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COMPUTE

VOLUME 15, NO. 6, ISSUE 153

JUNE 1993

FEATURES

8

FAX IT, SCAN IT, PRINT IT

By Mike Hudnall
and Robert Bixby

With integrated peripherals, you can squeeze an entire office full of equipment onto your tabletop.

20
TEST LAB

Edited by Mike Hudnall
What do the latest and greatest audio boards have to offer? Test Lab puts ten through their paces.

62

DOS 6.0: DOS REACHES A NEW LEVEL

By Mark Minasi

Whether you've been demanding better memory management, better disk management, or more tools, Microsoft's been listening.

68

PRODUCTIVITY CHOICE

By Clifton Karnes
Paradox for Windows.

COLUMNS

4

EDITORIAL LICENSE

By Clifton Karnes
Four cool products.

40

NEWS & NOTES

By Jill Champion
Top computer news.

46

FEEDBACK

Answers to tough questions.

50

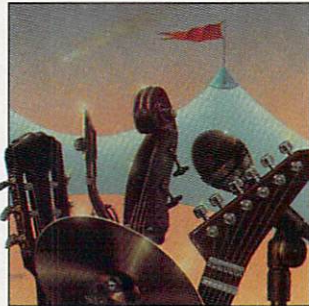
WINDOWS WORKSHOP

By Clifton Karnes
Super TrueType add-ins.

52

TIPS & TOOLS

Edited by
Richard C. Leinecker
Tips from our readers.



Cover photo by Mark Wagoner. Monitor from Dell.
Graphic courtesy of Autodesk.

56

INTRODOS

By Tony Roberts
Make DOS work better.

58

HARDWARE CLINIC

By Mark Minasi
DOS 6.0's MultiConfig.

60

PROGRAMMING POWER

By Tom Campbell
Great moneymaking ideas
for programmers.

70

PERSONAL PRODUCTIVITY

By Bradley M. Small
Now you can run UNIX at
home.

72

MULTIMEDIA PC

By David English
Sound software.

74

ART WORKS

By Robert Bixby
Art without the work.

128

NEWS BITS

By Jill Champion
Top stories at press time.

ENTERTAINMENT

76

DISCOVERY CHOICE

By Clayton Walnum
Treasure Cove.

78

GAME INSIDER

By Shay Addams
June's a hot month for game
releases.

80

ENTERTAINMENT CHOICE

By David Sears
Star Control II.

82

GAMEPLAY

By Paul C. Schuytema
How solid research results in
great games.

84

GOING VERTICAL

By Paul C. Schuytema
Computers are finally robust
enough to provide real
helicopter simulation. Here's
the scoop on two of the
hottest chopper simulations
around today.

REVIEWS

89

AST PowerExec,
Stepway,
JDR 33-MHz
486 Cache System,
Outside In
for DOS and Windows,
Fly the Grand Canyon,
Interpreter TapeXchange
300TX Tape Backup,
PowerMonger,
ACMA 486SX/25,
Visual Basic for DOS,
Paradise Accelerator Card
for Windows,
Moses PromiseLAN,
Creativity Kit:
Little People Farm
and Little People Main St.,
PrintSprint,
DrivePro,
Summer Challenge,
and Dvorak on Typing.

ADVERTISERS INDEX

See page 113.

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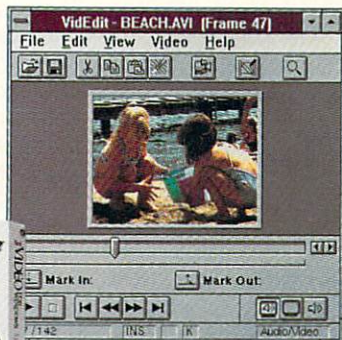


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Clifton Karnes

Cool products are hardware or software marvels that make you smile and say "Yeah!"

Cool products. That's what I live for. If you've been computing for any length of time, you know what I mean. Cool products are hardware or software marvels that make you smile and say "Yeah!"

Really cool products come along a few times a year, but this past month I've been lucky enough to find *four* of them. The first one's a utility, the second's a type manipulation tool, the third's a multime-



dia upgrade kit, and the last is, well, . . . I'll save that for last.

I use Windows and I like Program Manager. Its weakness is, however, that you often have to do a fair amount of double-clicking to get to the group you need and the program you want to run. I've partially solved this problem by putting all my most-used applications on one large group, which Program Manager always displays. But I can't put everything on this group. In the first place, you can only put 50 items on a Program Manager group (boo Microsoft!). And even if you could put more, most people still couldn't fit *all* their nifty utilities on one group. That's where

Squeegee comes in (Icom Simulations, 800-877-4266, \$79.95). This pop-up menu is ready at a mouse click to display all the programs you need to run quickly.

Squeegee can be customized to be called from a button on your title bar or by pressing almost any key combination or mouse button. I've set it up to spring to life when I make a single left mouse click on the desktop. If I want to run Windows' Setup, I don't have to hunt for the right group and icon; I simply click once on the desktop, slide the mouse pointer to Setup, and run the program. This is as fast as it gets running Windows programs.

Another really neat feature lets you display a directory of files. You can, for example, set up a Squeegee menu item to display all your Excel files. When you want to load an Excel file, you simply select that menu item, look for the file you want, and click on it, and both Excel and the file are loaded. This is much easier and faster than using Excel's Open dialog box or using File Manager.

That's a brief tour of Squeegee—but I'll tell you, this program has really improved my productivity in Windows. It's guaranteed to please.

If you work with documents in Windows, you'll want to try Makeup (Bitstream, 617-497-6222, \$149). This dazzling program lets you turn your fonts into taffy and manipulate them in almost every imaginable way. You can create shadows, embossed effects, and fill patterns, and you can stretch and twist type in ways nature never intended.

Makeup is the key to high-impact logos, headlines, handbills, advertisements, and posters. Trust me—you won't be able to tear yourself away from this program.

The next cool product on my list is Creative Labs' Multimedia Upgrade Kit (Creative Labs, 408-428-6600, \$799). This kit includes a Sound Blaster Pro card and a Panasonic-built CD-ROM drive. The kit installs as easily as any major hardware addition I've ever seen, and it performs flawlessly. After installing the Multimedia Upgrade Kit, your PC will be a real multimedia PC machine with synthesized and digital sound, and you'll have a fast CD-ROM drive. The Creative Labs Multimedia Upgrade Kit also comes with a slew of CD-ROM titles.

Not only is the Multimedia Upgrade Kit cool itself, but it lets you play the next really cool product—PC Karaoke.

If you've been stranded on a desert island for the last few years, you might not have heard of karaoke, but it's getting really big. A karaoke system plays music accompaniments that you can sing to. To make it possible to keep your place, the system displays words synchronized exactly with the music.

If you have a multimedia PC, however, you can have your own karaoke party with PC Karaoke (Sirius, 602-951-3288, \$129). This innovative product comes with a high-quality microphone and an audio CD of hit songs (you can order additional CDs from Sirius). The software plays the CD through your system's audio, so the sound is full CD quality, and it synchronizes the words and displays them on the screen for you using Sirius's patented Compact Disc Synchronization technology, so you can keep your place. This thing is more fun than a barrel of Mr. Microphones.

That's it. Four cool products in one month. I just hope this isn't my cool allotment for the year. □

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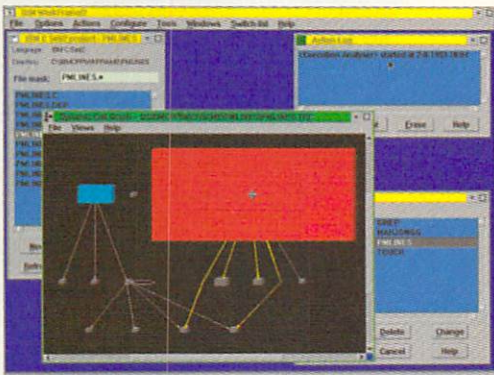


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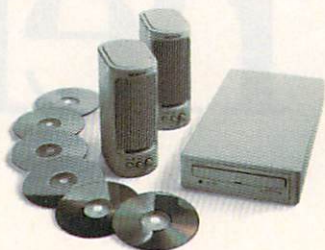
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FAX IT, SCAN IT, PRINT IT

What can you do if you have a very limited amount of space for your office? You don't have room for a scanner, a fax machine, and a printer. Which do you sacrifice? Or what if you're setting up an office for a temp? You need a whole range of office automation devices, but you don't have all week to shop around town for a computer, a printer, and so forth. Wouldn't it be great if you could have all of your peripherals in one small package?

This kind of thinking has led to the latest revolution in peripherals marketing: the integrated peripheral. And it only makes sense. After all, what is a fax machine but a scanner and a printer? The photocopier is another common device that contains a scanner and a printer. Some fax machines have a copy option that will print out a copy as if it were a fax.

Most fax machines aren't very good scanners or printers, to be sure, and most of them print on that funky fax paper that's about halfway between tissue paper and wax paper; but if you could get a really good scanner and a really good printer, you could reduce their resolution for sending and receiving faxes and increase their resolution for normal office work.

In this article we will cover a handful of exciting new products that shrink an entire office suite down to a desktop while improving on the products they replace through integration and computer software.

DDM Private Station

Multifunctional capabilities, document storage and management, and speed are just a few features that make the Alacrity Systems Desktop Document Manager Private Station (DDM) an attractive package. To use it, you need an 80386 or higher

THE COMPUTERIZED OFFICE BECOMES THE INTEGRATED OFFICE.



BY

MIKE HUDNALL

AND

ROBERT BIXBY



ILLUSTRATION

BY

JOHN MATTOS

industry-standard-architecture PC or compatible, Microsoft Windows 3.1 or higher, MS-DOS 5.0 or higher, 4MB of RAM, a hard drive with at least 16MB of free space, two available bus slots, and an appropriate printer (Hewlett-Packard LaserJet II or III, IBM 4019 or 4029 Laser-Printer, Canon LBP-8, Unisys 9000-series laser printer, Olivetti PG-404 laser printer). For \$1,995, you get a 50-MHz image coprocessor, 6MB of image RAM expandable to 16MB, a 9600-bps send-and-receive fax modem, a scanner interface, a high-speed interface to your printer, and a collection of integrated Windows apps that let you access and organize your documents in a variety of ways. The optional Microtek MS-II scanner COMPUTE used with the DDM adds around \$600 to the price of the system. The DDM also supports Hewlett-Packard scanners.

To put the DDM to the test, we installed it in COMPUTE's production department, where it sent and received documents (paper and electronic) without a hitch, kept a record of all fax transactions, copied documents, scanned documents for further reference (and compressed them to save space), and printed faxes and spreadsheets very quickly indeed. While optical character recognition wasn't really a factor in the daily activities of our production department, we tried the OCR software, which performed respectably. You can use data scanned by your DDM system in paint or desktop publishing programs, although these programs are not part of the DDM package.

Installation. Installing the DDM wasn't difficult. The manufacturer provides excellent installation instructions, as well as a checklist to make sure you cover all the bases. The controller card plugged into the computer, a raster interface card

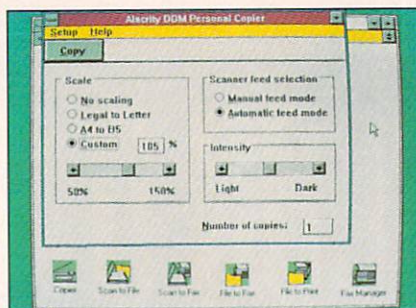
plugged into the LaserJet's auxiliary I/O port, and cables went from the computer to the raster interface, the telephone line, and the Microtek scanner. Additional steps could involve setting DIP switches for a different port address or modifying the raster interface card if you aren't using a Hewlett-Packard LaserJet. The limited length of the raster interface cable necessitated moving the LaserJet closer to the computer. As for the software, it installed easily, much as any Windows app, with the manual explaining choices along the way.

Documentation. The package includes four very good manuals: Installation & Getting Started, Scanning & Copying, Printing & Faxing, and DDM Viewer Optical Character Recognition. Each provides an overview, tells you what it will cover, covers the topic, and provides screen illustrations. Though the manuals lack indexes, the tables of contents, headings, and subheadings help a great deal. The Windows apps in the package include online help.

Ease of use. Just about anyone familiar with Windows should find this package easy to use. But even a user not familiar with Windows had no difficulty putting the system to work. Simply select the appropriate icon, choose from the options in the various dialog boxes, and, if need be, use the online help. The directories you build for fax destinations make sending a fax to an individual or a special group simple. No more queuing up to use a dedicated fax machine. You can fax from any Windows app simply by specifying the DDM fax system as your printer and clicking on the print button. The DDM keeps a record of your faxes for you. (Information about your faxing appears on the screen; unfortunately, there's no auditory feedback). Also, to simplify your access to documents you've stored on disk, the DDM software includes a finder utility with several search options.

Special capabilities. Thanks to the graphics coprocessor and the 6MB of image RAM, the DDM system works fast and in the background, whether printing, copying, scanning, or sending or receiving a fax. Alacrity Systems claims that printing from Windows apps can be accelerated by as much as 500 percent; fax transmission and reception with the DDM were surprisingly fast.

If your hard drive space is limited, you'll welcome the DDM's compression and decompression capabilities. According to the manufacturer, up to 500 pages of documents can be



Windows software makes the DDM simple.



The CJ10 provides beautiful color in seconds.



SatisFAXtion puts power in a small package.

stored in 10MB of disk space using the DDM. This last point bears careful attention if much of your document processing and management involves paper rather than electronic files.

Canon CJ10

If you're into color, you should take a look at the Canon CJ10 color copier/scanner/printer (\$6,995 for the copier, \$2,700 for the IPU that turns it into a scanner/printer). If you've made color copies at a copy shop, odds are that you've seen the output of the Canon CJ10. It prints on special paper and doesn't allow two-sided printing. The unit scans and prints at 400 dpi, which results in a printout that is very close to photographic quality. To test the unit, we spent most of a weekend scanning in blurry, faded, yellowed photographs and cleaning them up with Aldus PhotoStyler, which is provided with the unit. By using PhotoStyler's sharpening routines and boosting the magenta and cyan in the scanned images, we were able to return most of them to their original clarity (and improve the appearance of all of them). Then, we blew the pictures up to fill the 8 1/2- x

11-inch paper and printed them out into framable portraits that looked as if they had been created by a watercolor master (the images created don't have the sheen of photographs but rather the matte appearance of quality art paper).

Installation. The Canon CJ10 requires an IBM PC, Windows (because PhotoStyler is a Windows program), and at least 2MB of RAM. (A Macintosh version is also available.) Setting up the Canon CJ10 was a most complicated and intricate installation. First, the copier had to be set up. As you might expect, it is no simple device in itself. A screw and numerous tabs had to be removed to allow the scan head and printer heads to move freely. Then, the individual printheads had to be installed. Once the copier was ready, the interface device, called the IPU, had to be installed. The IPU is a metal rectangle about four inches high and slightly larger in area than the copier itself. It has indentations for the feet of the copier so the copier can sit on the IPU. A cable leads from the copier to the interface and from the interface to a SCSI adapter card, which has to be installed in the computer itself. Give yourself an afternoon to install this equipment—you'll need it. Finally, the software had to be installed under Windows (Aldus PhotoStyler, mentioned above).

Documentation. Strangely, the most difficult part of setting up the system was figuring out which side of the paper should face up in the paper tray. The manual says to put the whiter side up, but both sides of the paper were equally white. One side was more reflective than the other, so that side was turned upward. A dozen ruined printouts later (if you put the paper in wrong, the printer jams), the error became clear and the paper was turned over. Fortunately, this is an exception in a very detailed manual that was clearly written for people who normally try to avoid technology. It's full of troubleshooting tips and detailed instructions.

Ease of use. Is it possible for a computer peripheral to be too easy to use? It is when you can rapidly generate color printouts that cost about 47 cents apiece. When you have this kind of power at your fingertips, how can you rein in your creativity? Put a cigar box next to the printer and put in a couple of quarters each time you make a printout. Printing and scanning are so effortless that you'll have to keep reminding yourself that this is no toy.



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System to System

Name of System	DDM	Canon CJ10	DOC•IT 4000	DOC•IT 3000	SatisFAXtion
Scanner dpi	300(a)	400	400	300	400
OCR	yes	no	no	no	yes
Gray Scale	(a)	yes	no	no	yes
Color	(a)	yes	no	no	no
Pages per Minute	(b)	.67	8.00	8.00	NA
Printer dpi	(b)	400	400	300	NA
Copying	yes	yes	yes	yes	NA

(a) Depends on the scanner you choose. For example, the Microtek scanner used in our evaluation does not support gray scale, but one of the Hewlett-Packard scanners does.

(b) Depends on the printer used.

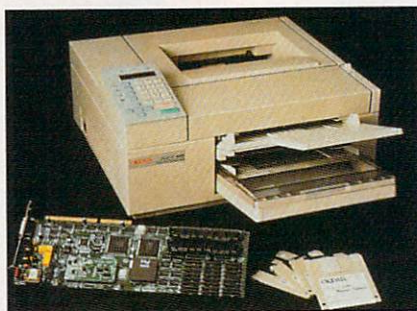
Special capabilities. Although color fax might be a logical extension to this leviathan, Canon has no immediate plans to add that option. If you want to send color faxes to someone with a similar unit, you'll have to fax or modem a color graphics file, then have the person on the other end send the file to the printer to get a hardcopy.

PhotoStyler is excellent software incorporating all sorts of photographic tools and a large assortment of special effects. It nearly won a COMPUTE Choice Award a couple of years ago. (In heavy competition, it lost out to Picture Publisher.)

The Canon CJ10 color scanner also does an excellent job as a gray-scale scanner.

DOC•IT

DOC•IT comes in two versions, the \$3,299 300-dpi DOC•IT 3000 and the \$3,799 400-dpi DOC•IT 4000. The unit reviewed for this article was the DOC•IT 4000. No larger or heavier than a standard desktop laser printer, the DOC•IT provides the full range of small office requirements. First, it's a laser printer that prints at a rate of eight pages per minute and supports both PCL 5, the page-description language used by Hewlett-Packard laser printers, and Truelmage, the PostScript emulation from Microsoft (standard on the 4000; the 3000 comes with PCL 4 and can be upgraded to PCL 5 and Truelmage). It can also function as a "walk-up" photocopier. The DOC•IT is set up as a sheet-fed scanner, which means that you feed sheets into it to copy them. However, the scanner is removable and can be used as a hand scanner for larger pages or for bound originals. The scanner allows the machine to operate as a 400-dpi



DOC•IT puts everything together for you.

sheet-fed or hand scanner. The software doesn't support gray-scale scanning, but if you have other software that supports gray-scale scanners (like Picture Publisher), you can access the DOC•IT as if it were a Hewlett-Packard ScanJet, and in this mode it can deliver up to 64 gray levels (Okidata technical support says that gray-scale capability will be added to the software in the future). Finally, the unit can function as a stand-alone fax machine capable of producing plain-paper faxes. The software can send either paper faxes or faxes generated by the software.

Is the DOC•IT overpriced? To answer that question, you must consider its advantages and the range of equipment it was designed to replace. (The street prices are expected to be much lower than the standard retail prices listed earlier—around \$2,500 for the 3000 and \$2,800 for the 4000.)

Installation. Although we approached the large, complex DOC•IT system with some trepidation, installation was no more difficult than installing a card and setting up a laser printer. The toner cartridge and fixer brush slipped easily into the machine. A power cable and a serial cable run from the machine to the full-

length 16-bit card. A telephone line is attached to the card just as it would be to a modem. Unlike the connections on many modem cards, the input and output connections on the DOC•IT card are clearly marked. We installed the phone lines in serial with the modem and had no trouble using the modem and the fax machine in tandem on a single phone line (though not at the same time, of course). Then the software was installed under Windows.

The only problem with installation was that when it was completed, the scanner wouldn't work. A few minutes on the phone with technical support supplied the solution, and the problem (an address conflict) was resolved and the scanner was fully operational. As automated as the software installation was, we had to edit the CONFIG.SYS and SYSTEM.INI files manually to get the equipment to work. Okidata says that in the next software release, the installation system will make these alterations itself.

Documentation. The Windows DOC•IT software was intuitive enough that reference to a manual was unnecessary for installation or operation. However, there is a complete manual that covers each of the functions in full (it didn't cover the technical problem described above, however). There are some typos in the manual, perhaps evidence of the haste with which the product was brought to market.

Ease of use. The software makes use of an icon bar that reduces all of the functions of the machine to clicking on a button that has both an icon and text. For example, the button that runs the scanner has a picture of a scanner on it as well as the word *Scan*. The DOC•IT unit has four buttons—for scanning,

TECHNOLOGY UPDATE

How to get surround sound without buying the theater...

An amazing new surround sound decoder turns your existing stereo into a five channel home theater.

By Chuck Anton

As much as I love renting videos, it's just not the same as seeing a movie in a theater. I remember the first time I saw *Top Gun*. I nearly jumped out of my seat when the planes flew overhead. One of the reasons movies seem so real is because they use surround sound to make it seem like you're actually there. Now, an incredible new device lets you use your stereo receiver to get that same surround sound in your home.

It takes more than just four speakers to get surround sound. You need to have some way of separating the signals. The new QD-1 Series II decoder does just that, and in a revolutionary way that rivals the best Dolby Pro-Logic and THX Systems available.

Wins over critics.

Noted audio critic, Len Feldman, reviewed the QD-1 for the September issue of *Audio Magazine*. He concluded that "...the QD-1 produced a completely accurate and realistic surround sound experience from a variety of videotapes and laser discs with Dolby surround encoding... the QD-1 delivers home theater sound the way it was meant to be heard."

Breakthrough 'L minus R.'

Back in the 1960's, Dynaco discovered that in addition to the right and left channels, a "difference" signal existed in a stereo recording, and aptly named it "L minus R." The QD-1 is able to decode Dolby Surround signals in a videotape or a laser disc because those spatial and depth cues have been matrixed into the "L minus R" portion of the stereo soundtrack. It does so passively, with no signal processing. What's more amazing, the QD-1 uses your main stereo amp to amplify the rear channels. You do not need any additional amplifiers!

Concert hall sound.

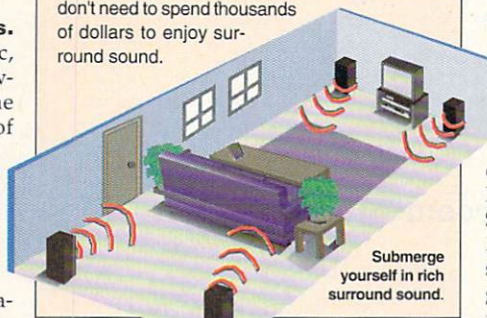
The QD-1 also decodes the ambience found in all musical recordings. This sense of space, or concert hall acoustics is present in all CDs and cassettes, especially live recordings. John Sunier of *Audiophile Edition*, a nationally syndicated radio program, says "If you're a surround sound buff who loves to listen to music, you'll find this \$79 passive black box superior to even the \$3000 THX or Dolby Pro-Logic processor."

The Secret of Surround Sound

Surround sound has become the rage of the '90's because it adds "depth" to stereo sound, giving you the home theater experience. Simply stated, it makes you feel like you're actually at a concert or a movie theater.

To "fill a room" with sound you need more than the two channels. And that's the beauty of the Dynaco QD-1, it provides five channels from any two channel stereo or TV.

Dynaco offers rear channel speakers specifically designed to integrate with the QD-1 decoder. You may also need our center channel speaker, the A10-V, if your two front speakers are more than eight feet apart. Adding this fifth speaker, or center channel, helps keep dialogue and important localization cues centered. So you don't need to spend thousands of dollars to enjoy surround sound.



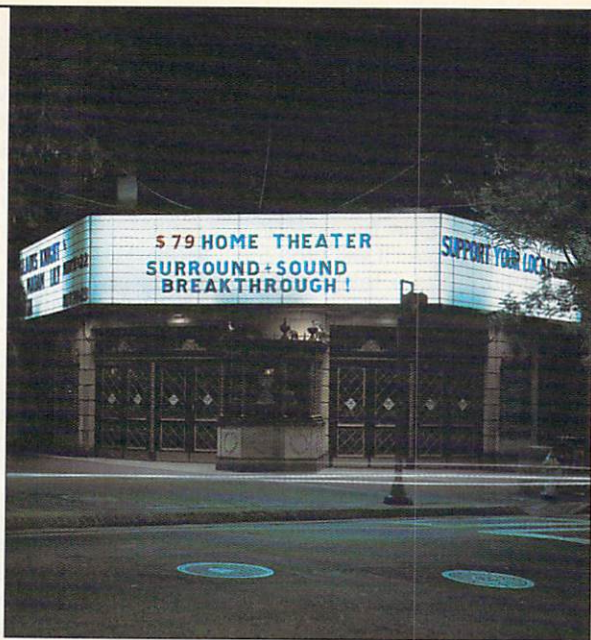
THE PASSIVE ADVANTAGE

Passive. The QD-1 is *passive*, meaning it requires no AC current. It actually sounds better than active decoders, producing more clarity, more detail, no noise, a greater sense of space, and zero distortion. This superior passive system is a breakthrough unique to Dynaco.

Active. All Dolby Pro-Logic decoders (stand-alone or built-in units) are active. This means they decode and amplify the signal electronically. The active way induces noise and distortion, hindering the home theater experience.

This is an example where "more is less." Spending thousands on an active system will not give you the performance of the QD-1.

The QD-1 decoder makes your movies come to life. Surround sound brings the theater experience home to you.



Quick and easy installation. Hook up is easy. The QD-1 connects to the speaker outputs on your amp. The speaker leads then run to each of your four (or five) speakers. The rear channel speakers may be small; we recommend the AW-1s at \$99 a pair. They come with mounting hardware, a key-hole slot for flush mounting, and have an attractive all-weather gun metal aluminum finish.



The AW-1 rear channel speakers integrate perfectly with the QD-1.

Factory direct offer. The QD-1 is so new you won't find it at your local department store. To introduce this product, we are offering it direct to you for a limited time special offer. By ordering now, you can save a substantial amount of money.

Risk-free home trial. Let's face it. The best way to evaluate surround sound is in your home, not in a showroom. That's why we're offering this risk-free home trial offer.

We're so sure you'll be delighted with the quality of these products and the surround sound experience that we are giving you 30 days to try them for yourself. If they're not everything we say, return them for a full refund.

QD-1 surround sound decoder.....\$79 \$6 S&H

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Special capabilities. The software allows you to scan in two pages, reduce and rotate them, and then print them side by side on a single sheet of paper. It will broadcast faxes and supports a telephone book and automatic cover page. If you are faxing to another DOC•IT, you can fax at the full resolution of the machine, though faxing to other machines is at standard 100 x 200 or fine 200 x 200 resolution.

SatisFAXtion Modem/400

The SatisFAXtion package from Intel takes multifunctionality a step beyond most fax/data modems on the market. If you're pleased with your computer and printer and would like to add scanning to fax/data modem capabilities, the SatisFAXtion is worth considering. With an 80286 or higher IBM compatible, DOS 3.0 or higher, at least 640K RAM and 4MB of disk space, and an appropriate graphics adapter (Hercules, CGA, EGA, MCGA, or VGA), you'll be ready to take advantage of this remarkable card.

The SatisFAXtion delivers great

performance with a fax send and receive speed of 14,400 bps and, thanks to V.42bis data compression, modem data throughput of up to 57,600 bps. Compliance with the V.42 specification means that your transmissions are not only fast but reliable. In addition, Intel employs Smart UART (Universal Asynchronous Receiver/Transmitter) buffering to prevent high-speed data loss. Because this card dynamically monitors the quality of the phone connection, slowing down or speeding up according to line conditions, it's able to offer the best throughput possible while protecting your valuable data.

While a PC-based fax/data modem can improve your productivity, nobody likes the interruptions these devices can sometimes cause. Intel's solution is a coprocessor. The SatisFAXtion architecture provides an 80186 microprocessor, 512K of memory, and a custom gate array designed to manage the flow of data. Fax communication becomes largely a background task, smooth and transparent.

The SatisFAXtion Modem/400 package (\$499) includes software for faxing directly from DOS apps. You also get a free copy of CROSSTALK Communicator software for data com-

munications and an invitation to buy Intel's software for Windows: FAXability Plus (\$79) or FAXability Plus/OCR (\$249). If you plan to use this fax software, make sure you have at least 2MB of RAM and 6MB of available hard disk space.

For an additional \$399, you can attach the Intel Hand Scanner, convenient for adding graphics into documents. It plugs into a Logitech-compatible gray-scale scanner port on the SatisFAXtion. Intel also sells three other versions of the SatisFAXtion board.

Installation. Hardware installation of the SatisFAXtion couldn't be simpler. Open your computer, ground yourself, handle the card carefully, and plug the card into an available bus slot. This unit features switchless automatic configuration, which means that you won't have to worry about jumpers or DIP switches. The installation manual spells out the installation very clearly and provides diagrams. The SatisFAXtion software and the FAXability Plus/OCR software also installed easily. Once the fax driver was chosen as the default printer, the SatisFAXtion was ready for business.

Documentation. In addition to the excellent Intel SatisFAXtion

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absolute latest in sound board technology: up to 16-bit/44KHz record/playback, Yamaha OPL-3 stereo synthesis 20-voice chip, 100%

Modem/400 Installation Guide, you receive hardware and software manuals, a CROSSTALK Communicator manual, a pamphlet with recent news about the Modem/400 (updates, corrections, advice), a command reference card, and a directory of software you can use to increase productivity with the Modem/400. These are excellent manuals—thorough, indexed, and clearly written and illustrated—and Intel includes mail-back cards for you to offer criticism. If you need more help, it's available by phone, fax, BBS, CompuServe, and MCI Mail.

Ease of use. As with other Windows-based products examined here, the FAXability software is easy to use, due to its common user interface. In addition to a flashing icon with information about the progress of faxes, it has an in-box, an out-box, a phone book, and options for viewing, printing, forwarding, deleting, and rescheduling faxes. The OCR version allows you to convert faxes to editable text (which lets you save disk space, since text files are smaller than fax files). The DOS-based software that comes with the Modem/400 is also easy to use and can be installed as a TSR.

Special capabilities. The Modem/400 supports MR (Modified

Is Integration for You?

Just as there are good reasons to integrate, there are good reasons to leave well enough alone. For example, imagine that your laser printer breaks down. You can continue with your other work pretty much as normal until the repairs are made. If you have an integrated system, you might be out not only your laser printer but also your fax machine and your copier. Okidata says that its machine will continue functioning even if one component is down—but if that component needs to go into the shop for repairs, the entire system is gone.

Another problem arises when you want to swap equipment. Normally,

when a person in an office needs temporary use of a laser printer, all you have to do is talk the burliest available worker into carrying it from one office to another (or wheel it on a desk chair or hand truck). With an integrated system, the printer is much more tied to the computer. Moving the equipment around also involves either shifting cards and installing software or moving the whole unit—computer and all—from room to room.

The final drawback is that integrated systems try to be all things to all people. If you have special needs, such as a higher-resolution scanner or a desktop typesetter, an integrated system will probably just get in the way.

Read) encoding, which reduces connect time and phone costs an average of 25 percent, according to Intel. Most PC fax/data modems don't support MR. Because SatisFAXtion can recognize whether an incoming call is voice, fax, or data transmission, the Modem/400 allows you to use one phone line for all three purposes. In fact, Intel includes detailed instructions for setting up your phone and

Modem/400 according to whether you use your line mostly for voice calls or mostly for fax calls. If your phone uses one ring pattern for one number and another ring pattern for another number, you can set the Modem/400 to pick up only for a particular ring.

Integration

Also available are what we've come to call "black boxes," which turn a print-

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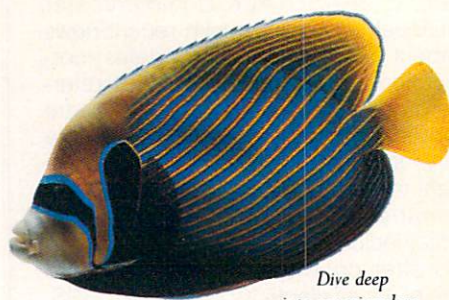
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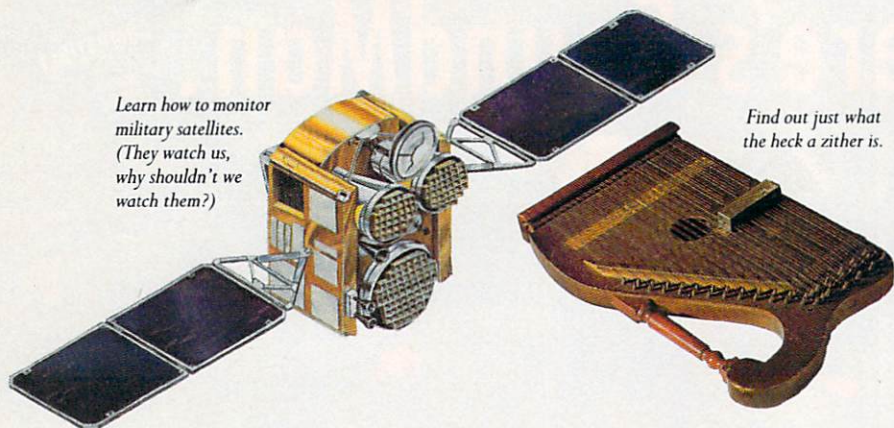
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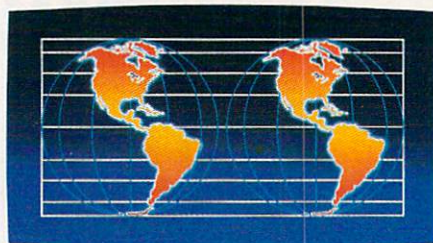


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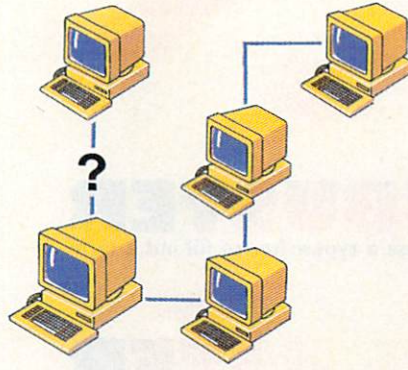
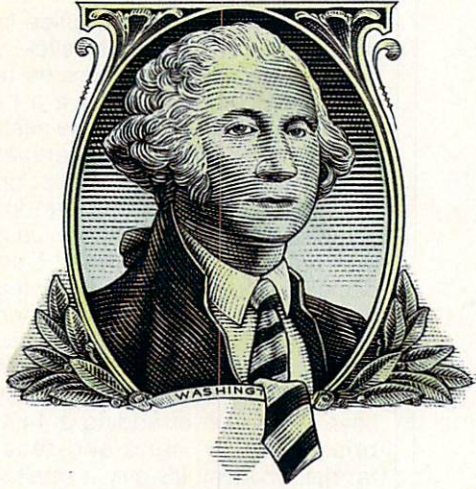
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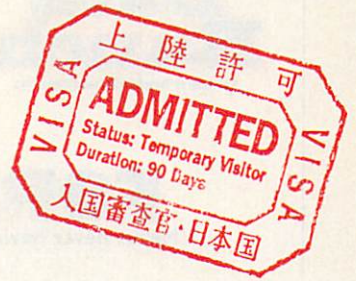
beginners to experts. So you can share software or work out a few personal computer bugs with your system's designer on Monday, battle a nefarious evildoer from Cleveland on Tuesday, and fax someone a list of bed and breakfasts in Vermont on Wednesday.

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rary rather than permanent quarters: homes, dorms, motel rooms, the backs of vans—wherever they will fit. And why should you give up the benefits of your office when you're away? Why not have a suitcase-size piece of equipment that can do everything?

The movement toward office integration hasn't reached that level—yet. None of the equipment covered here is portable, and you'd have a hard time getting it under an airline seat (or even in an overhead compartment). But we already have scanners, printers, and computers that can keep company in a single briefcase. Just as this was going to press, Canon demonstrated in our offices its integration of the famous BubbleJet printer and a laptop computer into a seven-pound computer with a 360-dpi printer inside for under \$2,500. With it, you have the option of adding a 14,400-bps PCMCIA send-and-receive fax/data modem. It's only a small step from there to packing an entire office suite to travel with you.

Meanwhile, if you want to install an office quickly and inexpensively with integrated peripherals, you have several options. And even more exciting things are on the horizon. □

Product List

Alacrity Systems Desktop
Document Manager Private
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scanner)

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Hackettstown, NJ 07840
(908) 813-2400

Canon CJ10—\$6,995
IPU—\$2,700
CANON USA
One Canon Plaza
Lake Success, NY 11042
(516) 488-6700

Intel SatisFAXtion Modem/400—
\$499

Intel Hand Scanner—\$399
FAXability Plus—\$79
FAXability Plus/OCR—\$249
INTEL
5200 NE Elam Young Pkwy.
Hillsboro, OR 97124
(800) 538-3373

DOC•IT 4000—\$3,799
DOC•IT 3000—\$3,299
OKIDATA
532 Fellowship Rd.
Mt. Laurel, NJ 08054
(609) 235-2600

er into a plain-paper fax receiver. For example, Moonlight Computer Products (10211 Pacific Mesa Boulevard, San Diego, California 92121; 619-625-0300) sells a unit called the PrinterFax, which plugs into the font cartridge slots in a Hewlett-Packard LaserJet. (It only receives faxes; to send a fax, you need to have a separate fax modem or fax/data modem in your computer.) Various printer makers are building this fax-ceive capability into their machines. Hewlett-Packard, Compaq, and others are adding the option of plain-paper

fax receiving to their laser printers.

Throughout the preparation of this feature, we awaited the arrival of a product that takes office integration still another step further—Digital Design's Gateway, a combination laser printer, scanner, fax, copier, and computer in a single unit. Unfortunately, the system never arrived.

If computerization was the revolution of the early 1980s and the home and mobile office were the revolutions of the late 1980s, then integration could well be the revolution of the early 1990s. Offices are moving into tempo-



When you already have a best seller like the KX-P1123 Dot Matrix Printer that delivers outstanding print quality, speed and reliability for the money, what do you do for an encore? We asked people just like you and they told us to make it quieter.



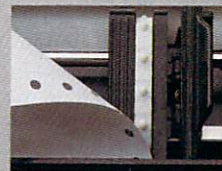
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simplified paper path. Plus, like all Panasonic Dot Matrix Printers, the KX-P2023 is backed by a two-year limited warranty.* No wonder the 1992 PC Magazine Service and Reliability Survey rated Panasonic "Excellent" on reliability, service and support.

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TEST LAB

Edited by Mike Hudnall
Reviews by Tom Benford

Trumpet fanfare heralds the opening of an application. A synthesized band with wailing guitars and a pounding beat draws your youngster into the latest educational (and highly entertaining) software. An ominous chord and an eerie tremolo from your electronic "orchestra" announce danger in an entertainment package. Thunder, crashes, squeaking doors, and a collection of sound effects worthy of a Hollywood studio enliven software of all sorts. All of these musical marvels are possible, thanks to sound cards.

The beeps and boops of tinny speakers, too long the repertoire of the PC, have given way to the incredibly rich and diverse sounds of today's sound cards in much the same way the Victrola gave way to sophisticated stereo systems or CGA displays gave way to Super VGA. If you've never heard music and sound effects generated by one of these electronic wonders, you're in for a treat. Once you've tried a sound card, you'll never again be satisfied with just a PC speaker. And if the sound card industry maintains its present evolutionary momentum, you'll continue to benefit from more and more features, truer and richer sound, and more value for your money.

While the sound card industry has developed a certain degree of standardization, such as Sound Blaster or Ad Lib compatibility, you'll find a surprising amount of variety—in design, capabilities, prices, and software bundles.

This month Test Lab focuses on ten cards that were chosen because they're likely choices for COMPUTE readers, because they were ready for testing, and because they offer a variety of prices and features. While you may associate sound cards with games or MIDI, one of the cards,

the Windows Sound System from Microsoft, targets the business user. An increasing number of productivity applications, such as word processors and presentation packages, take advantage of sound. Sound can entertain and educate, certainly, but it can also make you more productive.

The least expensive card in this month's lineup lists for \$129, and the most expensive will run you \$429. Take a look at this month's grid of features to see why you'll be spending more for some of these cards than for others. There, you'll find details about everything from the input and output jacks to the synthesizer chip set, the number of synthesizer voices, and the supplied accessories.

Notice in the grid a similarity in terminology to describe slot requirements and sampling rates. Four of the cards require a 16-bit bus slot; the other six can fit into an 8-bit slot. However, six of the cards offer 16-bit sampling rates (in addition to their 8-bit rates), and the other cards offer 8-bit sampling rates. What that means is that cards with 16-bit sampling rates give you access to more sound information than cards with 8-bit sampling rates. Thus, 16-bit sampling rates offer better sound quality than 8-bit rates and also require more hard disk space to store all of that information. The greater amount of sound information with 16-bit sampling becomes apparent, too, when you notice the frequency ranges (listed in kHz) that go with these sampling rates. Simply put, 16-bit sampling at 44 kHz gives you CD-quality audio, while 8-bit sampling gives you the kind of audio you might hear with an inexpensive FM radio.

Seven of the sound cards provide a CD-ROM interface, increasingly important if you plan to take advantage of the growing number of CD-ROM titles, including many specifically developed for multimedia.

Some of the cards offer FM synthesis, some offer wavetable synthesis, and some offer both. If these technologies are foreign to you, take a look at the glossary and at the sidebar comparing these two techniques for synthesizing sounds.

The reviews of these cards also offer insights into sound technologies, as well as detailed information about each card. Each review discusses installation, software, options, and distinctive features.

Finally, you'll find test data. We tested the compatibility of each card using six different programs. More significantly, however, we checked each card for distortion levels and signal-to-noise ratios. The sidebar on methodology details exactly how we tested these cards, and our bar graphs provide the results.

Whether you're looking for an entry-level card or a more sophisticated MIDI-capable device, this month's Test Lab has information you can use to make a sound purchase.

MIKE HUDNALL

ADVANCED GRAVIS ULTRASOUND

If you're looking for plenty of musical voices, features, capabilities, and expandability, the UltraSound from Advanced Gravis may be the right audio board for you.

This full-length board installs in any 8- or 16-bit expansion slot and uses jumpers to alter any of the default settings, although these settings should work for the majority of installations. The jumper caps on the UltraSound are nifty little items with extended "handles" that make them easier for you to remove and reinsert as required using the fingers alone. Standard jumper caps usually require the assistance of tweezers, needle-nosed pliers, or similar implements to change their position, so this is a nice touch that makes installation a bit easier than usual.

The mounting bracket of the board contains a 15-pin D connector in the middle, which you use for attaching joysticks or the optional MIDI breakout box. Four jacks (two on each side of the D connector) provide audio input and output; the two uppermost jacks provide amplified output and line level output, while the lower two jacks accommodate microphone input and line level audio input.

The UltraSound does not contain an FM synthesizer chip. Instead, it uses a proprietary audio signal processor and wavetable synthesis to produce sounds. The board is capable of 16-bit, 44.1-kHz audio playback and can record 8-bit sound from 2.0 to 44.1 kHz in either mono or stereo. You can add 16-bit recording capability with an optional daughter board. Another daughter board for implementing the CD-ROM interface capabilities is also offered as an optional accessory.

The musical and sound capabilities of the UltraSound are impressive. Its on-board 16-bit synthesizer can generate 32 independent voices; in other words, you can control the volume, the amplitude, and the timbre of each voice independently. Since wavetable synthesis uses software "patches" of sound that can be loaded as desired, the ability to play 32 of these sound patches gives you the flexibility to create any type of orchestral arrangement you want. This capability is sure to find favor with serious com-

ADVANCED GRAVIS
1790 Midway Ln.
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(604) 431-5020
List price: \$199
Warranty: one year

puter musicians and MIDI users.

Installation is a bit more involved than with some of the other boards, but since it's highly automated, even novice users should be able to accomplish it without a problem. Function tests check the board's operation and detect any conflicts that may require resetting the board's jumpers; this is a great aid for troubleshooting and correcting any problems that you might encounter in systems heavily laden with installed peripherals.

The review board came equipped with 256K of on-board memory, which you can upgrade to 1MB by adding 128K of DRAM chips, although according to Advanced Gravis's press release, 512K will be the standard complement for retail versions. Adding RAM to the board increases its capacity for storing wavetable patches to increase the number of sounds available in memory.

Included with the UltraSound is a program called UltraSound Studio 8, a full-featured recording studio for playing, recording, mixing, and customizing digital sound files. The package also includes Windows and DOS drivers and recording and playing utilities, as well as a program for synchronizing digitized sound with

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List price: \$199
Warranty: five years



the AutoDesk Animator FLI-format animations. A program for playing MIDI files and numerous samples of demo music, sequences, and sounds also comes with the package, as well as a set of 192 General MIDI instrument patches. All software comes supplied on 3½-inch low-density (720K) disks, with no mention of the availability of 5¼-inch versions.

Sound Blaster and Ad Lib compatibility is provided by running a program called SBOS (Sound Board Operating System). This program tells the UltraSound's CPU to emulate the FM-synthesized sounds, but the resulting sounds are much better than their FM counterparts with respect to realism and clarity.

Circle Reader Service Number 371

ATI STEREO F/X-CD

Ease of installation and ease of use obviously ranked high on ATI's list of priorities as its engineers set about the task of designing the STEREO F/X-CD audio board. They've succeeded admirably in both areas.

The three-quarter-length card has no jumpers or DIP switches; you configure the card completely through the software, making the installation simply a matter of inserting the card into any available 8- or 16-bit slot and running the installation software. Interrupt 2, 5, or 7 is available for audio use, and you can select either 220 or 240 as the address.

The board uses pin connec-



TEST LAB

tors, and there's a cable for routing the PC's speaker sounds through the STEREO F/X-CD. Another channels a CD-ROM drive's audio output through the board. You'll also find a 40-pin interface for Mitsumi and compatible CD-ROM drives.

The backplane mounting bracket houses a 15-pin D connector for attaching joysticks or the optional MIDI connector box. Three jacks handle microphone and line level input and speaker or headphone output. The mounting bracket also contains a rotary knob for controlling volume.

The Yamaha YMF262-M (OPL3) synthesizer chip provides the sonic heart of the board, delivering 20 stereo voices with 8-bit sampling rates up to 44 kHz in monophonic and 22 kHz in stereo.

This board offers full Ad Lib and Sound Blaster compatibility, along with full programming support for software designed to conform with these standards under DOS and Windows.

The accompanying software comes provided on two 5¼-inch high-density disks, with no mention of the availability of 3½-inch disks. Universal DOS and Windows drivers are provided, as well as several utilities and sound applications, including WinDAT and DOSDAT, two programs developed by Voyetra Technologies to provide an interface similar to the controls found on a stereo system and high-end tape deck. The DAT portion of these program names stands for *Digital Audio Transport*; the programs run from Windows and DOS, respectively.

For full, rich sound on applications written for mono FM synthesis, the STEREO F/X-CD has a feature which can add a stereo effect. I was somewhat skeptical of this feature until I actually tried running some mono FM sound samples through the card with and without the Stereo Effect feature active. I must admit that the effect made a noticeable differ-

AZTECH LABS
46707 Fremont Blvd.
Fremont, CA 94538
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List price: \$179
Warranty: one year

ence in the sound and definitely added some dimension to it.

You'll also find mixer programs for DOS and Windows which permit actively mixing and blending the signals of six different sound sources (FM, Wave, CD audio, PC speaker, line input, and microphone). In addition to controlling the individual volume of each sound source, these mixer applications also regulate the left-to-right balance and overall volume.

