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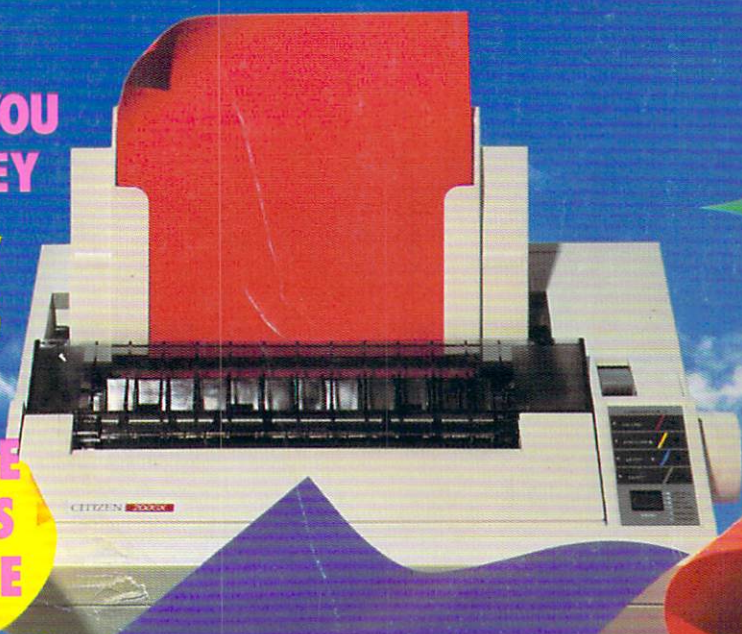
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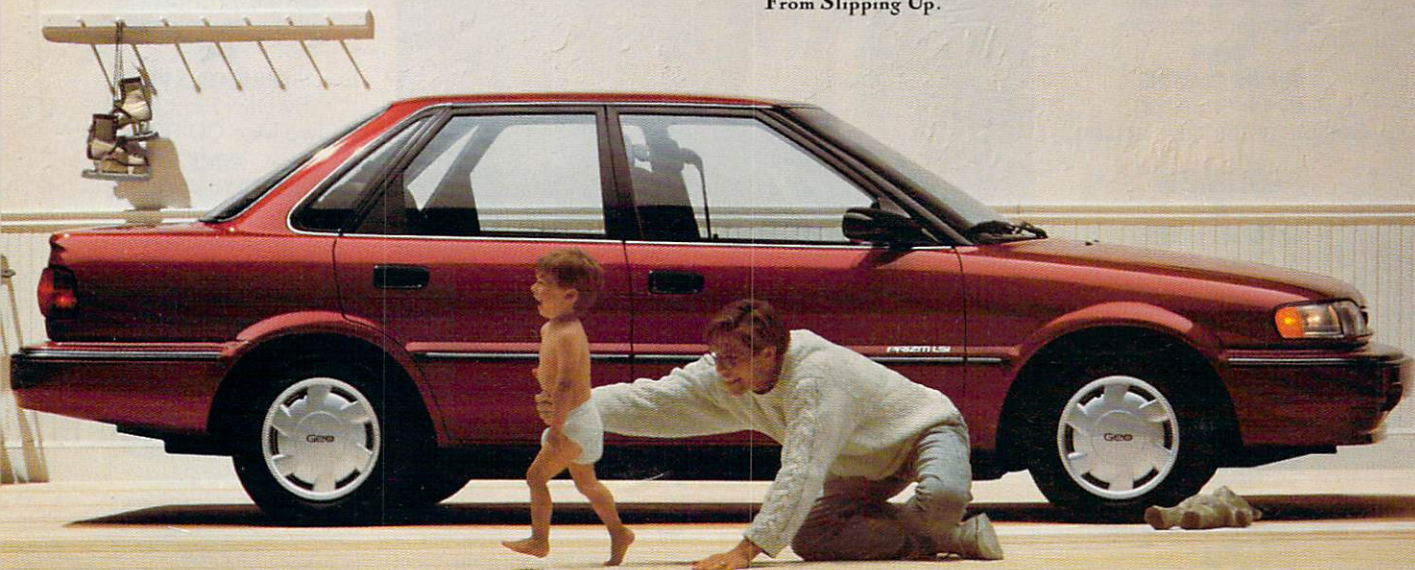
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COMPUTE

VOLUME 14, NO. 2, ISSUE 138 FEBRUARY/MARCH 1992

FEATURES

6

MANAGING YOUR PC'S MEMORY

By Dan Gookin
Three cures for RAM cram.

18

TEST LAB

We examine eight top
color printers.

72

WEALTH AND TAXES

By Rosalind Resnick
Beat the tax man.

86

CONTINENTS OF DATA

By Gregg Keizer
Instant information.

104

SPRING TRAINING

By Peter Scisco
Games for the new season.

COLUMNS

4

EDITORIAL LICENSE

By Clifton Karnes
The February/March scoop.

40

NEWS & NOTES

By Peter Scisco
Hot computer news
from COMDEX.

48

FEEDBACK

We answer
our readers' questions.

52

POINT & CLICK

By Clifton Karnes
Ten new *Windows*
applications.

53

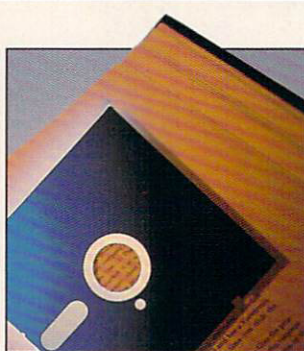
PROGRAMMING POWER

By Tom Campbell
BASIC's DATA statement.

56

TIPS & TOOLS

Timely tips
from our readers.



Cover photo by Michel Tcherevkoff

62

INTRODOS

By Tony Roberts
Colorful DOS prompts.

64

HARDWARE CLINIC

By Mark Minasi
How to master HPPCL.

68

COMPUTE/NET

By Richard C. Leinecker
Sierra week online.

70

ON DISK

By Tony Roberts
Five top programs.

80

SHAREPAK

By Richard C. Leinecker
Four top programs.

136

CONVERSATIONS

By Lisa Sarasohn
Synthesizer pioneer
Robert Moog
speaks out on music.

DEPARTMENTS

82

HOME OFFICE CHOICE

By Tony Roberts
Microsoft Publisher.

84

WORKPLACE

By Daniel Janal
How to manage people
you rarely see.

92

ARTS & LETTERS

By Robert Bixby
Publishing with *Ensemble*.

94

DISCOVERY CHOICE

By Heidi E. H. Aycock
Kid Works.

96

PATHWAYS

By Steven Anzovin
Multimedia education.

98

MULTIMEDIA PC

By David English
Two Mac CD-ROMs.

100

ENTERTAINMENT CHOICE

By Peter Olafson
Gunship 2000.

102

GAMEPLAY

By Orson Scott Card
Build castles in your PC.

REVIEWS

110

Quicken for Windows,
FoxPro 2.0,
Harvard Graphics,
Smith Corona Acer PC
110/286,
The Far Side
Computer Calendar,
Mickey's Jigsaw Puzzles,
Mario Andretti's Racing
Challenge,
Paradox Engine,
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Before You Upgrade To MPC, Listen To This.

BYTE

USER'S COLUMN

Sound Blaster

One of the boards we installed in the Arche 486 was Sound Blaster. With its associated software, it has quietly (no pun intended, but what the heck) become the standard sound system for advanced PCs. The Roland board has much higher sound quality for a higher price, but for anything short of professional music quality, Sound Blaster is good enough.

One use, of course...

There are lots of other accessories you can get for Sound Blaster, including musical instrument software and a voice editor. Sound Blaster has become the standard sound board, if not for the industry, at least here at Chaos Manor. Recommended.

Jerry Pournelle

COMPUTE

SNEAK PEEKS

SOUND BLASTER PRO

In just two years, the Sound Blaster has become one of the most widely-supported PC sound cards. It's easy to see why. The Sound Blaster contains an 11-voice FM synthesizer that makes it fully compatible with the popular Ad Lib Music Card. The day it hit store shelves, the Sound Blaster could be used with hundreds of Ad Lib compatible games and educational programs. To add even more value, the original Sound Blaster included a DAC (Digital to Analog Converter) for digitized voice and sound effects, a microphone jack for voice input, a built-in game port, a built-in 4-watt amplifier, and an optional MIDI interface.

Creative Labs, Inc.

The built-in mixer makes the Sound Blaster Pro fully compliant with Microsoft's Multimedia Level 1 Extensions to *Windows*. Multimedia software will be able to fade-in, fade-out, and pan the various audio sources to create elaborate sound montages.

The Sound Blaster Pro includes a CD-ROM interface for either an internal or external CD-ROM player.

There's also an internal connector for CD-Audio. The MIDI interface is compatible with the original Sound Blaster's MIDI interface, but adds the MIDI time-stamp that's part of Microsoft's new multimedia standard.

All in all, the Sound Blaster Pro is chock-full of new features, yet it's fully compatible with its younger brother.

DAVID ENGLISH

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PC HOME JOURNAL

SOUND BLASTER DOES IT ALL

Review by Harvey Bernstein

The Sound Blaster has so many audio applications packed into one half-sized board that it almost boggles the mind. First, it has an 11-voice stereo music synthesizer that is fully compatible with the widely used AdLib sound format. Older software that only supports the AdLib board will automatically turn on the AdLib mode — no adjustment by the user is necessary. A separate channel is exclusively for reproducing digitized speech. A microphone jack on the back of the card allows you to digitize your own input voices. With a 4-watt stereo amplifier built in, you can run speakers or headphones directly from the card — no additional amplification is necessary. A standard joystick port also doubles as a MIDI interface, allowing you to connect a synthesizer or any other MIDI instrument. Combine this with an excellent library of software, and it is easy to see why the Sound Blaster has become so popular.

The Sound Blaster Pro is the Sound Blaster worth the investment? Yes, yes, a thousand times yes!!! When you hear how much the Sound Blaster increases the capabilities of your PC, you'll wonder how you ever got along without one.

PC

PC GAMES

SOUND BLASTER PRO

By Barry Brenesal

The Marines may look for a few good men, but any PC game player will gladly settle for a single good sound card: one that plays both Sound Blaster and AdLib scores, one that doesn't fry your other boards, one that never draws attention to itself, one that delivers all the sophisticated sound effects and music bundled into the latest batch of game software.

Look no further: Sound Blaster Pro does it all, and more. At \$299.95 it's not cheap, but neither are its features.

Testing: One, Two . . .

Installing Sound Blaster Pro is a snap. The 16-bit card slips easily into place. It comes with a test disk that...

Trying out Sound Blaster Pro is a treat. It's got great frequency response — that's the difference between listening to a film score on a tinny, muffled AM radio and hearing it on a stereo movie-theater speaker system. The orchestral soundtrack to Origin's *Wing Commander* is a good example, because it changes mood and melody to match the success of your current battle. Add Sound Blaster Pro to a good VGA screen and a responsive joystick (which you can plug into Sound Blaster Pro's joystick port), and the illusion of dogfighting aliens in a George Lucas-style film becomes 3-D, symphonic reality.

Another plus is the absence of the annoying background hiss that plagues other sound cards. In short, Creative Labs' Sound Blaster Pro is a big winner. It's quick to install, easy to use, full-featured, and compatible with Sound Blaster and AdLib files. Signal response is excellent. And don't forget...

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EDITORIAL LICENSE

Clifton Karnes

That's right. The issue you hold in your hands *does* say February/March. But don't worry—we're not going bimonthly, and subscribers aren't going to lose an issue. If you signed on to *COMPUTE* for a year, you'll still get 12 issues. For example, if your subscription was due to run out in May 1992, now it will expire in June 1992.

Why the combined issue, then? Here's the story.

As many of you know, *COMPUTE* used to be part of ABC, the network that made the phrase *up close and personal* part of our national culture. Well, in May 1990, *COMPUTE* was purchased from ABC by GMI, a dynamic company that publishes a score of magazines, including the popular *OMNI*.

From the beginning of our relationship with GMI, *COMPUTE* and *OMNI* have been closely related. The readers of the two magazines have much in common, and as a result, we often cover the same topics, though from different points of view. *COMPUTE* has remained a hands-on magazine for PC owners, and *OMNI* is a trailblazer of science

fact, fiction, and opinion.

The close relationship between *COMPUTE* and *OMNI* was further enhanced last year when *COMPUTE*'s senior editor, Keith Ferrell, left *COMPUTE* to take over the position of editor at *OMNI*. Even after he left *COMPUTE*, Keith continued on our masthead as senior editor emeritus, and he always made himself available for advice and encouragement.

With so much in common, it made sense to bring the magazines together in one location. So *OMNI* has moved from its offices in New York City to Greensboro, North Carolina, *COMPUTE*'s home.

This move has two major benefits. First, the two magazines can share physical resources. *COMPUTE* has a leading edge network system with more capacity than we need. And *COMPUTE*'s offices boast more than enough room for an extra staff. The second major benefit of *OMNI*'s move is the day-to-day contact we'll have with each other. We expect the exchange of ideas, technical information, and gossip to be invigorating for both groups.

So, what does all this have to do with the *February/March* on your issue? With *COMPUTE* and *OMNI* working together and sharing production facilities, we needed to move the two magazines' on-sale dates two weeks apart so that both publications wouldn't be requiring the same resources at the same time. After much discussion, it seemed that the best way to do this was to make *COMPUTE*'s February issue our February/March installment and to have our April issue appear on the newsstand two weeks earlier than it would have.

As a result of this change, our *PC Disk* and *Amiga Re-*

source Disk will be changing months. *PC Disk*, which appears every other month, used to accompany issues in even-numbered months: February, April, June, and so on. The disk will accompany the February/March issue (as it normally would), but since the next every-other-month issue is May, the disk will accompany that issue and will correspond with odd-numbered issues from then on.

Similarly, *Amiga Resource Disk*, which used to ship in odd-numbered months, will appear in even-numbered months after the February/March issue.

This may sound complicated, but it isn't really. Whether you subscribed to *PC Disk* or *Amiga Resource Disk*, you'll continue to get your disk every other month, but since we have just one issue for February and March, the name of the month appearing on the magazine will change. That's all there is to it.

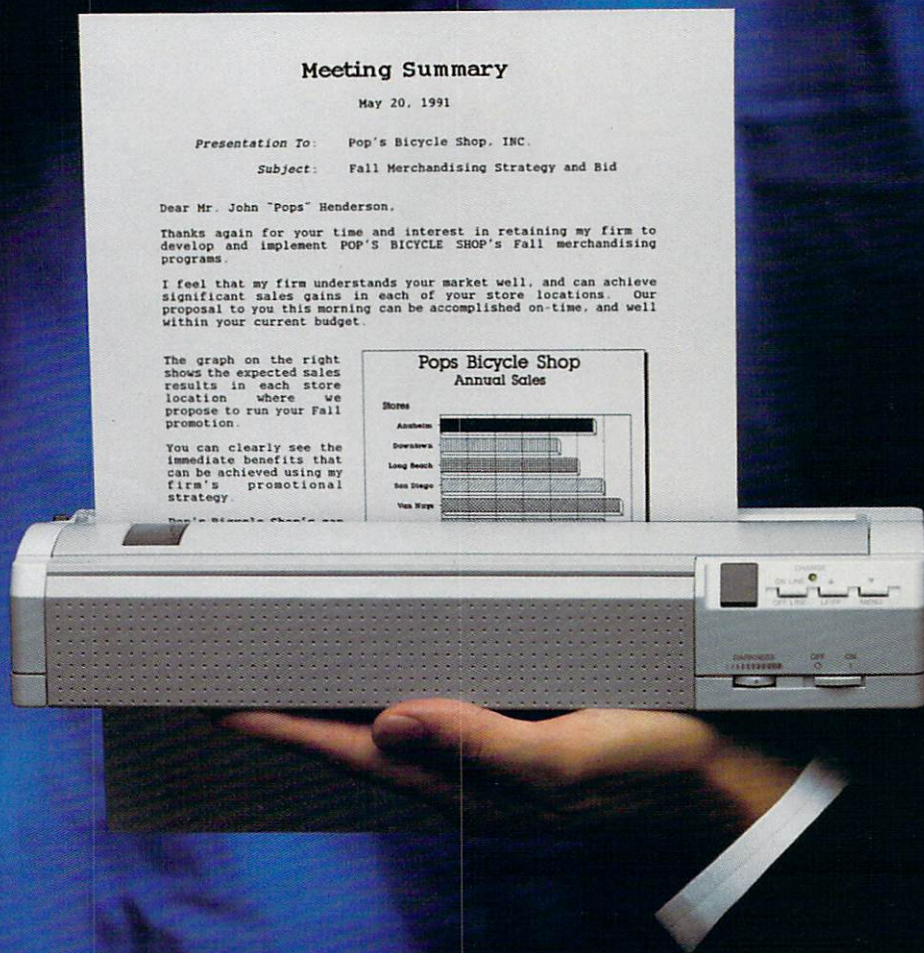
What does this change mean to you? As I said earlier, if you signed up for 12 issues, you'll still get 12. So you won't lose anything. And you'll be getting your issues earlier. From April onward, you'll see *COMPUTE* at least two weeks earlier than you used to.

When you look at the big picture of *OMNI*'s move to Greensboro, there's no downside. Both magazines will continue to serve their audiences with the highest-quality information possible. *COMPUTE* will still focus on the leading edge of PC software and hardware technology, and *OMNI* will still tackle challenging issues in the scientific realm. *COMPUTE* readers will get their magazine two weeks earlier, and everyone—readers, as well as *COMPUTE* and *OMNI* staff—will benefit from the closer relationship. □

It makes sense to bring OMNI and COMPUTE together, so OMNI has moved its offices from New York City to Greensboro, North Carolina.



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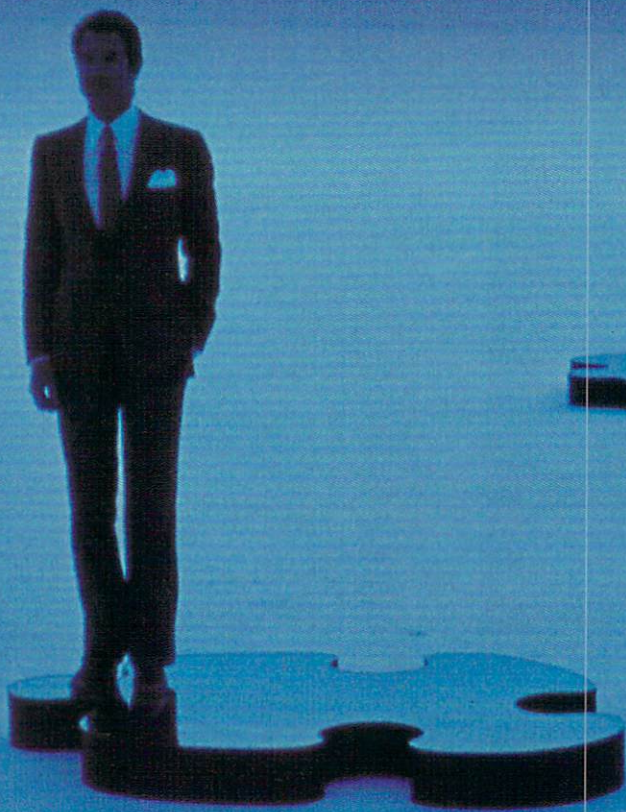
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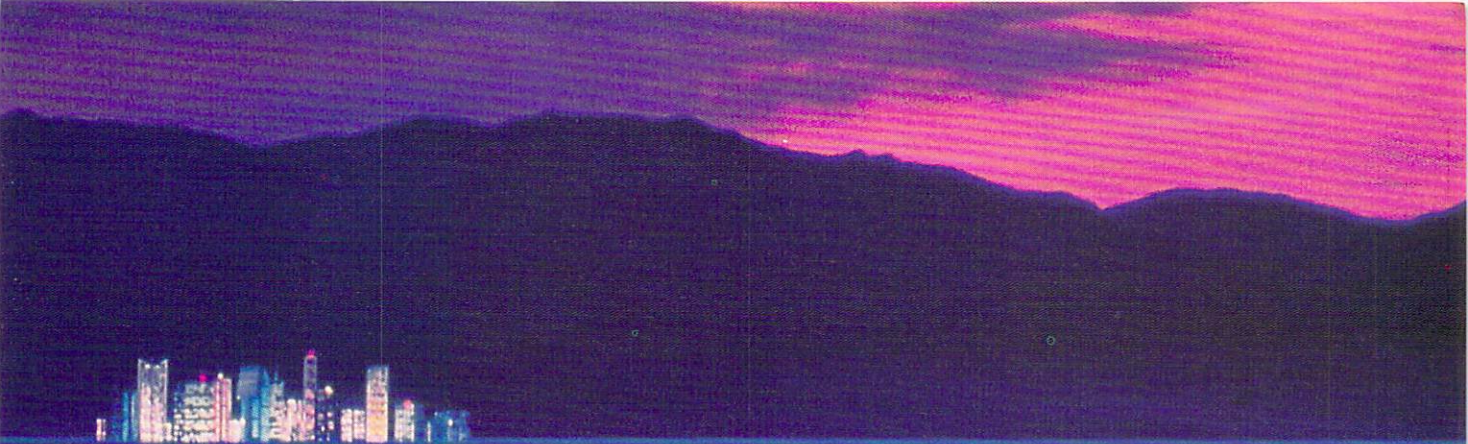
PUT THE MEMORY PUZZLE
TOGETHER WITH
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MANAGING YOUR PC'S MEMORY

BY DAN GOOKIN



As technology drags a reluctant DOS into its second decade, one of the issues PC users face is memory management. And thanks to a lack of Darwinian evolution, the procedures for dealing with memory are downright gross. Thankfully, memory managers exist to give you control over the



megabytes of RAM most PCs now contain. DOS legitimized the process when version 5.0 came out. But that doesn't simplify the problem.

In order to understand memory management, you need to know how memory is used in a PC. Further, you need to acquaint yourself with some of the strange terms used to describe memory—primarily the differences between extended and expanded memory and why one is more useful than the other. Then comes learning the memory management techniques that finally help you get your full hardware dollar value under DOS.

Memory in Your PC

Everything starts with the traditional memory map, as shown in figure 1. All PCs, regardless of their microprocessors, have two main areas of memory: conventional memory, which is also called DOS memory, and upper memory, which is sometimes referred to as reserved memory. Together these two areas constitute the basic one megabyte of memory used in all PCs.

Why only one megabyte? Because that was the design of the original PC. Its 8088 microprocessor could only access 1MB of RAM. Further, it could only use that memory in 64K chunks. Therefore, the basic 1MB memory map is divided into 16 banks of 64K each, numbered 0 through 9, then A through F (see figure 1).

IBM designed the bottom ten banks of memory—10 × 64K or 640K of memory—for use by DOS and for running

programs. That was ten times the amount available in competing CP/M computers of the early 1980s—a truly massive amount for a personal computer. The rest of the memory, the 384K that makes up the upper memory area, was devoted to future expansion: ROM BIOSs, video systems, network adapters, and so on.

This would all work great, and everyone would be happy save for two things: People wanted their PCs to do more, so programs got bigger, and new PC microprocessors appeared that could access more than the 8088's paltry 1MB.

Extra Memory in Your PC

For a program to do more, it requires more memory. After a short time, PC applications grew in size, quickly reaching the 640K "brick wall." There is no way around that problem; 640K was and is the max for all DOS programs, period. Several work-around solutions were developed, such as memory resident programs, also called TSRs (for Terminate and Stay Resident), that allow software to pop up at the press of a key. But the only lasting and practical way to give DOS applications more memory was expanded memory. (Keep that thought warm for a second.)

The other problem with the 640K limit surfaced with the new, powerful microprocessors hardware manufacturers began tossing into PCs. First the 80286 could access up to 16MB of RAM, 16 times the original PC's limit, and later the 80386

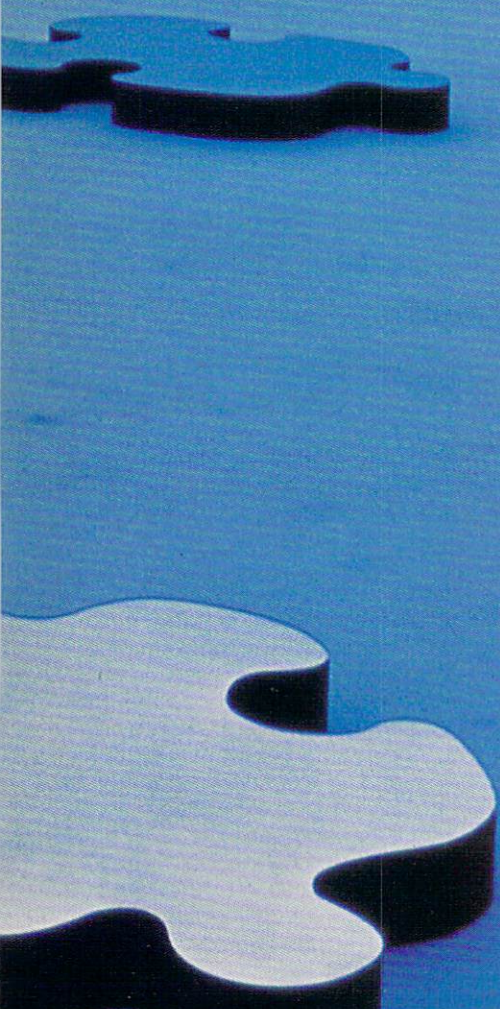
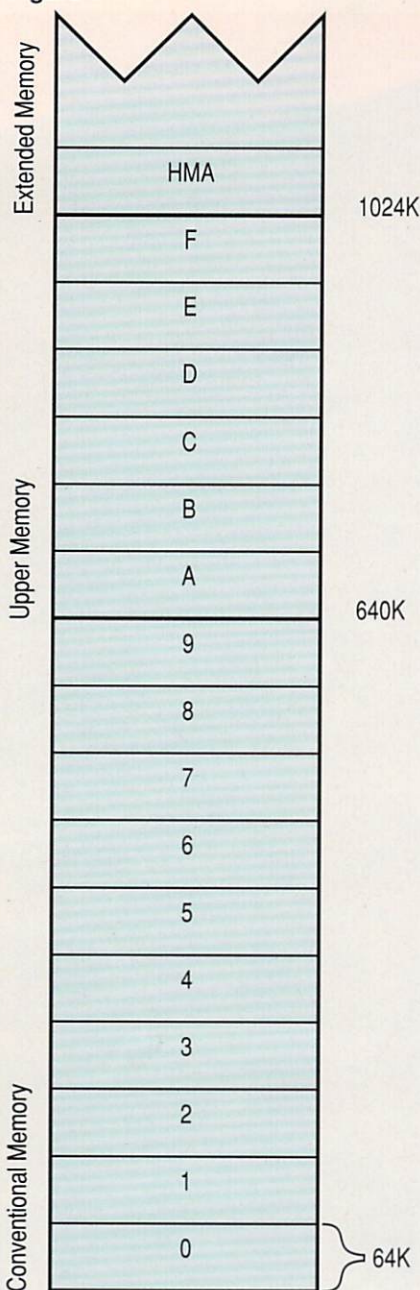


Figure 1



for DOS programs that need extra memory. Extended memory is useful, but under DOS it's merely a name given to any extra memory (above the 1MB mark) in an 80286 or later PC. Table 1 lists the differences, but up front you should remember that for DOS programs, it's expanded memory you want.

Expanded Memory

Expanded memory is basically an extra hunk of memory in your computer—something like another hard drive, only it's memory. To put this memory into an 8088 or 80286 computer, you need to add an expanded memory adapter card, such as the AST RAMPage! or Intel AboveBoard. For 386 PCs, you create expanded memory by using a device driver to convert your extended memory into the more useful expanded memory. (That trick can also be done with some 80286 systems, specifically those with the NEAT or AT/386 CHIPSet from Chips and Technologies.)

On the software side, expanded memory is controlled using the Expanded Memory Specification, or EMS. Since expanded memory was developed by Lotus, Intel, and Microsoft, the

spreadsheet, you have no way of knowing that it's really using some 4MB of expanded memory for storage. All the technowizardry is handled by the 1-2-3 software working with the EMS device driver.

The page frame sounds rather inefficient and inelegant. After all, looking at 32MB of memory via a 16K page is limited. However, your hard drive is accessed only 512 bytes at a time. And working with memory is much quicker than working with a mechanical hard drive, so expanded memory can really be quite zippy. To augment the process, LIM 4.0 EMS also gives you a giant 384K page frame in conventional memory. This allows for major movement of data to and from expanded memory, and it's how task swappers like *Software Carousel* and *DESQview* move programs into and out of memory at the touch of a key.

Expanded memory is the true solution for extra memory under DOS and with DOS applications. All PCs can have expanded memory, and most programs that could use a few kilobytes of extra memory will support expanded memory. Fortunately, there are only a

Table 1

	Expanded memory	Extended memory
Extra memory in a PC	Yes	Yes
Memory above 1MB	No	Yes
8088PC	Yes	No
80286 or later PC	Yes	Yes
DOS programs	Yes	No
OS/2, UNIX, and so on	No	Yes
Data storage	Yes	Yes
Standard	EMS	XMS

raised the roof to 4096MB, or four gigabytes, of RAM. All that extra memory is referred to as extended memory.

Extended memory sounds like a dream come true: acres of ready RAM. The problem is that DOS cannot use extended memory to run programs; all PCs—regardless of their microprocessors—are stuck with the same 640K limit as the old 8088 when they run DOS. Therein lies the rub: To be compatible with DOS and its volumes of programs, you have to all but ignore your PC's extended memory.

Welcome to the first hurdle to understanding memory management. There are two types of extra memory in a PC, expanded and extended. Of the two, expanded memory is the best solution

standard is referred to as LIM 4.0 EMS. The 4.0 refers to the version, which presently allows for up to 32MB of expanded memory in a PC.

Since expanded memory isn't a part of the PC's basic memory layout, it must be accessed through a special area of memory called the page frame. That's a 64K chunk of upper memory that contains four 16K pages. Each page contains memory that can be copied to expanded memory or that was read from expanded memory (see figure 2).

The page frame and all of expanded memory are controlled by the EMS device driver. That's how your software accesses the extra memory. So when you're working on that massive 1-2-3

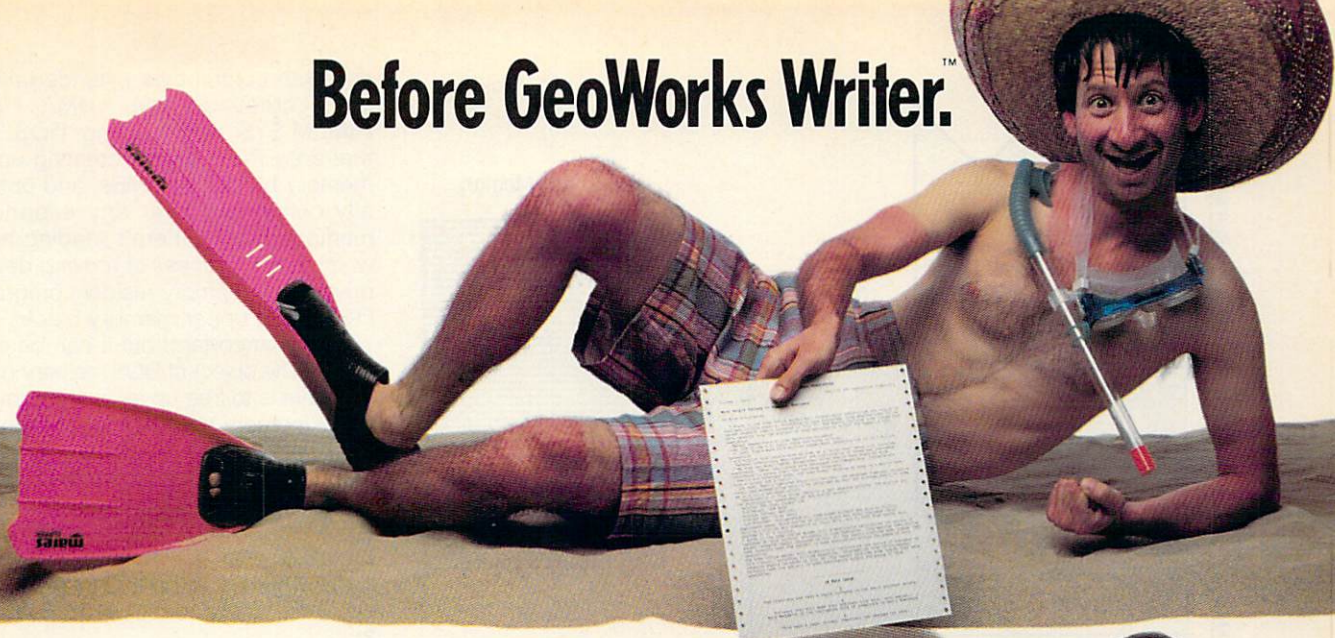
few acronyms and silly terms to learn: *EMS*, *LIM*, and *page frame*. But unfortunately, memory management doesn't end here.

Extended Memory

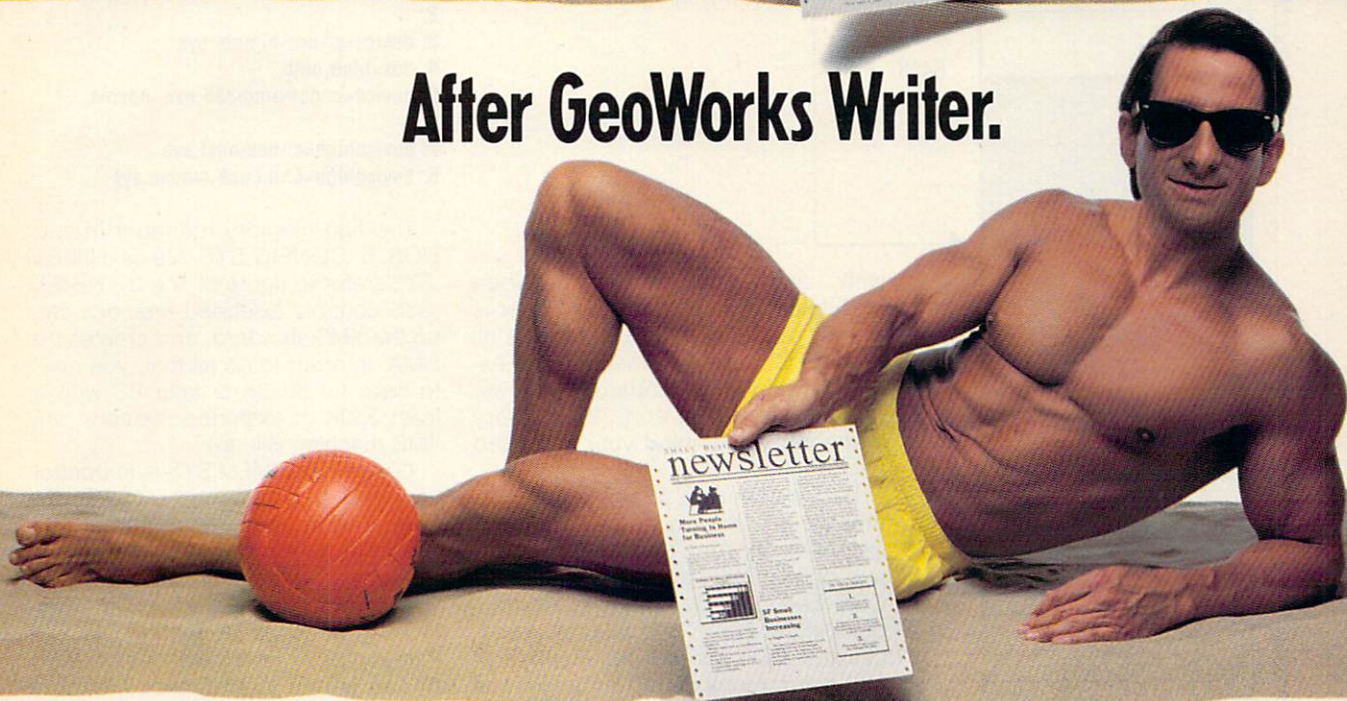
Extended memory is an often cursed at and confusing element of memory management. Basically, extended memory is extra memory above the 1MB mark on 80286 or later PCs. Whenever you add memory to those systems, you're adding extended memory. (On an 80286, you add expanded memory via an expansion card.)

The unfortunate part is that DOS can't run programs in extended memory. To use extended memory, your PC must run in its protected mode. DOS is

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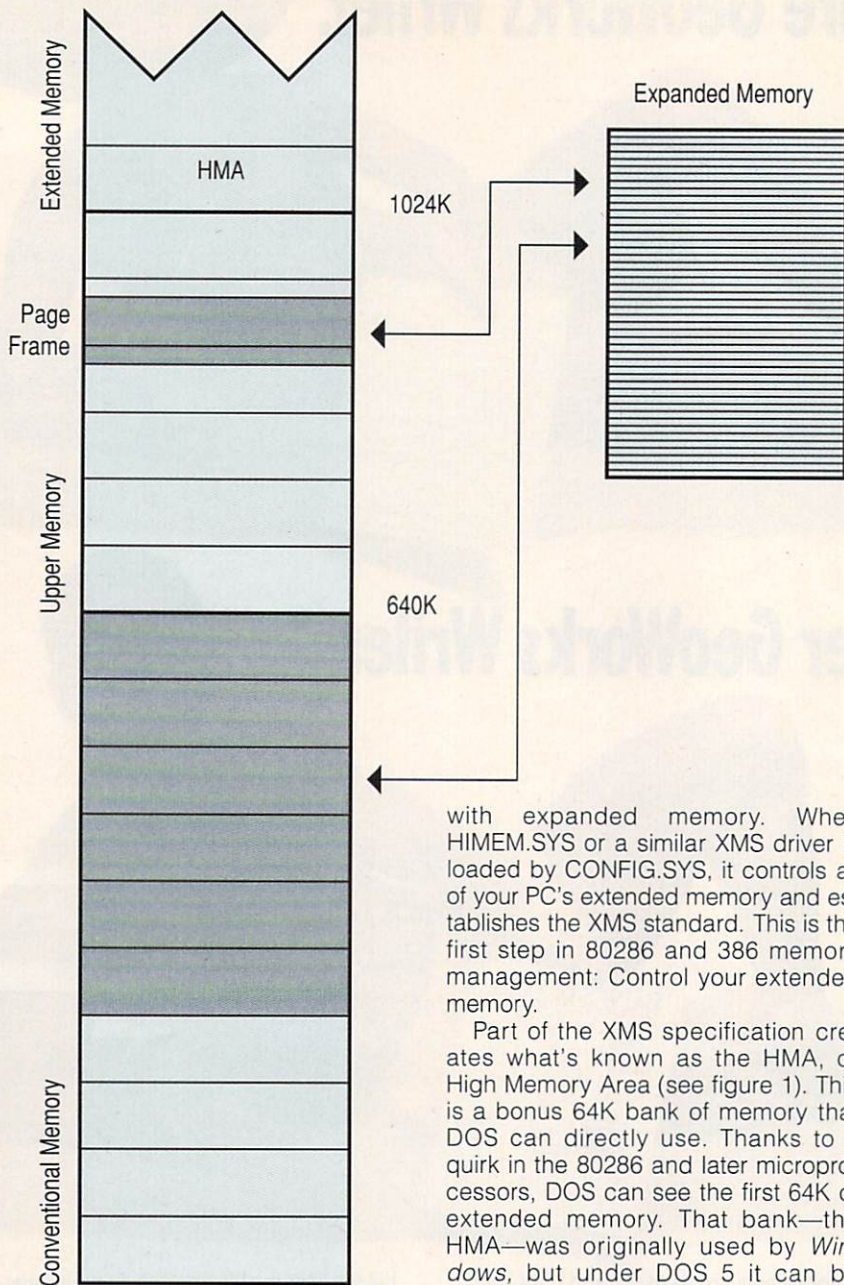


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Figure 2



with expanded memory. When HIMEM.SYS or a similar XMS driver is loaded by CONFIG.SYS, it controls all of your PC's extended memory and establishes the XMS standard. This is the first step in 80286 and 386 memory management: Control your extended memory.

Part of the XMS specification creates what's known as the HMA, or High Memory Area (see figure 1). This is a bonus 64K bank of memory that DOS can directly use. Thanks to a quirk in the 80286 and later microprocessors, DOS can see the first 64K of extended memory. That bank—the HMA—was originally used by *Windows*, but under DOS 5 it can be shared between DOS and *Windows* and help save conventional memory.

HMA is the last of the acronyms you need to learn to understand memory on a PC. The others are EMS and XMS. And the different types of memory are conventional, upper, expanded, and extended memory. Between expanded and extended memory, expanded is more useful for DOS. And the bottom line for everything, technical terms aside, is that a system with an 80386-level microprocessor opens more doors for you than any other type of PC. This becomes apparent when you start managing all that memory.

Managing Memory with DOS 5

There are three steps to memory management under DOS 5: The first is to

establish control over extended memory, creating the HMA with HIMEM.SYS and loading DOS into that area. Next comes creating upper memory blocks, or UMBs, and optionally converting over any expanded memory. Finally, there's loading high, which is the process of moving device drivers and memory resident programs (TSRs) into upper memory blocks.

This is important, but it can be confusing. The object of DOS memory management is to free up as much conventional memory as possible, giving your applications more breathing room. Follow along closely, and refer to the sample CONFIG.SYS file in figure 3.

Figure 3

- 1: REM This is a typical DOS 5 CONFIG.SYS file.
 2:
 3: device=c:\dos\himem.sys
 4: dos=high,umb
 5: device=c:\dos\emm386.exe noems
 6:
 7: devicehigh=c:\dos\ansi.sys
 8: devicehigh=c:\mouse\mouse.sys

The first memory manager in your DOS 5 CONFIG.SYS file is HIMEM.SYS (refer to figure 3, line 3). HIMEM.SYS controls extended memory, sets up the XMS standard, and creates the HMA. In order to do all that, you need to have an 80286 or later PC with at least 350K of extended memory (any 1MB machine will do).

Given that HIMEM.SYS is in control, your next step is to load DOS into the HMA. This frees up 40K to 50K of conventional memory, making that much room available to your applications. The command DOS=HIGH in CONFIG.SYS does the job (figure 3, line 4).

If you have an 80286-level system, this is where DOS 5 stops. You've freed up some 50K of conventional memory, but that's all DOS 5 can do for your machine. If you have an expanded memory card in your system, your next step would be to load your EMS driver (EMM.SYS or something similar), followed by a third-party memory manager, if you have one. Otherwise, the 80286 choo-choo stops here.

On a 386 system, the next step is to create upper memory blocks, or UMBs. These are unused areas of upper memory—that 386K of reserved future expansion memory in all PCs (see figure 1). IBM was quite liberal in giving the PC 384K; in most systems, half of that space is empty. To use it under DOS 5, you can install the EMM386.EXE device driver. (Yes, it ends in EXE even though it's a device driver.)

EMM386.EXE will fill in the cracks of upper memory, putting useful RAM in-

an 8088 or real mode operating system. If you have OS/2, UNIX, or Xenix, which are protected mode operating systems, then extended memory is required. But under DOS, extended memory is a white elephant.

Don't write off extended memory just yet! It can still be used under DOS for data storage, RAM drives, and disk caches. And on 386-level systems, extended memory can be converted into expanded memory. This all starts with an extended memory driver, such as HIMEM.SYS, which comes with DOS 5.

HIMEM.SYS controls extended memory via the Extended Memory Specification, or XMS. That's a set of rules for accessing extended memory just as the EMS is a set of rules for working

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OPTIMIZING WITH QEMM OR 386MAX

Third-party memory managers offer a whole gang of optional switches to customize the way they control your PC's memory. For example, the following command in CONFIG.SYS sets up *QEMM*.

```
DEVICE=C:\QEMM386.SYS R:2 RAM ST:M
```

QEMM installs both the XMS and EMS drivers for your system's extended memory, as well as creating upper memory blocks. Therefore, one command in your CONFIG.SYS file serves the same functions as HIMEM.SYS and EMM386.EXE under DOS.

The R:2 option is what loads *QEMM* into high memory, saving you some 12K; RAM works like EMM386's similar switch to create UMBs; and ST:M turns on *QEMM*'s Stealth option. That compacts and relocates ROM and BIOS areas of upper memory, giving you more UMBs. It doesn't really free up space under DOS, but the memory savings are enormous under *DESQview* and *Windows*.

386MAX is a heavy-duty memory manager competing toe-to-toe with *QEMM*. The following line sets up *386MAX* in CONFIG.SYS.

```
DEVICE=C:\MAX386MAX.SYS  
PRO=C:\MAX386MAX.PRO
```

The file *386MAX.PRO* is the memory manager's profile; it contains a list of command line options for *386MAX* that keep your CONFIG.SYS file from getting junky.

Both *QEMM* and *386MAX* have video memory-stealing options. For *QEMM* the option is VIDRAMEGA. That preserves EGA and VGA memory. Then you use the memory resident VIDRAM utility to turn that extra memory on or off. *386MAX* uses the option CGA to hand over an extra 96K of EGA or VGA memory to DOS. Either way, you up the limit of DOS from 640K to 736K.

to the unused spaces. Those areas of memory then become the upper memory blocks. This is done by installing the EMM386.EXE device driver into your CONFIG.SYS file, along with its NOEMS option (figure 3, line 5). Note that EMM386.EXE must come after HIMEM.SYS is installed.

In addition to installing EMM386.EXE, you also need to tell DOS that there will be UMBs. The command DOS=UMB does that in your CONFIG.SYS file. Since DOS is already equal to HIGH, you can simply stick a comma at the end of the command and then add UMB (see figure 3, line 4).

Once the UMBs are created, you can load device drivers and memory resident programs into them. This frees up conventional memory dramatically; with all your 4K, 10K, and 25K de-

vice drivers in the upper memory area, you'll have that much more conventional memory available to your programs.

The command to load device drivers high is DEVICEHIGH. It's used in CONFIG.SYS exactly like the DEVICE command. (See figure 3, lines 7 and 8.) The LOADHIGH command is used at the DOS prompt, or more likely in AUTOEXEC.BAT, to load memory resident programs into UMBs. Just put LOADHIGH, or its abbreviated form LH, in front of any memory resident program you want to load high. Here's an example.

LH DOSKEY /INSERT

In the example above, the LOADHIGH command will put the DOSKEY keyboard macro program into a UMB. Note that any options that would normally follow the TSR in AUTOEXEC.BAT or at the DOS prompt are still specified; the only addition is LH or LOADHIGH inserted before the program's name.

You can load high all you want. Consider bringing out older TSRs and device drivers you didn't think you had the RAM for and using them once

again. (Hello, *Sidekick!*) DOS will load each of them high until there are no more UMBs. When you run out, DOS will load the program low as it did before. You can use the MEM command with the /C switch to see which programs are loaded into UMBs and which are loaded low. (Note that HIMEM.SYS and EMM386.EXE cannot be loaded high.)

Together, all these commands carry out DOS's memory management to the fullest—provided you're a *Windows* user. *Windows* wants and needs extended memory to run. If it sees one byte of expanded memory, *Windows* blanches and won't run in its powerful 386-enhanced mode.

If you don't use *Windows* or if you'd like some expanded memory for the DOS applications on your 386, then you can use the EMM386.EXE device driver to convert some or all of your extended memory into expanded memory.

Figure 4

1: REM This is another DOS 5 CONFIG.SYS file.

2:

3: device=c:\dos\himem.sys

MEMORY TERMS TO DRIVE YOU INSANE

Here's a rundown of common memory terms and some of the jargon you'll see over and over as you work with DOS 5 or a third-party memory manager.

A20. The microprocessor address control line that provides access to the HMA.

BIOS. Basic Input/Output System. The primary ROM instructions for a PC, hard drive, video card, and so on.

conventional memory. The basic 640K of memory available for running DOS programs. Also called DOS memory or low DOS memory.

8088. Any PC that has an 8088, 8086, or similar microprocessor.

80386. Any PC that has a 386-family microprocessor: 386DX, 386SX, i486, 486SX, or similar chips.

80286. Any PC that has a 286 or similar microprocessor.

EMS. Expanded Memory Specification. The rules for working with expanded memory, both hardware and software.

expanded memory. Extra memory for all PCs, which is directly usable by DOS and DOS applications.

extended memory. Memory above the 1MB mark in 80286- and 386-level PCs. Used in *Windows* and other protected-mode operating systems.

