple checkbook balancer. It's a low-end home and small business money manager that also prepares budgets and reports. You can import

financial data from Quicken and Checkfree and export it to Lotus worksheets or as ASCII files. Continuous-feed check blanks are available.

You can set up multiple accounts and track them by user-defined categories, with a ceiling of 50,000 entries. Installation is uncomplicated. The fairly intuitive user interface drops down menus over its main working screen, which features scrolling check blanks and a running account balance.

The package offers neither written documentation nor an F1 help key; instead, you'll find instructions in a separate file within the program. Telephone support is prompt and knowledgeable. While not recommended for a large business or an individual with a complex financial portfolio, MyBusinessCheckbook is fine for consumers and companies with minimal cash flow.

KATHY YAKAL

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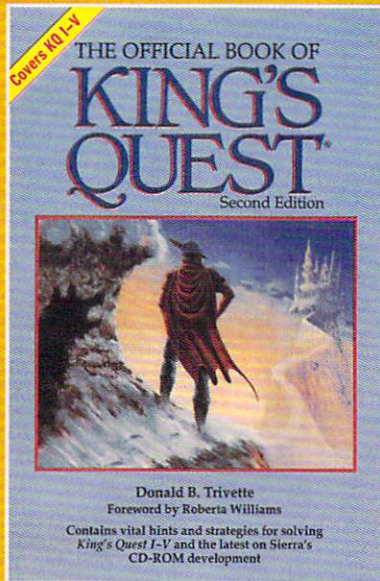
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EPSON NB3S

Now that Epson is shipping its new NB-SL line of notebook computers, the company has discontinued its previous notebook—the NB3s. As a result, the NB3s can now be bought at a bargain price, making it a highly competitive machine.

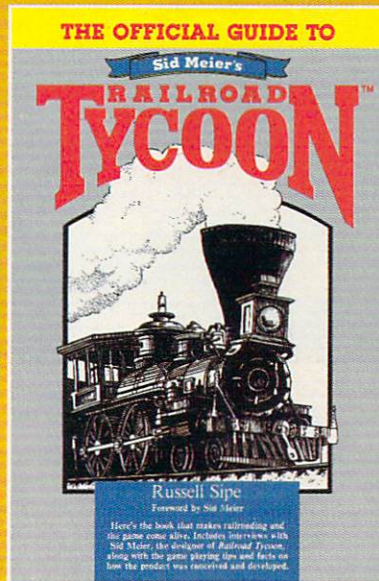
For an early-generation notebook, the NB3s is extremely small and lightweight. It's only 1.7 inches high, and it weighs just 5.8 pounds including the battery. The hard drives come in 20MB, 40MB, and 60MB

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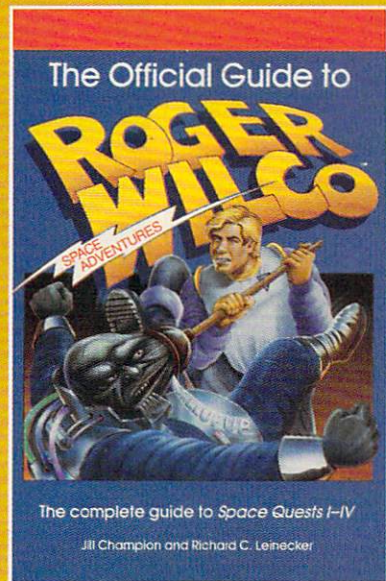
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Here's the source for hints, tips, and background for the newest adventure, *King's Quest V*. This new volume includes more clues, maps, and inside details, along with more ways to add even more fun to all five of the best-selling *King's Quest* games. Covers *King's Quest I - V*.



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This is the book that makes railroading and the game come alive. Inside players will find interviews with Sid Meier, the designer of *Railroad Tycoon*, along with facts on how the product was conceived and developed. Also includes formulas the program uses to determine income and expense.



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YES!

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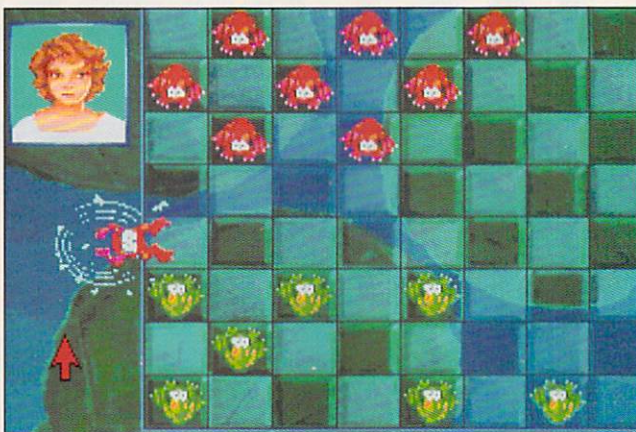


sizes, and they're removable—so you can easily carry an extra hard drive with you. The 60MB drive I tested worked fine with Stacker 2.0, providing a 120MB hard drive in a very small package.

Epson also offers an optional lightweight docking station that lets you add two standard 16-bit cards and a proprietary 200MB hard drive. The docking station has its own handle and can be carried with the NB3s attached. Epson even offers a special carrying case that accommodates both units, which together weigh only ten pounds. This combination, unique at this price, would allow you to add both network and multimedia cards and easily move the whole thing between your office and home.