In the bundled software, ATI includes a generous selection of MIDI song files and a DOS MIDI player utility.

The ATI STEREO F/X-CD provides a good means of adding stereo FM sound synthesis and audio capabilities at an affordable price.

Circle Reader Service Number 372

AZTECH LABS SOUND GALAXY NX PRO

Aztech Labs packs plenty of desirable features and options into its Sound Galaxy NX PRO sound card.

A three-quarter-length card, the NX PRO requires a 16-bit expansion slot for installation. One of the interesting things about this board is that only Aztech proprietary chips are used for sound generation; the familiar Yamaha OPL2 or OPL3 chips are nowhere to be found on this board. A connector provided on the board routes CD-ROM audio through it, and another connector permits channeling the sound that would ordinarily go to the PC's speaker through the board as well.

The NX PRO boasts two CD-



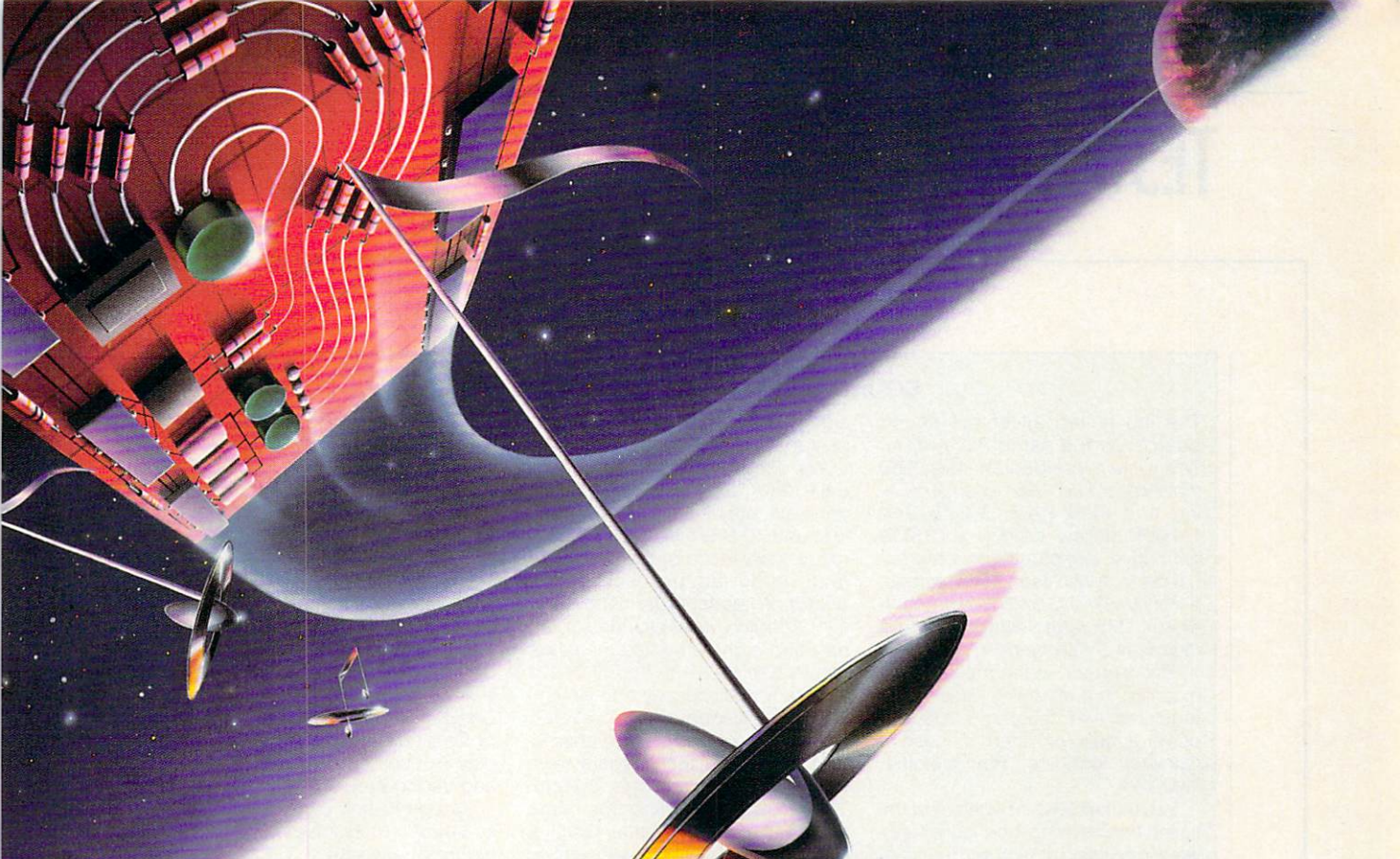
ROM interfaces, both 40-pin, which can accommodate a Panasonic CR-521 or CR-522 or a Mitsumi LU005S CD-ROM drive. An optional Future Domain SCSI upgrade kit (a Future Domain SCSI controller chip and device driver software) costs \$30 and adds SCSI capability to the sound board.

The card's backplane mounting bracket holds three jacks used for microphone input, line input, and speaker or headphone output. There's a volume wheel between the speaker and the microphone input jack and a 15-pin D connector used for attaching a joystick or the optional MIDI cable.

To install the NX PRO, you simply insert the board into any available 16-bit slot and start the software installation process. The installation software and the other software come supplied on 3½-inch disks only, and I could find no mention in the manual or other supplied material of the availability of 5¼-inch disks. That's too bad, because the package is exceptionally complete in other respects.

In addition to the NX PRO sound card and the installation software, an RCA patch cable and a pair of miniature Walkman-style speakers are provided, along with a cable for routing the PC speaker's output through the board.

The real bonus is the software that comes with the hardware. You get First Byte's Monologue text-to-speech synthesizer; Voyetra's WinDAT waveform editor for Windows; SoundScript, a multimedia authoring program; and



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SOUND BOARD TEST METHODOLOGY

The lab tested all of the sound boards on the same PC system. This system included an i486DX/50 motherboard with 256K external caching and 8MB RAM, 1.2MB and 1.44MB floppy drives, a 213MB hard drive, one parallel port, two serial ports, a Microsoft serial mouse, a Renoir NT SVGA Windows Accelerator 1MB video adapter, and a multiscan SVGA monitor.

The system components were mounted in a minitower case with a regulated and calibrated 200-watt power supply, provided courtesy of General Technics, Ronkonkoma, New York.

Lab technicians installed all of the sound boards using the supplied software installation utilities and the manufacturers' default jumper, I/O, address, and DMA settings.

The test results appearing in the bar graphs are relative performance

comparisons that are based on proprietary CPTS test files.

We used a Leader Instruments LAG-126 Audio Signal Generator to generate signal sound files. The 1-kHz and 10-kHz files offer a testing range easily heard by the human ear and supported by each of the boards. A Leader Instruments LDM-171 Distortion Meter provided distortion and signal-to-noise measurements. The LAG-126 and LDM-171 were provided courtesy of Leader Instruments, Hauppauge, New York.

The sine waveforms and characteristics of the test signals were checked using a Gage CompuScope Lite 64K oscilloscope board and GageScope Digital Oscilloscope software, which we installed in the test system. The board and software were provided courtesy of Gage Applied Sciences, Montreal, Canada.

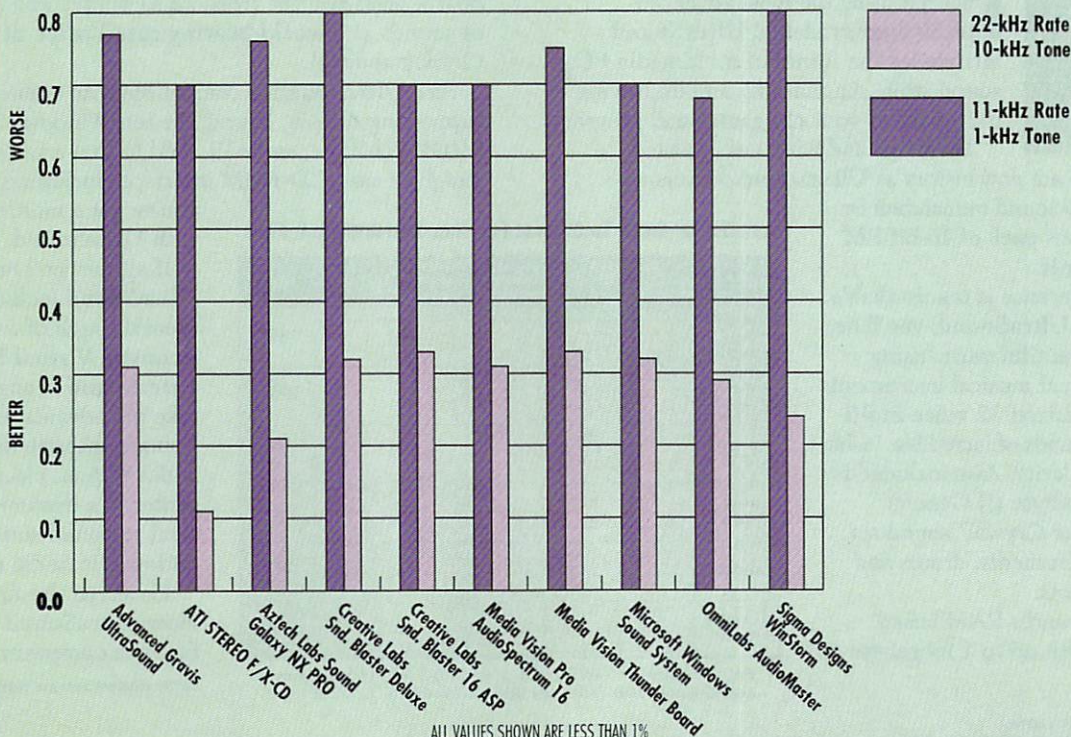
We ran the CPTS proprietary audio test files from within Windows 3.1 using Voyetra Technologies' AudioView software. Distortion and signal-to-noise readings were taken from each board's headphone or speaker output using both the 1-kHz and 10-kHz test files.

We tested each sound board's Ad Lib, Sound Blaster, and Disney Sound Source compatibility using Spectrum HoloByte's Falcon 3.0, Davidson's Zoo Keeper, The Learning Company's Operation Neptune, Sierra On-Line's King's Quest VI, Interplay Productions' Out of This World, and Virgin Games' Dune.

Joseph Fisher, product manager at Leader Instruments, provided technical assistance in calibrating and setting up the LAG-126 and LDM-171 Distortion Meter.

—TOM BENFORD, PRESIDENT
COMPUTER PRODUCT TESTING SERVICES

DISTORTION LEVEL—8-BIT FILE



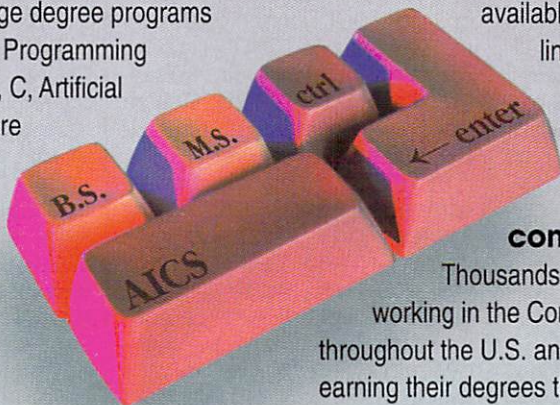
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Galaxy Master, a digital recording and playback program. Another utility program called Jukebox permits you to create playlists and play sound files, and CD Player serves as a CD-audio control panel. Another disk, called Sound Tracks, is a collection of song files, and still another disk contains Windows 3.1 drivers. There's certainly no lack of software here.

Of all the sound cards covered in this issue, the NX PRO undoubtedly offers the widest spectrum of compatibility. This stereo board supports four sound standards: Ad Lib, Sound Blaster Pro 2.0, Covox Speech Thing, and even the Disney Sound Source. During the review I ran several software titles which use sound, including Dune, King's Quest VI, Operation Neptune, Zoo Keeper, and Out of This World. I encountered no compatibility or audio playback problems.

The Sound Galaxy NX PRO provides good stereo sound quality, exceptional compatibility, a nice selection of features, and good upgrade and expansion potential.

Circle Reader Service Number 373

CREATIVE LABS SOUND BLASTER DELUXE

One of the first audio cards on the scene for PCs, the original Sound Blaster from Creative Labs set the industry standard for sound. Creative Labs has continued to refine and improve the Sound Blaster, so it's an oldie but a goodie.

As the Sound Blaster has evolved over the years, its physical form has changed as well. The original Sound Blaster, a three-quarter-length card, contained lots of discrete components; the new Sound Blaster Deluxe, now only half-length, uses plenty of large-scale integration to reduce the number of components required. The board will install in any available 8-bit slot.

CREATIVE LABS
1901 McCarthy Blvd.
Milpitas, CA 95035
(800) 998-5227
(408) 428-6600
List price: \$129.95
Warranty: one year

Creative Labs has added a one-eighth-inch jack on the backplane of the board, increasing the total number of jacks to 3 (from 2 on the earlier Sound Blaster versions). This additional input jack accommodates line input, whereas line and microphone input shared the same jack in the past. There's also a line output jack, a manual volume wheel, and a 15-pin D connector for attaching a joystick. This connector doubles as an attachment point for an optional MIDI Connector Box so that you can use a MIDI keyboard or instrument with the Sound Blaster. The Sound Blaster Deluxe does not provide a built-in CD-ROM interface, however.

The Sound Blaster Deluxe comes preconfigured to use I/O address 220, IRQ 7, and DMA channel 1; these default settings will work with most systems, although there are some instances when IRQ 5 may be more desirable (LPT1 is usually assigned to IRQ 7, and this might be troublesome in some systems). You change any of these default values by relocating the jumpers over the desired pair of pins to correspond with your choice.

Once you've completed the physical installation, all that remains is to run the automated installation application provided on the two high-density 3½-inch disks supplied; one contains the DOS programs, and the other contains Windows drivers and programs. A format-request card lets you receive low-density 3½-inch disks or either low- or high-density 5¼-inch disks. Your only cost for the optional-size media: the price of a stamp to mail the card back to Creative Labs.



During the review I installed the Sound Blaster Deluxe in a 486DX/50 PC, and the DOS portion of the installation proceeded without a hitch. The software correctly found the card; identified the IRQ, I/O, and DMA settings; and successfully played the provided sound test files. I ran several DOS-based games with the Sound Blaster Deluxe, and everything worked just fine.

Windows, however, was another matter. Running the Winsetup.exe program from within Windows produced an error message telling me that the Sound Blaster Deluxe environment wasn't set (even though it had been from the DOS installation) and refusing to let me proceed any further.

To get around the problem, I tried installing the drivers from the Add Drivers section in the Windows control panel. I managed to install the Sound Blaster Deluxe MIDI Synthesizer and Sound Blaster Deluxe Wave and MIDI drivers; I was not, however, able to get them to work. Upon loading Windows I heard a distinct "click" sound from the speakers

Benchmark/performance testing was conducted by Computer Product Testing Services, Inc. CPTS is an independent testing and evaluation laboratory based in Manasquan, NJ. 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.

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but no opening Windows sound (the default "tada" sound). Looking in the control panel section under Sounds, I found that all of the sound file names were ghosted out, signifying that Windows wasn't recognizing the Sound Blaster Deluxe.

I called Creative Labs' tech support department and waited only about six or seven minutes in the holding queue before a technician picked up my call. After double-checking my settings and asking me a few questions about my system, the tech support person told me that there were some known problems with the Deluxe drivers when used with high-speed 486 systems. I was advised to use the Sound Blaster 1.5 drivers included on the Windows system disks to get me up and running until a set of updated Deluxe drivers arrived via Fed-

eral Express the next day.

Time being of the essence, I decided to turn off both the internal and external caching on my 486DX/50 system to see if that would help. Presto—with the caching disabled, I could load and use the Sound Blaster Deluxe drivers without further incident or problems. Since my motherboard does not support dual speeds, disabling the caching apparently slowed the system down enough for the 8-bit Sound Blaster board to be recognized. When the new drivers did arrive, I still found it necessary to keep the on-board caching disabled in order for them to work correctly.

Like earlier Sound Blasters, the Sound Blaster Deluxe is an inexpensive audio product that delivers good performance and has industrywide software support.

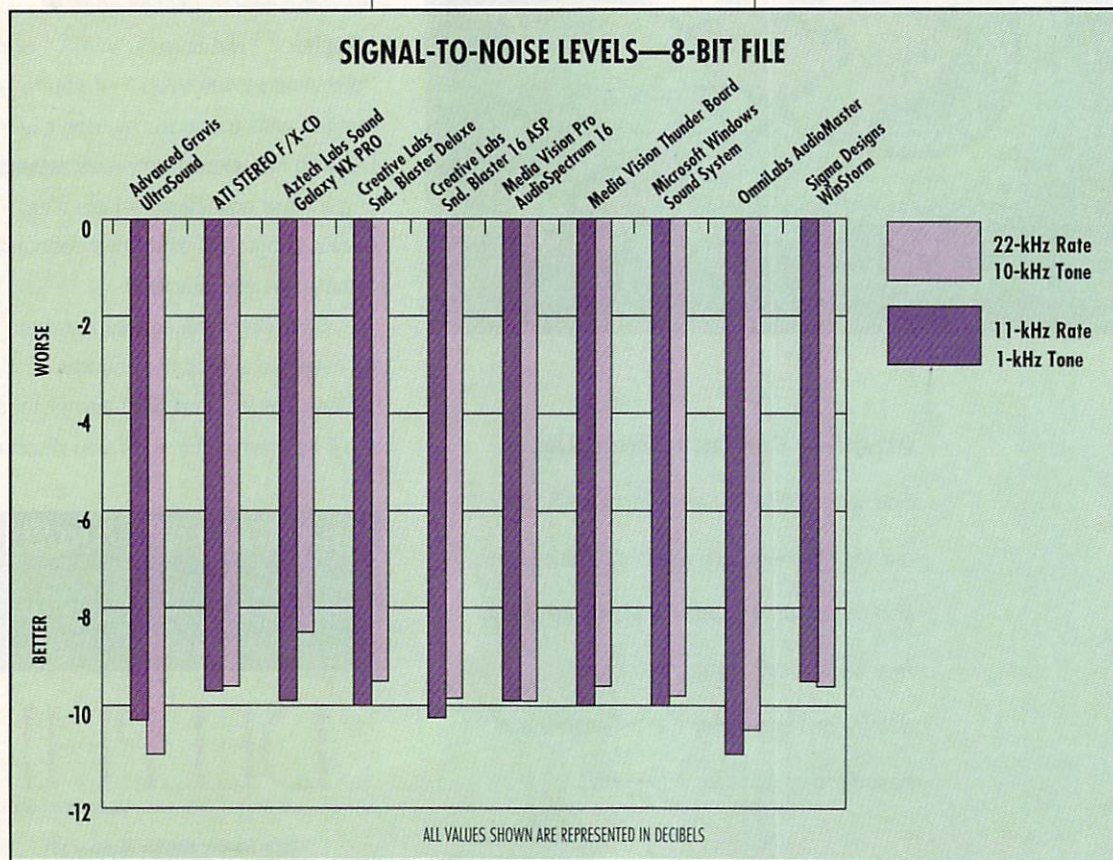
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CREATIVE LABS SOUND BLASTER 16 ASP

Creative Labs has taken the basic features of its Sound Blaster Pro card and added its ASP (Advanced Signal Processing) technology to produce true 16-bit stereophonic recording and playback while maintaining full compatibility with software designed to run on the original Sound Blaster and Ad Lib sound boards.

The 20-voice FM synthesizer capabilities of the Yamaha YMF262-M (OPL3) chip combine with lots of highly integrated components and several of Creative Labs' proprietary chips to deliver the best of both the FM synthesis and digital audio technologies.

This three-quarter-length card



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requires a 16-bit expansion slot for installation. A wheel mounted on the board's backplane bracket controls volume. There you'll also find jacks for microphone input, line level input, and speaker or headphone output. Creative Labs supplies a high-quality dynamic microphone and a miniphone-to-RCA patch cable. A 15-pin D connector for attaching joysticks or the optional MIDI breakout box also resides on the mounting bracket.

As with the other better-quality sound cards covered here, the 16 ASP provides several connectors for channeling various sound elements through the board for recording, playback, mixing, or integrating. Connector pins are provided for routing the sound of the PC's internal speaker and CD audio through the 16 ASP. The board also includes a CD-ROM interface that supports internal CD-ROM drives from Creative Labs or Panasonic drive models CR-521 and CR-523. For attaching the optional Wave Blaster daughter board, there's a pin connector.

The Wave Blaster daughter board endows the 16 ASP with 32-voice, multitimbral stereo sound using E-mu Systems' sampled wavetable synthesis technology. If you're interested in exploiting the musical and MIDI capabilities of this board, you should also consider buying the Wave Blaster

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Warranty: one year

Upgrade option.

The Sound Blaster 16 ASP comes with plenty of software. The assortment includes Creative Wavestudio, a Windows-based wave editor that supports editing multiple sound files simultaneously. Creative Sound'le, an object-linking recording and playback utility, is also included, along with Creative Mosaic, a tile-matching game with bit-mapped graphics and, of course, sound effects. The Creative Talking Scheduler helps you keep up with your calendar and appointments by giving you voice-annotated reminders.

Other bundled software consists of HSC's Interactive, a multimedia presentation-authoring, icon-animating, and image-enhancing package; PC Animate Plus, an animation creation program; and Monologue for Windows, a text-to-speech utility.

Several of the standard software offerings from Creative Labs also come with the Sound Blaster 16 ASP, including SBTalker with Dr. Sbitso, FM Intelligent Organ, SBMIDI (MIDI file driver), SBSIM (Sound Blaster Standard Interface Module), MMPLAY (multimedia presenter), and DOS and Windows 3.1 software drivers. Creative Labs supplies the software on 3½-inch high-density disks, but a format-request card makes getting low-density 3½-inch or low- or high-density 5¼-inch disks as sim-

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(510) 770-8600
List price: \$299
Warranty: three years

ple as affixing a stamp, filling in your name, address, and other pertinent information, and dropping the card into a mailbox.

The Sound Blaster 16 ASP proves that you can make a good thing better by constantly improving it with the latest technological advances.

Circle Reader Service Number 375

MEDIA VISION PRO AUDIOSPECTRUM 16

Media Vision's Pro AudioSpectrum 16 audio board has been around for some time now, but additional features and software utilities that the manufacturer now provides with the hardware keep this 16-bit stereo sound card current for today's more demanding audio applications.

A three-quarter-length board, the PAS 16 requires a 16-bit expansion slot for mounting. Three one-eighth-inch jacks on the board's mounting bracket accommodate microphone input, stereo line input, and stereo line output. A 15-pin D connector on the mounting bracket connects the optional MIDI Mate or an external SCSI cable kit.

The board also has a standard 50-pin SCSI interface connector for attaching a ribbon cable, as well as a 5-pin connector for routing CD audio through the board. There's also a 4-pin connector for





channeling the PC's system beeps through the board instead of through the computer's speaker (appropriate cables for making these connections are available as options). The board's mounting bracket doesn't contain a manual volume control wheel or knob because you adjust the volume via the software rather than through hardware.

Installing the board involves inserting it in a suitable expansion slot and putting the PC back together again; there are no jumpers or DIP switches to set, making this one of the easiest boards to install.

You should find the software installation for both DOS and Windows almost as easy as the hardware portion. Default IRQ, DMA, and port settings; subdirectory options; and installation options will work just fine with the majority of installations. However, you're given the opportunity to override the defaults if you so desire. A particularly nice feature is the automatic IRQ and DMA conflict testing, which alerts you to the possibility of a conflict and even tells you how to resolve it.

Running the Setup.exe program from within Windows will configure the board, load the appropriate drivers, create a program group, and install the audio applications in that group. The PAS 16 package includes four applications. Pocket Recorder, a simple recording and playback pro-

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 List price: \$169
 Warranty: three years

gram, offers surprisingly good editing and effects features. Pocket Mixer, a simplified audio mixing console, uses an analog representation of dials to make adjustments. Pocket CD is a CD-audio player utility (this works only if you have a CD-ROM drive installed). Pro Mixer, a ten-control mixer, uses "sliders" to increase or decrease recording or playback volumes from all of the audio components. The ten sliders are labeled SYNTH, REC, AUX, CD, MIC, WAVE, SPKR, BLSTR, Master, and Record.

The DOS utilities provided include Stereo Studio F/X, a recording, playback, and editing package; SP Spectrum, a MIDI sequencer program; a DOS mixer; TrakBlaster Pro, a four-track music studio; Audio Mate, a DOS-based multimedia presentation package; and Monologue, a text-to-speech synthesizer.

One of the more noteworthy improvements to the software is Media Vision's new virtual device driver for Windows, which allows Windows and DOS software applications to share the PAS 16 hardware without the conflicts that frequently cause applications to crash. This feature allows you to run DOS applications (such as games) through a DOS window and still have full access to the sound card from both the DOS application and Windows.

With the ability to record and play back sound at a sampling rate of up to 44.1 kHz, this board is capable of CD-quality audio. Media Vision's Pro AudioSpectrum 16 remains a highly desirable product for adding sound to your system.

Circle Reader Service Number 376

MEDIA VISION THUNDER BOARD

If you're looking for an inexpensive way to get into the world of sound and audio for both DOS and Windows applications, the Media Vision Thunder Board merits a close look.

The Thunder Board, a half-length card, installs easily into any available 8-bit expansion slot in the PC. The board uses a bank of four jumpers for changing the default IRQ setting, as well as a six-position DIP switch to select addresses, activate or deactivate the joystick port, enable or disable FM synthesis, and other functions.

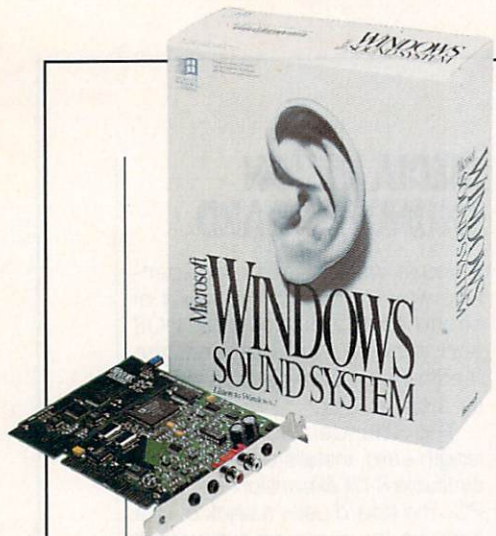
The board's mounting bracket contains a volume wheel, a pair of one-eighth-inch jacks (one for input and one for output), and a 15-pin D connector for attaching a joystick. External MIDI functions are not supported by the Thunder Board, nor does it have a CD-ROM interface.

While it may lack these expanded capabilities, the Thunder Board does have all of the basic elements that most users interested in adding sound to their computing will want. It uses a Yamaha 3812 (OPL2) synthesizer chip to produce 11-voice FM music synthesis, and it's capable of recording and playing back 8-bit sounds up to 22 kHz. The Thunder Board's microphone input circuit also has AGC (Automatic Gain Control) to provide smooth recording at the proper volume level with minimal distortion.

You install the Thunder Board from DOS using an automated installation program that creates a subdirectory on the hard drive and copies over a series of files. The package includes both 3½-inch and 5¼-inch disks, a practice that I like.

During installation, the software checks to determine the card's address and IRQ settings, and a test tone helps you adjust the volume. The entire process

TEST LAB



takes only a few minutes and, like the Thunder Board itself, is efficient without frills.

Included in the Thunder Board package you'll find a series of DOS-based utilities, which are copied to the THUNDER subdirectory during the installation process. The Recfile.exe program records sound files, and as you might guess, the Playfile.exe program plays them back. A Setvol.exe program produces an audible tone so you can manually adjust the volume (using the volume wheel on the board's mounting bracket) to a suitable level. A diagnostic program called Tbstest.exe determines the board's hardware settings and will optionally also play the test tone for checking volume.

The Thunder Board packs plenty of free software samplers in the package. A full working copy of MicroProse's F-15 Strike Eagle II is supplied, along with a complete 96-page user manual for the game. In addition, sampler editions of the following games are also provided: Nova 9 (the sequel to Stellar 7), Lemmings, Lexi-Cross, Rex Nebular, and Goblins. If you're into games, the software included justifies the purchase price of the board alone.

Media Vision's Thunder Board is an good entry-level sound card that will appeal to gamers and others who want to add sound to their applications without breaking the bank.

Circle Reader Service Number 377

MICROSOFT
One Microsoft Way
Redmond, WA 98052-6399
(800) 426-9400
(206) 635-7040
List price: \$289
Warranty: one year for hardware, 90 days for software

MICROSOFT WINDOWS SOUND SYSTEM

The Microsoft Windows Sound System, as its name clearly indicates, is designed for Windows only, and it targets the business computer user.

Look at the board closely, and you'll see that its physical configuration departs from the norm with regard to its components. A half-length unit, the Windows Sound System has both a Yamaha YMF262-M FM synthesizer and an Analog Devices CODEC digital sound processor as sound-generation sources.

The metal mounting bracket of the board contains three jacks to accommodate line input, microphone input, and headphone or speaker output. Two RCA jacks route the board's line output to another location; the only things you need are standard audio cables.

Along with 5¼-inch and 3½-inch high-density software disks, you get a form for requesting 3½-inch low-density (720K) disks. A decent pair of lightweight stereo headphones and a microphone also come with the Windows Sound System package, so you're ready to record, play back, and use sounds as soon as you complete the installation.

Installing the Windows Sound System consists of inserting the sound board into any available 8- or 16-bit expansion slot. A 16-bit slot, however, provides the best flexibility for the hardware configuration, because with a 16-bit slot you have additional address-

es and IRQ lines to avoid conflicts in systems with plenty of peripherals. Jumpers on the card allow you to change the default address of 530, although this I/O address should work without a problem in most systems.

You can install the software from either DOS or Windows; the only difference is that the DOS installation starts Windows first, a step not required if you launch the setup from within Windows itself.

The Windows Sound System setup automatically starts when Windows is rebooted. First, the sound test checks the proper operation of the board and helps you troubleshoot any problems. If everything checks out as it should, the software installation

FM SYNTHESIS VERSUS WAVETABLE SOUND TECHNOLOGY

The principal difference between FM synthesis and wavetable sound is that with FM synthesis the sound is synthesized (artificially created), whereas with wavetable technology the data parameters (sound wave characteristics) of the actual sound are stored in internal memory on the sound card.

The sounds that are possible using FM synthesis are limited by the architecture of the synthesizer chip and the formulas hard-wired into its circuits.

Wavetable technology generates sounds by scanning either entire waveforms or portions of them from sounds produced by a real instrument; consequently, there are no limitations to the number or types of sounds that can be produced based on the chip's circuitry or algorithms. Different wavetable "patches" load different instrument sounds into memory and make them available for use. Wavetable technology, since it is RAM based, offers the ability to load a variety of patch sets to change the instrument selection available; FM synthesis technology is limited to the sounds possible from the circuits on the FM chip.

—TOM BENFORD



can proceed. If changes are required to resolve conflicts, an installation option permits modifying the settings for the board prior to installing the software.

The setup program installs Volume Control, Recording Control, SoundScapes, and Sound Control Panel in the Windows Control Panel, since these are required as system sound software elements. The setup program also creates a Windows Sound System program group and installs the system sound software icons and other applications in this group as well. The ProofReader application is installed with a Proof menu in Microsoft Excel or Lotus 1-2-3 for Windows if selected as an option during the installation process.

In addition to creating annotated voice files which can be embedded and linked into word-processing documents, spreadsheets, and other Windows applications, the Windows Sound System offers an innovative feature—voice recognition capabilities. The supplied voice recognition application, called Voice Pilot, enables you to execute commands by voice using the microphone that comes with the Windows Sound System.

With Voice Pilot, it's possible to navigate through the Windows operating system and 15 popular Windows-based applications via limited voice recognition. You can issue menu commands, including system commands such as "next window," or commands in a word-processing document, such as "Cut" and "Paste." Voice Pilot can also control customized commands, such as using a standard closing or boiler-

OMNILABS/RTM
13177 Ramona Blvd., Ste. F
Irwindale, CA 91706
(818) 813-2638
List price: \$299
Warranty: one year

plate, which will insert predefined standard text into a document upon a spoken command.

The voice recognition is surprisingly accurate, and while I found that Voice Pilot understood my speech without a problem, you can also use a training mode to adapt it to different accents, pronunciations, or dialects.

If you're a game enthusiast, take note. While the lab was unable to test the Windows Sound System for Ad Lib or Sound Blaster compatibility because the test unit did not have these capabilities at the time of testing, Microsoft now provides Ad Lib compatibility and Sound Blaster compatibility, according to Microsoft representatives.

Business users will find the Windows Sound System to be a most useful add-on that really enhances the power and dimension of computing under Windows 3.1.

Circle Reader Service Number 378

OMNILABS AUDIOMASTER

OmniLabs has taken a modular approach with its AudioMaster sound board, offering special enhancements and capabilities as accessory modules which attach to the sound board.

The almost-full-length board requires a single 16-bit expansion slot for installation, even with an optional daughter board (such as the FM Synthesizer Module) installed on the main AudioMaster unit. The board's backplane bracket provides a home for three jacks: one for line output, one for auxiliary input, and one for microphone input. A standard 15-pin D connector can attach one or two

joysticks or the optional MIDI breakout box accessory (\$69.95).

A variety of CD-ROM interface accessory modules (\$69.95–\$79.95) permit adding an internal CD-ROM drive and routing its audio through the AudioMaster. Kits are available for generic SCSI CD-ROM drives, for the Sony SLCD drive, for the Sony 531 and 525 drives, for Mitsumi CD drives, for Matsushita or Panasonic drives, and for Philips and LMSI (Philips manufactured) CD-ROM drives. The necessary driver software, ribbon interface cables, and audio output cables come with each of these kits. These kits are intended for use only with internal drives.

Technologically, the Audio Master differs a great deal from other sound cards. It has its own 32-bit Motorola 68008 CPU complete with an operating system and RAM as integral components of the board. This board uses wavetable lookup synthesizer technology rather than chip-based FM sound and music synthesis. This gives the AudioMaster an impressive range of 24 polyphonic channels which are fully independently controlled via MIDI commands. You get 128 instrument sounds, and 24 different timbres (or voices) can be played simultaneously, so you can virtually duplicate the instrument ensemble of a decent-sized orchestra. The excellent quality of the instrument sounds is equivalent to that of a high-end music synthesizer keyboard.

Since the AudioMaster uses wavetable technology, it isn't compatible with software designed to support Ad Lib or Sound Blaster sound standards unless you add the optional FM Synthesizer Module daughter board (\$69.95). This small board snaps into a connector on the main board and contains a Yamaha 3212 (OPL2) chip, which enables the Audio Master to play FM-synthesized sounds and music. Sound Blaster speech functions, however, are not supported, even with the

TEST LAB



FM accessory module installed.

The AudioMaster's 128-instrument-sound wavetables are stored in its 384K of on-board memory. The RAM Expansion Module daughter board accessory (\$99.95) adds another 1152K of memory, allowing more sophisticated and comprehensive wavetables to be stored and used. You also get a disk of enhanced instrument files with the module, which snaps into two connector receptacles on the AudioMaster board.

An RCA-to-miniphone audio cable and a good dynamic microphone come with the package, along with 3½-inch disks, an excellent user's guide, an equally excellent music application software manual, and an accessory catalog. The software bundled with the Audio Master includes a digital audio recorder, a mixing studio, a CD-music player, and MIDI jukebox applications for Windows, as well as numerous sound clips and Monologue text-to-speech software. DOS applications include Band-in-a-Box (an automated music composer), 2-Part Music Tutor, Sequencer Plus Jr., Multimedia Control Center, Command-Line Multimedia Player, and recorder, mixer, jukebox, and CD-music player programs.

If you're seriously interested in exploiting the sound capabilities of wavetable synthesis and the power of MIDI as a control medium, along with excellent CD-quality audio recording and playback capability, the AudioMaster is a product that deserves your attention.

Circle Reader Service Number 379

SIGMA DESIGNS
47900 Bayside Pkwy.
Fremont, CA 94538
(800) 845-8086
List price: \$429

SIGMA DESIGNS WINSTORM

The Sigma Designs WinStorm gives you full 16-bit audio and 24-bit true color SVGA video, along with joystick, MIDI, and SCSI interfacing capabilities, all on a single card.

The three-quarter-length WinStorm board is densely populated with highly integrated components. The board's mounting bracket contains a 15-pin D connector for attaching a color monitor, along with three jacks for microphone input, line input, and headphone or speaker output; no manual volume control is provided. In addition to a 16-bit expansion slot for installation, you'll require a second access slot in the PC's case to receive the mounting bracket which contains the 15-pin D connector for attaching a joystick (this connector doubles as the MIDI I/O connector and attaches via a ribbon cable to the board).

The WinStorm's video is excellent, providing 24-bit true color (16.8 million colors) and SVGA modes up to 1024 × 768 with 256 colors. The board also features fast vertical refresh rates and VESA BIOS compatibility, which means that any modes supported under the VESA specification work correctly with this board. A MultiMode Control Panel application allows instant resolution switching via software under Windows, a very novel and handy capability. For popular applications such as AutoCAD and others, the package provides a number of DOS video drivers.

The WinStorm is certainly no slouch when it comes to audio capabilities. It has a Yamaha YMF262 (OPL3) 20-voice stereo

synthesizer chip as its sound source, which also endows the board with full Ad Lib and Sound Blaster compatibility. Since the audio chip set used on the WinStorm comes from Media Vision, the board is also fully compatible with the Thunder Board and Media Vision Pro AudioSpectrum 16 sound standards.

This board uses jumpers for enabling or disabling functions (for example, VGA on and off), altering default settings (such as IRQ), and other variables, although the defaults will prove satisfactory for most installations. Several pin connectors on the board attach various cables. One routes the PC's sound through the board, and another channels the CD-ROM drive's audio through it as well. Another 4-pin block attaches external audio sources, and there's also a 50-pin SCSI connection, in addition to the connector for attaching the joystick or MIDI ribbon cable noted earlier.

All of the WinStorm software comes supplied on high-density (1.44MB) 3½-inch disks; I found no mention of the availability of 5¼-inch disks on or in the package. Of the nine disks provided, three contain Windows drivers, OS/2 2.0 drivers, DOS drivers, and utilities.

Additional software exploits the sound and multimedia capabilities of the WinStorm card. Animation's MCS MusicRack, a Windows-based utility, allows you to control multimedia hardware with an interface resembling a home stereo. You also get Midisoft's Multimedia Music Library, a collection of MIDI music and sounds. Multimedia Make Your Point, a Windows-based presentation application from Asymetrix, completes the assortment of bundled software.

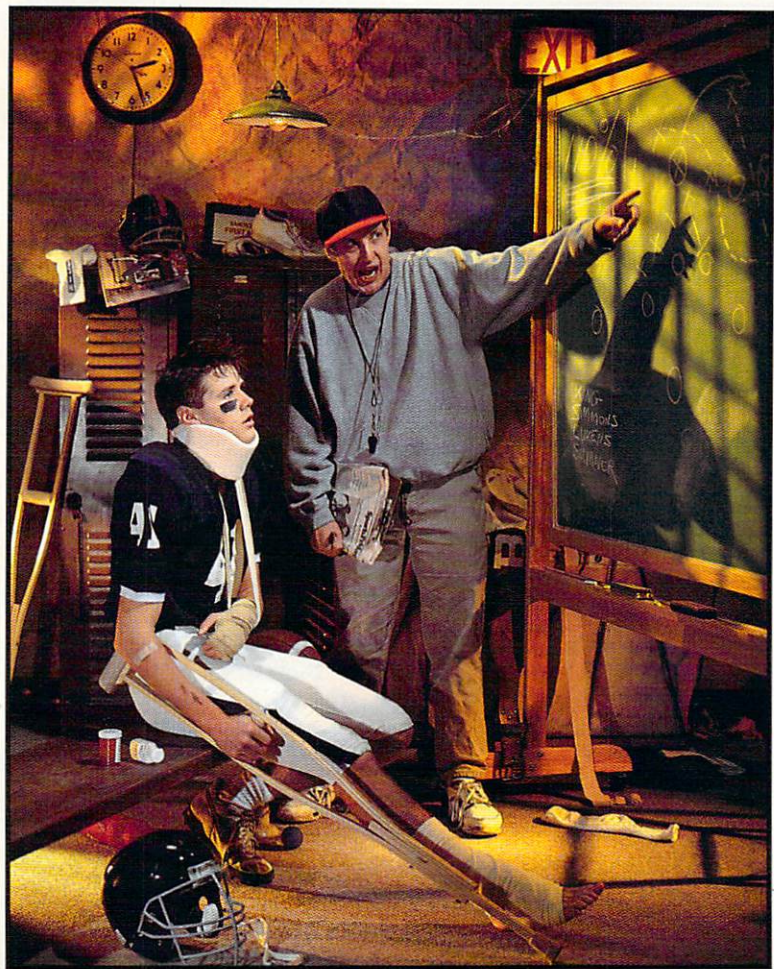
Sigma Designs' WinStorm is a good, cost-effective means of adding high-resolution video, 16-bit audio, and other multimedia features, all in one product.

Circle Reader Service Number 380

"Now listen, Tank, when this

300 pound
bug gets in
your way, run
a dynamic link
library around it. You
know what the other
team's got so you'd better go
over our playbook and learn about object
inheritance, operator overloading, and
virtual destructors. Better yet, **telnet**
to **BIX** and get into their Objective C
huddle and go over strategies with the
other BIXen, they're **real pros**.

After you've reviewed all the plays,
send **Internet** mail to my old buddy
RAM at genvid.com to get his feedback.
Let me give it to you straight, Tank,
if you ever want to get off the bench
and become a Hall of Famer, you'd better
sign up with the **BIX team**."



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Under the 5 for \$5 plan, daytime surcharges (\$9/hr.) apply for access during prime time hours. The 5 for \$5 offer is valid for first-time members only. Unused hours do not accrue to subsequent months. The \$5 charge is a non-refundable flat fee and is charged regardless of use.

BIX

If you can hack it
Circle Reader Service Number 288

TEST LAB

SOUND CARD FEATURES

	Advanced Gravis UltraSound	ATI STEREO F/X-CD	Aztech Labs Sound Galaxy NX PRO	Creative Labs Sound Blaster Deluxe	Creative Labs Sound Blaster 16 ASP
Slot required	8-bit or 16-bit	8-bit or 16-bit	8-bit or 16-bit	8-bit	16-bit
Compatibility					
Ad Lib	yes	yes	yes	yes	yes
Sound Blaster	yes	yes	yes	yes	yes
Disney	no	no	yes	no	no
Driver(s) for Windows 3.1	yes	yes	yes	yes	yes
Can be used from DOS	yes	yes	yes	yes	yes
Stereo or mono	stereo	stereo	stereo	mono	stereo
Microphone input	yes	yes	yes	yes	yes
Line input	yes	yes	yes	yes	yes
MIDI	yes	yes	yes	yes	yes
Joystick port	yes	yes	yes	yes	yes
External volume control	yes	yes	yes	yes	yes
Software volume control	yes	yes	yes	no	yes
CD-ROM interface	option	proprietary	proprietary	no	proprietary
Sound sampling	yes	yes	yes	yes	yes
Sampled sound playback	yes	yes	yes	yes	yes
Sampling rate	8-bit ¹	8-bit	8-bit	8-bit	8-bit, 16-bit
8-bit	to 44 kHz	to 44 kHz	to 44 kHz mono (22 kHz stereo)	to 15 kHz	to 44.1 kHz
16-bit	to 44 kHz	NA	NA	NA	to 44.1 kHz
Audio compression	NA	2:1, 3:1, 4:1	2:1, 3:1, 4:1	2:1, 3:1, 4:1	2:1, 3:1, 4:1
Synthesizer chip set	Gravis Wavetable	OPL3	OPL3	YM3812 (OPL2)	OPL3 and CODEC
Number of synthesizer voices	32	20	20	11	20
Microphone supplied	no	no	no	no	yes
Headphones supplied	no	no	no	no	no
Patch cable supplied	no	no	yes	yes	yes
Speakers supplied	no	no	yes	no	no
NA=not applicable	¹ The manufacturer offers a 16-bit option.				

GLOSSARY

decibel. A measure of sound intensity. One decibel is the smallest unit of sound that the human ear can hear.

8-bit/16-bit sound. This refers to the dynamic range of the sampled sound, with 16-bit having double the amount of sound data of 8-bit sound. While 8-bit sound provides 48 dB of dynamic range, 16-bit increases the range to 96 dB, or double that of 8-bit. Since more sound information is involved, 16-bit sound requires more memory and more disk space for storing the sounds than 8-bit sound does, but it provides much better quality.

FM (Frequency Modulation) synthesizer

chip. A chip with predefined circuits that generate sound waves. To synthesize different sounds, one fixed waveform modulates (adjusts the characteristics of) another. The resultant waveform can have harmonics (tonal quality) better than those of either of the two waveforms used to create it. By varying the modulation and adding more waveforms to the mix, you can approximate the sounds of musical instruments. The Yamaha YM3812 and YMF262 are the two most commonly used FM synthesizer chips.

harmonic distortion. The "overtone" produced as byproducts of generating the original signal. These are naturally occur-

ring signals that are generally multiples of the original signal. Unfortunately, the harmonics can degrade the original quality of the signal. The greater the number, the lower the quality.

line level input/output. A line level signal is typically put out by audio components which do not require preamplification (CD and cassette players, for example). Line level signals are based roughly on the signal intensity sent over a telephone line.