G. Abbreviation for *gigabyte*; 1 billion bytes.

HMA. The High Memory Area. An extra bank of memory for DOS created in extended memory by an XMS driver (like HIMEM.SYS).

K. Abbreviation for *kilobyte*. Although *kilo* means 1000, 1K is actually 1024 bytes.

LIM 4.0. Lotus-Intel-Microsoft. The found-

ers of the Expanded Memory Specification. The 4.0 refers to the version number.

MB. Abbreviation for *megabyte*; 1 million bytes.

RAM. Random access memory. The memory in a PC where the microprocessor can store and manipulate information. This is the area where the work gets done by your applications.

ROM. Read only memory. Usually a chip with instructions for the computer. It's accessed just like RAM, but it cannot be written to or altered.

shadow RAM. A way of speeding up upper memory by copying it to special high-speed RAM. This option is best left turned off when you have a memory manager installed; you'll have more memory available that way.

TSR. A memory resident program. An acronym for *Terminate and Stay Resident*, a DOS programming function.

UMBs. Upper memory blocks. Unused portions of upper memory where device drivers and TSRs can be loaded high.

upper memory. The top 384K in the first megabyte of all PCs. It may also be called reserved memory or high DOS memory. It's often abbreviated *UMA*.

V86. The Virtual-86 mode of the 386 microprocessor. Using this mode, a single 386 chip can be made to emulate several 8086-level computers. This is how environments such as *DESQview* and *Windows* can run several programs at a time.

XMS. The Extended Memory Specification. It consists of rules for accessing and controlling extended memory, as well as creating the HMA.

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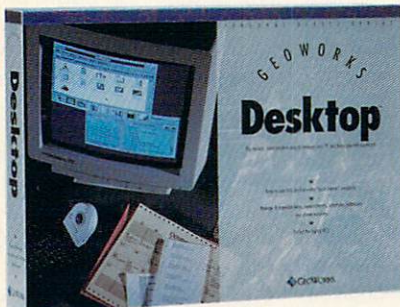
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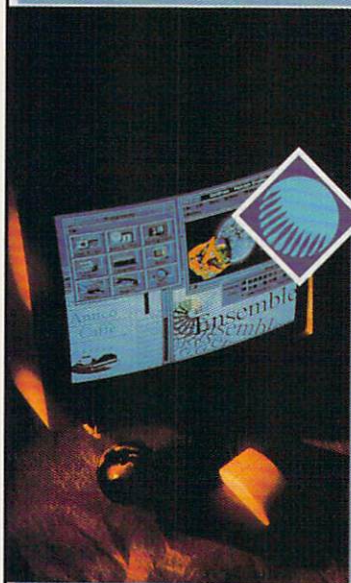
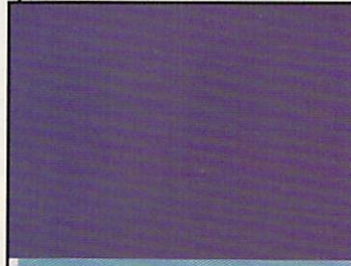
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4: dos=high,umb
5: device=c:\dos\emm386.exe 1024 ram
6:
7: devicehigh=c:\dos\ansi.sys
8: devicehigh=c:\mouse\mouse.sys

Figure 4 is almost identical to the CONFIG.SYS file in figure 3. The EMM386.EXE device driver line is a bit different, however (line 5). First, the value 1024 is specified, and second, the RAM switch is used instead of NOEMS. Otherwise, everything is identical.

The value 1024 after EMM386.EXE indicates that 1MB, or 1024K, of extended memory is to be converted into expanded memory. By default, EMM386.EXE wants to convert 256K of extended memory into expanded. It can convert any value you specify, from 16 on up to 32768 for 16K through 32MB, but usually is limited by the amount of extended memory you have to begin with. Any memory you don't convert remains as extended memory for programs that need it.

The RAM option is basically the same option as NOEMS; both cause EMM386.EXE to create UMBs. The difference is that RAM is used when expanded memory is created. NOEMS directs EMM386.EXE not to create any expanded memory. (Therefore, NOEMS is only used in situations where only extended memory is required, such as when running *Windows*.)

This wraps up what DOS can do with its memory management abilities. It's not bad considering how much more conventional memory you'll have. But it does require a lot of work on your part, editing CONFIG.SYS and AUTOEXEC.BAT to set everything up and load your programs high. If that bothers you, then you should consider the blessings that third-party memory managers offer.

Third-Party Memory Managers

DOS 5 provides a lot of solutions that already existed out in third-party products. Memory management is one of them. While DOS 5 now does memory management, and not too badly, third-party memory managers have been around much longer and do things much more neatly—and automatically. If the bottom line excites you, then know that third-party memory managers often give you an extra 20K to 30K of conventional memory over what DOS provides.

Up front, third-party memory management setup is automatic. Your system is analyzed and customized by a series of tests and self-resets. There's no need to toil with editing CONFIG.SYS or AUTOEXEC.BAT ever. When you make changes to the system, you simply rerun the op-

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timization utility that came with the memory manager. Everything is set up for you. It's really painless.

If you want to go beyond the basics, the third-party memory managers also give you greater control over your memory. Special options let you customize how memory is used beyond what the automatic installation programs can do. These include options to control shadow memory, include or exclude certain parts of upper memory to work around special expansion cards, or really give you a memory boost by taking advantage of unused video memory.

Stealing video memory is one sure-fire way to break through the 640K barrier. For example, if you have an EGA or VGA graphics adapter, you can surrender its high-resolution graphics memory to DOS, adding an extra 64K or 96K to conventional memory. That ups the ceiling from 640K to 704K or even 736K. Wow! Most programs immediately recognize and greedily gobble up the extra memory—more than they would ever have otherwise. But this trick isn't without cost: Any graphics programs or applications that use a graphic screen (such as *WordPerfect's* Print Preview) won't work; you'll just get plain CGA color text.

Presently, two powerhouse memory management packages are available

for 386 systems: *386MAX* (Qualitas, Suite 1386, 7101 Wisconsin Avenue, Bethesda, Maryland 20814; 301-907-6700; \$99.95) and *QEMM* (Quarterdeck, 1901 Main Street, Santa Monica, California 90405; 213-392-9851; \$99.95). Both offer automatic installation and optimization, extensive options for customizing memory on your system, and 100-percent compatibility with DOS 5, *Windows*, and *DESQview*.

Bottom Line

Memory management is going to be a major DOS theme for quite some time to come. The problem has been around since the first spreadsheet users hit their heads on the 640K barrier, and it will be with us until DOS (or its successor) offers a smooth method of accessing extra memory without headaches. Until all these problems are solved, there will be terms to learn, acronyms to identify, and various interesting things to work out in *CONFIG.SYS* and *AUTOEXEC.BAT*.

But the best part about memory management is that once you've set up your PC, you can forget about it. With the proper memory managers installed and the system tested, you can get on with your work and enjoy all the hardware and memory you've paid for. Soon you'll be swimming in RAM. □

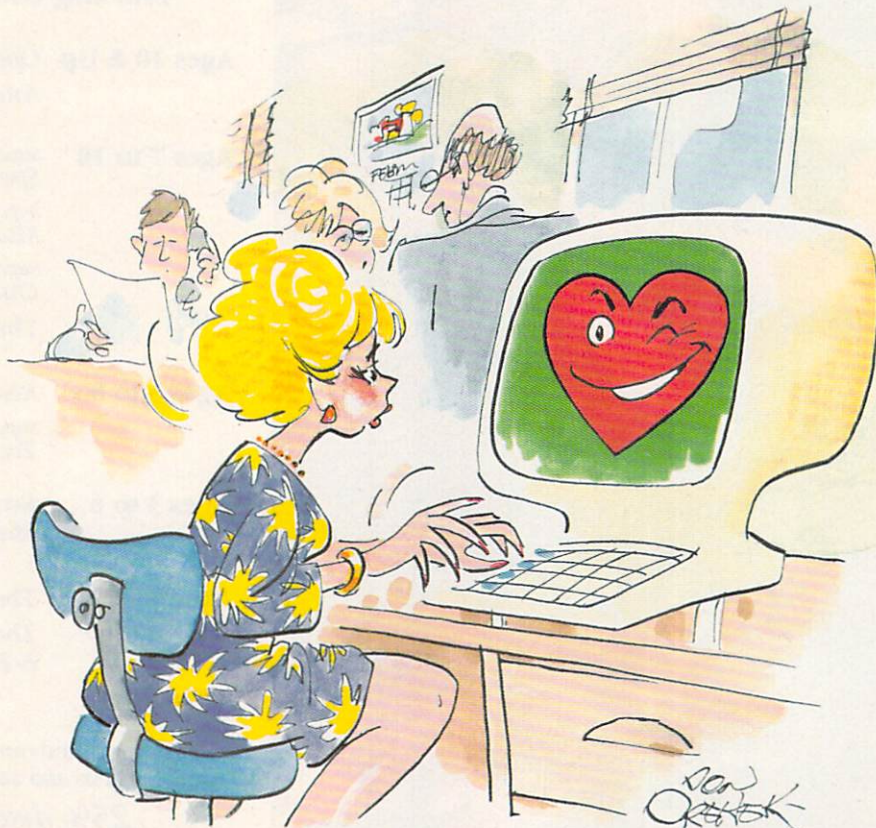
WORKING WITH AN 80286

The DOS 5 memory management solution—like all memory management solutions—works best with 386 systems. If you have an 8088 or 80286 system, however, all hope is not lost. There are solutions, but only with the aid of third-party hardware and software.

Your first step is to install a LIM 4.0 hardware-compatible EMS expansion card. Pack it full of RAM, maybe 2MB worth. Next, you'll need to purchase a third-party memory manager. My recommendation is *QRAM* from Quarterdeck. Under DOS 5, you can then set up your *CONFIG.SYS* file as follows.

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\EMM.SYS AT 258
DEVICE=C:\Q\QRAM.SYS R:1
DOS=HIGH,UMB
```

HIMEM.SYS is loaded first, followed by the expanded memory manager for your EMS expansion card. Next, *QRAM* is loaded to control expanded memory. Finally, you can load DOS high and create UMBs with the DOS configuration command. From that point forward, the DOS commands *DEVICE-HIGH* and *LOADHIGH* will work on your system just as they would on a 386. The overall conventional memory savings won't be as great, but this is the best that can be done with an 80286.



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drivers had to do was generate an acceptable dither pattern for 16 shades of gray. But now color seems to be coming from everywhere. Just take a look at the number of color printer drivers available in new software applications. Meanwhile, the price and performance of color printers tantalize general computer users because of technological advances and increased competition.

This month's Test Lab focuses on eight printers with color capabilities—from a 9-pin dot-matrix to a sophisticated thermal printer—and helps you decide which printer best fits your needs. Here you'll find benchmarks, output samples, and eight penetrating

by giving home-based computer users exceptional dot-matrix color output, along with a number of other attractive features, at a reasonable price.

The GSX-140 PLUS employs a 24-pin printhead for well-defined text printing. If you're looking for solid color graphics output, as we are in this month's Test Lab, the optional color kit reviewed here fits the bill nicely. With the color kit and a color ribbon installed, you should select the Color Ribbon option from the installation menu—even if you only print in black.

Anyone working in color will most likely be working within the *Microsoft Windows* environment.

Although Citizen doesn't ship a *Windows* driver with the printer, one is available from Citizen's electronic bulletin board. After installing that driver, I found that the color printing worked flawlessly with a variety of applications—from low-end graphics packages like *Paintbrush* to high-end packages like *CorelDRAW!* and *PageMaker*. The productivity packages I used, *Ami Pro* and *Excel*, also printed in color without a hitch.

According to the documentation for this Citizen, you should be able to use the printer driver for the Epson LQ-2500 (a printer with color capability); however, I wasn't able to get color printing from *Windows* using that driver. The manual does provide instructions for configuring the printer to work with several leading DOS applications, including *Harvard Graphics*, *Lotus 1-2-3* (version 2.2), *Microsoft Word*, *The New Print Shop*, *WordPerfect*, and *WordStar* (version 6.0 and *Professional*).

Configuration of these and other DOS applications may require that you write a macro to control how the software interfaces with the printer. Fortunately, Citizen makes this work a little easier for you. With the GSX-140 PLUS, you can create macros by using the utility and reference disk which comes with the unit. It took me only a couple of minutes to create a macro for printing color output from *Harvard Graphics* 3.0. Alternatively, you can load macros through the Command-Vue menu system on the printer's panel.

Almost all of the color output I produced was acceptable for the majority of small business presentation and graphics needs. Charts and colored text were quite bright and well defined. A detailed image from *CorelDRAW!* also reproduced well, including several subtle shadings of color. A *Harvard Graphics* image with a dark background revealed the printer's propensity to create



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bands across the page. However, such banding is to be expected from a dot-matrix printer. Overall, I thought the brighter colors fared better and the printer's ability to mix colors and shadings was exceptional. Graphics printing took some time to emerge from the printer; I would recommend using a print spooler or upgrading the printer's memory from the standard 8K to 40K with the optional memory expansion chip.

In other categories, the GSX-140 PLUS also performed well. I found text very readable and sharp using the printer's built-in fonts or fonts created with *Adobe Type Manager*. In addition, I appreciated the printer's low noise level. At no point during testing did I feel that I had to abandon my small home office while running a print job.

More and more printer manufacturers are using color capability as a means of differentiating their products from their competitors' products. If your job requires the production of presentation materials, if you're looking for a way to enhance the educational uses of your home computer, or if you're interested in exploring the world of color graphics on your PC, this Citizen provides a low-cost, functional means of doing so.

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CITIZEN 200GX

If you're in the market for a good 9-pin dot-matrix printer that can also output in color, then read on: The Citizen 200GX may be just the ticket, especially if you're on a budget.

A compact unit with a small footprint, the 200GX weighs only 11 pounds and measures a demure 17 inches wide x 12.6 inches deep x 5 inches tall. While I found the output sound level to be tolerable, the 200GX is a bit on the noisy side (a characteristic of dot-matrix printers). Thanks to its light weight, however, you can easily move the printer farther away if the noise proves to be bothersome.

The printer comes standard as a black-and-white model, but it can also output color on command with the optional color kit. The color kit consists of a wider printhead and a four-band color ribbon. Installing the color kit is a snap—literally. The color printhead snaps into place, as does the color ribbon cartridge. Installation of the kit takes less than three minutes and doesn't require any technical prowess whatsoever.

The 200GX can churn out copy in high-speed draft mode at the rate of 240 characters per second and in near letter quality (NLQ) mode at 40 cps. Select character widths in sizes of 10,

12, 13.3, 15, 17.1, and 20 characters per inch. Two fonts (draft and high-speed draft) are available in data-processing (utility) mode while three fonts (roman, sans serif, and Courier) serve your needs in NLQ mode.

Single-sheet and continuous-form (tractor-feed) paper can be accommodated in widths up to ten inches and in weights ranging from 14 to 27 pounds. You can mount the included tractor-feed unit in the push mode for rear feed with paper parking or in pull mode for bottom feed or rear feed without paper parking. Single sheets are friction-fed from the top of the unit.

It's easy to select or change all features and settings via Citizen's Command-View II control panel. You can access any of 25 functions in three seconds or less through the four menus that comprise this control panel. Effective overall layout and design of the menus and control mechanism make this printer easy to use.

The well-written user's manual provides comprehensive coverage of the black-and-white features and functions of the printer. I would've liked to see more attention given to using the color kit option, especially since I didn't come across any software packages with dedicated drivers for the 200GX. More coverage of how to access and implement the color features would be a welcome addition to this otherwise fine document.

Available emulations allow the 200GX to perform and behave like an Epson FX-850 or an IBM Proprinter III. If you use the color kit and want to output in color, software should be configured to emulate an Epson EX-800 or Epson JX-80 printer. As I stated earlier, the manual should go into more detail for color-kit users. Only a brief, single mention of these Epson color printer driver emulations was made on page 194 of the manual, and it isn't referenced in the index.

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List Price: \$949 (\$28 for color
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EPSON LQ-860

If you intend to use the 200GX in color mode with *GEM Artline 2.0* or *Presentation Team*, you'll need Digital Research's optional *Printer Driver Pack #7* for the Epson JX-80 driver (this is available free to registered GEM users by contacting Digital Research directly). The print resolution of the Citizen 200GX is 120 x 144 dots per inch with this driver.

Being accustomed to color output from much higher-end printers, I was pleasantly surprised that the 200GX did such a nice job using the Epson JX-80 driver. The printer can create seven pure colors (magenta, yellow, cyan, blue, green, red, and black) from its four-band ribbon, which is adequate for most spot color tasks. Since it can't dither (combine various color dots in sequence to produce additional colors), it isn't capable of outputting sophisticated color files which use color palettes composed of more than these seven solid shades.

If you need sophisticated color palette capabilities and high-resolution output, the 200GX is probably not for you. On the other hand, if you're on a tight budget and you need a good 9-pin dot-matrix workhorse that also has color capability, this Citizen may fill the bill nicely.

TOM BENFORD

Circle Reader Service Number 302

No fuss. No bother. No conflicts. Industry standard. When a printer manufacturer wants to convince you that it's selling a recognizably superior printer, it almost always stresses that the printer's Epson compatible. Well, you don't get much more Epson compatible than with an Epson, and the new Epson LQ-860 will give you more than compatibility—it provides smooth operation and brilliant color output for all of your small business needs.

Printers are often difficult to set up, but setup of this Epson is relatively simple, and the excellent Epson documentation makes understanding and operating the printer much easier. Maintenance should prove simple, and you shouldn't have to service the printer frequently.

I tested the LQ-860 with both DOS and *Windows* programs. Within each of these environments, I used the Epson LQ-2500 driver, which allowed me to take full advantage of the LQ-860's color capabilities. My printouts of a *Windows* bitmap, a *CorelDRAW!* sample, and a *Harvard Graphics 3.0* sample all proceeded without any complications.

As this is a 24-pin printer, you can expect some banding in your printouts. There was more of this than I would've liked, but I found the overall mix of colors and shading quite good. The results are certainly acceptable for

printing graphs in your spreadsheets and for making drafts of presentations. The banding seemed most noticeable with dark colors. If you're producing charts and graphs, put those graphics against a light background or against no background at all. The banding should be much less noticeable. You'll want to steer away from dark backgrounds anyway, as dynamic presentations incorporate lighter, brighter colors.

One frequently overlooked feature of color printers is the way they handle black text. In this area, the LQ-860 truly excels. Even when you're using the color ribbon cartridge, black characters appear sharply defined. With some dot-matrix color printers, the black ink tends to look washed out. Needless to say, when equipped with a black ribbon, the LQ-860 prints even better.

The paper-handling features of the LQ-860 are the standard ones that you'd expect in a printer of this caliber. Loading single sheets and continuous paper is simple. Paper parking also works well. The front panel allows for the selection of fonts and pitch, but I didn't find it as intuitive as front-panel displays on other printers. It doesn't, for example, provide much visual feedback on the status of your document or on the status of print operations.

Noise levels from the printer are quite bearable. The straightforward, complete documentation includes a well-organized troubleshooting section that will help solve any problem you're likely to face when using the printer.

The Epson LQ-860 is designed for the serious business professional who needs good-quality color output at a competitive price. It's not expressly designed for home use, although a home-based worker with serious graphics needs would do well to consider it.

PETER SCISCO

Circle Reader Service Number 303

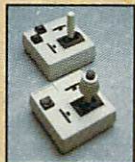


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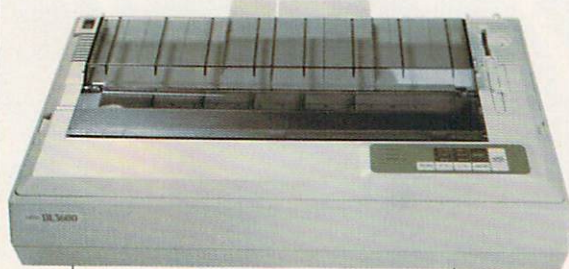


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Warranty: 2 years

FUJITSU DL3600

Exceptionally compact, quiet, and picture perfect in its output, Fujitsu's workhorse DL3600 offers versatility and respectable color at a dot-matrix price.

The DL3600 works perfectly well as a basic text printer. After installation of its enclosed color kit, the machine can also render text or graphic images using seven colors, provided you have software capable of creating color text or graphics.

Setting up the machine proved neither time-consuming nor difficult, and within minutes I was generating routine printouts. The DL3600 user's manual, with its clear illustrations and straightforward organization, helped in that regard. I would have liked a troubleshooting section, though, and I found the index to be on the skimpy side. Despite those minor flaws, the user's manual also proved vital in explaining the DL3600's different mode and font settings, which are easy to use after you take a little time to read about them.

Text printouts using the varying settings were of uniformly good quality, even if some of the draft printouts were a little dotted. Color printouts of both text and graphics yielded similarly satisfactory results, with the color images somewhat banded but very impressive otherwise. The optional Fujitsu *Creative Faces* software, which works only within *Microsoft Windows*, offers both PostScript-compatible fonts and color-saturation control for the DL3600. Four emulations are standard on

this printer: the Fujitsu DPL24C PLUS, the Epson LQ-2500 and LQ-2550, and the IBM Proprinter XL24.

Weighing in at a sturdy 26.5 pounds and occupying a space that's 4.7 x 22.8 x 13.6 inches, the DL3600 requires a fair amount of operating room. With dimensions like that, you get desk-commanding bulk but also the capability of handling paper as wide as 16.5 inches. Whether pulling in tractor-feed paper or loose single sheets, the rear-loading DL3600 usually prints quickly and flawlessly. I did run into a couple of jams, though, using both loose sheets and tractor-feed paper. And while the vertical single-sheet paper-feed mechanism didn't always take hold on the first try, it works significantly better than the more complicated, horizontal-feeding setup more common to dot-matrix printers. Soundwise, the DL3600 makes about

as much noise as the next model, operating neither especially loudly nor quietly. The solidly built machine comes with a two-year warranty.

If you're in the market for a printer that performs well with a variety of paper sizes, fonts, and color printing jobs, Fujitsu's DL3600 just may be the one for you.

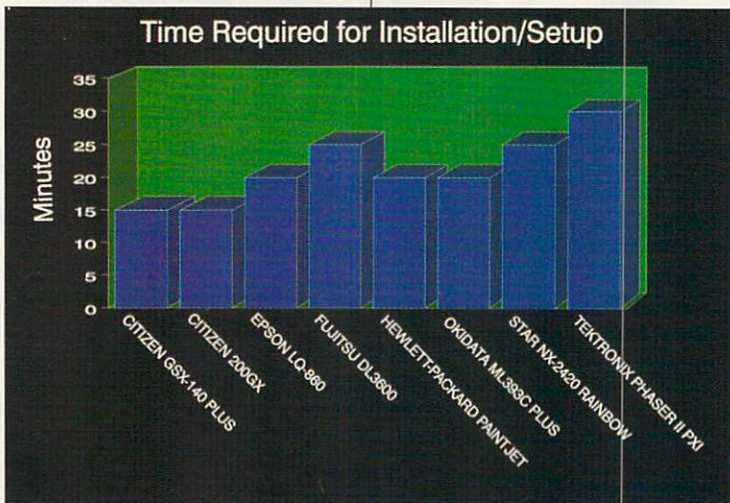
EDDIE HUFFMAN

Circle Reader Service Number 304

HEWLETT-PACKARD PAINTJET

I like computer products that are easy to install, reliable, and versatile. And it is precisely for those reasons that I like the Hewlett-Packard PaintJet color graphics printer.

With the experience and reputation HP has for developing and producing high-quality printers and plotters, I naturally expect excellence in any product bearing the HP logo, and the HP PaintJet lives up to these expectations. This color printer measures approximately 12 inches front to back by 17½ inches wide by 4 inches tall. I found the PaintJet easy to set up, and thanks to its relatively light weight—only 11 pounds—this compact unit moves easily from one location in





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your office to another.

The PaintJet delivers ink to the paper or transparency film via jets of colored ink sprayed precisely through pinhole-size nozzles. Since black ink is used for both regular and color printing, it runs out faster than the colored inks, and the HP folks have wisely adopted a two-cartridge system in the PaintJet. One ink cartridge contains black ink only; the second cartridge contains three compartments, one each for yellow, magenta, and cyan inks. From these four basic ink colors seven "pure" tones are created (black, yellow, magenta, cyan, red, green, and blue). You can produce all other possible colors by dithering (printing small dots of the basic colors side by side). This scheme permits a color palette of several thousand shades at a resolution of 180 dots per inch.

A black ink cartridge will yield about 1100 text pages (using PaintJet paper), while a color cartridge will be spent after about 180 pages on the average. The process of inserting and replacing ink cartridges simply requires removing the cartridge from its container, putting it into the appropriate cartridge well (black or color), and snapping the retainer clip over it. The whole process takes less than 15 seconds and is a "white glove clean" operation.

The PaintJet used for this review came equipped with a parallel interface, although both HP-

IB (IEEE-488) and RS-232C interfaces are also available for this printer.

The printer can accommodate single (cut) sheets of paper, Z-fold tractor-feed paper, or single-sheet transparency film in 8½ x 11 inch size. HP PaintJet paper works best and produces the most vibrant colors thanks to its fine grain; ordinary bond paper has a tendency to let the inks bleed, making the color reproduction muddy, so the slight extra cost for the HP PaintJet paper is a wise investment.

In addition to printing in color, the PaintJet is also quite serviceable as a black-and-white printer for normal uses. Standard fonts include Courier in 10 pitch and Letter Gothic in 12 and 18 pitch, along with boldface and underline enhancement capabilities. Line spacing, perforation skip, page length, top of form, and other adjustable settings normally found on line printers come standard on the PaintJet as well.

Because of the nature of the nonimpact ink-jet technology, the printer is almost totally silent in operation with only the paper-advance mechanism producing a sound as it prints. Maintenance of this printer is simple and you shouldn't need to service it often.

Hewlett-Packard's user's manual is excellent from cover to cover and very thorough. And thanks to HP's leadership in the area of printer and plotter technology, most popular software packages that support color include HP PaintJet drivers.

If you're looking for versatile color-output capability and strong software support in a durable, well-made printer that's moderately priced, the PaintJet certainly merits a closer look.

TOM BENFORD

Circle Reader Service Number 305

OKIDATA MICROLINE 393C PLUS

The original Okidata 393C 24-pin color dot-matrix printer was a heavy-duty, high-speed workhorse that earned the loyalty and fondness of PC users around the world. It's hard to believe that this venerable old printer could be improved, but that's exactly what Okidata did with the Microline 393C Plus—took a very good thing and made it even better.

Physically, the 393C Plus looks virtually identical to its predecessor, since most of the changes are internal, affecting performance, rather than cosmetic improvements. All of the great features of the original model remain—parallel and serial interface ports; rear and bottom paper feed; paper-handling capabilities for cut sheets, tractor-feed paper, and envelopes; the ability to print on transparency film, card stock, thick multipart forms, and labels; and more. All are here in the 393C Plus, along with some new features.

The 393C Plus uses a wide four-color ribbon as the imaging medium, driven by a high-speed 24-pin dot-matrix printhead. *High-speed* is an appropriate term here, since the 393C Plus boogies along at a blistering 517 cps (characters per second) in high-speed draft mode and about 185 cps in near letter quality mode. Draft and letter quality modes are also available, as are pitches of 10, 12, 15, 17.1, 18, and 20 characters per inch.

An able contender for color printing chores, the 393C Plus proves a sterling performer for

black-and-white tasks as well, especially for printing multipart forms or peel-and-stick labels. Changing the ribbon cartridge is easy, so alternating between black and color ribbons for different tasks makes sense. Black ribbons come in either fabric or film versions; the color ribbon is available in fabric only.

The 393C is a large unit. Measuring about 7 inches high by 22½ inches long by 16½ inches deep and weighing in at 37 pounds, it's not a printer you'd want to move around the office unless you nestle it on a roll-around printer stand. Its mass can be attributed to the heavy-duty components and solid construction, which endow it with a high reliability factor and a long life expectancy.

Available emulations include Epson LQ, IBM Proprinter X24/XL24, and IBM X24 AGM. For color work, you'll want to use the Epson LQ emulation and an Epson LQ2550 driver.

Seven solid "pure" colors are produced either by single passes of the ribbon (black, magenta, cyan, and yellow) or by two passes that overprint a second color on top of the first (red, blue, and green). Thousands of other colors and shades are produced by dithering. Virtually any software package capable of color output using the Epson LQ2500 or LQ2550 driver can be used with the 393C Plus, as well as packages which support the IBM Proprinter XL/XL24 and X24 AGM printers (black-and-white only). The output resolution is 180 x 180 dpi.

A quick setup guide will get you operational in just a few minutes. The comprehensive, clearly written, well-organized reference guide simplifies the use of this multifunctional printer.

Noise is a fact of life with dot-matrix printers, and the 393C Plus is no exception. Excellent design and internal sound dampening, however, keep the noise down to a tolerable level.

OKIDATA
532 Fellowship Rd.
Mount Laurel, NJ 08054
(800) OKIDATA
List Price: \$1,499
Warranty: 1 year parts and labor

If your computing requires the versatile paper handling that a dot-matrix printer offers and you also need high-quality color output at 180 dpi, the Okidata Microline 393C Plus is a good choice. While it's not an inexpensive color dot-matrix printer, without a doubt it's one of the best-engineered and most rugged units available.

TOM BENFORD

Circle Reader Service Number 306

STAR MICRONICS NX-2420 RAINBOW

The Star Micronics NX-2420 RAINBOW is a color printer that doubles as a professional-quality monochrome printer. With support for IBM and Epson printer commands and character sets, this versatile printer can print just about anything your computer can generate.

Installation and setup of this printer are simple, as is maintenance. Because the ribbon comes in a cartridge, moving from regular black-and-white printing to color printing is a simple matter of changing cartridges and using a color driver.

As with all Star printers, the NX-2420 RAINBOW can handle single-sheet or fanfold paper, switching easily between the two with Star's paper-parking feature. You can load fanfold paper from the rear or the bottom. There's even a special mode that lets you print multipart forms with up to five copies, plus an original.

Instead of using a bank of internal DIP switches to set print functions, the NX-2420 RAINBOW uses electronic DIP switches on the printer panel. These let users

select from 25 different functions as power-up defaults.

While the NX-2420 RAINBOW's color mode sets it apart from most printers, its ability to produce quality black-and-white print has not been compromised. It can print in regular and high-speed draft modes and in any of five letter-quality fonts. It can print condensed, bold, double-size, and quadruple-size characters. Speeds range from 55 to 222 cps. Fonts and printing modes can be selected at the printer or from embedded software commands. Print quality is excellent. I wouldn't hesitate to use the NX-2420 RAINBOW to print any business document.

For extra zest in printing, the RAINBOW model offers a splash of color. In addition to black, the NX-2420 RAINBOW can print red, blue, violet, yellow, orange, and green. Colors can be selected easily by pressing buttons on the printer panel, but I wondered if they could be accessed via software. Most word processors do not support color.

The Star manual provides a list of embedded printer commands that permit users to change fonts, size, and color from within most documents. I tried switching fonts, colors, and print size from within several word processors, and the NX-2420 RAINBOW worked flawlessly. Commands are easy to use, consisting of a capital letter enclosed in double parentheses, followed by a digit.

Producing type in a single color is no problem. I discovered that the NX-2420 RAINBOW han-



TEST LAB



STAR MICRONICS
420 Lexington Ave.
New York, NY 10170
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List Price: \$499
Warranty: 2 years limited

dles multicolored graphics just as well when I ran a program that prints cards and posters with colorful cartoon characters. Since the NX-2420 RAINBOW is fairly new, there was no printer driver for it in the software's setup menu, but that wasn't a problem. If you use the printer in standard mode, the Star manual suggests a half dozen alternate drivers as substitutes. I selected one of the Epson drivers and soon had pages of colorful characters rolling off the printer. It was just as easy as that. Depending on the graphics mode selected, the NX-2420 RAINBOW can print between 60 and 360 dots per inch.

Color may not be a required feature on every home or office printer yet, but it does offer another avenue of creativity. If you need a quality monochrome printer for letters and other documents but would like the option of using color, don't overlook the Star Micronics NX-2420 RAINBOW.

TOM NETSEL

Circle Reader Service Number 307

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.

TEKTRONIX PHASER II PXI

It's virtually impossible not to use superlatives in describing the Phaser II PXI color printer from Tektronix. Everything about this high-end PostScript thermal-wax printer is truly "top drawer."

Weighing in at approximately 75 pounds when loaded and ready for use, the printer is physically large, measuring about 17 inches deep by 17.5 inches wide by about 14.75 inches high. The II PXI comes outfitted with serial, parallel, SCSI, and Appletalk (Macintosh) interface ports as standard equipment; and, since the printer can automatically switch between interfaces, you can connect all ports simultaneously. This feature makes the II PXI particularly attractive in environments where multiple PC platforms (even Macintoshes) are present, as in some graphic arts studios, advertising agencies, and office networks.

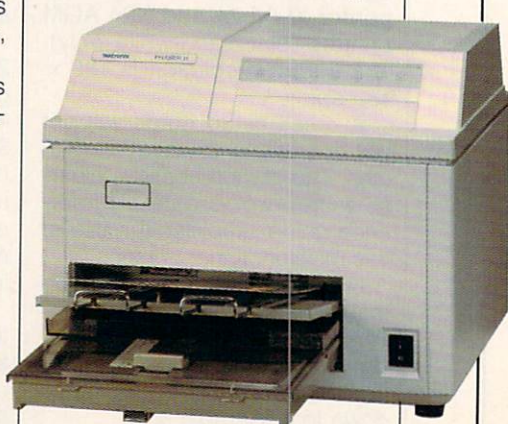
The features and capabilities of this machine are indeed out-

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standing, but with a suggested list price of almost \$8,000, it isn't for everyone. If you're interested in printing out an occasional greeting card or banner via *The Print Shop* or you'd like to output your latest artistic creation in *DeluxePaint II Enhanced*, the Phaser II PXI is not the printer for you, even if your pockets are deep enough to afford it; neither of these popular software programs provides color PostScript drivers to support it. In truth, however, using the II PXI for such normal consumer-level software is analogous to using an Uzi to kill a fly; there's much more power than required.

If, on the other hand, you're using high-end/high-capability software packages like *Gem Artline 2.0*, *CorelDRAW! 2.0*, or *Tempura Pro* (all of which have color PS drivers), you'll really appreciate the amazingly vibrant colors and absolute fidelity that the II PXI delivers on a fast and consistent basis. It's a serious printer designed to handle serious applications without a whimper. And it succeeds marvelously.

The print mechanism is hot thermal-wax transfer with a resolution of 300 dots per inch. Rather than using ink, ribbon, or toner, a thermal-wax printer uses a roll of film coated with yellow, magenta, cyan, and black wax sections; the image is transferred to paper or transparency film using a thermal (heat) transfer process in three passes (one for each of the pri-



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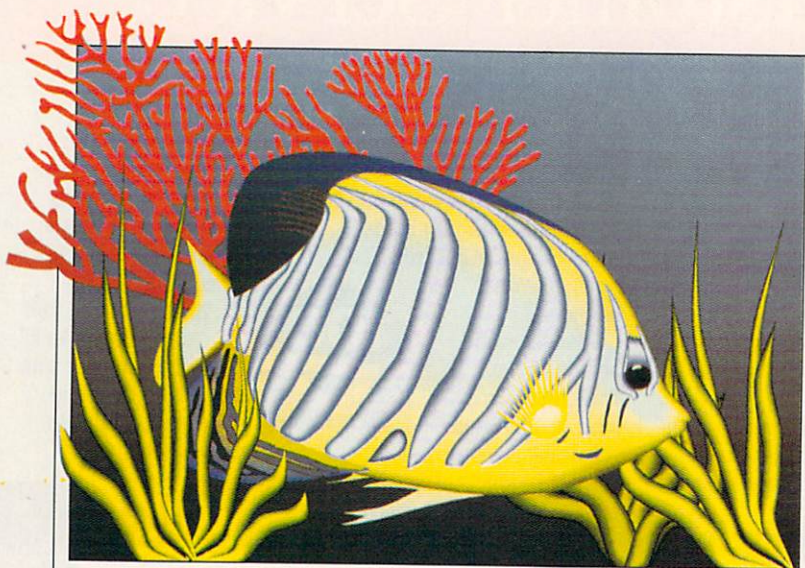
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GEM Artline 2.0

mary colors). By layering and combining the three primary colors, you can produce virtually any color (black is used as a shading medium to vary the color hue).

As with the initial cost of this

printer, output materials are also more expensive. For example, a transfer roll will yield about 275 full-color prints or about 1100 black-and-white prints. A four-color transfer roll sells for \$150,

and a monochrome transfer roll sells for \$160. In addition to the transfer roll, you'll also need special paper for your output to look really spiffy. A 1000-sheet package of letter-size paper will set you back an additional \$58. Using these figures, the costs translate to about \$0.60 per color copy and approximately \$0.20 per black-and-white output sheet. Then, too, you might want to purchase additional RAM (\$995 per 4MB upgrade), extra paper trays, or other accessories, which will add to the overall expense. Is it worth it? The answer is undoubtedly yes—if you require this much color-output power. The Phaser II PXi implements Adobe PostScript Level 2 and takes full advantage of this feature-rich page-description language. There are 39 PostScript fonts resident, and the SCSI external port permits storing and downloading additional fonts.



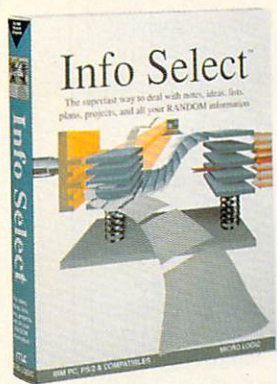
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Phone notes



Client info



Decisions



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Editor's Choice "First rate" PC Magazine

TEST LAB

The Phaser also runs under Hewlett-Packard HP-GL 7475A (color plotter) emulation for additional versatility and usefulness.

The II PXi is certified by Pantone as compliant with the Pantone Color Matching System and also offers CIE and TekColor-based color matching. Pantone certification is particularly important for any graphic arts or pre-print design applications, since Pantone is a universally accepted and used color-matching system. The possible color palette exceeds 8 million shades using default halftones, and the maximum printable area is 8.1 x 11.6 inches on legal-size sheets.

In addition to the exceptionally quiet operation of the II PXi, I was also very impressed with how fast this printer is—especially

TEST METHODOLOGY

Our Test Lab printer tests were engineered primarily to gauge the output quality of these color printers rather than output speed. Since this month's lineup consists of 9- and 24-pin dot-matrix printers, as well as an ink-jet printer and a thermal-wax printer, speed comparisons are less important across such a broad range of color printer technologies. So although you'll find bar graphs indicating times required to output graphics, pay particular attention to the output samples on pages 32-33.

To determine print output quality, we included in our test suites four graphics files created with *GEM Artline*. Two of these files used black ink only, one used "spot" color, and one used four colors to fill areas within black outlines.

A special color-palette file was also created using the seven solid primary colors (magenta, yellow, cyan, blue, green, red, and black) available on all of our dot-matrix models.

Both the ink-jet and the thermal-wax printers are capable of shading these solid primary colors by adding black to the colors, so a special color-palette file was generated to showcase these capabilities.

While speed is certainly important, the quality of output should be your primary criterion as you select a color printer. As is often the case, quality generally improves, along with speed and capabilities, as the price increases.

—TOM BENFORD, PRESIDENT
COMPUTER PRODUCT TESTING SERVICES

PRINTER GLOSSARY

band. A portion of a graphic sent to the printer. The term **banding** describes the horizontal lines in dot-matrix graphics output.

dpi (dots per inch). A standard for printer resolution that measures the number of dots a printer can place along a linear inch. Laser printers are typically rated at 300 dpi. You should realize, however, that this resolution is not necessarily an indication of print quality, as 300-dpi laser output looks better than 360-dpi dot-matrix output.

draft quality. The lowest print-quality setting of a printer. Because the printer puts less ink on the page, this is usually the fastest print mode. Most often associated with dot-matrix printers.

emulation. The ability of a printer to mimic the functions of a similar, but incompatible, printer. Many printers contain the code to emulate one or more standard printers, such as an Epson FX-80, a Hewlett-Packard LaserJet, or an Apple LaserWriter Plus.

font. A typeface or family of typefaces. Each font has a particular

design but may include different styles and sizes. Most higher-resolution printers allow a choice of font. When shopping for a printer, you'll want to pay attention to how many fonts come standard and how many you can add.

ink-jet printer. A type of printer that uses a mechanism to spray ink onto paper.

jaggies. The saw-blade (or stairstep) appearance of slanted or curved lines. Jaggies occur because you're trying to print a line that is not perfectly straight and either perfectly horizontal or perfectly vertical—the only kind of lines a raster device can create.

laser printer. A type of printer that uses the electrophotographic method used in copy machines. Laser printers print an entire page at a time and offer very high quality.

near letter quality. Print quality that approaches the quality of a standard office typewriter. Abbreviated NLQ.

near typeset quality. Print quality that approaches the quality of a typesetting printer.

pin. One of a series of pins located in the printhead of a dot-matrix printer. Each pin produces a dot at a specified location on a printed line of text. See also **dot-matrix printer**.

print driver. A device driver that converts a program's generic printer output into the codes required by a specific printer.

printer buffer. A hardware- or software-based memory device that accepts printer data from a computer and holds it until the printer is ready for it—thus freeing the computer for other use. The process of using a print buffer is often referred to as print spooling.

sheet feed. A mechanism that uses friction to move single sheets of paper through a printer. See also **tractor feed**.

tractor feed. A mechanism that moves continuous, or fanfold, paper through a printer. The paper must have pre-punched sprocket holes on both the left and right sides. Also known as pin feed. See also **sheet feed**.

—DAVID ENGLISH



Get the best of Windows and OS/2 without learning all this.

Sure, you want to get your PC flying. With features like multiple open applications and background printing. Maybe even the ability to maintain your host connection while you work on something else.

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Thanks to Print'N'Run, new Software Carousel is also an advanced print handler. One that quickly takes over your printing jobs by accepting all the output bound for the printer, then sending it to the printer as fast as it can take it.

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And OLÉ works with all kinds of connection software. Including IBM, Attachmate, and others. Without changes to your hardware or software.

Even the experts agree.

Garry Ray, writing for PC Week, said, “Of these alternative operating environments (OS/2, DesqView and Software Carousel), Carousel may be the best choice of the day.”

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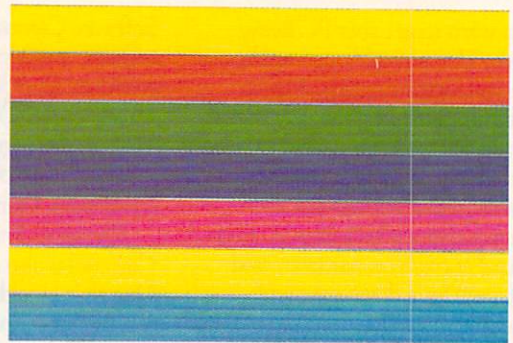
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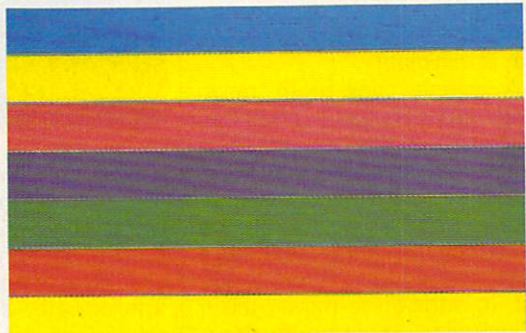
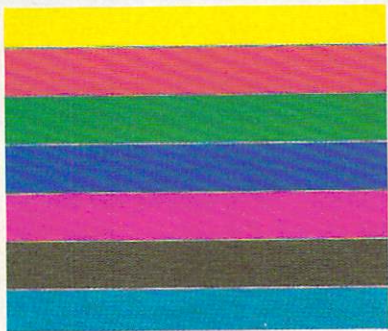
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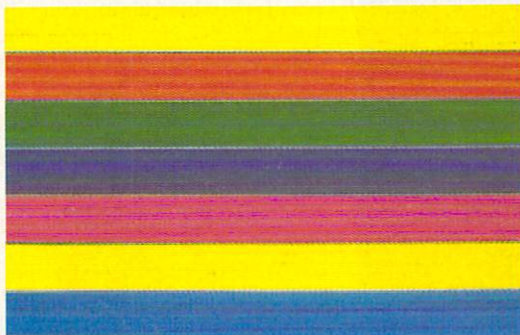
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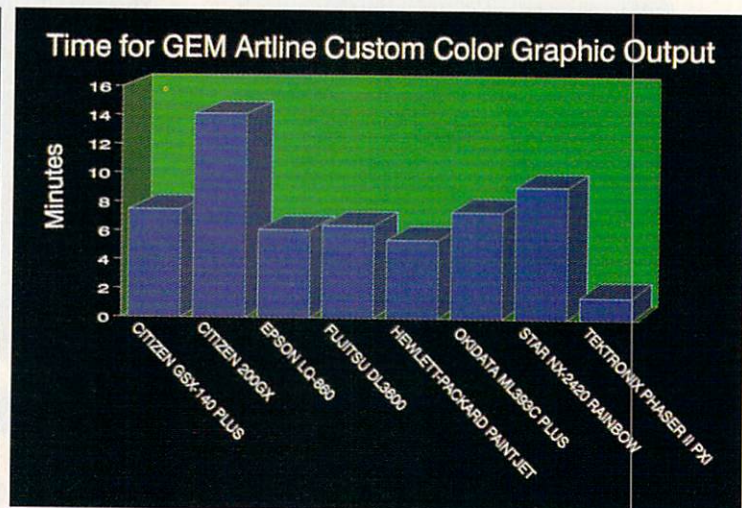
Tektronix Phaser II PXI

TEST LAB

since it outputs in full color. On the average it only took about 45 seconds to output a color page and less than 25 seconds for a black-and-white page. The printer uses a 24-MHz RISC-based processor and comes with 6MB of RAM standard (expandable to 18MB in 4MB increments), which accounts for its remarkably swift color output. Since the image is transferred using heat, operational noise is very low. (The unit's cooling fan and paper-movement mechanisms are the only components that make noise, and even that is minimal.)

A special fine-grain pure-white paper is used in the II PXi, which affords the best adhesion for the heat-transferred wax. I experimented with normal bond paper and achieved poor results, so the special Tektronix paper is a must for the highest-quality output. In addition to paper, the II PXi will also output on transparency film or fabric transfer media (to make iron-on transfers for T-shirts); all output materials are available from Tektronix directly. Tray capacity is 100 sheets of paper or 50 sheets of transparency film.

The documentation supplied with the II PXi is excellent, as are the support materials and software disks containing utilities and



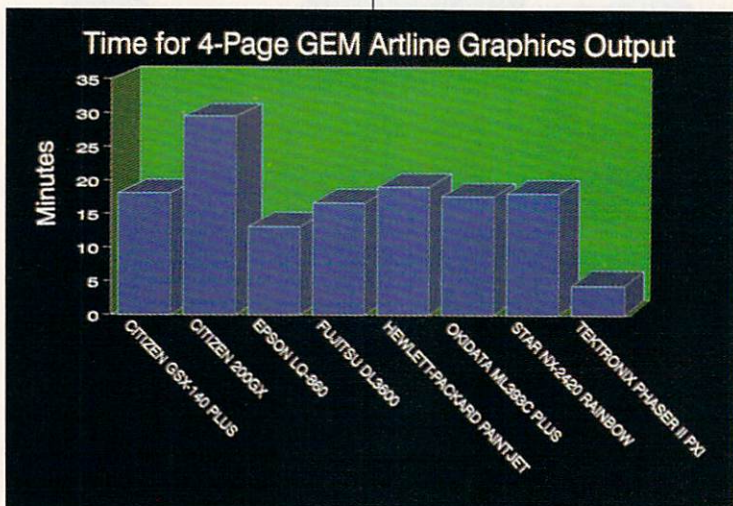
drivers for numerous applications. Using the printer is as simple as connecting it to your PC's parallel (or serial) port, running your favorite application (with an appropriate color PostScript print driver installed), and sending the file to print as normal. Once the file data is sent, the multipass imaging process begins. First the yellow color component is transferred to the paper, which is then drawn back into the printer. Next the magenta color is transferred, and again the paper disappears into the printer. The cyan areas are transferred next with the paper again receding into the print-

er for the black pass, after which it is ejected into the output tray. The output quality is absolutely breathtaking, rivaling a high-gloss color-printed magazine page.

Make no mistake: The Tektronix Phaser II PXi is not a color printer for the average PC user with limited color-output requirements. It is the printer of choice for virtually unlimited color-output capabilities and for serious graphic art applications that require uncompromising Pantone color matching and high-resolution output.

TOM BENFORD

Circle Reader Service Number 308



For further information about this month's Test Lab, see the COMPUTE area on GENie and America Online. In addition to regular Test Lab information, you'll find our HDBENCH.EXE, proprietary benchmark software developed especially for the Test Lab.

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- Champions of Kyrnn.....33
- Chuck Yeager's Air Combat.....40
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- Conan the Cimmerian.....32
- Conflict:Middle East.....37
- Corporation.....32
- Countdown.....36
- Covert Action.....37
- Crime Does Not Pay.....32
- Crime Wave.....36
- D-Generation.....34
- Das Boot Submarine.....31
- Days of Thunder.....27
- Death Knights of Kyrnn.....33
- Dick Tracy.....32

- Hare Raising Havoc.....32
- Hare Raising/Sound Source.....43
- Harpoon.....39
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- Harpoon BattleSet # 4.....25
- Harpoon Challenger Pak.....28
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- Heart of China.....37
- Hockey League Simulator.....26
- Home Alone.....27
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- Test Drive 3.....35
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- Warlords.....24
- Theme Park Mystery.....32
- TimeQuest.....37
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- Tony La Russa AL Stadium.....18
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- Tracoon 2:Air Traffic Controller.....43
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- Ultima 6.....40
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- Ums II: Nations at War.....37
- Vaxine.....28
- Vengeance of Excalbur.....32
- Vette.....27
- Volpheed.....29
- Warlords.....29
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- Sim Earth for Windows.....43
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- Spellcasting 101.....37
- Spellcasting 201.....43
- Spirit of Excalbur.....32
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- Star Control.....21
- Starflight 2.....22
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- LightQuest.....34
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- Links:The Challenge of Golf.....23
- Loom.....37
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DIMENSIONS								
Height	5.10"	5.10"	15.70"	4.70"	3.86"	7.09"	6.10"	14.75"
Width	16.90"	16.90"	18.50"	22.80"	17.40"	16.42"	18.20"	17.50"
Depth	12.60"	12.60"	7.60"	13.60"	11.89"	22.44"	14.00"	17.10"
Weight (in pounds)	12.1	11.0	22.0	26.5	11.0	37.0	14.6	75.0
PRINT MECHANISM								
Matrix	■	■	■	■	□	■	■	□
Ink-Jet	□	□	□	□	■	□	□	□
Thermal	□	□	□	□	□	□	□	■
HIGHEST PRINT SPEED (in cps)								
Draft	220	160	295	324	300	517	250	N/A
Quality	72	40	82	108	167	230	100	N/A
INTERFACE								
Parallel	S	S	S	S	S	S	S	S
Serial	O	O	S	S	O	O	N/A	S
SCSI	N/A	N/A	N/A	N/A	N/A	N/A	N/A	S
AppleTalk	N/A	N/A	N/A	N/A	N/A	N/A	N/A	S
EMULATIONS								
IBM ProPrinter	■	■	■	■	□	■	■	□
HP II	□	□	□	□	■	□	□	□
Epson	■	■	■	■	□	■	■	□
HP Plotter	□	□	□	□	□	□	□	■
PS Level 2	□	□	□	□	□	□	□	■
PS Level 3	□	□	□	□	■	□	□	□
RAM/BUFFER								
Standard	8K	8K	6K	24K	8K	23K	30K	6MB
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	360	240	360	360	180	180	360	300
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PAPER FEED								
Tractor	■	■	■	■	■	■	■	□
Friction Sheets	■	■	■	■	■	■	■	□
Labels	□	□	■	■	□	□	■	□
Transparencies	□	□	□	□	■	■	□	■
Legal	□	□	□	□	□	□	□	■
Envelopes	□	■	□	□	□	■	□	□
OPTIONS								
Sheet Feeder	■	■	■	■	□	■	■	□
Labels	■	■	□	□	□	■	□	□

■—Yes □—No N/A—Not Applicable or (information) Not Available S—Standard O—Optional

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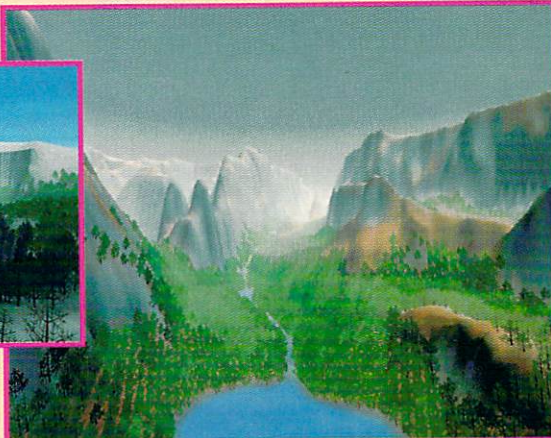
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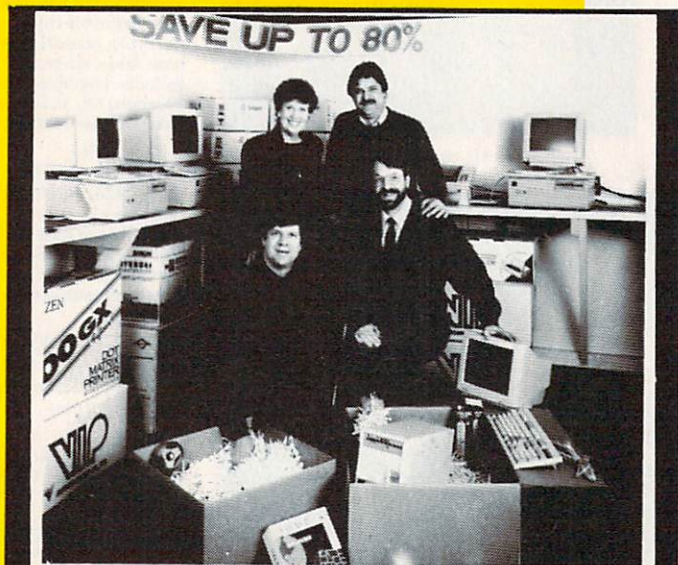
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NEWS & NOTES

Peter Scisco

Soundings

Ad Lib has officially declared that the long wait for its new generation of sound cards is over. The company announced at COMDEX that the Gold Series would begin appearing on store shelves in mid December. A new Yamaha synthesizer chip—the YM262—provides exceptional performance improvement over the previous Ad Lib music card. Chief among the advances are four-operator FM voices and eight FM waveforms for true stereophonic quality, a 12-bit stereo DAC (digital-to-analog converter), and sampling rates up to 44.1 kHz, making for true CD-quality sound. In addition, the Ad Lib Gold Stereo Sound Adapters can be accessorized with

64K of on-card memory. Scheduled for release in 1992 for under \$200. For more information, contact Advanced Gravis, 1602 Carolina Street, Unit D12, Bellingham, Washington 98226; (800) 663-8558.

ATI Technologies, which introduced its sound cards at last summer's PC Expo in New York, began shipping the VGASTEREO-F/X (\$449) and the STEREO-F/X (\$199) cards during COMDEX. Both boast 8-bit DAC and ADC (analog-to-digital converter), compatibility with the Ad Lib and Sound Blaster sound cards, and drivers for DOS and Windows applications. The VGA version also sports ATI's VGA Wonder XL controller, with support for 1024 x 768 resolution graphics and a 16-bit graph-

boasts a CD-ROM mixer so that materials from a CD-ROM drive can be mixed in with digital audio and MIDI tracks. A sound-editing package, *Wave for Windows* (\$149), gives users professional control over the creation of audio presentations. For further information, contact Turtle Beach Systems, CyberCenter, Unit 33, 1600 Pennsylvania Avenue, York, Pennsylvania 17404; (717) 843-6916.

Apple's Polishing Up

Since its disappointing Macintosh Portable, computer users have been waiting to see how Apple would answer the call for a true notebook computer. At this past fall's COMDEX (a conference and exposition held by computer dealers in Las Vegas), Apple answered with a line of laptop computers called the PowerBook series. The series includes the low-end 16-MHz 68000-driven PowerBook 100 (\$2,299 with 20MB hard disk and 2MB RAM or \$2,499 with optional external floppy disk drive), the midline 16-MHz 68030-driven PowerBook 140 (\$2,899 with the same hard disk and RAM, but a longer list of options), and the high-end PowerBook 170 (\$4,599 including 2400-bps modem and 4MB RAM). All models include a trackball, full-size keyboard, and System 7 software. Options include memory upgrades, battery rechargers, power adapter, SCSI adapter and cable, and modem. All of the systems are available now. For more information about these portables for the rest of us, contact Apple Computer, Customer Relations, 20525 Mariani Avenue, Cupertino, California 95014; (800) 776-2333.

Ink Jet to the Stars

Star Micronics entered the field of ink-jet technology in a

Ad Lib introduces a new generation of sound cards with the YM262 synthesizer chip.



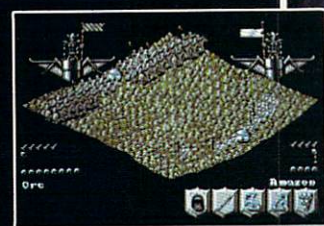
several add-on modules, including a PC telephone-answering system, a surround sound module, and a SCSI adapter kit for CD-ROM interfaces. For more information, contact Ad Lib, 220 Grande-Allee East, Suite 850, Québec, Québec, Canada G1R2J1; (800) 463-2686.

Also making noise at COMDEX was Advanced Gravis. New in its product lineup is UltraSound, a PC-compatible sound card. The UltraSound has a built-in stereo amplifier, 16-bit digital audio, 8-bit digital sampling capability, MIDI support, joystick port, and

ics data path for speeding graphic-intensive applications. An optional MIDI interface option for either card sells for \$79. For more information, contact ATI, 3761 Victoria Park Avenue, Scarborough, Ontario, Canada M1W3S2; (416) 756-0718.

Another high-end sound solution comes from Turtle Beach Systems. The Multi-Sound card retails for \$995 and is aimed at users who want to create professional multimedia applications. The card includes 126 CD-quality sampled instruments that are stored in 4MB of ROM. It also

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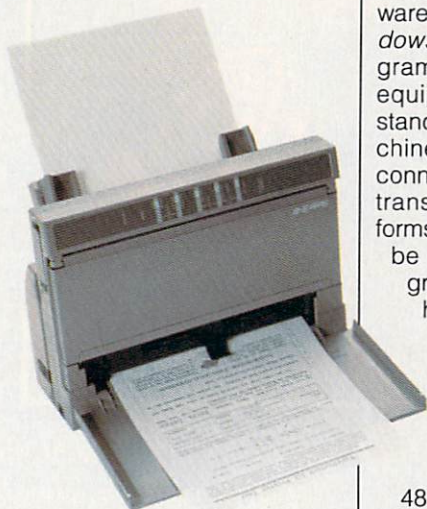
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Circle Reader Service Number 151

Star Micronics enters the ink-jet market with a versatile, up-endable four-pound ink jet.

big way at COMDEX by releasing the StarJet SJ-48, a total four-pound printer based on the Canon BJ-10ex printer technology but with significant enhancements, including 13 scalable Bitstream fonts for use with *Windows*, NEC graphics emulation for 360-dpi graphics, and a quarter-size mode for compressed spreadsheet printing. The printer lists for \$499. For more information about the StarJet, contact Star Micronics, 420 Lexington Avenue, Suite 2702, New York, New York 10170-2702; (800) 447-4700.



Windows Calling

If your local telephone company offers a Caller ID service and you're running *Windows* on your home computer, then *WindowPhone* from AG Communication Systems could be the calling manager you've been looking for. As designed, the program will identify the caller by number and associate that number with a name (if that name is contained in your personal phone book), maintain a log of all calls (incoming and outgoing), record phone activity even when the PC is turned

off, support DDE for seamless use with other *Windows* applications, and support speed dialing for up to 20 numbers. The program is scheduled to ship in the spring of 1992, but its price wasn't available at press time. For more information, contact AG Communication Systems, 2500 West Utopia Road, Phoenix, Arizona 85027; (800) 424-8559.

Just the Fax

Fax technology moved away from the simple office fax machine a couple of years ago, but the flood of PC fax products hasn't abated.

At fall COMDEX, Cardiff Software showed *Teleform*, a *Windows*-based software program that links computers equipped with fax cards to stand-alone Group III fax machines. The purpose of this connection is to collect and transport information from forms into data files that can be used by a PC. The program sells for \$995. If you have further questions about *Teleform*, contact Cardiff Software, 531 Stevens Avenue, Building B, Solana Beach, California 92075; (619)

481-2255.

If a big system isn't for you, perhaps you'd be interested in the FM 9642ecc fax/modem card from Osmos. This card is truly a card—its actual size is hardly larger than a credit card (3 x 2 x 3 inches). It offers Hayes compatibility, requires no external power source, has autodial and autoanswer, and sends fax transmissions to Group III fax machines at 9600 bps. The modem part of the card is rated at 2400 bps. The fax/modem is listed at \$300. If you have further questions, contact Osmos, 4151 Business Center Drive, Fremont, California 94538; (415) 623-1000.

Multimedia Does Windows

The showroom of the Bally's Hotel in Las Vegas was bursting with multimedia products, especially those that support the multimedia extensions of *Windows*. Among the most notable were a new edition of the pioneer *Microsoft Bookshelf*; *Macmillan Dictionary for Children*, based on the well-known bound edition and aimed at children ages 8 to 12; and a version of *Links* from Access Software, which boasts detailed graphics and fly-by shots of golf courses.

Low-End Toolbox

Asymetrix announced three products in a new Pocket-Book series designed to appeal to *Windows* users on a budget. *Instant Database* (\$59.95) lets users with little knowledge of database programming develop graphical databases. *Make Your Point* (\$59.95) is a presentation builder. The third product, *Day-Book Plus* (\$49.95), is a personal calendar. If you have any questions, contact Asymetrix, 110 110th Avenue NE, Suite 717, Bellevue, Washington 98004; (206) 462-0501.

Rabbit Grows Up

Not only did The Learning Company show its new *Reader Rabbit 2* at COMDEX, but it also showed an updated version of the original *Reader Rabbit*. This new version is called *Reader Rabbit 1* and includes 256-color VGA graphics, animation, and sound board support. *Reader Rabbit 2* is designed for kids 5-8, while *Reader Rabbit 1* is for kids ages 3-6. Owners of the original *Reader Rabbit* can upgrade to the new version for just \$10. For more information, contact The Learning Company, 6493 Kaiser Drive, Fremont, California 94555; (800) 852-2255.

continued on page 47

The Games:
Winter Challenge

"HE HATED THE AUSTRILIANS."

THEY WERE FEARLESS, CUNNING AND FAST. FIVE GOLD MEDALS WERE ALREADY GOING BACK TO KITZBÜHEL. BUT HE VOWED TO DENY THEM A SIXTH. ON THE TRAM, HE TOLD THE REPORTERS. HE WOULD BE THE FASTEST MAN DOWN THE MOUNTAIN THIS DAY." INTENSE RIVALRY. GRUELING COMPETITION. WORLD CLASS SPEED. ALL PART OF THE GAMES: WINTER CHALLENGE™ GO FOR THE BRONZE, SILVER OR GOLD AS YOU EXPERIENCE THE



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THE GREAT TR

The following descriptions and values in the 1992 Great Treasure Hunt correspond to the numbered photos on these pages.

1)GEO Tracker LSi 4x4 Convertible, including sporty aluminum wheels option. Value: \$12,935; 2)Honda Nighthawk 750 Motorcycle. Value: \$4,199; 3)Leading Edge Computer package including color VGA monitor, 100MB hard drive and built-in Send/Receive Fax modem. Value: \$2,359; 4)Philips CD-I + Discs. A whole new way of looking at TV: The Imagination Machine (TM). It's CD-Interactive instruction and fun. Value: \$2,300; 5)Creative Labs Multimedia Upgrade Kit consists of the Sound Blaster Pro card, an internal CD-ROM drive, 5 CD and 13 exciting Multimedia software titles. Value \$2,142; 6)Pioneer CDX-FM 45 Universal CD Changer and PCC-700 Compact Cellular Phone for the car. The cellular phone weighs only 10.1 ounces and the CD player has multi-play capability. Value:\$2,100; 7)American Airlines round trip air fare for two to Paris, France from any U.S. gateway city. Value: \$2,000; 8)RCA 35 inch Home Theatre TV, with Pix-in-Pix capability, zoom and pan feature, and sound Retrieval System. Value: \$2,000; 9)Lifecycle Model 5500R The Recumbent Lifecycle Aerobic Trainer makes exercise easier, with a semi-reclining position that helps burn more calories with less exertion. Value:\$1,995; 10)Sansui Mini Stereo. Full-featured mini component surround sound A/V shelf system, which includes three Karaoke modes, allowing users to replace the vocal on their favorite music and sing along. Value: \$1,699; 11)NEC CD Gallery A complete CD-ROM system that adds exciting new capabilities to a PC or Macintosh. Display pictures and illustrations, listen to live audio and experience motion graphics. Includes 7 popular interactive CD-ROM software programs. Value: \$1,500; 12)Schwinn Paramount Series 70 bicycle, with Tange Ultra-Lite 38mm rake fork for smoother, more stable handling on any terrain.

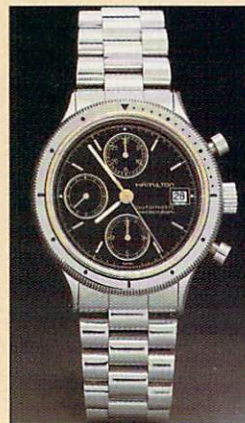
Value: \$1,274; 13)(2) Konica Aiborg 35mm Cameras. A his and hers pair, featuring the world's first moving frame auto focusing system, plus 30 rolls of Konica Super SR Color Print Film. Total Value: \$1,182; 14)(2)CITIZEN PN-48 Notebook Printers the world's smallest laser-quality printer at 2lbs, and packed with accessories such as a NiCad battery, AC adapter/charger and carrying case. The perfect tool for the portable computer user. Total Value: \$1098; 15)Hamilton Deluxe Chronomatic III watch (\$750) with 17 jewel, self-winding mechanical movement, and a Hamilton Wilshire watch with a slim, trim case and unusual hinged lugs that make it one of the most comfortable watches ever designed (\$295). Total Value: \$1,045; 16) Fujitsu DEX-80 FAX Machine features an automatic cutter, built-in answering machine interface, and a full featured handset. Value: \$999.



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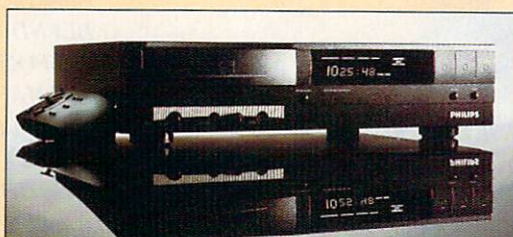
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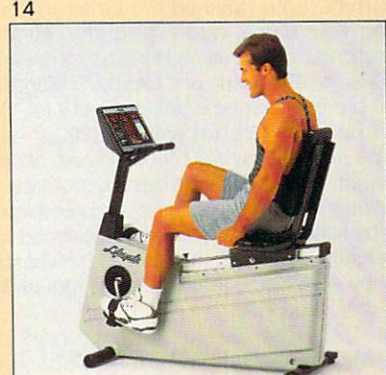
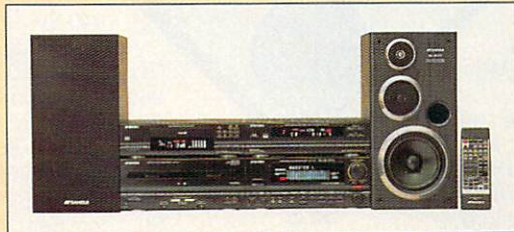
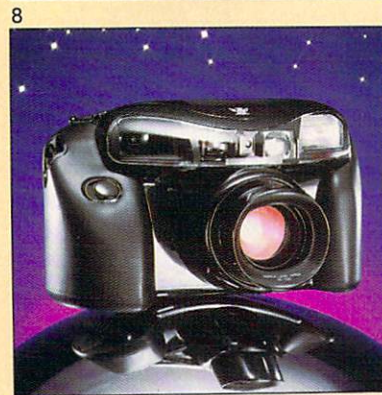
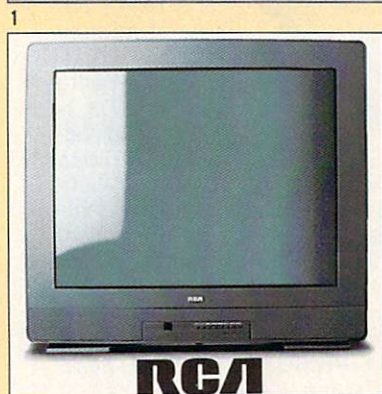


12

MEASURE HUNT

GET TO KNOW
GEO
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Geo Tracker 4x4 Convertible.



13

11

9

The 1992 Great Treasure Hunt is on, and it's easy to enter. When you find the solution, simply mail it to the address shown below, or using a touchtone phone, call 1-900-976-HUNT (\$1.50 for the first minute, \$1.00 for each additional minute). Your solution will be recorded automatically. Here's how to find the correct answer:

Each of the dozen picture discs displayed inside the perimeter of the diamond shown on this page is a portion of a photo or illustration in an ad in this issue. To solve the "Treasure Hunt", find the ads from which discs were taken, and note the page number for each. If an ad appears on the inside or outside of the front or back cover, count that page number as zero. If there is no page number, turn to the next numbered page, and use that page number. If there is no numbered page between the ad and the end of the magazine, stop at the inside back cover, and use zero as your page number. Then add up all twelve page numbers. That is the solution to the "Treasure Hunt" in this issue.

No purchase or phone call required. To enter automatically on a touch-tone phone from 9:00 A.M. EST on 2/1/92 through midnight EDT 5/31/92, call 1-900-976-HUNT to give your name, address, telephone number, and the solution to the "Treasure Hunt" as it appears in the February/March 1992 issue of *COMPUTE* Magazine. The cost for the call is \$1.50 for the first minute and \$1.00 per minute thereafter; average call length is estimated to be 2-3 minutes. Call-in entrants will receive a \$5.00 discount certificate valid toward the purchase of any two books currently available in the *COMPUTE* Library. Charges for calls to the above numbers will appear on your telephone bill. Callers must be 18 or older or have a parent's or guardian's permission to place the call. Call as often as you wish; each call is a separate entry. Call-in entry option is void in LA, MN, and where prohibited.

Alternate Entry Method: You may also enter by printing your name, address, phone number, and the solution to the "Treasure Hunt" as it appears in February/March 1992 issue of *COMPUTE* Magazine on a 3" x 5" piece of paper, mail your entry to: "Treasure Hunt", Box 664, Gibbstown, NJ 08027. All entries must be received by 5/31/92. Enter as often as you wish; each entry must be mailed separately.

You may request the solution and complete Official Rules by sending a self-addressed stamped envelope to "Treasure Hunt" Solution, Box 728, Gibbstown, NJ 08027 by 4/30/92; no return postage required for residents of VT and WA.

The 1992 "Treasure Hunt" is sponsored jointly by *OMNI* Magazine and *COMPUTE* Magazine, 1965 Broadway, New York, NY 10023, (212)496-6100. Winners will be selected by 6/30/92 in random drawings from all qualifying entries received. Drawings

Now
THAT YOU'VE
SEEN
THE PRIZES, FIND
OUT
HOW TO ENTER.

THE GREAT TREASURE HUNT

SEE
INSTRUCTIONS
ON
THIS PAGE.

will be conducted by POWER GROUP, INC., an independent judging organization whose decisions are final. Odds determined by number of entries received. Major prize winner will be required to execute and return an affidavit of eligibility and release within 21 days of date on notification letter. Limit one winner per household. Open only to U.S. residents except employees and their families of *OMNI* Publications International, Ltd., *COMPUTE* Publishing, Ltd., POWER GROUP, INC., their respective subsidiaries or affiliates and advertising agencies. Total prize value, \$40,827. Prizes are not transferable or redeemable for cash. No substitution of prizes except as necessary due to availability. Some prizes will be awarded to winner's parent or guardian if the winner is under 21. Taxes, licensing, transportation, registration, and dealer charges are winner's responsibility. The Paris trip must be from the airport nearest the winner's home serviced by American Airlines and must be completed by 2/28/93. Other travel restrictions may apply. For names of major prize winners, send a self-addressed stamped envelope to: "Treasure Hunt" Winners, Box 813, Gibbstown, NJ 08027 by 6/30/92.

GIFT FINDER'S GUIDE: For information on the products and services in the Great Treasure Hunt, contact these companies: American Airlines, 4333 Amon Carter Blvd., Mail Drop 5375, Fort Worth, TX 76155; American Honda Motorcycle, 1919 Torrance Blvd., Torrance, CA 90501-2746; Citizen America Corporation, 2450 Broadway, Suite 600, Santa Monica, CA 90404-1003, 1-800-4-PRINTERS; Fujitsu Imaging Systems, 36 Apple Ridge Rd., Danbury, CT 06810, 1-800-243-7046; GEO, See your local Chevrolet/GEO dealer for more information.

Hamilton Watch, 941 Wheatland Ave., Lancaster, PA. 17604, 1-800-234-8463; Konica, 440 Sylvan Ave., Englewood Cliffs, NJ 07632; Leading Edge Products, 117 Flanders Rd., Westborough, MA 01581, 1-800-874-3340; Life Fitness, 9601 Jeronimo Rd., Irving, CA 92718, 1-800-735-3867; NEC Technologies Inc., 1255 Michael Dr., Wood Dale, IL 60191; Philips Consumer Electronics Company, One Philips Dr., Knoxville, TN 37914, 1-800-223-7772; Pioneer Electronics, 2265 East 220th St., Long Beach, CA 90810, 1-800-421-1603; RCA Corporation, 600 N. Sherman Dr., Indianapolis, IN 46201; Sansui Electronics Corporation, 1290 Wall St. W., Lyndhurst, NJ 07071; Schwinn Bicycle Company, 217 N. Jefferson, Chicago, IL 60661-1111; Creative Labs, Inc., 2050 Duane Ave., Santa Clara, CA 95054, 408-986-1461. **CONTRIBUTORS TO THE CREATIVE MULTIMEDIA UPGRADE KIT:** Broderbund Software, 1-800-521-6263; Davidson & Associates, 1-800-545-7677; Dr. T's Music Software, 617-455-1454; HSC Software, 310-392-8441; ICOM Simulations, 1-800-877-ICOM; Interplay Productions, 1-800-969-GAME; Origin, 1-800-999-4939; Passport Design, 1-800-443-3210.

NEWS & NOTES

Reglazing

Microsoft Windows might make it easier to run computers, but things can get complicated when your Windows installation isn't working right. Gordon Kraft, president of DiagSoft, explained that when Windows users get in trouble, it's often nearly impossible to determine whether the problem is hardware-, software-, or configuration-related.

Kraft's company has a possible answer. DiagSoft's new software package, *QAPlus/WIN*, lets you check your entire system and identify the problem.

QAPlus/WIN provides extensive Windows-related configuration and setup information and allows you to edit specific files. If you use it every day, you can actually use the software to fine-tune your system so Windows will deliver peak performance. *QAPlus/WIN* is available through computer and software dealers for a suggested retail price of \$159.95.

If you have questions, contact DiagSoft, 5615 Scotts Valley Drive, #140, Scotts Valley, California 95066; (800) 342-4763.

ALAN R. BECHTOLD

A Higher Low End

Micrografx has introduced *Windows Draw*, a drawing package that will raise the stakes in the competition for the low end of the PC graphics market. Selling for a suggested retail price of less than \$200, *Windows Draw* was designed to provide everything entry-level Windows graphics users need.

Micrografx is so sure about its ease of use that *Windows Draw* is backed by "the 60-minute challenge," which promises a full refund to anyone who isn't drawing up a storm after the first hour of running the program.

Micrografx compares its new low-cost drawing program to similar packages retailing for \$600 or more. *Windows Draw* includes Bézier-curve editing, outline fonts, and special effects such as text on a curve and blending—features usually found only in more expensive drawing programs.

Micrografx has established a hard-won reputation for inexpensive, easy-to-use drawing programs. The company established its name with *PC-Draw*, the first drawing program ever developed for the PC. *Windows Draw* is available for a retail price of \$149.95.

If you have further questions about *Windows Draw*, please contact Micrografx, 1303 Arapaho, Richardson, Texas 75081; (800) 733-3729.

ALAN R. BECHTOLD

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High Scorer

Is there a short routine in BASIC I could add to my games that would allow a high-scorers list, including the player's name, his or her score, and the date? I've experimented with sequential files and random access files, but I can never get them to work very well.

DAVID SKRDLA
MEDFORD, OK

The following routine creates an ASCII file that contains a list of the top ten scorers. When you enter the routine, you should have a variable called name\$ that contains the contestant's name and a variable called score that contains the contestant's score. This example program contains a short routine at the beginning that creates a name and a score so that each time it runs it updates the high-scorers list. You should delete these lines when you use the routine with your program. This program is written in Microsoft QuickBASIC but should be usable with most BASICS, since it doesn't do anything fancy.