For a notebook computer, the keyboard has an excellent feel. The NB3s uses the much-preferred inverted-T cursor-key layout, though the Insert and Delete keys are awkwardly placed to the right of the space bar. There's also a standby button that you can use to shut down most of the unit's power quickly without having to reboot. As is true with most early notebooks, pressing the standby button will lock up the system when you're in Windows' 386-enhanced mode.

As for the NB3s's disadvantages, there are three main ones: a very short battery life, a slower-than-usual processor, and the inability to switch automatically between normal and inverse modes while in Windows. The rechargeable battery runs only 1 to 1½ hours, though this is somewhat mitigated by Epson's including two batteries with the unit. The processor runs at 16



Hoyle's Official Book of Games, Volume 3, allows children and adults to play several fine games, including frog checkers.

MHz, rather than the 20- and 25-MHz speeds more common in today's notebook computers.

Not being able to switch automatically between normal and inverse modes requires a bit of explanation. Because white text against a black background can be hard to read on an LCD screen, most notebook computers switch from inverse to normal when moving from a text-based to a graphics-based application. The NB3s doesn't do this automatically, but it does include a program that you can use in your batch files to make the switch for you. Unfortunately, this program doesn't work under Windows. If you prefer black text against a white background and use Windows, you'll have to put up with a certain amount of frustration. If you prefer white text against a black background or don't use Windows, you'll feel perfectly at home.

If the slower processor, shorter battery life, and inverse-mode problems don't bother you, the NB3s is a nice little notebook. Its small size and lightweight docking station make it a good choice for shuffling be-

tween your office and home. Since the NB3s was discontinued earlier this year, if you see one for a bargain price at your local discount store—as I did recently—consider picking it up and giving it a try.

DAVID ENGLISH

Epson NB3s with 1MB RAM and 60MB hard drive—\$3,398

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HOYLE'S OFFICIAL BOOK OF GAMES, VOLUME 3

In Hoyle's Official Book of Games, Volume 3, Sierra returns once again to the tried-and-true games format used in its two earlier versions. Hoyle's 3 presents us with six new game challenges: Checkers, Backgammon, Dominoes, Snakes and Ladders, Yacht (a variation on Yahtzee), and Pachisi (a variation on Parcheesi). The third Hoyle's presents board games as opposed to the card games that were offered in Hoyle's 2.

I was pleased to see that the computer opponents presented in Hoyle's 3 are, as in the first Hoyle's, nine heroes and nine villains of other Sierra games. (Hoyle's 2 is a solitaire game; there are no opponents other than you and the cards.) You can now pit your Pachisi prowess against Passionate Patty and her pulsations. You can overhaul Vohaul's Yacht. The nine heroes are arranged in order of their difficulty as opponents, from Mother Goose, whose digitized voice prompts you when you make a mistake, to Sonny Bonds, whose ruthless play is mirrored in his squinty-eyed computer visage. The villains are similarly ordered according to their play proficiency. If you don't like computer opponents, you can play against human ones.

Checkers is by far the cutest game in the box, with little green and red frogs sitting and croaking on lily pads configured in the familiar 8 x 8 checkerboard pattern. A frog can jump from anywhere to anywhere, even to the top of your opponent's head. It will then jump back to its original position, while your opponent's digitized voice informs you that you've made an illegal move. If a legal move is made, the game proceeds as usual. If you make a double jump, your opponent will acknowledge your obvious demonstration of skill with a compliment. Once jumped, frogs dive deep into a pond. Should you choose, traditional button-shaped checkers can be used, but I strongly recommend playing with the frogs at least once.

Yacht and Pachisi are similar to the board versions of the games Yahtzee and Par-

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cheesi, but not identical. In Yacht, you use five dice to build poker hands. The flashy color-cycling background where the dice are rolled is animated to increase variety and interest. In Pachisi, you can play with up to four players, either computer-controlled or human. Cowrie shells, which were used in the ancient game, can be rolled instead of dice, with the clear or slitted side of the shells indicating the number of moves. An alternate board layout can be selected for gameplay. Neither Yacht nor Pachisi has a board exactly the same as that of its respective board game.

Dominoes, Backgammon, and Snakes and Ladders are the traditional games with no differences in this version. Dominoes can be played with two players and six different sets of rules. Backgammon can be played with two players and allows for use of the doubling cube if desired. Backgammon also lets you play with acey-deucey rules against a human, and two board designs are available. Snakes and Ladders is played with up to four computer or human players. The playing pieces are animated children who automatically climb the ladders and slide down the snakes. The animation is fluid, well done, and fascinating to watch. The rules can be varied, and the game can be configured so it prompts younger players to make the correct moves.

Hoyle's backgrounds, opponents, and playing pieces are animated, with digitized voices and a varied musical score accompanying play. The music is impressive throughout, as are the digitized voices. While playing the games, you can carry

on conversations with the computer players to get information on the history of the games. Hoyle's 3 comes in 256-color and 16-color VGA and EGA with two sets of 3½- and 5¼-inch disks. Modem play is not supported by the game. If you wish to play a human opponent by modem, you must subscribe to The Sierra Network (TSN), a new electronic database service recently established by Sierra, and play Hoyle's 3 on the TSN board. Some voice bugs have been reported, such as conflicts with the mouse and partial rather than complete phrases and words.

On the whole, Hoyle's 3 is a great game for adults and children alike. Small children will learn about the games by choosing opponents like Mother Goose, who will not only teach them how to play but also tell them about the history of the games. If my experience is any indication, grownups will be equally entertained. Hoyle's 3 will probably be a permanent addition to my hard drive.