MIDI breakout box. An assembly which usually attaches to the 15-pin joystick connector on an audio card to provide additional input and output connec-

SOUND CARD FEATURES

	Media Vision Pro AudioSpectrum 16	Media Vision Thunder Board	Microsoft Windows Sound System	OmniLabs AudioMaster	Sigma Designs WinStorm
Slot required	16-bit	8-bit	8-bit or 16-bit	16-bit	16-bit
Compatibility					
Ad Lib	yes	yes	yes ¹	option	yes
Sound Blaster	yes	yes	yes ¹	option	yes
Disney	no	no	no	no	no
Driver(s) for Windows 3.1	yes	yes	yes	yes	yes
Can be used from DOS	yes	yes	no	yes	yes
Stereo or mono	stereo	mono	stereo	stereo	stereo
Microphone input	yes	yes	yes	yes	yes
Line input	yes	(uses microphone input)	yes	yes	yes
MIDI	yes	no	no	yes	yes
Joystick port	yes	yes	no	yes	yes
External volume control	no	yes	no	no	yes
Software volume control	yes	no	yes	yes	yes
CD-ROM interface	SCSI	no	no	proprietary ²	SCSI
Sound sampling	yes	yes	yes	yes	yes
Sampled sound playback	yes	yes	yes	yes	yes
Sampling rate	8-bit, 12-bit, 16-bit	8-bit	8-bit, 16-bit	8-bit, 12-bit, 16-bit	8-bit, 12-bit, 16-bit
8-bit	to 44.1 kHz	to 22 kHz	to 48 kHz	to 44 kHz	to 44 kHz
16-bit	to 44.1 kHz	NA	to 48 kHz	to 44 kHz	to 44 kHz
Audio compression	2:1, 3:1, 4:1	2:1	2:1, 4:1	2:1, 3:1, 4:1	NA
Synthesizer chip set	YMF262 (OPL3)	YM3812 (OPL2)	OPL3 and CODEC	OmniLabs Wavetable ³	OPL3
Number of synthesizer voices	20	11	20	24	20
Microphone supplied	no	no	yes	yes	no
Headphones supplied	no	no	yes	no	no
Patch cable supplied	no	no	no	yes	no
Speakers supplied	no	no	no	no	no
NA=not applicable			² The manufacturer offers a SCSI option.		
¹ According to Microsoft, the Windows Sound System now supports Ad Lib and Sound Blaster compatibility. However, because the lab had an earlier version of the Windows Sound System, those compatibilities were not tested.			³ The manufacturer offers an OPL2 option.		

tors. The breakout box usually provides MIDI in, MIDI out, and MIDI thru connections for attaching external MIDI devices such as keyboards and drum machines. A connector for attaching a joystick is also usually provided on the breakout box.

patch. A sound data file used for loading desired sound libraries (data about a particular sound) into the sound card's memory. Patch files are usually used with wavetable and MIDI devices.

sample. The first step required to convert an analog signal into a digital rep-

resentation. The analog sound is measured at regular intervals called samples. These measurement values are then encoded to provide a digital representation of the analog signal.

signal-to-noise ratio. This number represents the strength ratio of the desired signal (for example, music) to that of the extraneous noise present (for example, background hiss). The higher the number, the cleaner the sound will be. The signal (music) is measured at full volume, whereas the noise (hiss) is measured when no

signal is present (during silence). In addition to hiss, noise can also include the whine of the computer or any other undesirable noise which is not a part of the signal itself.

timbre. Also called tonal color or musical quality, this term refers to the sound characteristics that allow us to differentiate one sound from another, the qualities that make sounds unique. For example, timbre is what makes a saxophone sound like a sax instead of a guitar.

—TOM BENFORD

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NEWS & NOTES

Jill Champion

Pentium Rollout

The long awaited rollout of the Pentium multitasking, superscalar (it can process up to two instructions in a single clock cycle), clone-killer chip has finally arrived.

Intel claims that the Pentium is up to five times as powerful as the 33-MHz Intel486 DX CPU and that the chip is fully compatible with existing software. Nonetheless, programs must be specially optimized to take full advantage of the new chip, so look for the emergence of a generation of Pentium-ready software.

Meanwhile, the Intel486 CPU-based systems continue to be the choice for today's mainstream application requirements."

The Pentium processor features two 8K on-chip caches, improved floating point performance, and a 64-bit burst-mode external bus. It has 3.1 million transistors—nearly three times as many as the Intel486 CPU.

The floating point unit (FPU) incorporates optimized algorithms and dedicated hardware to execute one floating point operation per clock

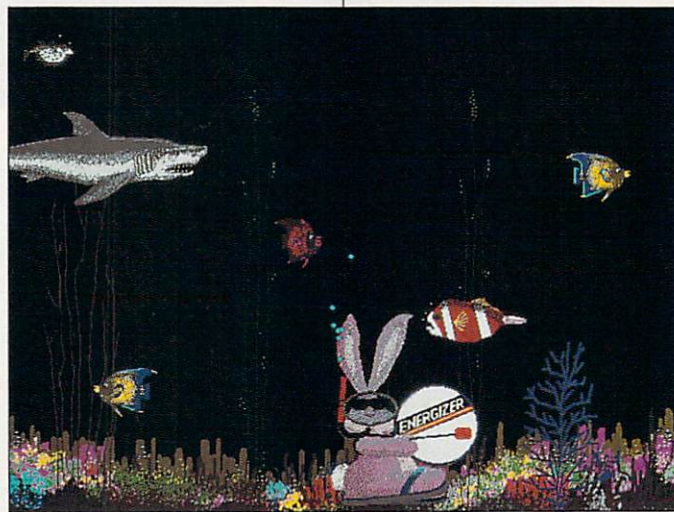
to your screen for guest appearances when you least expect it, safely interrupting your computer session for some humorous shenanigans with a snorkel, parachute, flag, and other accoutrements. Under Windows 3.1, the pink guy thumps his drum loud enough for you to hear through your PC's built-in speaker. If you have a sound board, you'll hear fully digitized sound clips excerpted from several different commercials, complete with the announcer. (Doesn't everyone need a commercial break?) And he's compatible with other screen savers, so if you're not satisfied with the Energizer Bunny on his own, you can have him make guest appearances with the crew of the *Enterprise*, a screenful of flying toasters, or your other favorite screen saver. Suggested retail price is \$24.95. To find out more, contact PC Dynamics, 31332 Via Colinas #102, Westlake Village, California 91362; (800) 888-1741, (818) 889-1014 (fax).

Recharging Portables

Duracell, of the copper-top battery fame, announced last fall that it was entering the rechargeable battery category with its new nickel-metal hydride (Ni-MH) battery packs, which promise to be "the most advanced rechargeable system commercially available." The battery packs will provide up to 40 percent longer life than the best nickel-cadmium batteries currently on the market for computers, cellular phones, camcorders, and other portable devices.

Better yet, the company is already teaming with computer OEMs (Original Equipment Manufacturers) to establish a standard-sized Ni-MH rechargeable battery pack for all types of portable computers. By eliminating the num-

Tonight on the adventure channel—no, it's that pink plush interloper, the Energizer Bunny.



The Pentium processor is offered in 66- and 60-MHz versions. "We expect that initial customers for Pentium processor-based systems will be those traditional early adopters who require increased performance to meet their needs. Additionally, these systems will surface in high-performance servers for corporate downsizing applications," said Paul Otellini, senior vice president and a general manager of Intel's Microprocessor Products Group. "As volume ramps over the next year, Pentium processor-based systems will gravitate toward more traditional desktop appli-

cycle. Many applications will run five to ten times faster on a Pentium than on a 33-MHz Intel486 DX CPU.

For more information, contact Intel at (800) 548-4725 or write for Intel Literature Packet #JP-53, P.O. Box 7620, Mt. Prospect, IL 60056-7641.

He Still Keeps On Going...

... and going, and going, only this time he's marching across your screen. PC Dynamics recently teamed with Eveready to bring you the Energizer Bunny screen saver—an energizer for your workday to chase the doldrums away. The "hare with flair" pops on-



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and even a copyright notice to your music. Chords are made simple: You can easily add your own chord symbols or guitar fingerboard symbols, build a library of frequently used chords, or play a chord on your MIDI instrument and let Finale analyze and label it.

Everything you see on the screen can be accessed, edited, copied, moved, removed, changed, or customized: staves, dots, brackets, bar lines, headers, footers, ties, text—anything. And as for signatures, the program supports standard and non-

standard key signatures, so no matter what kind of music you play, from classical to alternative rock, Finale will handle it. The *grand finale* to this program is the stack of slick, publisher-quality musical scores it'll print for you.

Standard retail price is \$749. To find out more, contact Coda Music Technology, 1401 East 79th Street, Minneapolis, Minnesota 55425; (800) 843-2066.

er-quality musical scores it'll print for you.

Suggested retail price is \$749. To find out more, contact Coda Music Technology, 1401 East 79th Street, Minneapolis, Minnesota 55425; (800) 843-2066.

Smart Keyboards for Kids

Preschool students, elementary school students, and even students with physical, visual, and cognitive disabilities will profit from IntelliTools' IntelliKeys "smart" keyboard. Designed with big graphics for little fingers, the keyboard works with Macintosh, Apple II, and IBM and compatible computers and includes six interchangeable keyboard overlays: Arrows, Alphabet, Numbers, Basic Writing, and standard IBM and Macintosh layouts. The overlays allow a parent or teacher to choose a keyboard face that matches a

Windy City Fair

If you're interested in viewing some of the more than 200 exhibits on new research and development in computer, communications, and control technologies, plan on being in the Windy City September 21-23 at Navy Pier. That's where Omron will hold its corporate global technology fair for the Western Hemisphere. Exhibits will include all of Omron's major new technologies and products introduced since 1991. Open to the public, the fair will feature numerous seminars and workshops, speakers and panelists, and special events and programs.

For more information, contact the Omron Technical Fair (OTF) Information Center, One East Commerce Drive, Schaumburg, Illinois 60173; (708) 843-7900, (708) 843-7787 (fax).

Companies or public relations firms with items of interest suitable for "News & Notes" should send information along with a color slide or color transparency to News & Notes, Attn: Jill Champion, COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

IntelliKeys gives kids a keyboard they can use (and it's programmable).

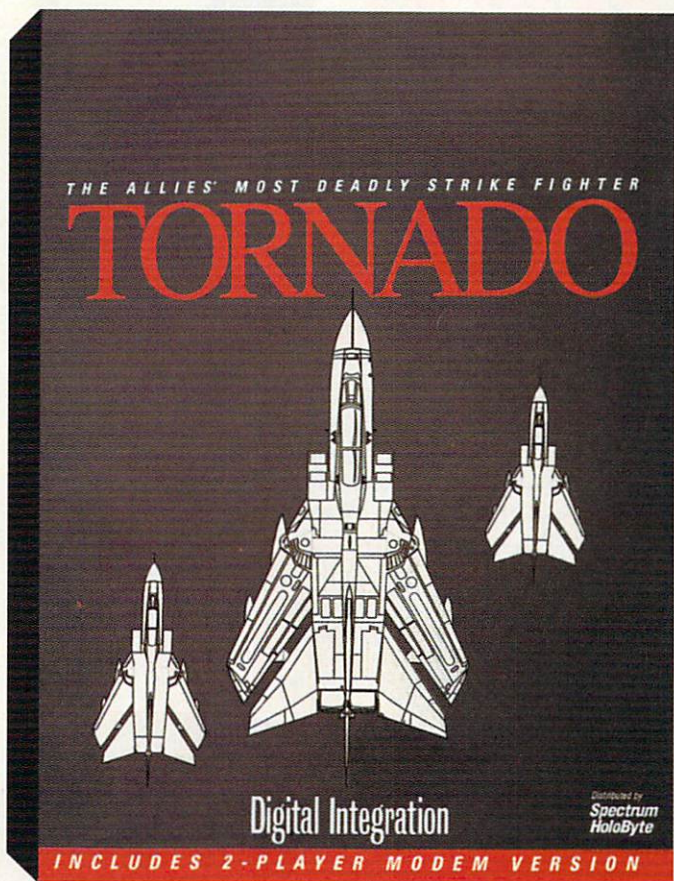


are, you want to put those original tunes in your head down on paper. No need to spend hours agonizing with a number 2 pencil when you have a computer at your fingertips—and the right software. Coda, in case you haven't heard, has been at the forefront of music-making software since its release of Finale in 1988. Now, Finale has more power than ever to notate music.

Finale's powerful HyperScribe feature transcribes your performance while you're playing your MIDI instrument—even complex rhythms and tricky tempo changes—capturing every note and nuance in piano-roll graphics. You can choose one of two ways to enter lyrics: either directly into the score or with the built-in text processor. Either way, every syllable is neatly aligned with its note. You can also add headers, page numbers,

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Some Are More Real Than Others

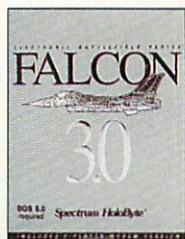


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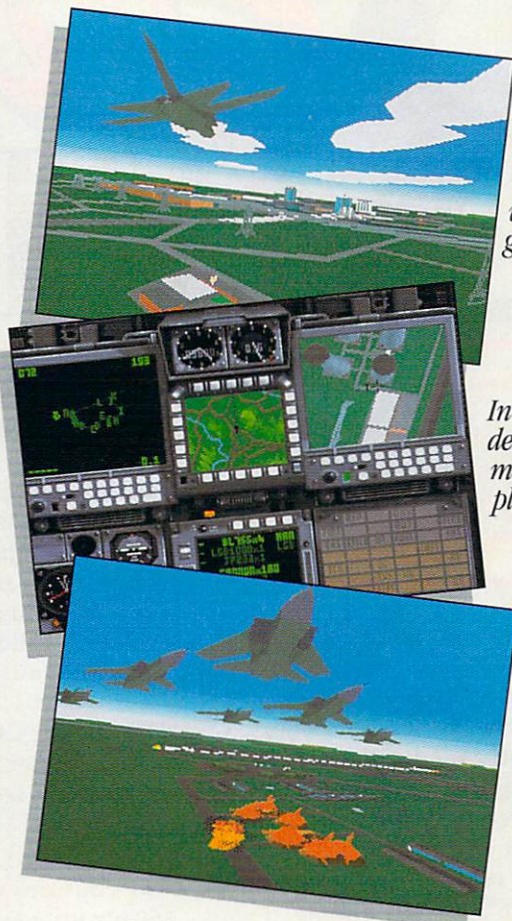
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Great Britain - White Cliffs of Dover

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All in One

I've read in catalogs and some advertisements about an "all-media" disk drive that can read and write 5¼- or 3½-inch disks, all in one drive unit. Have there been any problems with these? Are they a good investment?

BRETT MCFALL
ROCK ISLAND, IL

We assume you're referring to the disk drives that pack two drive units—one 5¼-inch and one 3½-inch—into a single half-height package. We've heard no complaints about them.

They're ideal if you find yourself short of drive bays. You not only get two drives in the space usually reserved for one, but the drive also uses only one ribbon connector and one power connector.

Unfortunately—and this is the case with any integrated system—if one drive in the unit goes bad and you take it in for repair, you don't have the other drive until the unit comes back.

Wall Crawling

I created a Windows wallpaper that I'd like to display in DOS. Is there a way to do that?

Also, are the DeskJet 500C and 550C compatible with TrueType?

PETER MOORE
BROOKLYN, NY

In answer to your second question, any graphics printer with the appropriate Windows driver is compatible with TrueType.

In answer to your first question, here's a BASIC program that provides a DOS slide show of Windows wallpaper files. It should work for your wallpaper. The list of DATA lines at the end contains some of the wallpaper files that come with Windows 3.1.

Just add your wallpaper to it. You can save time on the display by making your BMP file small and simple (the more variations in color within a single line, the longer the graphic takes to be displayed) and by compiling the program with QuickBASIC or a similar BASIC compiler. This program will only display 16-color BMP files measuring 640 by 480 or less.

If you're interested in writing a routine using GET and PUT to tile your logo, note that the variable tilewid contains the tiling width of the BMP file, which isn't always the same as the width of the graphic.

```

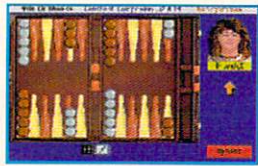
SCREEN 12
DIM a$(255)
DIM filebyte(640)
top:
READ file$
IF file$ = "000" THEN
LOCATE 1, 1: PRINT "End of
slide show. Press Enter to
continue."
GOSUB waitforkeypress
PALETTE
END
ELSE
OPEN "c:\windows\" + file$
FOR BINARY AS #1
END IF
FOR i = 0 TO 53
a$ = INPUT$(1, #1)
filebyte(i) = ASC(a$)
NEXT
height = filebyte(22) + 256 *
filebyte(23)
wid = INT(((filebyte(2) +
filebyte(3) * 256 + filebyte(4)
* 65536 - 110) / height) * 2)
tilewid = filebyte(18) + 256 *
filebyte(19)
colors = (2 ^ filebyte(28))
IF colors < 16 OR wid >
640 OR height > 480 THEN
CLS
PALETTE
PRINT file$; " is either too
large or has too many
colors"
PRINT "to display with this
viewer. Press Enter to

```

```

continue."
GOSUB waitforkeypress
CLS
CLOSE
GOTO top
END IF
col(0) = 65536: col(1) = 256:
col(2) = 1: col(3) = 0
j = col(3)
FOR i = 0 TO 255
a$(i) = j
NEXT
FOR i = 1 TO (4 * colors)
a$ = INPUT$(1, #1)
a$(INT(j / 4)) = a$(INT(j / 4))
+ (col(j AND 3) *
(INT(ASC(a$) / 4)) AND (col(j
AND 3) * 63))
j = j + 1
NEXT
indent = (640 - wid) / 2: i =
indent: j = (480 - height) / 2
PALETTE USING a$(0)
WHILE NOT EOF(1)
a$ = INPUT$(wid, #1)
FOR l = 1 TO wid
a1$ = MID$(a$, l, 1)
IF a1$ = "" THEN a1$ =
CHR$(0)
a1 = ASC(a1$)
PRESET (i, 480 - j), (a1 AND
240) / 16
PRESET (i + 1, 480 - j), a1
AND 15
i = i + 2
IF i >= wid + indent THEN
i = indent
j = j + 1
END IF
NEXT
WEND
CLOSE
GOTO top
bmpfilenames:
DATA CASTLE.BMP,
CHITZ.BMP, HONEY.BMP,
ZIGZAG.BMP,
ARCHES.BMP,
MARBLE.BMP,
ARGYLE.BMP, CARS.BMP,
FLOCK.BMP,
REDBRICK.BMP,
RIVETS.BMP, TARTAN.BMP,
THATCH.BMP, WINLOGO.BMP,
EGYPT.BMP, ARCADE.BMP,
LEAVES.BMP, SQUARES.BMP,
WINDSURF.BMP, EAGLE.BMP,
EARTH.BMP, EIFFEL.BMP,
HILLS.BMP, LITNING.BMP,

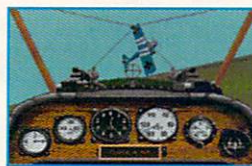
```

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Red Baron™



FlipFlop™



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MiniGolf



Checkers



Chess



PaintBall



Hearts



Cribbage



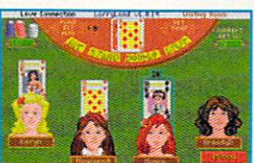
Boogers™



Poker



The Shadow of Yserbius™



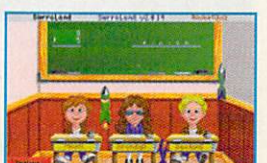
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YACHT.BMP,TREES.BMP,000

waitforkeypress:

a\$ = ""

WHILE a\$ = ""

a\$ = INKEYS

WEND

RETURN

BATcom

I work with batch files a lot, and I'm looking for a program to convert the batch files to EXE files. Where can I find a program like that?

JOHN MA
KNOXVILLE, TN

A program called Turbobat, available on most online services, will turn a BAT file into a COM file. This will cause it to run faster and will also discourage nosy people from looking at your batch files to see what you do with your computer.

Looking Out for #1

After reading your January issue, I feel you're quite unclear about which product should be ranked #1.

You awarded Word for Windows the COMPUTE Choice award for best word processor, then in your "Productivity Choice" article, you say, "Ami Pro . . . is without a doubt the best Windows word processor."

So which is it? Ami Pro or Word for Windows? The world is waiting.

JAMES GALLEGOS
FREMONT, CA

The "Productivity Choice" article represents the opinion of its author (Mark Minasi) and the opinion of some of the editors and writers for COMPUTE.

The COMPUTE Choice award was a political choice that represents the majority view. You wouldn't go wrong with either of these word processors—they're both excellent.

It was just a coincidence that both views were expressed in the same issue. We didn't mean to confuse anyone.

Intel We Meet Again

We have been looking to buy a 486 or a 486SX computer and were shown a computer with an SLC chip which isn't made by Intel.

Can you tell me what is the difference between the Intel chip and this other one and whether it's worthwhile to buy this computer, which costs several hundred dollars less than the one

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FEEDBACK

with the Intel chip?

BENJAMIN PUGH
MADERA, CA

Several chip makers have decided to climb on the CPU bandwagon with their 386-and 486-clone CPUs. From what we've heard, there's no significant difference between the Intel CPUs and these clones other than the price. Make sure you know what you're getting, though, so you can compare chips intelligently. Find out the cache size, the CPU speed in MHz, and whether the chip has an onboard math coprocessor. Then compare the price to an Intel chip with similar specs (you probably won't be able to match them perfectly).

The Right Idea

IdeaFisher Systems has lowered the price of IdeaFisher (discussed in the May 1993 "Personal Productivity" column) from \$595 to \$199. Please let your readers know.

MARLEE PARKER
MISSION VIEJO, CA

Not My Type

I liked reading the programming listings in your early days. I understand that the IBM PC is a little more difficult to program, but I would like to see more articles on programming in machine language and QuickBASIC, especially in animation and data organization. Also, is there any way to convert the program listings of Commodore computers to the PC without buying an expensive conversion utility?

ALBERT POLLARD
RUTH, CA

We've never heard of any conversion utility, expensive or otherwise, that would convert programs written for the Commodore to the PC.

COMPUTE runs program listings in "Feedback," "Programming Power," and "Tips & Tools." Data management and animation are best left to professionally developed programs. It would be impossible to run a program listing for a professional database or animation program even if we filled several issues. And who would spend weeks typing it in? Type-in programs made sense in the early days when we were still discovering what a computer could do and when there was virtually no professionally developed software. The program listings we publish now focus on teaching techniques or getting little jobs done with utilities.

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VISTAPRO

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IBM version retail: \$129.95

Amiga version retail:
\$99.95

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Most PC programmers don't use machine language. In a machine such as the Commodore 64, which only has about 40K of program space, machine language is the only way to get an extensive program into RAM. On the PC, C is king while machine language is primarily used for the kind of quick utilities you can often find in "Tips & Tools." If you want to learn machine language, Borland's Turbo Assembler is sold with an excellent guide to the language.

And, finally, the PC is no more trouble to program than any other computer. Maybe it's even a little easier

than most because there's so much expertise around.

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

WINDOWS WORKSHOP

Clifton Karnes

HOW TO GET MORE FONTS

Last time, I talked a little about TrueType and its advantages. This time, I'd like to discuss some software packages that can help you get the most from TrueType.

If you're interested in adding some TrueType fonts to your system, there are many sources. First, I'd suggest you look into the Microsoft Font Pak (Microsoft, \$69.95). This package contains the Arial Narrow, Book Antiqua, Bookman Old Style, Century Gothic, and Century Schoolbook font families, which, along with the TrueType fonts originally shipped with Windows 3.1, give you the 35 fonts that form the original PostScript stable.

With your original TrueType fonts plus those in the Font Pak you'll have the following fonts (with the PostScript equivalent names in parentheses): Arial (Helvetica), Arial Narrow (Helvetica Narrow), Times New Roman (Times), Courier New (Courier), Book Antiqua (Palatino), Bookman Old Style (Bookman), Century Gothic (Avant Garde), Century Schoolbook (Schoolbook), and Symbol (Symbol).

In addition, Font Pak includes the complete Lucida family, type that's designed to be easy to read and attractive when printed on laser printers. Also in the Lucida family is a subfamily of fonts just for faxes. If you fax often, check it out.

Microsoft's Font Pak II (Microsoft, \$69.95) contains more text and display fonts as well as a host of decorative fonts. You'll also get Microsoft's Font Manager, which lets you store fonts in groups for easy access.

Another superb collection of fonts comes from Swfte in TypeCase I and TypeCase II

(Swfte International, TypeCase I—\$69.95, TypeCase II—\$49.95). These two collections include 230 excellent TrueType fonts plus a font manager. TypeCase I and II contain just about every font you'd ever need.

What if you already have an investment in PostScript fonts or those in another format. There are several utilities that can come to the rescue here. For quick and easy conversion try Atech's AllType for Windows (Atech, \$79.95). This program goes back and forth from TrueType, PostScript, Nimbus Q, FastFont, and Bitstream's Fontware, to name just a few of the formats supported.

If you need more than conversion, Font Monger (Ares, \$149.95) is my top choice. It will convert just like AllType, but it also lets you edit fonts. You can create special characters or modify those already in the font. And it's a beautifully designed and intuitive program.

If you need to modify your TrueType fonts but what you're really after is special effects, then TrueEffects for Windows (SoftLogic, \$59.95) may be the right package. With TrueEffects, you can change the way your fonts' letters are filled. Instead of plain black, you can use a grid, stripes, stars, bricks, or a fountain, and you can reverse your type and add effects to the background. No doubt about it, this program is fun.

Now that we have the TrueType ball rolling, I'd like to finish this column with a little information about how to use all the characters of each font.

As you may know, DOS uses the ASCII character set (ASCII stands for American Standard Code for Information Interchange). This character set consists of 127 characters. IBM added another group of

characters to the ASCII set to form IBM ASCII. This additional group of characters is called the extended character set.

This comes as a shock to some people, but Windows uses the ANSI character set (ANSI stands for American National Standards Institute). The first 127 characters of this set are identical to the ASCII set. The two differ only in characters 128–256.

There's some real gold in these extended characters, however. We just have to learn to mine it.

If you look at these characters, you'll see symbols for typographical double and single quotes, em dash, en dash, fractions, copyright and trademark symbols, and much more.

If you use these in your documents instead of their sometimes crude typewriterlike equivalents, they'll have a polished, professional quality. Making it easy to use them is what we're going to talk about next.

If you look at the bottom right corner of Character Map, you'll see an indication of which keys you need to press to place one of these characters in your document.

For example, select the copyright symbol (5th row down, 15th character over), and you'll see *Keystroke: Alt+0169* indicated.

If you're in a document and you press the Alt key, hold it down, and press 0, 1, 6, and 9 on the numeric keypad, you'll get the copyright symbol in your document.

To try this, load Windows Write and use the keypresses described above, and then experiment with some other extended characters. If you incorporate these characters into your documents, then you'll get the most from your beautiful new TrueType fonts. □

If you're interested in adding some TrueType fonts to your system, there are many sources.



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TIPS & TOOLS

Edited by Richard C. Leinecker

Wild Copies

If you've ever wanted to copy more than one file type using wildcards, you're out of luck if you just rely on the regular Copy command. Here's a batch file called COPYSOME.BAT that copies up to eight file specifications with wildcards to a single destination.

```
ECHO OFF
REM We need at least two
REM arguments for the batch
REM file to work.
IF "%1"=="*" GOTO USAGE
IF "%2"=="*" GOTO USAGE
:GETDEST
SET DESTINATION=%2
IF "%3"=="*" GOTO GOTDEST
SET DESTINATION=%3
IF "%4"=="*" GOTO GOTDEST
SET DESTINATION=%4
IF "%5"=="*" GOTO GOTDEST
SET DESTINATION=%5
IF "%6"=="*" GOTO GOTDEST
SET DESTINATION=%6
IF "%7"=="*" GOTO GOTDEST
SET DESTINATION=%7
IF "%8"=="*" GOTO GOTDEST
SET DESTINATION=%8
IF "%9"=="*" GOTO GOTDEST
SET DESTINATION=%9
:GOTDEST
REM We keep copying file types
REM until %1 is the same as
REM %DESTINATION%.
:MAINLOOP
COPY %1 %DESTINATION%
SHIFT
IF "%1"=="%DESTINATION%"
GOTO END
GOTO MAINLOOP
:USAGE
ECHO Usage: COPYSOME filetype1
filetype2 . . . destination
ECHO Example: COPYSOME *.EXE
*.COM C:\DOS
:END
SET DESTINATION=
```

ALLEN KORSLUND
EAGLE GROVE, IA

Daily Reminders

I use a batch file called DAY.BAT to remind me of tasks I need to perform on certain days of the week. I call it

from the last line of my AUTOEXEC.BAT file with the line *call day.bat*.

```
ECHO OFF
REM First we create a script
REM that'll let us create a small
REM COM file to report
REM the day of the week to our
REM batch file.
ECHO E 100 B4 2A CD 21 B4 4C
CD 21 > DAY.LST
ECHO RCX >> DAY.LST
ECHO 8 >> DAY.LST
ECHO W >> DAY.LST
ECHO Q >> DAY.LST
REM Now we execute Debug and
REM pipe in our script to create
REM DAY.COM.
CTTY NUL
DEBUG DAY.COM < DAY.LST
CTTY CON
REM Run the program that'll
REM report the day of the week to
REM our batch file
REM as an errorlevel.
DAY
REM Check to see which day it is
REM and jump to the appropriate
REM label.
IF ERRORLEVEL 6 GOTO SAT
IF ERRORLEVEL 5 GOTO FRI
IF ERRORLEVEL 4 GOTO THU
IF ERRORLEVEL 3 GOTO WED
IF ERRORLEVEL 2 GOTO TUE
IF ERRORLEVEL 1 GOTO MON
IF ERRORLEVEL 0 GOTO SUN
:SUN
ECHO Today is Sunday.
GOTO END
:MON
ECHO Today is Monday.
ECHO It's time to back up
ECHO WordPerfect files.
ECHO Make sure there's a disk in
ECHO drive A.
ECHO (You can press Ctrl-C
ECHO to cancel.)
PAUSE
COPY C:\WP51\MYFILES\*. * A:
GOTO END
:TUE
ECHO Today is Tuesday.
GOTO END
:WED
ECHO Today is Wednesday.
ECHO Get ready to defragment
ECHO disk.
ECHO (You can press Ctrl-C
```

```
ECHO to cancel.)
PAUSE
SPEEDISK C: /U /SN
GOTO END
:THU
ECHO Today is Thursday.
GOTO END
:FRI
ECHO Today is Friday.
ECHO It's time to back up
ECHO DPAINT files.
ECHO Make sure there's a disk in
ECHO drive A.
ECHO (You can press Ctrl-C
ECHO to cancel.)
PAUSE
COPY C:\DPAINT\MYFILES\*. * A:
GOTO END
:SAT
ECHO Today is Saturday.
ECHO Don't forget to wash the car.
GOTO END
:END
DEL DAY.COM
DEL DAY.LST
```

DANIEL DEAN
FAIRBORN, OH

Shorter Prompts

In the October 1992 "Tips and Tools" column a reader showed some uses of the PROMPT command. One of these uses was to show the time as part of the prompt. That can be very useful, but it's better if you leave off the seconds and hundredths of seconds.

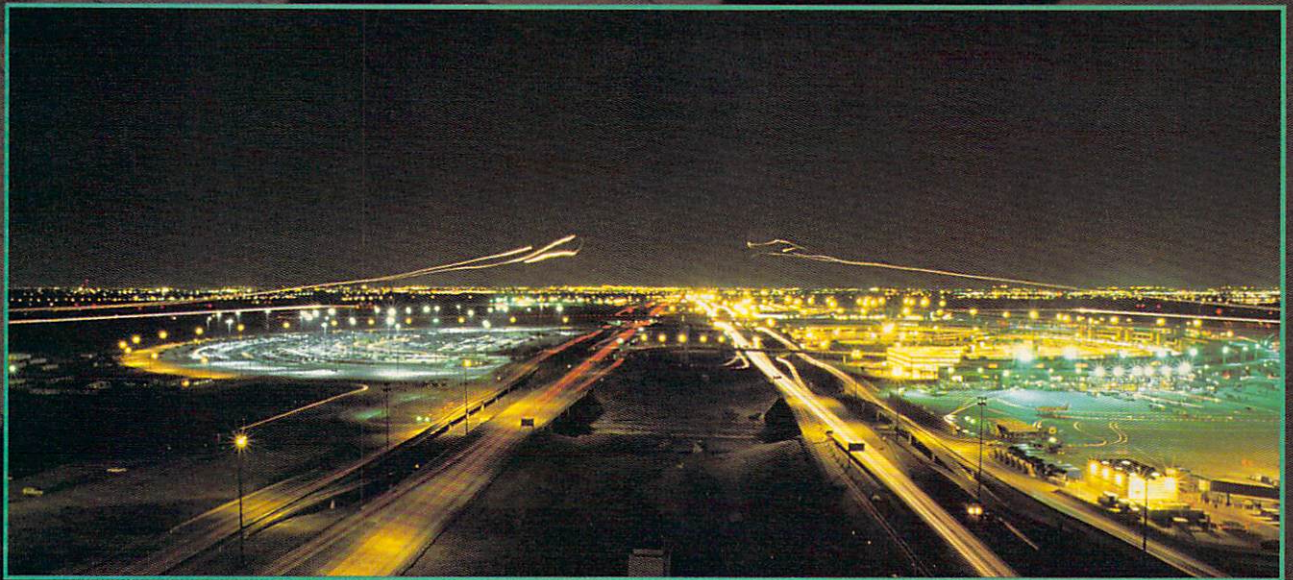
To omit the seconds and hundredths of seconds, you need to use the prompt code for backspace, \$H. Now, instead of the prompt \$T \$P\$G that gives you the prompt 17:38:17.54 C:\XY>, you can get the prompt 17:30 C:\XY> with the command Prompt \$T\$H\$H\$H\$H\$H\$H \$P\$G.

ENRIQUE MUNOZ TORRES
SANTIAGO, CHILE

Easy Formats

I teach computer repair and frequently need to format a large number of disks for use in the classroom. I prefer to do this while I do other

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with a single
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TIPS & TOOLS

things, so I devised a batch file called MASSFORM.BAT that reduces the amount of interaction I have during the process.

@ECHO OFF

CLS

IF '%1'==' ' GOTO HELP
ECHO Put the diskette to
ECHO be formatted into
ECHO the drive and:

PAUSE

CLS

:AGAIN

REM This line redirects a
REM cr/lf to the first
REM FORMAT.COM prompt.
ECHO. > ZYXW.TMP

REM This line answers
REM FORMAT.COM's request for a
REM label.

ECHO J_WEBB_CET> ZYXWA.TMP

REM This line answers
REM FORMAT.COM's
REM question about
REM formatting another
REM diskette.

ECHO N > ZYXWB.TMP

REM This line concatenates
REM the FORMAT.COM response
REM file.

COPY /A ZYXW.TMP +
ZYXWA.TMP + ZYXWB.TMP /B
ZYXW.TMP > NUL

FORMAT %1 %2 %3 %4 %5 %6 <
ZYXW.TMP

ECHO Press Ctrl-C to exit.

ECHO OR

ECHO Put the next diskette
ECHO to be formatted into
ECHO the drive, and
REM this line cleans up the
REM *.tmp mess.

DEL ZYXW*.TMP

REM This line beeps to alert
REM the user to check the
REM diskette quality and
REM either change diskettes or
REM exit.

PAUSE

CLS

GOTO AGAIN

:HELP

ECHO.

ECHO.

ECHO The correct syntax
ECHO for MassFormat is
ECHO the same as for the
ECHO MS-DOS 5.0 FORMAT
ECHO command:

ECHO MASSFORM drive: [/S] [Q]

ECHO [/U] [F:size]

PAUSE

JERRY WEBB
DRUMRIGHT, OK

Command Line Typewriter

There are many times when I want to type a couple of lines of text and print them out. That means loading my word processor and going through all of the steps to print a document.

Here's an easier way. It's a program called *Typerite*, and it lets you type as many lines as you want and sends them out to the printer. Once you're done, just press *Escape*, and it sends a form feed to the printer and returns you to the DOS prompt.

To use the program, just type *typerite*. If you want another printer port, type *typerite port#*. When you're done, press *Escape*.

You can type in *Typerite* using the DOS *Debug* command. Make sure the DOS program called *Debug* is in your path or the current directory. In these examples, the italic text is what the computer prints; the roman text is what you should type. One way to be sure you get these programs exactly right is to have someone read the numbers to you as you type them in. Another way suggested by one of our readers is to read the numbers into a tape recorder and then play them back as you enter the program code.

debug typerite.com

File not found

```
-e 100 be 80 00 ac 0a c0 74 10
-e 108 ac 3c 0d 74 0b 3c 20 74
-e 110 f7 2c 31 2a e4 a3 4e 01
-e 118 b4 01 cd 21 3c 1b 74 20
-e 120 50 8b 16 4e 01 2a e4 cd
-e 128 17 58 3c 0d 75 ea b0 0a
-e 130 8b 16 4e 01 2a e4 cd 17
-e 138 b4 02 b2 0a cd 21 eb d8
-e 140 b0 0c 8b 16 4e 01 2a e4
-e 148 cd 17 b4 4c cd 21 00 00
-RCX
CX 0000
:50
-W
Writing 0050 bytes
-Q
```

If you run *Checksum* on this program ("Tips & Tools," July 1992), the number 062 should appear on your screen.

RICHARD C. LEINECKER
MIAMI, FL

If you have an interesting tip that you think would help other PC users, send it along with your name, address, and *Social Security* number to *COMPUTE's Tips & Tools*, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. For each tip we publish, we'll pay you \$25-\$50. All tips submitted become the property of *General Media International*. □

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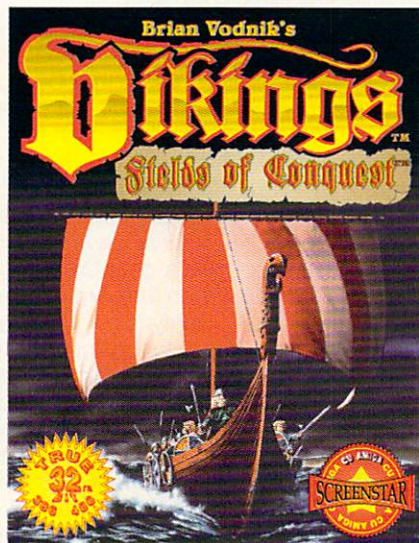
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INTRODOS

Tony Roberts

KEEP DOS IN LINE

Sometimes it's easy to overlook the little things. Somehow the big picture keeps getting in the way. Here's a list of little things you can do to make DOS work better.

What was that switch again? Don't forget DOS 5.0's help feature when the syntax for a seldom-used command escapes you. Just enter either *help* for a list of subjects on which help is available or *help* command, filling in the name of the command for which you need extra information.

Where did that file go? DOS 5.0's enhanced Dir command can be used as a file finder. The */s* switch, when added to a directory command, will build a directory for the current subdirectory and all of its children. To search your whole hard disk for that missing file, use a command such as `Dir README.TXT /s`. Wildcards work, too. Try `Dir MYFILE*. * /s`, for example, to find any file with any extension that begins with the characters *myfile*.

Hey! Where am I? It's easy to get lost in the subdirectory structure of a large hard drive, but it's also easy to teach the DOS prompt to provide a You Are Here pointer. Just add the line *prompt \$P\$G* to your AUTOEXEC.BAT file. This will display the current path as the system prompt, so you'll always know which subdirectory is current.

Kick that keyboard into high gear! The DOS Mode command provides a way to control the typematic rate of the keyboard—the rate at which DOS repeats a character when you hold down the key for that character. The command `Mode con:rate=32 delay=1` will give you the fastest rate possible. Add it to your AUTOEXEC.BAT and watch your cursor fly. In the unlikely

event that this setting is too fast, reduce the rate and increase the delay (up to a maximum of 4) until you find a setting that suits you.

Make your hard disk brush and dfFloss daily. Preventative maintenance is good for your teeth, and it's good for your hard disk as well. Run Chkdsk or another disk-repair utility at least once a day and clean up any file allocation problems or lost clusters. This keeps the disk's road map to your files clear and easy to read. Always perform a disk check after a system crash or lockup because file damage is most likely to occur when programs can't exit normally.

Verify that Copy. Have you ever copied a file to a floppy disk for a friend or co-worker only to learn later that the file couldn't be read on his machine? If you want to be sure you've saved a good copy, turn on DOS's verify feature with the command `Verify on`. If verify is on, DOS will write the file to the floppy disk and then read it back and compare it to the copy on the hard disk to ensure that the data was saved correctly. Using Verify takes a little longer, but the extra few seconds is worth it. Use Verify off after you've finished with the copy, or your system will verify every file write. To see whether Verify is on or off, type *verify* at the DOS prompt.

Directory style default. If you have DOS 5.0, you have a Dir command with lots of switches to customize your directory listings. You can specify sort order, group subdirectories first, display files based on attribute settings, and display directories in upper- or lowercase letters. Once you've figured out which directory settings you use most of the time, make those commands your default by setting an environment variable called DIRCMD. Do this in

your AUTOEXEC.BAT file. I use the command `Set DIRCMD=/l/ogn` to display directory information in lowercase ordered by name with subdirectories listed first.

Quicker than Copy. If you're copying several files to and from floppy disks, save time by using Xcopy rather than Copy. When copying multiple files, Copy reads one file from the source disk and then writes it to the target. But Xcopy reads as many of the files as possible into memory; then it writes them all out in one operation.

Buckle up for safety. If you've been uninspired by the Mirror command, reevaluate the situation. Mirror is like a seat belt: When everything's going smoothly, it doesn't do much, but when there's trouble, it can make all the difference. Mirror saves copies of your system's file allocation table, which the Undelete and Unformat commands can use as reference points if the need arises. I recommend running Mirror on each of your hard drive partitions from commands within your AUTOEXEC.BAT.

See the difference. Have you ever wondered what the difference is among the files on your disk named AUTOEXEC.BAT, AUTOEXEC.BAK, AUTOEXEC.000, and AUTOEXEC.SYD? An easy way to compare text files is with the FC command. FC is a DOS file-compare utility that doesn't seem too helpful until you figure out that you need to use the */l*, */c*, and */n* switches with it. The switches indicate that you're doing an ASCII compare (*/l*), you're not concerned about the characters' case in the files (*/c*), and you want line-number references included in the output (*/n*). For example, enter `fc /l /c /n autoexec.bat autoexec.bak`; any differences in the files will be displayed. □

Follow these guidelines to make the most of DOS.

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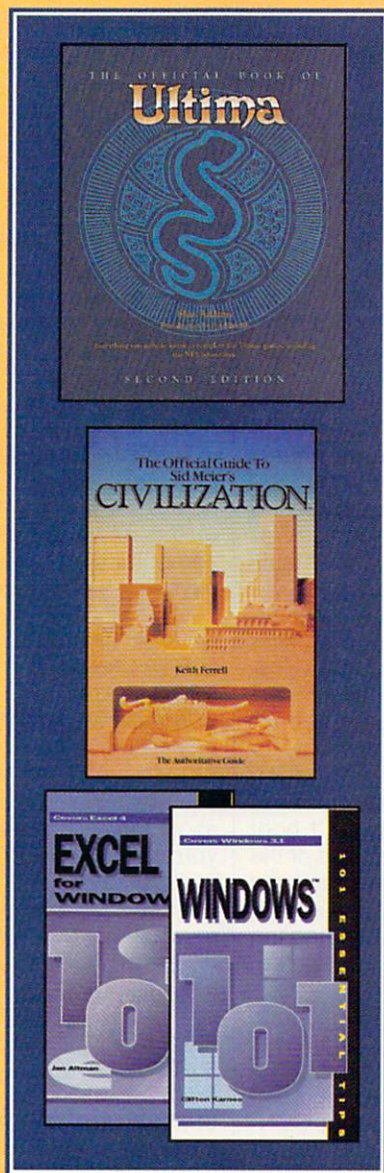
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HARDWARE CLINIC

Mark Minasi

DOS 6's MULTICONFIG

DOS 6 will be out by the time that you read this. That means that I can finally tell you about it. And you know what's probably the best part of DOS 6, at least for techies? MultiConfig.

I mean it. I have one computer that has ten different sets of CONFIG.SYS/AUTOEXEC.BAT files—one for normal DOS work, one for remote access, one for playing around with the CD-ROM, and one for when I attach the Bernoulli Box and do backups.

How often do you find yourself having to set up a plain-vanilla AUTOEXEC.BAT/CONFIG.SYS combination to make some kind of program happy? Or rooting around for a bootable floppy because a CONFIG.SYS experiment went awry and your system won't boot from the hard disk? One of the great annoyances of the world (like having to floss your teeth or do the dishes) is juggling configurations. MultiConfig solves all that.

Here are the highlights. First, MultiConfig allows you to merge together many CONFIG.SYS/AUTOEXEC.BAT combinations into one big CONFIG.SYS/AUTOEXEC.BAT. Second, it adds a simple front-end menu system to those multiple configurations, allowing you at runtime to decide which configuration is right for your work today. And third, it allows you to designate a particular configuration as the default configuration that loads after waiting a specified number of seconds. This month, I'll show you how to do all three with a simple MultiConfig example.

Getting Started

For my example, I'll use another DOS 6 feature, Interlnk. DOS 6 includes a serial and parallel port-based file trans-

fer program much like Lap-Link, called Interlnk. Setting up Interlnk involves two parts: a device driver called INTERLNK.EXE and a TSR called either INTERSVR.EXE or INTERLNK.EXE, depending on whether your PC will be acting as a server (INTERSVR.EXE) or a client (INTERLNK.EXE). I don't want to explain Interlnk in detail—you don't need to know the details in order to follow this example—but I want to show you how to set up a PC to be able to act as an Interlnk client sometimes. Suppose you have this basic CONFIG.SYS.

```
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

To make your PC able to act as an Interlnk client or server, you have to add the INTERLNK.EXE device driver. On the days when you want to work with Interlnk, you'll need a CONFIG.SYS that looks like this.

```
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\INTERLNK.EXE
```

Basically, you have two CONFIG.SYS files—one that you use for normal operations, and one that you use for Interlnk operations. Let's call them that for convenience's sake: the normal and interlnk configurations.

There are several steps to MultiConfig-ing these files; let's take it one step at a time.

Merging CONFIG.SYS Files

With MultiConfig, you put both CONFIG.SYS files into the same ASCII text file. (I say *both*, but if you have almost a

dozen configurations—as I do—then the better phrase is *all configurations*.) Don't name it CONFIG.SYS just yet, as it's still going to need some work. For now, call it CONFIG.ALL.

The configurations will be separated with MultiConfig commands, so leave a blank space or two in the file between each configuration. At this point, my CONFIG.ALL looks like this.

```
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

```
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\INTERLNK.EXE
```

Naming the Configurations

MultiConfig separates the commands that are to be executed as CONFIG.SYS statements from the commands that are to be MultiConfig commands by requiring MultiConfig commands to be enclosed in square brackets. The first MultiConfig statements to add are the identifiers for these two configurations.

You can call these configurations anything that you like, so let's keep calling them normal and interlnk. Just put those names in square brackets above each configuration. Your CONFIG.ALL will then look like this.

```
[normal]
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

```
[interlnk]
FILES=60
BUFFERS=30
STACKS=9,256
```

One of DOS 6's best features is MultiConfig. Here's how to make it work for you.

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\INTERLNK.EXE
```

Just for convenience's sake, let's call each group of lines, headed by a line in square brackets, a block. This CONFIG.SYS contains a block called [normal] and a block called [interlnk].

If you were to attempt to boot using this file as your CONFIG.SYS, DOS would treat this CONFIG.SYS as if it were blank. None of the commands would execute. MultiConfig would recognize two configurations called normal and interlnk, but there would be no MultiConfig statements actually telling DOS to use either of these configurations.

Setting Up the Menu

Most of the directives to MultiConfig go in a block called [menu]. In the [menu] block, you list the alternative configurations and tell MultiConfig what the menu should look like, which options it should take as defaults, how long to wait for a user response, and even what color to put on the screen! Just for starters, we'll list the configurations. You do that with the MENUITEM command. It looks like this: MENUITEM configuration-name,menutext. Configuration-name is the name in brackets at the top of a configuration—normal or interlnk in our example—and menutext is the English text that MultiConfig should display when showing the menu. Add the [menu] block, and CONFIG.ALL looks like this.

```
[menu]
MENUITEM normal,Standard setup
MENUITEM interlnk,Setup with
Interlnk driver
```

```
[normal]
FILES=60
BUFFERS=30
```

```
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

```
[interlnk]
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\INTERLNK.EXE
```

Now, you can copy CONFIG.ALL to C:\CONFIG.SYS and reboot. You'll see the *Starting MS-DOS...* message (a message always seen in DOS 6 when booting), and after two seconds you'll see a screen containing a menu like this.

MS-DOS 6 Startup Menu

- ```
=====
 1. Standard setup
 2. Setup with Interlnk driver
Enter a choice: 1
```

Press 1 and the Enter key, and the system will boot with the normal setting. If you reboot and press 2 this time, you'll see the Interlnk driver load. Take a bow; you've built your first MultiConfig menu!

#### Adding Defaults and Timeouts

It would be a pain to have to hover over the PC every time it boots, pressing 1 to start up the standard setup and 2 now and then when you need Interlnk. It would be preferable to be able to tell MultiConfig, "If I don't press any keys for two seconds, assume that I want the normal configuration." You can do that with the MENUDEFAULT command. It looks like this: MENUDEFAULT configurationname,timeout.

In this command, the configurationname is the same thing as it was in the MENUITEM command—the name surrounded by square brackets that precedes the block of CONFIG.SYS statements that

define a configuration. In our example, you could specify either normal or interlnk. You can optionally add a number to define a timeout, the maximum number of seconds for MultiConfig to wait before taking the default. I'd like to tell MultiConfig to give me two seconds to make a choice, and if I don't make a choice within two seconds, then just to load and use the normal configuration. I can do that by adding this line to the [menu] block of CONFIG.SYS: MENUDEFAULT normal,2. It can go anywhere in the [menu] block. Now, my CONFIG.SYS looks like this.