```
DIM a(9)
leftmargin = 20
REM Take out this part. It's for
REM demonstration purposes only,
REM to generate names and
REM scores.
RANDOMIZE (VAL(MID$(TIME$, 7,
2)))
name$ = ""
FOR i = 0 TO 8: name$ = name$ +
CHR$(RND * 25) + 65): NEXT
score = INT(RND * 5000)
REM End of demonstration lines.
score = 99999 - score
score$ = STR$(score)
score$ = RIGHT$(score$,
LEN(score$) - 1)
score$ = RIGHT$("00000" +
score$, 5)
IF LEN(name$) > 8 THEN name$ =
LEFT$(name$, 8)
OPEN "highscor.txt" FOR APPEND
```

```
AS #1
PRINT #1, score$, name$, DATE$
FOR i = 0 TO 9
PRINT #1, "99999"
NEXT
CLOSE #1
RESET
SHELL "type highscor.txt >
tempscor.txt sort"
SHELL "del highscor.txt"
OPEN "highscor.txt" FOR OUTPUT
AS #2
OPEN "tempscor.txt" FOR INPUT
AS #1
FOR i = 0 TO 9
LINE INPUT #1, a$
PRINT #2, a$
NEXT
CLOSE #1
CLOSE #2
SHELL "del tempscor.txt"
OPEN "highscor.txt" FOR INPUT
AS #1
FOR i = 0 TO 9
LINE INPUT #1, a$(i)
NEXT
CLOSE #1
CLS
PRINT SPC(leftmargin);
PRINT "-----HIGH SCORES
-----"
FOR i = 0 TO 9
IF LEFT$(a$(i), 5) <>
"99999" THEN
PRINT TAB(leftmargin); "":
PRINT USING ("#####"); 99999-
VAL(LEFT$(a$(i), 5));
PRINT RIGHT$(a$(i), LEN(a$(i))-
5);
PRINT " "
END IF
NEXT
PRINT SPC(leftmargin);
PRINT "-----"
-----"
```

The Numbers

I would like to have a program that would turn on the Num Lock key in my Tandy 1000TL/2 during power-up.

JERRY G. JOHNSON
SUGAR CREEK, OH

Enter this program using GW-BASIC or any compiled BASIC at your disposal.

```
10 DEF SEG = (0)
```

20 POKE 1047, (PEEK(1047) OR 32) 30 SYSTEM

The last line should only be used with interpreted BASIC. Save the program as NUMON.BAS (or compile it as NUMON.EXE) and run it from the command line by typing GWBASIC NUMON (or just NUMON, if you've compiled it) or put this command in your AUTOEXEC.BAT file. This will turn on Num Lock. If you would like a program that toggles the Num Lock condition on or off, change the name to NUMTOG.BAS and change line 20 to POKE 1047, (PEEK(1047) XOR 32). If you want to turn Num Lock off, change the name to NUMKILL.BAS and line 20 to POKE 1047, (PEEK(1047) AND 223) which is 255-32. That's not the end of it, though. The Caps Lock key is operated by using OR 64, XOR 64, or AND 191. Here's a diagram that tells you all the values you can use and the keys they affect.

	OR	AND
Right Shift	1	254
Left Shift	2	253
Ctrl	4	251
Alt	8	247
Scroll Lock	16	239
Num Lock	32	223
Caps Lock	64	191
Insert	128	127

Short Story

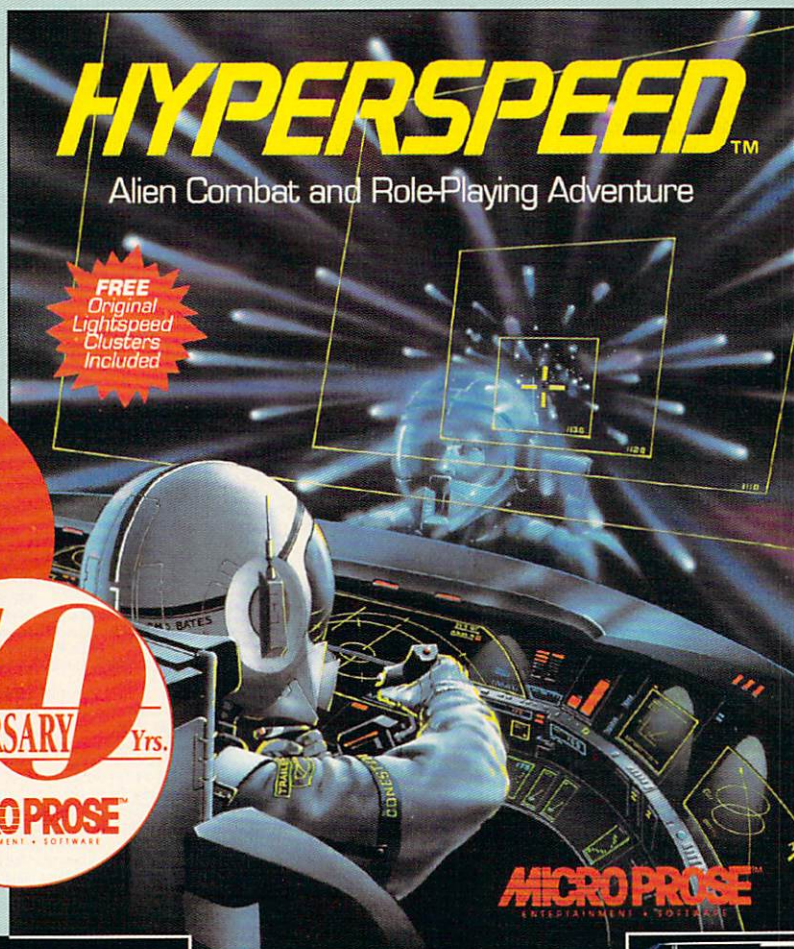
The normal size of your magazine is 10³/₄ inches tall. However, the height of my September 1991 issue was 1/4 inch shorter. Why is this? Is it an official size change or just a coincidence?

MIKE WILSON
AUBURN, CA

It was intentional. We cut 1/4 inch off the magazine to save money. You probably would not think that the 25 inches of slick-finish paper we saved

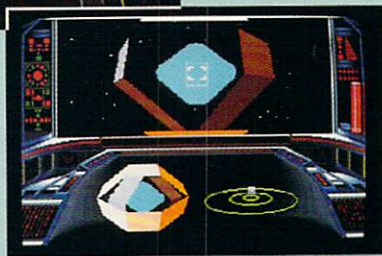
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per magazine would amount to much, but in publishing, you have to multiply everything by hundreds of thousands (it comes to almost 150 miles of paper, enough to stretch from Kalamazoo to Detroit). Besides, it allowed us to make use of a different printing process. COMPUTE has been a consistent size over the years, and perhaps, in retrospect, some sort of statement should've been made. Although the magazine is a slightly smaller "trim size," we've made absolutely sure that exactly the same number of words are used, so you shouldn't feel cheated. Next time you see a tree, you can be proud that you did your part to save it.

Another GeoWorks Fan

I've noticed that much of your focus has been on Windows. You've completely ignored a much better alternative. GeoWorks Ensemble does the same job Windows does, but it does it more easily and far better than Windows.

Right now, I'm writing this letter using GeoWrite while downloading a file from America Online and printing yet another file, all at the same time, on a wimpy XT. This is to say nothing of laser-quality printouts on 9-pin printers, 32-character filenames, and the abundance of other goodies Ensemble offers.

I hope you'll pay more attention to the real miracle GUI on the market.

MIKE SHAW
LAFAYETTE, IN

We thought we had paid enough attention to Ensemble, but we're all so impressed with its capabilities that we're willing to mention it again. As of this writing, it has been as newsworthy for its potential as for its accomplishments, and for those of us who spent years waiting for Microsoft to make Windows a

viable operating system shell, our impatience with GeoWorks may be unwarranted. The truth is that GeoWorks Ensemble is an incomparable bargain and worth serious consideration, particularly if upgrading to the newest version of Windows also means having to upgrade your hardware.

Hard Luck

I purchased a Seagate 157A hard drive, and about ten months later it just quit. The dealer looked it over for a week and then agreed to replace it. I asked if a new receipt could be sent so I could continue my warranty. I was told that the new drive would be covered under the old warranty—in other words, with ten months chopped off, resulting in a two-month warranty on a brand-new drive. I called several more manufacturers and discovered that this is the industry standard. I thought your readers would like to know.

DERK HATCHER
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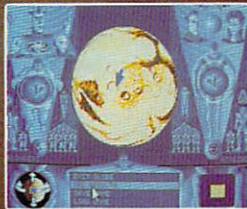
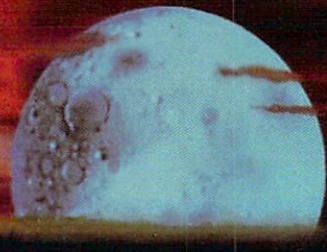
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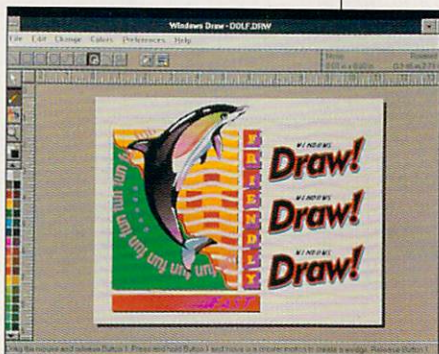
Clifton Karnes

TOP TEN NEW WINDOWS APPS

COMDEX/Fall, the most exciting computer show on earth, was held this past October in Las Vegas, Nevada. This year, there were more than 1500 exhibitors, and *Windows* applications were everywhere. Here's a look at the ten best new *Windows* products I saw at COMDEX.

For productivity, the big news was *Microsoft Word for Windows 2.0* (\$495). It's been more than a year since *WinWord* had an upgrade, and 2.0 is well worth the wait. New features include a redesigned ribbon and ruler, with a customi-

DTPers will be delighted with *Micrografx Windows Draw*, a beautifully designed draw program that lists for just \$149.95.



zable toolbar. Grammar checking is now available on board as is a graph editor. For desktop publishing, the program sports a draw program, and layout can now be frame based, which means you can move text and graphic elements around on the page by dragging and dropping them.

The second biggest COMDEX productivity package also comes from Microsoft—*Microsoft Works for Windows* (\$149.95). This program is like the DOS version of *Works*, except for the fact that the telecommunications module has been dropped and a draw program has been added. *Works* looks great under *Windows*. For a home office,

this integrated combination of a word processor, spreadsheet, database, and draw program may be just the ticket.

Although Microsoft has released its own *Windows*-based money-management tool, the biggest news at COMDEX in this popular category was Intuit's *Quicken for Windows* (\$69.95). This product has everything found in version 5.0 of *Quicken* for DOS, except for loan amortization, and the interface is excellent.

Desktop publishers will be excited about Bitstream's new type design tool, *Makeup* (\$149.00). With *Makeup*, you can stretch and bend type to create almost any effect you want. And *Makeup* works with PostScript Type 1 (the fonts used with *ATM*), TrueType (which will be bundled with *Windows 3.1*), and Bitstream's own Speedo fonts.

DTPers will also be delighted with *Micrografx Windows Draw*, a beautifully designed draw program that lists for just

\$149.95. It has about 95 percent of *Micrografx Designer's* power at a fraction of its \$795.00 price.

For entry-level DTP, the most interesting new *Windows* program was *Microsoft Publisher* (\$149). The program has everything you need to get going with page design and layout, including a boatload of on-board fonts.

For desktop publishing professionals, there's *LaserMaster's WinPrinter* (\$1,995). This is a 400 x 400 dpi PostScript-compatible printer designed especially for the *Windows* environment. Its output is beautiful, and it's fast.

Windows utilities at COMDEX were led by *Diagsoft*

QAPlus/Win (\$159.95), a tremendously powerful diagnostic tool for the *Windows* environment. If you've heard of *Check-It*, the popular DOS diagnostic utility, you may be interested to learn that the QA people also wrote that. But this is more than just *Check-It* for *Windows*. It offers powerful features you're not likely to find in any other diagnostic program.

Although not strictly a *Windows* product, *Stacker AT/16* (\$249) is almost a must for every *Windows* user. It's a software or software-and-hardware combination that can double the size of your hard disk. As most of us are painfully aware, *Windows* programs eat up hard disk real estate like nobody's business—as a case in point, *Word for Windows 2.0* gobbles up a breathtaking 15MB. *Stacker AT/16* can make living with *Windows* much easier.

In the last year, *Windows* programmers have been treated to a raft of programs that make it easy to create *Windows* apps. The earliest group to appear were *HyperCard*-like products—*Asymetrix ToolBook* and *Spinnaker's Plus*. Then came what are now being called visual programs—*Visual Basic* and *Realizer* are the two best examples. The problem is that up until now there haven't been any programs that make traditional C-and-SDK-style development easier. Well, now there's *Microsoft QuickC for Windows* (\$199). To program with this tool, you'll have to know C, and you'll have to learn the *Windows* API, but you'll have an integrated environment that's hard to beat.

Also included in the package is *QuickCASE:W*, a special version of *CASE:W* that makes it possible to create interfaces by drawing them, *Visual Basic* style. Make no mistake, this one's a winner. □

PROGRAMMING POWER

Tom Campbell

WARP FACTOR 8, MR. DATA

While you take it for granted now, BASIC didn't always have the ability to read files. Hard to imagine BASIC without this crucial aspect of the language, but the first versions of Microsoft BASIC had to be squeezed into 4K. That's right—less than the *minimum* disk space required for any file on some high-capacity hard drives.

DATA statements were added as a sop. For reasons we'll examine shortly, I rarely employ them in BASIC programs anymore, but my first excursion into a higher-level language—and in 1984, *Turbo Pascal* was undeniably a higher-level language than GW-BASIC—left me amazed that there was no way to include data in a program. You can now use *Turbo*'s strangely named typed constants to do roughly the same thing as DATA statements, but they were added years later as a response to C's initialized variables. I was depressed to realize that my only recourse was either to declare a bunch of variables at the top of a routine and initialize them manually at a later time or to use files.

Make My DATA

A DATA statement is just a list of one or more values of a type recognized by BASIC. The READ statement automatically assigns one of the values in the DATA statement to a variable, magically keeping track of both the line of the DATA statement and the datum being read. Then it moves efficiently on to the next datum the next time it's called, using an internal placeholder called the DATA pointer.

The program PLAY1.BAS offers an example of DATA at work, as well as DATA's assis-

tant, RESTORE. Run it, and you'll hear a passable rendition of reveille, the familiar bugle call played by a lone, shivering enlisted man at dawn in countless war movies.

```
' PLAY1.BAS—tested with  
' PowerBASIC and QuickBASIC.  
' Illustrates DATA and RESTORE  
' statements by playing reveille.  
' THE FIRST PART.
```

```
' Each call to PlayVerse will read  
' each NextLine$ string and play  
' it until a "" occurs.
```

```
CALL PlayVerse  
CALL PlayVerse
```

```
' THE SECOND PART.  
' Go back to the first DATA  
' statement. Play up to a "".
```

```
RESTORE  
CALL PlayVerse  
' Skip down to the Part 2 DATA  
' statement, and play up to a "".
```

```
RESTORE Part2  
CALL PlayVerse  
' THE THIRD PART.
```

```
' Simply continue playing Part 3.  
CALL PlayVerse
```

```
' This loop fetches the value of  
' each DATA statement, copies it  
' into the string variable  
' NextLine$, and plays it. When  
' the variable is a null string,  
' the subroutine exits.
```

```
SUB PlayVerse  
DO  
  READ NextLine$  
  PLAY NextLine$  
  LOOP UNTIL NextLine$ = ""
```

```
END SUB  
' Refrain—this is used several  
' times by reveille.
```

```
DATA "P8 C32 P32 P16 F32 P16  
L16 A F C32"  
DATA "P16 C32 P32 P16 F32 P16  
L16 A F C16"  
DATA "P16 C32 P32 P16 F32 P16  
L16 A F C16"  
DATA ""
```

```
' Part 1—this is used the first  
' time through.  
DATA "P16 L16 F P16 L4 A F8 P8"  
DATA ""
```

```
' Part 2—used the second time  
' through.  
Part2: DATA "P16 C16 P16 L4 F"  
DATA ""
```

```
' Part 3—used as the third and  
' last part of reveille.
```

```
DATA "MS P8 L8 A A A A L4 O5  
C"  
DATA "L8 O4 A F A F A F"  
DATA "L8 A A A A L4 O5 C"  
DATA "L8 O4 A F A F C C L4 F"  
DATA ""
```

At the heart of PLAY1.BAS is the PlayVerse subroutine. It fetches each string found in a DATA statement (BASIC knows to start the DATA pointer at the first DATA statement in your program), copies that string into the variable NextLine\$, and then uses PLAY on that string variable. It stops when an empty string is encountered. The empty string as used here, by the way, is referred to in the literature as a sentinel value. A sentinel value is a user-defined value that cannot possibly occur in a valid list of data and can therefore be used to stop a sequence of actions (normally data entry, as in this example). You'll often see -1, 0, or a large number such as 9999 used for the same purpose in DATA statements that use numeric values.

The first two calls to PlayVerse together play the first of reveille's three parts. The first call plays the section labeled Refrain, a section used by all three parts of the bugle call. At this point, the DATA pointer points to the DATA comment as Part 1, and that's what gets played on the second call to PlayVerse, right up to its null (sentinel) string.

As we get ready to play Part 2 of reveille, the utility of the DATA and RESTORE statements becomes clear. The second part of reveille reprises the first section, which is labeled Refrain. We could take the easy way out and just copy the DATA statements, but BASIC was originally designed with 4K or 8K free system memory in mind, not

The READ statement automatically assigns one of the values in the DATA statement to a variable.

The data in sequential files is used in a continuous stream from top to bottom.

640K. The RESTORE statement allowed you to reset the DATA pointer back to the first DATA statement. We'll quickly see that this wouldn't really do the job for this program, but luckily RESTORE was later supplemented to allow you to restore to a particular line number, meaning that the DATA pointer would now point at the DATA statement on the given line. Later, an alphanumeric label (like Refrain in this example) could also be used.

So to play the second part, RESTORE moves the DATA pointer to the first DATA statement. However, this time we want to play the data statements labeled Part 2 after we play Refrain, not Part 1.

After the refrain is played, a RESTORE Part2 allows us to skip over Part 1 and go directly to the Part2 label when a subsequent call to PlayVerse executes its first READ statement.

File Your Data

So far, so good. We've seen how DATA statements let us embed initialized data into a program, which no popular language until C would allow, several years after BASIC's rise to unprecedented popularity. We've also seen how to reorganize the sequence of this data by using the RESTORE statement with a line label (or number, for the Philistines reading this column). Why bother with files?

Because files allow the crucial separation of program and data—that's why. As you can see, the sample program PLAY1.BAS, above, is written for a BASIC compiler. If you decide to change the tune it plays or to give it an option to play more than one tune, you'll be confronted by a morass of DATA statements that could haunt you for the entire life of the project. Every time you want to add or edit a

song, you'll have to recompile. Worse, the people to whom you distribute your program would have no way to add or change tunes themselves, unless they had the source code to your program and a BASIC compiler and they knew how to program.

No, DATA statements are only helpful when the data set is small, does not change, and is only used once. For example, some BASIC programs contain short subprograms in machine language. If they total a page or less of source code, converting them into DATA statements isn't a bad idea. Otherwise, they should reside in separate object modules.

The solution to data that changes while the program doesn't is to use files. First the good news: They're very easy to use once you get the hang of file I/O statements and maintenance. Now the bad news: The data in sequential files (as in this example) is used in a continuous stream from top to bottom, and the only way to change position is to start back at the beginning of the file.

These compromises are well worth the limitations, and you can always use random files for more sophisticated manipulation of the file pointer (eliminating the ability to use ASCII files, though).

Play It Again

Here is the new program, with a data file following it. Save the data file as an ASCII file under the name PLAY.DAT.

Make sure this file ends with a blank line! Otherwise, the loop won't stop because the sentinel will never be found. When you want to add a song, just place it in a different file under a new name and pass that name to the PlayTune subroutine.