ALFRED C. GIOVETTI

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DICONIX COLOR 4

Kodak's Diconix Color 4 is a lightweight and quiet desktop color ink-jet printer that uses four drop-in cartridges of black, magenta, cyan, and yellow ink to produce an expansive palette of color combinations.

The Color 4 offers 192 x

192 dpi resolution on both plain paper and ink-jet transparencies. Its ability to print transparencies could be a real boon to anyone who needs to create display or presentation transparencies for use in overhead projectors. The Color 4 accepts both cut-sheet and tractor-feed paper.

Setting up the Color 4 is simple. A system card which contains driver information slips into a slot in the back of the printer, and the four color cartridges drop easily into their color-coded receptacles in the printhead assembly. The cartridges do have to be primed for use first. This involves using a paper clip to start the flow of ink before the cartridges are inserted. A small sheet of blotter paper supplied with the printer must also be inserted in a special receptacle. This blotter absorbs excess ink and helps prevent smearing.

The printer's display panel contains the usual online, linefeed, and form-feed buttons, plus a 16-character LCD display window. This display keeps you informed of any errors, and it also serves as a menu from which to select printing functions. From this menu, you can select either paper or transparency, print quality, any of three resident fonts, text color, and text mode.

This display is especially useful whenever a malfunction occurs. The Color 4 can diagnose most problems and flash an appropriate message on the screen. Some messages, such as *ADD PAPER*, are easy to understand, while others, such as *CARTRIDGE D 41*, require help from the manual in locating a possible cause and remedy.

I experienced this latter

message a number of times when I first used the Color 4 near an office window. One possible remedy involved removing, inspecting, and priming the black ink cartridge. This error persisted intermittently and became quite annoying. Later, I discovered that ambient light could be the culprit, causing such repeated errors to occur. An optical sensor tracks carriage and printhead movement, and bright light on this sensor can cause errors. After I made certain that the printer's lid was closed and I moved it away from the window, the Color 4 worked very well.

I tried the printer with a number of color printing programs, but very few of them had a printer driver for this new model. The manual recommends selecting a Hewlett-Packard PaintJet driver as an alternative.

Whenever this driver was available, the Color 4 performed quite well and the quality of its color images was impressive. Drivers are supplied on a separate disk for using the Color 4 with Microsoft Windows.

On the negative side, I was not impressed with the quality of the Color 4's text printouts. Draft, NLQ, and Quality modes are available, but even at its highest resolution, I'd hesitate to recommend the Color 4 for business correspondence. I *would* recommend it, however, for use at home, at school, or anywhere else that low-cost color printouts are needed.

TOM NETSEL

Diconix Color 4—\$895

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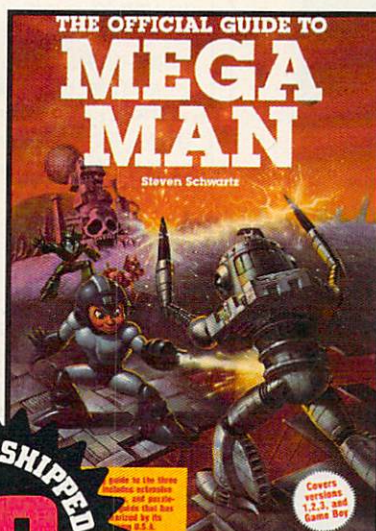
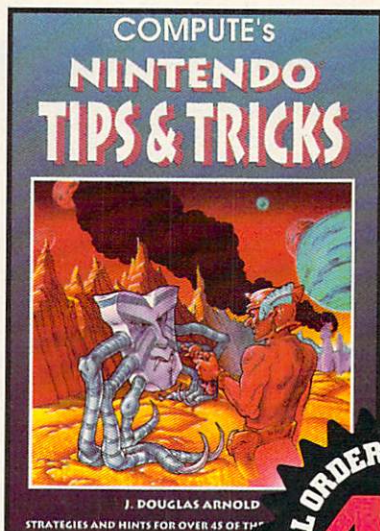
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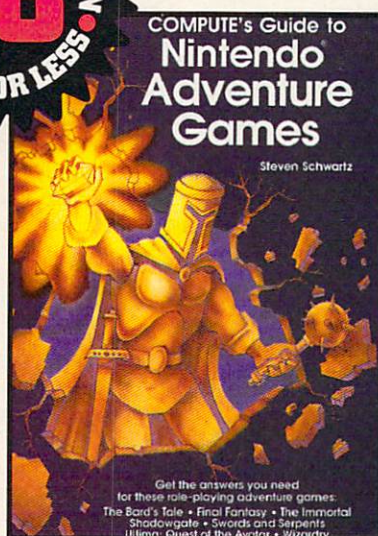
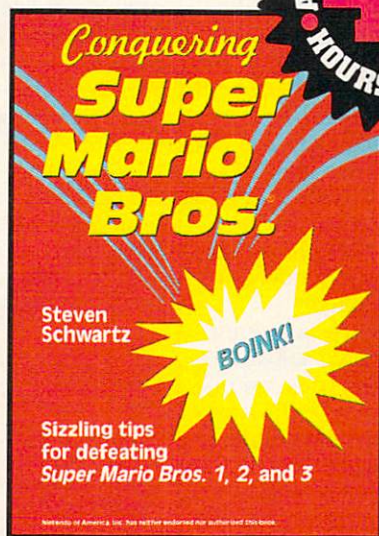
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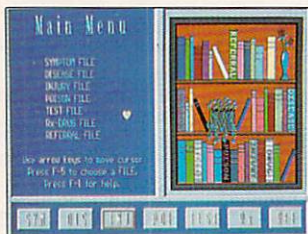
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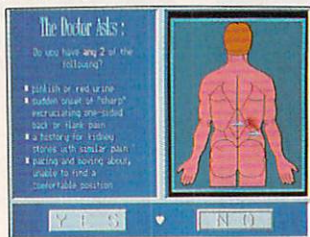