```
[menu]
MENUITEM normal,Standard setup
MENUITEM interlnk,Setup with
Interlnk driver
MENUDEFAULT normal,2
```

```
[normal]
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
```

```
[interlnk]
FILES=60
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\INTERLNK.EXE
```

Try booting the system, and keep your hands off the keyboard. You'll see MultiConfig count down and load the normal configuration. Try booting again, and press 2; you'll see that it overrides the default, loading the Interlnk driver.

Now that you have a basic menu system in place, try adding a third or fourth option. By then, you'll notice that there's a lot of redundancy in this system.

Next month, you'll learn how to fix that, as well as how to add a bit of color. □

**It would be a pain to have to hover over the PC every time it boots.**

# PROGRAMMING POWER

Tom Campbell

## WHAT'S THE BEST REASON TO READ COMPUTE?

What would be the best reason to buy a copy of COMPUTE? My answer would be "to help me make more money." Here's my way of making good on that statement. There's some really hot development software available at consumer prices, and I've been seeing some hot market opportunities for savvy users of these tools. Believe me—if I had the time, I'd be taking advantage of these opportunities myself. But I'm working on my own killer ideas. Pick up where I had reluctantly to leave off and make us both look good.

### A DOS Idea Manager in Visual Basic for MS-DOS

There are some good commercial programs around to help you track lots of different ideas and create relationships among them. The usual metaphor for this concept is Post-it™ notes, but extended by adding searches between notes, querying notes by date or word content, sorting them by title or subject, and so on. This requires a built-in text editor and a good windowing interface to keep the user working on ideas instead of trying to figure out the software, but up until now those abilities meant buying costly add-on libraries. Visual Basic for MS-DOS comes with an application called NotePad that lets you open multiple notepad windows and enter up to 32,000 characters in each one of them. It's a fully realized program and is more than adequate to get you going. Visual Basic is a superlative extension to QuickBASIC because it's upward compatible yet gives you nearly the

same ease of application development as the Windows version. So you get Windows-like convenience with BASIC's power.

### Medium-Strength Windows Editor in Pascal

Windows' Notepad drives me up the wall because it only opens one window, has no macros, and can't be customized. Borland Pascal 7.0 (or any version of Turbo Pascal for Windows) comes with editor objects in Borland's ObjectWindows library—which comes bundled with every copy of TPW sold—with the built-in ability to open as many windows at once as Windows has memory. I'd love to see a medium-strength text editor that's beefier than Notepad but easier than Brief. Why hasn't anyone done it before? Because ObjectWindows is woefully underdocumented. The TFileWindow object in question, for example, gets this treatment in the 7.0 manual: 'For details on the fields and methods of the type TFileWindow, see the online help.' Period. This won't be an easy project to get started, but it will reward you early on because TFileWindow is in fact a very high-level object. You'll look like a real genius, too, because Borland/Turbo Pascal for Windows generates small, fast code. Windows bloat won't be a problem with this product.

### A Scrapbook Program

The Windows Clipboard is frustrating in a number of ways, most notably in that it nominally holds only one thing at a time. Copy some text to the Clipboard, and the bitmap picture you were storing there is gone. Copy a row of cells from your spreadsheet, and the text is history. The Macintosh has always had a modest desk accessory called

Scrapbook, which is like a simple Clipboard that can hold as many Clipboard-supported objects as you want, just like your family scrapbook. I'd love to see a utility like that but one that goes one better than any similar applications I've seen. One of the little-known aspects of the Clipboard is a process called registration, in which applications often store several versions of the same data at the same time on the Clipboard, and the receiving application chooses which it can handle best. For example, if you copy data from an Excel spreadsheet to the Clipboard, it's stored not only in Excel's native format (called, unfortunately, BIFF) but also in text, comma-delimited, and bitmap formats. So if the application you paste to understands Excel data as is, great. But if it doesn't, it probably understands text or perhaps comma-delimited. Anyway, I'd like to see a Scrapbook-type application that would hold more than one item at a time; give you each item in all its registered formats; and let you attach notes to Scrapbook entries, sort them by user-defined categories, and print. At worst, you'll sell at least one copy—to me. I really need that program.

### Tiny BASIC for Windows

How about a small BASIC interpreter for Windows? A lot of people have complained about the huge runtime size for Visual Basic, and surely there are plenty of old-time BASIC users who'd like to dash off a short program without having to lard it with buttons and bitmaps. This may not be a huge moneymaker, but it would be a public service in the spirit of the free Tiny BASIC interpreters that sprang up in the late seventies. □

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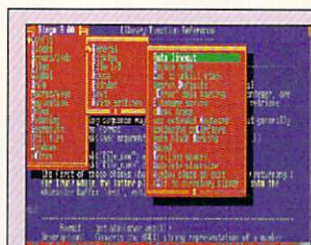
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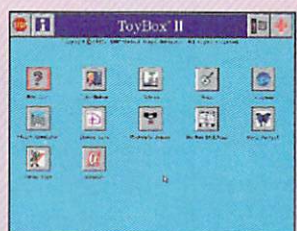
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# DOS



# DOS REACHES

**Whether you've  
been demanding  
better memory  
management, better  
disk management,  
or more tools to help  
you avoid loss  
or climb the learning  
curve more  
quickly, Microsoft has  
been listening.**

**By Mark Minasi**

Once again Microsoft has brought forth a new DOS, claiming this time to "make it easier." The world's most widespread operating system has graduated to 6.0.

But is DOS growing up, or growing out? Does DOS 6.0 break new ground, or simply put a polish on existing features? A little of both, as it turns out.

DOS 6.0 is the latest in a long line of versions of Microsoft's biggest cash cow, the virtually ubiquitous PC operating system. Though long, the line hasn't been an unbroken string of successes for DOS architects, however—if you've been around long enough to remember DOS 4.0, you'll probably agree—so it's logical for a PC user to ask, "Should I upgrade? Is DOS 6.0 worth it?" The answer is "Yes, almost certainly." Here's why.

Don't expect the kind of gotta-have-it revolutionary features in DOS 6.0 that you saw in DOS 5.0; in some ways, DOS 6.0 might better be named DOS 5.1. That's not a negative comment; it's just a recognition that DOS 6.0, while different from DOS 5.0, is nowhere near as different from its forebear as 5.0 was from 4.01. There's still a lot to talk about in DOS 6.0, however. This article will have to be the quick tour. We can only cover the highlights here.

## **On-the-Fly Disk Compression**

DOS 6.0 is fairly big—about 8MB, if you install it all—but paradoxically, you may find after you've installed DOS 6.0 that you've got more free disk space

than you did before. That's because of the DoubleSpace feature.

DoubleSpace is an adaptation of a product that's been around for a while called DoubleDisk. Microsoft started from DoubleDisk, but the company says that DoubleSpace is much improved over DoubleDisk. An on-the-fly compression routine works something like PKZIP or Lharc, compression programs with which you may be familiar. Various programming tricks let you crunch a lot of data to a smaller space. Virtually every file you find on a bulletin board or communications service nowadays is zipped or arced—there's nothing new there. But when you want to use the file, you must first uncompress it, which can be something of an annoyance. DoubleSpace and programs like it offer the ability to transparently compress and decompress your files as they are used, removing the need to run a separate compression or decompression routine.

Decompressing and compressing data on the fly sounds a mite risky. In my experience it's fairly reliable. I've used it on a notebook computer for months now without incident, but people using high-performance disk controllers sometimes report trouble with DoubleSpace, so back up before you rely upon it.

## **Fending Off Viruses**

Sometime in the mid 1980s, the PC world got something new to worry about (as if hard disk crashes, acci-



# DOS 6.0:

## A NEW LEVEL

dental formats, power surges, and buggy software weren't enough). Word got around the business that a class of program called a virus was starting to appear in PCs.

You've probably heard about viruses for years, but 1992 was the year viruses came into their own. For the purpose of teaching seminars (which is my main job), my company rents PCs for use in hands-on exercises. In the entire second half of 1992, I never rented a group of computers that didn't have at least one infected machine. Stoned, Flip (Omicron), and Joshi were the viruses I saw most commonly.

DOS 6.0 offers two kinds of protection from viruses: a virus scanner and a virus shield. Both programs are based on the very popular Central Point Antivirus. Msav is a virus scanner. It searches a disk, looking inside every program for a possible virus. Msav works very quickly, which is quite a feat when you consider that it was designed to recognize thousands of miscreant programs. There are two versions of the scanner program: Msav runs under DOS, and Mwav runs under Windows. You could conceivably run Msav every time you booted up DOS, but you'll probably find that you'll scan your disk every week or so, or perhaps after installing some software that you suspect to be infected. The scanners can either detect viruses by looking for distinctive strings in program files or by cre-

ating checksums for each program file which can then be recomputed and compared later to the previously created checksum files. Any programs whose checksums have changed get flagged.

A virus scanner like Msav or Mwav reports that the damage has been done; it doesn't keep viruses from getting to your disk in the first place. For this purpose, DOS 6.0 offers full-time virus protection in the form of Vsafe, a virus shield. When you run Vsafe, you activate a program that runs continuously in your system, looking over DOS's shoulder and trying to keep DOS from getting into trouble. Vsafe first tries to keep your data safe by monitoring efforts by programs to go resident in memory (become terminate-and-stay-resident programs or TSRs). Now, all TSRs must go resident in order to do their jobs, so Vsafe will sound a false alarm for any legitimate TSR program; that's an unfortunate fact of life. Vsafe also monitors any attempts to use the BIOS's Format command—a command normally used only by the DOS Format command, and only then to format floppies. With IDE drives these days, there's probably no reason anymore for the BIOS to support a format command on hard disks, as you can't low-level-format IDE drives. Vsafe won't make it impossible for programs both good and bad to request format operations, but it will alert you to their format commands

before BIOS can carry them out, giving you the chance to override the format request.

Despite its good points, however, there are some real flaws in the antivirus package. For one thing, Vsafe can be removed from memory with a particular keystroke. What's to keep a virus from detecting Vsafe and then just mimicking that keystroke? Msav itself can also cause false alarms, leading other virus scanners to think that there's a virus in memory. And Msav has trouble cleaning several viruses that it claims to be able to handle, including Frodo.

Sadly, it's true: PCs need virus protection, and it's about time that DOS reflected that sad truth.

### Hooking Up

With DOS 6.0 come two new approaches to hooking up PCs—Interlnk and Workgroup Connection.

Nowadays, many people rely on laptop computers. Laptops are great, except for one small problem: Transferring data to and from a laptop is generally somewhere between a pain and a nightmare.

A whole class of high-speed utility programs has arisen to solve the data transfer problem—programs with names like Brooklyn Bridge, LapLink, and FastWire. These programs support data transfer at speeds of up to 500 Kbps.

The new DOS includes one of these programs. Called Interlnk (pro-

nounced "interlink"), this new facility makes blasting data from your desktop PC to your laptop PC (or from any PC to any other PC, for that matter) a breeze. You'll find Interlnk simple to use: You just hook up the first PC to the second with a cable (that's the hard part, by the way—DOS doesn't include a cable for the transfer), install the Interlnk device driver in the CONFIG.SYS of both machines, and then run Intersvr on the server PC and Interlnk on the client PC. The drives of the server PC will instantly appear as new drive letters on the client PC. (The server PC can't do anything else while Interlnk is in operation.)

But the new communications capabilities don't end there. As you are probably aware, in the fall of 1992 Microsoft released a new version of Windows called Windows for Workgroups. It's a version of Windows designed to allow people to build peer-to-peer networks (networks that don't require dedicated servers).

DOS 6.0, as the first version of DOS released since Windows for Workgroups, contains an updated version of the workstation software, called Workgroup Connection. It is very important for you to understand, however, that Workgroup Connection under DOS is not a stand-alone product. This isn't made clear in the DOS documentation. You cannot build a network using only Workgroup Connection. It'll only let you share printers and files and send messages via a PC running Windows for Workgroups. But if you do use Windows for Workgroups, then the Workgroup Connection will allow you to send and receive E-mail as well as share files, disks, and printers with a PC running Windows for Workgroups.

## MultiConfig

My favorite DOS 6.0 feature is MultiConfig. If you run more than one complex program, you probably have more than one CONFIG.SYS and AUTOEXEC.BAT file—one for doing normal work, one for Wing Commander II, and perhaps another for Windows.

Even if you don't mess around much with your CONFIG.SYS and AUTOEXEC.BAT, you must sometimes rename them or move them somewhere else so that you can boot your system in a so-called vanilla configuration, a stripped-down setup required for troubleshooting some hardware and software.

Either way, it all boils down to lots of shuffling around of configuration files. (And always keep a bootable

floppy handy in case you didn't copy something right!) But DOS 6.0 solves the multiple configuration problem with MultiConfig.

MultiConfig is actually three features rolled up into one. First is Clean Boot. Any time you want to boot your PC and not run your CONFIG.SYS and AUTOEXEC.BAT, just press and release F5 when the *Starting MS-DOS . . .* message appears, or hold down both Shift keys and DOS will boot without either file. This is a godsend for inveterate configuration twiddlers like me (and probably like you, if you read COMPUTE).

The second form of MultiConfig is Interactive Boot. Have you ever had a situation where you wanted to boot the system without a particular device driver? Or have you ever seen an error message flash by from some CONFIG.SYS command but not known which command caused the error? In these situations, you should press F8 when the *Starting MS-DOS . . .* message appears. DOS will pause at each CONFIG.SYS command and ask whether or not to execute that particular command.

Under the third form of the new MultiConfig utility, you can combine several configurations into a single AUTOEXEC.BAT/CONFIG.SYS pair. You can attach a menu to it, complete with colors and a countdown timer. Then, every time you boot, you'll see your various boot-up options and a countdown timer. If you don't select any option within a certain amount of time (an amount that you choose), then DOS picks a default configuration.

MultiConfig brings a whole slew of new commands to CONFIG.SYS. There's not enough space to examine them here, but you'll find that MultiConfig is covered in detail in my "Hardware Clinic" column this month.

## Better Memory Management

DOS 5.0's memory manager was pretty good. It was very good, if you consider that it cost nothing beyond the price of DOS. But it lacked a few of the features of the two big-name memory managers, Quarterdeck's QEMM and Qualitas's 386Max. Namely, it didn't offer any assistance in setting up the memory manager, it didn't allow you to specify where to place programs in memory above 640K, and it didn't provide any special handling for programs that grow and shrink in size while loading—so-called yo-yo programs.

DOS 6.0 includes a memory optimizer program called MemMaker, which is much like Qualitas's Maximizer

or Quarterdeck's Optimize. MemMaker analyzes your CONFIG.SYS and AUTOEXEC.BAT files to determine which commands take up memory in your conventional area—that is, the area below 640K. It does that by rebooting your system. It then looks at the amount of unused space in your upper memory area (UMA) where these commands could be loaded. It then considers all possible combinations of ways of loading these programs, seeking the combination that nets the most free conventional memory. Then, it reboots a second time to try this configuration. If your computer seems to be behaving and it didn't lock up when MemMaker attempted to make it reboot, you've got a freshly optimized configuration. If the configuration malfunctions, you tell MemMaker that it didn't work, and MemMaker tries something else.

I've never liked automatic memory optimizers. They're too much of a compromise, and their designers ask too much of a simple program. MemMaker does nothing to change my mind on that score. Late one night I set up a real humdinger of a memory optimization problem with 260K of TSRs and told MemMaker to put as many of them into upper memory as it could. Upon MemMaker's first reboot, my system complained that the CMOS setup memory was erased . . . and sure enough, it was. Good thing I'd written down how many heads, cylinders, and sectors I had on my hard disk. My advice about MemMaker is (1) be sure to map out all of your upper memory from addresses 640K through 1024K, explicitly including and excluding addresses, and (2) don't allow MemMaker to aggressively search memory for free space.

Readers of last year's "Hardware Clinic" columns about using the DOS 5.0 memory manager will recall that I grumbled about DOS 5.0 just loading each program into whichever area has the most free space available rather than letting you pick where each program should go in upper memory. That's a terrible approach, and DOS 6.0 now allows you to add a parameter to your LOADHIGH and DEVICEHIGH statements that will let you specify which region of upper memory to load a program into.

But what about handling yo-yo programs? Quarterdeck handles them with its Squeeze feature, and Qualitas handles them with its Flexframe feature. DOS 6.0, on the other hand, puts its head in the sand about programs that grow and shrink at boot time. According to a Microsoft techie, the

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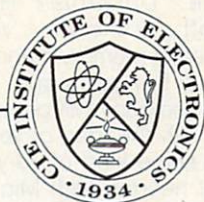
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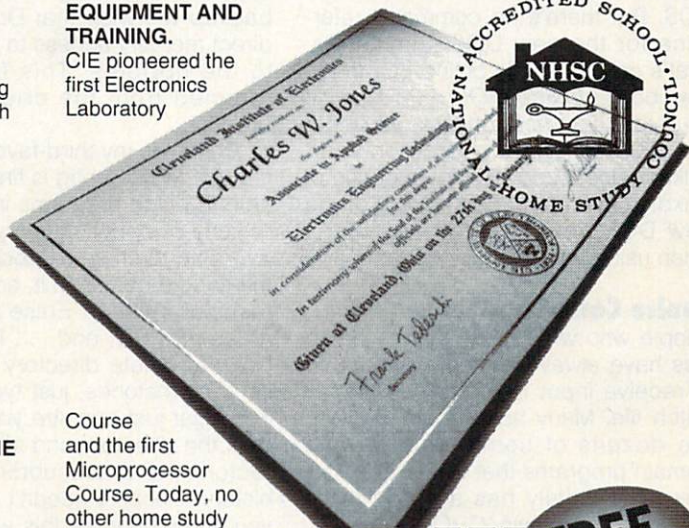
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reason why DOS 6.0 doesn't include commands for special handling of yo-yos is that this would make the system unstable. *Unstable?* Hmm... Microsoft, by the way, viewed the whole idea of memory management as unstable a few years ago. Perhaps in time the company will get comfortable enough with the idea of yo-yos that it will add some kind of yo-yo support. It's most needed with Microsoft programs—the MOUSE.COM driver loads at 56K and shrinks to 17K!

### On-Line Documentation

If you find hunting around in a manual to be tedious, Microsoft's heard you. It's solved the problem by not including a manual with DOS 6.0.

That's not really true. There *is* a manual discussing some of the why's, where's, and how-to's of the new DOS. But there's no command reference for the new DOS commands. That's only available online. (Or in my new book, *Inside DOS 6.0*.) Now, if you type, say, *help chkdsk*, you'll get the Chkdsk syntax, notes on what Chkdsk does, and examples of use of Chkdsk. I've found this aspect of the new DOS very useful, particularly when using my notebook on the road.

### Choice Comes to PCs

People who write really snazzy batch files have always lacked a command to receive input from the user of the batch file. Many have gotten by with the dozens of commercial public domain programs that fill the gap, but now DOS finally has a batch input command of its own: CHOICE.

CHOICE is a simple command. It will provide a prompt to the user; then it will accept one keystroke—and only one—from a list of acceptable keystrokes. By default, it only accepts the keys Y and N, but you can change that, and even make the choices case-sensitive. It will also optionally "time out" after a given time, using a default choice if no other is made. This command really opens up some interesting possibilities for batch files; I've even used the timeout option to create a batch file that will cause the PC to "sleep" for a specified number of seconds by telling CHOICE (1) not to display a prompt and (2) only to accept as input an Alt-255, the "invisible" ASCII code.

### Better Disk Management

Little by little, Microsoft is chipping away at the domain of the disk utility vendors. DOS 6.0 includes four new commands which together are proba-

bly worth half the cost of the package—Dosback, Deltree, Defrag, and Move.

Dosback is a trimmed-down version of Norton Backup, and Microsoft ships it in both a Windows flavor and a DOS flavor. Don't use both, by the way—running one trashes the configuration file of the other. Dosback does all of the things you've come to expect from a high-speed backup program. It's easy to use, it supports data compression, it has built-in error recovery, and it can memorize your pattern of backing up into configuration files called sets. It does not support tape drives directly, but it will back up to any DOS device driver-type storage mechanism; for example, I've used Dosback with Bernoulli Box cartridges with no problems. Those using floppy disks for backup will wish that Dosback used direct memory access to transfer data to the floppies. This feature was trimmed from the original Norton product.

Deltree is my third-favorite DOS 6.0 feature. (MultiConfig is first, and being able to place programs into particular regions of upper memory is second.) Ever had to erase a subdirectory, and the subdirectories in it, and the subdirectories in them? Erase and RD, and erase and RD, and... It's tiresome. Now, to delete directory X and all of its subdirectories, just type *deltree x*. You'll get just one *Are you sure?*, and then the directory and all of its subdirectories and subsubdirectories are history. I hope I needn't mention that you should handle this with care, but that's the case with all power tools.

Defrag is another cut-down Norton product, a version of Speed Disk. Not only will it unfragment your disk, but it'll sort your directories.

Move is another utility that's been around since at least 1983 in public domain versions, and it finally comes to DOS. Move will move a file from one directory to another in one command, rather than making you copy a file and then delete the original. Oddly enough, Move also has another purpose: It lets you rename a subdirectory. (Move is another one of those it's-about-time commands).

### More Bulletproof Undeletion

It's hard not to like the Undelete command in DOS 5.0. It's potentially of use to almost anyone. Nice as DOS 5.0's Undelete is, however, DOS 6.0's outdoes it by providing three levels of undeletion protection.

The Undelete that comes with DOS

5.0 already has two levels of undeletion protection: simple undeletion and deletion tracking. DOS 6.0's Undelete not only includes those two undeletion methods (which space does not allow me to recapitulate), but it adds a new level of protection called the Deletion Sentry. It's a simple idea, but it offers a whole new level of data integrity. The idea is this: Once you've activated the Deletion Sentry, any file erase operations do not actually erase files. Instead, they move the files to a hidden directory. The files in this directory are not counted as taking up disk space, and in general, you won't see them at all. If you need a lot of disk space for some new file or files, so much disk space that DOS would have to actually erase the hidden files in order to fit the new files, then DOS erases the files for good. But that won't happen in most cases, and the net effect of the Delete Sentry is to extend the life of an erased file for a few extra days—time enough for you to realize that you've erased a file that you didn't mean to erase.

### Should You Upgrade?

Is DOS 6.0 worth the cost and trouble of upgrading?

For most of us, the answer is yes. The continual improvements in data recovery tools are priceless, as the most valuable thing on your computer is your data. The disk compression lets you put more data on that hard disk—a real blessing if you're using modern disk-hungry software.

The improved memory manager lets you load more programs in your computer, and the antivirus protection makes it easier to keep malicious virus programs from loading into your computer.

For heavy Windows users, DOS 6.0 offers a new Windows Undelete, an antivirus utility and a backup program, plus DoubleSpace.

The E-mail and network support are convenient add-ons if you're already using Windows for Workgroups or LAN Manager, and the Interlink software will keep the folks who make LapLink, FastWire, and the like burning the midnight oil trying to turn out something better.

*Something better* may be the best way to characterize DOS 6.0. It's not everything we want in an operating system, but it's a step beyond any previous version of Microsoft DOS. Whether you've got an XT or a Pentium-driven machine, at \$60 (discounted price) there's something in the latest DOS for you. □

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# PRODUCTIVITY CHOICE

*This powerful, feature-rich program is as successful at satisfying database-design experts as it is showing novices the ropes.*

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## PARADOX FOR WINDOWS

Paradox for Windows is a beautifully designed database program that has something for beginners and pros alike. With its intuitive design tools, tyros can get databases up and running quickly without writing a line of code, and pros have a powerful built-in language at their disposal for demanding tasks.

The first thing you'll notice when you open the Paradox for Windows box is the program's extensive documentation; the package boasts six manuals. Three of these manuals cover basic aspects of Paradox: Getting Started, a fast-paced guide to get you up and running; Quick Reference, which covers common commands; and User's Guide, which is thorough.

The other three manuals, devoted to ObjectPAL, Paradox's built-in development language, are Learning ObjectPAL, ObjectPAL Developer's Guide, and ObjectPAL Reference. Overall, the documentation is excellent. I'd prefer more tutorial material and more examples both in Getting Started and in Learning ObjectPAL, but these are minor criticisms.

In addition to the manuals are four high-density installation disks. You'll find that installing Paradox is fast and painless, but you'll need about 14MB of hard disk space to get your database party going. This isn't an extravagant amount of hard disk real estate, however, when you consider what Paradox can do.

When you run Paradox for the first time, you'll see what

looks like a typical Windows application with a menu bar and a toolbar (Borland calls its toolbar SpeedBar) with buttons for opening a table, form, query, report, script, or library, as well as ones for opening a folder and adding and deleting folder items (more about folders later).

To open an existing table (*table* is just another name for a database), click on the Open Table button. You'll see a File-Open dialog box from which you can select the database you want to load. Paradox can read dBASE III, dBASE IV, Paradox 2, and Paradox 3 databases. When your database opens, you'll see it in a tabular view (hence the name *table*) where each row is one record and each column is one field in the record. This table view is like dBASE's Browse view.

You'll notice that when your table loads, the toolbar changes and several buttons are added. Since these buttons give a good idea of just what you can do with Para-

dox and your table, I'll run through some of the most important ones. Moving from left to right, you'll see buttons for cut, copy, and paste; print; search and search again; navigation for moving to the first and last record in a file, moving forward or backward by pages, and moving forward or backward by single records; editing; and switching to a forms view. There are also Quick Form, Quick Report, Quick Graph, and Quick Crosstab buttons.

If you haven't designed a form for your table (a form shows a single table record), you can press the Quick Form button and create a respectable form on the fly. And, as you probably gathered from the buttons described above, you can also generate reports and graphs at the press of a button.

Before moving on, I want to mention the Folder button. Press it, and Paradox displays icons for all the database files (including forms) in the current working directory.



The folder view is like a mini-Program Manager just for your database files. It's a very nice front end that makes managing your databases much faster and easier.

That's a quick look at Paradox. Now, let's go through some of the program's features that you'll encounter when you design a database from the ground up.

Designing a database from scratch with Paradox is much easier than you might think. If you've done this before with other database programs, you'll be familiar with the steps. You may be surprised at how easy Paradox makes most of these steps, however.

The first thing you need to do when you create a new table is define its structure. By *structure*, I mean the items your table will hold. If, for example, you're designing the classic address-book database, you'll have fields for last name, first name, address, city, state, ZIP code, phone number, and perhaps several others.

You need to tell Paradox which fields you want to use, their type, and their size. To open a new table, you simply right-click on the Open Table button and choose the table type from the dialog box.

You'll see an empty table. To create your fields, you simply fill in the blanks for field name, type, size, and key. If you don't know, for example, what types are available, you right-click on the field, and you'll see a menu of choices.

Right clicking is something you can do almost everywhere in Paradox's windows to inspect fields and objects and to get help. It's one of the things that makes using the

program so easy and so much fun.

After you've created all of your fields, you save your table. You can work with your table by using the table view and the program's quick forms, or you can create your own forms. Since Paradox has such excellent design tools, let's look at form design.

To create a new form, you right-click on the Open Form SpeedBar button. The program will ask you which table to use for the form; you supply the name of the one you just created.

You'll find yourself in form design view with fields laid out for your table showing each field's label and its data area. Now, the real fun begins. You can move and resize all of these fields, and more important, you can change their *properties*.

To change a field's properties, right-click on the field. You'll see a pop-up menu with the entries Color, Pattern, Frame, Design, Runtime, and Methods. Each of these entries is a cascading menu, so choosing one calls a sub-menu.

Choose Color, for example, and you'll see a grid of colors to choose from. If you want to keep the Color grid handy, its title bar has a snap-off button. Click on this, and the Color grid snaps off the menu and stays on your Paradox desktop. Many of the menus have this snap-off feature, which I've found indispensable.

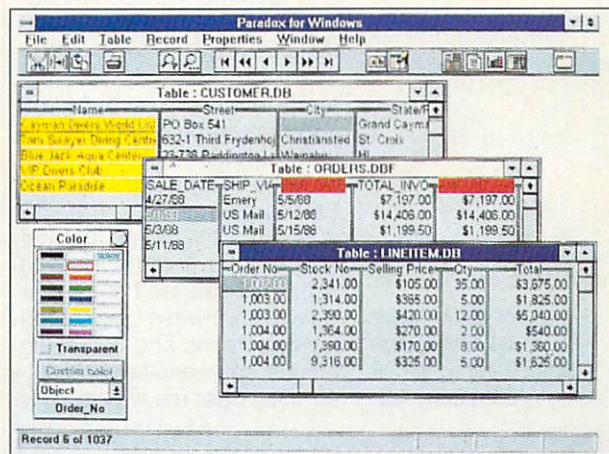
One of the most important entries on the menu is Frame, because it lets you choose the overall appearance of the object. You can place a shadow behind the object or give it a 3-D indented or a 3-D out-

dentented look, to name just a few choices. The Frame option combined with the Color selection gives you the tools to create dazzling-looking forms.

After you discover how easy it is to design a great-looking form with Paradox, you'll probably want to spend an inordinate amount of time in the designer. I know I did.

If you do get out of the designer, however, you'll have a chance to look at some of Par-

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adox's other excellent features. Here's a whirlwind tour of some of the most important. The program's report designer is as easy to use and as powerful as the forms designer—you can create crisp reports in minutes. Paradox is fully relational, too, and it supports a graphical query-by-example tool that's the easiest to use I've seen.

Of course, I've only been able to touch the surface of this powerful and feature-packed program. But the message is loud and clear: Paradox for Windows is a winner. It's not only easy to use and very powerful, it's also fun. □

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# PERSONAL PRODUCTIVITY

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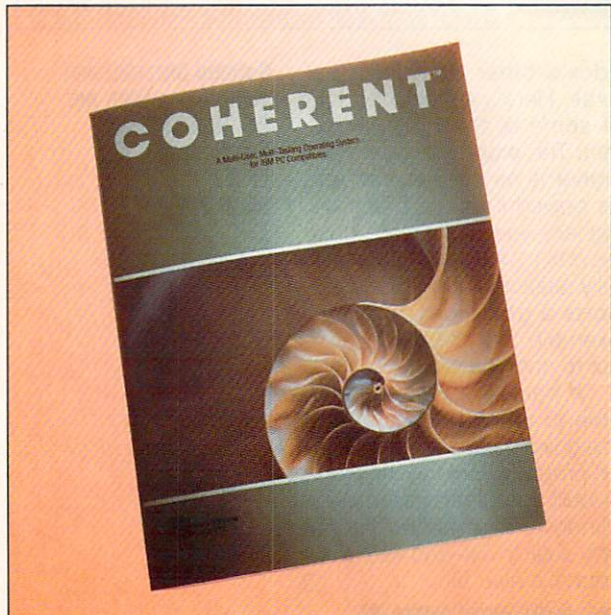
## COHERENT 4.0

For many computer users the only question has been whether to run OS/2 or DOS alone or DOS with Windows. COHERENT (Mark Williams Company, 60 Revere Drive, Suite 250, Northbrook, Illinois 60062; 708-291-6700 or 800-627-5967, fax 708-291-6750) should be another option under consideration. COHERENT 4.0 is a 32-bit UNIX-like operating system for the Intel 386 or higher.

One of the strongest reasons for choosing Windows or OS/2 is that they both have the ability to multitask. COHERENT answers this need by being a true multiuser, multitasking operating system. Granted, it currently does not support graphics, but I am told that graphic capability is in the works.

For text editing, COHERENT provides MicroEMACS and elvis (a vi clone), both of which take a little getting used to if you are not familiar with them. I wasn't expecting flashy screens and pull-down menus, so I wasn't disappointed. Don't get me wrong; they

**For UNIX power  
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are both powerful editors—they just aren't flashy.

For those who want to try programming, COHERENT provides a K&R C compiler, lex, yacc, and make utility. There is also sh (Borne shell) or ksh (Korn shell) for programming shell scripts and awk (a string-based interpreter). Best of all, they are all documented with short beginner's examples in the manual.

An operating system is of no use without applications. Although COHERENT comes with only the applications mentioned above, many additional applications are available. One of the new developments in COHERENT 4.0 is that it is COFF compliant. This means that its executable files, theoretically, will run on any other system that is also COFF compliant. This should include systems like Interactive UNIX and SCO UNIX (not Xenix) just to name two.

I checked out this claim. Pacific Micro (201 San Antonio Circle, C250, Mountain View, California 94040; 415-948-6200, fax 415-948-6296) sent me a copy of its Interactive UNIX version of Common-Link (a product that will format, read, and copy from Macintosh high-density disks and DOS 720K or 1.44MB disks), and it worked under COHERENT.

If you're trying to learn UNIX or have UNIX at the office and want something similar at home, COHERENT 4.0 is a very close clone of UNIX System V. It has most of the tools that you would expect to see on many Unices (the plural of UNIX). For those of you familiar with the GNU (GNU's Not UNIX) project (Free Software Foundation, 675 Massachusetts Avenue, Cambridge, Massachusetts 02139; 617-876-3296), Mark Williams is currently finishing the port of both the GNU (ANSI standard) C/C++ 2.3 compiler as well as the

GNU tools, a selection of programming, development, and general file-manipulation tools. Mark Williams will be making the compiler and the tools available for \$49.95 each and the source to the compiler available for \$99.95.

One other service worth mentioning is the Mark Williams Bulletin Board. On this you may read mail or news and ask questions and download updates or software packages, most of which will even include source code. It is accessed using UUCP, a mail package that comes with COHERENT. It takes a little effort to set up, but if you take the time to follow the manual, it's not that difficult.

If you have a business and your VAR/dealer tells you that the solution you need includes a UNIX operating system, COHERENT is only \$99.95 and doesn't require a license from AT&T.

If you are a VAR or dealer, one of the most promising products available on COHERENT is the Acucobol-85 COBOL compiler (Acucobol, 7950 Silverton Avenue, Suite 201, San Diego, California 92126; 619-689-7220, fax 619-566-3071). Acucobol runs on over 520 platforms, and its programs are portable unmodified. Acucobol's Golden Access disk contains a catalog of applications arranged according to the vertical markets that they target and the companies that provide them.

So, do you need COHERENT? Well, it probably won't replace your DOS, Windows, or OS/2 system, but if a UNIX-like solution is what you need and you don't want to pay a lot, ask your VAR or dealer if COHERENT can be your solution. Of course, if you prefer, you can contact Mark Williams and order it directly. COHERENT comes with a 30-day, money-back guarantee. □





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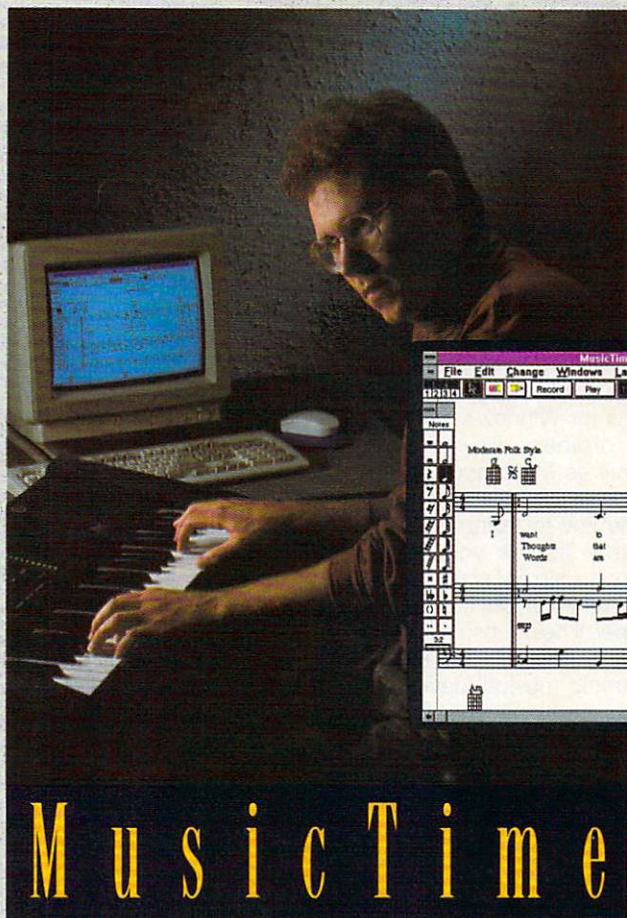
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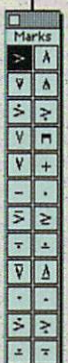
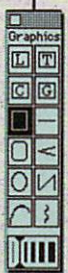


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# MULTIMEDIA PC

David English

## MUSIC FOR SOUND CARDS

When Microsoft added sound to Windows 3.1, it also added MIDI to Windows. MIDI (Musical Instrument Digital Interface) is the data communications protocol that has become the standard for today's music synthesizers, computer-music interfaces, and computer-music software. As I mentioned last month, great-sounding General MIDI modules are inexpensive enough (\$250-\$800) for almost anyone to buy one. This month, I'll look at music programs for Windows that work with ordinary sound cards as well as MIDI modules and synthesizers.

The key to telling Windows whether to use your sound card's built-in FM sounds or an external MIDI device is MIDI Mapper. It helps ensure that music produced for one kind of electronic musical device will sound the same when played back on another. If you've installed the Windows driver for your sound card or MIDI instrument, you should be able to bring up MIDI Mapper by double-clicking the Control Panel icon (it's usually in the Main group) and then double-clicking the MIDI Mapper icon. Microsoft provides drivers for many popular sound devices (usually including Ad Lib, General MIDI, MT32, and Proteus/1). If you can't find the driver for your sound card or MIDI device, check your documentation to see if you can use another driver in its place.

By selecting the appropriate driver, you tell Windows to route all MIDI communications to and from that device. For example, if you have a Media Vision card, you can have its FM synthesizer chip play your MIDI notes. If you have a MIDI device attached to your sound card, such as the Wave Blaster

daughterboard that's available for the Sound Blaster 16 ASP, you can send the MIDI signals there. Because Windows takes care of which device gets the MIDI data, most Windows-based MIDI software will work with most sound cards and MIDI devices—as long as you have the right MIDI Mapper driver selected.

Now that you know how to send MIDI data to your sound card or MIDI device, let's look at Windows-based MIDI programs that can be used by beginners as well as professionals. Top of the list would have to be Band-in-a-Box Pro for Windows (PG Music, 266 Elmwood Avenue, Unit 111, Buffalo, New York 14222; 800-268-6272; \$88). It creates automatic accompaniments using a large number of musical styles (Jazz Swing, Reggae, Miami Sound, Blues Shuffle, and so on). Type in the chords to a song, pick an appropriate style, and press the Play button. That's all there is to it. The bass, drums, piano, guitar, and strings parts are created automatically. Band-in-a-Box Pro comes with 75 styles, but you can buy extra ones or create your own in the Style-Maker section of the program. While the package includes many preprogrammed melodies and chords, you can record your own using the built-in sequencer or buy MIDI Fake-Book disks that contain the melodies and chords to many popular songs. Best of all, this mix-and-match approach yields some excellent—and often unique—tunes. If you're into music, Band-in-a-Box is a must buy. It's loads of fun.

PG Music also sells PowerTracks for Windows, a full-featured Windows MIDI sequencer that costs only \$29 (they even throw in the DOS version of PowerTracks for free). And for just \$389, the company will sell you a Roland SCC-1 (it's a Sound Can-

vas on a PC card) and throw PowerTracks for Windows in for free. It's a terrific package for anyone who wants to get started with General MIDI.

If you've ever wanted to program a drum machine, take a look at The\*Drums. It offers realtime pattern editing and recording and supports standard MIDI files. Each drum instrument is given a row of boxes that represent the beats in a measure. Simply click on the boxes to turn the drums notes on and off. If you have a good ear for music, you can quickly create complex drum patterns. CompuServe members can find the demo version of The\*Drums in the MIDI/MusicForum (type *go midiforum*). The full version is available for \$50.

Other Windows music programs that support sound cards, as well as MIDI synthesizers and modules, include Power Chords 1.0 (Howling Dog Systems, Kanata North Postal Outlet, Box 72071, Kanata, Ontario, Canada K2K 2P4; 613-599-7927; \$84.95), which lets you generate your music using the onscreen frets of a guitar, bass, or banjo; NotePlay for Windows (Ibis Software, 140 Second Street, #603, San Francisco, California 94105; 415-546-1917; \$49.95), which helps you learn to sight read music; and MusicTime (Passport, 100 Stone Pine Road, Half Moon Bay, California 94019; 415-726-0280; \$249.00), which lets you record your music and use desktop publishing to produce it in standard notation.

If you would like to learn more about MIDI, check out these two books. Craig Anderson's *MIDI for Musicians* is intended for the nontechnical musician who's just starting out with MIDI, while Joseph Rothstein's *MIDI: A Comprehensive Introduction* is a clear and concise explanation of all aspects of the MIDI specifications. □

**You can use most Windows-based MIDI music programs, even if you only have a sound card.**

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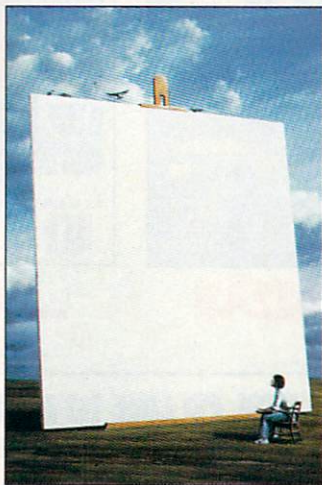
# ART WORKS

Robert Bixby

## ART WITHOUT THE WORK

Last month, I told you about Arts & Letters Scenario (Computer Support, 15926 Midway Road, Dallas, Texas 75244), a simple and inexpensive way to have fun with clip art and a generous set of drawing tools. Instant Artist (Autodesk Retail Products, 11911 North Creek Parkway, Bothell, Washington 98011) takes this concept even further. Instead of providing a blank canvas for you to fill, Instant Artist pro-

**Drawing supplies like Sketcher and Instant Artist take the pain out of computer art.**



vides eight standard formats (letter, envelope, certificate, postcard, banner, sign, business card, and greeting card) with several predrawn examples in each format. You can alter the existing designs or create your own with free-form art, any of the dozens of clip art objects, or text in any TrueType or Adobe PostScript Type 1 font available on your system. The type styles available include plain and italic (no bold) but also tilted, staggered (at random baselines), and wacky (staggered and tilted at all angles). You can also alter the type's width, color, and outline color.

One problem is that Instant

Artist prints registration marks (little crosses to indicate the edge of the card on the paper) when you print postcards and business cards. I found them unnecessary, and there is no way to turn them off.

This month, I also had the opportunity to try Fractal Design Sketcher (Fractal Design, 335 Spreckels Drive, Suite F, Aptos, California 95003).

Sketcher is a gray-scale graphics program that's both ingeniously designed and creatively packaged. Another Fractal Design product, Painter, comes in a paint bucket. Sketcher comes in that staple of sketch artists everywhere, the cigar box. Sketcher supports the Wacom touch-sensitive tablet, but I was able to get great results using just a mouse (Sketcher comes with a special mouse driver).

Sketcher provides the computer artist with a broad range of drawing tools, including pen, pencil, and charcoal. You can also smear with water and erase completely. You have the option of drawing on one of several paper grains. You can cut, paste, distort, and trace. Tracing is a little different from what you might expect. Rather than tracing the contours of a gray scale, it superimposes one drawing on the other so you can trace it, just as if you were working with tracing paper. The program is a complete gray-scale photo studio that lets you take charge of brightness and contrast and even impose a paper's texture on a scanned photo, making it look as if it's been rendered in charcoal on art paper. A gray-scale editing program is perfect for most desktop publishers, since few of us can afford much use of color on the desktop.

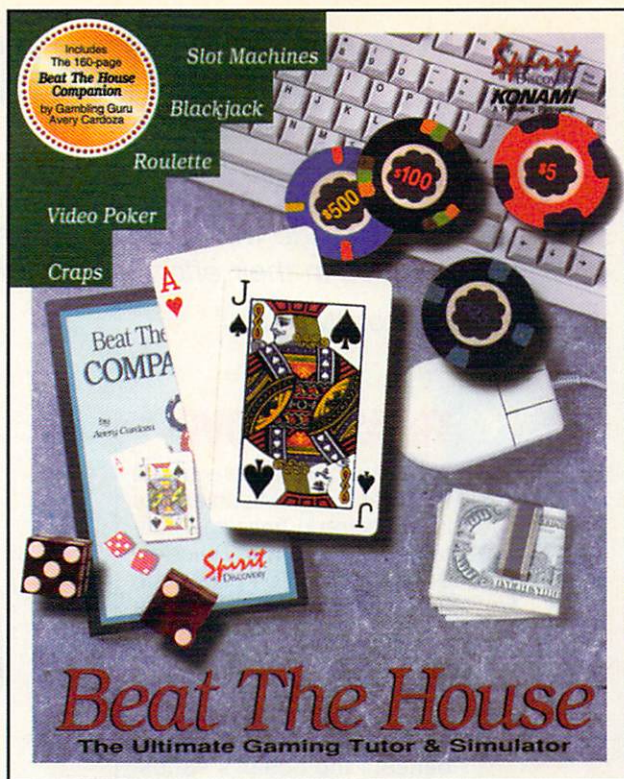
On the hardware front, after some months of trying, I finally got my hands on the ScanPlus B/W 300 PageRead-

er LT scanner (Plustek USA, 3350 Scott Boulevard, Suite 46, Santa Clara, California 95054). This scanner is a sheet-fed HP ScanJet-compatible black-and-white 300-dpi scanner specially designed for OCR work. It comes with Calera Wordscan OCR software, which operates in Windows (you can order another package, if you want; Recognita is available, which can read foreign languages and operate under DOS). I normally use ReadRight OCR software, and the Calera product impressed me in two ways. It's very accurate (while somewhat slow when compared to ReadRight). But it is simple to use and has a very intuitive user interface. Once you've scanned material in, you can save it in any one of several word processor formats, including ASCII.

Installation involves nothing more than putting a controller card in the expansion bus of your computer, stringing a cable from the scanner to the computer, and installing the OCR software. The scanner doesn't even require its own power supply. It attaches to the computer via a control cable, and it takes its juice from the expansion bus. The software and hardware performed flawlessly, but remember that a sheet-fed scanner is useless for scanning from bound material. If you only need to scan in sheets of material, the ScanPlus will serve you well.

This scanner currently lacks a paper handler, so you have to feed each sheet in individually, but a paper handler may be added by the time you read this. It's no fun feeding sheets through a scanner, but after typing a book and then scanning a book, I can attest that the process of scanning and using an OCR is much easier (and far more accurate) than typing. □

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# DISCOVERY CHOICE

*This colorful, animated game keeps kids thinking and moving fast as they solve math and language puzzles in their effort stop the Master of Mischief.*

Clayton Walnum

## TREASURE COVE

A mysterious fellow named the Master of Mischief has left his home in Treasure Mountain, crossed the Rainbow Bridge, and made his way to Invention Island, a place where he is anything but welcome. Now, he has destroyed the Rainbow Bridge and is polluting Treasure Cove with goobies, a type of fish found beneath the ocean's sands. It's up to your child, in the role of a Super Seeker, to stop the Master of Mischief, get rid of the goobies, and help the elves rebuild the Rainbow Bridge.

This is Treasure Cove, another exceptional educational program from The Learning Company. Children ages 5-9 get to slip into their swim fins, don a mask and snorkel, and join a fascinating adventure beneath the sea as they solve puzzles, learn about sea creatures, and find treasures. They'll discover that Treasure Cove is as addicting as any videogame, thanks to its charming characters, challenging puzzles, and action. And, as they enjoy the videogame-style fun, they're brushing up on their counting, reading, and logical skills.

The game begins with a short storybook presentation that explains the underwater mission. To play, your Super Solver must dive into the depths armed with only a flashlight and a bubble pump. Under the sea's surface there's much to explore: over a dozen types of sea creatures, a sunken ship, mysterious caves, and more. By capturing sea animals with the bubble pump and exploring the ocean floor with the flashlight, your child advances through

the levels of the game, eventually gathering enough gems to rebuild the Rainbow Bridge.

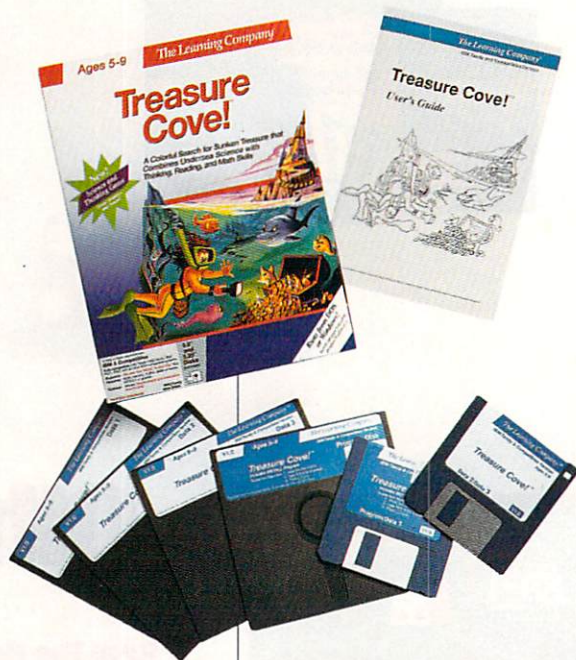
The Super Solver's flashlight requires light energy to work. To get light energy, your child has to collect red sea stars with the bubble pump. This involves swimming up to a sea star, aiming the bubble pump, and shooting bubbles. If the bubbles enclose the sea star, the flashlight's energy indicator goes up one unit, the bubble pops, and the sea star skedaddles. In the lower levels, capturing sea stars is a snap. As the game progresses, however, your child's aim must be increasingly more accurate.

The bubble pump, of course, requires air. Super Solvers can refill the pump by finding an air station and blinking the flashlight the number of times shown on the pump. If they're successful, the station's Crabby Attendant emerges, grabs the sea-horse air nozzle, and fills the bubble

pump with a ten-bubble charge. Players who run out of light energy and therefore can't refill the bubble pump can find a school of glow fish. These glowing friends provide just enough light energy to start the air station. In this way, Treasure Cove never comes to a frustrating dead end.

After capturing an orange sea star, your child is given a puzzle to solve. Puzzles are multiple-choice questions and usually involve solving simple math problems, finding rhyming words, or completing sentences. A correct answer is rewarded with a clue that will help your child locate gems and the all-important puffer fish.

Gems increase your child's score, but the elves also need them to rebuild the Rainbow Bridge. And, after all, helping to rebuild the bridge is one of the game's objectives. Therefore, as a Super Solver, your child's main task is to find as many gems



as possible. But the gems are hidden on the ocean floor, covered by various types of ocean life. To find them, Super Solvers must locate the right group of life forms and then shine the flashlight on them. The clues given for correct responses to puzzlers help children locate the life forms that are hiding the gems.

Each level in Treasure Cove offers as many as three clues. For example, after catching an orange sea star and answering its puzzler correctly, children may be given the clue *three*. This means the kids should search for a group of three plants or animals. A second clue may be *blue*. By combining the clues, children can figure out that they must look for a group of three blue plants or animals. Finally, the last clue may be the name of an animal or plant—for example, *crabs*. Gems can be found under a group of life forms that match just two clues. In our example, any group of blue crabs, any trio of crabs, or any trio of blue life forms may hide gems. However, when players locate the group of life forms that matches all three clues, they get the puffer fish, which is required to move on to the next level.

Of course, children can search for gems and the puffer fish with any number of clues by randomly shining the flashlight on the ocean floor. This method, however, takes a lot of time and forces the child to stock up often on bubbles and light.

While searching for gems and puffer fish, your child also needs to keep an eye out for enemies—specifically goobies, which steal light en-

ergy when touched. Luckily, goobies, like the sea stars, can be handled via the bubble pump. Enveloping these creatures in a bubble causes them to float up and off the screen. By replacing traditional weapons with the bubble pump, The Learning Company has cleverly avoided violence in Treasure Cove. Animals trapped in bubbles are not destroyed; they're simply removed from the screen.

After finding all the gems in the level and locating the obligatory puffer fish, players can move on to the next level. To do this, they have to find the level's Goobie Tube and plug it with the puffer fish. The successful Super Solver is escorted to the next level by a sea creature. For example, in one level, the child's onscreen character swims into a whale's mouth and then is blown into the air through the whale's blowhole. These well-rendered animations further reward children for a job well done.

After completing three levels, players enter Shark Park, where they must avoid sharks while trying to shine the flashlight on a bonus gem. Sharks, like goobies, steal light energy when touched. However, a well-aimed blast from a bubble pump fills these meanies with air and floats them away.

Players who successfully avoid or remove the sharks are taken to the elves to give them the gems collected so far. The elves rebuild part of the Rainbow Bridge with the gems and then reward the Super Solvers with a special treasure of their own. These treasures are stored in the sunken ship. Children can swim through the ship to see the

treasures they've amassed.

All throughout this underwater adventure, your child will be delighted by Treasure Cove's almost cartoon-quality graphics and humorous animation—especially when the program is run in 256-color VGA. (The EGA graphics are OK, but to fully appreciate this program, you really need VGA.) Moreover, Treasure Cove's

**IBM PC or compatible; 640K RAM; EGA, MCGA, or 256-color VGA; mouse and hard disk optional; supports Sound**



sound takes full advantage of a Sound Blaster-compatible card to produce snazzy sound effects and a catchy soundtrack.

As mentioned previously, Treasure Cove is targeted for children between the ages of 5 and 9. However, the younger children will need parental assistance, since reading skills are required to answer the puzzlers. Also, younger children may not have the dexterity required to handle the action portion of the game; aiming the bubble pump and swimming both require manual skills.

Treasure Cove is filled with delightful characters, fascinating underwater scenes, and enough sound and action to keep learning from becoming boring. Kids will love it. What more could a parent ask? □

**Blaster sound card—\$59.95**

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# GAME INSIDER

Shay Addams

## THE NOT-SO-DEAD ZONE

June traditionally signals the beginning of the dead zone for entertainment software—publishers aim to release new games for Christmas, not the Fourth of July. This summer, however, a clutch of fresh titles promises an endless summer of fun for those of us who vacation at home in front of our computers.

After achieving a breakthrough with *Sim City*, Maxis is moving to the country in *Sim Farm*. In this engaging simulation of running a small family farm, you must keep an eye on the environmental aspects of your endeavors to turn the farm into a lucrative business. (Unfortunately, Willie Nelson will not stage a Farm Aid concert if you run out of money.)

In another novel simulation, Walt Disney's *Coaster* straps you into the front seat of Disneyland's Matterhorn and nine other world-famous roller coasters. You may also build your own roller coaster, if you desire. *Coaster* was scaled back from the original design, so don't expect the depth of *Stunt Island*. Do expect to pay about half the price, though.

Air combat fans seeking new war birds to fly can finally climb into the cockpit of the British *Tornado*. Spectrum HoloByte is importing a European simulation of this jet that specializes in low-level ground attack rather than air superiority. For anyone having trouble mastering all the controls of Falcon 3.0's F-16, Spectrum HoloByte has produced its first video, which also includes new mission disks along with other extras.

Three-Sixty followed up with its WWII land war game, *V for Victory*, with a stand-alone program called *V for Victory*: Market Garden. Featur-

ing SVGA graphics, *Market Garden* is based on the operation portrayed in the film *A Bridge Too Far*. Another one to watch for later this summer is New World Computing's *Empire Deluxe*, a six-player version of the classic war strategy game. It offers modem and network play options.

Access's second golf course for *Links 386 Pro* carts you off to *Innisbrook* for 18 holes of SVGA-illustrated golfing. (It includes a VGA version that's compatible with the original *Links* and *Microsoft Golf*.)

In *La Russa Baseball II*, Stra-

quest. Lowe went west—to the Wild West—to tell the story of Freddy Pharkas: *Frontier Pharmacist*. Lowe applied a *Blazing Saddles*-style of humor to his first Western, and it's sure to keep you laughing even when you're hopelessly stuck.

*Space Quest V* is the first installment in the series to be produced at Dynamix.

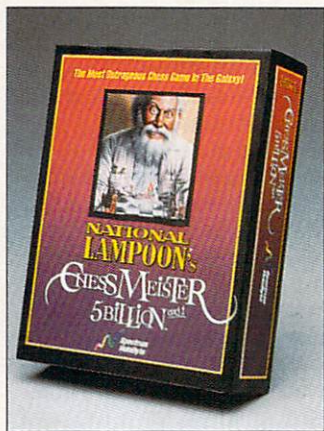
LucasArts is heating things up in the CD arena, simultaneously shipping the CD talkie and the floppy versions of *Maniac Mansion II: Day of the Tentacle*.

New World Computing's *Dark Side of Xeen* (which may not arrive until late June) will give role-playing aficionados good reason to keep Clouds of Xeen on their hard disks. Players will be able to move back and forth between the worlds found in *Dark Side* and *Clouds* and finally solve those mysterious quests that were so elusive in the latter.

Other new role-playing games you should be watching for in June are Dynamix's *Betrayal at Krondor*, which employs rotoscoped 3-D graphics; Virgin's *Lands of Lore*, a three-character quest with a first-person perspective à la *Eye of the Beholder*; and Realms of Arkadia, a best-selling German quest just imported by Sir-Tech.

If you're looking for something different, the most unusual new game on the shelf this month is *National Lampoon's Chessmeister 5 Billion and 1* (from Spectrum HoloByte). The world's only humorous chess simulation, *Chessmeister* is also the most risqué of the dozens of such programs. It parodies chess and computer games and gives you a better chance of winning than the artificial intelligence of other chess games. Until next month, that's check and mate for "Game Insider." □

**Chessmeister 5 Billion and 1 puts a National Lampoon slant on the ancient game of chess.**



tegic Simulations' sequel to last year's hit sports sim, veteran sports announcer Ron Barr calls the plays. Three expansion disks provide new players and stadiums, plus a fantasy draft feature.