```

DECLARE SUB PlayTune (File-
name$) ' PLAY2.BAS—tested
with
' PowerBASIC and QuickBASIC.
' Illustrates separation of program
' and data by placing the
' tune to be played in a sequential
' ASCII file. Read in the file
' PLAY.DAT and play it. Stop
' when a blank line
' is encountered.
CALL PlayTune ("PLAY.DAT")
' PlayTune opens the ASCII data
' file Filename$ and reads in the
' music data to be played, playing
' each string until a null string
' (blank line) is hit.
' End your file with a blank line!
' Filename$ is an ASCII data file.
' Make it usable for reading.
' Loop until the sentinel value
' (a blank line) is encountered.
' Read in a line. Play it unless
' it's blank. In that case, quit.
' Return the file resources to DOS.
SUB PlayTune(Filename$)
OPEN Filename$ FOR INPUT AS
#1
DO
LINE INPUT #1, NextLine$
PLAY NextLine$
LOOP UNTIL NextLine$ = ""
CLOSE #1
END SUB

```

Here is the ASCII file PLAY.DAT. End it with a blank line and save it as an ASCII file.

```

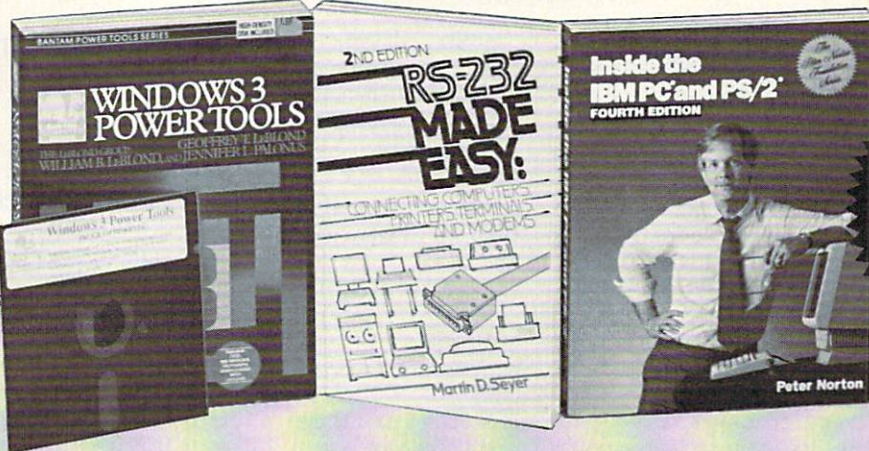
P8 C32 P32 P16 F32 P16 L16 A F
C32
P16 C32 P32 P16 F32 P16 L16 A F
C16
P16 C32 P32 P16 F32 P16 L16 A F
C16
P16 L16 F P16 L4 A F8 P8
P8 C32 P32 P16 F32 P16 L16 A F
C32
P16 C32 P32 P16 F32 P16 L16 A F
C16
P16 C32 P32 P16 F32 P16 L16 A F
C16
P16 C16 P16 L4 F
MS
P8 L8 A A A A L4 O5 C
L8 O4 A F A F A F
L8 A A A A L4 O5 C
L8 O4 A F A F C C L4 MS F

```


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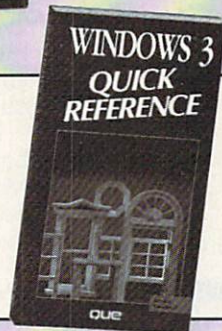
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Y-DR8

TIPS & TOOLS

This month's column offers help for those environment-busting long paths and for organizing your PageMaker publication with thumbnails.

Quick Path Changes

My 200MB hard drive has plenty of room for installing software, but its path statement doesn't have plenty of room for the directories.

To solve this problem, I created a batch file that lets me easily change my path statement. That way, when I decide to work on editing text files, I can set the path so my word processor and text editor are available. Then, when I want to compile a program, I set the path so my compiler and all of its directories can be found.

Here's a simple example batch file. To use it, just type NEWPATH and a number. If you don't specify a number or the number you specify is out of range, the available options will be displayed.

```
ECHO OFF
REM Check for a
REM command line argument.
REM You'll need one IF
REM statement for
REM each new path choice.
REM
IF "%1" == "1" GOTO ONE
IF "%1" == "2" GOTO TWO
IF "%1" == "3" GOTO THREE
IF "%1" == "4" GOTO FOUR
IF "%1" == "5" GOTO FIVE
IF "%1" == "6" GOTO SIX
IF "%1" == "7" GOTO SEVEN
IF "%1" == "8" GOTO EIGHT
REM
REM Show choices, since there
REM was no command line
REM argument given or the
REM command line argument did
REM not match any of the above
REM choices.
REM
ECHO 1. PATH=C:\DOS;\C:\BRIEF;
ECHO 2. PATH=C:\DOS;\C:\WS;
C:\WINDOWS;
ECHO 3. PATH=C:\DOS;\C:\WP50;
C:\WINDOWS;
ECHO 4. PATH=C:\DOS;
C:\DPAINT2;\C:\PBRUSH;
ECHO 5. PATH=C:\DOS;\C:\BRIEF;
C:\EXTRA;
ECHO 6. PATH=C:\DOS;\C:\C600;
```

```
C:\QB45;\C:\EXTRA;
ECHO 7. PATH=C:\DOS;
C:\ARTFILES;\C:\VENTURA;
ECHO 8. PATH=C:\DOS;\C:\UTILS;
C:\NORTON;
```

```
ECHO To set the environment to
ECHO one of these paths, just
type
ECHO NEWPATH [number].
```

GOTO END

```
:ONE
REM Set the path to the
REM first choice.
PATH=C:\DOS;\C:\BRIEF;
ECHO Path set to
PATH=C:\DOS;
C:\BRIEF;
GOTO END
```

```
:TWO
REM Set the path to the
REM second choice.
PATH=C:\DOS;\C:\WS;\C\
WINDOWS;
ECHO Path set to
PATH=C:\DOS;
C:\WS;\C\WINDOWS;
GOTO END
```

```
:THREE
REM Set the path to the
REM third choice.
PATH=C:\DOS;\C:\WP50;\C\
WINDOWS;
ECHO Path set to
PATH=C:\DOS;
C:\WP50;\C\WINDOWS;
GOTO END
```

```
:FOUR
REM Set the path to the
REM fourth choice.
PATH=C:\DOS;\C;\DPAINT2;\C\
PBRUSH;
ECHO Path set to
PATH=C:\DOS;
C;\DPAINT2;\C;\PBRUSH;
GOTO END
```

```
:FIVE
REM Set the path to the
REM fifth choice.
PATH=C:\DOS;\C;\BRIEF;\C\
EXTRA;
ECHO Path set to
PATH=C:\DOS;
```

```
C;\BRIEF;\C;\EXTRA;
GOTO END
```

```
:SIX
REM Set the path to the
REM sixth choice.
PATH=C:\DOS;\C;\C600;\C;\QB45;
C;\EXTRA;
ECHO Path set to
PATH=C:\DOS;
C;\C600;\C;\QB45;\C;\EXTRA;
GOTO END
```

```
:SEVEN
REM Set the path to the
REM seventh choice.
PATH=C:\DOS;\C;\ARTFILES;\C\
VENTURA;
ECHO Path set to
PATH=C:\DOS;
C;\ARTFILES;\C;\VENTURA;
GOTO END
```

```
:EIGHT
REM Set the path to the
REM eighth choice.
PATH=C:\DOS;\C;\UTILS;\C\
NORTON;
ECHO Path set to
PATH=C:\DOS;
C;\UTILS;\C;\NORTON;
```

```
:END
RICHARD C. LEINECKER
REIDSVILLE, NC
```

Tom Thumbnails

When I'm designing a document, I like to see it from as many perspectives as possible. I also like to show my client as many aspects of the job as I can. A convenient feature of *PageMaker* is its ability to print thumbnails. Thumbnails are small renderings, or pictures, of all the pages in a document. I find them especially useful for gaining a perspective on a project with several pages. Here's how you, too, can use *PageMaker*'s thumbnail feature:

With *PageMaker* running and the document you want to thumbnail open, select Print from the File menu. Under Options select Thumbnails. If you are using *Page-*

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B-3607

Tips for configuring your ZIPs and shrinking all of your batch files into a single cluster—and more.

Maker 4.0, you can also designate the number of thumbnails you want to print on each page. *PageMaker* 4.0 will also allow you to print color separation thumbnails, so you can compare separations to make sure they will print correctly. Once you have set all the parameters you want, click on OK. *PageMaker* will print your thumbnails.

I used to take *PageMaker's* thumbnail feature for granted, hardly ever using it, until I once showed thumbnails of a lengthy newsletter to a client. He was very impressed, calling it "the most comprehensive first renderings" he'd ever seen. Since then I have used thumbnails often to preview a presentation, to sell an idea, and to spark ideas.

WILLIAM HARRELL
VENTURA, CA

Easy Zips

If you use *PKZIP* and a lot of switches such as *-r* to allow recursing subdirectories, *-p* to store the pathnames, and *-wHS* to include hidden and system files, you can set these as default options.

With a text editor, create a file called *PKZIP.CFG*. In this file you'll specify the defaults. To set recursive subdirectories, add these two lines.

```
paths=recurse
recurse=on
```

To include hidden and system files, add the following line.

```
mask=hidden/system
```

To set the method of compression, add this line.

```
compress=size
```

Save the *PKZIP.CFG* file in the *PKZIP* directory. Then set an environment variable

PKZIP.CFG=C:\PKZIP in your *AUTOEXEC.BAT* file. Now you're all set. The program will default to what you've set in the *PKZIP.CFG* file. For more information you can consult the *MANUAL.DOC* file in the *PKZIP* package.

SANDEEP TAMHANKAR
HAZLET, NJ

Mondo Batch

Most people have dozens of batch files on their hard drives that make DOS easier for them. Some may log on to a directory, run an application, clear the screen, and then return to the root directory. Some may even be interactive and display menus. But each of these batch files occupies a cluster of storage space. That can be 2K or 4K, depending on the size of your hard drive. It's a shame to waste so much space for these small files.

There is a solution. Combine many of your batch files into one big file. Here's how.

Run a text editor or word processor in ASCII mode. I called mine *BIGBAT.BAT*. Start the file like this.

```
ECHO OFF
IF "%1"==" " GOTO SYNTAX
SHIFT
GOTO %0
```

The label *SYNTAX* will give instructions for using *BIGBAT* in case no command line argument was given. If there was an argument, then the batch file will go to the label of the same name. For instance, if you typed *BIGBAT WORD*, it would go to the label *WORD*. Here's the rest of *BIGBAT*.

```
REM Run XyWrite word processor.
:WORD
CD \XY
EDITOR
CLS
CD \
```

```
GOTO END
REM Run Brief text editor.
:BRIEF
CLS
CD \BRIEF
B
CLS
GOTO END
REM Run QuickBASIC.
:QB
CLS
CD \QB45
QB
CLS
CD \
GOTO END
REM Delete the contents
REM of disk in drive A
REM without Are you sure?
REM prompt.
:KILLA
ECHO Y DEL A:*. *
GOTO END
REM Delete the contents
REM of disk in drive B
REM without Are you
REM sure? prompt.
:KILLB
ECHO Y DEL B:*. *
GOTO END
REM Read a file on the screen.
:READIT
TYPE %1 MORE
GOTO END
REM
:SYNTAX
ECHO To use BIGBAT, type
BIGBAT [label]
ECHO where label is the label
ECHO within the batch file you
ECHO want to execute.
:END
```

RICHARD C. LEINECKER
REIDSVILLE, NC

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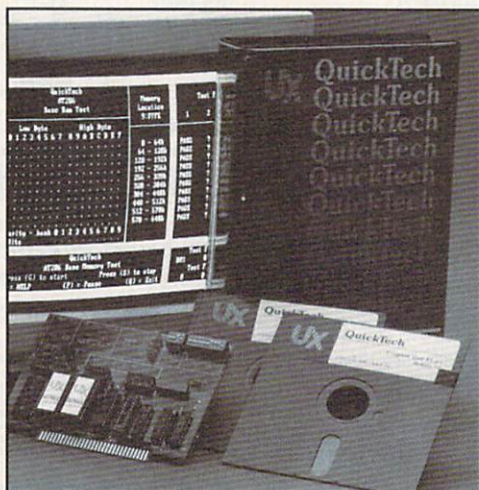
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INTRODOS

Tony Roberts

PROMPTING FOR COLOR

In a recent column, I discussed the PROMPT command and suggested a few ways to customize the DOS prompt so it would provide you with more useful or interesting information.

Perhaps the most common PROMPT command anywhere is PROMPT \$p\$g, which causes the system to display the current PATH on every prompt line. But there's more that can be done with PROMPT, and I invited readers to offer their suggestions.

I heard from several readers, most of whom concentrated on experimenting with color. If you have a color monitor and want to display color on your DOS screens, the PROMPT command is probably the easiest way to do it.

Before you begin experimenting, make sure that ANSI.SYS or an equivalent is installed on your system by checking your CONFIG.SYS file for the line DEVICE=ANSI.SYS.

When installing device drivers such as ANSI.SYS, it's OK to put the driver file in a subdirectory other than the root directory as long as the DEVICE line in the CONFIG.SYS file specifies the complete path.

To refresh your memory on prompt metastrings, refer to table 1. Metastrings are groups of characters (strings) that the program changes into something else. In the case of the PROMPT command, the dollar sign is a special signal that tells the program to apply special treatment to the following character.

On to the prompts: Rob Moses, of Sacramento, California, puts different parts of his prompt in different colors. He prints the path in cyan, a hy-

phen and greater-than symbol (->) in red, and the text in yellow. He describes it as "an interesting effect that emphasizes data and keeps the drive and path in the background."

```
prompt $e[1;36m$P$e[31m
$g$e[33m
```

In this line, you can identify the various metastrings: \$e for escape, \$p for the current path, \$g for the greater-than symbol. Most of the other information—the left brackets and the numbers—is used by ANSI.SYS to control the color of the output.

The combination of an escape character (\$e) and a left bracket ([) is a metastring that alerts ANSI.SYS that it should translate the next few characters. Use tables 2 and 3 to help you interpret the previous PROMPT command.

Following the first \$e[is the number 1, which indicates high intensity, or boldface. Next, the number 36 calls for a foreground color of cyan. The m signals an end to this ANSI color sequence. Further along, 31 changes the color to red, and later 33 changes it to yellow.

If you're getting the hang of understanding these cryptic codes, try this one from Larry Parker of Springfield, Missouri.

```
prompt $e[1;37;44m$P$e[2;37;
40m$ _ $e[1;33;41m$g$e[2;37;40
$e[m
```

This prompt displays the drive and path in bold white type on a blue background and then uses the \$_ metastring to move to a new line, where it displays a prompt arrow (=>) in yellow on red. Finally, normal white text on black is restored.

Bob Smith of Negley, Ohio, sent along a colorful prompt that displays the path in blue text on red, the date in yellow

text on green, and the prompt WHAT NOW? in red text on cyan. The DOS colors are set to white text on magenta.

```
prompt $e[1;34;41m $p$g
$e[1;33;42m $d $e[0;46;31m
WHAT NOW? $e[1;37;45m
```

Our final prompt comes to us from Richard Ericksen, of Orinda, California, who honors us with a prompt that says COMPUTE, spelled out in a rainbow of color.