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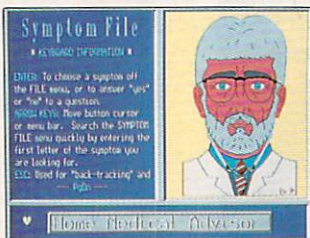
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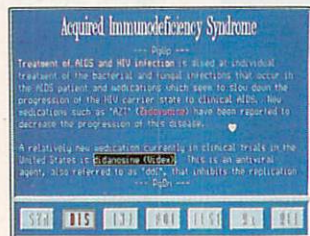
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REVIEWS

DESIGN YOUR OWN HOME

For many years, I've dreamed of designing my own house, and I've covered an untold number of sheets of paper with sketches and plans. But the effort made one thing abundantly clear. I'm no architect, and it shows.

Then I discovered the Design Your Own Home software from Oregon-based Abracadata. Its three modules (Architecture, Interiors, and Landscape) brought my PC into the picture. Ah . . . Just the thing for a would-be Frank Lloyd Wright like me!

The DYOH modules are, in essence, a set of specialized CAD programs with reasonable price tags and gentle learning curves. At the heart of each one is an intuitive, Windows-like user interface with pull-down menus. Each module offers a variety of appropriate tools for creating and labeling your designs; a mouse is highly recommended for DYOH.

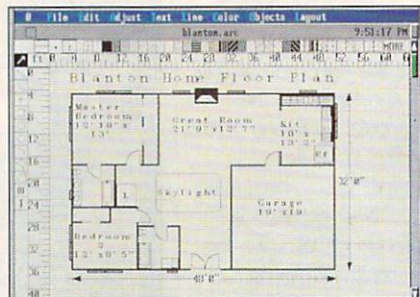
One key to successful PC-based design is the ability to create and export layers, and this is easily done in the DYOH modules. For instance, you can create a floor plan in DYOH Architecture with separate overlays showing wiring and plumbing. You can then import the basic plan into DYOH Interiors to lay out furniture and plan the decor. Finally, you can use DYOH Landscape to plan the plantings and gardens. It's straightforward, and it's fun!

Although each module is a stand-alone package, many users will want to start by designing a floor plan and elevations (side views) with DYOH Architecture. Features such as automatic scaling and snap-to-grid speed the process, and a library of pre-drawn architectural symbols (stairs, doors, and so on) eliminates tedious detail drawing. You can modify a built-in sample plan, work with a plan from one of the optional libraries, or (like me) start from scratch and design your own. Plan size can range from one page wide by one page high (a single screen) to eight pages wide by eight pages high.

With the floor plan done, DYOH Interiors helps you design the interior and arrange the furniture. You have control over color, texture, and even simulated wallpaper patterns. Interiors also offers a library of common furnishings, which you can move anywhere you want. Finished with your arrangement? Check it out from four different sides and from above. Don't like it? Just click on the of-

fending piece of furniture and drag it somewhere else. At last—a way to move sofas without working up a sweat!

Finally, DYOH Landscape helps you plan the plantings around the structure you've designed. The program automatically generates four side views from your top-view drawing. You can also preview the landscape at different



Abracadata's Design Your Own Home gives a total picture at a good price.

seasons and even at different ages (helpful for seeing how your landscaping will look once it's "grown out"). The program includes a basic library of plant types, although you may want to add one of five optional regional plant libraries, too. DYOH Landscape even prepares a shopping list for you to take to the local nursery.

As you might expect, the DYOH packages are not quite so gutsy as their full-blown CAD cousins. But neither are they as expensive or as complex. You'll master any of them in just a couple of hours, and you'll be turning out the plans for your dream house in no time at all.

STEVE HUDSON

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LEXICA

WordStar's Lexica describes itself as "a memory-resident, multilingual, translating thesaurus that can quickly translate words and phrases from one language to another." While Lexica won't exactly undo the curse of Babel, it may well make dealing with foreign languages easier—if you already know them.

Lexica's thesaurus contains a generous selection of words from English, Dutch, German, French, and Spanish (any or all of these languages may be loaded on your hard drive). The program may be called up from within a

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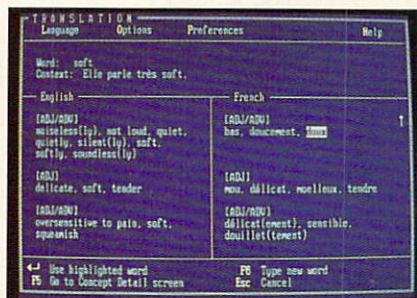
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word processor or at the system prompt. To access Lexica from your word processor, you place the cursor on the word you want translated and press the hot keys. The memory-resident Lexica will take you to the Translation Screen, which consists of three main windows. The top window displays the word you want translated, as well as a sampling of its context. The



Lexica can give multilingual synonyms to bilingual or multilingual people.

lower left window contains your word in the primary language you're working in (called the Source Language); a list of its synonyms; and, in some cases, idiomatic phrases in which the word typically occurs. The lower right window displays the Target Language translation, with the primary translation highlighted, along with a collection of the word's synonyms.