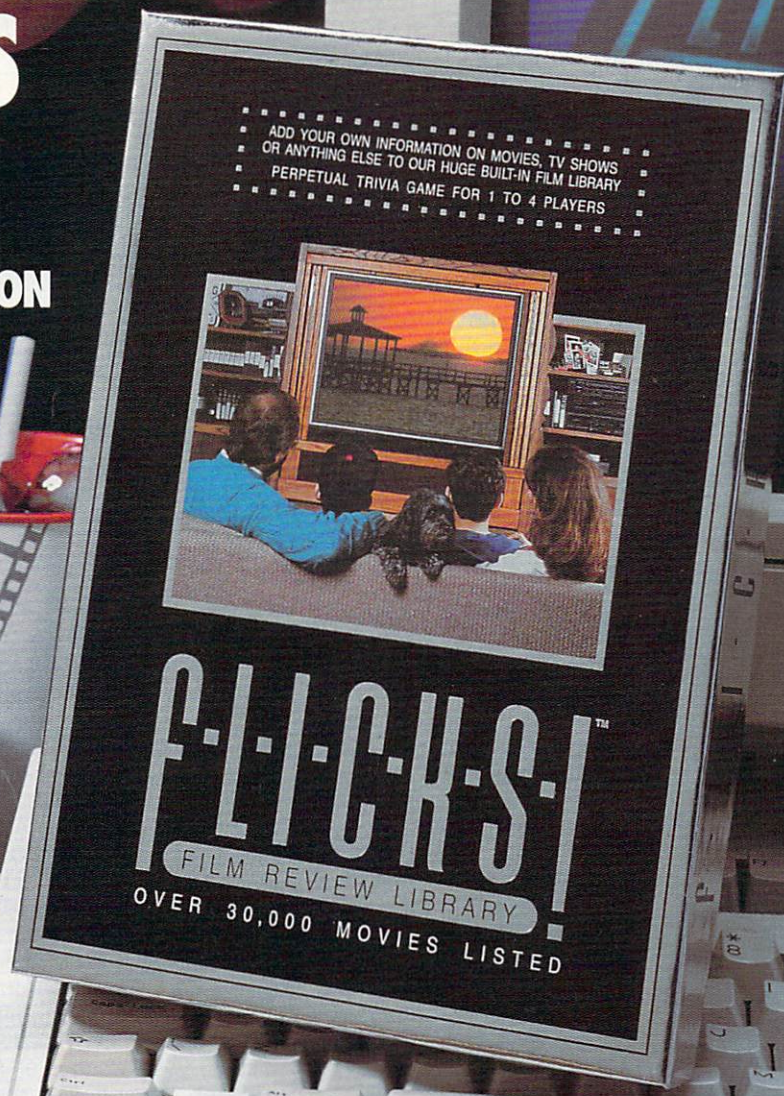
Jim Walls, a retired California Highway Patrolman and creator of Sierra's *Police Quest* series, recently completed *Blue Force: Next of Kin*. You begin as a by-the-book motorcycle cop, but for the last two-thirds of the game you play a private eye who gets to bend the rules. Walls codesigned the game with Cheri Lloyd, who has done the art for Walls' games since *Police Quest II*.

Meanwhile back at Sierra, Al Lowe made a dramatic shift in story material for his latest



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# ENTERTAINMENT CHOICE

*With 3000 planets to explore, hosts of aliens to meet, and scads of spacecraft to fly, you'll be entertained for hours with this fully digitized space adventure.*

David Sears

## STAR CONTROL II

When we last heard from Earth, the Alliance fared badly against the Hierarchy. It threw everything it had against the brutally powerful Ur-Quan dreadnoughts and battle thralls, but it suffered terrible defeat. Now, most Alliance worlds lie fallow; their star-faring days are over. The Ur-Quans no longer consider humanity a threat. Little do they know that a handful of earthlings survive outside the slave shield—the children of a lost scientific expedition to Vela.

That's where you come in. Cut off from news of the war, the scientists in the Vela-Zee-man system worked in ignorance of the struggle's outcome. There, they discovered an abandoned Precursor factory. The ancient Precursors possessed science that today's sentient races can only mimic and never fully comprehend. With this factory, you hope to manufacture a Precursor starship that might withstand the fury of the Ur-Quan masters.

Alas, you can produce no more than the skeleton of the Precursor vessel. What now? You return to Earth, where, hopefully, whatever remains of the human race will assist you in completing your warship and join you to annihilate the dread Ur-Quan masters. Thus begins your quest, and the journey, even in hyperspace, is a long one.

Star Control II holds much in common with its popular predecessor, such as large star maps, starship factories, a definitive space-combat simulator, interstellar exploration, and more—there's plenty here for 100 hours of play.

But Star Control II offers much more than the original's tactical considerations and manic action. It reaches deep into galactic history to paint a picture of considerable drama and pervasive humor. For instance, if you ever wondered why the fairylike Arilou visited Earth centuries ago, you may find the answer in this sequel. On your expeditions, you'll encounter over a dozen alien species of disparate temperaments and combat aptitudes. All prove quite talkative, particularly if you've acquired items they desire. Just ask your questions via the dialog box and enjoy their responses. Avoid insults: A few unkind words so angered the Vux that they swore animosity toward man forever.

To complete your ship, you'll need vast amounts of raw materials. Some you may acquire within the solar system; most, however, lie scattered throughout the galaxy. Using the Earth's star base to synthesize necessary modules, add a few storage pods to your Precursor ship along

with extra fuel and crew members. Pull up the star map and choose your destination. Nearby stars might not promise the greatest mineral wealth, but the likelihood of an insectoid Ilwrath Avenger blasting you to atoms isn't as great, either. A convenient autopilot feature guides you into hyperspace and then drops you at your destination. You can instead work the controls manually, but even the abbreviated distance covered in hyperspace takes considerable time.

Once within a star system, you guide your ship into orbit around a planet or moon, perform an energy scan, a biological scan, a mineral scan, or perhaps all three, depending on your zeal. Next, drop a lander craft on the surface and run over minerals to store them; stun life forms with the lander's blaster and then pick them up. Any energy sources shown on the map indicate technology of some sort; approach with caution. You may lose some crew members, but the rewards of more



Precursor trinkets warrant a few sacrifices. Return to your ship and repeat the process until your cargo bays overflow or your limited fuel levels dictate a return to Earth.

At home, you can exchange your raw materials for more synthesized Precursor modules—more powerful weapons, defensive systems, crew and storage pods, and additional fuel tanks. In the Earth's shipyards, you'll choose from plans for lesser starships—earthling cruisers at first, but more diverse vessels as you form alliances with friendly races and they place their technology at your disposal.

Initially, Star Control II seems to involve much of this sort of exploration, flagship design, and fleet construction; and all of these constitute an excellent game. But after a point, you acquire enough resource units that you really don't need to explore every planet you encounter. Of course, whenever a new species offers you starship blueprints, you'll want to build that ship just to fly it, if for no other reason.

So, what's left after you have all the credits an earthling could ever spend? Meeting the neighbors! They all have problems, and only you can solve them. Either that, or it will seem that every alien you encounter will want to kill you, so pack your blasters along with your best diplomatic banter. As you work your way through the galaxy, you come closer to unraveling the mysteries the Precursors left behind and the motivations of the Ur-Quans, and you encounter the strangest assortment of spacecraft ever assembled in one game. More

significantly, you'll play top gun in a galactic showdown rivaled only in the best science-fiction films.

Called the first totally digital game by its designers, Star Control II stands ready to amaze. Played only in impressive VGA and MCGA graphics modes, its playfields sport parallax star fields, exquisitely detailed battle craft, and gorgeous explosions. Consistently superb, though limited in variety, the animated sequences that accompany each alien encounter convey whimsy or dread equally well. Dialogue, often the weakness of sci-fi or fantasy role-playing games, rates from witty to inspired, and it would probably amuse even the most grizzled space veteran. The designers placed the emphasis on fun here, and while it's easy to treat Star Control II seriously, only a few of the aliens do. These are, of course, your worst enemies.

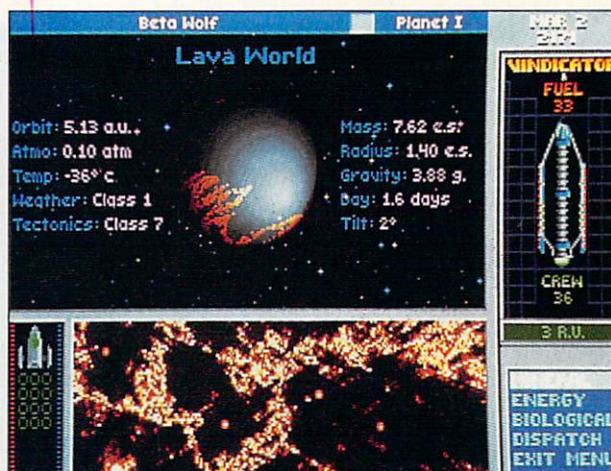
Owing more to its digital heritage than the graphics and dialogue, however, the eight-channel score and accompanying sound effects redefine what a PC speaker can produce. The Pkunk starship captain taunts his opponent with intelligible insults while a techno combat theme thumps in the background. Explosions sound very large—and very much like explosions. Somehow, all this mixes without missing a beat. Alien encounters merit moody atmospheric pieces or playful tinkling melodies; all are memorable and among the best done for any game on the market.

Star Control II configures itself automatically on most systems, will run under Windows, and works happily in tandem with a disk-caching program.

The larger the cache the better: With 9MB of hard drive space full of scores of stars, uncountable planets, and nearly an hour of music, the more time you can spend playing the game and not drumming your fingers during seek/read times, the better.

Before you tangle with the Ur-Quans, you'll want to try out a few of the newer starships and pit them against the old standbys. The

**IBM AT or compatible (25-MHz 80386 or faster recommended), 640K RAM, high-density 3½- or 5¼-inch floppy, hard drive with 10MB free, MCGA or VGA; joystick optional; supports Ad Lib,**



game includes a stand-alone program, SuperMelee, that lets you fill a fleet with the ships of your choice and slug it out in deep space. For a humbling experience, try a melee against the computer in Frenzy mode. You won't believe your PC can move so fast!

Star Control II gives you exactly what you want in a space adventure: action, bizarre technologies, monsters, friendly aliens, vicious aliens, a love interest, and unfathomable mysteries. Who wouldn't want more of the same? This time, though, the smart money is on the earthlings at Accolade. □

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# GAMEPLAY

Paul C. Schuytema

## HITTING THE BOOKS

Gone are the days when good mechanics and a fresh idea ensured a quality game. We, as consumers, demand more from our computer entertainment, and game developers have obliged us.

A case in point is Dynamix's *Aces of the Pacific*. This World War II flight simulator pulls us into the world of sun-bleached runways, swaying palms, and Quonset huts of the Pacific theater. The me-

chanics are there: a solid simulator with impressive graphics and a healthy dose of great gameplay.

and official listings of fighter and bomber groups. Bruning discovered that one of the highest-ranking aces of the Pacific theater, Gerald Johnson, was a native of Oregon. He tracked down Johnson's widow and borrowed an interesting piece of memorabilia from her: the silk map Johnson carried with him when he flew. On it were all of the main American air bases, against which Bruning could check his research. His interest in this era is evident not just in his conversation but also in *Aces*.

but also for the tone of speech and the quirks of Holmes's character.

Berg didn't want to rehash any of Doyle's work or rely on explanations borrowed from the fiction. He wanted to create a completely new adventure that excited the modern palate for mysteries but also remained true to the fictional Holmes. He labored to re-create Holmes's rhythm, from his conversational mannerisms to his tendency to overuse people's names.

Berg also studied Dickens's fiction to capture the Victorian flavor of the dialogue as well as the setting, and he used the clichés of Victorian society to bring the 1880s back to life.

Using period maps, Berg made sure that place and street names were accurate, while artists worked with books of Victorian fashion and costume to create the look of the game's characters.

Berg explains that Holmes was an enigmatic individual who was generally very far removed from the Basil Rathbone matinees. He was crass, solitary, and very unsympathetic toward those who were swung by their emotions. He didn't like women very well, and he couldn't tolerate ignorance in anyone. Holmes's personality is very strong in the game, a product of Berg's endless writing and rewriting.

The result is a cinematic excursion into the smokestacks of London and a wild and believable journey with Holmes as we help him unravel the Case of the Serrated Scalpel.

The research necessary to create these games answers our demands for greater depth. Our criteria for what makes an unforgettable movie or book have intermingled with our expectations of computer entertainment. We demand much more, and thankfully, we are getting it. □

**Aces, like good literature, provides a vivid, continuous experience. Research is the element that makes the experience real.**



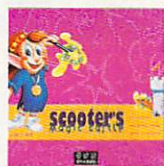
He began his research in typical fashion: devouring books at the university library, from secondary sources to pilots' memoirs. After he'd grasped the big picture, he worked through the Air Force archives at Maxwell Field, Alabama, where he studied microfilm records of unit histories

Stepping back even further in time, Electronic Arts' *The Lost Files of Sherlock Holmes* enters the smog-draped London of 1888. *The Lost Files* is the largest interactive adventure yet put on a PC, and the experience it provides is a cross between a colorized Basil Rathbone movie and a long indulgence in the work of Sir Arthur Conan Doyle.

R. J. Berg, the game's scriptwriter, has been a fan of Sherlock Holmes since boyhood. When he decided to put this game together, his first step was to dive into the canon of Doyle's work, rereading the stories not only for the mystery



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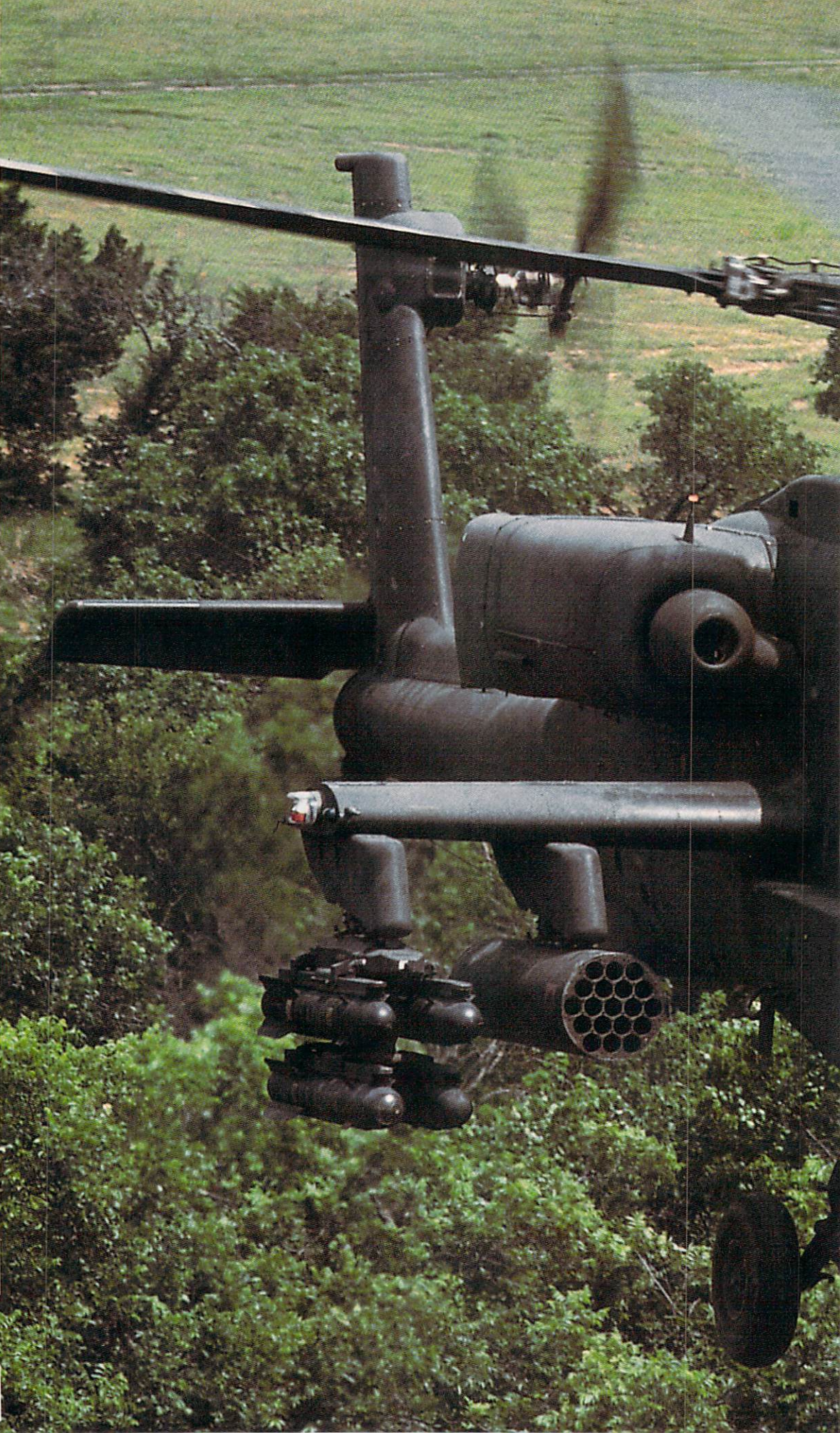
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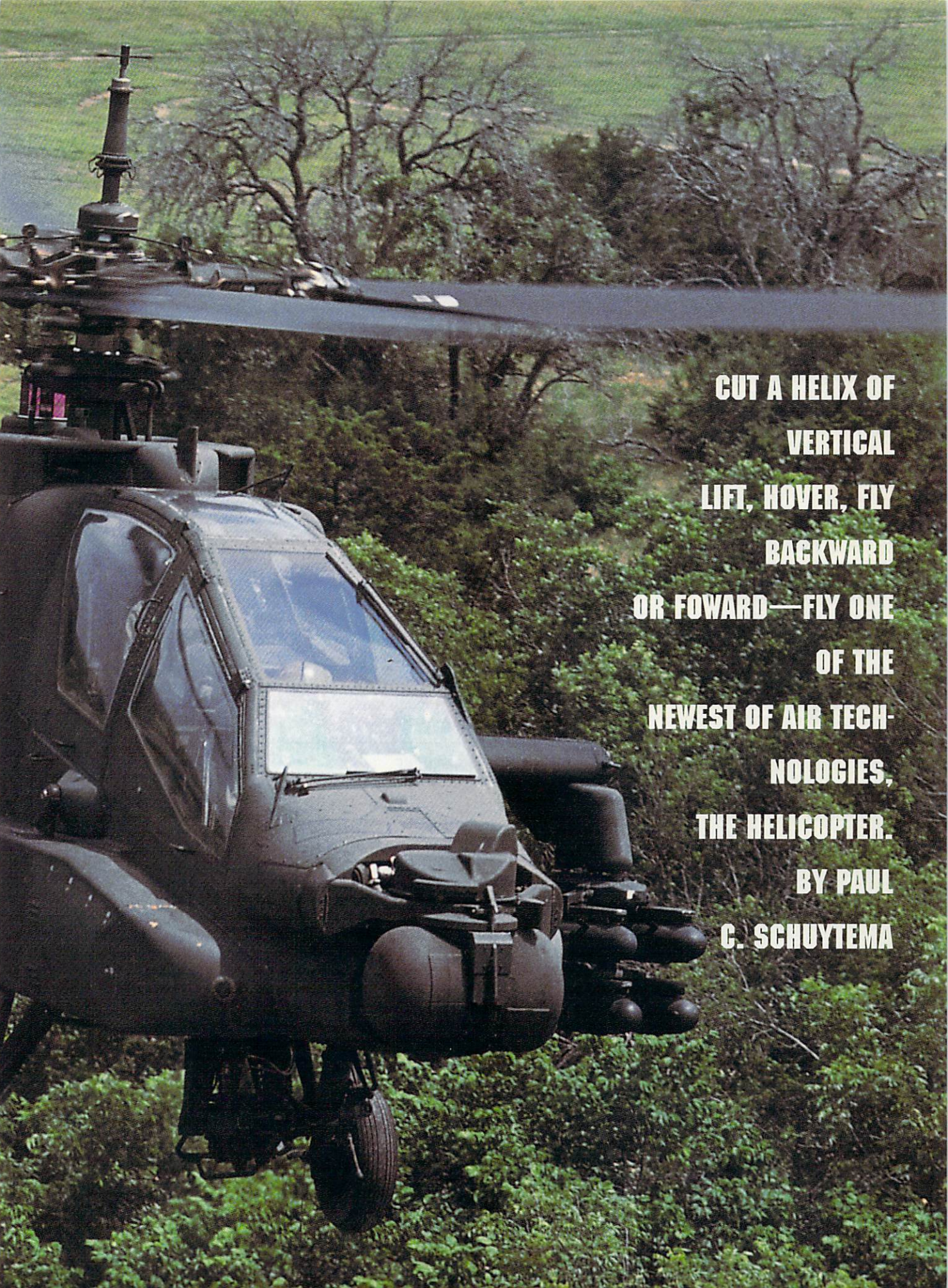
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# COMING VERTICALLY





**CUT A HELIX OF  
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LIFT, HOVER, FLY  
BACKWARD  
OR FOWARD—FLY ONE  
OF THE  
NEWEST OF AIR TECH-  
NOLOGIES,  
THE HELICOPTER.  
BY PAUL  
C. SCHUYTEMA**

You're flying low, almost brushing the trees' highest branches. Suddenly you detect a surface-to-air missile (SAM) rocketing toward you. You lift, swerve, and then duck to avoid it. Safe for a moment, you drop and hide along the side of a forested hill. You're not flying the fastest jet, but one of the slowest of aircraft, a helicopter. You've traded speed and glamour for stealth and unusual powers. Almost a secret weapon in modern warfare, your helicopter possesses advantages over all fixed-wing aircraft. It can take off and land in a space no larger than a two-car driveway, fly at arm's length above treetops, and duck into foliage to hide. Lucky for you, you aren't actually risking life and limb during your mission; you're piloting one of the latest flight simulators in the safety of your own home.

Only recently have computers been able to handle the close-to-the-ground rendering necessary for helicopter flight. The most significant of these simulators are Gunship 2000 from MicroProse and Comanche Maximum Overkill from Nova Logic. They use the technology found in the powerful helicopters in action as recently as Desert Storm.

Electronic sophistication: That's the hallmark of the modern helicopter. Apaches, SuperCobras, and Comanches are marvels in state-of-the-art electronics, with multifunction computer displays, laser and infrared targeting, and extensive countermea-



Low-level scenery makes sims realistic.



Helicopter sims bring the enemy up close.

sure capabilities. Gunship 2000 and Comanche Maximum Overkill are, respectively, modern-era and near-future simulators that take advantage of these capabilities.

One of the most enjoyable aspects of a helicopter simulator is that the slower speed gives you time to assess situations. And, since piloting a helicopter involves intense concentration on the terrain, flight is a much more active—and challenging—endeavor.

## Gunship 2000: Multichopper Missions

MicroProse's Gunship 2000 allows you to fly a wide array of helicopters, from the Apache to the experimental Comanche. Missions allow you to travel the globe from the Middle East to Europe, the Philippines, and Antarctica (the latter two theaters are included in the scenario add-on disk, Gunship 2000 Philippine Islands and Antarctica Scenario Disk with Mission Builder).

Play begins with a series of training missions, and successful completion earns you a promotion to Warrant Officer First Class. From there, you fly single-helicopter missions until success leads you to full commission. As a commissioned officer, you can fly any of the helicopters in single-helicopter missions or command a multichopper flight. Lastly, a campaign series of multichopper flights tests your expertise.

MicroProse has done a commendable job in bringing the complicated instrumentation of the modern helicopter to the computer. Fortunately, it has included many ways for players to customize the flying difficulty, from allowing the copilot to handle all weapons and countermeasures to taking full charge of the helicopter simulation with varying lift-to-speed characteristics.

The exterior graphics are unspectacular polygon renderings, but there's so much going on around you that they're more than adequate.

Flying the choppers is simple at

## THE RAH-66 COMANCHE

Both Comanche Maximum Overkill and Gunship 2000 allow you to sit behind the controls of the Comanche, but just what is at the heart of this high-tech helicopter? The Boeing Sikorsky RAH-66 Comanche is an experimental helicopter that will reach its first prototype flying stage in 1994. Already, the U.S. government has committed to purchasing over 1200 of these nimble combat and scout choppers.

The Comanche's small, thin, and aerodynamic body will be constructed entirely out of composite materials. The scooped cockpit holds a crew of two, each in sealed, identical chambers. The pilot sits in front, enjoying a panoramic view, and the copilot is a fully trained pilot as well.

The instrument panel is dominated by twin Multi-Function Displays, each able to display a wide array of instruments from digital maps to tele-

vision images and damage control. The units are redundant, which means that if one unit fails, the other can replace it. Prior to each mission, the pilot loads a 650MB optical disk into the chopper's computer, which then relays such information as targets and maps.

One of the most interesting aspects of the Comanche is its ability to pop into view of the target area, record data, and then retreat. The pilot and copilot can then review the images in relative safety to plan their attack.

The Comanche's design is totally modular, with ergonomics and efficiency factored in at every juncture. Currently, when Apache helicopters are in the field, an entire electronic testing laboratory must accompany them for maintenance and repairs. The Comanche needs only handheld computers to diagnose its problems, and its modular nature allows a

new part to be fitted almost instantly while the malfunctioning part is repaired offline.

The Comanche is a fly-by-wire helicopter, which means that the pilot's control actions aren't linked directly to the control surfaces but instead are linked electronically to the computer. Based on the context, the computer can then take whatever actions are necessary to achieve the pilot's desired results. When flying a Comanche, a pilot no longer has to control the throttle, tail rotor, cyclic, and collective; the computer handles all of the calculations and adjusts each system automatically.

Undoubtedly the most advanced helicopter yet designed, the Comanche is expected to see service well into the next century. With user-friendly designs such as this being possible with today's technology, one wonders what the future holds for rotary-winged aircraft.



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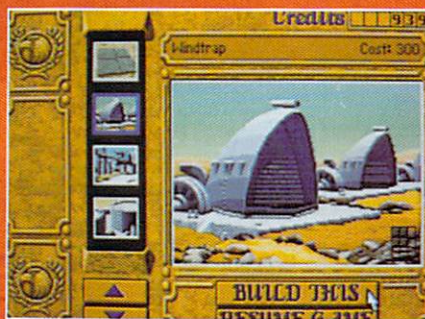
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first, but at the advanced levels it's a true test for your brain's on-the-fly computational ability. You control the cyclic, which is the directional control, and the collective, which controls lift. These controls continually affect each other, requiring you to give them almost constant attention and adjustment, especially when you are swerving and ducking to avoid mountains or incoming SAMs.

During multicopter missions, you must not only fly a helicopter but also issue orders to an entire wing. During the course of many missions, the pilots who are flying with you grow in experience and training, and any green cadets become seasoned combat veterans.

Gunship 2000's scenario add-on disk, Gunship 2000 Philippine Islands and Antarctica Scenario Disk with Mission Builder, adds some flight capabilities, like collective control for a CH Flightstick. But the heart of the add-on disk consists of new theaters and scenarios. City flights are available in the European theater, and you can skim over and through rugged mountain ranges in northern Iraq. The Philippines and Antarctica are also represented. Plus, the disk sports a comprehensive scenario builder.

## BUYING INFORMATION

### **Comanche Maximum Overkill—\$69.95**

NOVA LOGIC  
Distributed by Electronic Arts  
P.O. Box 7530  
San Mateo, CA 94403  
(800) 245-4525

### **Gunship 2000—\$59.95** **Gunship 2000 Philippine Islands and Antarctica Scenario Disk with Mission Builder—\$39.95**

MICROPROSE SOFTWARE  
180 Lakefront Dr., Dept. 10  
Hunt Valley, MD 21030  
(800) 879-7529

### **Comanche Maximum Overkill: Electronics Challenge**

Nova Logic's Comanche Maximum Overkill is set in the year 1999 and is based on the RAH-66 Comanche, a helicopter not yet in actual use. There are no flight options and no levels of flight difficulty, but the Comanche is such an unusual chopper (see "The RAH-66 Comanche") that there's

plenty to keep you busy.

The most striking feature of Maximum Overkill is its terrain graphics. The mountains, hills, and riverbeds appear as fractal landscapes based on actual topographical data. Thanks to native-mode assembly language programming (no memory manager is needed, but you do need 4MB of RAM), the graphics are smoothly rendered and awe-inspiring. Nothing quite compares to whipping down a river canyon at 190 knots with cliffs blurring past on either side.

Maximum Overkill is easier to operate than Gunship 2000; consequently, it sacrifices some realism. For instance, the only graphics besides the rolling terrain are the threats (missiles and other hazards that your enemy sends your way); there are no incidental buildings or cities, nor are there trees. Also, you fly the missions in the immediate vicinity of the threats; you do not have to struggle with navigating your Comanche.

The flight model is also easier to fly than that of Gunship 2000, but that's partly because of the projected ease of flying the Comanche, which automates many of the controls. Since there's no hard flight data yet for the Comanche, it's impossible to know just how realistically Maximum Overkill flies.

That doesn't mean this simulation isn't entertaining: Gameplay is fast and exciting, and there are plenty of tactics to learn. With the complexity of the terrain modeling, you truly can utilize "nap of the earth" tactics, popping up to target and order an artillery strike and diving low over a riverbed to avoid an incoming missile.

### **Take the Challenge**

Helicopter simulators are a fascinating and addicting way to learn about the flight models of one of our most unusual inventions. Rotary-winged aircraft are common enough, but the details of their operation are something very few of us know about. The battlefield of the future will be nonlinear. No longer will massive deployments of troops cover hundreds of miles; rather, small, discrete combat units will be asked to perform small, very specific missions in discontinuous locations. At the heart of this type of strategy is the helicopter: elusive, dangerous, and capable of transporting troops and armament deep behind hostile borders. If you're ready for new challenges and a fresh gaming (and a true learning) experience, climb behind the cyclic of a rotary-winged simulator and give helicopter flight a whirl. □



"Sorry, Jack, but I'm sending someone a tad more reliable."

# 64/128 VIEW

*You know something, Igor?  
I think there may be  
life in this thing after all.*

Tom Netsel

There's a great scene in the movie *Frankenstein* when things look bleak for Dr. Frankenstein. He and his assistant, Igor, have done their best to create life in the laboratory, but the experiment appears to have failed. The electrical storm has blown itself out, the generators are quiet, and the traveling arcs of electricity have ceased to crackle and spark. The creature lies still on the table. The doctor slumps in despair.

But wait! There's movement on the table. A hand twitches and starts to move. The doctor rushes forward with his stethoscope and listens for a heartbeat. It's there! His creature lives! "It's alive!" Dr. Frankenstein cries ecstatically. "It's alive!"

That movie scene flashed through my mind recently as I examined a new disk publication called *Cee-64 Alive!* Jack Vander White and Steven Baxter started the enterprise about a year ago, and now it's up and running and producing disks for the 64.

I suppose the *Cee-64 Alive!* name reminded me of that movie, but the name also indicates that there's still 8-bit life after IBM. If you're like me, you've had enough of this doom and gloom and moaning and groaning about the alleged death of the 64. Well, its CPU is still beating. The "monster" lives, so let's get on with the movie! We've got a lot of computing to do before the peasants burn the mill in the final reel.

Vander White and Baxter believe that, too. Last year they released a demo and five disks of programs and computer art. Later, Gaelyne

Moranec joined the team as disk editor. This year they've issued another double-sided demo disk and expect to release more programs, articles, and graphics for the 64 and 128. "Our plans for 1993 include six issues of *Cee-64 Alive!*," Moranec says, "and as yet an undetermined number of supplementary *Cee-128 Alive!* issues."

In addition to original programs, the staff plans to include programs from the past that still have appeal. "In the areas of shareware and public domain alone it would take one person a lifetime to sift through the programs available, and then there are thousands of commercial programs to consider," Moranec says. The staff already has enough material to fill several volumes, but Vander White still encourages program submissions.

"*Cee-64 Alive!* has survived its first year—a recession year, at that—by starting out small and building slowly," Moranec says. "We're not packaged fancily, but we offer a wealth of information and programs for a very low cost."

You can get a sample disk for \$3. The six disks issued for 1993 in volume 2 cost \$25, and discounts are available for groups that order five disks or more. The five-disk set of volume 1 is still available for \$20.

Subscribers also can access the *Cee-64 Alive* BBS. It offers more than 26MB of programs. The BBS number is (916) 395-9733. To subscribe, order a demo disk, or request more information, write to Jack Vander White, P.O. Box 232115, Sacramento, California 95823. □

## GAZETTE

### 64/128 VIEW

G-1

Check out *Cee-64 Alive!* This disk publication offers programs and articles for the 64.  
By Tom Netsel.

### UPGRADING WITHOUT CHANGING PLATFORMS G-3

You don't have to abandon your 64 just because you want to upgrade your present computer system.  
By John Elliott.

### REVIEWS

G-8

Dr. Spellingstein, The Landmark Series, and Escape Route.

### FEEDBACK

G-14

Questions, answers, and comments.

### D'IVERSIONS

G-16

Young artists and their multimedia illuminations wow an IBM crowd in Atlanta.  
By Fred D'Ignazio.

### MACHINE LANGUAGE

G-18

Touch a key and your screen changes immediately.  
By Jim Butterfield.

### PROGRAMMER'S PAGE

G-20

Try these wild and exciting sound effects.  
By Randy Thompson.

### GEOS

G-22

Get the most out of geoPublish, a powerful but sometimes intimidating program.  
By Steve Vander Ark.

### BEGINNER BASIC

G-24

Use your TOD clock to control the user port.  
By Larry Cotton.

### PROGRAMS

|                             |      |
|-----------------------------|------|
| Minesweeper (64)            | G-25 |
| TurboDOS (64)               | G-27 |
| Instant Art (64)            | G-32 |
| Number Base Calculator (64) | G-35 |
| Quickscreen (64)            | G-37 |

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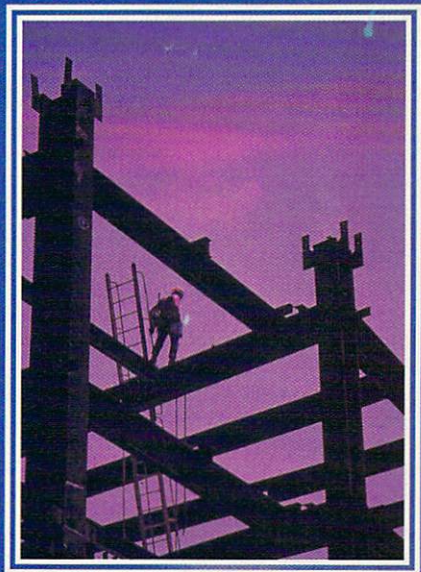
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# UPGRADING WITHOUT CHANGING PLATFORMS

By John Elliott

Just because you  
want to upgrade doesn't  
mean you have to  
abandon your present  
equipment and  
buy a new system.



**A**re you planning to upgrade your computer system anytime soon? If so, just what do you mean by upgrading? Even people who support the 64 and 128 usually think it means moving to the Amiga or IBM, but it can mean something else as well. You can upgrade your present equipment, making it more flexible and powerful, without buying a whole new system.

It's true that major software developers rarely produce for 8-bit platforms anymore, but that doesn't mean that the platform's been abandoned. It would seem that owners of these computers should consider preserving their hardware and software since replacing them may be expensive.

Some people argue that there's nothing new for the 64 in the way of hardware and that even once-familiar names in the Commodore market are dropping their 8-bit products. So maintaining and enhancing existing equipment can also be difficult.

### **Schnedler Systems**

The story of Schnedler Systems supports the above arguments. Until recently, Schnedler Systems produced accelerator CPUs that boosted the 64's operating speed to better than 4 MHz. It also made adapters that let you use RAM expansion units with these speed-up devices. Schnedler's main Commodore customers were factories in various industries which used 128s to monitor different testing procedures. The additional speed of the accelerator CPU was useful in this process.

"When Commodore stopped making the 128, the factories gradually lost interest in using it for these purposes," says a Schnedler spokesperson. Schnedler has sold out of these devices and has terminated production. The company now primarily makes interfaces and modems for IBMs, although one interface is Commodore compatible.

Efforts to boost the operating speeds of the Commodores have met with little success. For more than a year, there were rumors about new high-speed chips that could accelerate the 128.

### **Parsec**

Through his company, Parsec, Ron Brown commissioned the production of a limited number of 128 boards which operate at from 6 to 12 MHz and carry up to 1MB of RAM on board. Advertising of this and two other new products was limited to his magazine, *Twin Cities 128*, and to bulletin board systems. By November

1992, he had more than 100 advance orders, but that was not enough to pursue production. Partly because of the narrow margin of profitability with this product, Brown was forced to abandon these high-speed boards.

The news is not all bad, however. Brown reacted to the death of *RUN* magazine by expanding *Twin Cities 128* to include 64 coverage.

The Commodore story is far from being over, however. Older products disappear, rumored new ones never make it to market, but there's still plenty to get excited about. Many companies still support the 64/128 by updating their successful older products and by developing new ones.

### **The FGM Connection**

Ron Hackley and Jerry Freadman operate a company whose very popular program, Fun Graphics Machine, manipulates graphics and type in many unique ways. I asked Hackley, the FGM programmer, why he still supports the Commodore platform.

"It's more forgiving and has a smarter DOS than the other machines," he said. "When you turn it on, the DOS is just sitting there. There are few viruses—maybe not any. It's much friendlier to use. For most programs, you need only a couple of sheets of simple instructions. It's for the home user who doesn't need extras."

Like many producers of a single program, Hackley and Freadman don't have a large advertising budget to attract customers. In addition to placing small ads in *Gazette*, they rely on somewhat unorthodox marketing approaches by selling FGM through user groups and electronic bulletin boards.

An FGM upgrade will soon be available that will support RAMLink from Creative Micro Designs (CMD). It will also support Commodore's RAM expansion units, if Commodore will allow a license. The new FGM will import graphics in geoPaint format, Handyscanner creations, and text from most word processors.

### **The Write Stuff**

Eric Lee is the creator of The Write Stuff, a word processor that's generated such loyalty among its users that they've created their own newsletter. With each hardware innovation in the 64/128 market, Lee has adapted his program to take advantage of any additional possibilities. All versions allow use of an REU to save text and to check spelling. There are special versions for the 1581 disk drive, Quick

Brown Box nonvolatile storage cartridges, and Creative Micro Designs' hard drive and RAM units.

Lee has decided to take his word processor to version 3. This version will feature high-resolution printing on Epson-compatible printers by utilizing three passes of the printhead. Each letter, up to 500 dots in height, can range from two inches to microscopic. Printing will be solid at all sizes—no jaggies! Fun Graphic Machine's Ron Hackley has seen sample printouts, and he says they are "near laser quality." A beta version should be circulating by the time this article appears.

At the same time, Lee is compiling a collection of 7000-8000 IBM shareware and public domain images that he is porting to the 64/128. He will sell catalogs of these images that will be indexed by subject. Sales will be largely through user groups. More than 220 of these associations are currently selling his Write Stuff word processor.

### **Quick Brown Box**

Brown Pulliam sells a range of battery-backed cartridges that have storage capacities of from 64K to 256K. Several hundred owners use a model of a Quick Brown Box that contains a specially adapted version of The Write Stuff. The word processor is available instantly, and users can store files in it as well. Many other people use a Box as a substitute disk drive to hold frequently used programs, such as SpeedScript.

Last year, Pulliam ran a contest for database and spreadsheet developers to see who could develop the best version for QBB. Although there were no database submissions, Pulliam did select and now distributes a spreadsheet that not only loads from QBB but also stores the created spreadsheets back to the Box. It was initially released in its non-QBB form as Calc by Pankhurst Programming. Pulliam says that he finds that the spreadsheet especially lends itself to inventory control.

With his relatively low sales volume, Pulliam does not advertise widely, but his products are still available. Word of mouth is a primary method of promotion.

### **Rio Computers**

Rio Computers, which sells a number of Commodore and video-related devices, sells Handyscanner, the only scanner available for the 64/128 in North America. By the spring of 1993 it expects to offer a genlock for the 64 that should sell for around \$400, but

early orders may go for \$300.

Rio also plans to offer a stand-alone video titler in the same price range. While it will begin with titling and mixing, video editing and other modules will eventually be added. The hardware should sell for prices that are comparable to an Amiga's. The market could include small television stations, cable stations, and home hobbyists.

I asked Rio why it produced high-end material for an inexpensive machine. "We love the 64," a spokesman said. "It meets all of our needs. We produce for those who don't want to go to a new machine when new things come out."

### Mad Man Software

Gene Barker and his associates have developed an adventure game that they call Messiah III. This multidisk product technically surpasses previous 64 games and challenges those of any platform. Bard's Tale had 70 different pictures, but Messiah III has more than 300, with more than 50 maps of the terrain.

To make this amount of information manageable, they developed a personalized "Mad DOS" that makes the longest wait between pictures 12 seconds. Since Messiah III has been adapted to run from CMD RAM devices, loading is instantaneous. "It's like using CD-ROM," says Barker.

It was also necessary to develop a compression program that doubles the disk capacity to fit the game on a reasonable number of disks. This Master Archiver is available separately for about \$40.

The staff at Mad Man has also written a paper called "How to Keep Your Commodore Alive." This is a collection of tips and suggestions to keep your computer fit and happy.

Barker and friends began work on Messiah in 1986 while at the Colorado School of Mines. They are just about finished. Why spend all this time and effort on an aging machine? "Why drop the 64 when it can challenge the IBM?" Barker answers. He and his coworkers feel that with appropriate planning and programming, the 8-bit Commodores can accomplish anything that other computers can and do it more efficiently.

### SOGWAP

Mark Miller is the creator of Big Blue Reader and Bible Search, two programs still on the market for the 64 and 128. He started selling Big Blue Reader for the 128 and 1571 in August 1986. By November 1987, it

## Referenced Companies

Creative Micro Designs  
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Roseburg, OR 97470  
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Mad Man Software  
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The Write Stuff  
Busy Bee Software  
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generated enough income (modest, he insists) for him to be able to quit his regular job. In 1988, he began to sell a version for the 64. For all these years sales have been consistent. Most of his market has been in North America.

While BBR provides profit, Bible Search barely supports itself. Miller revised it about a year ago. It now prints verses, saves a range of verses to disk more easily, and on the 1581 treats the Old Testament and New

Testament as one section.

BBR version 4 now supports a joystick, and both the 64 and 128 versions recognize subdirectories and RAM expansion units. Both versions are compatible with JiffyDOS.

Over the years, support has been consistent for the 1571 and 1581 versions of BBR. As yet there have been few requests for a version that works with the new floppy drives from CMD.

### Creative Micro Designs

CMD has produced more innovative software and hardware for the 64 and 128 than any other company. Its initial success came from JiffyDOS. There are now a million of these DOS wedge and disk accelerator units in use. CMD's RAMLink and RAMDrive cartridges provide nonvolatile RAM expansion units with a proprietary DOS. CMD sells the only hard drive still being marketed for the 64/128. CMD also markets a number of software enhancements for GEOS that make special use of its hardware.

CMD also sells special-purpose cartridges. One contains an extra SID chip that enables the 64 to produce stereo sound. The other is a high-speed RS-232 interface that allows connection to IBM devices.

Most recently, CMD is marketing two high-density FD series drives. The FD-4000 3 1/2-inch drive lets you use enhanced density disks and provides up to 3.2MB of storage. This is more storage capacity than the floppies of most other computer platforms. Its little brother, the FD-2000, allows up to 1.6MB of storage.

The latest version of JiffyDOS is three years old. With the exception of it and the hard drives, all of CMD's products have been either developed or newly marketed in the past two years. This is a heavy commitment to a platform that some say is in decline.

Charlie Christianson Jr., the president of the Massachusetts-based CMD, provided some significant statistics that may explain his company's support for the Commodore computer. "About 800,000 Commodore 64s were sold worldwide in the past 12 months. Eighty percent of these were sold in Germany, where these machines are assembled. The company (Commodore) still supports the C64 in Europe."

While business in Europe is good, over half of the CMD sales are in this country. After Germany and North America, Australia provides a good return in terms of investment. Last year the Australian branch of Commodore sold 30,000 units in a

Commodore sold 30,000 units in a single sale to China.

Christianson says he wants to assure Commodore users that as long as his company's products continue to be successful, they can expect further hardware and software enhancements from CMD.

### Performance Peripherals

Peter Fiset, in addition to being a graduate student in computer engineering, is the creator of CMD's RAMDrive. Although his studies are not on Commodores, he continues to develop for the 64/128 because he sees a strong potential market.

In December 1992, he began to ship a battery backup unit (BBU) which allows both geoRAM and Commodore REUs to have nonvolatile memory. Whatever program or data is in the unit when you turn off your computer will be there when you turn it on again. As long as the program doesn't reinitialize the REU each time it's loaded, whatever the program puts in the REU will remain there. The most obvious uses for this product would be for word processors which place text files and spelling checkers in the REU, and, of course, GEOS.

A separate battery backup RAM

disk (BBG RAM) can retain up to 2MB of memory. This device is only for GEOS, but it includes a GEOS application that lets you select one of up to five 1571 drives.

By some estimates there are up to 800,000 Commodore RAM expansion units and geoRAMs on the market. Fiset will be successful if a significant fraction of this population becomes aware of his devices and decides it wants to leave programs or data in its REUs. What BBG RAM will lack in comparison with the CMD units is the ability to access partitions, emulate different Commodore disk drives, and easily convert the device number of the RAM device.

Fiset has a particular market in mind. Aware that in a sense he is competing against his own RAMDrive, Fiset pointed out that "some Commodore users cannot afford the CMD RAM devices but do want nonvolatile memory." Fiset has not done formal market research and will know by his sales whether there is a market for his devices, which start at about \$50.

### The Current State of the 64/128

In a recent "64/128 View," editor Tom Netsel complained that his cupboard

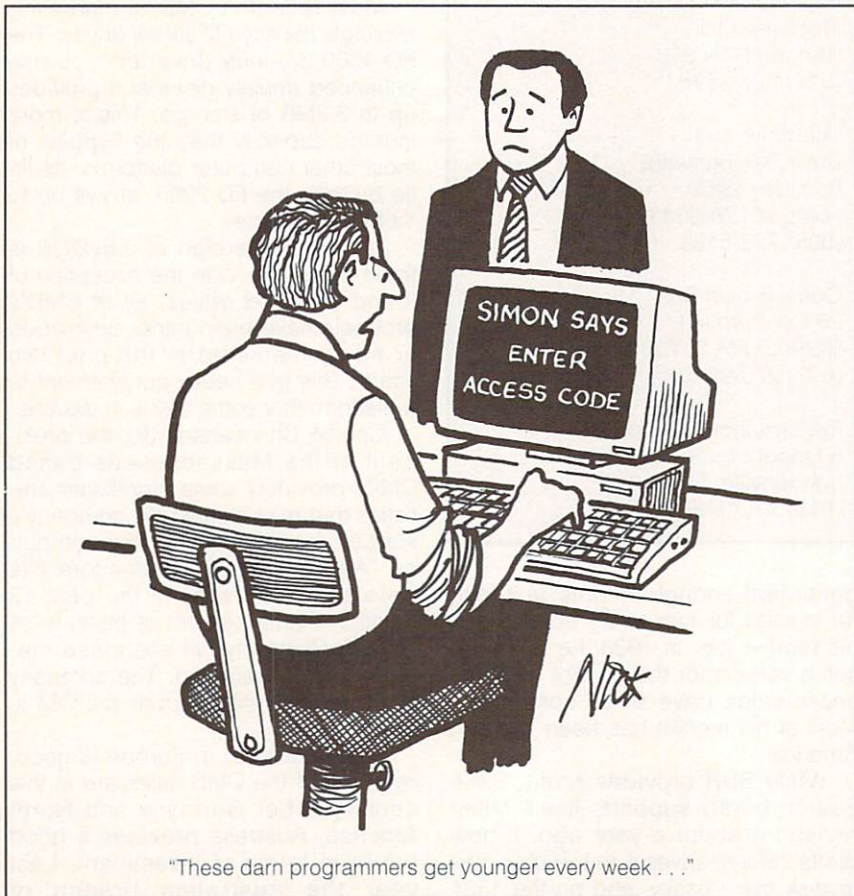
was nearly bare of products to review for Gazette. New products for the IBM were being released at a tremendous rate, but Commodore products had slowed to a trickle and had practically dried up altogether. Was this going to be the end of the 8-bit line?

That's when I decided to check with companies to find out for myself whether or not anything new for the 64 was in the offing. Was there anything coming that could give my system a technological upgrade, or should I resign myself to stick with the hardware that I already have? I expected to hear people say that as long as my Commodore is performing its tasks satisfactorily, then I should be content. After all, only vanity could justify my changing platforms.

Instead, I found that a group of individuals and small companies are stretching our computers in directions undreamed of only a few years ago. Gone are the huge distributors who once flooded the Commodore market with flashy advertisements and jealously guarded their marketing plans. This group is a community of developers. In many cases I received names and phone numbers of companies from people who in any other business would be considered rivals.

Collaboration is evident. The Write Stuff adapts to CMD and Quick Brown Box hardware. The Write Stuff creator sends his letter quality fonts to the developers of Fun Graphics Machine. Messiah III's developers at Mad Man are adapting for the CMD RAM devices and considering further joint projects. It could be argued that some of the products described in this article don't constitute simple upgrades. A cartridge or a new piece of software may not seem like much, yet each product makes the 64 or 128 do something it couldn't do before. The more substantial pieces of hardware from Rio or CMD can certainly broaden your computing horizons, and you don't have to be a computer engineer to use or install them.

Upgrading by using the products described here seems to me to be a better idea than switching computer platforms. It's an especially strong argument when you consider the time, effort, and money you probably have invested in your Commodore system. There's another reassuring note when you examine the other end of the Commodore pipeline. The investment of time, energy, and money by the software and hardware developers is an indication of their conviction that our Commodore computers will be productively used and enhanced by





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## DR. SPELLINGSTEIN

Things are different in Australia. Stargazers seek the Southern Cross, not the Big Dipper. Those wanting to be alone with their thoughts go on *walkabout*, not *retreat*. And Australian schools use Commodore 64s—hence Free Spirit's import from the "Minister of Education for and on behalf of the Crown in right of the State of South Australia." Meet Dr. Spellingstein, the monster spelling program for the 64.

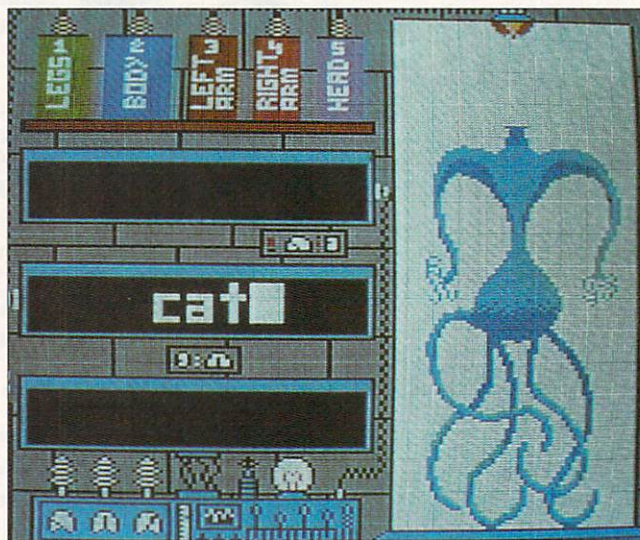
Dr. Spellingstein is a drill-and-practice program designed to reinforce words already taught in the classroom. It does this via three different games: Flash Words, Jumbled Words, or Guess the Word. Players who answer all game questions correctly earn the chance to build their own monsters in the laboratory via Monster Mix and Match.

There are two ways to use Dr. Spellingstein. The first is to play what the manual refers to as Dr. Spellingstein—Home Version and what the game menu refers to as The Dr.'s Flash Game. This discrepancy illustrates the sole problem with this game: The program menus differ from those illustrated in the manual. Only the section titles are changed, however, and since they're in correct sequence, it's not hard to figure them out.

This first game lets you select a list of six words from 168 lists already on disk. The word list is displayed on the screen for study. When you've finished studying, press Return to begin. At that point, Dr. Spellingstein's laboratory appears, and the first word flashes briefly in the top window. The word

disappears, and a cursor appears in a second window, ready for you to spell the word that just flashed.

Correct answers are sometimes rewarded by the appearance of a monster's body part in the laboratory. By the end of a game, even without getting every answer right, the whole mon-



Answer all questions correctly and earn the chance to build your own monsters in the laboratory via Monster Mix and Match.

ster can be assembled. Get all the answers right, however, and you can build your own monster by combining parts from other monsters.

The next option on the menu (School Version in the manual; Your Game and More Games on the screen) lets you play games that you've created with your own word lists. These lists may contain up to 20 words and are saved with their own game parameters. That is, a list saved as KATE1 may be a list of 20 words that we've saved for our daughter Kate to play as Flash Words. KATE2 could be the same list saved as Jumbled Words where you unscramble letters to make your word. KATE3 could be

the same list again for playing Guess the Word, a Hangman-type game.

The lists are created with the next module (Word List Editor in the manual; Game Creator onscreen). From here you can change the game setup; edit a word list; print the list; and load, save, or erase games.

ating a math quiz. There are any number of short questions that could be handled with this option, making this program much more useful than a mere spelling game.

The last module, known as Monster Printer in the manual and Print Saved Monsters onscreen, handles the loading and printing of monsters that the players have created. It also provides a way to delete files to make room for new monsters.

We have always admired programs that allow versatility and creativity in their operation. Dr. Spellingstein has as its primary goal to assist youngsters in learning their spelling words. It approaches this in a challenging and fun way. Yet it also allows you to modify enough facets of the program to put you in control. You determine how hard to make the games, what words to use, and even how the games are played. The possibilities are as endless as the number of monsters you can make with the various parts Dr. Spellingstein provides!

It's easy to see why the Australian school system uses Dr. Spellingstein. It's a program that can be used at home or in a class, and it can be adapted by parent or teacher to suit any student's abilities and needs. It's flexible and powerful, easy to grasp for the student user, and entertaining as well. In fact, Dr. Spellingstein fulfills every requirement we've ever had for an educational program and does so respectably. We highly recommend it.

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## REVIEWS

### ESCAPE ROUTE

It was a cold night in the city when the chief gave me the job of reviewing this new game from Creative Pixels called Escape Route.

Following his orders, I went undercover as private investigator Eric Hawthorne of the Apex Detective Agency. My job: recover the rare Acme diamond. It seems some dame called the IceLady stole this little trinket. I've got three weeks to catch this frozen Fräulein and recover the rock, and she's got a 4000-mile head start on me. This gumshoe's got no time to waste.

The sleuthing begins with a main menu of seven icons and a picture of the chief, who looks amazingly like Humphrey Bogart. These icons, which are explained in detail in the instructions, are a series of tasks and events that make up the game. These include a piano drop, roulette wheel, expenses, driving, gems, the IceLady's castle, and a flat tire.

When the main menu comes up, a flashing figure of Eric moves quickly from icon to icon. He's moving so fast that you have no real choice of which icon to try. Instead, you must hit the joystick's fire button and take your chances. Just hope that Eric doesn't land on the expenses or flat tire icons, since these cost him time and points.

The piano drop, like the main menu, depends solely on luck and requires no skill. Your only requirement is to move Eric left or right on the screen when he encounters the IceLady. Pick a spot, press the fire button, and wait for the piano to drop, praying it doesn't land on Eric. If Lady Luck is in a good mood, Eric not only avoids being flattened, but he gains 250 miles on the IceLady. On the other hand, if his luck is out to lunch, the IceLady gains 250 miles on Eric.

When an event is over, you return to the icon screen to try another game. Once again you press the fire button and see where Eric lands. At the top of this screen, you'll see the number of days which have passed, the number of miles to go, and the point score.

These extra miles can be whittled down easily, however, if Eric lands on the roulette icon. They can be increased just as quickly if he lands on the expenses icon. When he lands on either of these icons, a screen will come up with a picture of the IceLady, stating how many miles have been lost or gained. With the roulette wheel, which works in the player's favor, you can gain from 1 to 500 miles. The ex-

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penses icon, which works in the IceLady's favor, can add from 1 to 500 miles to her lead over you.

The flat tire screen is similar to the roulette and expenses routines in that it offers no action or player involvement. It consists of a picture of Eric standing next to his car, which has a flat tire. The number of flat tires add up throughout the game. Get four of them, and the caper is over. The number of flat tires is displayed on the main menu screen. Luckily, no mileage penalty is given for a flat tire.

The remaining icons, which consist of the IceLady's castle, driving, and gems, are the most enjoyable aspects in this program since they require some skill and offer you some chance of action. Each task starts with explanatory text and graphics which may be skipped later on.

In the IceLady's castle, Eric must battle against her henchmen who fight ninja-style to keep him from entering her castle. For each henchman that you defeat, you gain 100 miles and receive 150 points. Bars at the bottom of the screen indicate both the strength of Eric and the strength of the ninjas. When Eric's punches land, he experiences a moment of spiritual connection with Bruce Lee!

The driving event seems to have been inspired by Alfred Hitchcock. The challenge comes from avoiding a number of low-flying ducks that head straight for Eric's car. Luckily, you can move the car to avoid the ducks. You can even move it backward. In this event, you can gain up to 500 miles.

Finally, gems is a fairly entertaining segment which closely resembles Pac-Man. Eric is chased by a ghost through a dungeon maze. The objective of this timed event is to pick up as many as possible of the 25 gems strewn about the maze without being caught by the ghost. For each gem you pick up, you gain 20 miles and 50 points.

Each game takes up 1 day of the 21 which you have to solve the case, so landing on the expenses icon or getting hit by the piano too often can make it difficult for you to catch the IceLady. The game is rather simple, and the action is limited. The main complaint I have is the large amount of time it takes to load each segment. This is most frustrating when you repeatedly land on the roulette, expenses, or flat tire screens. After you've landed a couple of times, you know what to expect. The text doesn't change, only the numbers. But loading seems to take for-

ever. As a result, the game is too simple for adults and too slow for children, who would lose interest waiting for the different segments to load.

The graphics are not too bad, and there are some pleasant sound effects and music scattered throughout the game. To make the game more appealing, however, I'd prefer to see more player interaction. As it is, it seems that most of the time spent with Escape Route is spent waiting for segments to load.

CHRISTIAN FLEMING

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## THE LANDMARK SERIES: DUALTOP 64 AND 128

"He started to sing as he tackled the thing that couldn't be done and he did it." This quote from Edgar Guest appears on the title page of the manual for The Landmark Series. The title of the collection and even the name of the company itself announce the same thing: These utilities and games from program-

mer Paul Murdaugh will perform like no other GEOS programs you've ever seen.

And they do. They have excellent RAM support, exceptional graphics, and lightning speed, and they're easy to use. To top it all off, they come with a clear and concise manual and a price to make you smile. The Landmark Series is a winner.

The star of the series unquestionably is DualTop, a file manager for both the 64 and the 128. DualTop's interface, as its name implies, presents you with two disk directories at once. The lists appear side by side, and you can scroll through each one. I might as well hit a negative point right off: To be honest, I'm not convinced I need this feature. I haven't found a practical advantage to it. Oh, I suppose it's handy to scroll through other directories looking for a file without closing your current disk, but I seldom have a need to do that.

The interface screen displays so much information that it looks cluttered and cramped. As for copying, it's just as easy to drop a file icon on a drive icon or, better yet, to use the keyboard shortcuts in GEOS 128. I certainly don't need to see the directory of a disk in order to do this. As a matter of fact, since you can't copy between disks in DualTop without opening both directories, this feature can actually slow you down.

If that were DualTop's sole claim to fame, I would leave it tucked away somewhere and never use it. Fortunately, this isn't the case. DualTop is a state-of-the-art file manager program. It's chock full of great, user-friendly features, the kind you'll find so intuitive and handy that you won't ever

want to be without them.

Formatting disks is handled with a very straightforward, easy-to-understand control panel. You can't accidentally format the wrong disk, a problem sometimes with deskTop. DualTop 128 takes advantage of 64K video RAM if you have it, using it to store the DualTop screen. This lets the screen appear almost instantaneously whenever you return from an application.

The 128 version also can be set to switch to the appropriate video mode (40 or 80 columns) without tossing a dialog box at you. Both versions include a set of buttons down the middle of the screen that activate some of the most-used file-handling functions. Most functions have keyboard equivalents.

GEOS's operating system has always had a problem recognizing more than two drives. Programmer Paul Murdaugh tackled the problem by having GEOS "see" drives in pairs. If you double-click on a data file on drive B, for example, GEOS checks both drives A and B for the application to run that file. The same is true of drives C and D, but GEOS won't check drive B or A if you try to open a file on drive C. The deskTop skirts the issue by forcing you to swap drive C into position A or B, keeping things paired the way GEOS wants.

That wasn't good enough for Murdaugh, though. He wanted full four-drive support, with all four drives equally accessible from anywhere in the GEOS environment. The problem is only partially resolved in DualTop itself, but Murdaugh has released a series of upgrade patches for each of the main GEOS applications which will make them fully

four-drive compatible.

DualTop supports four drives without the patches if you take care where you place your files. It will access the 1541, 1571, and 1581 drives as well as the Commodore 1700 series REUs. Creative Micro Design's RAM devices, the RAMLink and RAMDrive, are also supported, as is the new FD-series drives. As long as you use Gateway to boot your system, DualTop will even access native mode partitions of any size on the CMD devices. This level of device support is unprecedented outside CMD's Gateway, and Gateway can't use four drives.

One feature above all the others puts DualTop on the cutting edge of GEOS file management: the RAM drive priority system. Without this, if you double-click on a data file, the system will start looking for the required application on the same disk as the data file. Unfortunately, if you have your data file and application on a 1571, for example, it'll run from that drive even if you also have the application loaded on your RAM device. DualTop automatically looks for your applications in RAM first, regardless of which drive your data is on, running only from the physical drive if necessary. That means that no matter where you open your file, the application will run from the fastest possible location.

All of this adds up to an outstanding piece of work, despite what I consider an unnecessarily cluttered interface screen. Even with the clutter, DualTop is the perfect file manager application for GEOS. It easily has the power and features to efficiently—no, elegantly—handle the most high-powered

GEOS systems. You can even set it up to load automatically on boot instead of the deskTop!

As if that weren't enough, the Landmark disk also includes several other GEOS utilities and games. Murdaugh's versions of Tetris and Solitaire are well designed. The 80-column versions require the 64K video upgrade to create magnificent color graphics.

Also requiring the video upgrade is a program called Lacell. This graphics display utility uses the extra video RAM to display BASIC 8 and I-Paint graphic images as well as large geoPaint pictures. Some modes involve interlacing, which meant a lot of flickering on my monitor, but the program certainly displays some impressive images. Unfortunately, the program doesn't import the various images into geoPaint, just displays them on your screen. If you're a graphics aficionado, however, and hate to leave GEOS to view your collection, Lacell is for you.

The Landmark Series is a good example of the skill and innovation of the current crop of GEOS programmers. DualTop is an outstanding program, at the top of its class. The games and Lacell are respectable additions to any GEOS library. Support of the top-of-the-line hardware such as the FD-series drives and a wealth of user-friendly features make this package one of the best to come along this year for serious GEOS users.

STEVE VANDER ARK

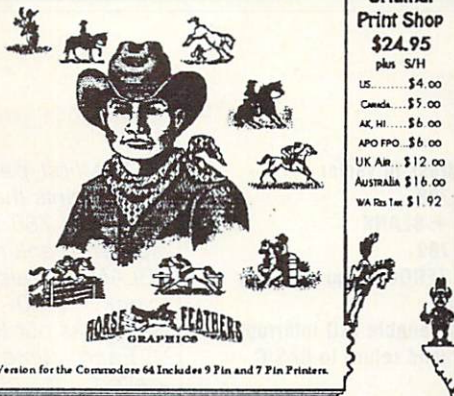
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# FEEDBACK

## Bug-Swatter

Kenneth Robinson of Keyport, New Jersey, pointed out a problem with the CHANGE command in DeMON (December 1992) that causes it to process BRANCH assembly code incorrectly.

To correct the problem, load DeMON back into MLX with the original starting and ending addresses of 8000 and 9967, respectively. Select the Enter Data option and enter the following line.