```
prompt $e[1m$e[37mC$e[35mO$e
[34mM$e[36mP$e[32mU$e[33mT
$e[31mE$e[37m$g$e[0m
```

Thanks to everyone who sent along prompts. You've brought a little color into our lives.

Table 1: Prompt Metastrings

\$q	= (equal sign)
\$\$	\$ (dollar sign)
\$t	current time
\$d	current date
\$p	current drive and path
\$v	MS-DOS version number
\$n	current drive
\$g	> (greater-than sign)
\$l	< (less-than sign)
\$b	(pipe)
\$h	backspace (erases previous character)
\$e	escape code (ASCII code 27)
\$_	carriage return and linefeed

Table 2: ANSI Color Codes

Color	Background	Foreground
Black	40	30
Red	41	31
Green	42	32
Yellow	43	33
Blue	44	34
Magenta	45	35
Cyan	46	36
White	47	37

Table 3: ANSI Attribute Values

0	white text on black
1	bold
2	low intensity
4	underline (monochrome only)
5	blinking
7	reverse
8	hidden

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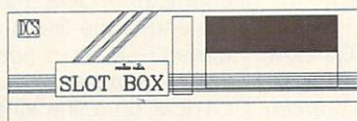
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HARDWARE CLINIC

Mark Minasi

TALK TO YOUR PRINTER

A while back, I played a computer game called *Skyfox II* from Electronic Arts. I don't know if it's still around, but it was an amusing shoot-'em-up in space, in the same genre as Origin's popular *Wing Commander* or, back in 1979, the Atari 400/800 *Star Raiders*. Anyway, it was a fun game, but it desperately needed a map of star bases, asteroid fields, and wormholes—handy little coordinates that could jump you immediately from one point in the galaxy to another.

So I collected the coordinates of all of the interesting objects and set out to write a program that would produce a nice, usable star map on my laser printer. To do that, however, I had to learn the printer's control language. And that's not the last time I've found it useful to know a printer-control language. Just yesterday, I needed to print out the *Windows* configuration file called *SETUP.INF*. Unfortunately, *SETUP.INF* runs 170 characters wide, making it difficult to print out the file on a laser printer. A batch file a couple of lines long, however, did the trick, compressing my printer typeface enough to fit 170 characters on a line. Laser printers have a wealth of nifty features, not all of which are exploited by most application programs. If you know how to write printer-control programs, however, you're no longer at the mercy of your applications.

Each printer's control language is different. The sequence of commands that instruct an Epson dot-matrix printer to draw a circle are completely different from the set of commands used to print a circle on a laser printer. So I'll stick to just one printer's command language: the language used by Hewlett-Packard's

line of laser printers, called HPPCL (Hewlett-Packard Printer-Control Language). There are different versions for different printers, so I'll discuss the most recent version, HPPCL5.

Printer-control languages do such things as select fonts; print graphics; describe the dimensions of the printable area of the page to the printer; and select print effects such as underlining, strikeout, and shadow.

This month, we'll spend a fair amount of space learning how to create printer-control programs. Once we have that out of the way, we'll be able to spend a column or two exploring what PCL can do for you.

Let's start our examination of printer languages by demonstrating how to send printer-control strings to the printer. For our first printer-control program, we'll reset the printer.

Paging Mr. Printer

The easiest way to send commands to your printer is to create a file with those commands and then copy that file to the device PRN. For example, you can make your printer say hello by creating a file that contains the word *Hello*. Call it *GREET.TXT* and just *COPY GREET.TXT PRN*.

You can use any old text editor; EDLIN or DOS 5.0's EDIT will do fine. Don't forget that a laser printer needs an entire page of text before it'll print, so you'll have to take it offline and press the Form Feed button to see your handiwork.

Isn't that form-feeding business annoying? It'll make a good starting point for our first printer batch file: *EJECT.BAT*. The printer command that forces a printer to eject a page is just one character: CTRL-L, the form feed character. Here's how to send a CTRL-L to your printer.

First, we'll create a file called *EJECT.TXT*. It'll contain

the CTRL-L character. I'll use EDLIN and, initially, EDIT for my examples. Since all my printer command programs will be very short, you won't mind using EDLIN, and, besides, everyone has EDLIN. Start the process by typing *EDLIN EJECT.TXT*. You'll see the EDLIN prompt, the asterisk (*). Type I, for *insert line*, and press the Enter key. You'll get a line-numbered prompt.

Now we're going to enter two characters: CTRL-L and CTRL-Z. CTRL-L is the command we want to send to the printer, as I've said. CTRL-Z is the this-is-the-end-of-the-command character. We'll end all our printer programs with CTRL-Z. The reason is simple—when you copy the file to the printer, the printer receives all of the codes in the file, including the carriage return/line-feed at the end of the line. But we don't want to send the CR/LF, as that essentially sends a blank line to the printer.

On the first line, press Ctrl-L and then Ctrl-Z. They'll show up on the display prefixed by circumflexes (that is, $\wedge L \wedge Z$). Press Enter, and EDLIN will offer you a second input line. EDLIN's not too bright—CTRL-Z is the internal character in DOS that signals the end of the file, but EDLIN doesn't seem to notice that you're done until you put a CTRL-Z on a line all by itself. So, at line 2, just press Ctrl-Z and press Enter again. (Think of EDLIN as being hard-of-hearing.) You'll be back to the EDLIN * prompt. You can now save what you've done by pressing E, which signals *save and exit*, and press Enter. EDLIN will save *EJECT.TXT* for you.

If you're using DOS 5.0's EDIT, press Ctrl-P Ctrl-L Ctrl-P Ctrl-Z. Anytime you want to insert a control character in EDIT, you must precede it with a Ctrl-P.

Learn a printer language?
It's easier than you think.
Find out how to quickly reset your laser printer.

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Now let's try it out. Just type `COPY EJECT.TXT PRN`. (This works only if there's something waiting to be printed in the printer.) Your page should appear.

It's annoying to have to type that `COPY` command every time, so let's create a batch file that will automate the process. All this batch file will do is copy the file. Use `EDLIN` to create this one, too. Type `EDLIN EJECT.BAT`. We'll call the batch file `EJECT` as well, just to make it descriptive.

When you get the `EDLIN` prompt, type `I` again, and on the first line type `@COPY EJECT.TXT PRN>NUL` and press Enter. There's no `CTRL-Z` at the end of this line. The `@` at the beginning of the line tells DOS not to show us the `COPY` command. The `>NUL` tells DOS to send the screen output from the `COPY` command to the special DOS device called `NUL`. It's a kind of DOS black hole—you put things in it, and they never come out. This way DOS doesn't show us the `1 FILE(S) COPIED` message.

On `EDLIN`'s second line, press `Ctrl-Z` and the Enter key. Type `E` to save the work, and you have an `EJECT` batch file. Now type `EJECT` from the DOS prompt, and voilà! You've forced the laser printer to spit out the page stored in memory.

Here's one side note on this batch file and all the others that we'll build. The `COPY EJECT.TXT PRN` command only works if `COPY` can find `EJECT.TXT`—that is, if `EJECT.TXT` is in the current subdirectory. I generally put all of my printer programs into a subdirectory called `C:\PCODES`. Then I can code the full filename with the subdirectory included. My `EJECT.BAT` looks like `@COPY C:\PCODES\EJECT.TXT PRN>NUL`. That way, `EJECT.TXT`

can be called from any subdirectory.

Now you've built your first printer program. You've seen the following.

(1) You create two files: one that contains the printer command string and another that uses a batch file to copy the command string to the printer.

(2) The printer command string file is a one-liner, and the one line must end with `CTRL-Z`, `ENTER`, `CTRL-Z`, and `ENTER`.

(3) The batch file is also a one-liner, but you end its one line with `ENTER`, `CTRL-Z`, and `ENTER`. (Recall that these instructions are `EDLIN`-specific.)

Calling Room Service

I share a printer—via a print-sharing device—with a few other folks in my office. One thing that constantly annoys me is that most software doesn't clean up after itself. What I mean by that is you'll run a word processor that makes Times Roman the default typeface so it can print your purple prose, and then it prints that purple prose. The problem is what the word processing program does to the printer as the program exits.

Nothing.

The program should reset the printer to its power-up settings, but it doesn't. So I wrote `RESET.BAT`. You reset a printer with just two characters: the `ESCAPE` character and a capital `E`. That's simple enough, but what's an `ESCAPE` character?

You see `ESCAPE` in most printer-control strings. It's also `CTRL-[` (that's a left bracket). But as you'll see, it's a bit tricky to enter it in a text editor. So let's see how we can do it.

You'll notice an `Esc` key on your PC keyboard. That's an `Escape`, all right—but don't try pressing it to insert an `ESCAPE` code into a file.

To build `RESET.BAT`, we'll first need `RESET.TXT`. Type `EDLIN RESET.TXT` and, as before, press `I` to start inserting lines. You insert the `ESCAPE` code by pressing `Ctrl-V` and then `[` (the left bracket). Then press `E`—making sure it's a capital `E`. Don't forget that all printer command strings end with `CTRL-Z`. Then press Enter. Again, `EDLIN` will expect another line, so press another `Ctrl-Z` and press Enter. Save the file with `E`, and test it out by typing `COPY RESET.TXT PRN`. As before, create a `RESET.BAT` batch file. On my system, it contains just one line: `@COPY C:\PCODES\RESET.TXT PRN>NUL`.

When you run `RESET.BAT`, all you'll see will be the printer's Form Feed light flashing briefly. The flashy programs come later.

If you're using `EDIT`—and if you're not, why not? DOS 5.0 is only 39 bucks at Egghead—you'll have to use a slightly different approach to enter the `ESCAPE` code. You can create `RESET.TXT` like this.

First, invoke `EDIT` with `EDIT RESET.TXT`. For the first line, press `Ctrl-P Ctrl-[` (that enters the `ESCAPE` code), then `E`, then `Ctrl-P Ctrl-Z`. The line will look like a capital `E` surrounded by arrows facing in opposite directions.

Save it by pressing `Alt-X` and the Enter key. Creating `RESET.BAT` involves no special instructions.

If you'd like to try your hand at another printer-control program, try this one from last month, a program that produces a solid black page: `<ESC>&10E<ESC>ESC>*p0x0Y<ESC>*c2400a3300B<ESC>*cOP<ESC>E`

The `<ESC>` is shorthand for the `ESCAPE` code. Pay close attention to the upper- and lowercase, and the first two 10s are *one-zero*, not *lowercase L-uppercase O*. □



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COMPUTE/NET

Richard C. Leinecker

MEET THE MOVERS AND SHAKERS

November 11-17, 1991, will go down in history as a special week. That's because it was Sierra week on COMPUTE/NET on GENie. Trivia quizzes with prizes, the latest Sierra demo software for downloading, and realtime conferences with the Sierra folks provided exciting events each and every day.

If you think you're an expert on Sierra software, you can still take the Sierra trivia quiz. It's in the COMPUTE Game section. We're not giving prizes anymore, but you'll still have a good time trying to match wits with the other Sierra trivia mavens. You can, however, win prizes by playing the COMPUTE scavenger hunt. It has questions about the latest issue of COMPUTE magazine. Prizes include magazine subscriptions, disk products, books, and connect time.

During Sierra week we had three realtime conferences: one with Corey and Lori Cole, authors of *Quest for Glory*; another with Al Lowe, author of *Leisure Suit Larry*; and the third with Ken and Roberta Williams, founders of Sierra. The discussions were lively, entertaining, and informative. You can get the transcripts and find out what went on by getting on COMPUTE/NET on GENie, finding COMPUTE's PC Magazine software library, and downloading THECOLES.TXT (the transcript of Corey and Lori Cole's RTC), ALLOWE.TXT (the transcript of Al Lowe's RTC), and KENROB.TXT (the transcript of Ken and Roberta Williams's RTC).

In January we're sponsoring another event. It's going to feature Brøderbund's PlayMaker Football software. You'll be able to download the demo software, play the PlayMaker

Trivia quiz and try for fabulous prizes, and participate in several realtime conferences. It's the perfect time for this to happen, too, right before the 1992 Super Bowl. Hope to see you there.

We've had lots of requests online for our previously published BASIC programs. It seems that the advent of *Visual Basic* and the preponderance of *QuickBASIC* have awakened a sleeping giant. BASIC is back, and plenty of hobbyists want BASIC programs to tinker with and learn from. Since you asked for them, we're more than happy to comply. Just log on to COMPUTE/NET on GENie or America Online, go to COMPUTE's PC Magazine software library, and you'll find tons of BASIC programs.

We uploaded several of our BASIC collections with source code only (those are the BAS files). After getting some feedback, though, we've started to include both the source code and the compiled, executable program so that nonprogrammers can have ready-to-run software without having to fool with BASIC. We're going back now and adding the compiled programs to the source code files we uploaded earlier. When you look through the files, note whether they're EXE files.

As always, COMPUTE/NET has software in its libraries that you'll want to download. To find the files, just log on to COMPUTE/NET and go to the software library section. Here are my recommendations.

This month's featured GIF picture is MOONFOOT.GIF. It's a hi-res, 256-color picture of an astronaut's foot on the moon. It was taken by the astronaut himself, looking down at his foot on the lunar surface. It's not only attractive but also thought provoking.

If you need a utility that gives you keypress shortcuts, try *SuperMAC* (filename SU-

PERMAC.ZIP). It's a keyboard macro utility that was published on COMPUTE's PC Disk. For those of you new to PCs, a keyboard macro program lets you store a sequence of keypresses that can be called with one hot key. For repetitive tasks, a utility of this kind saves you endless time and energy by easily repeating sequences of keypresses. This program isn't shareware, so you won't get requests for a registration fee. You won't have much trouble using it. For a program of this type, it's easy to use and has most of the features of commercial macro utilities.

If you like playing cards, you'll love *Card Shark* (filename CARDSHRK.ZIP). It has all of the casino favorites: poker, blackjack, baccarat, and solitaire. For poker, blackjack, and baccarat you can play up to five hands and sit in any position. That's great for those of you who're practicing for the next junket to Atlantic City or Las Vegas. The program even gives you advice if you don't know what you should do next. The colorful graphics run in CGA, EGA, Tandy 16-color, and VGA graphics modes.

What do you think of COMPUTE magazine? If you have suggestions or comments, there's an easy way to talk to us and get a swift response. Get onto COMPUTE/NET and leave messages to the editors and staff in our message section. It's probably the least formal way to communicate with the COMPUTE staff, and because of that, you'll get friendly and speedy answers to your questions and comments.

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 RLEINECKER on GENie, Rick CL on America Online, or 75300,2104 on CompuServe. □

Rub elbows with the likes of Ken and Roberta Williams, founders of Sierra, on COMPUTE/NET.

INTRODUCING

COMPUTE NET

COMPUTE NET

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Welcome to Compute/NET
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with assistants
Tom Campbell
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GENie

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14. COMPUTE Online Game

COMPUTE/NET on GENie had a terrific grand opening. The comments ranged from "I've never seen a RoundTable open up with so much information" to "This makes my modem and computer system worth their price."

This month we're sponsoring some contests. Do you know your computer trivia? Then try our computer trivia game. And that's only one of the games we have ready. There's a scavenger hunt and a logic game. And if you win, you can get free magazine subscriptions, disks, books, or connect time.

Above all, though, when you visit COMPUTE/NET, stop in at the COMPUTE Bulletin Board and participate in some of the most stimulating conversations online.

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ON DISK

Tony Roberts

SHOP SMART, SEE THE DOCTOR, AND MORE

This issue's *PC Disk* is loaded with fun software. We have programs to fill you in on the day's historical events and to help you make your shopping list.

The disk also includes a utility that lets you in on the inner workings of your PC as well as an outstanding application-switching program for Windows users.

COMPUTE's *PC Disk* is issued every other month and includes a selection of the best shareware and freeware programs we've been able to locate. We scan hundreds of pro-

WinEZ is here. It's the Windows program I've been looking for since the day I cracked open my Windows 3.0 box.



grams and present you with the cream of the crop to save you time and trouble.

The disk is mailed automatically to those who subscribe to the service, but it's also available on a disk-by-disk basis. If something on this month's disk interests you, send in the adjacent coupon and give these programs a test run.

If you find some software you can use and think it's a good value, be sure to send in a registration form and pay any fee requested by the author. If everyone will support shareware authors, they'll continue to produce software we can try before we buy.

The Grocer

Ever since I bought my first computer ten years ago, peo-

ple have asked whether it could be of any help doing a normal household chore such as filling out a grocery list. Up until now, I've said no, but things may be changing.

The Grocer, a creation of Richard Zakas, finally makes computerized grocery list management practical. His program is fast, customizable, and easy to use.

You start with the sample data files and add to them the foods you buy, the product sizes, and the prices. Then to make a grocery list, you simply indicate how many of each item you want to buy.

The program organizes its displays (and printouts if you wish) into food groups—canned goods, condiments, paper products, and so on—making it easier to fill out your shopping list. Once you get to the store, you'll find that the grouping on your list fairly well matches the grouping of products on the shelves.

The Grocer also can help with budgeting. If your database contains up-to-date pricing information, you'll have a close estimate of how much this week's shopping expedition will cost before you ever leave home.

Zakas distributes *The Grocer* as shareware and requests a \$12.50 registration fee, which should be mailed in by anyone who continues using the program after an initial testing period.

Today

With Patrick Kincaid's *Today* running on my system, I really look forward to going to work each day. The program, which runs as the last item in my AUTOEXEC.BAT file, fills my screen with fascinating facts relevant to today's date.

I find out who's celebrating a birthday, I learn what hap-

pened historically on that date, and I read a pithy thought for the day. Although the program comes with its own data files, the user is encouraged to create a data file of his own important dates. On February 22, George Washington's birthday will be reported, but my dad's birthday will be noted there as well.

Today also allows you to create reminders. Perhaps you need a reminder on the first day of each month to pay the rent. I've just entered a 21-day reminder for the three weeks preceding my wife's birthday. Maybe this year I'll do my shopping before the eleventh hour.

People who use *Today* are asked to send in the program's \$15 registration fee. Registered users will receive updated disks which include greatly expanded data files as well as a companion program called *When*, which permits you to search the data files for specific events, rather than specific dates.

PC Doctor

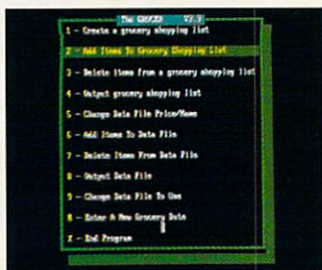
PC Doctor is a shareware program that lets you in on the inner workings of your PC. Among its features is a system analysis, which gives you the lowdown on your PC's configuration, tells you about its memory, and reports on installed ports.

The program also can display a memory map and information about IRQs, TSRs, the environment, and installed device drivers. You can scroll through your system's memory and edit it if necessary.

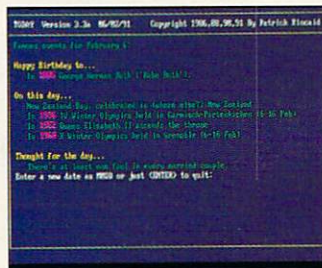
PC Doctor, which was created by COMPUTE's Rick Leinecker, has a \$19.95 shareware registration fee.

Critter

Dana Cline's *Critter* is a critical error handler that replac-



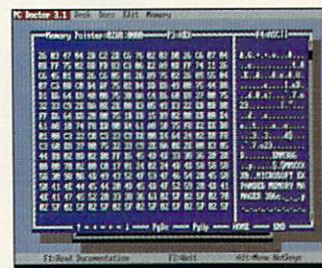
The Grocer



Today



Critter



PC Doctor

es the infamous *Abort, Retry, Fail* message that DOS unceremoniously provides when something goes wrong.

Critical errors are hardware errors, often involving disk drives (no disk or door open, for example) or printers (offline or no paper, for example). When a problem occurs, *Critter* pops up with a check-

and a bright red box that explains the problem. You still press the appropriate key to continue, but it's nice to be notified of the problem in such a pleasant way.

If the system is unattended, however, such as a network hub, a BBS system, or a system running batch files, *Critter* permits an automatic response after a specified timeout. The automatic responses that can be preprogrammed include *Abort, Retry, Fail, Ignore, Warm Reboot, and Cold Reboot*. Critical errors also can be logged to a printer.

Critter is a memory resident utility that can be loaded high under DOS 5.0. If the software you are using has its own critical error routine, *Critter* quietly steps aside and lets it do the work. The program is offered as shareware and has a \$20 registration fee.

WinEZ

Here's the *Windows* program I've been looking for since the day I cracked open my *Windows 3.0* box. *WinEZ* makes it a snap to switch instantly from one application to another.

The program installs two additional buttons on the title bar of the active window. One is the Fast Path Icon, which allows you to quickly start any *Program Manager* application; the other is the Task Switch Icon, which moves you instantly to any currently open application.

WinEZ also includes a Run feature that lets you quickly select and run any executable file on disk. In addition, Run remembers the last five programs initiated through this facility and maintains a list box with their names so they can be found and executed easily.

I haven't seen a faster, friendlier tool for *Windows* navigation. *WinEZ*, from New Generation Software, is shareware with a fee of \$29.95. □

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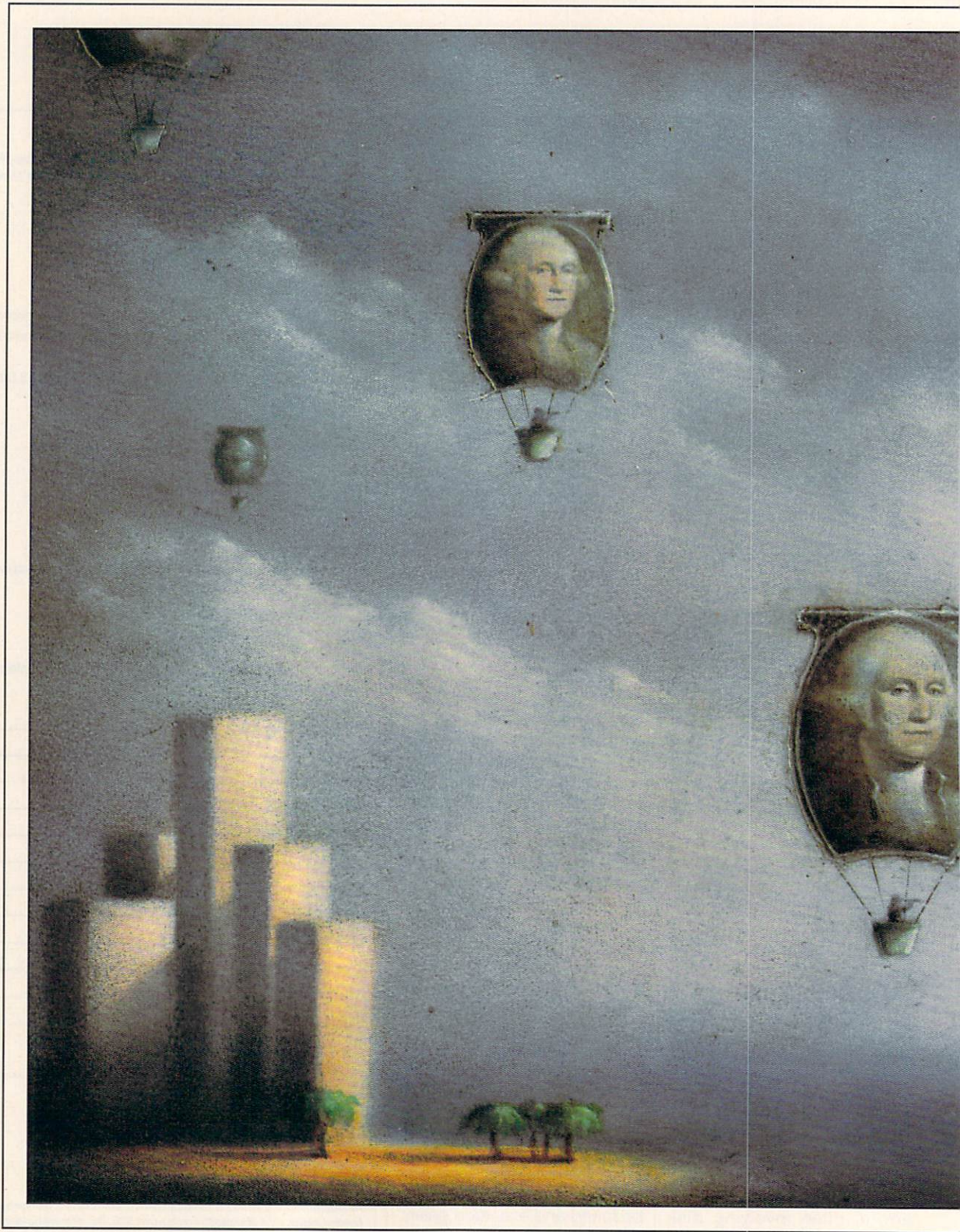
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ONCE YOU GET IT,
HOW WILL YOU MANAGE IT?
NOTHING IS CERTAIN BUT

WEALTH AND TAXES

BY ROSALIND RESNICK

For millions of Americans, April 15—Tax Day—is a day approached with dread. If you're like many last-minute taxpayers, you'll spend one long, sleepless night rummaging through a stack of old receipts, bank statements, and check stubs. Then, scribbling some numbers on your coffee-stained tax return, you'll dash off to the post office just before midnight—offering up a prayer to the patron saint of Lost Taxpayer Causes as you slip the envelope through the slot. Or maybe you'll simply throw up your hands and dump the whole mess on the lap of the nearest C.P.A., paying dearly for your procrastination.

There is a better way, and if you have a computer, you're already way ahead of the game. If you use tax-preparation software, you'll probably end up spending far less than the \$50 an hour charged by many C.P.A.'s, who often use professional versions of the same software that you can go out and buy yourself.

Now that prices are coming down and programs are getting friendlier, you owe it to yourself to give tax-preparation software a try. If you do, you'll be in good company. Dataquest, the San Jose market research firm, estimates that over three-quarters of a million personal tax packages were sold in 1990. Dataquest predicts that figure could double by the end of 1991, and again in 1992.

"It's one of the fastest growing software categories around," says Gladys Francis, a Dataquest information analyst. "If you know how to use a personal computer, you can probably use tax-preparation software."

Once merely glorified spreadsheets, tax-preparation programs now do virtually everything except root through your shoeboxes and sign your name at the bottom of the return. These days just about all of the top-selling programs—*TurboTax*, *TaxCut*, *MacInTax*, *Personal Tax Edge*, and others—feature IRS instructions online, taxpayer interviews, pop-up help, onscreen calculators, almost every IRS form you'll ever need, and the ability to import data files from programs like *Quicken* and *Managing Your Money*. Upgrades for the 1992 tax season have improved on these features to make them better, faster, and even friendlier.

"We have turned from form preparers to tax advisers," says Anne Rawland, director of corporate communications at Parsons Technology, which sells *Personal Tax Edge*. "We're both a form provider and a simplified H&R Block at the same time."

Andrew Tobias, the popular financial writer who lends his name and expertise to MECA Software's *TaxCut*, says he uses the tax-preparation software to do his own taxes, his friends', and even his mother's.

"If you're rich and you hate this kind of thing, you can take everything over to your accountant and pay \$2,000 and not worry about it," Tobias says. Tax software, on the other hand, is inexpensive and "ready when you are, and you don't have to leave messages with the secretary."

Even the U.S. government, often

WEALTH OF INFORMATION

There's probably a money-management program out there that's perfect for you. And, if you're conscientious about using your software, when tax time rolls around, you can hit a few keys and all the information slips neatly into a software program that computes your taxes.

Most money-management software falls into one of two categories: day-to-day cash management and long-term financial planning. A few programs (*Market Base* and *Andrew Tobias' Managing the Market*, for example) even help you track the stock market.

Intuit's *Quicken*, by far the most popular personal finance program, looks and works just like a checkbook and register. *Quicken* helps you pay your bills, track your income and expenses, budget, and keep track of your stock portfolio.

The other leading personal finance program is *Andrew Tobias' Managing Your Money 7.0* (\$219.95) by MECA Software. *Managing Your Money* does everything

Quicken does and packs in plenty of pithy advice from the financial expert and best-selling author whose name is on the product. *Managing Your Money* also has everything you need to run a home business, including an appointment calendar and an electronic card file. The program also links up with MECA's *TaxCut* and *Managing the Market*, which automatically updates stock quotations online by logging on to Dow Jones News/Retrieval. Also watch for forthcoming personal finance software from Parsons.

If your goal is active portfolio management and long-term financial planning, consider programs like *Dollars & Sense* and *Money* magazine's *WealthBuilder*. Introduced in 1989 by Reality Technologies, *WealthBuilder* bills itself as "the program that picks up where *Quicken* leaves off." With Wall Street scandals breaking almost daily and the nation's S&Ls drowning in debt, your computer may be the only investment adviser you can really trust.

maddeningly slow to embrace change, favors the growing trend toward taxpayers using PCs to fill out their own returns. "We don't have any problem with it as long as it results in an accurate return," says an IRS spokesman in Washington, D.C. In the not-too-distant future, he predicts, home computer users will be able to send their returns to the IRS via modem.

Despite the many pluses, however, tax software isn't for everybody. If you don't do your own taxes now and wouldn't know a 1040 if you tripped

over one, you may be better off continuing with your accountant. Likewise, if your taxes involve passive losses, home office deductions, or anything else that's likely to trigger an IRS audit, then a C.P.A. may be your best bet.

Fortunately, when it comes to shopping for tax software, it's hard to go wrong. Since the market is so competitive, once one company unveils a new bell or whistle, it isn't long before everybody else builds in that feature, too. And even though the market for tax software has undergone a good deal of consolidation over the last few years, price competition remains fierce. Most top-selling programs now sell for less than \$100 with upgrades available for under \$50.

Here's how the Big Three of the tax-preparation software field break down:

- *TurboTax* (\$79.95 for the DOS version, \$99.95 for *Windows*) and *MacInTax* (\$99.00): The most popular program by far, ChipSoft's *TurboTax* offers versions not just for Joe Taxpayer but for C.P.A.'s and tax preparers, too. *TurboTax*'s latest version features 11 new forms and work sheets, toll-free technical support, quicker data entry, a smoother interface with *Quicken*, a *Windows* version, and a final review feature that checks over your tax return after you're done. Now that ChipSoft has bought out Softview, the developer of *MacInTax* (the leading Macintosh tax program), *TurboTax for the Mac* has been discontinued, and many of its best features have been grafted onto *MacInTax*.
- *Andrew Tobias' TaxCut 1040* (\$89.95): The up-and-coming num-

TAPPING THE MONEY LINE

If your PC is equipped with a modem, financial help and information are only a phone call away. But be prepared to pay for it. Dow Jones News/Retrieval can run you close to \$200.00 an hour after access fees, surcharges, and per-character charges. On the other hand, DJN/R is the only service with up-to-the-minute stock quotes—and that may be just what you need. If you can wait until the trading day is over, you can get daily stock quotes on GEnie as part of your basic service for an access fee of \$4.95 per month.

For financial novices, Prodigy offers a wealth of financial information for the monthly membership fee of \$12.95. Prodigy's Money section includes advice on financial planning and home business, a Money Talk bulletin board, and more. For \$14.95 more per month, Prodigy members can log on to Strategic Investor, a database with reports on more than 4500 individual stocks and 2500 mutual funds plus market news, charts, and columns from *Investor's Business Daily*.

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Program	Price/Update Price	System Requirements	State Editions/Price
<p>AM-TAX Personal-1 AM-TAX Personal-2 AM-TAX Professional AM Software P.O. Box 25010 Kansas City, MO 64119 (816) 426-8361</p>	<p>\$40.00/\$25.00 (Personal-1) \$65.00/\$45.00 (Personal-2) \$125.00/\$95.00 (Professional)</p>	<p>IBM PC or compatible; 320K RAM (Personal-1 and Personal-2), 512K and hard disk (Professional)</p>	<p>18 states at \$30.00 each (\$20.00 each for update): AZ, CA, GA, IL, IN, KS, KY, MD, MA, MI, MO, NJ, NY, NC, OH, PA, SC, VA</p>
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<p>RapidTax Professional RapidTax DacEasy 17950 Preston Rd., Ste. 800 Dallas, TX 75252 (800) 877-8088</p>	<p>\$699.95/\$399.00 (RapidTax Professional) \$49.95/\$25.00 (RapidTax)</p>	<p>IBM PC or compatible, 512K RAM, and hard disk; (RapidTax Professional only) laser printer required for Client Organizer/Proforma</p>	<p>24 states at \$25.00 each: AL, AZ, CA, CO, CT, DE, DC, GA, ID, IL, IN, LA, MD, MA, MI, MO, NJ, NY, NC, OH, PA, SC, VA, and WI</p>
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<p>Tax Preparer HowardSoft 1224 Prospect St., Ste. 150 La Jolla, CA 92037 (800) 822-4829</p>	<p>\$295.00/\$99.00</p>	<p>IBM PC or compatible, 128K RAM (with IBM BASIC) or 256K (with GW-BASIC)</p>	<p>1 state at \$125.00: CA</p>
<p>Andrew Tobias' TaxCut 1040 MECA Software 55 Walls Dr. Fairfield, CT 06430 (800) 288-6322</p>	<p>\$89.95/\$49.95</p>	<p>IBM PC or compatible, 512K RAM, and hard drive</p>	<p>13 states at \$39.95 each: CA, CT, DC, GA, IL, MD, MA, MI, NJ, NY, OH, PA, and VA</p>
<p>Tax Ease Individual Park Technologies P.O. Box 1317 Clifton Park, NY 12065 (518) 877-5881</p>	<p>\$79.00/\$49.00</p>	<p>IBM PC or compatible, 256K RAM, and Lotus 1-2-3 or compatible spreadsheet</p>	<p>25 states included for \$10.00 more (final cost \$89.00): AZ, CA, CO, CT, DC, GA, IL, IN, KS, KY, LA, MD, MA, MI, MN, MO, NJ, NY, NC, OH, OK, OR, PA, VA, and WI</p>
<p>Personal Tax Edge Parsons Technology One Parsons Dr., P.O. Box 100 Hiawatha, IA 52233-0100 (800) 223-6925</p>	<p>\$49.00/\$24.50 to upgrade from last year's Personal Tax Preparer</p>	<p>IBM PC or compatible, 640K RAM, and hard disk</p>	<p>All states that require a return except HI for an additional \$49.00</p>
<p>J. K. Lasser's Your Income Tax Software Simon & Schuster Software 15 Columbus Cir. New York, NY 10023 (800) 825-7638</p>	<p>\$74.95/\$49.95</p>	<p>IBM PC or compatible, 512K RAM, and hard drive</p>	<p>24 states at \$29.95 each: AL, AZ, CA, GA, IL, IN, IA, KS, KY, LA, MD, MA, MI, MN, MO, NJ and NY together, NC, OH, OK, PA, SC, VA, and WI</p>
<p>EasyTax (replaces Swiftax) Timeworks 625 Academy Dr. Northbrook, IL 60062 (800) 323-7744</p>	<p>\$79.95/\$39.95</p>	<p>IBM PC or compatible, 512K RAM, one floppy drive or hard drive; for state returns: 640K and hard drive</p>	<p>24 states at \$39.95 each: AL, AZ, CA, GA, IL, IN, IA, KS, KY, LA, MD, MA, MI, MN, MO, NJ, NY, NC, OH, OK, PA, SC, VA, and WI</p>

Forms	Technical Support	Description and Features
<i>Personal-1</i> : 1040, 2106, 2119, 2210, 2441, 3903, 4562, 6251, 8615, 8814, W-2, W-2G, W-2P; schedules A-F, EIC, R, and SE <i>Personal-2</i> and <i>Professional</i> : all forms with <i>Personal-1</i> plus 1040A, 1040ES, 3800, 4136, 4137, 4255, 4684, 4784, 4797, 4835, 4868, 4952, 4972, 5329, 6252, 8283, 8453, 8582, 8606, 8829; schedules 1-4 and D1.	Unlimited support by toll call during business hours, Monday through Friday; extended to 8:00 p.m. on Mondays and Tuesdays January 15 through April 15	Input screens follow tax forms. Supporting forms are called up with the press of a key. Prints approved tax forms on most dot-matrix and laser printers; no special fonts or paper required. <i>AM-TAX Personal-1</i> is designed for simple tax situations and low-end computers. <i>AM-TAX Personal-2</i> is designed to handle virtually any personal tax situation. <i>AM-TAX Professional</i> includes the ability to handle up to 500 returns per directory, and it issues an instruction letter, a client bill, and a 1992 organizer.
1040, 1040A, 1040ES, 1116, 2106, 2119, 2210, 2441, 2555, 2688, 3800, 3903, 3903F, 4137, 4255, 4562, 4684, 4797, 4868, 4952, 4972, 5329, 6198, 6251, 6252, 8283, 8332, 8453, 8582, 8606, 8615, 8814, 8822, and 8824; schedules 1-3, A-F, R, and SE; plus 22 work sheets	Free technical support via toll call, fax, bulletin board, CompuServe, and GEnie	For 1991 <i>TurboTax</i> added 11 new forms and an easier installation process. Another new feature categorizes you according to special situations and leads you through all the proper forms. Its final review feature displays an evaluation of the return once it's completed. <i>TurboTax</i> also offers a short-form program for \$29.95 (DOS) or \$39.95 (Windows).
1040, 1040A, 1040ES, 1040EZ, 1116, 1310, 2106, 2119, 2210, 2210F, 2441, 2688, 3800, 3903, 3903F, 4137, 4255, 4562, 4684, 4797, 4835, 4868, 4952, 5329, 6251, 6252, 8283, 8453, 8582, 8606, 8615, 8814, 8815, 8829, and 9282; schedules 1-3, A-F, R, and SE; plus 21 work sheets; <i>RapidTax Professional</i> includes additional forms 1040X, 3468, 4136, 4469, 4972, 5884, 6198, 8271, 8801, and 8803; <i>RapidTax</i> includes form 2555.	Unlimited telephone and fax support (<i>RapidTax Professional</i>); Unlimited free fax support, unlimited telephone support and priority updates for \$25.00 (<i>RapidTax</i>).	After Sylvia Porter's death, DacEasy dropped her name from the <i>RapidTax</i> program. Both versions of <i>RapidTax</i> support laser and dot-matrix printers. In <i>RapidTax Professional</i> a database manager tracks client data and prints reports or mailing labels. <i>RapidTax Professional</i> also includes a client organizer that carries last year's tax forward including depreciable assets with updates. <i>RapidTax Professional</i> also has higher quality forms than <i>RapidTax</i> , the individual version.
1040, 1040A, 1040X, 1041, 1116, 2106, 2119, 2210, 2439, 2441, 2555, 3468, 3800, 3903, 4136, 4137, 4255, 4562, 4684, 4797, 4835, 4868, 4952, 4972, 5329, 5884, 6198, 6251, 6252, 8283, 8396, 8582, 8586, 8606, 8615, 8803, 8814, 8815, 8828, 8829; schedules 1-3, EIC-A, A-F, K, R, and SE	Unlimited support during normal business hours, Monday through Friday, by toll call	Tracks omissions and potential errors. File preview discloses summary of tax information without loading the file. Tracks line number and form location of all overridden fields. Professional version also prepares a transmittal letter explaining the amount of tax or refund due and provides a customer invoice.
1040, 1040ES, 2106, 2119, 2210, 2441, 3468, 3800, 3903, 4562, 4797, 5329, 6251, 6252, 8582, 8606, 8615, and 8829; schedules A-F, R, SE, and EIC	Free telephone support and a 24-hour fax line	HowardSoft markets <i>Tax Preparer</i> for professionals and individuals with complex returns. It has more than 20,000 users nationwide. It allows them to forecast tax liabilities while planning future tax strategies. It includes a file manager that allows control of multiple accounts, plus cover and billing letters, batch processing, and graphic printing.
1040, 1040A, 1040EZ, 1040ES, 1040X, 1099-R, 1116, 2106, 2119, 2210, 2441, 2688, 3468, 3800, 3903, 4136, 4137, 4255, 4562, 4684, 4797, 4835, 4868, 4952, 4972, 5329, 6198, 6251, 6252, 8271, 8283, 8453, 8582, 8606, 8615, 8801, 8803, 8814, 8815, 8822, 8824, 8829, W-2, W-2-P, and W-2-G; schedules 1-4, A-F, R, SE, and EIC; plus 21 work sheets	Unlimited support via toll call, CompuServe, and fax, plus a special number for installation problems	<i>TaxCut</i> is based on an expert system designed to learn about the user as it prepares the tax forms. It raises red flags at figures that might trigger an audit. MECA guarantees <i>TaxCut's</i> accuracy with a pledge to pay penalties resulting from any miscalculation by the program. A shoebox feature can sort tax records into specific categories from a general file. MECA also offers a short-form version called <i>TaxCut EZ/A</i> for \$29.95. The buyer can upgrade to <i>TaxCut</i> for \$25.00 if the return becomes too complicated for <i>EZ/A</i> .
1040, 1040X, 2106, 2119, 2210, 2210F, 2441, 3800, 3903, 4136, 4255, 4562, 4797, 4952, 4972, 6251, 6262, 8582, 8606, 8615, and 8814; schedules A-F, R, and SE; plus four work sheets	Unlimited support via toll call	<i>Tax Ease</i> combines both federal and state returns on a single program and features line-by-line assistance for complex forms. The program is five years old with 1000 current users. On-disk tutorial and printed instructions.
1040, 1040A, 1040ES, 1040ES WS, 2106, 2119, 2210, 2210WS, 2441, 3903, 4562, 4684, 4797, 4868, 5329, 6251, 8283, 8453, 8606, 8615, 8814, and 8829; schedules A-F, R, and SE; plus seven work sheets	Unlimited support via CompuServe, fax, or toll call	Replaces <i>Personal Tax Preparer</i> . New: state modules, cross-referencing, online help, a glossary, enhanced windowing, pull-down menus and toolbars, plus turbo-speed processing. Includes a depreciation calculator, online questionnaire, and audit warnings. If you have no tax payment due, <i>Personal Tax Edge</i> supports electronic filing (for \$19.00).
1040, 1040A, 1040ES, 1040EZ, 1040X, 1099R, 1116, 2106, 2119, 2210, 2441, 3800, 3903, 4136, 4137, 4255, 4562, 4684, 4797, 4835, 4868, 4952, 4972, 5329, 6198, 6251, 6252, 8283, 8453, 8582, 8606, 8615, 8814, 8815, 8824, W-2, W-2G, W-2P, Schedules 1-3, A-F, K, R, and SE; plus 12 work sheets	Unlimited support via toll call or fax	This program still comes with J. K. Lasser's <i>Your Income Tax 1992</i> and includes an interview feature which walks a user through filling out the necessary forms. This year's version supports electronic filing via modem or disk and includes a tax timesaver that works straight from tax records. It will compare different strategies (for example, a married couple could file jointly or individually) to contrast their impact.
1040, 1040A, 1040EZ, 1099-MISC, 1099-R, 2106, 2119, 2210, 2441, 2688, 3800, 3903, 4137, 4255, 4562, 4684, 4767, 4868, 4952, 4972, 5329, 6251, 6252, 8283, 8453, 8582, 8606, 8615, 8814, 8815, 8822, 8829, W-2, and W-2G; schedules 1-3, EIC-A, A-F, K, R, and SE; plus 19 work sheets	Unlimited free support via toll call (satisfaction guaranteed). Support hours extended after January 2. Toll-free premium support: \$50 annual fee.	Just released in September 1991, <i>EasyTax</i> is an upgrade of Timeworks' <i>Swiftax</i> program. Timeworks describes it as "the only program that replicates IRS-identical forms on laser or dot-matrix printers with no additional software or font cartridge required." It supports electronic filing, includes shoebox-style expense entries, and imports from <i>Quick-en</i> , <i>Lotus 1-2-3</i> , <i>Dollars & Sense</i> , and <i>Managing Your Money</i> .

—GARY TAYLOR

GETTING HELP

While financial software can certainly make your life simpler, it can't make you wealthy unless you yourself are prepared to make some savvy decisions. Let's face it—even the world's most sophisticated software program can't tell you which stock will be a superstar or whether to buy term or whole life insurance.

The secret, say the professionals, is solid tax and financial planning, not betting the farm on a hot new issue or seeking out some shady accountant who promises to save you a bundle.

"Good planning is not going to make you rich," says Harold Evensky, a financial planner at Evensky & Brown in Coral Gables, Florida. "You're going to get rich by doing whatever you do for a living. Good planning is not a way to beat the system. Rather, it's an intelligent way to work within the system."

If your goal is a comfortable nest egg and long-term financial success, here's

what Evensky suggests:

- Cover your assets: Protect yourself against disaster with life, health, and disability insurance.
- Save for a rainy day: Set aside enough cash to cover at least three months' living expenses.
- Don't put all your eggs in one basket: Diversify your portfolio. Don't just buy bonds; for example. Buy government bonds; corporate bonds; short-, intermediate-, and long-term bonds; and taxable, tax-free, and tax-deferred bonds.
- Don't hide from the tax man: Invest your money in whatever you think will yield the highest returns. After all, it's not how little you pay in taxes; it's how much you get to keep after your taxes are paid.
- Plan to die (and to live): Make a will. Let your heirs know how to handle your estate after you're dead or incapacitated.
- Plan to plan: Start early. Be realistic. Get good, qualified, independent advice.

ber 2 of the tax-preparation market, *TaxCut* owes a lot to a program released several years ago called *Ask Dan About Your Taxes*. Massachusetts tax lawyer Daniel Caine continues to refine the software as president of Legal Knowledge Systems, while MECA Software (marketer of Andrew Tobias' other software programs) distributes it. The program's strong points are its ease of use, especially for tax novices, and Caine's expert advice that's sprinkled throughout. This year's program includes a soup-to-nuts taxpayer interview, a *Windows* version to be released in January, and *TaxCut EZ/A*, a "baby *TaxCut*" for short-form users that retails for \$29.95. If you discover along the way that you really need the long form, you can always upgrade to the regular *TaxCut* for only \$25.00 more.

- *Personal Tax Edge* (\$49): The nation's third-ranked program in user popularity, Parsons' tax software has long been a low-price leader. The \$49 package packs in everything the big boys do—depreciation calculator, audit warnings, what-if estimator, taxpayer interview, the works—in addition to free, unlimited technical support by phone. *Tax Edge*'s object-oriented capabilities, added in 1990, let you open the Schedule C file, for example, at the same time you're working away on your 1040. Last October, Parsons released an early bird version of its program by mail for only \$29. Rawland, Parsons' director of corporate communications, says this year's *Personal Tax Edge* crunches numbers faster and offers better graphics.

No matter which tax program you decide to buy, make sure it includes these helpful features:

- Taxpayer interview: A series of step-by-step questions can help guide you through the maze of forms and schedules you'll need to file. This year's *TaxCut*, for example, starts out by asking you such questions as "Do you want to file jointly?" and then suggesting some reasons to consider doing that. *TaxCut* even prompts you to enter your name, occupation, and Social Security number.
- Forms and schedules: Besides the basic 1040, most top-selling programs include dozens of approved IRS forms for everything from deductible business expenses to depreciation of rental property. Make sure the program you buy has the forms you need.
- IRS instructions: Unless you get your kicks from wading through a pile of IRS brochures, you'll want a program that has the official IRS instructions online.
- Electronic filing: If you think you're due a refund, get a program that lets you file your return via modem. The reason? You'll get your refund check a lot faster. Many programs let you electronically send your completed form to a third-party service which, in turn, transmits your return to the IRS computers. (There is an additional fee for this.)
- What-if tax planning: You can plot this year's tax strategy and get a head start on 1993 with programs that let you make projections. You can calculate how fast your home business will grow, for example, or whether you can save money if you

and your spouse file separately.

- Onscreen tools: Pop-up calculators and scratch pads mean you don't have to waste time rooting through piles of paper to find your pencil.
- Financial data support: If you've used a program like *Quicken* to track your expenses all year, there's no reason to type everything in again from scratch.
- Technical support: If you're a member of CompuServe or GEnie, you'll welcome the chance to get your questions answered online. Most companies also offer help via phone and fax, though that can get expensive.

What's next for tax-preparation software? In the future, the experts say, tax programs will become even faster, easier to use, and less expensive. They'll hook up not only with personal-finance programs like *Quicken* but with financial-planning software, IRS computers, online information services, and more.

And yet there will always be limits to what your PC can do to help you with your taxes. It won't write that big check to the IRS. And it won't help you explain to the auditor why you deducted that trip with your kids to Disney World as business travel. □

PRODUCT LIST

Managing Your Money—\$219.95

Managing the Market—\$149.95

MECA Software
55 Walls Dr.
Fairfield, CT 06430
(800) 288-6322

Market Base—\$59.00

MP Software
P.O. Box 37
Needham Heights, MA 02194
(800) 735-0700

CashBiz—\$49.95

M-USA Business Systems
15806 Midway
Dallas, TX 75244
(214) 386-6100

Wealth Starter—\$59.95

Wealth Builder—\$149.95
Reality Technologies
3624 Market St.
Philadelphia, PA 19104
(800) 346-2024

Quicken—\$69.95

Intuit
66 Willow Pl.
Menlo Park, CA 94026
(800) 624-8742

Dollars & Sense—\$99.95

The Software Toolworks
60 Leveroni Ct.
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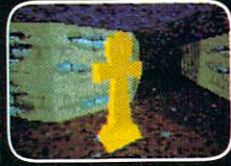
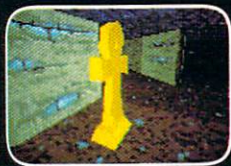
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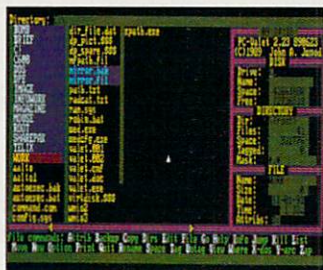
SHAREPAK

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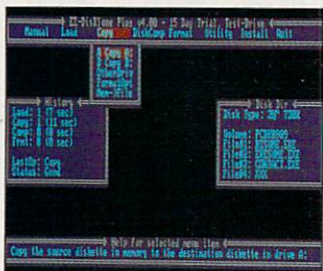
SERIOUS STUFF FOR YOUR PC

This month's *SharePak* brings you four value-packed programs that'll put your computer to work and lighten your load. They're solid productivity programs that help tame DOS, copy high-density disks, create TSR help screens, and maintain a register for your credit card accounts. All of these programs are easy to use yet very powerful. That means you won't

February/March brings programs that'll put your PC to working hard so you don't have to.



PC Valet Shell gives you power with a single keypress.



Save a ton of time and grief with EZ-DiskClone Plus.

spend hours learning how to use them; you'll just save hours by using them.

CredCard

In these days of budgets and belt tightening, this program is especially welcome. Its objective is to provide a financial register for your credit card accounts, similar to your bank account register, so that you can effectively manage your credit cards. It won't help you resist the urge to

plunk down the plastic when you see something you just have to have. But it'll give you an honest assessment of your sins when the bill comes in.

The program has a very friendly, consistent interface that makes it easy to learn and use. Online help is as close as the F1 key, so you won't have to fumble with the manual. The program's main function is showing you your day-to-day unpaid balance. You'll see how much money you owe; how much interest you're paying; and thus, how much the account is costing you.

The program runs on any IBM PC or compatible with 256K RAM, any monitor, and at least one floppy drive. The registration price is \$49.

EZ-DiskClone Plus

Disk copying is a pain—that is, until you get *EZ-DiskClone Plus*. This program makes disk copies in a single pass, regardless of the disk's density. You'll get no more of those *Insert Target Disk* instructions from DOS; just run the program with its easy-to-use menu, and your disk is copied.

There are lots of nice options. If you want to make several copies of a disk, you don't have to constantly reinsert the source disk. It remains in memory until you're ready to copy another disk. In addition to copying disks, *EZ-DiskClone Plus* will compare disks, check for bad sectors, list a directory, and let the utilities clean the disk drive.

The program runs on any IBM PC or compatible with 256K RAM, any monitor, and at least one floppy drive. The registration price is \$29.95.

PC Valet Shell

I'm a guy who hates *Windows*, shells, menu programs, and anything else that comes between me and

the DOS prompt. But I've softened my stance after using *PC Valet Shell*. This program does everything that it takes two dozen utility programs in my DOS directory to do. And I don't have to remember the syntax of using each of the utilities or the DOS commands, since the program gives me a single keypress for each one.

It's fast, too. No long delays while it fetches a directory or looks at a file. It's obvious that the programmer went to great lengths toward optimal code. The list of commands is long; you can do everything that DOS does and plenty more.

To run the program, you need an IBM PC or compatible, 256K RAM, any monitor, and at least one floppy drive. The registration price is \$15.

TSRMAKER

You're using a new program. It's great, but you can't remember all the keypresses. What usually happens is that the manual becomes part of your lap for several weeks. And when it drops to the floor for the hundredth time, it looks like it has been through a war. Well, there's a better way. *TSRMAKER* lets you create single text screens that become TSRs and pop up with a single keypress. You can create help and reminder screens for just about anything.

No, you don't have to be a programmer. All you need is a text editor or word processor. Using an editor, you create an ASCII file. Then *TSRMAKER* converts it to a COM file. Anytime you want to load your special help screen, just run the COM file it created. To see the screen, press the hot key that you selected.

The program runs on any IBM PC or compatible with 256K, any monitor, and at least one floppy drive. The registration price is \$20. □

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FEB 91: *Our United States*, develop your knowledge of the U.S.; *Trivia Whiz*, great trivia game; *Word Whiz*, great vocabulary drill/game; *The World*, enhance your world geography. (#CDSK0291)

MAY 91: *Click! Filer*, excellent program manager and file manager; *PBlcon*, make your own icons for Windows applications; *PCBUDGET*, full-featured budgeting tool; *Résumé Professional*, create the best possible résumé. (#CDSK0591)

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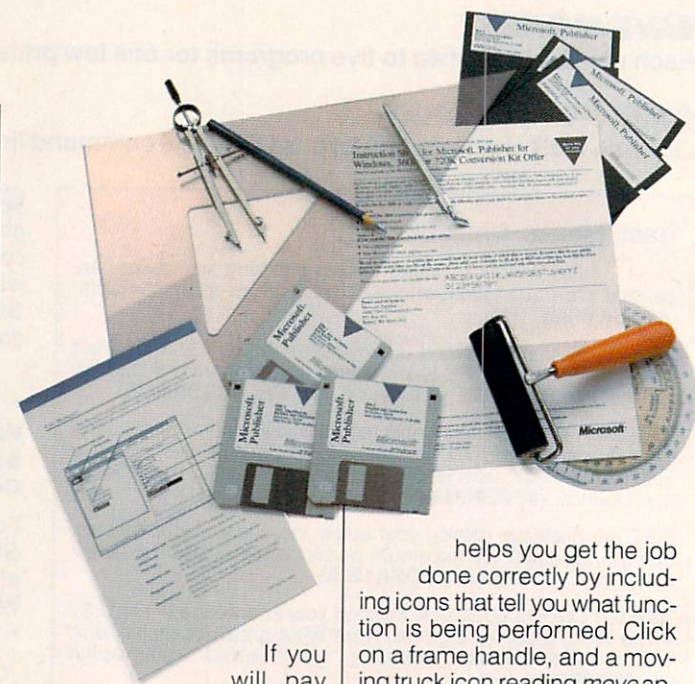
Microsoft Publisher is a breakthrough desktop publishing program that will help anyone prepare brochures, newsletters, cards, and other printed materials. And you don't need a degree in picas and points to get results that will please you for most of your personal desktop publishing chores.

The package has many of the amenities of high-end desktop publishing software, but it overflows with features that make it simple to use for those not schooled in the graphic arts. With *Microsoft Publisher*, you'll be able to create birthday cards, party invitations, and newsletters for the canoe club quickly, efficiently, and in a manner that's pleasing to the eye.

Page Wizards are the genius behind this ease of use. Microsoft has bundled a handful of Wizards with the program to help you make quick work of setting up brochures, newsletters, greeting cards, calendars, and business forms. There's a Page Wizard for just about everything—there's even a paper-airplane-making Wizard to help you through those slow Friday afternoons.

The Page Wizard feature asks you a series of questions about the selected project: Do you want a classic or a modern brochure? Do you want a picture on the front page? Large or small?

Once you've completed the questionnaire, *Microsoft Publisher* goes to work and assembles the elements needed for your publication and places them on the page while you watch. An information box keeps you posted on what the program is doing and why.



If you will pay close attention, you'll learn how to build your own similar publications.

But if you're interested only in the final results, that's fine. Go warm up your coffee or put out the trash while the Page Wizard does its work. When you return, you simply replace the Wizard's sample copy and graphics blocks with your information and artwork—that's it. Send your pages to the printer and get on with your life.

Using Page Wizards, I created a birthday card for my brother in about five minutes. Calendars for the whole family took slightly longer only because my daughter wanted to see every possibility for the piece of art that was to adorn the calendar for her room.

Microsoft Publisher is a frame-based program. This means that you create boxes called frames on your pages and then fill the frames with various elements. You can select text frames, word-art frames, and picture frames.

Frames are easy to move and resize, and the program

helps you get the job done correctly by including icons that tell you what function is being performed. Click on a frame handle, and a moving truck icon reading *move* appears, reassuring you that you are about to move the frame. Similarly, if you click on a frame handle to resize the frame, a double-headed arrow reading *resize* lights up.

Another winner in the ease-of-use competition is a *Microsoft Publisher* feature called Word Art. This ingenious concept allows you to create headlines or word illustrations that are curved around a circle, slanted, rotated, shaded, or stretched. *Microsoft Publisher* also provides a battery of specialty fonts for this purpose, so you can make a statement that really fits the tone of your project.

It takes under a minute to make and place a Word Art creation. Developing the same effect with a traditional font-manipulation tool would take much longer. Although its Word Art effects are clearly less sophisticated than what could be produced with dedicated software, *Microsoft Publisher* almost guarantees that anyone, even a complete novice, will get speedy and satisfactory results.

Border art is another fascinating feature that will captivate *Microsoft Publisher* users. You can place a traditional box around one of your frames, or you can spice things up by selecting one of the dozens of border art possibilities provided with the program.

Microsoft Publisher makes it easy to locate and select just the right border art. Simply click on a border art filename in the selection box, and a preview of the art appears onscreen. If you like it, click on OK, and the border will be applied. If the selection isn't what you had in mind, continue browsing until you find the perfect border. The same process also makes selection and placement of clip art quick and easy.

Clip art of various forms can be imported into your publications. If your clip art library is small or nonexistent, you'll find more than 100 black-and-white and color clip art examples packed with the program to get you started.

Microsoft Publisher has the look you'd expect of a *Windows* application, and anyone familiar with that format can press forward with little or no help from the manual. Program options are selected via standard menu options or through a toolbar that provides quick access to the most commonly used options.

This toolbar changes its appearance, too, depending on which type of frame is currently selected. If a text frame is selected, options for changing type sizes, fonts, justification, and line spacing are available. When a picture frame is selected, the options presented include border weight, shading, and shadows.

Microsoft Publisher is a per-

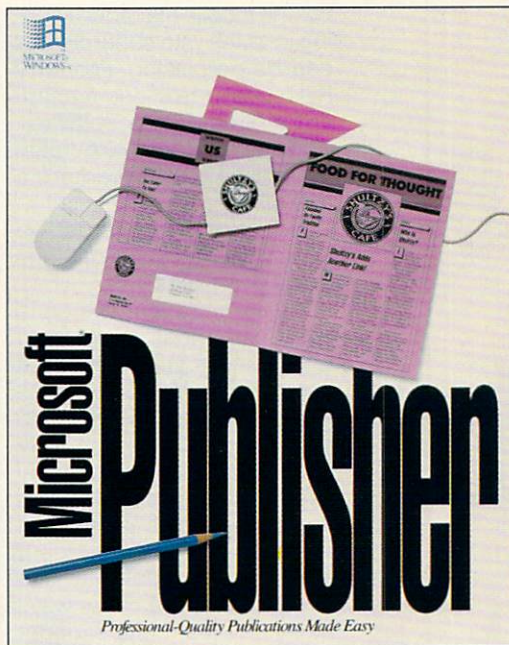
fect program for someone who doesn't plan to do desktop publishing every day. You don't have to study it, practice it, or learn it—you just use it whenever you need it.

Help and guidance are built into every aspect of the program. A status bar at the bottom of the screen helps keep you on track. Place the mouse pointer over a tool on the toolbar, and the status bar identifies the tool and explains how to use it. The program includes a standard *Windows* help program and offers a brief tutorial to show you how *Microsoft Publisher* pages are assembled.

Microsoft Publisher includes a built-in word processor with a spelling checker, so you can create and design your documents without leaving the program. Alternatively, you can create your text outside *Microsoft Publisher* and import it through one of the many text filters provided.

In addition to the clip art and border art that come bundled with *Microsoft Publisher*, the package includes several template files to help you get started with such things as résumés, business cards, labels, or price sheets.

Although not as sophisticated as the top-of-the-line professional desktop publishing packages, *Microsoft Publisher* deserves credit for being an inventive piece of software. Its print routine, for example, automatically rotates the panels of a greeting card so the card folds correctly. Also, you can create a publication in book format. For example, to create an eight-page booklet, *Microsoft Publisher* prints pages 8 and 1 on the first sheet of paper, 2 and 7 on the second sheet, 6 and 3 on the third sheet, and 4 and 5 on the final sheet.



Fold the sheets together, and you have a nice, neat booklet. This type of pagination, or imposition, is something users of high-end desktop publishing software have requested for many years.

Professional desktop publishers may become frustrated by the lack of detailed controls in *Microsoft Publisher*. One example concerns type size: It can only be selected in half-point increments instead of tenth-point increments. Another *Microsoft Publisher* shortcoming that might annoy professionals is that it doesn't use style sheets to facilitate copy formatting.

But if you don't know a thing about desktop publishing, *Microsoft Publisher* will make you happier than any other software package I can imagine. It won't make you an automatic desktop artist, but it will let you quickly and easily turn out clean, crisp desktop published documents. □

IBM AT and higher and compatibles; 1MB RAM (2MB recommended); EGA, VGA, 8514/A, Hercules, or compatible video adapter and monitor; hard disk; Windows 3.0; mouse recommended—\$199

**MICROSOFT
One Microsoft Way
Redmond, WA
98052-6399
(800) 426-9400**

WORKPLACE

Daniel Janal

LONG-DISTANCE DELEGATION

For the mobile manager, keeping in touch with subordinates can be perplexing. For Terry Kalil, public relations manager for Great Plains Software, who spends about 40 percent of her time on the road, it's a fact of life.