Even more information is available on the Concept Detail Screen. Here, you may highlight each of the Source Language synonyms in turn, and the Target Language Window will indicate the most appropriate primary and secondary translations for the word chosen. Move the highlight to the translation you prefer and press Enter. If Lexica supports your word processor, it will erase the original word and substitute the translation. If Lexica doesn't support your word processor, the translation will be inserted, but you'll have to delete the original word yourself.

Once in Lexica, you can easily switch from language to language to provide a multilingual sampling of translations. If you want to translate another word, you don't have to return to your text; Lexica allows you to type in a new word in any of the supported languages at any time. If the word contains international characters (accents or other diacritical marks) not on your keyboard, Lexica also provides a Compose Characters screen that shows you how to produce the character you need.

If you think you've finally happened across Star Trek's fabled Universal Translator—sorry. Lexica will be of limited use if you don't already know at least some of the basic grammar of your target language. Lexica doesn't,

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for example, conjugate verbs. If you ask it for, as an example, the French equivalent of the verb *try*, you'll get the infinitive forms: *essayer*, *examiner*, *mettre à l'essai*, as well as many other synonymous verbs. But deciding on the person, number, and tense of the verb is up to whatever you've retained of high school or college language study. (Lexica does, however, helpfully indicate whether the verbs are transitive or intransitive.) Similarly, because words don't translate from one language to another with mathematical exactitude, you'll have to know a little about the connotations of the Target Language words and their appropriateness in the context of your writing—a basic requirement for the use of any thesaurus.

Lexica is quite easy to learn and use. Most of its functions can be performed either through function keys or the handy pull-down menus, and the user's guide provides clear instructions in all five of the supported languages. Those who are cursed with slower PC systems may experience a wait of up to 30 seconds for Lexica to appear, but once you're in the system, it performs with gratifying speed. For people who frequently deal with other languages, Lexica is a wonderful remedy for those momentary bouts of aphasia.

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SPEEDBALL 2

Speedball 2 is more than a futuristic, fast-action sports game; it's a full sports simulation that lets you compete in a 16-team league for the world speedball championship. Over the course of the competition, you'll use the detailed player and team statistics to trade and buy new team members in order to create an invincible force of speedball demons. In addition, you can use the money your team earns to buy extra equipment to boost your players' stats.

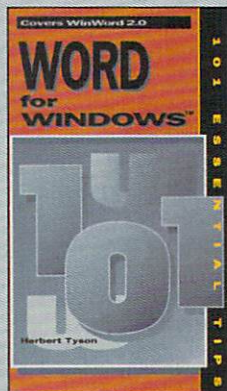
When the game begins, you can choose from four play modes, including Knockout, which is a series of exhibition games against each of the 16 teams; League, which is a 14-game season; Cup, which is a single-elimination tournament; and Practice, which gives you a chance to run your team members through their moves without an opponent getting in the way.

Depending on the type of game you choose, you can view team and play-

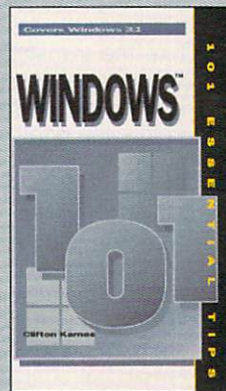
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er statistics, fire and hire players, and buy new equipment. A splendidly crafted 3-D control panel—including player portraits, equipment display, moving buttons, and panel lights—guides you through this portion of the game.

When your team is ready, it's off to the playfield where the fun really revs up. The object of the game is to get the speedball into your opponent's goal, but the playfield contains myriad devices and special items that complicate gameplay wonderfully. The score multiplier ramp, for example, increases the value of your goals each time you manage to roll the ball through it. In addition, electrobounce units change the speedball into an electrified menace, stars on the side wall light up and give extra points when hit, and warp gates suck the ball up and spit it out in a new location.

Also on the field are coins you can scoop up and use to buy new equipment, and tokens you can grab, each of which affects some facet of gameplay. Tokens can reduce your opponent's statistics to their minimum, move the speedball instantly to one of your players, lock your goal, boost a player's energy, increase your players' statistics to their maximum, and more. Pieces of equipment, which appear sporadically on the playfield, boost one of a player's statistics when picked up.

Sensational graphics, convincing animation, snappy music, savory sound effects, and smooth gameplay combine to make Speedball 2 a guaranteed hit. Computer sports fans won't want to overlook this one.

CLAYTON WALNUM

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PC PARTNER LX

Leading Technology's PC Partner LX is a super machine for two reasons: high technology and low price.

Designed with new computer users in mind, it comes straight out of the box ready to plug in. It's equipped with everything today's computer whiz needs (to get started, anyway), and you have the option of ordering an array of peripherals as you expand your knowledge.

The PC Partner LX comes with two floppy drives (5¼- and 3½-inch), allowing you to use both disk formats. It's equipped with a 40MB hard drive, a full megabyte of memory (many new software packages require a meg), and a VGA monitor. In short, the package has everything you need to run all your favorite—or soon-to-be-favorite—applications.

It took me less than ten minutes to set up the unit. The ports at the back of the machine are clearly marked, so there was no confusion as to where to plug what. There are ports marked for the keyboard, mouse, joystick, and monitor, in addition to two serial ports and one parallel port for the printer. The connectors are the thumbscrew type, so no tools are needed.