```
9168: BD 1F 99 86 71 85 FB A0 08
```

Be sure to save the program before you quit MLX.

Roger Mollen of Rogers, Minnesota, noticed a checksum error with the flashing message program in the November 1992 "Feedback" column. The problem was the DATA statement in line 70. Here's the correct listing.

```
70 DATA 4,41,15,197,6,208,
9,177,2,41
```

## Screen Blanker

If I leave the same screen displayed on my monitor for long periods of time, the image stays even after I clear the screen. Could you provide me with a machine language program for my 64 that will blank the screen if the user doesn't press a key after a specified time?

JOHN NESBITT  
HICKORY, NC

*The machine language program listed here blanks the screen to the current border color if a keypress doesn't occur within five minutes.*

```
; Screen blanker
; First, redirect IRQ vector to
BLANK.
SEI ;disable IRQ interrupts
LDA #<BLANK ;store BLANK
```

```
address in vector
STA 788
LDA #>BLANK
STA 789
JSR ZEROCLK ;go zero jiffy
clock
CLI ;reenable IRQ interrupts
RTS ;and return to BASIC
BLANK
LDA 197 ;check for last
keypress
CMP #64 ;Has no key been
pressed?
BEQ SCRBLK ;Yes, so check
screen
JSR ZEROCLK ;A keypress has
occurred. Reset timer
LDA 53265 ;and turn on screen
ORA #%00010000 ;turn on bit 4
STA 53265
EXIT
JMP 59953 ;execute normal IRQ
interrupts
SCRBLK
LDA 53265 ;Is screen blank?
AND #%00010000 ;bit 4 controls
screen blanking
BEQ EXIT ;Yes, so leave
LDA 161 ;Has time expired?
CMP #71 ;timer set for 71 x
4.2267 secs, or 5 min.
BCC EXIT ;No, so exit
LDA 53265 ;Yes, so blank
screen
AND #%11101111 ;turn off bit 4
STA 53265
BNE EXIT ;and leave
ZEROCLK
LDA #0 ;Zero jiffy clock to
"000000"
STA 160
STA 161
STA 162
RTS
```

*The routine runs off the IRQ interrupt. IRQ interrupts take place once every 1/60 second on the 64. During the interrupt, the computer performs certain housekeeping routines: updating the jiffy clock, flashing the cursor, scanning the keyboard for a keypress, and so on. The 64 locates the code for these routines using the two-byte pointer, or vector, at location 788. Ordinarily, this vector points to 59953.*

*The first part of the program points the IRQ interrupt vector at 788 to our custom screen-blanking routine (BLANK). It also sets the jiffy clock (160-162), which serves as our timer, to 0.*

*Each time BLANK is called, it checks for a keypress. If one has occurred, it zeros the clock, turns on the video display by setting bit 4 of location 53265, and exits through the normal interrupt routine.*

*If no key has been pressed, the routine checks the screen display. If it's off, the routine exits to BASIC. Otherwise, it examines the timer to see whether it has reached the specified limits (in this case, five minutes). If it has, the routine blanks the screen display and exits.*

*If you'd prefer a longer or shorter delay before the screen blanks, adjust the number 71 in the SCRBLK part of the program. This byte represents the number of 256-jiffy intervals (4.2267 seconds) that take place between key-strokes before the screen is blanked. If you wanted the delay to be only two minutes (120 seconds), for instance, you'd change the 71 to a 28 (120 ÷ 4.2267 = 28.4).*

*For those readers who don't have a machine language monitor, here is the equivalent program in the form of a BASIC loader. To change the delay time, use the above formula and enter the number in the single DATA statement in line 180. The default, like the machine language version, is approximately five minutes.*

```
AH 100 FOR X=0 TO 69:READ A:PO
KE 49152+X,A:NEXT
HB 110 SYS49152:PRINT"CLR"
{WHT}{DOWN}SCREEN BLANK
ER IN PLACE"
BX 120 DATA 120,169,16,141,20,
3,169,192,141,21,3
PJ 130 REM CHANGE VALUE IN LIN
E 180 TO CHANGE TIME TO
BLANKING
QA 140 DATA 32,59,192,88,96,16
```

Questions and  
answers about bugs  
in programs,  
a way to blank  
an inactive  
screen, and more.



```

5,197,201,64,240,14
HB 150 DATA 32,59,192,173,17,2
 08,9,16,141,17,208
KR 160 DATA 76,49,234,173,17,2
 08,41,16,240,246,165
KJ 170 DATA 161,201
BG 180 DATA 71
FQ 190 DATA 144,240,173,17,208
 ,41,239,141
GG 200 DATA 17,208,208,230,169
 ,0,133,160,133,161,133
SJ 210 DATA 162,96,1,254

```

## Old Software

I'm trying to find old programs such as accounting software, but it seems that most stores no longer carry them. Is there someone I can contact to buy old out-of-date software?

BETTY DESJARDIN  
EAST GREENVILLE, PA

Contact Bare Bones Software, 940 4th Avenue, Suite 222, Huntington, West Virginia 25701; (800) 638-1123. It stocks a variety of used program for most computers. Call and ask about specific programs or request a free catalogue. Be sure to specify the type of computer you have.

## Hex Converter

You've probably covered this several times already, but I'd like to have a short program that will let me convert decimal numbers to hexadecimal on my 64.

BRAD STAPLETON  
LIMA, OHIO

We have printed a number of conversion programs over the years, but it's a common request. Here's a version that does what you ask followed by one that converts from hex to decimal.

```

10 INPUT "{CLR}DECIMAL NUMBER TO CONVERT"; DC
20 HX$ = " ": DC=DC/4096: FOR K=1 TO 4: DC%=DC: HX$=HX$+CHR$(48+DC%-(DC%>9)*7)
30 DC=16*(DC-DC%): NEXT K
40 PRINT "{DOWN} HEX EQUIVALENT IS ";HX$

10 INPUT "{CLR}HEX NUMBER TO CONVERT"; HX$

```

```

20 DC=0: FOR K=1 TO LEN(HX$):
 DC%=ASC(HX$): DC%=DC%-48+(DC%>64)*7

```

```

30 HX$=MID$(HX$,2): DC=16*DC+DC%: NEXT K

```

```

40 PRINT "{DWN}DECIMAL EQUIVALENT IS ";DC

```

For a full-featured conversion program that allows you to convert between any numbering system from base 2 through base 64, see *Number Base Conversions* by Bruce Bowden in this issue's program listings.

## Colorful Subroutines

I use a lot of subroutines when I program. I usually set them off with REM statements or lines that contain only colons, but I'd like to make them stand out even more so I can quickly locate them. I once saw a program listing whose routines appeared in various colors. How can I use this effect in my programs?

WINSTON SALE  
SAN ANTONIO, TX

When you write a PRINT statement and want to change text colors, you press the Ctrl key and one of the number keys to select the desired color. When in quote mode, if you press Ctrl-2 for white, a reverse E appears on screen. Press Ctrl-3 for red, and a reverse British pound sign (£) appears. These symbols are the computer's color tokens. You can use these tokens to make different sections of a program listing appear in different colors.

First, load into memory or write a short program to use as a test. Then decide which tokens represent the colors you want. Let's use white and red in this example and arbitrarily select the lines after line 25 to appear in white and the lines after line 55 to appear in red.

Type the following line, but

do not press Return.

```
25 REM " "
```

After typing the second quote, press the Del key once to delete it. This makes sure you are not in quote mode.

Now hold down the Ctrl key and press the 9 key (Rvs On). This turns on reverse character mode. Now press Shift-M. This prints a reversed back slash, which is the token for Return. Now enter the key that prints the color token for your desired color. In this case we want the listing to appear in white, so press the E key (not Ctrl-2) to print that token. Then press Return. Line 25 should look like this:

```
25 REM " E
```

This REM line will call for a color change to white.

Repeat the process at the next subroutine where you want a color change, line 55 in this example. To change it to red, repeat the process, but press the pound key to produce the token (£) for red. That line should look like this:

```
55 REM " £
```

Now list your program. Lines up through 25 should be in the color that your cursor was when you typed LIST. At line 25 you should see REM" followed by a blank line with the text up to line 55 in white.

At line 55 you should see another REM", a blank line, and then the remaining text printed in red.

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

**A source for old software, another hexadecimal converter, and program listings in different colors**

# D'IVERSIONS

Fred D'Ignazio

## MULTIMEDIA ILLUMINATIONS

IBM asked me to present its Illuminated Books and Manuscripts at the company's recent EduQuest Executive Conference in Atlanta. This product is a collection of multimedia illuminated works that include Shakespeare's *Hamlet*, the essays titled "Black Elk Speaks," Martin Luther King's 1963 "Letter from a Birmingham Jail," Tennyson's poem *Ulysses*, and the Declaration of Independence. I have

ers, by you and me. The new media is not meant to be another spectacle. It's an opportunity for all of us—the masses—to be artists, musicians, sculptors, and composers.

So when IBM approached me to demonstrate its product, the last thing I wanted to do was show it like a movie. So I called up a fourth-grade teacher, Bill Lang, and asked him if he could organize a field trip to my studio to see how his nine-year-old kids would do illuminating their own original works using IBM's product. Bill said yes,

voice ringing through the crisp capital air.

But the high point was seeing and hearing the children's own words. The children rehearsed their works and read them proudly into the computer microphone. And the words themselves were exceptional—free of sloppy misspellings, immature constructions, and embarrassing imperfections. The children had been writing all year long under Mr. Lang's guidance. They wrote every day in class and for homework. They wrote journals, biographies, poems, letters, and short stories. And it showed. Beneath all the multimedia illumination, it showed!

And it reminded me that words are the basis for all our thinking. The little voice that speaks to each of us in the hollows of our minds is a voice of words, not images, pictures, or music. We get the pictures, too, if we're lucky. But first of all come the words.

That started me thinking: What will be the result if all linguistic (or word-oriented) thinking is replaced by this multimedia Babel? What will we be like if we lose the primacy of words? What will happen if we each think in a different, multimedia tongue—some of us in images, some in sounds?

Maybe writing, at least, should be protected. Writing doesn't have to be the end of our young authors' creative expressions. They can use their words as a launch pad from which to illuminate their ideas. They can link written words to images, music, spoken words, and movies to illustrate and communicate rich and complicated ideas. Writing, it seems, is the basis for thinking. And Bill Lang's young writers have shown us some beautiful thinking through their multimedia illuminations but, most of all, through the words that they eloquently created. □

Bill Lang with multimedia authors Attallah Price (left), Sara Comstock, Mariko Hachiya, and Dana Clifford.



watched the way people take this magnificent product and become humbled.

The product is so stunning, so overwhelming, that you feel timid and uncreative in comparison. It's a little like entering a giant sports arena, or attending a Broadway play, or watching Michael Jordan swoop through the air toward the basket, or gazing in awe at the Grand Canyon.

But this feeling is wrong, wrong, wrong! The new media is not just a spectator sport for millions of hyper-couch potatoes. It's going to be cheap, fast, and easy to use. It doesn't have to be crafted by the likes of Lucas, Spielberg, and Schwarzenegger. It can be created by toddlers, teach-

and the rest is history.

In Atlanta, I presented the fourth graders' illuminated works to hundreds of educators from all over America. On a giant nine-foot screen with a public-address system carrying the children's digitized voices, I demonstrated letters they had written to their newly inaugurated president and their poems about everyday life, including Grover, Charlie Brown, and ice cream. The children's multimedia illuminations were extraordinary. They taped segments of President Clinton's inaugural address and keyed them to words in their own letters. They captured clips of Maya Angelou's magnificent inaugural-day poem and replayed her rich

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# MACHINE LANGUAGE

Jim Butterfield

## SCREEN SCREAMER

One of the first programs I wrote to show the power of machine language was a "screen screamer." Touch a key and the whole screen changes instantly.

This version of the program is for the 64. It works by poking screen memory directly. That's not always a good idea, but it's fast and effective here.

The program is written two different ways. The first is genteel; the second is brute force. We'll discuss their respective merits later.

The approach is the same in both cases. We call for a character from the keyboard by means of the GETIN subroutine at hexadecimal FFE4. If a key has been pressed, we send a thousand copies of it to screen memory. Here's the genteel code.

```
2000 : JSR $FFE4 : TAX : BEQ
 $2000
```

If a key has been received, we store the screen address (\$0400 on the Commodore 64) into an indirect pointer at \$FC/D.

```
LDY #$00 : STY $FC : LDY #$04 :
STY $FD
```

Here comes our big loop to store 250 values; we call it four times to get the 1000 screen memory locations.

```
200E : LDY #$00
```

Here comes our little loop.

```
2010 : 91 FC STA ($FC),Y : INY :
 CPY #$FA : BCC $2010
```

We must bump our indirect pointer 250 locations further along. While we're doing the arithmetic, the value in A may be pushed to the stack.

```
PHA : CLC : LDA $FC : ADC #$FA
```

```
: STA $FC
LDY $FD : BCC $2024 : INY
2024 : STY $FD : PLA
```

The big loop tests to see if the indirect address has gone outside limits. If not, the program loops back.

```
CPY #$08 : BCC $200E
```

The key is now tested to see if it's a Return key being pressed. If not, we wait for another key. Otherwise, we exit the program.

```
CMP #$0D : BNE $2000
RTS
```

The above code wouldn't be hard to modify for differently sized screens. That's what makes it genteel. It could be made even better, however, by having it loop 25 times, each loop clearing 40 characters (one screen line). That way, the change to other screen aspects would be even simpler.

Here's the brute force method of programming.

```
3000 : JSR $FFE4 : TAX : BEQ
 $3000
```

This time, there's only one loop, containing four instructions that smash the data into the screen area.

```
LDY #$00
```

The four addresses need to be calculated carefully. Once in, they do the job efficiently.

```
3008 : STA $0400,Y : STA $04FA,Y
 : STA $05F4,Y : STA $06EE,Y
```

We walk the loop along in the usual way with the Y register.

```
INY : CPY #$FA : BCC $3008
```

As before, we test to see if the key pressed was Return. If not, we wait for another key.

```
CMP #$0D : BNE $3000
RTS
```

This program is visibly shorter than the previous one. It runs faster, although the average user isn't likely to notice the difference. But the program isn't so easy to change to fit a new screen configuration. An 80-column screen, for example, would need eight STA instructions in the loop.

If you have an older 64, this program might show some interesting effects. Both the screen memory and color arrangement were changed a couple of times.

If it sets all screen characters to the same color, you have a recent machine. If some parts of the screen show in white rather than the current color, you have an original 64. And if parts of the screen don't seem to have any characters, you have the in-between machine. (The characters are there, but they're printed blue-on-blue.)

Here is a BASIC loader for Screen Screamer. Watch the screen change instantly as you press various keys.