How does a manager go about managing workers she rarely even sees?

"In the past year I've gone from [being the] sole person to heading a staff of three. It has presented incredible challenges," says Kalil. Her full-time staffers are a publicity specialist and two publicity coordinators. She also shares an administrative assistant.

Because of her frequent absences, her staff has matured quickly. "In many ways I think my team is a stronger team because I am not here. They are learning to make day-to-day decisions," she says. "There is a great joy in finding [that] projects get done."

Yet there are special challenges for the mobile manager who manages from different time zones.

"Anytime you are developing a team, the challenge is to

be a teacher via long distance," she says. "It is critical that when I'm in town I spend a lot of time laying out assignments, managing their current work, and providing feedback. One of the things we're implementing is a detailed planning-within-plan process." This means that every task is broken down into a set of steps and procedures, as on a flow chart.

However, she warns other managers that disaster can occur if a manager doesn't set boundaries for authority and decision making by workers. "You need to set policies that empower employees to make decisions within a range that's appropriate [for] their experience," she says. "When you are gone a lot, they need that authority."

She advises managers to make sure that everyone understands the steps to complete the project. "I'm very big on having systems. They are critical to getting things done. They are important to remove redundancy." She's in the process of creating a training and procedures manual for her staff that will include such topics as how to update the database and how to write a press release.

Kalil shares these rules for mobile managers:

- Decide who will make decisions on which subjects.
- Create clear ground rules.
- Set clear limits of authority.
- Encourage communication with your team. Ask them to leave voice mail. Let them come to you. Call them back as soon as possible. Leave a detailed itinerary so they can get in touch.
- Give your people space and independence.

It's important for managers to communicate clearly the purpose of their field trips. "Al-

ways tell people . . . what you got out of [a trip]. If all you talk about is this great party or that great dinner, it creates the wrong impression in people's minds," she says. "If you tell people about the great concert or Broadway play, be sure to tell them about getting stood up for an appointment or delays at the airport. You must be sensitive to what war stories you tell."

Not only does she have to stay in touch with her staff, but she must also report to her managers. She says this is not a problem because the corporate culture accepts the telephone, with its special strengths and weaknesses, as a fact of life.

"A lot depends on corporate culture. The company must be flexible and informal. People are top priority, instead of how many documents [are] processed," she says. Because of this philosophy, her own performance review was conducted via voice mail with her manager. "It was not uncomfortable because our communication skills have adapted. It feels like we are talking face to face."

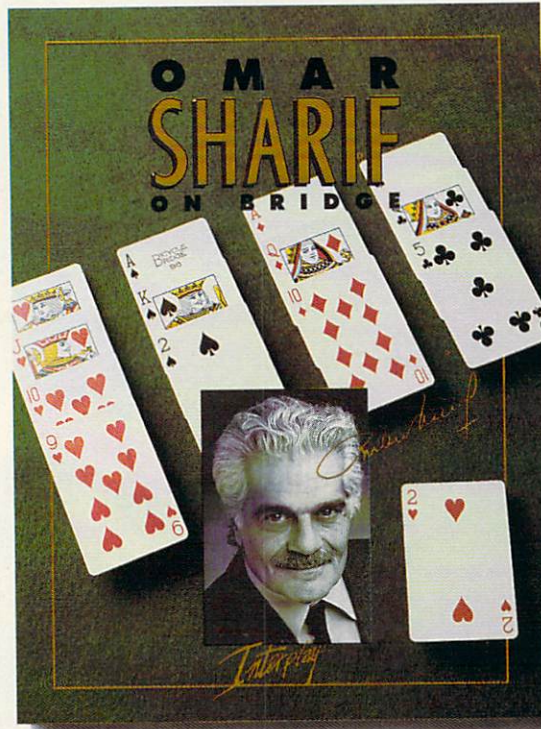
One important dimension of using technology to manage employees is discipline. "Discipline means you check your E-mail and voice mail on a daily—or hourly—basis to stay connected to your employees in a timely manner," she says. "In a nutshell, it means not letting the technology replace the human elements of communication that are the keys to successfully using technology as a management tool."

Kalil's system for combining people, technology, and travel seems to have worked. The amount of media coverage received by the company has doubled in the past year, as has the number of leads generated by publicity. □

Technology is just a tool—a way to establish and maintain relationships. The people are the ones that matter.



PLAY BRIDGE WITH THE MASTER HIMSELF



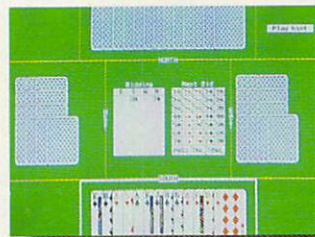
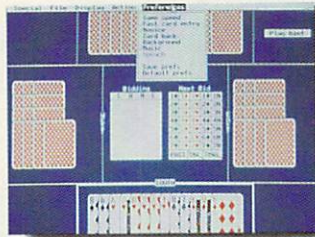
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Omar Sharif On Bridge™ is the world's first talking bridge game that features full VGA graphics, major sound board support, an on-disk tutorial, and an easy-to-use, point and click interface.

You'll hear Omar Sharif congratulate you on a bold finesse, or suggest another lead if your game needs some fine-tuning. Full VGA graphics allow you to select from several types of card decks while the user-friendly interface makes bidding and playing fast and intuitive.

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- Loading and saving hands
- Plus much, much more!

To order *Omar Sharif On Bridge™*, call 1-800-969-GAME. Available on MS-DOS compatible machines for \$59.95.

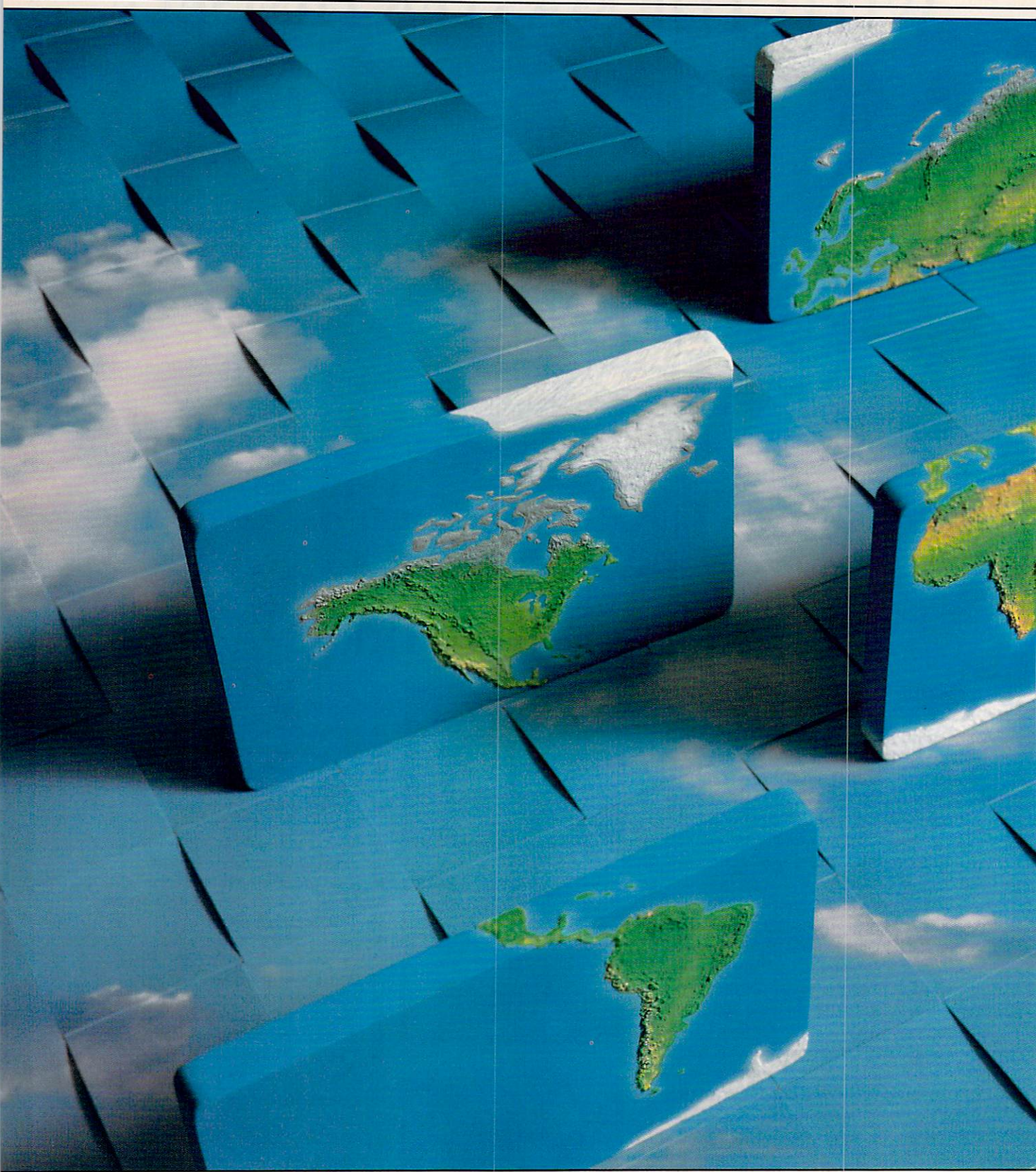
Interplay™

Interplay Productions
3710 S. Susan, Suite 100
Santa Ana, CA 92704
(714) 549-2411

MS-DOS Screens Pictured.

Circle Reader Service Number 105

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YOU CAN NAIL YOUR
HOME OFFICE DOOR SHUT AND
STILL STAY IN BUSINESS.

CONTINENTS OF DATA

BY GREGG KEIZER

As long as your phone, PC, fax, copier, and other gadgets stay in good repair, you can keep in touch with your clients and customers, order supplies and services, pump out the work, and turn a dollar without leaving your home office or accessing outside sources of information. In fact, the only opening you would need to the outside world is one large enough for delivery people to slide mail and express packages through.

As farfetched (and unhealthy) as that sounds, the day of the virtual home office—where you have everything at your electronic fingertips—has already dawned. You can reach out and touch every resource you need from the comfort and convenience of your home office.

You can even draw from the information well without setting foot inside a library. One way, of course, is to hit the wires and telecommute to any of several excellent commercial databases on online services and bulletin boards.

Another way to get the business information you need, a way that doesn't set the telecomputing meter ticking, one that compresses entire shelves of in-office reference material to a handful of plastic discs, is CD-ROM technology.

CD-ROMs use the same CD technology that has revolutionized the music business. Tiny pits and peaks are set in plastic to represent digital data. A low-powered laser reads these highs and lows and then re-creates the original music, image, or text. A CD-ROM opens up vast expanses of storage space—enough to fill about 1500 floppy disks. You can cram hundreds of books onto one platter slightly smaller than a 45-rpm record.

But CD-ROM development suffered from a computing Catch-22: Without a broad selection of usable discs, few people had reason to buy a drive. But without lots of drives on desktops and in PCs, disc publishers had little reason to produce software. Recently, however, drive prices have fallen from the stratosphere, and producers have seen a ready market for their wares.

Sony, one of the consumer electronics gorillas, slips around this chicken-and-egg problem by bundling a six-pack of CD-ROM titles with its CDU-535 drive. You'll find Sony's Laser Library commonly discounted to just under \$600. Some PC makers who are providing CD-ROM drives in their systems, like Sun Moon Star and Headstart, also seed with software that's sometimes free, sometimes deeply discounted. Aggressive CD-ROM publishers take a risk and price their products for the consumer, not the corporation, hoping to make their profits on volume.

Tandy, though not normally known for breakthrough pricing, sells its CDR-1000 internal drive for less than \$400. The CDR may be slow at accessing data, but it's one of the few drives that meet MPC (Multimedia PC) standards for streaming data—reading it from the disc—once it's found. Sony's CDU-7211 and CDU-541 are faster, more expensive drives that sit outside your PC. Toshiba's XM-3300 series devices (XM-3301B-PCF and TXM-3301P1-PCF) are fast, but they're troublesome if you want to play audio CDs (almost all CD-ROM drives also take straight music discs). And NEC's portable CDR-36 is a go-anywhere drive that provides CD-ROM access on the road.

For the home office, where speed sacrifices must often be made at the altar of price, the Tandy drive and the Sony Laser Library are best buys. Both drives are solid performers; and the Laser Library's bonus software goes a long way toward getting your CD-ROM collection rolling. The Tandy drive does without the bothersome caddy, the protective shell the discs sit in, and has the advantage of hiding inside your PC. By the same token, that means you must install the drive yourself, something some home office workers will shun. The Laser Library, on the other hand, is an external drive that only requires an empty slot.

Indispensable Home Office CD-ROMs

It's not difficult to assemble a working CD-ROM reference library that replaces several feet of space once reserved for dictionary, encyclopedia, atlas, and thesaurus. Even more specific CD-ROMs can turn you into a direct-mail marketer or a telemarketing phenom.

CD-ROMs let you search through volumes of information in less time than it now takes you to grab a book.

Microsoft Bookshelf should be at the front of your home office CD-ROM archives. Available in both DOS and Windows (multimedia) formats, *Bookshelf* is an excellent general reference starter kit. You get *The American Heritage Dictionary*, *Bartlett's Familiar Quotations*, *Concise Columbia Encyclopedia*, *Concise Columbia Dictionary of Quotations*, *Hammond World Atlas* (Windows version only), *Roget's Thesaurus*, and *The World Almanac*.

The multimedia version of *Bookshelf* uses animation, music, and speech to bring these references alive, something that you can forgo if you're using them exclusively for the office. You'll find that others in the family, especially kids, will think the spoken word pronunciations, digitally recorded national anthems, and animated illustrations for articles are great, though.

TEN WAYS TO MAKE CONTINENTS OF DATA PAY

1. Target a direct-marketing campaign—nationwide or local—with the help of *Business Lists-On-Disc's* (\$2,500) 9 million names and addresses.

2. Keep your computer consulting business up-to-date with a year's subscription to *Computer Select*, a database of hundreds of articles from nearly all the nation's PC-related publications.

3. Translate documents with the help of *Languages of the World* (\$950), a collection of 18 dictionaries in a dozen languages from around the world, including English, Japanese, Chinese, Dutch, French, Spanish, German, and Italian.

4. Stay in your office (and stay productive) rather than going to the library—once you have something like *Facts on File World News Digest*, a CD-ROM with thousands of clippings from the last ten years.

5. Feed your business-consulting clients news on the competition when you stick *The Wall Street Journal Ondisc* (\$1,950 per year) into your CD-ROM drive.

6. Split the cost of your home office's basic reference library with the family and forget about buying a paper encyclopedia.

7. Plan a marketing campaign for your client by digging into the volumes of Dun & Bradstreet business information on *MarketPlace Business 1.1* (\$695, Macintosh).

8. Track Weather trends near your farm or outdoor business with the *World Weather Disc*, a collection of 17 databases culled from the National Climate Data Center and the National Center for Atmospheric Research (\$249).

9. Blow the doors off your desktop publishing competition with *Type Gallery PS* (\$399), a CD-ROM that holds the entire Adobe PostScript font library. You can access three of the 470 fonts; after that, you pay only for the ones you want by calling a toll-free number and giving a credit card number. Font families cost \$25 and up.

10. Improve your research-on-demand productivity with *Reader's Guide to Periodical Literature* (\$1,095 per year).

If you're strapped for cash, go for *The Software Toolworks Reference Library*, a collection that costs \$50 less than *Bookshelf*. It, too, includes a dictionary, thesaurus, and quotations, and it tosses in several other useful works—an address and phone directory and *New York Public Library Desk Reference* stand out—but it lacks an atlas and encyclopedia.

No matter what general collection you start with, a full-length encyclopedia should be next on your home office CD-ROM list. *The New Grolier Electronic Encyclopedia*, number one on the Bureau of Electronic Publishing's bestseller chart, is a multimedia production with such minimal hardware requirements—only 512K and a floppy drive—that it's perfect for the low-powered

home office. Sound, speech, and music add to the reference, but it's the text itself—identical to *Academic American Encyclopedia* you find on the online services—and an attractive price (\$395) that makes this worthwhile. Your other pick, *Compton's Multimedia Encyclopedia*, comes from Britannica and is a more thorough reference.

List-O-Mania

Once you have the essential references at your fingertips, you can move on to more specific CD-ROMs that meet the needs of your own business.

The process of finding new clients and then organizing a direct-mail campaign means you'll burn the midnight oil. You can hit the local yellow pages, but that only gives you nearby business-

TRADING TIME FOR MONEY

Isn't paper good enough?

I'd be among the first to vote for paper's long life span. After all, I make my living putting words on paper. But I'd like to draw the line when it comes to looking something up. I can do without paper there.

That's because time is a nonrenewable resource. There's never enough. Anything that lets me use my time more productively puts more money in my checking account and keeps the mortgage wolves from the door.

A simple experiment sufficed to demonstrate the advantage of CD-ROMs over book resources. I needed to find out when the Brooklyn Bridge was completed. Using *World Book*, a popular at-home reference, I pulled out the B volume, first looking under the general "Bridges," which then led me to the more specific "Brooklyn Bridge," where I found the

date—1883. Total time for the reference excursion: ten minutes, what with pulling volumes and skimming text.

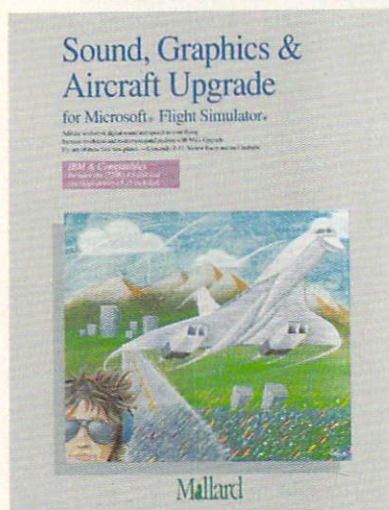
When I slipped *Compton's Multimedia Encyclopedia* in the CD-ROM drive and typed *Brooklyn Bridge*, though, it took about two seconds for dozens of references to appear on the screen. Another ten seconds or so led me to the "Bridges" article, where each instance of the words *Brooklyn Bridge* was highlighted. In less than a minute—and without getting up from the computer—I had my answer.

CD-ROM technology puts more information at your fingertips, and puts it there faster, than any paper-based reference, and without the fumbling. Add the ability to quickly cross-reference information and the ease with which you can integrate information into computer-created work, and CD-ROMs shine even more brightly.

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Circle Reader Service Number 119

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Omaha, NE 68127

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Compton's Multimedia

Encyclopedia

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\$895.00 (for Windows)

Britannica Software

345 Fourth St.

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(800) 533-0130

Computer Select

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Disk Products Division

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Irvine, CA 92718

(714) 583-3000

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\$1,950.00

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UMI

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Reader's Guide to Periodical Literature

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The World Weather Disc

\$295.00

Weather Disc Associates

4584 N. 89th St.

Seattle, WA 98115

(206) 524-4314

es. Or you can slip American Business Information's *Business Lists-On-Disc* into your CD-ROM drive. This collection of over 9 million businesses, culled from over 5000 telephone directories, lets you search for clients by everything from city or ZIP code to company size or the type of business.

And you pay only for the names you use. *Business Lists-On-Disc* includes a key counter that you stick into your PC's parallel port. You can download, print, or autodial up to 1000 names before that counter empties; you buy additional lots of 1000 names at 12 cents per name. Obviously, it's most economical when you download lists to your PC—that way you can reuse the list as many times as you want.

If you work in the computer business, you need Ziff-Davis's *Computer Select*, a full-text collection of 50 computer magazines. Hundreds of other publications toss in article abstracts (short summaries), which are less valuable. For computer consultants, freelance writers, and mail-order merchants of software or hardware, *Computer Select* is a paper-free way to keep up with the industry. You can search through the hodgepodge of text by any combination, from company name or product to your own string of words. *Computer Select* isn't inexpensive at nearly \$1,000 per year, but the perks include monthly CD updates.

High-Tech Home Office

CD-ROMs in the home office provide instant access to library-sized chunks of information. It's as if you had a slew of electronic databases in your home.

The home office of the near future will have even more ways to handle information. Sony's Data Discman, a Walkman-sized box that bundles a 3½-inch CD-ROM drive with a 3²/₅-inch screen, sells for around \$550. Discs like *CIA World Fact Book*, *The American Heritage Dictionary*, *USA Today 1990/1991*, and *Compton's Concise Encyclopedia* put text (but no pictures or sound) on the Data Discman. Throw this two-pound machine in your briefcase, add a couple of miniature CDs, pick up your notebook computer, and you can handle business anywhere.

Apple and IBM, meanwhile, hope to mine the same reference mother lode with a portable reference reader or multimedia machine they will coproduce sometime in the next three years.

If the future of working includes working at home, it also includes optical discs, gigabytes of information, and the means to make sense of it all. Continents of data are waiting under the rainbow sheen of the compact disc. It's time to start exploring. □



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STRATEGIC SIMULATIONS, INC.®

ARTS & LETTERS

Robert Bixby

PUBLISHING ON A SHOESTRING

I lay out books as a hobby. One of the simplest forms of books is the chapbook. Chapbooks are usually printed on bond paper with cardstock covers and saddle-stitched. Because chapbook publishing is so simple and inexpensive, it's open to virtually everyone.

I have laid out a 40-page book in an evening using nothing more than *GeoWorks Ensemble's GeoWrite*. There are strong advantages to the *Ensemble* environment—chiefly, the wide variety of fonts that can be printed at laser quality on dot-matrix printers.

Begin by using Page Setup in the File menu to specify landscape orientation, 8½ x 11 inch sheet, and two columns. Make the right and left margins ½ inch and the top and bottom margins 1 inch. Make the gutter (the space between the two columns) 1 inch.

Use Insert from Text File on

the File menu to insert your edited ASCII file (all editing should be finished *before* the book is laid out). The next step is to allow for alternating pages. At the top of the first column of the first page, insert a page break from the Edit menu. Do the same a line above the bottom line in the second column. Insert a page break a line above the bottom of the first column on the second page and another at the top of the second column of the second page. Continue inserting page breaks in this way until you reach the end of the text. Remember that the left column should be blank on odd-numbered pages and the right column should be blank on even-numbered pages and each page containing text should have a page break at its bottom.

You're dealing with four-page signatures—that is, each unit of your publication is a single sheet of paper which contains four book pages, two pages on each side. Therefore, you're going to want to lay out your book so that the middle two book pages will print on an even-numbered page in *GeoWrite*. Go to the approximate middle of your *GeoWrite* document, or perhaps a page or two after the middle. Be sure that it's an even-numbered page in *GeoWrite*. From here on, you'll be cutting and pasting whole pages.

Go to the next page in *GeoWrite*. Click the mouse button on the text five times. This selects the entire page, including the page break. The page breaks at the bottoms of the pages are a potential problem. Place the mouse cursor on the left end of the page break (it appears as a solid line), hold down the Shift key, and click to unselect it. Now use Cut from the Edit menu to cut the page. Go back to the blank side of the middle

page. Click above the page break on that page and paste the text you just cut.

Continue this procedure, cutting successive pages and pasting them on the blank side of pages from the middle to the front of the book. As you can guess, this is the point where organization is most apt to break down.

You can't rely on *GeoWrite's* headers, footers, or page numbers. You'll have to create your own and paste them into the columns. Go back to Page Setup and make the top and bottom margins one-half inch. That will give you an additional inch of space on each page. Go to the first page where you want a header and type the information at the top of the column—*not* in the header area provided by *GeoWrite*. Use the Copy command in the Edit menu to place the header in the clipboard. Then go through the book, page by page, pasting this header in place at the top of each column. Some people like to use alternating headers, and this is very easily done. Just copy one header (usually the book title) to the top of each right column and the other header (chapter name or author name) to the top of each left column. Number the columns at the bottom of the text area (*not* the footer area) following the flow of the text, remembering that odd numbers go with right columns and even numbers with left columns.

Print out a complete set of pages, place them back to back, and fold them in half. Read the pages in page-number order to check continuity.

Find a copy shop that can make two-sided photocopies and let the proprietor set the material up (usually every other page has to be upside down). It's worth the extra money to have the books folded in half, stapled, and trimmed. □

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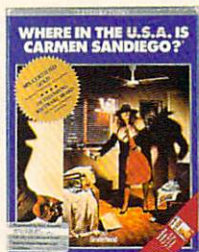
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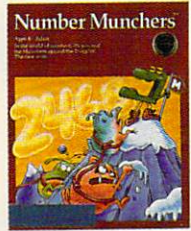
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Name of Program (Print in box)

- AGE of child (check one): 3-7 7-10 10-13+
- Computer you own and disk size required (check one):
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 IBM/Tandy & compatibles with 3.5" disk drive
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- Child's name _____
Child's birthdate: Month _____ Day _____ Year _____
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DISCOVERY

COMPUTE CHOICE. Encourage your child's imagination and give new meaning to the art of storytelling with this fun program.

Heidi E. H. Aycock

KID WORKS

Your child comes home an hour later than you'd expected. You ask where he's been. "What took you so long?" you ask.

"Well, there was this big dinosaur in the school parking lot, and he wouldn't let me get on the bus," your child says. When you hear the tall-tale engine revving up, do you stop the process pronto? Or do you listen carefully, ask for details, and pull out some crayons and paper so your child can draw an artistic rendering of the events in question?

Imagine, if you can, swallowing your anger and encouraging your child to express what's in his imagination. Paper, pencil, and crayons make ideal tools for elaborating on such tales, but so do computers—especially now that Davidson & Associates has released *Kid Works*, a kid-sized writing program with graphics and sound.

There's a big difference between exercising your imagination and lying. Relish your child's fabricated adventure. Turn on the computer, start up *Kid Works*, and say, "Tell me more. Type in what happened."

Your child sits at the computer and sees an electronic sheet of paper that looks just like the specially lined paper he uses in elementary school—lots of space and a dotted guideline running between the lines. Hands poised on the keyboard, your child begins to type an epic tale of stout-hearted courage.

After he's put several well-written lines onscreen, he jumps up from the computer and tells you he's finished. "Read my story," he says.



"Let's make the computer read your story," you say. "Click on the mouth at the top of the screen to hear it."

Your child easily finds the correct icon, and a robotic voice reads back the whole exciting tale.

"Some of these words would make good pictures, wouldn't they?" you say to your child.

"Yeah, like the dinosaur," he says.

"Let's click on the button that turns words into pictures," you say. You have to point this one out because it isn't as obvious as the Mouth icon was. Your child clicks on it, and suddenly several of the words become small pictures. The word *run* changes into a small picture of a child running. The word *eat* changes into a kid eating a slice of pizza; the word *fast*, into a picture of a tortoise racing a hare, with an arrow pointing at the hare. The word *dinosaur* changes into a picture of a green thunder lizard.

"That's not what the dinosaur looked like, though," says your child. "For one thing, it

wasn't green, it was purple."

"Why don't you draw one? Click on the picture of the paintbrush and bucket," you say.

Now he has colors, drawing tools, and funny stamps with which he can draw his dinosaur. When he finishes, he can insert the picture into the story. He can draw other scenes for the story, too.

After he's finished writing and illustrating, he can play the story back. The robotic voice reads his words and icons while his pictures pop up, full size. In effect, your child has written his own electronic storybook.

Kid Works is a treat for children and a godsend for parents who want to encourage creativity. It's a perfect adjunct to reading aloud and adds new meaning to the idea of storytelling.

Besides helping your children write picture books, the program can do many other tricks. It can help them learn to read new words; the electronic voice will read aloud any word they choose. By setting up matching games, parents can reinforce associative skills; the computer can

check the child's work by reading aloud the words as they're matched. Kids can learn about sequencing and comparing by writing whole stories from icons—the program provides loads of icons—but you can make your own, too. *Kid Works* looses a flurry of projects and games for kids. Even before they can type, your children can benefit from this new package if you'll sit with them, typing the words that they say and helping them draw pictures.

The program is large in scope, and the collection of tools is ideal. While it won't replace the time you spend reading aloud and spinning yarns with your children in your lap, *Kid Works* will add a new dimension to the concept of telling stories. Because it emphasizes all of the elements of a good tale, this program will stir up creative juices and reinforce imaginative play. It will encourage such varied behaviors as parent-child cooperation and child independence. You can work together on a project or let your kids produce surprise masterpieces.

The speech portion of the program sets it apart from many other children's word processors and graphics programs. Kids will love to hear their stories read aloud by the computer (though to an adult the voice may sound a little sterile and mechanical). Because you can teach the voice to read words it doesn't already know, you can teach it to say your child's name. Best of all, you don't need to run out and get a sound card to benefit from the speech capabilities. Even on a plain PC speaker, you can hear the voice very well. *Kid Works* also sports some charming sound effects

that punctuate the interface, but to hear these, you'll need an Ad Lib, a Sound Blaster, or another add-on sound board.

Kid Works' only weakness is its interface. The program is so massive and has so many modules to manage that it's easy to get lost. Some icons clearly denote their functions. Others, however, are obscure.

Creating these icons must have been a tough challenge for the program designers. Imagine coming up with an icon for the move function (analogous to cut-and-paste in many word processors). *Kid Works* uses the image of two moving people carrying a crate. Pretty good. But when it comes to the icon for cancel, the designers might have come up with a more obvious choice than a hand with its palm facing out.

In some parts of the program, you have to go through too many steps. If you want to quit, for example, you click on the Stop icon at the top of the screen. If you haven't saved yet, the program makes you go through the save procedure—clicking in a few dialog boxes—before it quits. The program should simply ask you if you want to save before quitting and do it for you. The save process itself requires two clicks too many.

In spite of the interface problems, *Kid Works* is still a great program. Don't let the complexity of the package scare you away from the enormous benefits. Your kids can only grow more creative and more confident in their abilities if they use this program.

Imagine your child has finished writing his story about coming home from school.

He's drawn illustrations of his battle with the dinosaur, his

triumphant exodus from the schoolyard, and his tired journey home. You've replayed the talking picture book six times, sitting together. You've exchanged a few laughs, a few hugs, a few daydreams. Then you say, "OK, that was a great story, but what really happened?"

Your child looks down at his hands, winces a little with the sting of the truth, and then lets you have it: "I traded my watch to Timmy for this cool lizard he caught. Then the lizard ran away, and I had to help look for her. I lost track of time."

"Your new watch! The one Grandma got you for your birthday?" You shudder. "What did the lizard look like?"

It may have taken a long time to uncover what happened, but *Kid Works* made it a fun time. And your child learned the difference between a tall tale and a true tale—and the value of each. □

IBM PC and compatibles 8 MHz or faster; 640K RAM; EGA, MCGA, or VGA; hard disk with at least 2MB free space; mouse; supports internal sound board or speech device, such as Sound Blaster, Speech Thing, Ad Lib, or IBM Speech Adapter—\$49.95

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PATHWAYS

Steven Anzovin

ADRIFT IN THE INFORMATION OCEAN

When Christopher Columbus landed on a Caribbean island in the fall of 1492, he was completely lost, though he didn't know it. He'd set off to find the spice islands of the East Indies (and was convinced that he'd found them), but instead, he opened the way to an entirely new world. That kind of serendipitous discovery is the theme behind a new class of educational software that lets kids explore the ocean of information in the hope that they'll make discoveries as significant to themselves as those of Columbus were to the world.

Exploration turns random wandering into knowledge. Can the same feat be accomplished with software?



Most multimedia reference software—like *The New Grolier Electronic Encyclopedia* (\$395.00) and *Xiphias' Timetable of History, Science, and Innovation* (\$129.95), both excellent educational tools for older kids and fun to use—is currently available only on CD-ROM. The usefulness of these packages is thus limited to kids who have access to a CD-ROM player, and the slow pace of CD-ROM makes it hard for children to sustain interest in spontaneous exploration.

A new program called *Knowledge Adventure*, from the company of the same name (4502 Dyer Street, La Crescenta, California 91214; 818-542-4200; \$79.95), is en-

cyclopedic in scope but needs no CD-ROM. It comes on floppies and takes up only a few megabytes on any hard disk, although it contains hundreds of text articles and scores of images and sounds on a wide range of topics. The information in *Knowledge Adventure* stays in compressed form and decompresses on the fly as you access it. The program's interface is slick and friendly, with point-and-click, drag-the-gadget operation. The main panel has windows for text and pictures, and as in any well-behaved hypermedia application, you can click anywhere on the picture or on any word in the text and be transported to related material. The path you take is selected by the program, however, which

sometimes makes random choices among multiple possibilities. There are also two neat navigational gadgets: a timeline slider that lets you pick an era—and a rotating globe of the earth. Not only does the globe spin on command, allowing you to access information about any location covered in the program's database, but you can also zoom in and out from low-earth orbit to a vantage somewhere beyond the smaller Magellanic cloud.

What's interesting about *Knowledge Adventure* is that it's deliberately free-form and aimless. Unlike a book or typical database, *Knowledge Adventure* encourages kids to wander in fields of facts, without dwelling too long on any particular topic. The program offers in-depth information about the high points of history, from the big bang to the

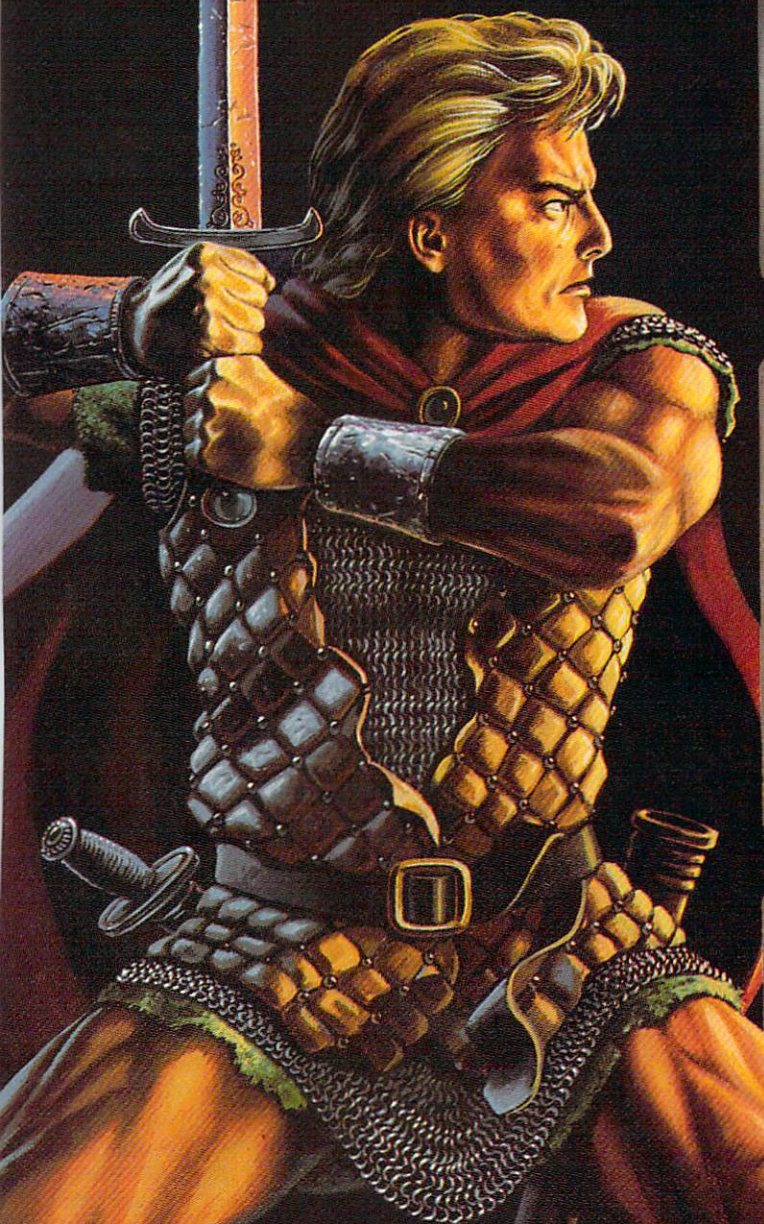
twenty-first century, covering such subject areas as technology, art, biography, music, architecture, and natural science. While to a certain extent purposeful navigation among these topics is possible, kids will find it easiest simply to let the program take them where it will, whether for better or for worse.

Is wandering a good way to learn? Well, it is and it isn't. Exploration behavior is as old as hunger, and it follows a well-known pattern. At first, when the environment is unfamiliar, we explore randomly. Then, as the general shape of the environment becomes known, we focus on a particular goal or set out for a specific destination. Educational programs that present gobs of material to explore need to satisfy both kinds of behavior. I let my six-year-old daughter and ten-year-old son play with *Knowledge Adventure* for a while, and I found that their explorations followed the usual pattern. At first, they were excited to see new things and content not to know where they were going next. But then they began to complain about not being able to go anywhere they wanted or to search for a particular concept by typing it in. To get around efficiently in *Knowledge Adventure*, they had to know how one fact might link up with another—or needed someone who did. With Dad and Mom on hand, *Knowledge Adventure* stayed interesting a lot longer.

What's the best way for kids to learn? Parent- or teacher-guided exploration. Computer software just isn't responsive or interesting enough yet. Otherwise, free-form adventures in learning provide an experience a little too close to Columbus's. After all, that venerable explorer went to his grave without a clue as to what he'd found. □



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Darklands™

Heroic Adventures in Medieval Germany

Circle Reader Service Number 113

MULTIMEDIA PC

David English

KNOCK YOUR SOCKS OFF

If you think of CD-ROM software as boring, you're in for a big surprise. Two new CD-ROM packages explode the old prejudices and point the way to great things to come.

What makes these two CD-ROMs so different? Each was put together by an exceptionally talented group of artists, animators, and musicians—individuals who are clearly excited about the creative potential of this new medium. Their talent also shows through in their ability to mix animation, music, sound effects, and video into a unified whole. If you need proof that multimedia is

identical to their Mac cousins. (Did you ever wonder why Microsoft chose the Mac II's default resolution of 640 x 480 with 256 colors as *Windows with Multimedia's* default resolution?) They should also be two of the first CD-ROMs that make multimedia a must-have component of PC computing.

Verbum Interactive (Verbum, 670 Seventh Avenue, Second Floor, San Diego, California 92101; 619-233-9977; \$49.95) is basically a multimedia version of *Verbum* magazine, a flashy quarterly that explores the cutting edge of computer art and design. It comes on two CD-ROMs (that's right, a single 650-megabyte CD-ROM wasn't big enough) and includes a look at how major ad agencies

use multimedia (with some impressive samples), a hands-on guide that explains how to add special effects to type, a discussion by six industry leaders about the future of multimedia (with three full hours of recorded

music selections, with screen graphics, by Todd Rundgren, Graham Nash, Pauline Oliveros, and others. The music plays in stereo through your CD-ROM drive's audio-out.

If *Verbum Interactive* could be described as art school meets multimedia, then *Spaceship Warlock* (Reactor, 3110 North Sheffield, Chicago, Illinois 60657; 800-843-9497 for orders, 312-573-0800 for information; \$95) could be described as Marvel Comics meets NASA simulation. Created by Mike Saenz, a former artist and writer for Marvel Comics, and Joe Sparks, a former aerospace simulation artist for NASA/Ames Research, *Spaceship Warlock* is quite simply the best-looking and -sounding game I've ever played on a computer. The stunning 3-D animation and excellent original score make it the closest thing yet to an interactive movie. (It even feels like a film—black bands at the top and bottom of the screen make it look like a wide-screen movie.)

The transitions from static graphics to animation are smooth as silk, and the digitized music doesn't begin and end abruptly during the animated sequences (unlike almost every other PC game that uses real sounds). But best of all, everything looks great—including the green buglike aliens, the dark city streets with their video-propaganda machines, the Flash Gordon-like luxury spaceliner *Belshazzar*, and the sudden attack of the pirate spaceship *Warlock*.

Verbum Interactive and *Spaceship Warlock* show the real potential for CD-ROM and multimedia technology when creative artists are involved. In upcoming columns, I'll take a look at other knock-your-socks-off CD-ROMs that are currently being developed to run under *Windows with Multimedia*. □

Verbum Interactive includes more than three hours of recorded voice and video excerpts.



something to shout about, look no further than *Verbum Interactive* and *Spaceship Warlock*.

There is *one* catch. At the time of this writing, both are available only for the Macintosh. They were created with *MacroMind Director*, which currently has no equivalent on the PC. But with the recent release of *Windows with Multimedia* and MacroMind about to release a PC program similar to *Director*, you can expect to see comparable CD-ROMs for the PC. In fact, both *Verbum Interactive* and *Spaceship Warlock* are being ported over to *Windows with Multimedia*. They should be virtually

voice and video excerpts), and much, much more.

My favorite section is called Gallery, which includes 13 stunning examples of multimedia. "Living Photos" lets you tour an interactive exhibit of photographs by rock musician Graham Nash. The commentary and music—both by Nash—make this more than a simple slide show. "Street Poet Ray" features Marvel Comic's rap poet Ray, whose colorized face moves in sync with his spoken poetry. "Student Work" showcases the multimedia explorations of a group of students at the Art Center College of Design in Pasadena, California. And "Ver-

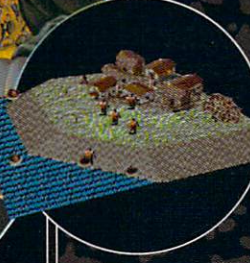
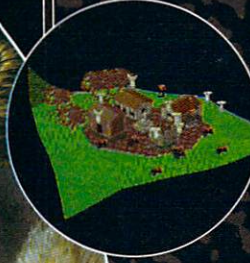
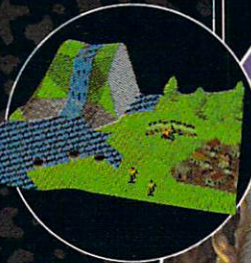
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ENTERTAINMENT

COMPUTE CHOICE. Step into tomorrow and command five helicopters in this simulation that's back from the past.

Peter Olafson

GUNSHIP 2000

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

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

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

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

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



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

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

Let's try the air over central

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

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

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

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

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

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

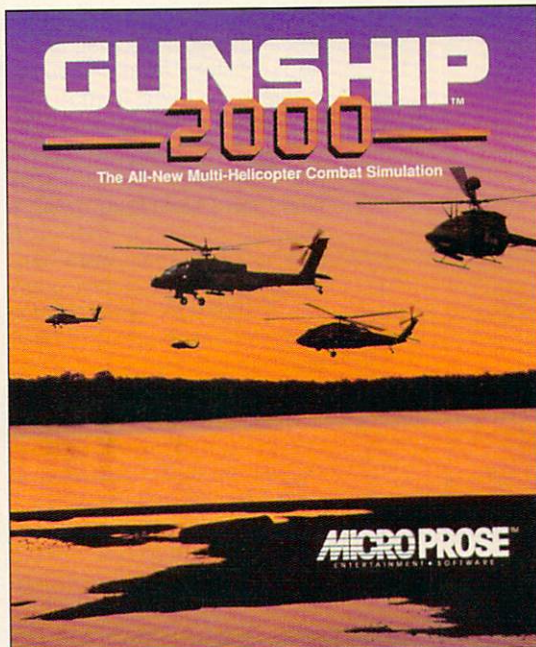
Indeed, there's not a part of *Gunship 2000* that doesn't make a mark. As you leaf through the briefing, you can hear the soft scrape of paper on paper. If you're still finding your way in the game, there's an option to have the computer take care of firing weapons and defensive countermea-

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

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

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

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



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

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

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

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

**MICROPROSE
180 Lakefront Dr.
Hunt Valley, MD
21030
(301) 771-1151**

GAMEPLAY

Orson Scott Card

STACKING STONE ON STONE

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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







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

Spring Training

By Peter Scisco

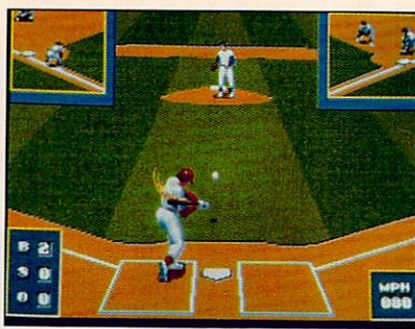
Finally, the Super Bowl is over. It's time to think green fields and diamonds in the sun. Think America's pastime. Never mind the snow and cold; think PC baseball games—and hold your own spring training season without leaving your home office.

Bo Knows Baseball

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

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

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



Bo Jackson Baseball from Data East

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

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

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

Weaver's Complete Makeover

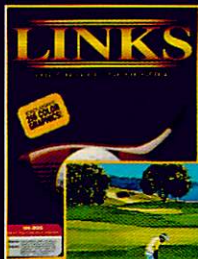
Earl Weaver Baseball II gets a complete graphic makeover in this latest version. The nondescript players in the earlier version are replaced by larger, digitized players. The split screen is gone, replaced by a view of the field that faithfully re-creates the view of major-league baseball as seen on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

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

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

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Akron, OH

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

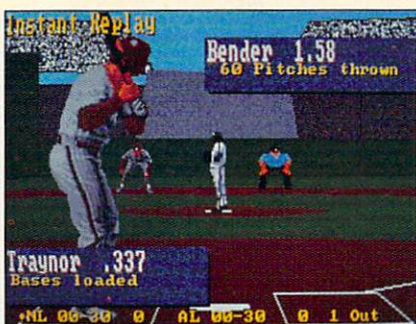
Other smaller improvements include better playing from the computer opponent, a bigger selection of pitches to choose from, and access to topnotch commissioner options. All of this means a brighter spring training for all PC baseball players.

Easy-to-Like *HardBall II*

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

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

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



Earl Weaver Baseball II from Electronic Arts

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

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

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

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

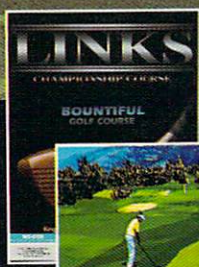
Maximum Challenge

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

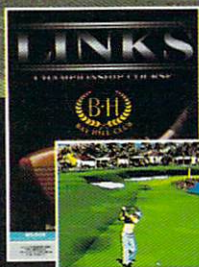
Here are some figures you'll uncover playing *The Manager's Challenge*: all the usual numbers on hits, RBIs, at bats, errors, and the like, plus ratings for stealing bases. Pitchers' performances are rated according to number of games completed, number of saved games, ERAs, walks surrendered, and number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

What makes *The Manager's Chal-*

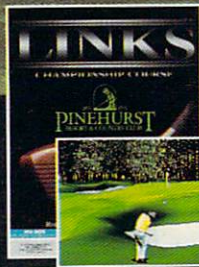
you'll think you're there.



Bountiful Golf Club
Bountiful, UT



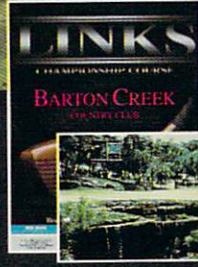
Bay Hill Club & Lodge
Orlando, FL



Pinehurst Country Club
Pinehurst, NC



Dorado Beach Resort
Puerto Rico



Barton Creek Country Club
Austin, TX

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

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

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

The A's Have It

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

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

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

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



HardBall II from Accolade



MicroLeague Baseball: The Manager's Challenge from MicroLeague Sports

NEW YORK				U.S.		LOS ANGELES					
PITCHER	LT	ERA	LV	PITCHER	LT	ERA	LV	PITCHER	LT	ERA	LV
FORD, WHITNEY	L	2.74	8	FOLKNER, SANDY	L	2.04	12				
LEITCHING, ORGER	LS	1.86	7	LEITCHING, ORGER	LS	1.86	7				
2B. LAZZERA, TONY	R	354	10	RF. KELLER, UMLIE	L	348	4				
OF. DIMAGGIO, JOE	R	381	11	LF. DAVIS, TOMMY	R	348	9				
1B. GEMRIG, LOU	L	370	12	2B. ROBINSON, JACKIE	R	342	7				
RF. RUTH, BABE	R	356	12	1B. HODGES, GE	R	304	11				
OH. FRANTLE, MICKEY	S	350	12	OF. ZINGER, DUKE	L	344	11				
C. HOUARIO, ELTON	R	343	10	OH. HARVEY, STEVE	R	312	8				
LF. ZOHNS, EARLE	L	324	10	C. CAMPANELLA, ROY	R	312	11				
SS. PIZZUTO, PHIL	R	324	8	SS. KEV, RON	R	281	8				
OB. POLTE, RED	L	323	9	SS. PREESE, PEE WEE	R	284	8				

Tony LaRussa's Ultimate Baseball from Strategic Simulations

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

Batter Up

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

TIPS, TOOLS, AND TACTICS

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

HardBall II

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

Earl Weaver Baseball II

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

The Manager's Challenge

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

THE ON-DECK CIRCLE

Bo Jackson Baseball—\$49.95

Data East
1850 Little Orchard St.
San Jose, CA 95125
(408) 286-7074

Earl Weaver Baseball II—\$49.95

Electronic Arts
1450 Fashion Island Blvd.
San Mateo, CA 94404
(415) 571-7171

MicroLeague Baseball:

The Manager's Challenge—\$39.95
MicroLeague Sports
2201 Drummond Plaza
Newark, DE 19711-5711
(800) 334-6572

HardBall II—\$49.95

Accolade
550 S. Winchester Blvd., Ste. 200
San Jose, CA 95128
(408) 985-1700

Tony LaRussa's Ultimate Baseball—\$49.95

Strategic Simulations
675 Almanor Ave., Ste. 201
Sunnyvale, CA 94086-2901
(800) 245-4525

64/128 VIEW

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

Tom Netsel

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

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

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

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

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

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

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

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

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

GAZETTE

64/128 VIEW G-1

The 64 and 128 are popular computers in Sweden, but new software is getting difficult to find.
By Tom Netsel.

COMMODORE CLIPS G-2

New products for the 64 and 128.

GETTING TECHNICAL WITH A 128 G-4

A graduate student in physics used his 128 and a little ingenuity to prepare his thesis.
By Shahin Shabanian.

REVIEWS G-10

Word Writer 6 and two GEOS programs:
geoStamp and *GEOS Font Editor*.

WORLD VIEW G-16

The 64/128 view from Sweden.
By Anders Reuterswärd.

MACHINE LANGUAGE G-18

BAGELS: a machine language game.
By Jim Butterfield.

GEOS G-20

Send your sweetheart a GEOS valentine.
By Steve Vander Ark.

D'IVERSIONS G-22

Imagine tiny computers inside the walls.
By Fred D'Ignazio.

BEGINNER BASIC G-23

Concluding a graphic lesson on RND.
By Larry Cotton.

PROGRAMMER'S PAGE G-24

Top tips from "Feedback." By Randy Thompson.

PROGRAMS

Balloon Crazy	G-25
Quizzer 128	G-28
Sammy Seal	G-33
RPG Codebuster	G-35

COMMODORE CLIPS

Tom Netsel

Gobs of Graphics

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

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

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

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

Tennis, Anyone?

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

In addition to great graphics, displays, and sounds, *Tie*

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

Practice in singles or doubles mode with human or computer opponents. With DigiTek's special joystick adapter, four players can participate in a doubles match at the same time.

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

The Doctor Is Out

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

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

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

32K EPROM

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

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

Gazette Gallery

See original computer artwork on the companion *Gazette Disk*. We pay \$50 for any picture selected and \$100 for the Picture of the Month. □

February's
Picture of the
Month in
"Gazette Gallery" is
Springtime by
Jack Modjallal of
Encino,
California.



Tax Time Again

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

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

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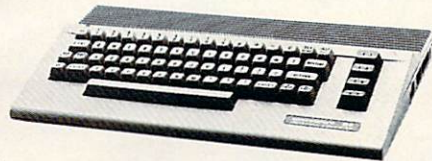


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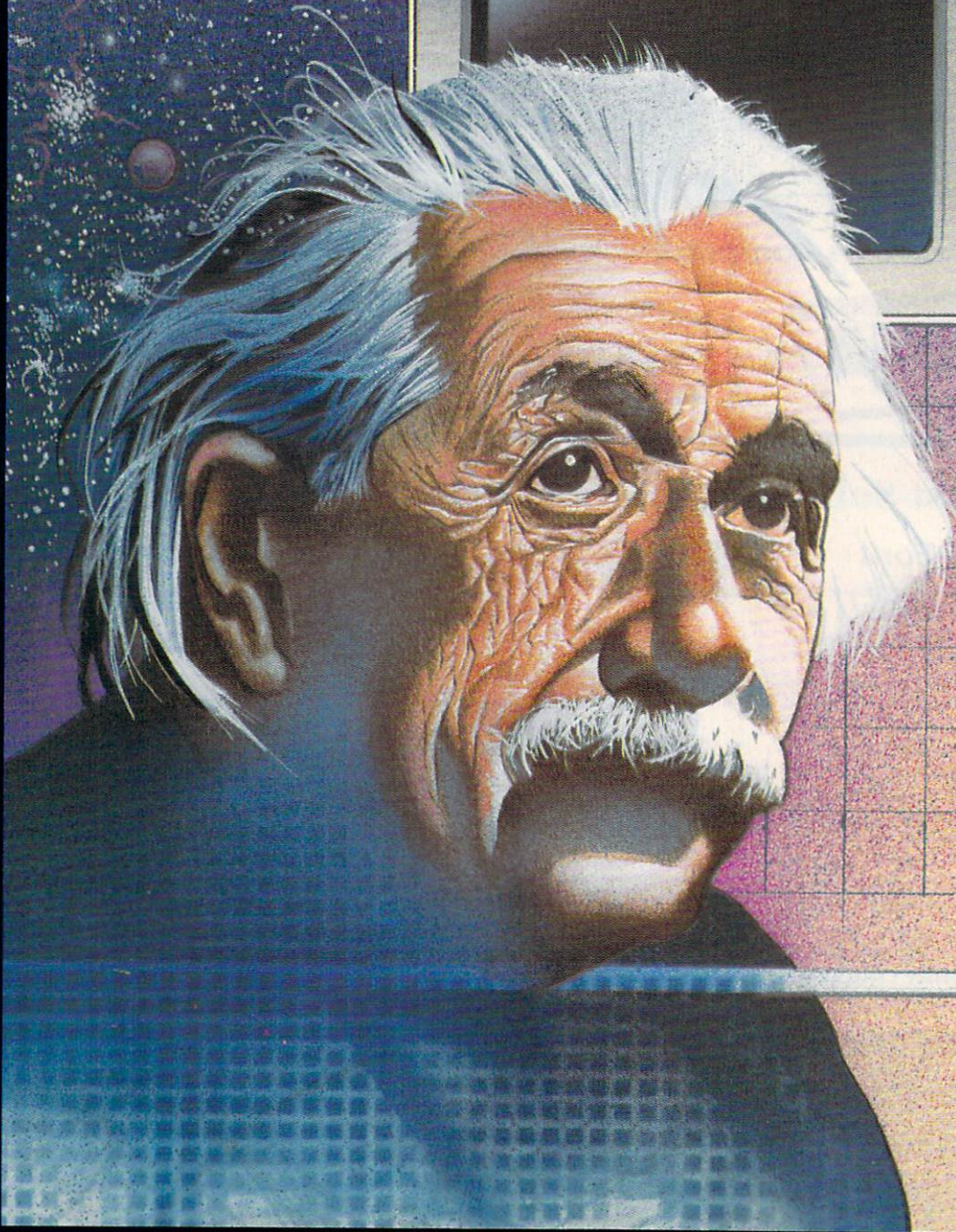
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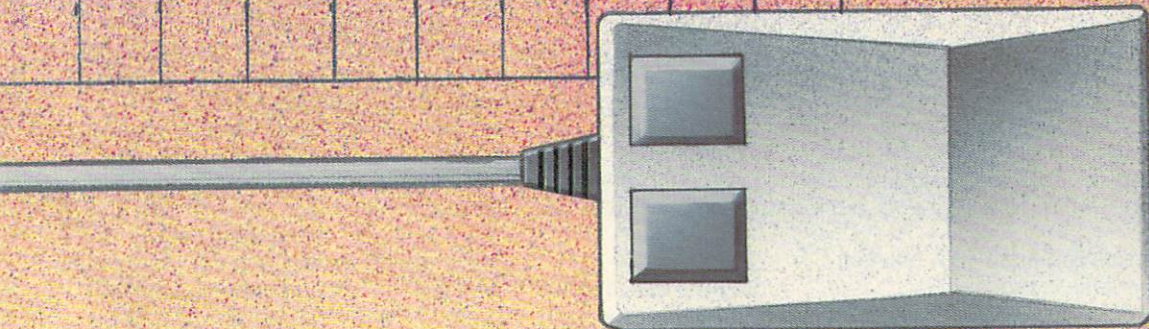
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dy

GETTING TECHNICAL WITH A 128

BY SHAHIN SHABANIAN



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

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

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

A Capable Combo

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

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

Create the Fonts

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

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

Figure 1

$$\int f(x)dx$$

[a]

$$\int f(x)dx$$

[b]

$$\int f(x)dx$$

[c]

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

[d]

Figure 2

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

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

A Solution

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

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

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

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

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

Essential Factors

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

Double Printing

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

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

The formatting and spacing of the formulas and accompanying text on

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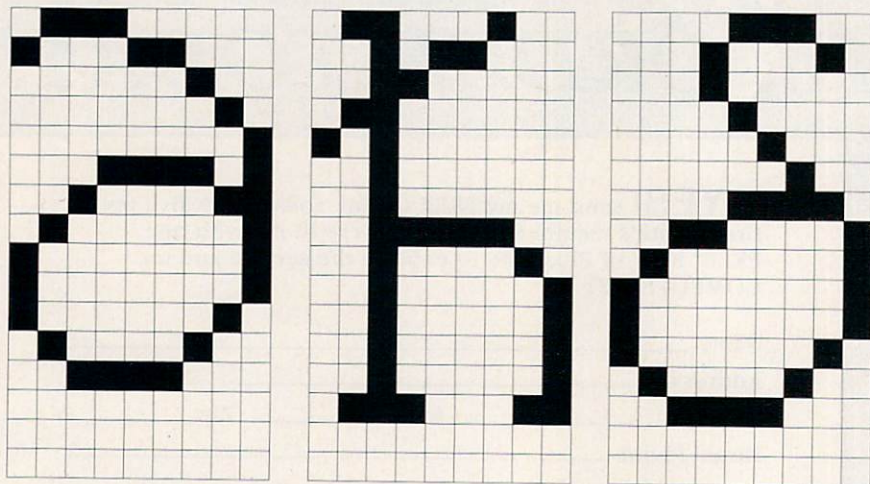
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Figure 3



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

were carefully chosen so there would be no disruption of either file.

These days, with the introduction of 24-pin printers, there is no need for such a procedure. The purpose of this article is to emphasize that a 128 can perform high-level tasks that are usually reserved for more powerful PCs. The only limitations are those of the software and the patience, expertise, and ingenuity of the operator.

Although I have an IBM in my lab and office at the university, most of the

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

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

SHARE THE KNOWLEDGE

A few months ago, while discussing a numerical solution to a physics problem with one of my students, this student informed me that he had solved the assigned problem using BASIC on his 128.

When I mentioned that I also own a 128 and had used it to write my thesis with all the necessary mathematical and physics equations and the associated fonts, he became interested in seeing my work. He said he hoped to utilize this less-publicized capability of a 128.

After I showed him a few pages of my thesis, the student suggested that I let other 128 owners who may be interested in technical publishing know what an 8-bit Commodore can do. His suggestion prompted me to write this article.

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was just forgetting things.



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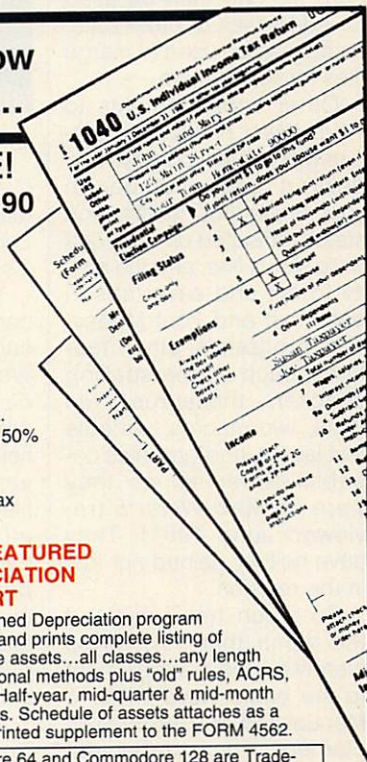
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WORD WRITER 6

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

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

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

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

The Cardfile Builder is sim-

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

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

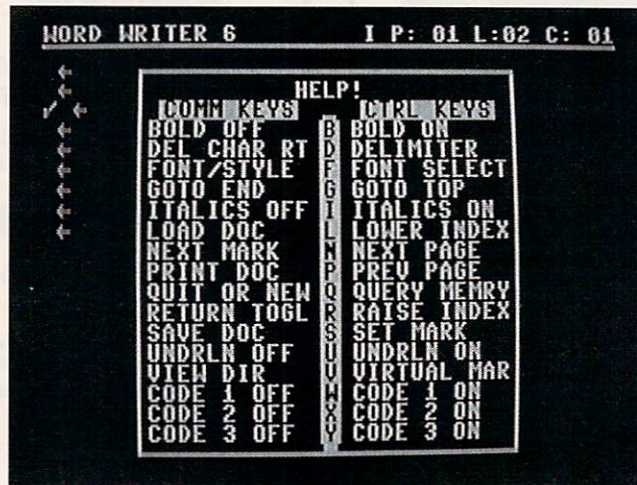
There are limitations. Your letter can be no more than four pages long. Apparently, no *WW6* document can be longer than that—a fact not

tings can be changed within the Printer Codes window and used with a particular document, or they can be saved as the new default settings. They are extremely easy to set, save, and use. There were some faults with *Word Writer 5*, however, that *Word Writer 6* retains. You can only skip lines by inserting carriage returns, and you can't string formatting commands together on a single line. When using graphics, you're limited to one per line, and you can't place text on both sides of a graphic.

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

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

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



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

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

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

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

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

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

The program starts with six default settings. These set-

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

ROBIN MINNICK

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

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

How would you like to have up to 49 fonts available

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

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

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

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

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

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

Version 2.5 of this excellent program is part of

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

ROBERT NELLIST

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GEOSTAMP

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

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

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

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

I immediately saw that these features would be

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STEVE VANDER ARK

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WORLD VIEW

Anders Reuterswård

VIEW FROM SWEDEN

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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MACHINE LANGUAGE

Jim Butterfield

BAGELS: A MACHINE LANGUAGE GAME

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

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

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

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

MATCH = EXACT+1

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

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

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

MID BNE TOP

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

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

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

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

**CMP #\$47
BCS INLOOP**

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

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

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

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

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

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

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

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

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INX
CPX #4
BNE SCANGS

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

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

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

LDA #S0D

JSR \$FFD2
CPY #4
BNE MID
RTS

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

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

Here's the BASIC driver for program BAGELS.

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

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

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

TYPING AIDS

MLX, our machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each *Gazette Disk* and are printed in all issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write to us, and we'll send you free copies of both of these handy programs. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope.

Write to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

CREATE THE VERY BEST

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

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

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

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

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

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

to get the placement right.

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

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

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

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

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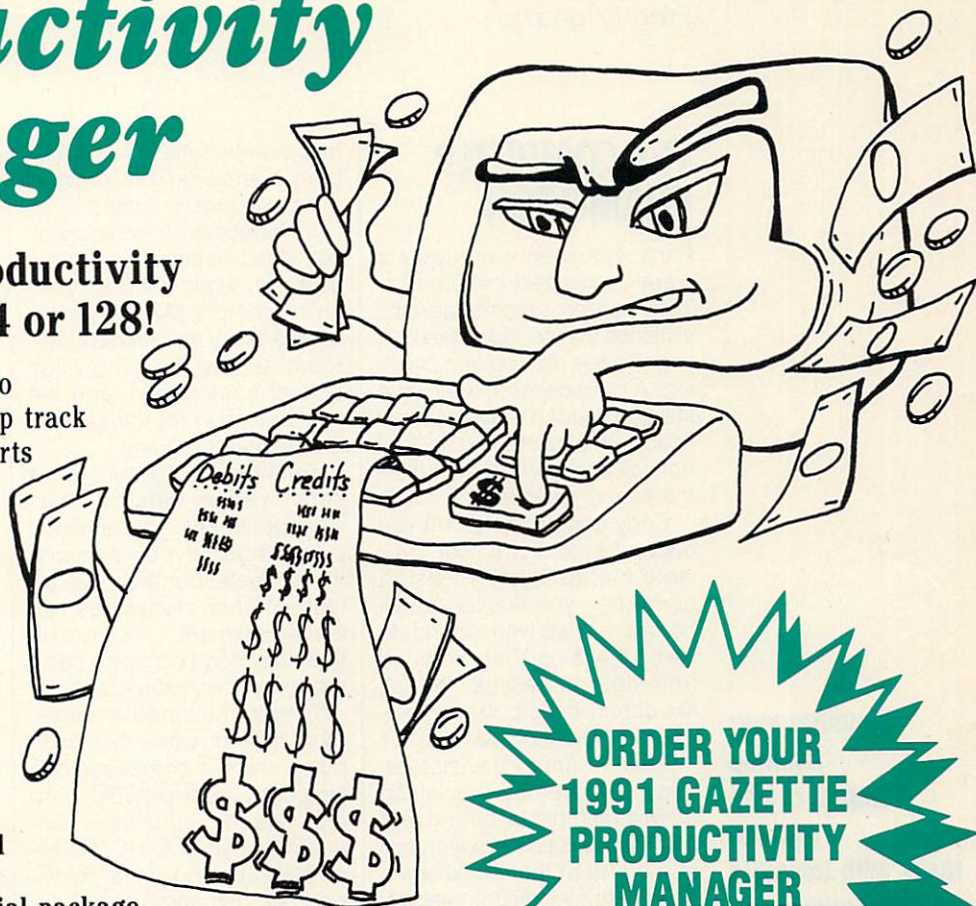
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D'IVERSIONS

Fred D'Ignazio

THE COMPUTER CHAMELEON

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BEGINNER BASIC

Larry Cotton

FINISHING UP RND

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The GOTO190 is necessary to begin a new pattern.

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

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

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

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

PROGRAMMER'S PAGE

Randy Thompson

"FEEDBACK" FLASHBACKS

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

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

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

Short Format Recovery

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

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

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

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

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

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

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

Noisy Random Numbers

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

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

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

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

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

Undocumented 128 Command

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

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

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

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

PROGRAMS

BALLOON CRAZY

Ligia Latino

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

Getting Started

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

Starting address: 0801

Ending address: 1998

Playing the Game

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

Scoring

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

Tips

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

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

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

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

BALLOON CRAZY