The documentation that accompanies this unit is logical and easy to read. The layout of the manuals and an extensive index make it easier to find that one bit of

information you don't have.

The PC Partner comes with HyperDOS already loaded on the hard drive. HyperDOS is the neophyte computer user's best friend. In clear and concise language, this GUI (Graphical User Interface) teaches you what you need to know about your computer and gives you a great environment in which to apply your knowledge.

HyperDOS is split into two basic sections: Knowledge and Accessories. In the Knowledge group you can find information on computer care, hardware components, warranty issues, repair, and technical support. It's nice knowing that when you need it, the information is easily accessible even if—God forbid—your children colored on the tech support pages of your manual.

The Accessories section provides you with all the desktop features you need to keep up with your busy schedule: a calendar for all your important activities, a letter writer for your correspondence, an address book for your friends' whereabouts, and a calculator for your finances. The DOS operations screen shows note cards with DOS commands (in perfect syntax) written on the top, with an explanation of the commands below. All you do is click on the card to execute the command. You can use the DOS Shell to explore your operating system and actually see and learn how it works. There's even a Program Manager section that enables you to access your favorite add-in programs from the GUI. The instructions on how to add programs are clear and easy to follow.

If you like, this can be the computer that you built. Leading Technology offers

many options at reasonable prices. Larger hard drives, memory upgrades (to 4MB), internal and external modems, mice, sound boards, high-resolution video cards, and CD-ROM drives are some of the options available. The unit that I worked with had the standard 640 × 480, .52-resolution VGA monitor, and if I were purchasing one of these units (which I'd certainly consider), I'd opt for the higher-resolution monitor. When you're doing marathon stretches of computer work (such as when you discover the hottest new action game and play it for eight hours straight), the first thing to go is your eyes. Anything to eliminate the itching and burning eyes and headache is worth a few dollars more.

You may also opt for additional software. Leading Technology offers several types of bundled software. Preschool, Grammar School, High School, Entertainment, Personal Home Manager, and Business Manager bundles are available. Each bundle contains six software programs. Window Works and Lotus Works are also offered.

At \$1,199 for the basic computer, the PC Partner LX is priced well under its competitors. For someone who's just breaking into the money pit of home computing (there's always another gadget or some new software package with better . . . *whatever* to put on your wish list), it's a reasonable price for better than reasonable performance.

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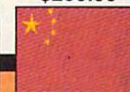
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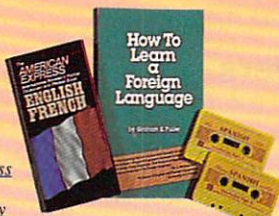
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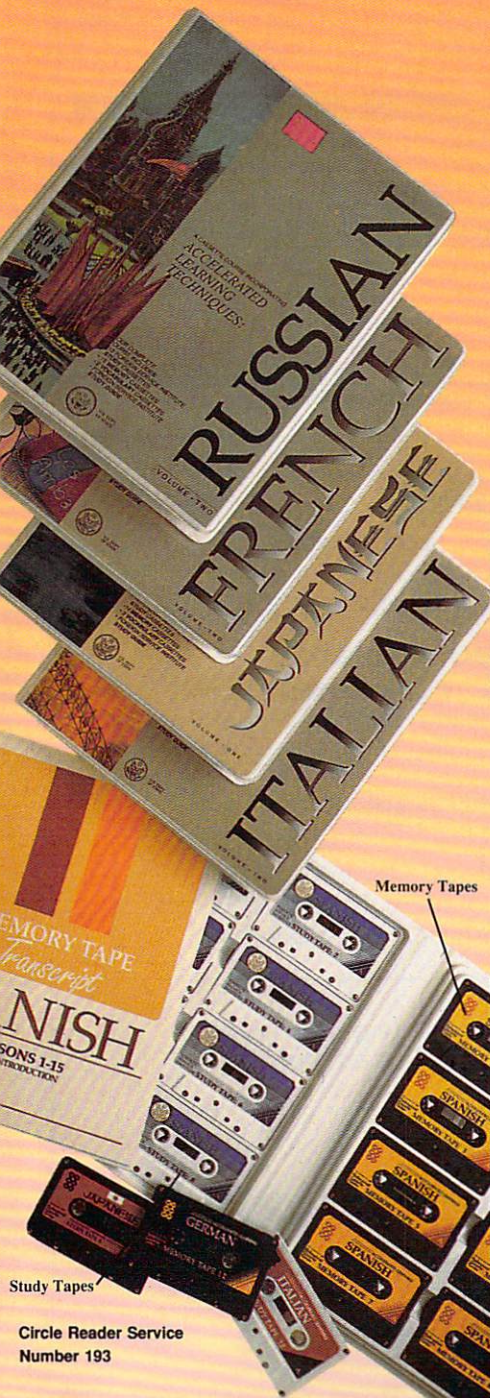
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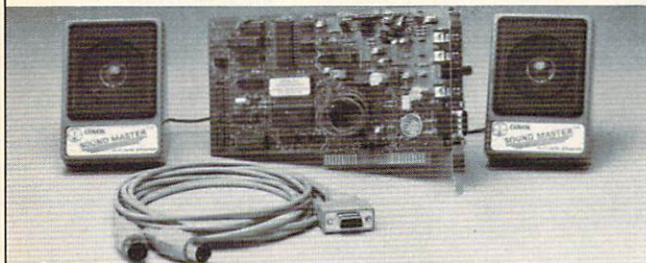