```
CB 100 DATA 32,228,255,170,240
 ,250,160,0,132,252,160,
 4,132,253,160,0
JB 110 DATA 145,252,200,192,25
 0,144,249,72,24,165,252
 ,105,250,133,252
CE 120 DATA 164,253,144,1,200,
 132,253,104,192,8,144,2
 27,201,13,208,209,96
BM 200 DATA 32,228,255,170,240
 ,250,160,0,153,0,4,153,
 250,4
KD 210 DATA 153,244,5,153,238,
 6,200,192,250,144,239,2
 01,13,208,227,96
FX 300 FOR J=8192 TO 8239
DS 310 READ X:T=T+X
DD 320 POKE J,X
PP 330 NEXT J
CE 350 FOR J=12288 TO 12317
EC 360 READ X:T=T+X
XE 370 POKE J,X
HS 380 NEXT J
BQ 390 IF T<>12130 THEN STOP
DH 400 PRINT "SCREEN SCREAMER
 {SPACE}..."
PP 410 PRINT "(PRESS RETURN TO
 END)"
BS 420 INPUT "PROGRAM 1 OR 2";
 P
DH 430 S=0
CC 440 IF P=1 THEN S=8192
KQ 450 IF P=2 THEN S=12288
XM 460 IF S=0 GOTO 420
CE 470 SYS S
```

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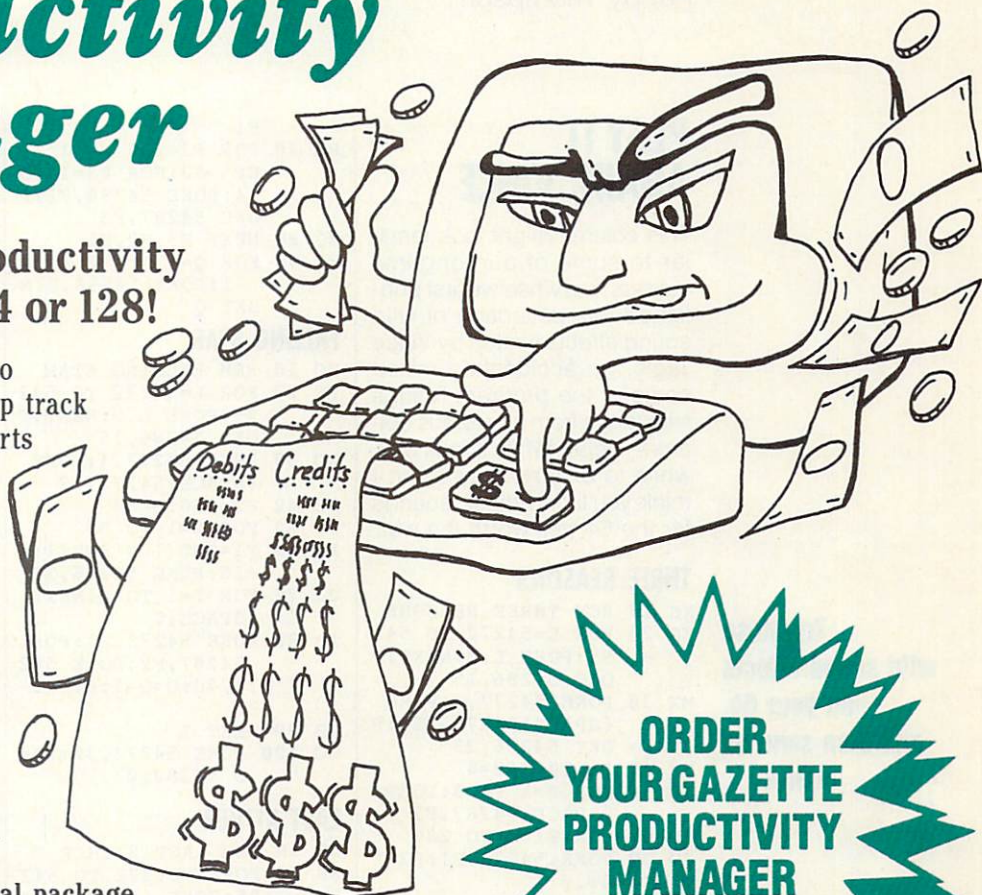
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# PROGRAMMER'S PAGE

Randy Thompson

## PLAY IT AGAIN, VINCE

This column might look familiar to some of our longtime readers, but when we first published this collection of wild sound effects written by Vince Tagle, we accidentally mixed some of the program listings with those from a previous column—oops! While it took us a while to discover our error, I think you'll find these sounds for the 64 well worth the wait.

### THREE REASONS

```
XE 10 REM THREE REASONS
KE 20 FOR L=54272 TO 542
 95:POKE L,0:NEXT:P
 OKE 54296,15
MX 30 POKE 54277,8:POKE
 {SPACE}54278,255:P
 OKE 54276,23
GX 40 F1=100:F2=4
JB 50 FOR Z=1 TO 3:POKE
 {SPACE}54287,F2
CD 60 FOR F1=1 TO 200
ED 70 POKE 54273,F1:F2=F
 2+.01
HB 80 NEXT F1,Z
RB 90 POKE 54278,15
```

### RINGING ALARM

```
FC 10 REM RINGING ALARM
KE 20 FOR L=54272 TO 542
 95:POKE L,0:NEXT:P
 OKE 54296,15
MX 30 POKE 54277,8:POKE
 {SPACE}54278,255:P
 OKE 54276,23
FM 40 POKE 54287,40
HD 50 FOR Z=1 TO 7
SD 60 FOR F1=255 TO 0 ST
 EP -6:POKE 54273,F
 1:NEXT F1
EP 70 FOR F1=0 TO 255 ST
 EP 20:POKE 54273,F
 1:NEXT F1,Z
KS 80 POKE 54278,15
```

### HARMONICS

```
BP 10 REM HARMONICS
KE 20 FOR L=54272 TO 542
 95:POKE L,0:NEXT:P
 OKE 54296,15
FP 30 AD=15:SR=190
AQ 40 POKE 54284,AD:POKE
 54291,AD:POKE 542
 92,SR
HX 50 POKE 54283,21:POKE
 54290,23
DB 60 FOR F1=200 TO 1 ST
 EP -10:POKE 54273,
```

```
F1
RB 70 FOR F2=200 TO 1 ST
 EP -50:FOR F3=1 TO
 4:POKE 54280,F2:P
 OKE 54287,F3
MQ 80 NEXT F3,F2,F1
FJ 90 FOR Q=15 TO 0 STEP
 -1:POKE 54296,Q:N
 EXT Q
```

### FALLING STAR

```
EQ 10 REM FALLING STAR
KE 20 FOR L=54272 TO 542
 95:POKE L,0:NEXT:P
 OKE 54296,15
KD 30 POKE 54277,4:POKE
 {SPACE}54278,12
PE 40 F2=150:Q=50
PF 50 FOR Z=1 TO 50
KJ 60 F1=INT(100*RND(1))
 +10:POKE 54276,23
JJ 70 FOR T=1 TO Q:NEXT
 {SPACE}T
AB 80 POKE 54273,F1:POKE
 54287,F2:POKE 542
 76,20:Q=Q-1:F2=F2-
 3
SB 90 NEXT Z
CG 100 POKE 54273,30:POK
 E 54280,0
```

### LAST XITHER

```
EC 10 REM LAST XITHER
KE 20 FOR L=54272 TO 542
 95:POKE L,0:NEXT:P
 OKE 54296,15
MX 30 POKE 54277,8:POKE
 {SPACE}54278,255:P
 OKE 54276,23
QX 40 F1=10
AJ 50 FOR Z=1 TO 24:F2=3
 0:POKE 54273,F1
PD 60 FOR Y=1 TO 10:POKE
 54287,F2:F2=F2*1.
 01:NEXT Y
GS 70 F1=F1+8
FA 80 NEXT Z
RB 90 POKE 54278,15
```

### STAR WALKER

```
BF 10 REM STAR WALKER
KE 20 FOR L=54272 TO 542
 95:POKE L,0:NEXT:P
 OKE 54296,15
MX 30 POKE 54277,8:POKE
 {SPACE}54278,255:P
 OKE 54276,23
SJ 40 FOR Z=1 TO 2:F1=10
PE 50 FOR Y=1 TO 6:F2=10
 :POKE 54273,F1
GJ 60 FOR X=1 TO 4:POKE
 {SPACE}54287,F2:F2
 =F2*1.02:NEXT X:F1
 =F1*1.2
PD 70 FOR W=1 TO 8:F2=20
 :POKE 54273,F1
FC 80 FOR V=1 TO 3:POKE
 {SPACE}54287,F2:F2
 =F2*1.2
```

```
MQ 90 NEXT V:F1=F1/1.2:N
 EXT W,Z
RH 100 POKE 54278,15
```

### HYPER WARP

```
GM 10 REM HYPER WARP
KE 20 FOR L=54272 TO 542
 95:POKE L,0:NEXT:P
 OKE 54296,15
PE 30 POKE 54277,8:POKE
 {SPACE}54278,255:P
 OKE 54276,21
PM 40 F1=2
QD 50 FOR Z=1 TO 24:F2=8
 0:POKE 54273,F1
FB 60 FOR Y=1 TO 5:POKE
 {SPACE}54287,F2:F2
 =F2*1.1
SF 70 NEXT Y:F1=F1+9:NEX
 T Z
KS 80 POKE 54278,15
```

### STAR PRINTER

```
AD 10 REM STAR PRINTER
KE 20 FOR L=54272 TO 542
 95:POKE L,0:NEXT:P
 OKE 54296,15
MX 30 POKE 54277,8:POKE
 {SPACE}54278,255:P
 OKE 54276,23
XC 40 FOR Z=1 TO 3:F1=15
BX 50 FOR Y=1 TO 9:F2=15
 :POKE 54273,F1
BP 60 FOR X=1 TO 5:POKE
 {SPACE}54287,F2:F2
 =F2*1.5 :NEXT X:F1
 =F1*0.8
AP 70 FOR W=1 TO 12:F2=2
 0:POKE 54273,F1
HX 80 FOR V=1 TO 6:POKE
 {SPACE}54287,F2:F2
 =F2*0.8
MQ 90 NEXT V:F1=F1/1.2:N
 EXT W,Z
RH 100 POKE 54278,15
```

### More, Please

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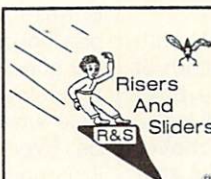
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Steve Vander Ark

## IMAGES IN LAYERS

No desktop publishing program or word processor can do as much with a blank sheet of paper as geoPublish. It's an amazing program, but it's also one of the more complicated programs around.

As a result, this program generates plenty of questions and plenty of frustrated users. This is because geoPublish pushes the limited resources of the 64 more than any other program. The result is a great program, but one that has a few quirks. So read on for the lowdown on that wonderful, powerful, exciting, and sometimes downright baffling marvel called geoPublish.

One of the key concepts behind geoPublish is the way it handles graphics. Most users come to geoPublish fresh from experiences with geoPaint. But geoPaint uses an entirely different type of graphics manipulation, and anyone who approaches geoPublish expecting geoPaint will be quickly confused.

Bear in mind that geoPaint is a bitmap editor, a program that lets you create patterns of dots in the shape of whatever you want to draw. Think of the geoPaint page as a large sheet of graph paper with tiny squares. You create pictures by using the various graphics tools to fill in the little squares to create dots. In fact, if you zoom in while you're in pixel edit mode, you'll see the grid that looks like graph paper, and you can fill or erase the dots with the cursor.

Everything you create with geoPaint is a large pattern of dots. Tools such as the polygon or the spray can fill in the dots to make whichever shape or design they're programmed to make. Even the text tool just fills in dots to make whichever letter you choose. If you want to change

something on a geoPaint page, you have to eradicate it dot by dot. If you create one thing on top of another, the new image replaces the old.

All that sounds pretty straightforward, but there's a big difference between the way geoPaint handles images and the way geoPublish does it. GeoPublish uses what are called object-based graphics. This means that a geoPublish page doesn't exist as a large grid of dots but as a set of individual, mathematically defined shapes all lying in layers. Each shape or object is a separate entity, even if it's placed near or on top of another to create a larger image. Every image on a page is an object.

The fact that the image is stored in memory as a mathematical equation instead of a grid of dots has many advantages. For example, if you want the object to be bigger, you can resize it by mathematically changing the equation. Make a geoPaint object bigger, and you'll see jaggies where the individual dots have been enlarged. A geoPublish object is redrawn by the program using larger numbers, so there are no jaggies.

Even more helpful is the fact that you can change an object without changing anything around it. In fact, since each object has its own layer, changes won't affect anything under or above that object. If you want a line to be thicker, for example, you simply pick it up from the page, change it, and then put it back. A piece of text can be changed from one font or style to another without affecting the filled rectangle below it or even leaving a hole where the text used to be. Everything on a geoPublish page is adjustable, which means you can play with a page until every element is perfect. Go back to geoPaint and you'll miss this flexibility.

I've mentioned layers a few times. That's a concept that causes problems for people. After all, once you've plopped down a dozen objects to get the effect you want, it's easy to forget that the whole thing isn't just one big picture as it would be in geoPaint. The computer has no idea what you've created, so when you pull out an object near the bottom to make an adjustment and then put it back, the computer puts it on top. That's why, if you've just altered it, a drop shadow you created when you started now covers everything.

This happens a lot, and it really throws people. Here's another example. Suppose you laid down a dark gray rectangle and then placed some text in white on top of it. You'd have a great-looking effect. But if you pick up the rectangle, change its color to black, and then put it back down, the text will be gone. Where is it? It's underneath. How can you find it again? Select the box and then select the Move to Back tool from the toolbox. The box is now placed at the bottom of the stack, and the text becomes visible again. Of course, if you simply pick up and move the box, you still won't see the text because it's white text on a white background. See how the confusion starts?

Next month I'll talk about some of the other quirks of this wonderful program. I'll run through the various ways a bitmapped geoPaint image can be incorporated into your object-based geoPublish page. I'll also talk about the different modes you can use in geoPublish. In the meantime, break out your copy of geoPublish and give it another try. Make a few posters or a newsletter just for the sake of trying things out. Don't let this powerful and exciting program gather dust on a shelf! □

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# BEGINNER BASIC

Larry Cotton

## USER PORT ALARM CLOCK

This month and next we'll take a look at one of the Commodore 64's superaccurate built-in clocks and learn how to set and read it in BASIC. At the request of a reader in Trinidad, we'll write a short program which uses that clock to control the user port.

We'll see how to control each of its eight lines independently, but what you control will be strictly up to you.

The 64's two Time of Day (TOD) clocks count in tenths of a second and are as accurate as the frequency of the AC power that your computer is plugged into. These clocks are relatively easy to program. We'll access the clock that uses memory registers 56328-56331. (The other TOD clock uses registers 56584-56587 and is accessed similarly.) To set the clock, poke values into the following registers.

| Function          | Register |
|-------------------|----------|
| Hours             | 56331    |
| Minutes           | 56330    |
| Seconds           | 56329    |
| Tenths of Seconds | 56328    |

To read the clock, we'll peek at these registers and print a digital clock on the screen based on what's there. Then we'll use an IF-THEN statement to take some action when the "alarm" goes off. Unlike a more sophisticated machine language clock that runs in the background, this one just counts elapsed seconds, and you can't do anything else while the clock is displayed. Here's the program listing.

```
DS 40 PRINTCHR$(147):POKE53281,14:POKE646,6
KR 50 PRINT"SET CLOCK AT :{DOWN}"
XC 60 R=8:GOSUB290:K=43200
GX 70 IFIS="PM"THENX=K
```

```
ER 80 FORI=1TO3:H=INT(T(I)/10):L=T(I)-10*H
:T(I)=16*H+L:NEXT
MC 90 C=56331:POKEC,T(1):POKEC-1,T(2):POKEC-2,T(3)
FA 100 PRINT"{DOWN}ACTIVATE USER PORT AT:{DOWN}"
FD 110 R=18:GOSUB290
HS 120 IFIS="PM"THENY=K
JB 130 B=Y+T(1)*3600+T(2)*60+T(3)
SK 140 PRINT"{DOWN}PRESS ANY KEY TO START CLOCK.{DOWN}"
RE 150 GETAS:IFA$=""THEN150
SB 160 POKEC-3,0
PH 170 H=PEEK(C):M=PEEK(C-1):S=PEEK(C-2):T=PEEK(C-3)
XG 180 C1$=CHR$(16ANDH)/16+48)+CHR$(15ANDH)+48)
XM 190 H=VAL(C1$)*3600
GJ 200 IFC1$=""00"THENC1$="12"
HD 210 C2$=CHR$(240ANDM)/16+48)+CHR$(15ANDM)+48):M=VAL(C2$)*60
FD 220 C3$=CHR$(240ANDS)/16+48)+CHR$(15ANDS)+48):S=VAL(C3$)
HA 230 A=X+H+M+S:IFA=2*K THENPOKEC,0:POKEC-3,0:X=0
SG 240 IFA=BTHEN420
BJ 250 IFA<KTHENJ$="AM":GOTO270
XX 260 J$="PM"
MD 270 PRINT"{WHT}TIME IS "C1$+"": "+C2$+"": "+C3$+"": "T;J$+"{UP}"
HG 280 GOTO170
DE 290 HS="":INPUT"HOURS";HS:IFHS<"0"ORHS>"9"THENPRINT"{2 UP}":GOTO290
KE 300 T(1)=VAL(HS):IFT(1)<0ORT(1)>12THENPRINT"{2 UP}":GOTO290
RA 310 IFT(1)=12THENT(1)=0
HP 320 MS="":INPUT"{DOWN}MINUTES";MS:IFMS<"0"ORMS>"9"THENPRINT"{3 UP}":GOTO320
PG 330 T(2)=VAL(MS):IFT(2)<0ORT(2)>59THENPRINT"{3 UP}":GOTO320
CE 340 SS="":INPUT"{DOWN}SECONDS";SS:IFSS<"0"ORMS>"9" THENPRINT"{3 UP}":GOTO340
GG 350 T(3)=VAL(SS):IFT(3)<0ORT(3)>59THENPRINT"{3 UP}":GOTO340
DC 360 PRINT"{DOWN}AM OR PM (PRESS A OR P)"
HD 370 GETIS:IFIS<"A"THENIFIS<"P"THEN370
EE 380 IFIS="A"THENIS="AM":GOTO400
FH 390 IS="PM"
JD 400 POKE214,R:PRINT:POKE211,24:PRINTIS
EX 410 RETURN
XD 420 PRINT"{CLR}{DOWN}USER PORT ACTIVATED."
```

When you run this program, you're asked to enter three values and an A or P (for a.m. or p.m.) to set the clock, which will be accurate to the nearest second. The values that you enter can range from 0-12 for hours and 0-59 for both minutes and seconds. It's not necessary to enter all of the values as two digits. For instance, to set 1:06 p.m., just type 1, 6, 0, and P at the four prompts. (Press Return after each number, but not after P.) To set 12:00:04 a.m. (four seconds past midnight), type 12, 0, 4 and A. I avoid setting exactly noon or midnight because I'm never sure if the time is a.m. or p.m. then.

Repeat this process to set the time for the user port to be activated. (Think of this as the alarm.) Like a new alarm clock, the port must be set to activate within 24 hours of starting the clock. Then press any key to start the clock.

At the selected time for the user port to be activated, the alarm goes off, and you'll see a message to that effect. However, the user port hasn't been set up yet; more programming is necessary.

Next month I'll explain the program, discuss the user port, and add the necessary code that actually turns on the user port lines. □

Take a look at one of the 64's built-in clocks and learn how to use it to control the user port.

## Minesweeper

By Robert B. Cook

Minesweeper, despite its military-sounding theme, is an ideal alternative to shoot-'em-up games. Rather than dealing with destruction, this game for the 64 provides you with excellent mental exercise.

You are presented with a grid that must be cleared of hidden mines as quickly as possible. Use a joystick in port 2 to maneuver around the screen.

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

Starting address: 0801

Ending address: 1400

Be sure to save the program before exiting MLX.

### Begin Play

After the opening screen, you'll be prompted for the number of mines you want hidden on the playing screen. Move the joystick up and down to change the numbers. You may select 16-64 mines. Press the fire button to begin the game.

Start to play by exposing each of the squares. Do this by placing the arrow on a square and pressing the fire button. One of three things will happen when you do. You'll uncover a blank space, a number, or a mine.

If you expose a blank space, you can be sure that there are no mines in the immediate vicinity. If you uncover a number, it indicates the number of mines within the eight squares surrounding the number. For example, if you expose a 3, the squares surrounding it might look something like the following.

```
- * -
- 3 *
* - -
```

The 3 indicates that there are three mines (indicated here by asterisks) bordering this square. Of course, the mines won't necessarily be in the positions shown here.

Exposing a mine will cause it to ex-

plode and subtract points from your score. The amount deducted depends on the number of mines you choose at the start of the game. You lose 10 points each for 64 mines. The score varies on up to 40 points each when you have 16 mines on the board. Of course, speed helps, too. You'll notice that your score drops by one point for every second of play.

### Flag It

If you think that there is a mine at a particular square, you can flag it. Do this by placing the arrow on that square and pressing the F key. You can't expose a square when it is flagged. To unflag a square, press F again. It isn't necessary to flag all of the mines to win the game.

An All Clear siren will signal the end of the game when you've exposed all of the blank and numbered squares. If you want to quit one game and play another, press the Stop key. To quit the game entirely, choose 00 for the number of mines.

### Strategy

As you play, you may find yourself stuck in one area. If that happens, try working toward your goal from a different direction.

### MINESWEEPER

```
0801:15 08 40 00 9E 32 30 37 FA
0809:31 3A 52 42 43 20 56 37 2D
0811:2E 39 32 00 00 00 20 70 7D
0819:0B 20 BF 0B 20 08 0C 20 B8
0821:3C 0B 20 64 0C A5 F7 D0 14
0829:03 4C 3C 0B 20 DB 0C 20 AE
0831:38 0C 20 9F 0D 20 EF 09 30
0839:A5 B6 D0 03 4C 0D 0B AD 6E
0841:00 DC 29 1F C9 1E F0 25 6D
0849:C9 1D F0 32 C9 1B F0 41 A4
0851:C9 17 F0 53 C9 0F F0 67 33
0859:A5 C5 C9 15 F0 61 20 E1 67
0861:FF D0 D2 4C 34 0B A0 40 14
0869:20 04 0B F0 C8 A5 B1 F0 2C
0871:C4 C6 B1 38 AD 01 D0 E9 4C
0879:08 8D 01 D0 D0 E8 A5 B1 45
0881:C9 0F F0 B1 E6 B1 18 AD 4F
0889:01 D0 69 08 8D 01 D0 D0 DE
0891:D5 A5 B0 F0 A0 C6 B0 38 D4
0899:AD 00 D0 E9 10 8D 00 D0 C0
08A1:B0 C4 CE 10 D0 10 BF A5 02
08A9:B0 C9 0F F0 88 E6 B0 18 CE
08B1:AD 00 D0 69 10 8D 00 D0 D0
08B9:90 AC EE 10 D0 10 A7 C9 FB
08C1:15 F0 55 20 74 09 A0 00 4E
08C9:B1 FD AA 29 30 D0 46 8A F5
08D1:29 40 F0 20 A9 00 8D 86 95
08D9:02 A9 3F 20 D2 FF A9 60 89
```