```

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

```

```

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

```

PROGRAMS

0B51:2C 34 0B 10 10 BD 70 40 85
 0B59:30 0B E0 07 F0 07 BD 80 76
 0B61:42 C9 04 30 2B BD 50 40 BF
 0B69:F0 26 DE 60 4B D0 21 9D 88
 0B71:60 40 DE 58 40 F0 06 FE F9
 0B79:F8 07 4C 91 0B BD 78 40 F0
 0B81:F0 0B DE 78 40 D0 06 20 A7
 0B89:6B 16 4C 91 0B 20 7D 16 67
 0B91:CA 10 B5 2C 34 0B 30 43 FB
 0B99:A2 07 AD 15 D0 3D 90 16 7C
 0BA1:F0 33 BD 10 40 18 7D 20 33
 0BA9:40 9D 10 40 BD 00 40 7D 39
 0BB1:28 40 9D 00 40 C9 AE 90 B6
 0BB9:06 20 6B 16 4C D6 0B BD 3B
 0BC1:18 40 18 7D 30 40 9D 18 A4
 0BC9:40 BD 08 40 7D 38 40 9D 5F
 0BD1:08 40 20 4B 16 CA 10 C2 73
 0BD9:20 C8 0C A9 80 8D E4 0B 5D
 0BE1:4C E9 18 00 A2 06 AD 15 39
 0BE9:D0 3D 90 16 F0 09 BD 80 D2
 0BF1:42 29 04 C9 04 F0 03 CA 45
 0BF9:10 EC 60 A9 00 2C A9 04 02
 0C01:8D 20 0C 8C 17 0C A2 06 66
 0C09:AD 15 D0 3D 90 16 F0 12 FB
 0C11:BD 88 42 29 7F C9 00 D0 F8
 0C19:09 BD 80 42 29 04 C9 00 46
 0C21:F0 03 CA 10 E3 60 AE 22 EC
 0C29:0F BD 7F 41 4A 4A A8 60 69
 0C31:18 6D 00 17 8D 00 17 90 4D
 0C39:03 EE 01 17 A9 80 8D 43 CD
 0C41:0C 6E 00 A2 07 20 6B 16 47
 0C49:CA 10 FA 60 A2 0A A0 08 B6
 0C51:18 8E 65 0C 20 F0 FF AE F9
 0C59:65 0C BD 69 0C BC 6C 0C AD
 0C61:20 1E AB A2 00 E8 E0 0D 23
 0C69:30 E4 AD 00 DC 29 10 D0 05
 0C71:F9 60 79 93 AC 0C 0C 0C 00
 0C79:05 20 20 20 20 20 20 20 C4
 0C81:47 41 4D 45 20 4F 56 45 BB
 0C89:52 20 20 20 20 20 20 20 BA
 0C91:20 00 20 20 20 20 20 20 A1
 0C99:20 20 20 20 20 20 20 20 B1
 0CA1:20 20 20 20 20 20 20 20 B9
 0CA9:20 20 00 50 52 45 53 53 80
 0CB1:20 46 49 52 45 20 54 4F 5C
 0CB9:20 50 4C 41 59 20 41 47 A8
 0CC1:41 49 4E 00 4C C1 0D A2 BC
 0CC9:06 AD 15 D0 3D 90 16 F0 49
 0CD1:F3 BD 70 40 D0 EE BD 88 AB
 0CD9:42 0A 0A 8E E4 0C AA 20 8C
 0CE1:C8 0D A2 00 BD 00 40 18 7C
 0CE9:69 02 4A 4A 38 E9 03 B0 45
 0CF1:02 A9 00 8D 16 0D BD 00 AE
 0CF9:40 18 69 0A 4A 4A 38 E9 DB
 0D01:03 C9 28 30 02 A9 27 8D A9
 0D09:35 0D 8E C0 0D A9 80 8D 7C
 0D11:D6 0D A2 03 A0 00 4C 34 30
 0D19:0D B1 FD C9 D9 90 13 C9 83
 0D21:DD 90 3A C9 F9 F0 08 C9 9F
 0D29:E0 90 07 C9 E5 B0 03 0E 5B
 0D31:D6 0D C8 C0 00 30 E2 F0 96
 0D39:E0 A5 FD 18 69 28 85 FD 63
 0D41:90 02 E6 FE CA 00 CD 2C 52
 0D49:D6 0D 30 72 AE C0 0D BD 8F
 0D51:80 42 C9 04 B0 68 A9 04 34
 0D59:85 A3 4C B4 0D AE C0 0D A5
 0D61:BD 80 42 C9 04 B0 11 A9 0E
 0D69:80 9D 68 40 A9 32 20 31 C3
 0D71:0C A9 02 85 A3 4C C1 0D 73
 0D79:BD 88 42 30 2D CC 35 0D F3

0D81:F0 2D A9 03 9D 28 40 A9 7C
 0D89:00 9D 20 40 BD 88 42 10 B7
 0D91:03 20 7D 0E A9 80 9D 70 C0
 0D99:40 A9 64 20 31 0C A9 03 DC
 0DA1:85 A3 A9 FF 8D 33 0B 4C 38
 0DA9:C1 0D CC 16 0D D0 D3 A9 DF
 0DB1:05 85 A3 A9 80 8D D7 0D B5
 0DB9:8D 34 0B 4C C4 0D A2 00 6D
 0DC1:CA 10 01 60 4C CA 0C BD CE
 0DC9:F0 EC 85 FD BD 2E 18 17
 0DD1:69 04 85 FE 60 00 00 A9 EE
 0DD9:93 20 D2 FF A0 10 A2 0C B6
 0DE1:20 20 F0 FF A9 FF A0 0D C9
 0DE9:20 1E AB AD 08 0E 18 69 FD
 0DF1:31 20 D2 FF A2 F0 20 64 84
 0DF9:0A A9 93 4C D2 FF 05 4C A7
 0E01:45 56 45 4C 20 23 00 00 50
 0E09:8C 6B 0E 48 8A F0 04 98 45
 0E11:09 80 A8 68 8C 59 0E 20 73
 0E19:83 17 B0 4D 9D 80 42 48 63
 0E21:98 9D 88 42 68 A8 B9 6D EC
 0E29:0E 9D 20 40 B9 75 0E 9D 19
 0E31:28 40 A9 00 9D 30 40 9D 72
 0E39:38 40 A9 00 9D 00 40 9D C1
 0E41:10 40 AD 59 0E 10 0D 20 AB
 0E49:7D 0E A9 AD 9D 00 40 98 BD
 0E51:18 69 08 A8 20 FE 15 A9 30
 0E59:00 0A 0A 0A 0A 0A 69 36 5B
 0E61:9D 08 40 20 4B 16 20 63 AE
 0E69:16 A0 00 60 40 50 60 80 43
 0E71:18 30 50 00 00 00 00 00 AF
 0E79:00 00 00 01 BD 20 40 49 DD
 0E81:FF 18 69 01 9D 20 40 BD 8C
 0E89:28 40 49 FF 6D 00 9D 28 A1
 0E91:40 60 AE 22 0F CA CA 4C 63
 0E99:A0 0E CA 20 C8 0E E8 E8 1E
 0EA1:EC 22 0F 90 F5 CA 20 02 C4
 0EA9:0F A8 B9 C4 0E 48 BD 80 88
 0EB1:40 48 BD 80 41 AA 20 18 CC
 0EB9:18 68 A8 68 91 26 A9 0B 1B
 0EC1:91 28 60 DC DB DA D9 20 A8
 0EC9:02 0F 0A 0A 8D D6 0E E8 59
 0ED1:20 02 0F CA 69 00 A8 B9 63
 0ED9:F2 0E 48 BD 80 40 48 8E F6
 0EE1:F0 0E BD 80 41 AA 20 18 CB
 0EE9:18 68 A8 68 91 26 A2 00 32
 0EF1:60 F9 00 E1 E0 00 F9 E3 B9
 0EF9:E2 E2 0E E4 00 E3 E1 00 FD
 0F01:E4 BD 80 40 38 FD 7F 40 0E
 0F09:18 69 01 A8 B9 23 0F 48 F8
 0F11:BD 80 41 38 FD 7F 41 18 62
 0F19:69 01 A8 68 18 79 26 0F C9
 0F21:60 03 02 00 03 00 00 01 89
 0F29:A2 00 A0 00 A9 05 20 2F 7D
 0F31:17 18 69 0A 8E 65 0F A2 79
 0F39:08 9D 8C 18 CA 10 FA AE 11
 0F41:65 0F 8C 66 0F 8A A2 01 B6
 0F49:20 93 17 AE 65 0F AC 66 51
 0F51:0F 98 18 69 04 A8 C0 27 22
 0F59:30 D2 8A 18 69 04 AA E0 A8
 0F61:14 30 C7 60 00 8D 93 43
 0F69:0F 8E 92 0F A0 00 8C 94 A8
 0F71:0F AE 92 0F AC 94 0F AD 89
 0F79:93 0F 20 2F 17 48 38 6D D3
 0F81:94 0F 8D 94 0F 68 20 95 98
 0F89:0F AD 94 0F C9 28 30 E1 4F
 0F91:60 00 00 00 C9 00 F0 27 37
 0F99:20 18 18 8C 12 18 18 6D 28
 0FA1:12 18 8D 13 18 C0 00 F0 66
 0FA9:03 A9 DF 2C A9 DE C0 28 E4

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

11E1:74 AA AA A8 2A AA AA 2A 44	1411:00 00 A8 00 00 A8 00 00 F0	1641:16 90 03 1D 90 16 99 00 DE
11E9:AA AA 0A AA A8 2A AA A0 DB	1419:A8 00 00 AA A5 50 AA A5 A9	1649:D0 60 8A 0A A8 BD 10 40 84
11F1:A8 AA A8 80 82 A8 A0 A0 C8	1421:44 AA A5 41 AA A5 44 2A 7D	1651:0A BD 00 40 2A 99 00 D0 7E
11F9:A0 A0 A0 A0 00 00 AA 80 88	1429:A5 50 00 00 00 00 00 00 38	1659:BD 08 40 99 01 D0 A0 10 A4
1201:02 AA A8 0A AA A8 2A AB 7E	1431:00 00 00 00 00 00 00 00 59	1661:D0 D9 AD 15 D0 1D 90 16 A5
1209:EA 2A AF 7A AA AF 7A AA 7E	1439:00 00 00 00 00 00 00 00 61	1669:D0 06 AD 15 D0 3D 98 16 49
1211:AB EA AA AA AA AA AA AA C5	1441:2A A5 41 AA A5 50 AA A5 24	1671:8D 15 D0 A9 00 9D 68 40 E5
1219:AA AA A8 AA 9D DC AA B7 6A	1449:44 AA A5 40 AA A5 41 A8 0E	1679:9D 70 40 60 BD 40 40 9D AB
1221:74 AA AA A8 2A AA AA 2A 85	1451:00 00 A8 00 00 A8 00 00 31	1681:F8 07 BD 50 40 9D 60 40 22
1229:AA AA 0A AA A8 2A AA A0 1D	1459:A8 00 00 AA A5 41 AA A5 AD	1689:BD 48 40 9D 58 40 60 01 0E
1231:22 AA A8 2A 0A 8A 2A 82 1A	1461:40 AA A5 44 AA A5 50 2A 04	1691:02 04 08 10 20 40 80 FE C3
1239:8A 02 82 80 00 00 AA 80 51	1469:A5 41 00 00 00 00 00 00 B4	1699:FD FB F7 EF DF BF 7F A0 5F
1241:02 AA A8 0A AA A8 2A AB BE	1471:00 00 00 00 00 00 00 00 99	16A1:05 20 FA 16 A9 03 A0 17 CA
1249:EA 2A AF 7A AA AF 7A AA BE	1479:00 00 00 00 00 00 00 00 A1	16A9:20 1E AB A0 0B 20 FA 16 D1
1251:AB EA AA AA AA AA AA AA 06	1481:01 5A A8 11 5A AA 01 5A C0	16B1:AD 02 17 20 F4 16 AD 00 75
1259:AA AA A8 AA 9D DC AA B7 AA	1489:AA 45 5A AA 11 5A AA 00 95	16B9:17 AC 01 17 85 63 84 62 53
1261:74 AA AA A8 2A AA AA 2A C5	1491:00 2A 00 00 2A 00 00 2A BF	16C1:A2 90 38 20 49 BC 20 DD C7
1269:AA AA 0A AA A8 0A AA A0 DC	1499:00 00 2A 11 5A AA 45 5A 7A	16C9:BD A2 FF E8 BD 02 01 D0 D4
1271:0A AA A8 0A 08 28 0A 0A F9	14A1:AA 01 5A AA 11 5A AA 01 9D	16D1:FA F0 11 A9 30 8D 00 01 2D
1279:0A 0A 0A 0A 00 02 AA 00 64	14A9:5A A8 00 00 00 00 00 00 29	16D9:A0 05 B9 00 01 99 01 01 40
1281:2A AA 80 2A AA A0 AB EA 32	14B1:00 00 00 00 00 00 00 00 D9	16E1:88 10 F7 E8 E0 04 D0 EB 88
1289:A8 AD FA A8 AD FA AA AB B1	14B9:00 00 00 00 00 00 00 00 E1	16E9:A0 1E 20 FA 16 A9 01 A8 A3
1291:EA AA AA AA AA AA AA AA D5	14C1:11 5A A8 41 5A AA 05 5A 14	16F1:4C 1E AB 18 69 30 4C 16 7D
1299:2A AA AA 37 76 AA 1D DE BD	14C9:AA 11 5A AA 01 5A AA 00 48	16F9:E7 A2 17 18 4C F0 FF 00 4D
12A1:AA 2A AA AA AA AA AA AA A1	14D1:00 2A 00 00 2A 00 00 2A FF	1701:00 00 05 4C 49 56 45 53 16
12A9:AA A8 2A AA A0 0A AA A0 60	14D9:00 00 2A 01 5A AA 11 5A 51	1709:3A 1D 1D 1D 1D 1D 1D 1D C5
12B1:0A A8 A8 0A 08 08 28 28 93	14E1:AA 05 5A AA 41 5A AA 11 70	1711:1D 1D 1D 1D 1D 1D 53 43 D1
12B9:28 28 28 00 02 AA 00 E0	14E9:5A A8 00 00 00 00 00 00 69	1719:4F 52 45 3A 00 AD 00 DC 63
12C1:2A AA 80 2A AA A0 AB EA 72	14F1:00 00 00 00 00 00 00 00 1A	1721:0A 0A 0A 0A A0 04 0A 90 72
12C9:A8 AD FA A8 AD FA AA AB F1	14F9:00 00 00 00 00 00 00 00 22	1729:03 88 D0 FA 98 60 8D 5A 80
12D1:EA AA AA AA AA AA AA AA 16	1501:05 5A A8 11 5A AA 41 5A C4	1731:17 A9 81 8D 0F D4 8D 12 57
12D9:2A AA AA 37 76 AA 1D DE FD	1509:AA 11 5A AA 05 5A AA 00 A9	1739:D4 A9 FF 8D 59 17 AD 5A F1
12E1:AA 2A AA AA AA AA A8 AA E1	1511:00 2A 00 00 2A 00 00 2A 41	1741:17 D0 04 60 4E 59 17 0A C5
12E9:AA A8 2A AA A0 0A AA A8 A8	1519:00 00 2A 05 5A AA 11 5A D2	1749:90 FA AD 1B D4 2D 59 17 0B
12F1:2A AA 2A 2A 82 02 0A 0A F7	1521:AA 41 5A AA 11 5A AA 05 33	1751:CD 5A 17 F0 02 B0 F3 60 0A
12F9:0A 0A 0A 0A 00 02 AA 00 E4	1529:5A A8 00 00 00 00 00 00 AA	1759:00 00 20 81 FF A2 18 BD 1C
1301:2A AA 80 2A AA A0 AB EA B3	1531:00 00 00 00 00 00 00 00 5B	1761:6A 17 9D 16 D0 CA 10 F7 69
1309:A8 AD FA A8 AD FA AA AB 33	1539:00 00 00 00 00 00 00 00 63	1769:60 D8 00 1F 79 F0 00 FF 7F
1311:EA AA AA AA AA AA AA AA 57	1541:41 5A A8 05 5A AA 11 5A 02	1771:00 00 00 01 00 0A 01 00 D9
1319:2A AA AA 37 76 AA 1D DE 3F	1549:AA 01 5A AA 41 5A AA 00 C7	1779:01 00 01 02 03 04 05 06 A0
1321:AA 2A AA AA AA AA A8 AA 23	1551:00 2A 00 00 2A 00 00 2A 81	1781:07 08 48 A2 00 AD 15 D0 1A
1329:AA A8 2A AA A0 0A AA A8 E9	1559:00 00 2A 41 5A AA 01 5A B6	1789:4A 90 05 E8 E0 07 90 F8 6D
1331:2A AA 88 A2 A0 A8 A2 82 C1	1561:AA 11 5A AA 05 5A AA 41 43	1791:68 60 48 A9 80 4C 9C 17 35
1339:A8 02 82 80 00 02 AA 00 E9	1569:5A A8 00 00 00 00 00 00 EA	1799:48 A9 00 8D 17 18 68 8D A6
1341:2A AA 80 2A AA A0 AB EA F3	1571:00 00 00 00 00 00 00 00 9B	17A1:14 18 18 7D 97 18 8D 15 08
1349:A8 AD FA A8 AD FA AA AB 73	1579:00 00 00 00 00 00 22 00 E7	17A9:18 98 8D 12 18 18 7D 95 8E
1351:EA AA AA AA AA AA AA AA 97	1581:00 08 00 00 82 20 80 00 52	17B1:18 8D 13 18 BD 99 18 8D 45
1359:2A AA AA 37 76 AA 1D DE 7F	1589:00 02 20 00 20 88 02 08 6C	17B9:ED 17 BD 9B 18 8D EE 17 02
1361:AA 2A AA AA AA AA A8 AA 63	1591:00 20 22 08 82 00 00 08 A4	17C1:BD 9D 18 8D E7 17 BD 9F C8
1369:AA A8 2A AA A0 0A AA A0 22	1599:22 22 20 00 00 08 22 08 CD	17C9:18 8D E8 17 A9 00 85 FC 4B
1371:2A AA A0 28 20 A0 A0 A0 53	15A1:82 00 82 00 08 00 08 02 AF	17D1:AE 14 18 AC 12 18 E0 19 F5
1379:A0 A0 A0 A0 00 00 00 00 36	15A9:08 00 00 00 80 00 22 00 20	17D9:BD 28 C0 28 B0 24 20 18 73
1381:2A A5 40 AA A5 44 AA A5 12	15B1:00 00 00 00 00 00 00 00 DB	17E1:18 86 FB A6 FC BD FF FF 86
1389:40 AA A5 51 AA A5 44 A8 61	15B9:00 00 00 00 00 00 08 00 F3	17E9:8D 16 18 BD FF FF A6 FB 8C
1391:00 00 A8 00 00 A8 00 00 6F	15C1:02 8A 00 00 88 80 0A 22 0C	17F1:C9 00 F0 0E 2C 17 18 30 22
1399:A8 00 00 AA A5 44 AA A5 F7	15C9:28 20 8A 08 22 88 A2 0A 64	17F9:02 A9 20 91 26 AD 16 18 DC
13A1:51 AA A5 40 AA A5 44 2A 72	15D1:20 8A 0A A2 28 82 20 82 FA	1801:91 28 E6 FC C8 CC 13 18 68
13A9:A5 40 00 00 00 00 00 00 B2	15D9:0A 8A 0A A2 20 A0 20 A8 83	1809:D0 CC E8 EC 15 18 D0 C3 2F
13B1:00 00 00 00 00 00 00 00 D7	15E1:8A 88 22 22 22 8A 20 22 77	1811:60 00 00 00 00 00 00 48 B9
13B9:00 00 00 00 00 00 00 00 DF	15E9:00 A8 08 A2 20 0A 22 80 57	1819:BD F0 EC 85 26 85 28 BD AF
13C1:2A A5 44 AA A5 41 AA A5 C6	15F1:00 28 00 00 00 00 00 26	1821:DE 18 18 69 04 85 27 69 F5
13C9:50 AA A5 44 AA A5 40 A8 D0	15F9:00 00 00 00 00 B9 A1 18 66	1829:D4 85 29 68 60 00 00 00 D3
13D1:00 00 A8 00 00 A8 00 00 AF	1601:9D 40 40 B9 B3 18 9D 48 31	1831:00 00 00 00 01 01 01 01 70
13D9:A8 00 00 AA A5 40 AA A5 28	1609:40 B9 C5 18 9D 50 40 20 CC	1839:01 01 02 02 02 02 02 02 A8
13E1:44 AA A5 50 AA A5 41 2A 27	1611:7D 16 B9 D7 18 29 01 9D 3B	1841:02 03 03 03 03 03 00 00 E7
13E9:A5 44 00 00 00 00 00 00 F3	1619:78 40 B9 D7 18 4A 48 4A 0B	1849:00 00 F9 FB FF FD FA D7 3E
13F1:00 00 00 00 00 00 00 00 18	1621:48 4A 48 A4 F0 03 9D 27 A7	1851:D5 FE FC F6 F5 E5 F7 68 6B
13F9:00 00 00 00 00 00 00 00 20	1629:D0 68 20 39 16 68 20 36 38	1859:D6 D8 F2 F3 F3 F0 FF EF 1C
1401:2A A5 50 AA A5 44 AA A5 95	1631:16 68 A0 1C 2C A0 1D 2C A2	1861:EE ED EF 00 08 08 08 08 FA
1409:41 AA A5 44 AA A5 50 A8 AA	1639:A0 17 4A B9 00 D0 3D 98 B6	1869:08 0A 0E 0E 0A 08 0A 0A 51

PROGRAMS

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

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QUIZZER 128

Bruce M. Bowden

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

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

Setting Up

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

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

Prepare a Quiz

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

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

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

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

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

Renumbering

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

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

Save the Quiz

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

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

Taking a Quiz

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

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

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

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

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

QUIZZER 128 40-Column Version

```
GD 10 REM COPYRIGHT 1991 - COMPUTE PUBLICATIONS INTL LTD - ALL RIGHTS RESERVED
MM 20 POKE53280,0:POKE53281,0:PRINT"{}":GOTO410
QD 30 GOTO 1390:REM THIS IS A {SPACE}RETURN FROM THE LINE ADDITION
FF 40 REM -----
XD 50 REM IMPORTANT ADDRESSES:
KX 60 GOTO 1370:REM THIS LINE {SPACE}CONTAINS A QUOTED GOTO WHICH SHOULD ADDRESS THE SECOND LINE OF THE PROGRAM
QP 70 GOTO1440:REM LOCATION OF NUMBER OF ENTRIES
KA 80 REM -----
DX 90 REM SAVE ROUTINE...
AC 100 BS(2)="QUIZZER40":BS(1)=BS(2)+".BK":PRINTCHR$(14):FORX=1TO2:PRINTPRINT"SCRATCHING ";BS(X):SCRATCH(BS(X)):CATALOG(BS(2)+"*")
AA 110 PRINT"SAVING ";BS(X):DSAVE(BS(X)+CHR$(160)+CHR$(172)+CHR$(184)+CHR$(186))
CD 120 CATALOG(BS(2)+"*"):NEXT:END
AH 130 REM -----
GX 140 REM 40-COLUMN MESSAGE C ENTERING ROUTINES
```

```
DP 150 IFLEN(M$)>39 THEN BEGIN
PJ 160 YX=INT(LEN(M$)/2)
PJ 170 IF MID$(M$,YX,1)=CHR$(32) THEN XX$=LEFT$(M$,YX):YY$=MID$(M$,YX):GOTO190
QB 180 YX=YX+1:GOTO170
MA 190 BEND
CH 200 IF LEN(M$)<40 THEN YX=INT((40-LEN(M$))/2):FOR {SPACE}XW=1 TO YX:M$="{SPACE}" +M$:NEXT:PRINT"{CYN}";M$:RETURN
PD 210 YX=INT((40-LEN(XX$))/2):FOR XW=1 TO YX:XX$="{XW}"+XX$:NEXT:PRINT"{CYN}";XX$
GR 220 YX=INT((40-LEN(YY$))/2):FOR XW=1 TO YX:YY$="{XW}"+YY$:NEXT:PRINT"{CYN}";YY$:PRINT:RETURN
RR 230 REM -----
FX 240 YX=(40-LEN(M$))/2:FOR XW=1 TO YX:M$="{XW}"+M$:NEXT
MB 250 IF LEN(M$)<>40 THEN M$=M$+" ":GOTO250
BE 260 PRINT CHR$(149)+CHR$(18)+M$:RETURN
RS 270 REM -----
DK 280 REM MESSAGE INPUT ROUTINE
PG 290 X$="":PRINT CHR$(15)+CHR$(28)+"<" +CHR$(143)+CHR$(157)+CHR$(149);
PA 300 GETKEY Y$
XM 310 IFY$<>CHR$(13)THENBEGIN
FD 320 IFY$=CHR$(20)THEN PRINT CHR$(29);Y$;Y$;CHR$(15);CHR$(28);"<";CHR$(143);CHR$(157);CHR$(149);:X$=LEFT$(X$,LEN(X$)-1):GOTO300
HM 330 IFY$=CHR$(34)THEN PRINT Y$;CHR$(27);CHR$(27);CHR$(15);CHR$(28);"<";CHR$(143);CHR$(157);CHR$(149);:Y$=CHR$(190):GOTO350
KR 340 PRINTY$;CHR$(15);CHR$(28);"<";CHR$(143);CHR$(157);CHR$(149);
QR 350 X$=X$+Y$:GOTO300
AM 360 BEND
PR 370 PRINT"... "
HS 380 RETURN
DG 390 REM -----
BB 400 REM CHOICE OF SELF-EXAMINATION OR ENTRY OF NEW QUESTIONS
EX 410 RESTORE 1440:READ NE:REM READING THE NUMBER OF ENTRIES
JD 420 DIM T(200),N(200),Q$(200),A$(200),R(200),C$(200),5),W$(200),V$(200),W(200),QQ$(200,3)
```

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

PROGRAMS

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

```

QUIZZER 128

80-Column Version

```

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

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PROGRAMS

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

```

```

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

```

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

SAMMY SEAL

Arthur Moore

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

Typing It In

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

Starting address: 0801
Ending address: 1458

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

Balancing Act

Sammy balances on his nose a block

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

On the Nose

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

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

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

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

How Blocks Move

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

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

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

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

Goal Blocks

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

Scoring

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

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

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

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

PROGRAMS

SAMMY SEAL

0801:0C	08	C7	07	9E	32	30	36	D6	0A21:D4	AD	60	14	C9	19	F0	0C	F8	0C51:EE	62	14	20	53	0E	20	86	97
0809:33	3A	00	00	00	00	20	F0	72	0A29:CE	60	14	AD	60	14	8D	01	89	0C59:0D	A9	0A	20	1C	0D	4C	3E	91
0811:10	20	99	0E	A2	08	A0	09	C4	0A31:D4	4C	3A	0A	A9	80	8D	04	19	0C61:0C	A5	F8	F0	09	C6	F8	A9	16
0819:18	20	F0	FF	A0	10	A9	56	4A	0A39:D4	A0	01	B1	FB	C9	20	D0	33	0C69:3C	85	F7	4C	3E	0C	A9	10	4A
0821:20	1E	AB	A9	C0	8D	01	D0	E7	0A41:13	20	2F	0D	20	63	0D	AD	F3	0C71:8D	04	D4	20	2F	0D	A9	FF	EE
0829:A9	E9	8D	F8	07	A9	00	8D	36	0A49:F8	07	C9	EC	F0	03	EE	F8	0E	0C79:20	1C	0D	20	45	0E	AD	5A	64
0831:66	14	AD	00	DC	29	1F	C9	C2	0A51:07	4C	22	0A	C9	3B	D0	12	CF	0C81:14	D0	08	CE	5B	14	A9	3C	80
0839:1E	F0	0B	C9	1D	F0	0F	C9	27	0A59:E8	A0	28	B1	FB	C9	20	D0	42	0C89:8D	5A	14	38	E9	05	8D	5A	DD
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0FD9:67	14	F0	F5	DE	67	14	8A	75	1209:18	00	00	08	0C	FE	FE	0C	20	1439:C0	1F	FD	C0	3F	FD	E0	7F	88
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0FF9:D0	FA	A0	23	A9	0D	20	D2	1A	1229:00	00	66	66	FF	66	FF	66	80									
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1011:D2	FF	B9	6B	14	18	69	03	5F	1241:46	00	3C	66	3C	38	67	66	6E									
1019:8D	86	02	69	25	20	D2	FF	C7	1249:3F	00	06	0C	18	00	00	00	4F									
1021:88	30	05	CA	D0	EC	F0	D4	CF	1251:00	00	00	00	00	3C	18	18	3C	24								
1029:A9	13	20	D2	FF	60	A9	80	69	1259:00	00	00	00	00	3C	3C	3C	05									
1031:8D	0F	D4	8D	12	D4	A5	A2	21	1261:00	00	00	00	00	18	3C	3C	7E	2E								
1039:8D	0E	D4	60	05	20	47	A1	BC	1269:00	00	00	00	00	18	3C	3C	18	CF								
1041:4D	45	20	4F	56	45	52	00	BE	1271:00	00	FF	81	81	81	81	81	44									
1049:05	42	4F	4E	55	53	20	31	B4	1279:81	FF	00	00	00	7E	00	00	58									
1051:30	30	30	21	00	9E	92	43	90	1281:00	00	00	00	00	00	00	18	BD									
1059:48	4F	4F	53	45	20	53	4B	2D	1289:18	00	00	03	06	0C	18	30	AA									
1061:49	4C	4C	3A	0D	0D	1D	2F		1291:60	00	36	63	63	63	63	63	B5									
1069:9C	1D	1D	1D	1D	1D	1D	1D	49	1299:36	00	18	38	18	18	18	18	C8									
1071:1D	1D	20	53	54	41	4E	44	29	12A1:3C	00	6E	47	07	0E	1C	38	07									
1079:41	52	44	20	0D	0D	1F	1D	51	12A9:7F	00	6E	47														

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

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

Noble Cheating

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

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

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

Typing It In

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

The Purpose

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

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

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

Easy Cases and Hard Ones

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

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

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

Step by Step

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

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

Translate to Hex

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

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

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

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

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

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

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

Find Character's Sector

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

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

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

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

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

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

Traps

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

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

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

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

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

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

Edit Data

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

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

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

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

PROGRAMS

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

Test Your Changes

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

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

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

Extra Power

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

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

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

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

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

RPG CODEBUSTER

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

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

```

HG 510 PRINT"POSSIBLE HOT TRAC
KS - 27-30,17-20"
KG 520 INPUT"WHICH STARTING TR
ACK";T
MR 530 INPUT"WHICH ENDING TRAC
K";ET
RX 540 IF T<1 OR T>35 THEN GOT
O520
BJ 550 IF ET<1 OR ET>35 THEN G
OTO520
HF 560 IF T>ET THEN GOTO520
JJ 570 PRINT"THIS TAKES A WHIL
E -- "
BC 580 PRINT"CURRENT TRACK AND
SECTOR"
DB 590 PRINT"{4 SPACES}BEING E
XAMINED:"
QB 600 S=0
QE 610 PRINT#15,"U1:2,"0;T;S
XM 620 PRINT#15,"B-P:2,1"
AS 630 PRINT#15,"M-R"CHR$(0)CH
R$(5)
MP 640 GET#15,BY$(0):IF BY$(0)
="" THEN BY$(0)=CHR$(0)
SC 650 F=1
JJ 660 PRINT"{7 SPACES}";T;S
QA 670 FORC=0TO8
PE 680 FORD=F*TO15
MP 690 GET#2,BY$(D)
DA 700 IF BY$(D)="" THEN BY$(D
)=CHR$(0)
HP 710 NEXT D:F=0
AH 720 NM=1
RX 730 IF C=0 OR C=1 THEN GOTO
750
QQ 740 IF C<>8 THEN NM=0:GOTO1
090
CM 750 BY$=""
BQ 760 FORD=0TO15
QS 770 BN=ASC(BY$(D))
JD 780 N1=INT(BN/16)
MG 790 B1$=MID$(HX$,N1+1,1)
JS 800 N2=INT(BN-16*N1)
SE 810 B2$=MID$(HX$,N2+1,1)
AC 820 FORK=2TO18STEP2
RM 830 IF B1$=MID$(HX$,K,1) TH
EN B1$="5"
SG 840 NEXT
KC 850 IF B1$<>"5" THEN B1$="4
"
EG 860 BY$=B1$+B2$
JQ 870 IF BY$="40" THEN BY$="2
0"
QP 880 IF FL=0 THEN GOTO920
PE 890 IF CM$(D+1)<>BY$ THEN N
M=0
HS 900 IF FL=1 AND NM=0 THEN D
=16:GOTO990
PC 910 IF D=LEN(RP$)-1 THEN D=
16:GOTO990
PF 920 BY$(D)=BY$
CX 930 IF FL<>3 THEN GOTO990
SF 940 NM=0
DP 950 IF C=0 THEN L1$=L1$+BY$
:GOSUB1590
HA 960 IF C=1 THEN L3$=L3$+BY$
:GOSUB1590
HB 970 IF C=0 OR C=8 THEN L2$=
L2$+BY$:GOSUB1590
HF 980 IF FL=3 THEN D=16
JC 990 NEXTD
QC 1000 IF FL=1 OR FL=3 THEN G
OTO1090
QK 1010 FORD=0TO15-LEN(RP$):NM
=1
DR 1020 IF BY$(D)<>CM$(1) THEN
GOTO 1070
MS 1030 FORK=1TOLEN(RP$)-1
XM 1040 IF BY$(D+K)<>CM$(K+1)
{SPACE}THEN NM=0
JD 1050 NEXT
PG 1060 IF NM=1 THEN D=16:GOTO
1080
BJ 1070 IF D=15-LEN(RP$) THEN
{SPACE}NM=0
DF 1080 NEXT
DA 1090 IF NM=1 THEN C=9
FF 1100 NEXT
DS 1110 IF NM=1 THEN GOTO1220
FD 1120 S=S+1:GOSUB1150
MS 1130 IF T>ET THEN GOTO1290
AF 1140 GOTO610
RP 1150 IF SF=0 THEN SL=12:GOT
O1200
BA 1160 IF T<18 THEN SL=20:GOT
O1200
XJ 1170 IF T<25 THEN SL=18:GOT
O1200
JM 1180 IF T<31 THEN SL=17:GOT
O1200
JM 1190 IF T<35 THEN SL=16
DA 1200 IF S>SL THEN S=0:T=T+1
:L1$="":L2$="":L3$=""
JM 1210 RETURN
XJ 1220 PRINT RP$ FOUND -"
EC 1230 PRINT"TRACK, SECTOR:";
T;S
RG 1240 PRINT"MORE RPG CODEBUS
TING? (Y OR N)"
GQ 1250 GETA$:IF A$="" THEN GO
TO1250
CK 1260 CLOSE 15,8,15:CLOSE 2,
8,2
AG 1270 IF A$="Y" THEN GOTO 60
MA 1280 END
GK 1290 PRINT RP$;" NOT YET FO
UND..."
MP 1300 CLOSE 15,8,15:CLOSE 2,
8,2
RR 1310 GOTO 60
KC 1320 FORD=0TO7:BY$(D)="0":N
EXT
RH 1330 PRINT "NO COMMAS, PLEA
SE..."
BM 1340 INPUT"CHARACTER STAT";
CS
AJ 1350 IF CS>268435456 THEN P
RINT"FIGURE TOO LARGE
{SPACE}FOR ROUTINE":RE
TURN
DH 1360 IF CS=268435456 THEN B
Y$(6)="1":GOTO1500
CH 1370 IF CS=16777216 THEN BY
$(7)="1":GOTO1500
DM 1380 IF CS>16777216 THEN DV
=16777216:D=7:GOSUB155
0
HA 1390 IF CS=1048576 THEN BY$
(4)="1":GOTO1500
FC 1400 IF CS>1048576 THEN DV=
1048576:D=4:GOSUB 1550
EB 1410 IF CS=65536 THEN BY$(5
)="1":GOTO1500
DB 1420 IF CS>65536 THEN DV=65
536:D=5:GOSUB 1550
RR 1430 IF CS=4096 THEN BY$(2)
="1":GOTO1500
CD 1440 IF CS>4096 THEN DV=409
6:D=2:GOSUB1550
BQ 1450 IF CS=256 THEN BY$(3)=
"1":GOTO1500
QQ 1460 IF CS>256 THEN DV=256:
D=3:GOSUB1550
XR 1470 IF CS=16 THEN BY$(0)="
1":GOTO1500
CC 1480 IF CS>16 THEN DV=16:D=
0:GOSUB1550
MK 1490 BY$(1)=MID$(HX$,CS+1,1
)
AD 1500 BY$(0)=BY$(0)+BY$(1):B
Y$(1)=BY$(2)+BY$(3)
JX 1510 BY$(2)=BY$(4)+BY$(5):B
Y$(3)=BY$(6)+BY$(7)
QR 1520 PRINT"PROBABLE FORM OF
CODED STAT IN BLOCK:"
HS 1530 PRINT BY$(0),BY$(1),BY
$(2),BY$(3)
DA 1540 RETURN
MF 1550 Q=CS/DV:Q=INT(Q)
JJ 1560 BY$(D)=MID$(HX$,Q+1,1)
GH 1570 CS=CS-DV*Q
XF 1580 RETURN
XE 1590 IF L1$=I$ THEN NM=1
GF 1600 IF L2$=I$ THEN NM=1
KP 1610 IF L3$=I$ THEN NM=1
QX 1620 IF NM=1 THEN C=9:RETUR
N
BA 1630 IF LEN(L1$)=LEN(I$) TH
EN T$=L1$:GOTO1670
MR 1640 IF LEN(L2$)=LEN(I$) TH
EN T$=L2$:GOTO1670
CK 1650 IF LEN(L3$)=LEN(I$) TH
EN T$=L3$:GOTO1670
XQ 1660 GOTO1740
DD 1670 FORK=3TOLEN(T$)-1STEP2
:W=LEN(T$)-(K-1):T2$=R
IGHT$(T$,W):V=LEN(T2$)
CM 1680 IF T2$=MID$(I$,1,V)THE
NK=LEN(T$)
SR 1690 NEXT
RC 1700 IF MID$(T2$,1,2)<>MID$
(I$,1,2) THEN T2$=""
CH 1710 IF LEN(L1$)=LEN(I$) TH
EN L1$=T2$:GOTO1740
XD 1720 IF LEN(L2$)=LEN(I$) TH
EN L2$=T2$:GOTO1740
MX 1730 IF LEN(L3$)=LEN(I$) TH
EN L3$=T2$
HX 1740 RETURN

```

George Kouba lives in Madison Heights, Michigan. □

THE AUTOMATIC PROOFREADER

Philip I. Nelson

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

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

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

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

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

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

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

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

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

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

ONLY ON DISK

Here are the *Gazette Disk* bonuses.

Hacker Helper

Daniel Lightner
Sidney, MT

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

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

Future Lock

Danny English
Moreno Valley, CA

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

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

Gazette Gallery

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

"Highland Beast"
By Brian Kissinger
Evansville, IN

"Sailing"
By John Green
Freeport, NY

You may order this disk (\$9.95 plus \$2.00 shipping and handling) from *Gazette Disk*, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

CHIPS & BITS

CALL 800-753-GAME

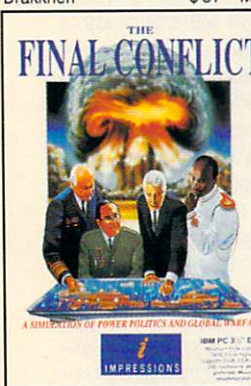
IBM HARDWARE	IBM ROLEPLAYING	IBM ROLEPLAYING	IBM ACTION /ARCADE	IBM ACTION /ARCADE	IBM SIMULATION
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Ad Lib Gold Snd Crd \$199	Fountain of Dreams \$15	Pirates \$9	Dr Doom's Revenge \$12	Rocketeer \$32	A10 Avenger \$43
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Ad Lib Speakers \$15	Immortal \$27	Scavengers \$34	Finale \$12	Space Ace 1 or 2 \$37	Aces of the Pacific \$39



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

Flight Stick \$43
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Mouse 3 Button \$29
Pro Audio Spectrum \$24.99
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Conan \$36
Corporation \$32
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Darklands \$39
Darkspyre \$32
Drakken \$37



'FINAL CONFLICT' from IMPRESSIONS is a strategy game of power politics & global warfare. Allocate resources. Build factories and control food production. Produce armies, tanks, ships, & missiles. Send out spies & conduct diplomacy to uncover military secrets & win allies. Features 95 countries, nuclear winter, optional arcade missile sequence, entirely icon driven. **\$34**

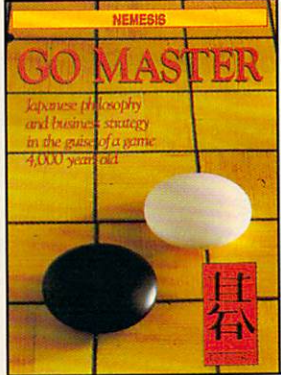
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Dragon Wars \$31
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Earthling \$32
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Elvira 2 Jaws Cerberus \$42
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Might & Magic 2 \$17
Might & Magic 1, 2&HB \$33
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Twilight 2000 \$34
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Ultima Savage Empire \$34
Ultima Trilogy \$35
Ultima 4 or 5 \$35
Ultima 6 False Prophet \$39
Ultima 7 Black Gate \$45
Ultima Stygian Abyss \$48
Uncharted Waters \$42

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Night Breed \$15
Night Hunter \$25
Night Shift \$19
North & South \$32
Nova 9 \$26
Obitus \$34
Obliterator \$6
Oil's Well \$21
Pac-Man \$9



Fire Power \$24
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Obitus \$34
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Psychic War \$28
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'NEMESIS GO VER 5' from TOYOGO is the ultimate computer GO program. With the simplicity of checkers and the complexity of chess, GO is both an enjoyable recreation and a serious strategy game. GO MASTER is a basic GO player and tutor. JOSEKI GENIUS adds complex corner openings. TACTICAL WIZARD is the ultimate tutor offering in depth tactical analysis. GO is 4000 years old. **\$39**

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Super Pac Man \$9



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

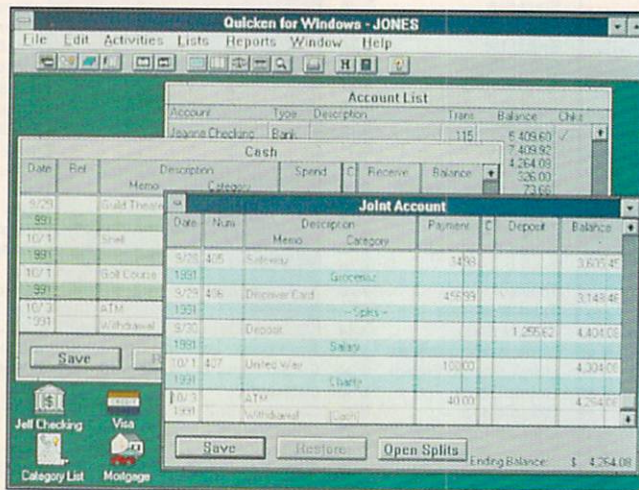
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QUICKEN FOR WINDOWS

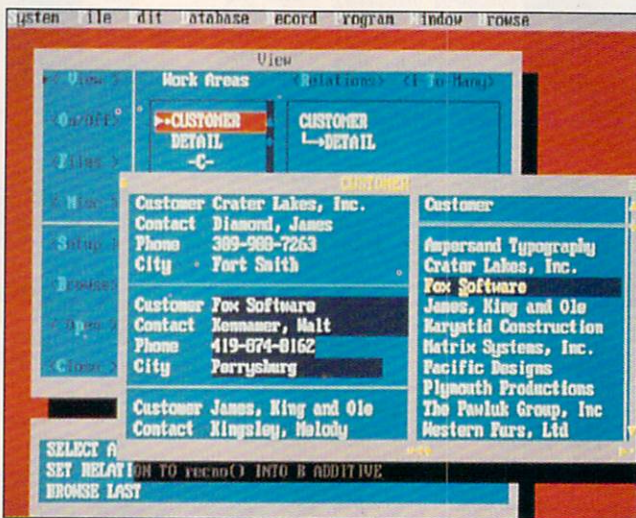
In the early 1980s, one of the most persuasive arguments against home computers was the existence of computerized checkbook programs—they were so complicated that only computer jocks and accountants could figure them out. These days, home-finance programs are much easier to use and can do a lot more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

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

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



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



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

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

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

DAVID ENGLISH

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

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Circle Reader Service Number 323

FOXPRO

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

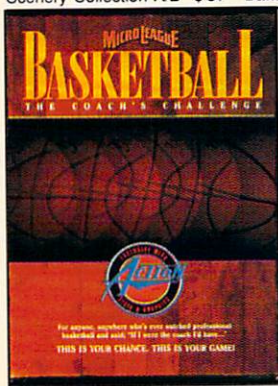
Using new patent-pending Rushmore technology, *FoxPro* retrieves data as much as 20 to 30 times faster than its nearest competitor and, under certain conditions, hundreds of times faster than some slower products, such as *dBASE IV*. If you use a professional database with files containing thousands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

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

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

IBM MAC & AMIGA GAMES FOR LESS

IBM SIMULATION		AMIGA GAMES		AMIGA GAMES		AMIGA GAMES		MACINTOSH		MACINTOSH	
Resolution 101	\$24	688 Attack Sub	\$34	Dragon Force	\$34	Shadow Sorcerer	\$32	Mission Starlight	\$29	Smearth	\$41
Rapcon	\$29	A10 Tank Killer	\$33	Dragon Strike	\$34	Shuttle	\$37	Nicklaus Course Disk 3	\$15	Skysshadow	\$29
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West Coast Voyages	\$39	ATP	\$37	Eye of the Beholder	\$39	Space Quest 1 or 2	\$29	Lost Treasures Infocom	\$59	Space Quest 3	\$34
Scenery Collection A/B	\$37	Bandit Kings A China	\$37	Eye of the Storm	\$32	Space Quest 3 or 4	\$34	Mean 18 Golf	\$30	Space Quest 4	\$34



'MICROLEAGUE BASKETBALL' from MICROLEAGUE is a realistic Basketball simulation. Features include full court scrolling graphics, pop-up screens for easy mid-game access to stats and substitutions, injury and fatigue factors, automatic stat compiler function, and a quick-play option. Expanded offensive & defensive options like, full court press, Double team, and Fast-Break. **\$28**



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

Search for the Titanic	\$27	Bard's Tale 1	\$18
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TD2 Super Cars	\$15		
Test Drive 3	\$32		
TD3 Road & Car Disk	\$19		
Their Finest Hour	\$37		
TFH & BH1942	\$38		
Thunder Chopper	\$28		
Thunderhawk	\$32		
Thunderstrike	\$39		
Tracon	\$34		
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Bard's Tale 3	\$34
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Battle Isle	\$32
Battle Tank Barbarosa	\$36
Battletech	\$34
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Wizardry Bane Csm Frg	\$37
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The **'ADLIB'** music synthesizer card by **ADLIB INC** adds sound capability to hundreds of existing PC games. Using its 11 different FM synthesized voices, it can reproduce any sound. The standard audio jack allows you to plug in any headphone, boombox, or bookshelf speaker. The AdLib Juke Box playback program containing numerous pre-programmed compositions is also included. **\$69**

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Star Control	\$34
Starflight 1	\$32
Starflight 2	\$32
Storm Across Europe	\$39
Team Yankee	\$37
Their Finest Hour	\$21
Thunderhawk	\$32
To the Rhine	\$36
Typhoon of Steel	\$39
Ultima 4 or 5	\$39
UMS 2	\$39
Vengeance of Excaliber	\$32
Wizardry Bane Cosmic	\$39
Worlds at War	\$29



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

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Falcon	\$34
Fast Break	\$30

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Pirates	\$39
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HI, AK, PR, 2 Day \$12 / Order

All Sales Final. Check compatibility before you buy. Shipping times not guaranteed. Defectives replaced with same product. Price & availability subject to change.