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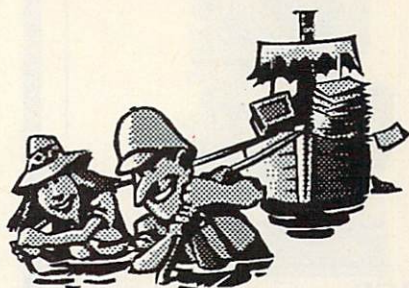
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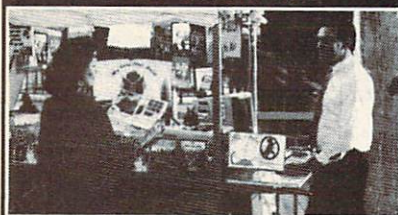
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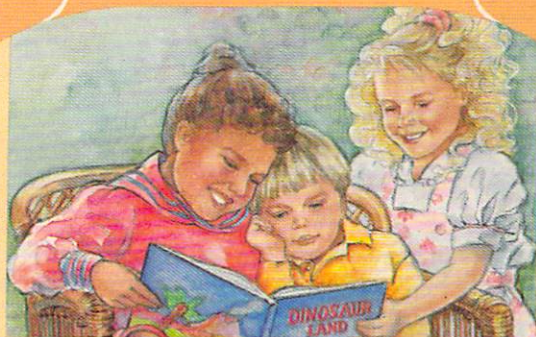
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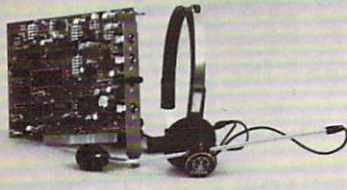
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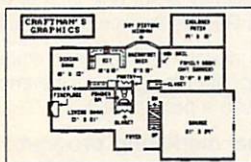
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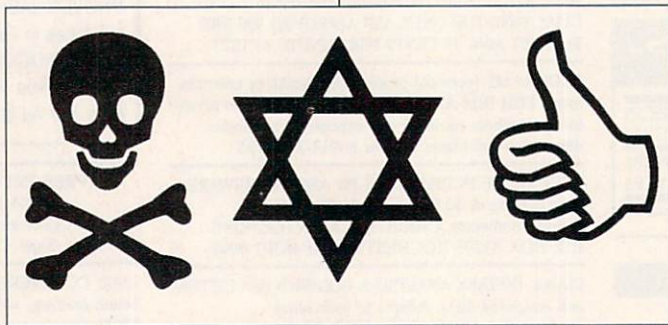
Against All Odds

In the wake of the riots following the Rodney King verdict last April, it should come as no surprise that heightened racial tensions sometimes lead to erroneous accusations. Take the case of an April 29 *New York Post* story in which an unnamed computer consultant discovered what he thought was an anti-Semitic message in Microsoft's Word for Windows program. When the letters NYC (for New York City) are changed to their corresponding Wingdings font symbols, a skull and cross-

ic keys; rather, they're grouped according to symbol, which you'll notice if you type out the entire alphabet in the Wingdings font. To avoid offending anyone, Microsoft says it will probably change the mapping of the Wingdings symbols in future versions of the font.

The Best on the Continent

The award season wouldn't be complete without the 1992 European Computer Trade Show Awards, handed out in London this past April. The winners were the following:



bones, Star of David, and thumbs-up sign appear. Accusations began flying when the consultant and others who saw the sequence of symbols were quick to interpret it as a code deliberately placed to convey an anti-Semitic message asserting "Death to Jews in New York City."

One friend of the consultant's who also believed that the symbols were an intentionally placed code calculated the odds of such symbols appearing in sequence while corresponding to the letters NYC at about a trillion to one.

Microsoft absolutely denies that the sequence is anything but an unfortunate coincidence, a conclusion supported by the Anti-Defamation League, which investigated the incident. Microsoft points out that the dingbats aren't intentionally mapped to specif-

ic keys; rather, they're grouped according to symbol, which you'll notice if you type out the entire alphabet in the Wingdings font. To avoid offending anyone, Microsoft says it will probably change the mapping of the Wingdings symbols in future versions of the font.

Best Action Game—Turbo Challenger II, Best Adventure/Role-Playing Game—Eye of the Beholder, Best Art Package—DeluxePaint IV, Best CD Game—SimCity, Best Graphics—Wing Commander II, Best Home Productivity Package—Amos 3-D, Best Packaging—3-D Construction Kit, Best Simulation Game—Railroad Tycoon, Best Sound—Wing Commander II, Best Sports Game—Jimmy White's Whirlwind Snooker, Best Videogame—Sonic the Hedgehog, Game of the Year—Lemmings, Most Original Game—Civilization, Software Publisher of the Year—MicroProse, Hardware Manufacturer of the Year—Sega, Going Live! Viewers Award—Sonic the Hedgehog, and LOG-IN Award—4-D Boxing. The COMPUTE Magazine Award was won by Stacker.

Game Developers Conference

Also in April, the 1992 Game Developers Conference was held in San Jose, California. Winners for best games overall, voted by the game developers themselves, were Monkey Island 2, SimAnt, Willy Beamish, and Wing Commander II. Conference topics included trends in game development for the coming year, such as games that learn as you play. In these games, artificial-intelligence techniques allow the game to "get to know you" over time and anticipate your actions. Also in the cards: more graphics and sound in games, which will most likely translate into higher retail prices for the consumer, and a 386-16 as the minimum gaming system.