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

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Lost Admiral	\$34
Lost Patrol	\$34
M1 Tank Platoon	\$39
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Midwinter	\$28
Might & Magic 2	\$38
Might & Magic 3	\$38
Nobunaga's Ambition	\$37
Nova 9	\$21
Nuclear War	\$34
Overrun	\$39
Perfect General	\$34
Planet of Lust	\$28
Police Quest 1	\$29
Police Quest 2	\$34
Pool of Radiance	\$34
Pools of Darkness	\$38
Populous	\$34
Populous 2	\$38
Powermonger	\$34
Railroad Tycoon	\$34
Red Barron	\$34
Red Storm Rising	\$30
Riders of Rohan	\$39
Rise of the Dragon	\$34



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

Wing Commander 1	\$39
WC1 Mission 1 or 2	\$19
Wing Commander 2	\$45
WC2 Op Module 1 or 2	\$27
WC2 Speach Pack	\$15
Wolfpack	\$15
Yeager's Air Combat	\$38
Yeager's AFT 2.0	\$19

Colonel's Bequest	\$24
Command HQ	\$39
Conan	\$32
Conquests of Camelot	\$24
Corporation	\$32
Curse of Azure Bonds	\$32
Days of Thunder	\$34
Death Knights of Krynn	\$32

Romanc 3 Kingdm 1or2	\$42
Rorke's Drift	\$34
Rules of Engagement	\$39
Sol Mutant Priestess	\$31
Search for the King	\$37
Second Front	\$34
Secret of Silver Blades	\$32
Sex Vixens from Space	\$28

Go Master 5.0	\$36
Graill Quest	\$19
Harpoon	\$39
Harpoon Challenge Pak	\$59
Hoyle's Games 1	\$21
Hoyle's Games 2	\$21
Ishido	\$34
Loom	\$29

Secret Silver Blades	\$38
Shanghai 2	\$32
Shufflepuck Cafe	\$27
Simant	\$37
Simcity	\$29
Simcity Graphics Set 1	\$23
Simcity Graphics Set 2	\$23
Simcity Terrain Editor	\$15

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

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

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

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

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

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

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

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

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

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

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

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

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

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

RICHARD O. MANN

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

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Perrysburg, OH 43551
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HARVARD GRAPHICS

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

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

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

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

IBM WARGAMES

IBM WARGAMES

IBM STRATEGY

IBM STRATEGY

IBM ADVENTURE

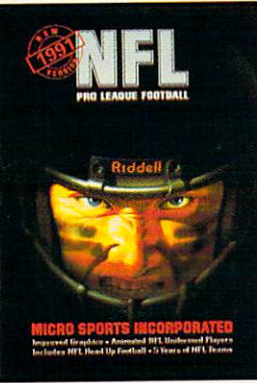
IBM ADVENTURE

Action North Atlantic	\$26	Main Bttle Tank C Grm	\$39
Action of River Plate	\$26	Main Bttle Tank N Grm	\$39
Action Stations	\$29	Main Bttle Tank ME	\$39
Air Raid Pearl Harbour	\$26	Malta Storm	\$39
Amer Civil War 1 - 3 Ea	\$22	Man of War	\$39
Ancient Battles	\$32	Mare Nostrum	\$26
Banza!	\$26	Marianas Turkey Shoot	\$28

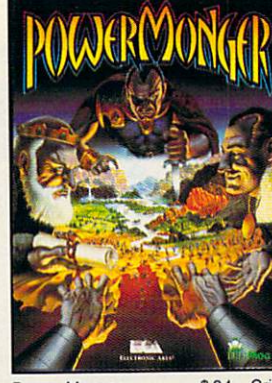
Ancient Art War	\$31	Ancient Art War at Sea	\$31
Ancient Art War in Sky	\$34	Armada 2525	\$32
Balance of the Planet	\$19	Bandit Kings of China	\$37
Battle Isle	\$32	Big Business	\$32
Black Gold	\$10	Breach 2 Enhanced	\$19
Breach 2 Scenario Disk	\$15	Castles	\$36
Castles Disk 1	\$19	Centurion	\$19
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Crisis in the Kremlin	\$37	Defender of the Crown	\$12
Designasaurus 2	\$28	Dino Wars	\$28
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Dune	\$34	Empire	\$31
Final Conflict	\$34	FireTeam 2200	\$29
FireTeam Const Kit	\$25	Fort Apache	\$34
Full Metal Planet	\$31	Genghis Khan	\$37
Gold of the Americas	\$12	Guns or Butter	\$12
Hidden Agenda	\$39	Imperium	\$26

Paladin	\$28	Perfect General	\$34
Perfect General Disk 2	\$23	Populous	\$21
Populous & Simcity	\$34	Populous Promise Land	\$14
Populous 2	\$38	Colonel Bequest 2	\$34
Conquests of Camelot	\$21	Conquests of Longbow	\$34
Conspiracy Deadlock	\$34	Countdown	\$37
Covert Action	\$29	Crime Does Not Pay	\$34

Hound of Shadow	\$19	Indy Jones L Crsd ega	\$22
Indy Jones L Crsd vga	\$28	Indy Jones Fate Atlantis	\$38
It Came from the Desert	\$19	James Bond Stealth Aff	\$34
Jetsons	\$19	Journey	\$12
King's Quest 1 Enhncd	\$34	King's Quest 2 or 3	\$28
King's Quest 4	\$34	King's Quest 5 ega	\$34
King's Quest 5 vga	\$39	Lane Mastodon	\$12
Leather Goddesses	\$12	Leather Goddesses 2	\$42
Leisure Suit Lrry 1 ega	\$16	Leisure Suit Lrry 1 vga	\$34
Leisure Suit Lrry 2	\$34	Leisure Suit Lrry 3	\$34
Leisure Suit Lrry 5	\$34	License to Kill	\$26
Loom	\$19	Lost in LA	\$37
Lost Treasures Infocom	\$59	Magnetic Scrolls Bndl	\$37
Manhunter NY or SF	\$28	Maniac Mansion	\$18
Martian Memorandum	\$37	Mean Streets	\$37
Mixed Up Mthr Goose	\$24	Mixed Up Fairy Tales	\$32
Moebius	\$28	Murder by the Dozen	\$15



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



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

Battle of the Atlantic	\$39	Midway	\$26
Battle of Austerlitz	\$12	Moscow Campaign	\$39
Battle Stations	\$26	Nam 65-75	\$45
Battle Tank Barbarosa	\$39	Northern Fleet	\$39
Battle Tank Kursk	\$39	Operation Overlord	\$39
Battles of Napoleon	\$30	Pacific Storm Midway	\$39
Battleship Bismark	\$26	Pacific Storm Solomons	\$39
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Borodino	\$30		
Bravo Romeo Delta Campaign	\$32		
Carriers at War	\$37		
Civil War NINGA	\$39		
Civil War SSI	\$42		
Charge Light Brigade	\$34		
Cohort	\$34		
Conflict	\$15		
Conflict: Middle East	\$37		
Conflict in Vietnam	\$12		
Decision at Gettysburg	\$29		
Fall Gelb	\$39		
Fifth Eskadra	\$39		
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German Raider Atlantis	\$26		
Gettysburg:Turning Pnt	\$37		
Golan Front	\$39		
Grand Fleet	\$39		
Grey Seas, Grey Skies	\$39		
Halls of Montezuma	\$22		
Harpoon	\$37		
Harpoon Set 2 or 3	\$19		
Harpoon Set 4	\$24		
Harpoon Editor	\$27		

Advanced Dungeons & Dragons	
Eye of Beholder II	



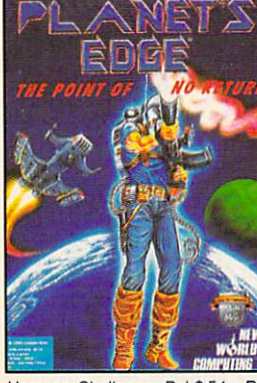
'EYE OF THE BEHOLDER 2' from SSI is a first person role playing game. A bigger adventure including forests, a temple, catacombs, and three huge towers. There are more people to meet, clues to learn, an improved point and click interface, and lots of newer, smarter, and meaner monsters. More complex non-player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

Power Monger	\$34	Crime Wave	\$37
Project Moonbase	\$24	Dark Heart of Ukukul	\$34
Project Space Station	\$15	David Wolf:Scrt Agnt	\$15
Railroad Empire	\$34	Deja Vu	\$12
Railroad Tycoon	\$34	Deja Vu 2 Lost in LV	\$12
Reach for the Stars 3	\$12	Die Hard	\$28
Renegade Legn Intcptr	\$37	Don't Go Alone	\$12
Revolution 76	\$29	Duck Tales	\$28
Rider of Rohan	\$32		
Romanc 3 Kngdm 1or2	\$42		
Rules of Engagement	\$38		
Second Conflict	\$34		
Seven Cities of Gold	\$12		
Siege	\$38		
Sim Ant	\$37		
SimCity	\$29		
SimCity & Populous	\$34		
SimCity Graphic 1 or 2	\$23		
SimCity Terrain Editor	\$15		
SimEarth	\$41		
Star Control	\$29		
Starfleet 1 or 2	\$38		
Stellar Crusade	\$12		
Strategic Forces	\$19		
Sword of Aragon	\$28		
Theatre of War	\$32		
Theatre Sets	\$21		
Visions of Aftermath	\$12		
Warlords	\$29		
Worlds at War	\$29		

Earthrise	\$12	Murder Club	\$28
East v West:Berlin '48	\$9	Murders in Space	\$12
Eco Quest 1	\$34	Neuromancer	\$15
Felony	\$12	Oregon Trail	\$28
Fool's Errand	\$12	Police Quest 1	\$28
Free DC	\$34	Police Quest 2 or 3	\$34
Future Wars	\$28	Prince of Persia	\$25
Gamma Force	\$12	Rise of the Dragon	\$34
		Robin Hood	\$34
		Search for the King	\$37
		Secrt Monkey Islnd 1ega	\$28
		Secrt Monkey Islnd 1vga	\$38
		Secrt Monkey Islnd 2	\$38
		Sex Olympics	\$24
		Sex Vixens from Space	\$12
		Shogun	\$12
		Sinbad	\$12
		Snoopy	\$9
		Sleeping Gods Lie	\$27
		Space Quest 1	\$34
		Space Quest 2	\$28
		Space Quest 3 or 4	\$34
		Spellcasting 101 or 201	\$34
		Startrek 5	\$12
		Startrek 25th Anivrsry	\$36
		Street Rod 1	\$19
		Street Rod 2	\$28
		Time Quest	\$29
		Total Eclipse	\$12
		Train	\$6
		Uninvited	\$12
		Universe 1-3 Ea	\$34
		War in Middle Earth	\$15
		Whales	\$34
		Where Amrcas Pst CSD	\$37

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

Earthrise	\$12	Murder Club	\$28
East v West:Berlin '48	\$9	Murders in Space	\$12
Eco Quest 1	\$34	Neuromancer	\$15
Felony	\$12	Oregon Trail	\$28
Fool's Errand	\$12	Police Quest 1	\$28
Free DC	\$34	Police Quest 2 or 3	\$34
Future Wars	\$28	Prince of Persia	\$25
Gamma Force	\$12	Rise of the Dragon	\$34
		Robin Hood	\$34
		Search for the King	\$37
		Secrt Monkey Islnd 1ega	\$28
		Secrt Monkey Islnd 1vga	\$38
		Secrt Monkey Islnd 2	\$38
		Sex Olympics	\$24
		Sex Vixens from Space	\$12
		Shogun	\$12
		Sinbad	\$12
		Snoopy	\$9
		Sleeping Gods Lie	\$27
		Space Quest 1	\$34
		Space Quest 2	\$28
		Space Quest 3 or 4	\$34
		Spellcasting 101 or 201	\$34
		Startrek 5	\$12
		Startrek 25th Anivrsry	\$36
		Street Rod 1	\$19
		Street Rod 2	\$28
		Time Quest	\$29
		Total Eclipse	\$12
		Train	\$6
		Uninvited	\$12
		Universe 1-3 Ea	\$34
		War in Middle Earth	\$15
		Whales	\$34
		Where Amrcas Pst CSD	\$37



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

Lemmings	\$32	Merchant Colony	\$34
Lemmings Data Disk	\$19	Millenium	\$27
L'Empereur	\$37	Nobunaga 1 or 2	\$37
Liberty or Death	\$37	Nuclear War	\$12
Lost Admiral	\$34	Objection	\$34
Lost Patrol	\$12	Objection Enh	\$89
Medieval Lords	\$37	Ogre	\$19
Medieval Warriors	\$19	Omega	\$30
Merchant Colony	\$34	Operation Combat	\$24
Millenium	\$27	Overlord	\$28
Nobunaga 1 or 2	\$37		
Nuclear War	\$12		
Objection	\$34		
Objection Enh	\$89		
Ogre	\$19		
Omega	\$30		
Operation Combat	\$24		
Overlord	\$28		

Stalingrad Campaign	\$39	UMS 2 Nations at War	\$34
Storm Across Europe	\$37	UMS 2 Desert Storm	\$20
Suez 73	\$29	UMS 2 Planet Editor	\$28
To The Rhine	\$39	V for Victory	\$38
Typhoon of Steel	\$37	Vulcan	\$34
UMS 1	\$19	War in the Falklands	\$26
UMS 2 Nations at War	\$34	Warship Changed Hist	\$26
UMS 2 Desert Storm	\$20	Waterloo	\$12
		Western Front	\$37
		White Death	\$29



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

Harpoon Challenger Pak	\$54	Rising Sun	\$26
High Seas	\$33	Rommel at El Alamein	\$39
In Harms Way	\$39	Rommel at Gazala	\$39
Kampgruppe	\$37	Rommel North Africa	\$24
Kriegsmarine	\$39	Rorke's Drift	\$34
Kursk Campaign	\$39	Sea Power & the State	\$39
Long Lance	\$39	Second Front	\$37
MacArthur's War	\$29	Seventh Fleet	\$39

Rising Sun	\$26	Stalingrad Campaign	\$39
Rommel at El Alamein	\$39	Storm Across Europe	\$37
Rommel at Gazala	\$39	Suez 73	\$29
Rommel North Africa	\$24	To The Rhine	\$39
Rorke's Drift	\$34	Typhoon of Steel	\$37
Sea Power & the State	\$39	UMS 1	\$19
Second Front	\$37	UMS 2 Nations at War	\$34
Seventh Fleet	\$39	UMS 2 Desert Storm	\$20
		UMS 2 Planet Editor	\$28
		V for Victory	\$38
		Vulcan	\$34
		War in the Falklands	\$26
		Warship Changed Hist	\$26
		Waterloo	\$12
		Western Front	\$37
		White Death	\$29

B.A.T.	\$19	Geisha	\$32
B.A.T. 2	\$32	Godfather	\$32
Bart Simpsons House Wr	\$32	Gold Rush	\$24
Black Cauldron	\$14	Grail Quest	\$27
Castle of Dr Brain	\$29	Harley Davidson	\$12
Chmbr Sci Mutnt Prstss	\$15	Heart of China	\$34
Code Name: Iceman	\$21	Honeymooners	\$12
Colonel Bequest	\$21	Hostage	\$12

B.A.T.	\$19	Geisha	\$32
B.A.T. 2	\$32	Godfather	\$32
Bart Simpsons House Wr	\$32	Gold Rush	\$24
Black Cauldron	\$14	Grail Quest	\$27
Castle of Dr Brain	\$29	Harley Davidson	\$12
Chmbr Sci Mutnt Prstss	\$15	Heart of China	\$34
Code Name: Iceman	\$21	Honeymooners	\$12
Colonel Bequest	\$21	Hostage	\$12

Geisha	\$32	Murder Club	\$28
Godfather	\$32	Murders in Space	\$12
Gold Rush	\$24	Neuromancer	\$15
Grail Quest	\$27	Oregon Trail	\$28
Harley Davidson	\$12	Police Quest 1	\$28
Heart of China	\$34	Police Quest 2 or 3	\$34
Honeymooners	\$12	Prince of Persia	\$25
Hostage	\$12	Rise of the Dragon	\$34
		Robin Hood	\$34
		Search for the King	\$37
		Secrt Monkey Islnd 1ega	\$28
		Secrt Monkey Islnd 1vga	\$38
		Secrt Monkey Islnd 2	\$38
		Sex Olympics	\$24
		Sex Vixens from Space	\$12
		Shogun	\$12
		Sinbad	\$12
		Snoopy	\$9
		Sleeping Gods Lie	\$27
		Space Quest 1	\$34
		Space Quest 2	\$28
		Space Quest 3 or 4	\$34
		Spellcasting 101 or 201	\$34
		Startrek 5	\$12
		Startrek 25th Anivrsry	\$36
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		Train	\$6
		Uninvited	\$12
		Universe 1-3 Ea	\$34
		War in Middle Earth	\$15
		Whales	\$34
		Where Amrcas Pst CSD	\$37

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

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

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

ROBERT BIXBY

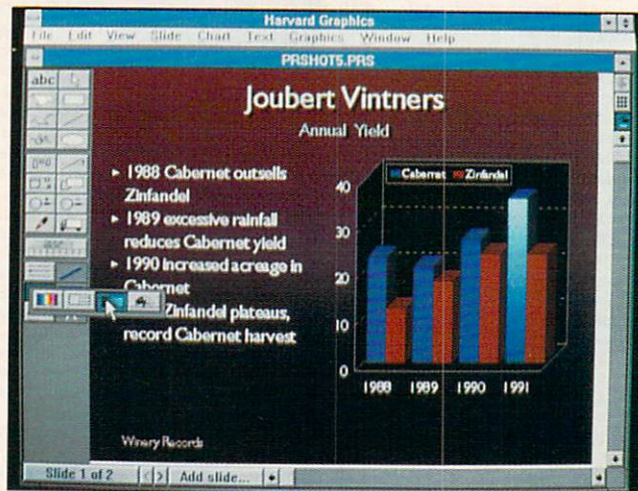
IBM PC and compatibles with 80286 processor or above, 640K RAM (with at least 438K available), EGA or VGA, hard disk with 11MB free, can utilize expanded or extended memory—\$595

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SMITH CORONA ACER PC 110/286

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



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



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

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

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

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

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

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

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

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

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

IBM MAC & AMIGA GAMES FOR LESS

IBM TRADITIONAL	
3D Pool	\$12
Advance to Boardwalk	\$15
Amarillo Slim Poker	\$15
Battlechess 1 or 2	\$31
Big Boggle	\$15
Blackjack	\$34
Cesar's Palace	\$15

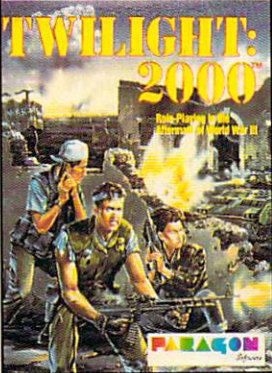
IBM TRADITIONAL	
Monopoly	\$24
Penthouse Jigsaw	\$24
Price is Right	\$15
Prime Time Hits 1 or 2	\$24
Puzznic	\$25
Rack'em	\$12
Risk	\$24

IBM SPORTS	
4D Boxing	\$32
4th & Inches	\$12
4th & Inches Teams	\$10
1992 Winter Olympics	\$32
ABC Boxing	\$32
ABC Mon Night	\$37
All Star Sports Pak	\$34
APBA Baseball	\$28
APBA Encyclopedia	\$34
APBA General Manager	\$31
APBA Innovator	\$34
APBA Stat Master	\$39
APBA Wizard	\$31
APBA 1908 - 91 Ea	\$21
APBA Basketball	\$28
APBA Bowling	\$19
APBA Football	\$49
Basketball Challenge	\$28
B ball Ch. 1987 - 88 Ea	\$13
B ball Ch. 1989 - 90 Ea	\$17
Bo Jackson Baseball	\$32
Blades of Steel	\$26
Championship Baseball	\$9
Cycles Grand Prix	\$28
Daily Double Horse	\$19
Days of Thunder	\$25
Fast Break	\$17
Games Winter Challenge	\$37
GFL Champ Football	\$9
Grand Prix	\$24
Grand Prix Circuit	\$17
Greg Norman Shark Att	\$25
Gretsky Hockey 2	\$34
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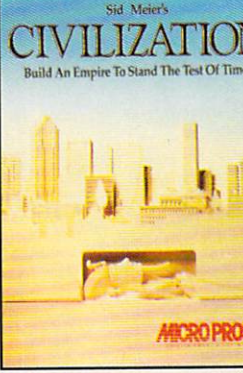
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ML GM Disk 3	\$25
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ML Personal Pro Golf	\$28
Microleague Football	\$28
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ML Ftbl GM/Owners	\$25

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Gateway Savage Frontr	\$32
Heroes of the Lance	\$12
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Pool of Radiance	\$32
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Shadow Sorcerer	\$32
War of the Lance	\$9



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



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

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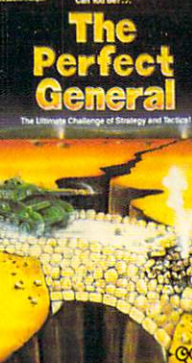
Sargon 4 or 5	\$34
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Scruples	\$28
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Grand Prix	\$24
Grand Prix Circuit	\$17
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Gretsky League	\$26

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ML Wrestling	\$28
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NCAA College Football	\$36
NFL Challenge	\$60
NFL 1984 - 1987 Ea	\$15
NFL 1988 - 1991 Ea	\$22
NFL Preseason Disk	\$22
NFL All Star Teams	\$22
NFL College Alumni	\$19
NFL College Teams	\$19
NFL Dream Teams	\$20
NFL Greatest Teams	\$22
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Reel 2	\$32
RBI Fish'n	\$12
Road to the Final Four	\$37
Serve & Volley	\$12

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Weaver 1988 - 1989 Ea	\$16
Weaver Baseball 2.0	\$32
Weaver Commisnr 2.0	\$21
Weaver 2.0 1990 Teams	\$16
World Class Soccer	\$28
1990 Stats/Mngr Profils	\$16
Weaver 2.0 Comm Edt	\$59

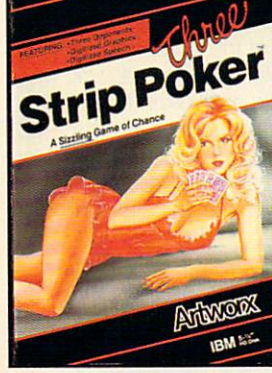
'CARRIERS AT WAR' from SSG is WW2 carrier warfare. Explore Pearl Harbor, Santa Cruz, Coral Sea, Midway, Eastern Solomons, & Marianas Turkey Shoot. Great graphics and simulation. You must seek out the enemy carriers, fleets and aircraft before they find you. Hundreds of ships & aircraft are individually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



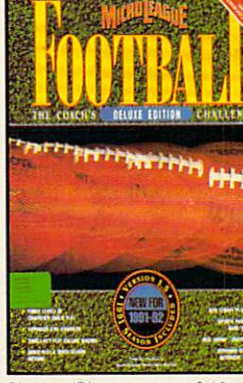
'PERFECT GENERAL' from QQP INC is a turn based ground war game. Features 12 years of play testing, great maps in VGA, easy to use mouse or keyboard interface, 14 scenarios, very strong artificial intelligence, hidden movement, line of sight option, in depth player ranking system, saves your career history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

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Champions of Krynn	\$10
Code Name Iceman	\$10
Police Quest 1 - 3 Ea	\$10
Pool of Darkness	\$12
Pool of Radiance	\$10
Power Monger	\$10
Puzzle Gallery	\$10
Quest for Clues 2, 3 or 4	\$21
Quest for Glory 1 - 3 Ea	\$10
Railroad Tycoon	\$10
Rise of the Dragon	\$10
Run 5 Issue 1 - 20 Ea	\$6
Savage Empire	\$10
Search for the King	\$10
Secret Mnky Islnd 1 or 2	\$10
Secret of Silver Blades	\$10
Shadow Sorcerer	\$10
Simcity/Simearth	\$20
Simearth	\$19
Space Quest 1 - 4 Ea	\$10
Starflight 1 or 2	\$10
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Strategy Plus 12-16	\$4
Tunnels & Trolls	\$10
Ultima 4 - 7 Ea	\$10
Wizardry 6 Cosmic Frg	\$12
Wizardry 7 Crusade	\$12
Yeager's Air Combat	\$19
Zak McKracken	\$10



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



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

IBM ADVENTURE	
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Where USA CSD	\$30
Where World CSD	\$27
Where World CSD Dlx	\$49
Where Time CSD	\$30
Wonderland	\$34
Zak McKracken	\$18

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Mean 18 Course 5 & 6	\$25
ML Basbil Mngr's Chllng	\$24
ML World Series Disks	\$17
ML TD 1982 - 1990 Ea	\$17
ML All Stars	\$17
ML Franchise Disks Ea	\$20
ML Box Score Stats	\$20

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Pool of Darkness	\$12
Pool of Radiance	\$10
Power Monger	\$10
Puzzle Gallery	\$10
Quest for Clues 2, 3 or 4	\$21
Quest for Glory 1 - 3 Ea	\$10
Railroad Tycoon	\$10
Rise of the Dragon	\$10
Run 5 Issue 1 - 20 Ea	\$6
Savage Empire	\$10
Search for the King	\$10
Secret Mnky Islnd 1 or 2	\$10
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Simcity/Simearth	\$20
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Space Quest 1 - 4 Ea	\$10
Starflight 1 or 2	\$10
Strategy Plus 3 - 11 Ea	\$8
Strategy Plus 12-16	\$4
Tunnels & Trolls	\$10
Ultima 4 - 7 Ea	\$10
Wizardry 6 Cosmic Frg	\$12
Wizardry 7 Crusade	\$12
Yeager's Air Combat	\$19
Zak McKracken	\$10

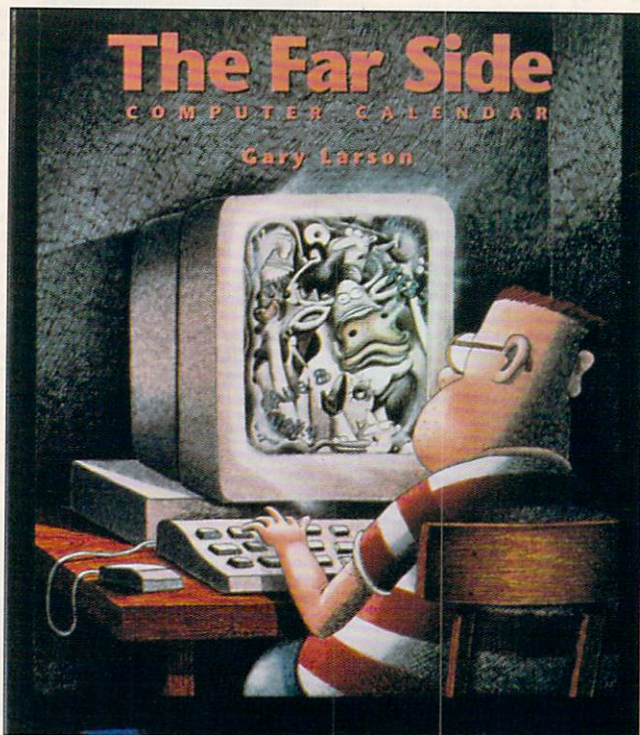
gest that a user who already knows how to use DOS commands and how to run applications move up to the Acer PC 120, since it comes with a 40MB hard drive.

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

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

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

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



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

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

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

JOYCE SIDES

Smith Corona Acer PC 110/286—\$1,299

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

Circle Reader Service Number 326

THE FAR SIDE COMPUTER CALENDAR

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

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

The Far Side Computer Cal-

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

DAVID SEARS

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

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

Circle Reader Service Number 327

MARIO ANDRETTI'S RACING CHALLENGE

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

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

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

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PIXEL PERFECT, INC.

10460 S. Tropical Tr., Merritt Island, FL 32952



Circle Reader Service Number 169

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

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

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

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

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



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

force pulling your Formula One racer into the retaining wall.

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

Three levels of graphic detail allow slower machines to

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

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

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

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

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

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

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

SCOTT MAY

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

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

Circle Reader Service Number 328

MICKEY'S JIGSAW PUZZLES

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

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

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



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

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

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

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

CAROL HOLZBERG

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

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

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

Circle Reader Service Number 329

PARADOX ENGINE

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

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

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

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

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

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

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

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

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

PEER PLAUT

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

BORLAND INTERNATIONAL
1800 Green Hills Rd.
Scotts Valley, CA 95066
(408) 438-8400

Circle Reader Service Number 330

SUPERBASE 2

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

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

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

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

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

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

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

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

RICHARD O. MANN

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

SOFTWARE PUBLISHING
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Circle Reader Service Number 331

HEWLETT-PACKARD DESKJET 500

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

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

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

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

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

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

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

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

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

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

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

TONY ROBERTS

HP DeskJet 500—\$599

HEWLETT-PACKARD
Company Inquiries
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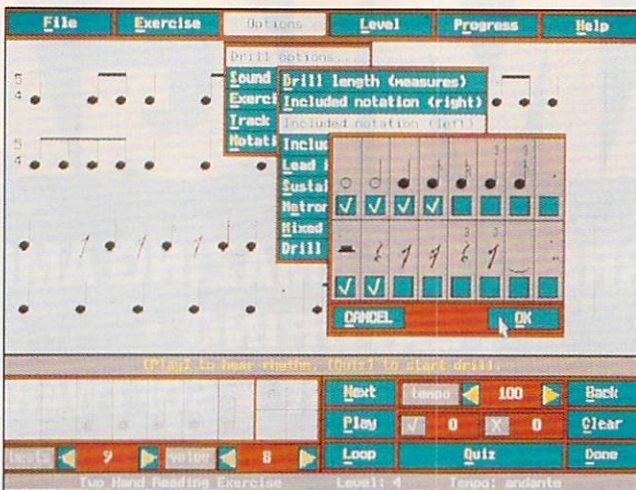
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RHYTHMACE

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

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

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



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

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

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

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

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

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

CLAYTON WALNUM

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

IBIS SOFTWARE
625 Second St., Ste. 308
San Francisco, CA 94107
(415) 546-1917

Circle Reader Service Number 333

RULES OF ENGAGEMENT

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

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

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

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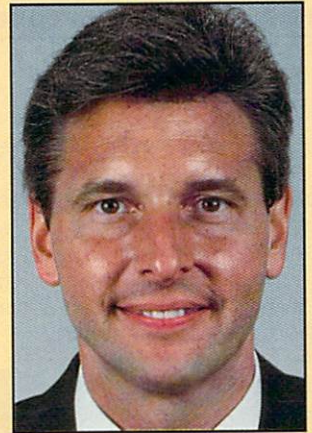


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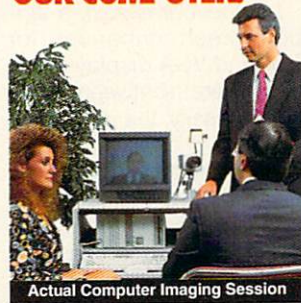
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Retrieval. In addition, each primary menu hosts a series of submenus, many of which are interconnected. The entire system fills more than a half-dozen screens, packed to the last pixel with buttons, dials, gauges, and interactive displays. The result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

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

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

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

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

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

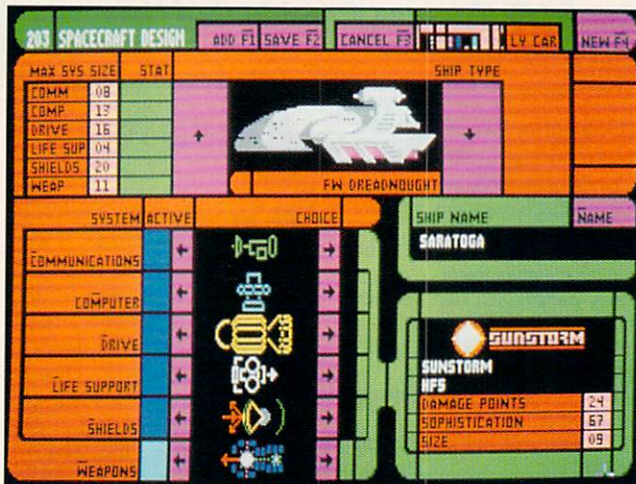
Intelligent and original,

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

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

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

EDDIE HUFFMAN



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

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

SCOTT MAY

IBM PC and compatibles; 640K RAM; CGA, EGA, VGA or Tandy 16-color; dual drives or hard disk; supports Ad Lib, Roland, and Game Blaster; mouse optional—\$49.95

MINDCRAFT SOFTWARE
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Circle Reader Service Number 334

LAPTOP ULTRAVISION

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

ing from helpful to totally superfluous.

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

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

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

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TRAVELER'S GUILD: GERMAN

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

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

Traveler's Guild: German keeps would-be polyglots

Advertisers Index

Reader Service Number/Advertiser	Page	Reader Service Number/Advertiser	Page	Reader Service Number/Advertiser	Page
162 8-Bit	G-17	216 ICD	A-3	121 Software of the Month Club	129
64 Disk Connection	G-14	Ingenius Software	G-17	198 Software Support Int'l	59,A-29,A-30,G-9,G11
159 900 Software	130	105 Interplay	85	180 Soft-Byte	131
147 AICS	128	213 J & C Repair	G-17	SOGWAP	G-13
146 Access Software	106,107	106 Jacobs Electronics Inc	131	SSI	91
Accolade	43	Jacobsen Software Design	G-14	130 Starware	133
191 Bare Bones Software	A-19	212 Jessie J. Hill	133	Superior Micro Design	G-17
211 Blue Ribbon Soundworks	A-11	127 LWS Software	131	Tech-Span	G-13
160 Blue Valley Software	131	119 Mallard Software	89	170 Tenex	A-5
205 Caloke Industries	G-17	Maxis Software	103	The Hunter Group	121
207 CH Products	21	MicroLogic	29	The Learning Company	15
Chevrolet	1	197 MicroMagic Productions	132	132 The Other Guys	A-27
129 Chips & Bits	109,111,113,115	138 MicroMiga	A-25	The Sterling Connection	A-13
218 Citizen American Corporation	5	113 MicroProse	97	Treasure Hunt	44,45,46
181 Compsult	G-8	139 MicroProse	49	124 Tycom	G-17
150 Compsult	128	MicroSphere	G-3	195 Universal Memory	27
103 CompuServe	17	152 Micro Tech USA	67	151 Virgin Games	41
118 Computer Business Service	130	174 Mission Control	35	145 Virgin Games	IBC
184 Computer Direct	38,39	176 My Story Books	130	167 Virgin Games	51
141 Computer Productions	132	133 NEC Technology	IFC	168 Virtual Reality	37
137 Covox	130	199 Needham's Electronics	132	172 Wedgwood Computer	129
125 Creative Labs	3	Newbridge Communications Inc.	55	122 WOL Direct/National Learning Systems	93
210 D & K Enterprises	133	NRI/McGraw Hill	60,61	114 Zero's & Ones	65
Damark International	57	104 Origin Systems	79		
120 DCS Industries	63	177 PC Component	132		
131 Demo Source	132	110 Peoples College of Independent Study	127		
204 Disk O'Plenty	G-17	169 Pixel Perfect/Dr. Schuller	117		
208 Disk-Count Software	129	185 Poor Person Software	A-19		
112 Electronic Arts	99	193 Professional Cassette Center	119		
179 Foxy Tech	A-19	Protect Yourself Scream Alarm	47		
190 Financial Services Marketing Corp	G-9	163 Psynosis	75		
192 Financial Services Marketing	37	186 Ramco	133		
115 GardenTech	128	143 SafeSoft Systems Inc.	131		
155 GeoWorks	9	116 SeXXy Software Inc.	131		
156 GeoWorks	11	154 Sierra OnLine	BC		
157 GeoWorks	13	109 Smart Luck Software	133		
128 The Grapevine Group	G-8	217 Soft Comp USA	134		
Hair Dynasty for Men	123	183 Soft Tech	23		
165 Heath Company	127	182 SoftLogic Solutions	31		
219 HelpDisk Inc	A-25	126 Softshoppe Inc.	128		

Amiga Resource Disk	A-23
Amiga Resource/Genie OnLine	A-15
COMPUTE Books	14
COMPUTE/Genie OnLine Systems	69
COMPUTE/Quantum Q-link	G-7
COMPUTE's SharePak Disk Subscription	81
COMPUTE's Single Disk Order	71
COMPUTE's Specialty Disks	G-15
Gazette Disk Index	G-14
Gazette Disk Subscription	G-13
Gazette Productivity Manager	G-21
Gazette Speedscript Disk	G-19
Mean 18 Golf Course	A-7

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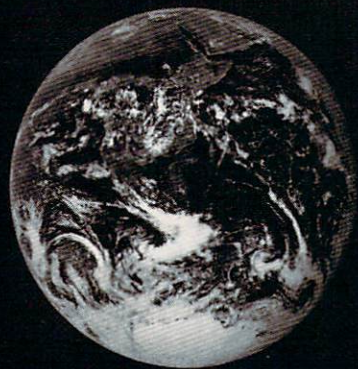
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REVIEWS

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

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

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

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

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

EDDIE HUFFMAN

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

TRAVELER'S GUILD
P.O. Box 819
Marquette, MI 49855
(906) 228-5030

Circle Reader Service Number 336

CAKEWALK

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

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

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

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

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

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

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

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

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

TOM CAMPBELL

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

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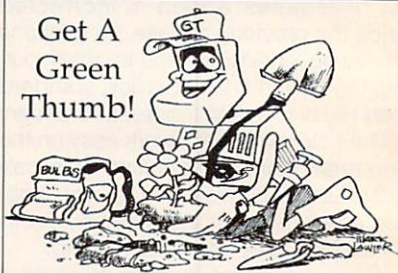
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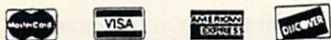
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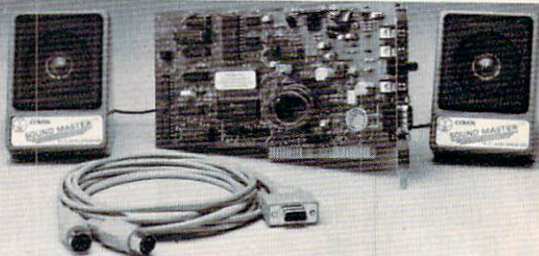
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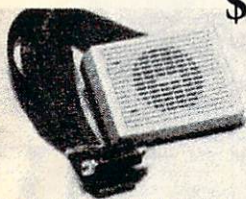
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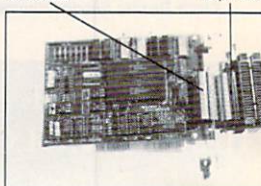
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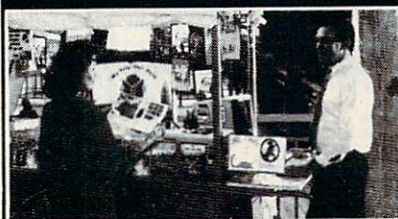
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CONVERSATIONS

Lisa Sarasohn

ROBERT MOOG SYNTHESIZED

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

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

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

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

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

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

C: *What changes do you*

see happening over the next few years in electronic music?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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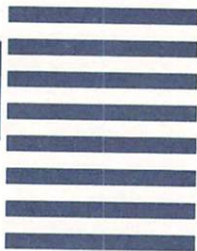
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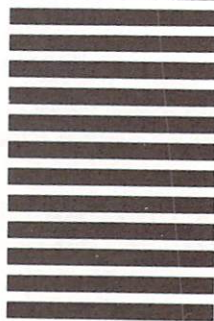
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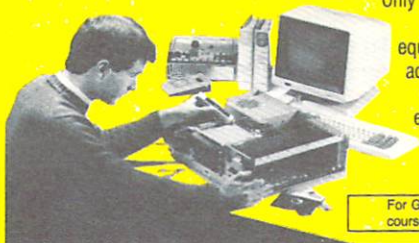
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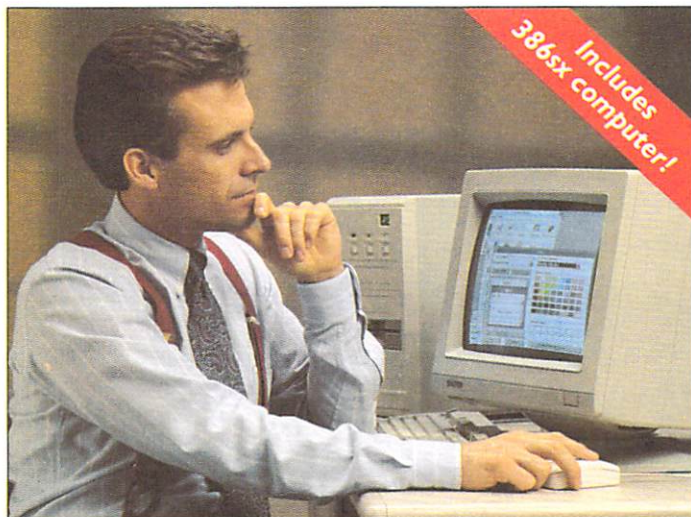
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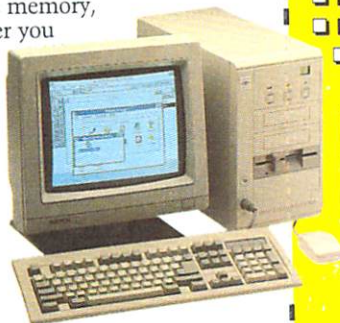
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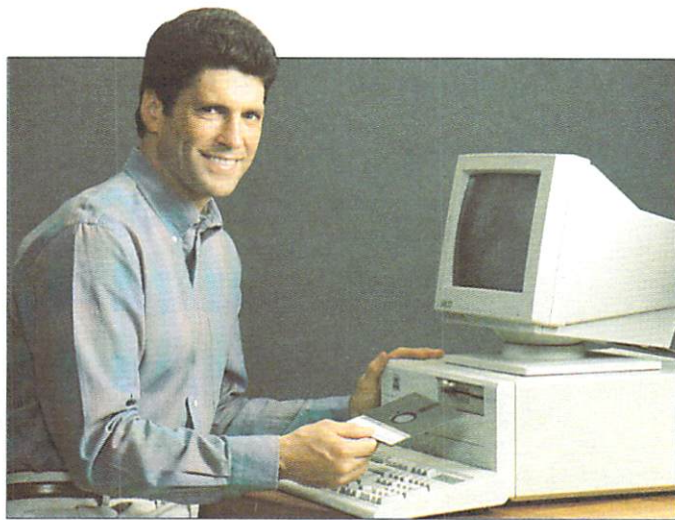
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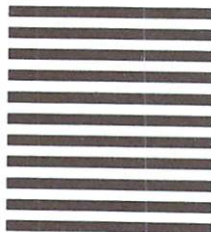
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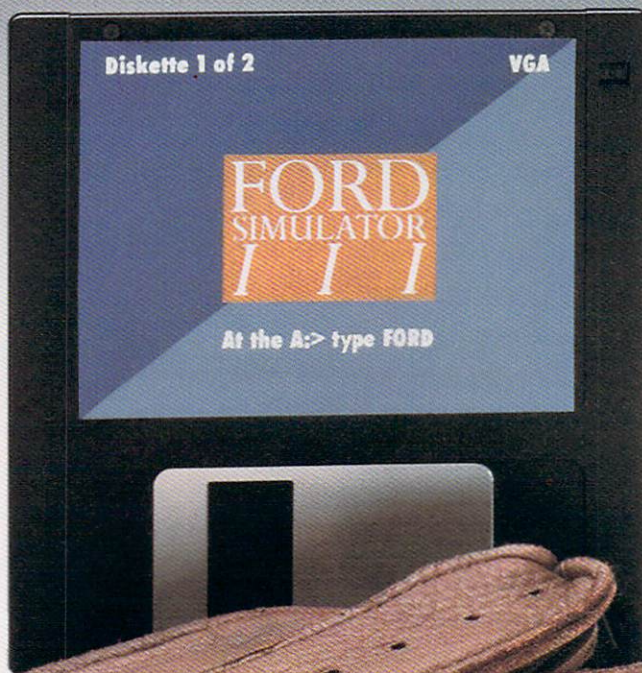
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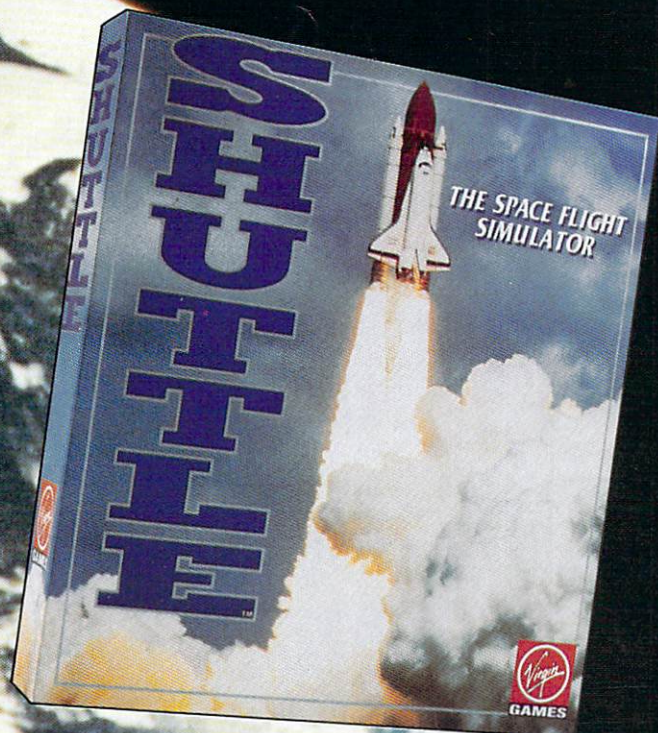
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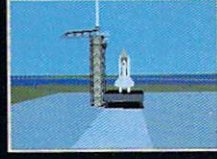
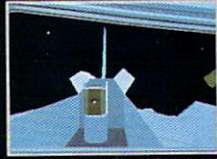
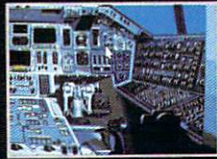
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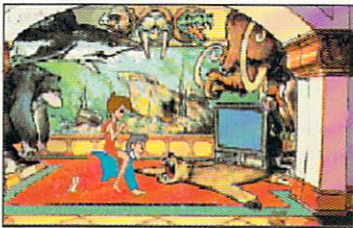
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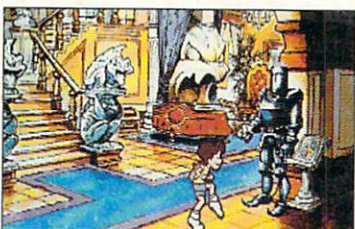
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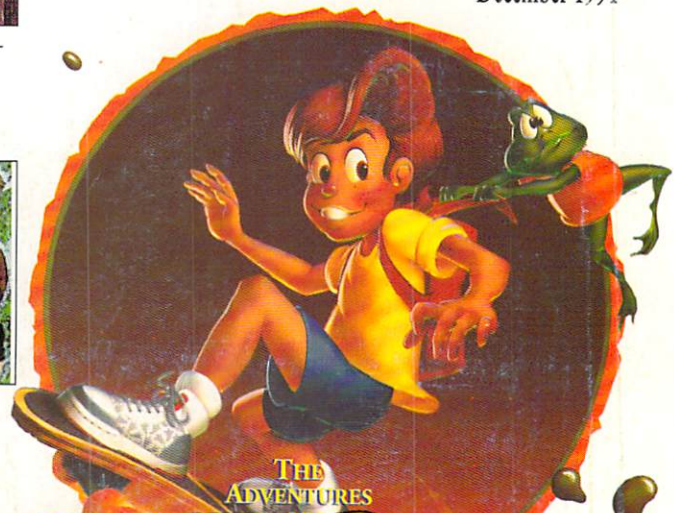
...And so much great art and animation you'd stare at the screen till you went blind...



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