Gardening Mars

At age 74, science fiction's venerable Arthur C. Clarke, in his isolated Sri Lankan home, still plugs away at predicting the future of humankind. This time, however, for his work in progress titled *The Snows of Mt. Olympus: A Garden on Mars*, he's crafting more pictures than words.

Clarke's rendering of a "gardened" Mars of the future will include some 60 color plates of a grassy, forested Mars with rivers, oceans, and condominiums. Even Mt. Olympus, the largest volcano in our solar system, is covered in crops and pine trees.

The renowned science fiction author is creating his "gardened Mars" pictures using VistaPro, an artificial-intelligence/virtual-reality software program developed by Virtual Reality Labs in San Luis Obispo, California. Using NASA data gained from the Viking mission, VistaPro produces a map of Mars to which Clarke adds detail, turning the Red Planet green. The book is expected to be completed in 1993. □

A curious sequence of Wingdings characters in the font turned out to be an extraordinary coincidence.

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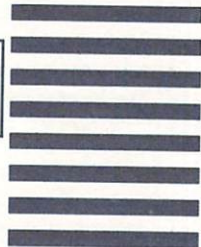
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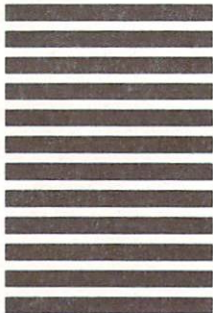
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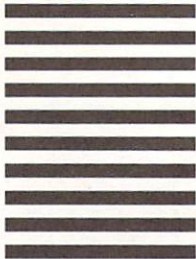
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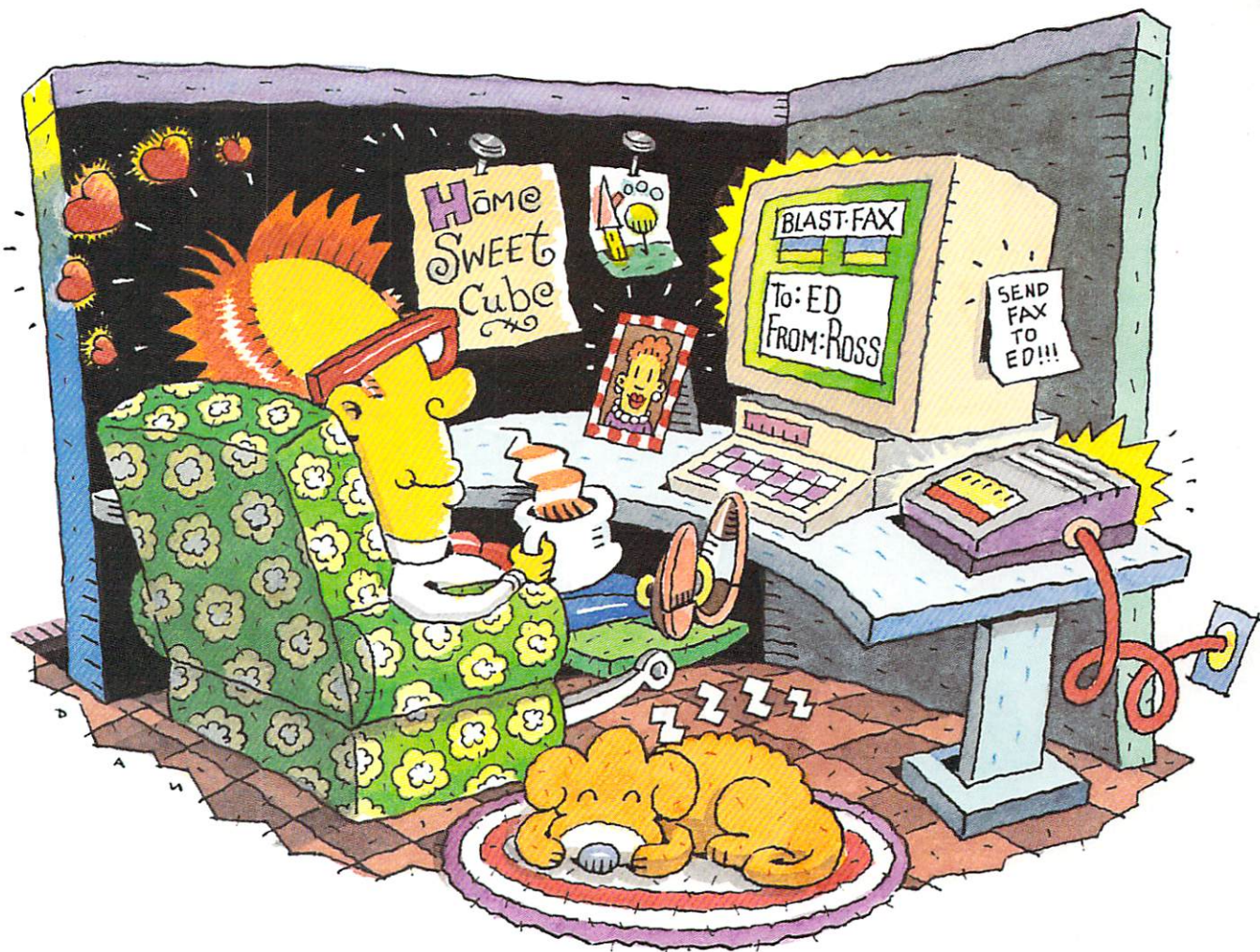
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