```
08E1:20 D2 FF 20 56 0A C6 F8 1A
08E9:20 A8 09 C6 FA A5 F8 D0 F2
08F1:19 4C 0D 0B A9 03 8D 86 EE
08F9:02 8A 0A A8 B9 B1 10 20 4E
0901:D2 FF B9 B2 10 20 D2 FF 85
0909:C6 FA A0 00 B1 FD 09 10 F8
0911:91 FD 4C 6B 09 4C 36 08 99
0919:20 74 09 A0 00 B1 FD AA F0
0921:29 10 D0 F1 8A 29 20 F0 2F
0929:22 A9 06 8D 86 02 A9 C1 A1
0931:20 D2 FF A9 C2 20 D2 FF DE
0939:20 95 0A C6 F9 20 CD 09 63
0941:A0 00 B1 FD 29 DF 91 FD A3
0949:4C 67 08 A9 02 8D 86 02 4C
0951:A9 3D 20 D2 FF A9 3E 20 FB
0959:D2 FF 20 7A 0A E6 F9 20 80
0961:CD 09 A0 00 B1 FD 09 20 68
0969:91 FD A5 FA C5 F8 D0 A5 81
0971:4C 0D 0B 18 A5 B0 0A 69 3D
0979:04 A8 A5 B1 69 07 AA 20 64
0981:F0 FF A5 FC 85 FE A5 FB FF
0989:85 FD 18 65 B0 85 FD 90 5F
0991:02 E6 FE A4 B1 D0 01 60 BB
0999:18 A5 FD 69 12 85 FD 90 AA
09A1:02 E6 FE 88 D0 F2 60 A4 8E
09A9:B5 38 A5 B2 F9 A1 10 85 80
09B1:B2 B0 0C C6 B3 10 08 A9 CE
09B9:00 85 B2 85 B3 85 B6 20 1D
09C1:23 0A A9 02 85 A5 A5 F8 44
09C9:85 A6 10 08 A9 03 85 A5 D4
09D1:A5 F9 85 A6 A9 02 8D 86 47
09D9:02 A0 09 A6 A5 18 20 F0 5F
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09F1:C9 5A 90 57 A5 B3 D0 07 AB
09F9:A5 B2 D0 03 85 B6 60 A9 47
0A01:00 85 A2 A9 0F 8D 0D D4 03
0A09:A9 11 8D 0C D4 A9 81 8D 86
0A11:0B D4 A9 64 8D 08 D4 38 C9
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0A21:C6 B3 A9 02 8D 86 02 A0 06
0A29:22 A2 02 18 20 F0 FF A5 23
0A31:B3 A6 B2 20 CD BD A5 D3 A5
0A39:C9 25 B0 05 A9 A0 20 D2 C4
0A41:FF A0 20 20 04 0B A9 80 A3
0A49:8D 0B D4 60 A9 00 99 00 08
0A51:D4 88 10 FA 60 A9 20 8D 1B
0A59:06 D4 A9 0A 8D 05 D4 A9 4F
0A61:81 8D 04 D4 A9 12 8D 01 19
0A69:D4 A9 00 8D 00 D4 A0 7F 3F
0A71:20 04 0B A9 80 8D 04 D4 A9
0A79:60 A9 49 8D 06 D4 A9 0A 0B
0A81:8D 05 D4 A9 11 8D 04 D4 6E
0A89:A9 32 8D 01 D4 A9 00 8D 9B
0A91:00 D4 F0 19 A9 F0 8D 06 BC
0A99:D4 A9 0A 8D 05 D4 A9 11 7C
0AA1:8D 04 D4 A9 23 8D 01 D4 D8
0AA9:A9 21 8D 00 D4 A0 7F 20 D4
0AB1:04 0B A9 10 8D 04 D4 60 47
0AB9:A0 00 B9 D1 10 99 00 D4 2E
0AC1:99 00 D7 C8 C0 07 D0 F2 E0
0AC9:A9 08 8D 18 D4 A9 12 85 DE
0AD1:02 20 F6 0A E6 02 C9 50 91
0AD9:D0 F7 A9 4F 85 02 20 F6 E9
0AE1:0A C6 02 C9 0E D0 F7 A9 D6
0AE9:40 8D 04 D4 8D 0B D4 A9 3B
0AF1:F0 8D 18 D4 60 A0 20 20 27
0AF9:04 0B A5 02 8D 01 D4 8D 4F
0B01:08 D4 60 A2 00 CA D0 FD 51
0B09:88 D0 FA 60 A0 0D 20 4D C3
```

# PROGRAMS

|         |    |    |    |    |    |    |    |    |         |    |    |    |    |    |    |    |    |         |    |    |    |    |    |    |    |    |    |  |
|---------|----|----|----|----|----|----|----|----|---------|----|----|----|----|----|----|----|----|---------|----|----|----|----|----|----|----|----|----|--|
| 0B11:0A | 20 | B9 | 0A | 20 | 04 | 0B | A4 | D7 | 0D41:B1 | FD | D0 | DE | A9 | 40 | 91 | FD | 2B | 0F71:20 | C9 | 0D | 12 | C8 | 20 | 20 | 20 | 20 | FB |  |
| 0B19:B4 | B9 | C3 | 10 | C5 | B3 | 90 | 09 | 98 | 0D49:CA | D0 | D7 | A2 | 10 | 86 | A5 | A9 | B1 | 0F79:20 | 20 | 20 | A7 | 1F | 20 | 20 | 20 | 08 |    |  |
| 0B21:D0 | 11 | B9 | C4 | 10 | C5 | B2 | B0 | 15 | 0D51:F8 | 85 | FD | A9 | 13 | 85 | FE | A0 | F0 | 0F81:20 | 9C | A5 | 20 | 20 | 20 | 20 | 20 | 6F |    |  |
| 0B29:0A | A5 | B3 | 99 | C3 | 10 | A5 | B2 | 1A | 0D59:0F | 84 | A6 | A9 | 00 | 85 | A7 | A2 | 93 | 0F89:20 | C9 | 0D | 12 | C8 | 20 | 20 | 20 | 14 |    |  |
| 0B31:99 | C4 | 10 | A9 | 00 | 8D | 15 | D0 | 13 | 0D61:07 | A0 | 13 | B1 | FD | D0 | 16 | BC | C0 | 0F91:20 | 20 | 20 | A7 | 1F | AF | AF | AF | 0D |    |  |
| 0B39:4C | 23 | 08 | 20 | 38 | 0C | A0 | 00 | 74 | 0D69:A9 | 10 | B1 | FD | C9 | 40 | D0 | 02 | 65 | 0F99:AF | 9C | A5 | 20 | 20 | 20 | 20 | A0 | CF |    |  |
| 0B41:A9 | 10 | 85 | A5 | A9 | 0C | 85 | D3 | 97 | 0D71:E6 | A7 | CA | 10 | F2 | A5 | A7 | F0 | B1 | 0FA1:20 | C9 | 0D | 12 | C8 | 20 | 20 | 20 | 2C |    |  |
| 0B49:B9 | FC | 0F | F0 | 0A | 20 | D2 | FF | E2 | 0D79:A4 | A0 | 13 | 91 | FD | 18 | A5 | FD | D2 | 0FA9:20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | C7 |    |  |
| 0B51:C8 | C9 | 0D | D0 | F3 | F0 | ED | 20 | 4C | 0D81:69 | 01 | 85 | FD | 90 | 02 | E6 | FE | 7A | 0FB1:20 | 20 | 20 | 20 | 20 | 20 | 20 | C9 | 79 |    |  |
| 0B59:7A | 0A | 20 | 04 | 0B | 20 | 7A | 0A | 4B | 0D89:C6 | A6 | A4 | A6 | 10 | CD | 18 | A5 | 3D | 0FB9:0D | 12 | C8 | 20 | 20 | 20 | 20 | 20 | DF |    |  |
| 0B61:20 | 04 | 0B | C6 | A5 | D0 | F9 | A5 | 60 | 0D91:FD | 69 | 02 | 85 | FD | 90 | 02 | E6 | B6 | 0FC1:20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | DF |    |  |
| 0B69:B5 | D0 | 03 | 4C | E2 | FC | 60 | A9 | 29 | 0D99:FE | C6 | A5 | D0 | BA | 60 | A9 | 00 | 51 | 0FC9:20 | 20 | 20 | 20 | 20 | C9 | 0D | 12 | 5A |    |  |
| 0B71:00 | 8D | 0E | DC | 85 | 58 | 85 | 5A | 6D | 0DA1:85 | A2 | 85 | F9 | 85 | FA | 85 | B0 | 4B | 0FD1:C8 | 20 | 20 | 20 | 20 | 20 | 55 | 53 | E1 |    |  |
| 0B79:A9 | 40 | 85 | 59 | A9 | D8 | 85 | 5B | D1 | 0DA9:85 | B1 | 8D | 10 | D0 | A9 | 3F | 8D | DE | 0FD9:45 | 20 | 4A | 4F | 59 | 32 | 20 | 20 | D4 |    |  |
| 0B81:A9 | 33 | 85 | 01 | A2 | 09 | A0 | 01 | 75 | 0DB1:00 | D0 | A9 | 6D | 8D | 01 | D0 | A9 | C7 | 0FE1:20 | 20 | 20 | C9 | 0D | 12 | C6 | C3 | BA |    |  |
| 0B89:20 | EC | A3 | A9 | 37 | 85 | 01 | A9 | 75 | 0DB9:01 | 8D | 15 | D0 | A9 | E8 | 85 | B2 | 16 | 0FE9:C3 | C3 | C3 | C3 | C3 | C3 | C3 | C3 | 08 |    |  |
| 0B91:01 | 8D | 0E | DC | A2 | 00 | BD | 18 | C3 | 0DC1:A9 | 03 | 85 | B3 | 85 | B6 | A9 | 02 | B9 | 0FF1:C3 | C3 | C3 | C3 | C3 | C3 | C3 | C3 | 10 |    |  |
| 0B99:11 | 9D | 08 | 3C | BD | D0 | 11 | 9D | 55 | 0DC9:8D | 86 | 02 | A0 | 09 | A2 | 02 | 18 | 85 | 0FF9:C3 | C7 | C0 | 13 | 11 | 11 | 11 | 11 | 1D |    |  |
| 0BA1:C0 | 3C | BD | 88 | 12 | 9D | 78 | 3D | 9C | 0DD1:20 | F0 | FF | A9 | 00 | A6 | F8 | 20 | 7F | 1001:11 | 11 | 11 | 11 | 11 | 11 | 9A | 0D | 30 |    |  |
| 0BA9:BD | 40 | 13 | 9D | 30 | 3E | E8 | 0E | 18 | 0DD9:CD | BD | A0 | 22 | A2 | 03 | 18 | 20 | F1 | 1009:12 | A3 | A3 | A3 | A3 | A3 | A3 | A3 | 60 |    |  |
| 0BB1:B8 | D0 | E3 | A9 | 1E | 8D | 18 | D0 | 97 | 0DE1:F0 | FF | A4 | B4 | B9 | C3 | 10 | BE | 10 | 1011:A3 | A3 | A3 | A3 | A3 | A3 | A3 | A3 | 31 |    |  |
| 0BB9:A9 | CB | 8D | 19 | 03 | 60 | A0 | 18 | CD | 0DE9:C4 | 10 | 20 | CD | BD | 60 | 13 | 11 | F1 | 1019:A3 | 0D | 12 | 20 | 20 | 20 | 20 | 20 | 74 |    |  |
| 0BC1:20 | 4D | 0A | A9 | 8F | 8D | 18 | D4 | CE | 0DF1:1D | 1D | 12 | 1C | C4 | CA | CA | CA | 97 | 1021:20 | 20 | 42 | 59 | 20 | 20 | 20 | 20 | 19 |    |  |
| 0BC9:A9 | 80 | 8D | 0E | D4 | 8D | 2F | D4 | 37 | 0DF9:CA | CA | CA | CA | CA | CA | CA | CA | 14 | 1029:20 | 20 | 20 | 0D | 12 | 20 | 20 | 20 | A7 |    |  |
| 0BD1:8D | 12 | D4 | A9 | 0A | 8D | 25 | D0 | 0A | 0E01:CA | CA | CA | CA | CA | CA | CA | CA | 1D | 1031:20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 51 |    |  |
| 0BD9:A9 | 0F | 8D | 26 | D0 | A9 | 0B | 8D | 6D | 0E09:CA | CA | CA | CA | CA | CA | CA | CA | 25 | 1039:20 | 20 | 20 | 20 | 20 | 0D | 12 | 20 | F0 |    |  |
| 0BE1:27 | D0 | A9 | 00 | 8D | 17 | D0 | 8D | EC | 0E11:CA | CA | CA | CA | CA | CA | CA | C5 | 28 | 1041:52 | 4F | 42 | 45 | 52 | 54 | 52 | 40 | 62 |    |  |
| 0BE9:1D | D0 | 8D | 1B | D0 | A9 | 01 | 8D | E2 | 0E19:0D | 1D | 1D | 12 | C8 | 4D | 49 | 4E | 24 | 1049:DC | 20 | 43 | 4F | 4F | 4B | A0 | 0D | 33 |    |  |
| 0BF1:1C | D0 | A0 | 3F | B9 | D8 | 10 | 99 | 3D | 0E21:45 | 53 | 3A | 30 | 30 | 20 | 20 | B6 | F7 | 1051:12 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 6A |    |  |
| 0BF9:80 | 03 | 88 | 10 | F7 | A9 | 0E | 8D | 33 | 0E29:CC | CD | CE | CF | D0 | D1 | D2 | CF | 39 | 1059:20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 79 |    |  |
| 0C01:F8 | 07 | A9 | 04 | 85 | B5 | 60 | A9 | 3A | 0E31:D3 | D4 | D5 | B5 | 20 | 20 | 53 | 43 | ED | 1061:20 | 0D | 12 | 20 | 20 | 20 | 20 | 20 | FA |    |  |
| 0C09:93 | 20 | D2 | FF | A9 | 0B | 8D | 20 | 02 | 0E39:4F | 52 | 45 | 3A | 39 | 39 | 39 | C9 | C8 | 1069:20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 89 |    |  |
| 0C11:D0 | A9 | 01 | 8D | 21 | D0 | A0 | FA | 7D | 0E41:0D | 1D | 1D | 12 | C8 | 46 | 4C | 41 | 29 | 1071:20 | 20 | 20 | 0D | 12 | 20 | 20 | 20 | EF |    |  |
| 0C19:A9 | A0 | 99 | FF | 03 | 99 | F9 | 04 | D7 | 0E49:47 | 53 | 3A | 30 | 30 | 20 | 20 | 20 | 8A | 1079:20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 99 |    |  |
| 0C21:99 | F3 | 05 | 99 | ED | 06 | A9 | 0B | 23 | 0E51:B7 | B8 | D6 | D7 | D8 | D9 | DA | D7 | 8B | 1081:20 | 20 | 20 | 20 | 20 | 0D | 12 | 20 | 39 |    |  |
| 0C29:99 | FF | D7 | 99 | F9 | D8 | 99 | F3 | FC | 0E59:DB | B8 | B7 | 20 | 20 | 20 | 20 | 48 | 94 | 1089:20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | A9 |    |  |
| 0C31:D9 | 99 | ED | DA | 88 | D0 | E1 | A0 | F3 | 0E61:49 | 47 | 48 | 3A | 30 | 30 | C9 | D0 |    | 1091:20 | 20 | 20 | 20 | 20 | 20 | 20 | 00 | 91 |    |  |
| 0C39:00 | B9 | EF | 0D | F0 | 06 | 20 | D2 | 41 | 0E69:0D | 1D | 1D | 12 | C6 | C3 | C3 | C3 | A8 | 1099:00 | 10 | 18 | 20 | 28 | 30 | 38 | 40 | 75 |    |  |
| 0C41:FF | C8 | D0 | F5 | A2 | 10 | A0 | 00 | 9B | 0E71:C3 | C3 | C3 | C3 | C3 | C3 | C3 | C3 | 8D | 10A1:00 | 28 | 23 | 1E | 19 | 14 | 0F | 0A | 53 |    |  |
| 0C49:B9 | BD | 0E | F0 | 06 | 20 | D2 | FF | D4 | 0E79:C3 | C3 | C3 | C3 | C3 | C3 | C3 | C3 | 95 | 10A9:26 | 25 | 24 | 14 | 12 | 02 | 01 | 00 | 86 |    |  |
| 0C51:C8 | D0 | F5 | CA | D0 | F0 | C8 | B9 | 03 | 0E81:C3 | C3 | C3 | C3 | C3 | C3 | C3 | C3 | 9D | 10B1:5C | 5C | 5E | 5F | 21 | 23 | 24 | 25 | DB |    |  |
| 0C59:BD | 0E | F0 | 06 | 20 | D2 | FF | C8 | 67 | 0E89:C3 | C3 | C3 | C3 | C3 | C3 | C3 | C7 | A9 | 10B9:26 | 27 | 28 | 29 | 2A | 2B | 2C | 2D | D1 |    |  |
| 0C61:D0 | F5 | 60 | A0 | 00 | A9 | 0A | 85 | B5 | 0E91:0D | 11 | 1D | 1D | 12 | 1F | C4 | CA | 4F | 10C1:2E | 2F | 00 | 00 | 00 | 00 | 00 | 00 | C4 |    |  |
| 0C69:D3 | B9 | 0E | 0F | F0 | 0A | 20 | D2 | 4F | 0E99:CA | CA | CA | CA | CA | CA | CA | CA | B5 | 10C9:00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | E9 |    |  |
| 0C71:FF | C8 | C9 | 0D | D0 | F3 | F0 | ED | EB | 0EA1:CA | CA | CA | CA | CA | CA | CA | CA | BD | 10D1:01 | 01 | F0 | 01 | 41 | 11 | F1 | AA | BD |    |  |
| 0C79:20 | 95 | 0A | A0 | 20 | 20 | 04 | 0B | E6 | 0EA9:CA | CA | CA | CA | CA | CA | CA | CA | C5 | 10D9:A8 | 00 | 95 | 6C | 00 | 95 | BC | 00 | 97 |    |  |
| 0C81:20 | 95 | 0A | A9 | 06 | 8D | 86 | 02 | 60 | 0EB1:CA | CA | CA | CA | CA | CA | CA | CA | CD | 10E1:95 | 60 | 00 | 95 | 58 | 00 | 95 | 56 | 82 |    |  |
| 0C89:18 | A2 | 0E | A0 | 13 | 20 | F0 | FF | 1D | 0EB9:CA | C5 | 0D | 00 | 1D | 1D | 12 | C8 | 98 | 10E9:00 | 99 | 55 | 80 | AE | 55 | 60 | BF | 6E |    |  |
| 0C91:A4 | B5 | BE | 99 | 10 | 86 | F7 | 86 | EB | 0EC1:20 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | 37 | 10F1:95 | B0 | F3 | E6 | F0 | C0 | FB | C0 | 39 |    |  |
| 0C99:F8 | A9 | 00 | 20 | CD | BD | A5 | B5 | 01 | 0EC9:C2 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | 90 | 10F9:00 | 3F | 00 | 00 | 0C | 00 | 00 | 00 | 4A |    |  |
| 0CA1:D0 | 05 | A9 | 30 | D2 | FF | A0 | 88 |    | 0ED1:C2 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | 98 | 1101:00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 23 |    |  |
| 0CA9:7F | 20 | 04 | 0B | AD | 00 | DC | 29 | 0B | 0ED9:C2 | C1 | C2 | C1 | C2 | C1 | C2 | C1 | A0 | 1109:00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 2B |    |  |
| 0CB1:1F | C9 | 0F | F0 | 1C | C9 | 1E | F0 | F1 | 0EE1:C2 | 20 | C9 | 0D | 00 | 1D | 1D | 12 | 32 | 1111:00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 33 |    |  |
| 0CB9:06 | C9 | 1D | F0 | C0 | D0 | ED | A5 | 1F | 0EE9:C6 | C3 | CB | CB | CB | CB | CB | CB | 81 | 1119:83 | 19 | 01 | 19 | 19 | 19 | 19 | 19 | 22 |    |  |
| 0CC1:B5 | C9 | 07 | F0 | C3 | E6 | B5 | 10 | 4C | 0EF1:CB | CB | CB | CB | CB | CB | CB | CB | 0E | 1121:03 | 19 | 03 | 19 | 19 | 03 | FF | FF | D1 |    |  |
| 0CC9:BF | A5 | B5 | F0 | BB | C6 | B5 | 10 | 65 | 0EF9:CB | CB | CB | CB | CB | CB | CB | CB | 16 | 1129:83 | 19 | 1F | 1F | 19 | 83 | FF | FF | FF |    |  |
| 0CD1:B7 | A5 | B5 | 85 | B4 | C6 | B4 | 06 | 6E | 0F01:CB | CB | CB | CB | CB | CB | CB | CB | 1F | 1131:07 | 13 | 19 | 19 | 13 | 07 | FF | FF | 05 |    |  |
| 0CD9:B4 | 60 | A9 | F8 | 85 | A5 | A9 | 0B | 4A | 0F09:CB | CB | C3 | C7 | 00 | 13 | 11 | 11 | 74 | 1139:01 | 1F | 07 | 1F | 1F | 01 | FF | FF | 73 |    |  |
| 0CE1:85 | FB | 85 | A7 | A9 | 13 | 85 | A6 | 32 | 0F11:11 | 11 | 11 | 11 | 11 | 11 | 11 | 9C | BA | 1141:01 | 1F | 07 | 1F | 1F | 1F | FF | FF | F3 |    |  |
| 0CE9:A9 | 14 | 85 | FC | 85 | A8 | A2 | 12 | 82 | 0F19:0D | 12 | C4 | CA | CA | CA | CA | CA | 69 | 1149:83 | 1F | 11 | 19 | 19 | 83 | FF | FF | 7F |    |  |
| 0CF1:A0 | 11 | A9 | 00 | 91 | A5 | 88 | 10 | 20 | 0F21:CA | CA | CA | CA | CA | CA | CA | CA | 3F | 1151:19 | 19 | 01 | 19 | 19 | 19 | 19 | 19 | 25 |    |  |
| 0CF9:FB | 18 | A5 | A5 | 69 | 12 | 85 | A5 | 69 | 0F29:CA |    |    |    |    |    |    |    |    |         |    |    |    |    |    |    |    |    |    |  |

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11A1:03 19 19 03 11 19 FF FF CB
11A9:81 1F 83 F1 11 83 FF FF 7A
11B1:01 C7 C7 C7 C7 C7 FF FF 19
11B9:19 19 19 19 19 83 FF FF 3A
11C1:19 19 19 19 83 C7 FF FF A6
11C9:1C 1C 14 00 08 1C FF FF 34
11D1:39 11 83 83 11 39 FF FF EA
11D9:19 19 83 C7 C7 C7 FF FF 19
11E1:01 E3 C7 8F 1F 01 FF FF 6C
11E9:C3 CF CF CF CF C3 FF 00 66
11F1:00 00 00 00 00 00 00 FF 14
11F9:C3 F3 F3 F3 F3 C3 FF 00 67
1201:01 07 01 01 01 01 07 00 B1
1209:C0 C0 C0 C0 C0 C0 F0 FF CC
1211:FF FF FF FF FF FF FF 00 35
1219:03 06 00 01 03 07 07 99 2C
1221:99 99 FF FF FF FF FF 00 78
1229:E0 70 E0 C0 80 00 F0 00 E7
1231:03 06 00 00 06 06 03 00 A6
1239:E0 70 E0 70 70 70 E0 00 14
1241:01 03 06 0C 1F 00 00 00 21
1249:E0 E0 E0 E0 F0 E0 E0 00 0D
1251:07 07 07 00 06 06 03 00 E9
1259:F0 00 E0 70 70 70 E0 00 20
1261:03 07 07 06 06 06 03 00 58
1269:E0 00 E0 70 70 70 E0 00 28
1271:07 06 00 01 01 01 01 00 B8
1279:F0 70 E0 C0 80 80 80 00 61
1281:03 06 03 06 06 06 03 00 B7
1289:E0 70 E0 70 70 70 E0 FF 64
1291:83 19 19 19 19 83 FF FF 49
1299:C7 07 C7 C7 C7 01 FF FF 1B
12A1:83 31 E3 8F 1F 01 FF FF 46
12A9:83 31 E3 F1 31 83 FF FF 0F
12B1:E1 C1 91 00 F1 F1 FF FF C0
12B9:01 1F 03 F1 31 83 FF FF 3D
12C1:83 1F 03 19 19 83 FF FF 38
12C9:01 31 E3 C7 C7 C7 FF FF 11
12D1:83 19 83 19 19 83 FF FF D6
12D9:83 31 31 81 F1 83 FF FF E7
12E1:FF E7 FF FF E7 FF FF 00 3F
12E9:07 0C 00 00 01 00 01 00 9E
12F1:E0 30 60 C0 80 00 80 00 AF
12F9:0F 0F 0F 00 00 00 00 00 4B
1301:E0 E0 E0 20 20 70 F8 00 A2
1309:09 07 0F 6E 0F 07 09 00 E4
1311:90 E0 F0 76 F0 E0 90 00 69
1319:7F 7F 7F 7F 7F 7F 7F 00 BF
1321:FE FE FE FE FE FE FE FF 48
1329:FF FF FF 00 FF 00 FF FF 4F
1331:80 BF A0 A7 A7 A7 A7 FF 41
1339:01 FD 05 E5 E5 E5 E5 A7 98
1341:A7 A7 A7 A0 BF 80 FF E5 0A
1349:E5 E5 E5 05 FD 01 FF A7 84
1351:A7 A7 A7 A7 A7 A7 A7 E5 B5
1359:E5 E5 E5 E5 E5 E5 E5 FF 99
1361:00 FF 00 FF FF FF FF 00 87
1369:FF FF FF 00 FF 00 FF 00 8F
1371:C6 EE FE FE D6 C6 00 00 58
1379:7C 38 38 38 38 38 7C 00 12
1381:E6 E6 F6 FE EE E6 E6 00 84
1389:FE E0 E0 E0 F8 E0 E0 00 9E
1391:7C EE E0 E0 7C 0E 0E 00 14
1399:C6 C6 D6 D6 D6 FE FE 00 CD
13A1:FE E0 E0 E0 E0 F8 E0 00 56
13A9:FC E6 E6 E6 FC E0 E0 00 80
13B1:FE E0 E0 F8 E0 E0 FE 00 C3
13B9:FC E6 E6 FC EE E6 00 E6 BE
13C1:00 00 00 FF FF FF FF E0 C8
13C9:FE 00 00 00 FF FF FF 0E 7D

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13D1:EE 7C 00 00 00 FF FF FE 8D
13D9:EE C6 C6 00 00 00 FF E0 E2
13E1:E0 FE 00 00 00 FF FF E0 19
13E9:00 00 00 FF FF FF FF 10
13F1:FF FF FF FF E7 E7 FF 00 F6
13F9:F3 C3 00 00 00 00 00 0B

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## TURBODOS

By Hong H. Pham

The 1541 disk drive is a remarkable device. It's very reliable, it has a wealth of DOS commands, and it easily handles sequential and relative files. The only downside of the 1541 is its notoriously slow speed. The 1571 is significantly faster when used with a 128 in 128 mode, but it's just as slow as the 1541 when used with a 64.

TurboDOS can change all that so you'll no longer have to wait very long to load or save large programs. TurboDOS commands speed loading, saving, and verifying up to seven times faster than DOS commands. In addition, TurboDOS breaks the track-35 barrier, allowing you to use all 40 tracks on a standard 5<sup>1</sup>/<sub>4</sub>-inch double density disk. With five more tracks available, you'll have another 85 blocks at your disposal, a total disk capacity of 749 blocks.

### Getting Started

TurboDOS is written entirely in machine language. Enter it with MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When prompted for the starting and ending addresses, respond with the following values.

**Starting address: 0801**  
**Ending address: 2238**

Before exiting MLX, be sure to save a copy of TurboDOS.

To run TurboDOS, load and run it like a BASIC program. TurboDOS installs itself and then displays a startup message. Note that the bottom of BASIC RAM is raised to \$2B01 (11009) to provide a protected area for TurboDOS to reside.

### New Commands

In addition to speeding up disk access times, TurboDOS adds 17 new com-

mands to BASIC. This makes disk accessing more convenient. For most TurboDOS commands, it's not necessary to give the device parameter. If no device number is specified, TurboDOS will assume that you are using drive 8. If you are using LOAD, SAVE, or VERIFY commands in immediate mode, you can omit the device parameter following the filename. To use TurboDOS commands in a BASIC program, they must be preceded with a slash (/).

Because TurboDOS completely reprograms the disk drive, 6 of the 17 new commands will not work on disk drives which aren't 1541 compatible. Those 6 commands are BLOCK, DIR, FORMAT, LOCK, RENAME, and START. If you try to use the above commands on a non-1541-compatible disk drive, TurboDOS will report a *DEVICE NOT SUPPORTED* error message.

### Seventeen Commands

Here are the new commands that you can use with TurboDOS.

#### DIR "string", device

DIR displays the disk directory on the screen. Entering DIR by itself will display the entire directory. You can specify which files to display with the string parameter. Wildcards are allowed.

#### BLOAD "filename", device, starting address

BLOAD loads a binary file and puts it at a specified location. If you don't specify the starting address, BLOAD will use the location specified by the file.

#### BSAVE "filename", device, starting address, ending address

Use BSAVE to save a file to a device from a specified memory location.

#### RESAVE "filename", device

When updating a BASIC program, you will have to scratch it before you can re-save it. RESAVE does all this in one step by scratching the file first and then saving it.

#### FORMAT "ID", "disk name", device

Because normal DOS cannot format tracks beyond 35, TurboDOS also is a custom disk formatter. A disk will format in about ten seconds. Use any two

# PROGRAMS

ASCII characters for the ID and up to 16 characters for the disk name.

## **BLOCK mode, track, sector, buffer, ID flag, device**

BLOCK is like DOS's B-R or B-W commands. To read a sector, set mode to 0. To write, set mode to 1. Buffer indicates which location TurboDOS should put the sector to or which location to get data from when performing a read or write operation.

Because TurboDOS cannot tell if a new disk has been placed into the drive, an *ID MISMATCH* error message may appear when you use this command. If a new disk has been placed into the drive, set the ID flag parameter to 1. Set it to 0 for any other consecutive read or write attempts to the same disk. It isn't always best to set the ID flag to 1 for all read or write attempts. TurboDOS will take an extra second to identify the disk, and the extra seconds will add up.

You can omit the ID parameter, and it will have the same effect as setting ID to 0. For example, to read track 18, sector 0 and then put the sector's contents at location \$4000 (16384), type in *BLOCK 0,18,0,16384,1*. To write this sector to track 35, sector 16, type in *BLOCK 1,35,16,16384*.

## **DISK "command string", device**

DISK sends a disk command or displays the drive status. If entered by itself, the drive status will be displayed.

## **SCRATCH "filename", device**

SCRATCH erases a file or multiple files from the disk directory. When using a TurboDOS formatted disk, you should use this command instead of the familiar S0: from DOS.

## **COLLECT device**

COLLECT is much like DOS's V0 command. It validates the disk, updates the BAM, and deletes any splat files from the directory.

## **RENAME "old name" TO "new name", device**

Use RENAME to change the name of a file on the disk directory.

## **LOCK "filename", mode, device**

A locked file cannot be scratched. To

lock a file, set mode to 0. Using wildcards, you can lock just one file or the entire directory.

LOCK can also unlock files. Set mode to 1 to unlock. If you omit the mode parameter, TurboDOS will assume that you want to lock a file.

## **START "filename", device, new load address**

START displays a program's load address or changes it. If you wish to see the program's load address only, omit the last parameter.

## **TRACK highest track, directory track**

You can set the highest track that TurboDOS will use or which track the directory is on by using TRACK. If entered by itself, the highest track and the directory track will be displayed.

If the head chatters when approaching track 40 on your disk drive, you should lower the highest track number to 39 or 38.

## **SKEW sector interleave, directory sector interleave**

Files will load faster if they are saved at an optimum sector interleave. TurboDOS saves files at a 1 : 7 sector interleave, and it also saves the directory at a 1 : 7 sector interleave. However, some other fastloaders will work faster if you change the sector interleave value to 1 : 6.

## **DEFAULT device**

TurboDOS usually defaults to drive 8 when no device number is specified, but you can change the default device with this command.

## **COLOR border, background, cursor**

COLOR is used to set the border, background, and cursor color to your own preference. Use the Commodore color numbers 0-15.

## **KILL**

KILL disables TurboDOS, and it restores the former load, save, and BASIC vectors.

## **Odds and Ends**

When using TurboDOS commands which require a filename, such as LOAD, SAVE, LOCK, and SCRATCH, you should not specify the drive num-

ber. For example, you should not type *LOAD "0:\*"*, 8. Instead, you should just simply type *LOAD "\*"*. TurboDOS will literally look for a file whose name is actually 0:\*, and you will get a *FILE NOT FOUND* error message.

If you are using wildcards with TurboDOS, you cannot specify the file type. For example, *DIR "\*=S"* will not display all sequential files on disk.

Although TurboDOS can access tracks 35 and beyond, it will not check for illegal tracks, tracks higher than 40. If TurboDOS encounters such errors, it will noisily slam the head against the headstop trying to look for a track that doesn't exist. If this happens, type *OPEN 15,8,15,"IO"*, and this will usually get your drive back in working order.

When scratching or collecting a TurboDOS formatted disk, you should use TurboDOS's SCRATCH or COLLECT command, rather than DOS's. Normal DOS will not scratch files or validate your disk properly if there are files saved beyond track 35. Although TurboDOS has its own disk-format routine to provide you with optimum storage space, this doesn't mean that you'll have to set aside several disks for exclusive TurboDOS use. TurboDOS can distinguish between regular format or TurboDOS format by looking at the third byte on track 18, sector 0, and it will act accordingly.

## **TURBODOS**

|         |    |    |    |    |    |    |    |    |
|---------|----|----|----|----|----|----|----|----|
| 0801:0B | 08 | 70 | 17 | 9E | 32 | 34 | 30 | 6E |
| 0809:37 | 00 | 00 | 00 | 20 | 20 | 20 | 20 | 96 |
| 0811:20 | 20 | 20 | 20 | A0 | C4 | B9 | 06 |    |
| 0819:3C | 08 | 99 | F8 | 00 | B9 | FD | 08 | F6 |
| 0821:99 | 33 | 03 | 88 | D0 | F1 | A0 | 09 | 4C |
| 0829:B9 | 0C | 08 | 99 | FF | 03 | 88 | D0 | A1 |
| 0831:F7 | A9 | FD | 85 | 2D | A9 | 28 | 85 | A5 |
| 0839:2E | 4C | 00 | 01 | 1B | E6 | 03 | FD | FB |
| 0841:28 | AD | 20 | B9 | 6E | 09 | 99 | E8 | 24 |
| 0849:07 | C8 | D0 | F7 | EE | 02 | 01 | EE | 19 |
| 0851:05 | 01 | C6 | F9 | D0 | ED | A2 | 03 | 23 |
| 0859:20 | 34 | 03 | F0 | 33 | C9 | 07 | D0 | 95 |
| 0861:16 | A2 | 01 | 20 | 34 | 03 | D0 | 0A | A0 |
| 0869:A2 | 04 | 20 | 34 | 03 | 18 | 69 | 07 | 65 |
| 0871:10 | 05 | A2 | 0A | 20 | 34 | 03 | 85 | 1D |
| 0879:A8 | A5 | A7 | 85 | A9 | A5 | FE | 85 | FB |
| 0881:F7 | A5 | FF | 85 | F8 | 20 | 6C | 03 | 73 |
| 0889:A5 | F8 | 85 | FF | A5 | F7 | 85 | FE | 72 |
| 0891:E8 | 20 | 34 | 03 | D0 | 1E | A2 | 08 | 21 |
| 0899:20 | 34 | 03 | A0 | 02 | 84 | A8 | 85 | 2A |
| 08A1:A6 | 18 | A5 | FC | 65 | A6 | 85 | F7 | 58 |
| 08A9:A5 | FD | 65 | A7 | 85 | F8 | 20 | 6C | EF |
| 08B1:03 | 4C | 13 | 01 | E8 | 20 | 34 | 03 | FB |
| 08B9:D0 | 1C | A0 | 03 | 84 | A8 | E8 | 20 | 36 |
| 08C1:34 | 03 | F0 | 08 | A2 | 08 | 20 | 34 | F4 |
| 08C9:03 | 4C | 5C | 01 | A2 | 0C | 20 | 34 | C3 |

08D1:03 E6 A7 4C 5C 01 E8 20 AF  
08D9:34 03 D0 0A E8 20 34 03 B2  
08E1:18 69 04 A8 D0 D6 E8 20 37  
08E9:34 03 D0 0A A2 02 20 34 21  
08F1:03 18 69 06 D0 ED A2 08 A2  
08F9:20 34 03 D0 E6 A9 00 85 F7  
0901:A7 A4 FB F0 0C 06 FA 2A 37  
0909:26 A7 C6 FB CA D0 F2 A8 D8  
0911:60 48 B1 FE 85 FA A9 08 FE  
0919:85 FB 68 A4 FE D0 02 C6 4A  
0921:FF C6 FE C0 E7 D0 DE A4 B5  
0929:FF C0 07 D0 D8 A9 37 85 BA  
0931:01 58 4C BE 1A A4 A8 F0 F4  
0939:22 A5 F7 38 E5 A8 B0 03 7E  
0941:C6 F8 38 85 F7 A5 FC E5 8A  
0949:A8 B0 02 C6 FD 85 FC B1 3A  
0951:F7 88 91 FC 98 D0 F8 C4 42  
0959:A9 F0 0A B1 F7 C6 FD C6 76  
0961:F8 C6 A9 10 EC 60 78 E6 98  
0969:01 4C 16 08 60 00 1B 08 93  
0971:36 21 9E 20 36 38 34 36 ED  
0979:20 E5 77 69 56 31 2E 30 9E  
0981:31 00 00 00 20 47 08 4C A6  
0989:2F 2F A9 DF A4 89 E2 8E D1  
0991:43 44 A9 1F A2 AC 27 8E 22  
0999:07 A8 83 A2 3A 01 A0 A9 B4  
09A1:3F 8D 02 4D B5 23 36 8D FF  
09A9:A4 AD 42 36 8D A4 AD 42 C1  
09B1:36 8D A4 AD 42 36 8D A4 5C  
09B9:60 AD DD C2 0A 30 A4 DE 88  
09C1:08 8D 31 00 0B 1D A4 32 A9  
09C9:03 AD 1E 0A 8D 33 03 A9 16  
09D1:47 A2 FE 8D 18 03 8E 19 EB  
09D9:03 60 48 8A 48 98 48 A9 16  
09E1:7F 8D 00 DC AD 01 DC C9 D9  
09E9:FD F0 21 C9 7F D0 C0 09 C1  
09F1:8F 8D 88 02 20 81 D7 16 2D  
09F9:96 21 20 8A FF 20 23 08 1B  
0A01:20 84 FF EA EA EA 6C 40 11  
0A09:7F 4C BC FE A2 FF 78 9A 18  
0A11:D8 E8 8A 95 02 E8 D0 FB C7  
0A19:A2 3C A0 93 86 B2 84 B3 8D  
0A21:75 C1 53 1D A0 20 8C 27 62  
0A29:15 FD 20 5B FF 58 6C 00 3B  
0A31:A0 40 5C 12 7E 80 85 93 E6  
0A39:5A 02 C2 C9 BB C9 24 F0 2E  
0A41:ED 70 9D 20 0E 08 16 C0 9B  
0A49:E3 20 AF F5 B4 55 85 B9 6C  
0A51:20 3F 0F 90 12 A9 62 8A B6  
0A59:D7 17 55 40 D8 43 7E 0A A2  
0A61:4C 0D 0A 20 D2 F5 A9 01 E4  
0A69:16 9F 12 E2 E2 EC A8 36 33  
0A71:62 6C 88 FD 0C 95 2C 06 D7  
0A79:04 60 E2 B9 F9 AC 14 62 AC  
0A81:AE 03 29 4C 4D 09 A4 C3 33  
0A89:A6 C4 84 E4 00 45 3C A2 31  
0A91:04 50 43 35 0E FA 72 18 D0  
0A99:A2 02 92 ED 50 8F 27 10 CF  
0AA1:03 4C F9 B8 72 60 12 22 70  
0AA9:26 1D D0 F0 F0 D9 9E 3C A9  
0AB1:D0 E0 F0 CD 75 5A F0 79 D1  
0AB9:54 47 28 4D 46 04 3C 19 77  
0AC1:19 21 2C F7 84 E6 E4 34 6D  
0AC9:D1 AE F0 20 A9 10 D4 6F 39  
0AD1:4C D9 09 36 51 87 4D C9 14  
0AD9:02 F0 0A EC FB 90 EC 42 79  
0AE1:ED 91 AE 48 15 0A A5 93 5B  
0AE9:F0 09 A5 90 F0 05 38 A9 2C  
0AF1:1C B0 03 39 2F 4D 48 86 F9  
0AF9:9E E0 68 A6 AE A4 AF C5 3A

0B01:2D A2 00 7C 40 1A 82 70 FD  
0B09:BC 02 29 08 C9 88 1C A2 EE  
0B11:42 86 90 38 B0 D8 E6 AE E4  
0B19:E2 9C AF E8 60 4C 4C F6 10  
0B21:3B 01 29 F8 CC 80 B0 15 A8  
0B29:53 79 90 C1 80 1E 41 43 B7  
0B31:0C 90 13 A9 33 2C A9 34 40  
0B39:42 3C C1 BB 10 B0 2A A9 B4  
0B41:40 B3 2C 82 B9 89 09 8C A4  
0B49:89 26 52 08 9A 09 C0 C4 B7  
0B51:0F 28 B0 64 46 0C A1 03 FD  
0B59:2A F0 08 30 06 5A CB 76 6C  
0B61:70 CA 20 CC 30 16 92 C2 F4  
0B69:BD 07 BD 08 5B A2 07 BA 86  
0B71:6C 0E 08 27 27 E4 28 11 E2  
0B79:01 AC 39 1C 80 D4 30 8B 67  
0B81:63 28 E9 05 CD E4 02 DB C2  
0B89:27 34 08 07 D1 BB D0 1B EB  
0B91:AC 1E F5 1C 47 06 60 A8 C1  
0B99:C9 A0 D0 0C A9 63 99 34 D9  
0BA1:88 84 C4 41 85 90 CA 30 FD  
0BA9:0A 9E 37 1B 9C 56 4C 8E 6A  
0BB1:0A 33 43 7B 7B 12 8F F6 F3  
0BB9:69 13 30 19 28 41 20 88 EF  
0BC1:04 05 0B 0B 54 05 70 1A DE  
0BC9:40 83 56 09 0E 24 D0 B0 8F  
0BD1:F0 2A CC 8C 18 C0 DC 78 43  
0BD9:01 06 80 3D A2 B7 09 ED C9  
0BE1:26 3E AB 85 46 40 10 8B 47  
0BE9:CF C0 C9 FD B0 3B AC 2C 29  
0BF1:30 E8 73 2C 33 7A 36 7E F9  
0BF9:36 86 C1 99 04 3A C6 3A 6F  
0C01:5E 81 A8 D8 7B 69 05 96 6D  
0C09:89 D6 F0 0A 82 C8 2B 0D F4  
0C11:B0 16 E3 A8 8C A5 C1 2B B7  
0C19:A1 09 0D A5 C2 CA 66 85 D3  
0C21:29 A2 04 12 29 03 2E C8 92  
0C29:98 91 18 A9 FC E3 10 EB 13  
0C31:38 A5 AE E5 28 1D 39 A5 D0  
0C39:AF E5 EE 3D AD 9D 3A C9 76  
0C41:FE F0 02 B0 34 78 A6 00 31  
0C49:39 8C 0D 21 8E 80 0E A3 0B  
0C51:AE C6 E8 8E 81 46 E0 A7 07  
0C59:CE AA 2E 3C F5 09 29 7E B1  
0C61:49 4C 65 0B 4F 1F 08 31 C6  
0C69:21 FA 0A 31 21 F8 2D 0E 7A  
0C71:B2 F8 90 08 2B 93 A9 72 21  
0C79:CA F6 08 F9 46 0D B9 3A 69  
0C81:28 99 02 BA 66 FE D0 F6 C7  
0C89:98 18 66 E5 4D 02 E6 2B 8A  
0C91:60 0C B0 B7 4C B2 0B 1B CC  
0C99:80 90 C8 13 23 24 0F 4C 90  
0CA1:94 0B 30 A6 2C 90 E9 D7 86  
0CA9:1F 60 C0 00 B2 4E A0 F3 85  
0CB1:E8 10 09 04 83 01 B1 18 3F  
0CB9:4C F2 55 00 B2 0F 05 7E B9  
0CC1:18 1E E3 07 47 2C A6 1A AC  
0CC9:10 65 9E AA 15 61 85 91 8C  
0CD1:EE E9 B4 28 A9 29 85 29 1B  
0CD9:B6 41 D0 06 A0 01 A9 FF 74  
0CE1:44 2B AD 88 1B 60 02 A9 2D  
0CE9:82 74 05 19 7B B0 92 81 D7  
0CF1:07 0C 90 2B 4A 95 61 CA 55  
0CF9:06 06 C3 F0 0D D6 6D F3 B0  
0D01:A9 A0 70 0B C0 10 D0 F9 B8  
0D09:AD 19 AD 05 BF 82 02 C8 94  
0D11:AD B2 91 28 4C B2 0D AC 57  
0D19:A7 52 CB 40 29 66 49 01 8F  
0D21:60 20 93 0E 8E 9B 8C 49 0C  
0D29:0E 00 D4 F1 70 B0 0B A3 04

0D31:BF 0E 0E BA 14 A8 1A 4C DF  
0D39:A3 0C 96 1F E0 01 A8 34 7D  
0D41:CA 24 E8 C3 2C F6 0E 90 0D  
0D49:EE 19 8E 88 28 14 89 79 99  
0D51:05 EE A2 8A 0D EE A3 28 3A  
0D59:5F 68 7A AE 9D 77 C0 0A CD  
0D61:A9 7B 0B 8F 38 80 8D E3 4C  
0D69:0C 6C 08 68 AA C7 90 43 05  
0D71:C6 08 97 8C B0 C2 02 46 87  
0D79:6C 36 72 04 20 28 E0 72 BB  
0D81:18 82 0A F0 02 CA 07 B2 94  
0D89:10 B1 52 0B 85 82 61 74 80  
0D91:98 23 CB 0F 5A 7E F5 A9 8D  
0D99:EA 8D 4C 0B 8D B1 A9 03 50  
0DA1:A0 86 90 06 19 58 8F 27 90  
0DA9:A2 58 8E A7 18 8E 02 19 8F  
0DB1:AA 08 38 EE 10 28 0C 44 96  
0DB9:C0 8D EB 0D 20 67 0D B0 4F  
0DC1:B7 C3 15 81 00 69 77 38 71  
0DC9:0E 8B 00 78 6D 0C AC 6B B5  
0DD1:4C 97 0D AE 79 1A DD 70 E4  
0DD9:1A CA B0 FA BD 75 1A 60 D1  
0DE1:A2 00 8A 9D 00 29 E8 D0 BF  
0DE9:FA 60 06 4F 51 E1 51 08 0C  
0DF1:D1 4C 3A 28 3C C8 73 94 52  
0DF9:CC F0 13 68 39 39 5B 52 57  
0E01:4A 0E CE 5F C9 68 4E 48 6A  
0E09:21 1A 20 75 0E 48 39 6F 0B  
0E11:0D ED 68 19 41 81 1E 26 22  
0E19:2A 53 93 70 0E EE F7 4C 01  
0E21:24 41 15 90 66 8D 81 0E C5  
0E29:9C 48 38 69 FF 8D 90 2B C5  
0E31:67 20 3D 41 0E 98 29 07 F0  
0E39:A8 5C 60 D1 A0 38 8C 73 5C  
0E41:05 3C 8E CD 12 70 A6 E5 23  
0E49:1C 11 C1 06 20 07 65 A7 DF  
0E51:39 60 AD 7D 1A 3A 95 03 97  
0E59:AD 7E 87 6D 23 34 8D 92 4B  
0E61:0D FA 89 8D 53 AD AC 40 31  
0E69:56 20 04 38 ED D1 31 A8 7E  
0E71:88 78 13 5B 0A C8 CC AD C2  
0E79:1A 90 D9 4F F0 F1 AD A4 46  
0E81:40 0E 12 AD A5 56 03 34 1F  
0E89:66 AC 15 D1 56 84 7A 03 80  
0E91:0F AD 00 2A D0 2E 60 70 B3  
0E99:ED 20 C0 E1 2E 90 0A E8 9B  
0EA1:0F 3D E4 90 E2 B0 F0 E0 D6  
0EA9:01 D0 0D B0 B8 EC 10 BF 80  
0EB1:F0 08 49 5D D0 E5 54 02 10  
0EB9:CC CA D0 C9 F0 D7 20 18 E4  
0EC1:0E C4 51 17 F8 87 A8 08 F0  
0EC9:22 8D CF C1 3A A9 05 83 76  
0ED1:4A 38 AC 1F 18 18 A5 AE C3  
0ED9:F3 B0 5D F0 84 4C 52 0F DF  
0EE1:5B 1F 0C 6F 50 1F 45 0F 84  
0EE9:AC 00 C6 AE 62 6B F0 0B CD  
0EF1:AC FA C8 61 42 80 7E 08 6B  
0EF9:B5 0C B6 C4 C9 2A F0 F4 E4  
0F01:C9 3F F0 04 D1 AE D0 0F 2C  
0F09:E5 57 8F ED F3 95 E3 B1 30  
0F11:AE C9 A0 F0 DD 04 47 44 ED  
0F19:82 A3 B0 8E 23 22 2A AC A2  
0F21:AB 2F A2 A2 2A 8D AB 24 62  
0F29:AC 16 15 08 31 4C BD 0F 8B  
0F31:3C 0E ED 66 28 04 44 42 31  
0F39:11 80 0A 84 72 D6 40 85 7E  
0F41:87 72 08 50 C4 A0 26 A2 5D  
0F49:9A 60 99 0C 58 C9 08 90 4B  
0F51:0D C9 0C E5 63 80 60 5A 80  
0F59:55 11 90 08 D0 75 56 7C 7E

# PROGRAMS

|         |    |    |    |    |    |    |    |    |           |    |    |    |    |    |    |    |    |         |    |    |    |    |    |    |    |    |
|---------|----|----|----|----|----|----|----|----|-----------|----|----|----|----|----|----|----|----|---------|----|----|----|----|----|----|----|----|
| 0F61:80 | 38 | 60 | 1A | 2F | 1A | 20 | A9 | 47 | 1191:0E   | A8 | E8 | 88 | D0 | F2 | 2C | B1 | E6 | 13C1:52 | 4F | 52 | 83 | 1B | AD | 81 | 1A | 14 |
| 0F69:46 | A2 | 01 | 0F | 83 | 8E | 9A | 21 | 11 | 1199:1A   | 30 | 04 | A9 | 2A | D0 | 07 | 50 | E2 | 13C9:C9 | 62 | D0 | D9 | CC | 84 | 81 | B1 | 52 |
| 0F71:A9 | 04 | A2 | 27 | 54 | 55 | 0C | 9F | DB | 11A1:03   | A9 | 3C | 2C | B2 | F7 | C3 | 70 | 67 | 13D1:4E | 4F | 54 | 67 | 4F | 22 | F8 | 44 | 2D |
| 0F79:18 | 78 | 7C | E2 | 06 | F1 | 01 | 33 | AC | 11A9:A0   | 1F | 50 | F3 | 88 | C0 | 6C | 20 | 6D | 13D9:52 | 91 | C9 | 63 | D0 | 12 | 19 | 51 | 4F |
| 0F81:C3 | 90 | D9 | 20 | 90 | F6 | 93 | 29 | 93 | 11B1:C2   | 93 | 0D | A8 | 00 | BD | 20 | E1 | 5F | 13E1:24 | 20 | 45 | 58 | E7 | 2D | 54 | 53 | 40 |
| 0F89:9C | F0 | 1C | 18 | A5 | 26 | B4 | 40 | A6 | 11B9:50   | 0B | 20 | 62 | C9 | 20 | D0 | 05 | 66 | 13E9:10 | B1 | B6 | AC | 02 | FF | C0 | 21 | D8 |
| 0F91:26 | 90 | 03 | E6 | 27 | 18 | AD | 08 | B2 | 11C1:50   | 96 | 29 | F0 | FB | 05 | 0B | 20 | 10 | 13F1:55 | 2B | B5 | 4A | 30 | C4 | 82 | C3 | 46 |
| 0F99:4E | 69 | 20 | 55 | 1B | 1A | 90 | C7 | BC | 11C9:38   | D5 | B0 | 72 | C5 | 12 | 40 | 93 | 45 | 13F9:10 | A9 | 2C | 17 | 78 | AD | 83 | F5 | 01 |
| 0FA1:EE | 1C | EC | 24 | 2D | 8E | 9D | 10 | 0D | 11D1:85   | 02 | B3 | 12 | 50 | 16 | 81 | 9F | 4C | 1401:98 | B8 | 53 | 0A | 84 | 40 | 63 | 04 | 9E |
| 0FA9:94 | C6 | 1E | 4C | A8 | FF | C8 | C0 | E3 | 11D9:63   | 07 | 27 | 4A | 6C | C4 | D1 | DB | EE | 1409:47 | A1 | 05 | 34 | C8 | E1 | 3E | 0A | 75 |
| 0FB1:33 | BA | 03 | AE | 8E | 21 | EC | 01 | 37 | 11E1:1A   | 1A | 46 | 39 | 1E | 45 | 22 | 52 | 90 | 1411:25 | 08 | 74 | C0 | 17 | 3A | A0 | 82 | CD |
| 0FB9:5F | B0 | A2 | 22 | 7C | D4 | 07 | A9 | 19 | 11E9:44   | 0B | 88 | 47 | 3E | 49 | 4E | 60 | 8A | 1419:28 | 10 | 38 | 5C | A5 | 28 | 18 | A6 | CA |
| 0FC1:05 | 85 | BE | 27 | F4 | C1 | C6 | BE | 09 | 11F1:E9   | 1E | 11 | 8C | 72 | D8 | 83 | 60 | D9 | 1421:81 | 23 | A5 | 29 | 85 | AF | 20 | 86 | CB |
| 0FC9:D0 | F6 | 18 | 5B | 2E | 4C | 0C | A5 | 27 | 11F9:18   | 5C | 9C | 1B | B0 | F0 | 04 | C9 | 9F | 1429:0F | B0 | 26 | 16 | 57 | AE | 90 | AD | 6F |
| 0FD1:BA | 20 | B1 | FF | A9 | 6F | 4C | 93 | C2 | 1201:29   | 90 | 02 | A9 | 23 | CC | F0 | 58 | 3F | 1431:0B | 46 | D0 | 1B | 81 | 14 | 09 | 40 | EA |
| 0FD9:FF | A0 | 71 | 85 | 09 | 20 | AD | B0 | 7B | 1209:22   | 68 | 89 | 40 | BD | 12 | 15 | 9D | 8B | 1439:4C | 25 | 17 | 29 | 40 | F0 | 10 | 88 | B4 |
| 0FE1:0D | 87 | 0C | AC | 8C | 95 | 38 | C0 | A0 | 1211:00   | 2A | E8 | D0 | F7 | A6 | 1C | 8D | 0A | 1441:2F | 29 | BF | 12 | 91 | 28 | A9 | FF | E4 |
| 0FE9:03 | 85 | B2 | 7A | 09 | 04 | 8D | D8 | 35 | 1219:8C   | 0C | CC | E2 | 00 | C6 | 88 | 28 | A2 | 1449:8D | A7 | 3A | EE | 08 | 18 | A9 | 20 | 6C |
| 0FF1:32 | 9B | 0F | 44 | E0 | 30 | A4 | FF | 47 | 1221:80   | 64 | AC | 62 | 28 | 40 | 74 | C2 | 48 | 1451:65 | 28 | 85 | 28 | 90 | B9 | 2C | AF | DC |
| 0FF9:9D | 29 | 2C | 45 | F3 | AD | A8 | 04 | B6 | 1229:27   | AC | AD | 51 | 1E | 82 | 9D | 08 | 15 | 1459:1A | 10 | 06 | 18 | 09 | 74 | D8 | C2 | 63 |
| 1001:F0 | 08 | 8D | BC | 10 | 35 | 15 | D0 | 69 | 1231:30   | 8D | AA | EA | 83 | 49 | A2 | 07 | 62 | 1461:9E | 89 | 3F | DD | 16 | 20 | 5B | 18 | 01 |
| 1009:68 | 48 | 78 | 20 | C1 | 10 | 20 | A7 | B2 | 1239:6A   | 01 | 8C | 62 | A3 | CA | 10 | F7 | EA | 1469:AD | A1 | 3B | F8 | 64 | 20 | CC | 25 | 2A |
| 1011:10 | 58 | 6F | B9 | 44 | 70 | FB | A9 | 5E | 1241:73   | 64 | E2 | 3C | 11 | 29 | 43 | F0 | FC | 1471:00 | 16 | 46 | 49 | 4C | 45 | 53 | 28 | C2 |
| 1019:C7 | 06 | 03 | 68 | D2 | 53 | 2C | 9B | 5D | 1249:0D   | 70 | 13 | 00 | 9D | 27 | 1D | 28 | 5E | 1479:53 | 29 | 20 | 00 | AD | AE | 1A | D0 | C6 |
| 1021:86 | 9A | 30 | FB | 09 | 10 | 91 | C1 | 5E | 1251:9D   | B1 | 2E | E8 | 84 | B0 | DF | 9E | 4A | 1481:0F | 45 | 74 | 87 | 02 | 22 | C3 | 23 | CC |
| 1029:46 | 84 | 80 | 1A | C5 | BA | D0 | 16 | 10 | 1259:A2   | 42 | AE | 40 | 50 | 40 | A1 | 1D | 1D | 1489:4B | 55 | 4E | 4C | B8 | D6 | 45 | 64 | 4B |
| 1031:20 | B2 | 10 | 10 | 57 | 0F | 8C | 37 | 58 | 1261:21   | F0 | 1E | BC | B6 | 1A | BD | E0 | 5C | 1491:A4 | 47 | C6 | 14 | A9 | 01 | 85 | D4 | 29 |
| 1039:29 | C0 | C9 | 80 | F0 | 09 | CA | D0 | 71 | 1269:6C   | 30 | 1E | 22 | 33 | E4 | 20 | 2D | 50 | 1499:5B | 26 | 68 | 85 | 27 | 00 | 17 | 0A | CF |
| 1041:F4 | 88 | D0 | F1 | 4C | F1 | 0F | 23 | A2 | 1271:0A   | AF | F0 | 43 | 14 | EE | 13 | AD | 09 | 14A1:0E | D0 | 19 | 09 | 86 | 5F | B1 | 17 | E4 |
| 1049:3A | D5 | 11 | 58 | 4B | 14 | AD | 87 | 31 | 1279:A7   | 1A | C9 | 08 | D0 | CD | 00 | BE | 2E | 14A9:4C | 9B | 17 | A5 | 27 | 48 | A5 | 26 | E7 |
| 1051:50 | 14 | 19 | 22 | 15 | 81 | E4 | 14 | 70 | 1281:47   | 04 | 89 | DE | 13 | 51 | DB | 83 | 82 | 14B1:48 | 60 | E6 | 26 | D0 | 02 | E6 | 27 | D8 |
| 1059:82 | EC | 60 | 06 | 19 | 8D | 83 | 1A | 82 | 1289:21   | 0F | 1D | 85 | FC | 85 | B0 | C7 | 25 | 14B9:60 | 30 | FB | 46 | 91 | 50 | E0 | 41 | D2 |
| 1061:E8 | 12 | 94 | 40 | 7A | 53 | 06 | A2 | E0 | 1291:D7   | 58 | 85 | BC | CF | 58 | D1 | 41 | F8 | 14C1:42 | 06 | 43 | 20 | 4C | D6 | 17 | A0 | 83 |
| 1069:23 | F8 | A9 | B0 | 20 | A9 | 11 | DE | 42 | 1299:1A   | 5E | 30 | 0D | 59 | 5E | 09 | 0D | 9C | 14C9:02 | 2C | A0 | 01 | 8C | 1C | 26 | A7 | EA |
| 1071:0C | 13 | 2A | 6E | 90 | 05 | 57 | 43 | 13 | 12A1:5C   | 46 | 61 | 10 | 0B | 20 | 5A | E6 | 27 | 14D1:50 | 8C | 4D | 18 | 8D | 52 | 8E | 42 | 85 |
| 1079:38 | 60 | A2 | 57 | 08 | 25 | E4 | FF | 36 | 12A9:AD   | A6 | 1A | A7 | 9C | 12 | 5D | 85 | 79 | 14D9:24 | C0 | A6 | A8 | 28 | 36 | BA | 1A | 4D |
| 1081:48 | 20 | A1 | 11 | 68 | 4C | F0 | 11 | 7A | 12B1:17   | D4 | D5 | 87 | 14 | 18 | E7 | 82 | 1D | 14E1:18 | 00 | 0E | B6 | 1A | 2E | B7 | 1A | 56 |
| 1089:ED | 8D | 7F | 1A | C9 | 53 | F0 | 07 | 1A | 12B9:A5   | B7 | D4 | 99 | 34 | 4C | D1 | 70 | B9 | 14E9:78 | F8 | E2 | 36 | 6D | 8D | 8D | 80 | 89 |
| 1091:CD | AA | E6 | 78 | 30 | 04 | 30 | E9 | 81 | 12C1:A4   | B9 | 62 | 60 | 29 | 12 | C4 | 62 | 76 | 14F1:88 | AD | 88 | 6D | 80 | 8D | 8D | 88 | 79 |
| 1099:46 | E8 | 3C | 0D | 8E | CE | A9 | 0D | 7F | 12C9:19   | 47 | 0D | 6A | C4 | A9 | B0 | ED | B0 | 14F9:AD | 8A | 08 | 6D | 88 | 8D | 80 | 90 | 7F |
| 10A1:A6 | BA | B0 | F0 | 4C | 13 | 3C | 48 | 38 | 12D1:20   | 69 | 18 | BD | FE | 80 | F0 | 51 | 6C | 1501:D8 | 58 | E8 | E0 | 10 | D0 | D6 | 00 | 4A |
| 10A9:09 | 7A | B0 | F0 | 0D | C9 | 29 | B0 | A4 | 12D9:75   | 11 | 4D | 18 | A5 | 28 | 24 | 3F | 7D | 1509:67 | 04 | C2 | A2 | 02 | 85 | 3A | 8A | 8F |
| 10B1:09 | 65 | 28 | 1C | 4C | D8 | 11 | 30 | 8E | 12E1:60   | 3D | A0 | 78 | 5D | 00 | 91 | 28 | 57 | 1511:CE | 8C | 8D | E0 | 00 | D0 | 10 | AD | 96 |
| 10B9:CA | 20 | 21 | FA | 07 | 83 | 1C | 30 | C9 | 12E9:DB   | 4A | C5 | 8E | 60 | 89 | 8C | C8 | 3B | 1519:F6 | 0D | B9 | 1A | 0D | BA | 41 | 2B | DB |
| 10C1:AA | 0B | B8 | 62 | A2 | 01 | 83 | C2 | 74 | 12F1:34   | 03 | 30 | 03 | AA | C8 | B1 | 28 | 2B | 1521:EA | BD | B8 | CA | 0F | 20 | 47 | 18 | 93 |
| 10C9:98 | F0 | 15 | BD | 48 | 4C | EE | 11 | 53 | 12F9:A8   | 9A | B1 | B0 | F3 | 0E | 25 | 22 | 9E | 1529:CA | 10 | D7 | 60 | CD | 24 | DE | D0 | 4B |
| 10D1:A0 | 35 | 18 | 6D | A0 | 04 | 8D | 9F | 39 | 1301:28   | 15 | 77 | 41 | 03 | AC | AF | 15 | C2 | 1531:05 | A9 | 30 | 80 | 09 | 09 | 30 | 55 | 78 |
| 10D9:1A | AC | EE | A0 | 1A | EC | 7C | 58 | EF | 1309:AE   | B0 | 96 | EE | 7A | 32 | 50 | 0E | BF | 1539:8C | 9E | 1A | B1 | 11 | A9 | 0D | 54 | 4D |
| 10E1:CF | 82 | E8 | D0 | DE | 93 | 3E | 3A | B0 | 1311:A0   | F4 | C0 | 83 | EB | 14 | 5D | 76 | F5 | 1541:A3 | AE | C8 | A8 | 1A | 00 | 38 | 4C | 1A |
| 10E9:E6 | 98 | C2 | 4F | 46 | 20 | 44 | 52 | 7E | 1319:40   | B0 | 1C | 21 | 15 | 44 | CB | B2 | 25 | 1549:81 | 0D | 1B | 03 | 28 | 86 | 29 | 7A | 33 |
| 10F1:49 | 56 | 45 | 87 | 43 | 20 | BA | B3 | 31 | 1321:0F   | 51 | D1 | 8A | A7 | 0F | D5 | 06 | 31 | 1551:3E | 10 | FB | A6 | 2A | 71 | 1E | 6D | 49 |
| 10F9:25 | 70 | 74 | 14 | 1C | 71 | 28 | 3C | CB | 1329:1A   | D7 | 80 | B0 | A3 | 03 | CF | 38 | 6E | 1559:78 | 6C | 8A | 09 | 10 | AA | 24 | 80 | B0 |
| 1101:06 | 47 | 90 | 3C | 1C | 10 | F1 | 70 | 43 | 1331:D7   | 60 | 07 | 36 | 60 | 3C | AE | 1C | 0D | 1561:EA | AD | 34 | 3C | 61 | 0E | 82 | 0D | 0C |
| 1109:8E | 34 | 10 | 8A | 11 | 2E | 20 | 3A | E5 | 1339:DE   | 60 | 5B | 18 | 24 | 90 | 10 | 2F | 86 | 1569:0F | 4D | 11 | 8E | 10 | AD | 45 | 2A | 65 |
| 1111:70 | E1 | 80 | 1A | A2 | 29 | 50 | 93 | 83 | 1341:B3   | 61 | 78 | 5C | 78 | 88 | 45 | 53 | 32 | 1571:2A | 87 | C4 | 60 | A0 | 00 | 34 | C1 | 60 |
| 1119:E8 | E0 | 05 | D0 | F5 | AD | 7F | C6 | C1 | 1349:45   | D9 | 2A | 80 | 14 | BA | 75 | D0 | 05 | 1579:36 | 32 | 88 | 8D | E7 | 18 | 8B | 65 | 51 |
| 1121:E9 | 10 | E0 | 83 | 31 | 35 | 34 | 47 | 44 | 1351:59   | 78 | 86 | 31 | 60 | 74 | C8 | 53 | DF | 1581:38 | 78 | AD | 12 | D0 | E9 | 32 | 90 | DF |
| 1129:32 | 30 | 33 | 31 | 2F | A0 | 01 | 34 | 1C | 1359:55   | 50 | 50 | 96 | 79 | A0 | 44 | 0D | 95 | 1589:04 | 29 | 07 | F0 | F5 | A5 | 7D | 0E | 3F |
| 1131:30 | 00 | 96 | 30 | D1 | 8C | 08 | 06 | 18 | 1361:00   | 60 | 48 | A3 | 0F | AB | C9 | A3 | 41 | 1591:91 | 51 | 29 | D1 | 88 | 25 | 31 | 51 | A7 |
| 1139:D9 | D9 | A1 | 3D | 18 | EC | A1 | 4C | CA | 1369:6D   | A9 | 32 | D4 | C1 | C6 | C1 | 09 | F9 | 1599:E1 | 41 | 29 | 2B | 97 | 29 | CC | 7C | 54 |
| 1141:A1 | 85 | 2F | 43 | 31 | 32 | 38 | 98 | 0B | 1371:30   | 52 | 04 | 45 | EE | 68 | D0 | 0A | DD | 15A1:DD | 4A | 4A | 29 | F0 | 05 | 2A | 16 | 2F |
| 1149:E4 | 70 | 9E | 71 | 0F | 8D | 0D | C2 | 70 | 1379:DE</ |    |    |    |    |    |    |    |    |         |    |    |    |    |    |    |    |    |



|         |    |    |    |    |    |    |    |    |         |    |    |    |    |    |    |    |    |         |    |    |    |    |    |    |    |    |
|---------|----|----|----|----|----|----|----|----|---------|----|----|----|----|----|----|----|----|---------|----|----|----|----|----|----|----|----|
| 15F1:C4 | 27 | A9 | 05 | 20 | ED | 10 | A9 | 50 | 1821:19 | E6 | 28 | A5 | 28 | CD | 05 | 22 | 9B | 1A51:A7 | 1A | 57 | F6 | A8 | 86 | C0 | 14 | 2F |
| 15F9:77 | A2 | 27 | 8D | B9 | 18 | 8E | D1 | 63 | 1829:90 | 02 | B0 | 2C | 80 | 1C | BF | 30 | 1F | 1A59:F0 | 04 | 1D | D1 | F2 | C8 | C8 | 98 | AC |
| 1601:0B | EE | BA | B6 | 04 | E0 | 20 | 0E | 23 | 1831:B1 | 26 | 20 | DE | B1 | 17 | 4C | D3 | 0C | 1A61:A2 | A6 | A0 | 0B | AE | BD | FF | 43 | 05 |
| 1609:0E | AD | 7B | 42 | 05 | C0 | 0E | 90 | 13 | 1839:1B | 61 | E5 | 85 | A6 | 28 | BD | 6F | 25 | 1A69:1B | 19 | 68 | 41 | 34 | 90 | 06 | 10 | 92 |
| 1611:8D | 20 | 8B | 12 | E9 | 19 | 20 | A7 | 3A | 1841:2C | 1D | 1C | BD | 70 | 22 | 8D | 1E | 73 | 1A71:62 | B7 | F0 | 0B | 57 | 0D | 72 | 34 | 9B |
| 1619:0F | 20 | B1 | 18 | A2 | 00 | 30 | EE | F0 | 1849:00 | 9E | 23 | 08 | 45 | BF | 84 | 51 | 89 | 1A79:66 | 9C | 1E | 0A | 46 | 26 | CE | 2A | FE |
| 1621:FD | 20 | 76 | 64 | BF | BB | 10 | 18 | 8E | 1851:A6 | 21 | 4C | FF | 50 | 3A | 03 | 7D | 95 | 1A81:E0 | 29 | 50 | 96 | 20 | BA | EC | 63 | 0D |
| 1629:60 | AD | 7A | 4C | 00 | 22 | 04 | 40 | D5 | 1859:A8 | 20 | B2 | 11 | F8 | 35 | 4C | 9E | 21 | 1A89:01 | A9 | 8E | B2 | 00 | 5F | CA | EC | A5 |
| 1631:B7 | C4 | 5E | 02 | 0E | 5B | 71 | 63 | 7A | 1861:15 | ED | E1 | 54 | 55 | 52 | 42 | 4F | E0 | 1A91:75 | 79 | B0 | E5 | E8 | 8E | E0 | 0E | A4 |
| 1639:70 | 28 | 14 | 02 | 00 | BC | 49 | 51 | 21 | 1869:44 | 4F | 65 | 70 | 44 | 44 | 21 | 41 | F9 | 1A99:74 | 48 | 49 | 47 | 48 | 45 | 53 | 54 | 0A |
| 1641:89 | 0A | 31 | 06 | 02 | 50 | 8D | 21 | C8 | 1871:42 | 4C | 45 | 44 | 2E | 0D | 00 | 14 | 7C | 1AA1:64 | F0 | 92 | 39 | 32 | 0A | 11 | 7B | 81 |
| 1649:15 | AE | 32 | E8 | 8A | 20 | 01 | 0E | 65 | 1879:5E | 1B | 2C | AB | B9 | C3 | 44 | CE | 14 | 1AA9:11 | 89 | A3 | 18 | 30 | 0A | 83 | 38 | A7 |
| 1651:A2 | 13 | AA | 38 | 2E | DD | 2E | A7 | 59 | 1881:03 | 4C | 83 | 1C | 69 | 92 | 01 | 0B | 1B | 1AB1:0D | 4F | 52 | 59 | 0E | 1A | 4F | 4E | E5 |
| 1659:1A | 2E | A8 | 1A | 02 | 4F | 35 | BD | 4A | 1889:D4 | A0 | D4 | 00 | 85 | B9 | 97 | 05 | 2E | 1AB9:20 | F0 | 76 | 43 | 20 | 00 | 6B | AE | C3 |
| 1661:A6 | 1A | F7 | 2F | E8 | E0 | 03 | 90 | BA | 1891:24 | D5 | 3B | 87 | 19 | 36 | 02 | 87 | 56 | 1AC1:68 | 00 | 6D | A0 | F0 | 40 | 01 | 27 | 93 |
| 1669:F5 | EE | B4 | AD | A9 | 1A | CD | 7C | 8B | 1899:58 | A1 | 14 | 84 | 41 | 28 | 85 | 29 | 08 | 1AC9:D0 | 48 | 0D | 68 | 36 | 00 | 23 | 01 | 99 |
| 1671:1A | 90 | 00 | 70 | 23 | A2 | 1A | A9 | 57 | 18A1:67 | 9F | C3 | 85 | C4 | A9 | 28 | A6 | 02 | 1AD1:98 | E6 | A5 | 0F | 20 | CE | 16 | 75 | 8F |
| 1679:A0 | 9D | 4D | CA | 10 | FA | 30 | 71 | F1 | 18A9:C3 | A4 | C4 | C5 | C5 | DC | 72 | A4 | 05 | 1AD9:1C | A2 | 40 | 6A | A3 | 80 | 03 | 0C | A4 |
| 1681:BB | 99 | 90 | 29 | 20 | 5F | 0B | 04 | 2F | 18B1:A1 | 6F | 43 | AE | 10 | 29 | 2C | 45 | A4 | 1AE1:5A | D0 | F0 | 79 | 00 | C9 | A4 | 34 | D1 |
| 1689:C4 | B7 | 8F | A6 | 09 | 02 | A2 | 21 | 19 | 18B9:46 | 41 | F3 | F6 | 88 | 20 | 44 | 45 | DD | 1AE9:A2 | 0B | 6C | 32 | 1D | C3 | E0 | 99 | 36 |
| 1691:00 | 63 | A3 | 21 | 32 | 8D | A5 | 29 | 59 | 18C1:56 | 49 | 43 | 45 | 20 | 4E | 55 | 4D | 5E | 1AF1:A6 | 1A | C8 | C5 | DF | F6 | A4 | B7 | 51 |
| 1699:A9 | 41 | 8D | A6 | 29 | 60 | 30 | 5E | 90 | 18C9:42 | E5 | A2 | 60 | 19 | 1A | 0A | F0 | 25 | 1AF9:8C | B2 | 20 | 73 | 00 | CB | 0E | 01 | A8 |
| 16A1:57 | 20 | 73 | 40 | 10 | 45 | 46 | 01 | 17 | 18D1:51 | 24 | C6 | 81 | BD | FF | A2 | D6 | AE | 1B01:B0 | 9E | C0 | D0 | 03 | 20 | CD | 20 | 1A |
| 16A9:4D | 2D | 52 | 02 | 80 | 01 | 00 | 80 | BA | 18D9:B1 | 25 | 81 | 0A | 20 | 06 | 94 | 00 | 3F | 1B09:2F | 99 | 38 | 24 | B6 | 94 | 6E | 65 | D0 |
| 16B1:20 | A0 | 40 | C0 | 60 | E0 | 10 | 90 | 61 | 18E1:B4 | 84 | 90 | 06 | AE | 04 | 22 | 4C | 16 | 1B11:7C | 94 | 4A | 12 | 20 | A5 | BB | 3C | 60 |
| 16B9:30 | B0 | 50 | D0 | 70 | F0 | FE | FD | 84 | 18E9:EC | E1 | 4C | E9 | 1E | F7 | 00 | 0C | 0E | 1B19:05 | BC | 48 | A5 | B7 | 48 | A9 | A6 | 3D |
| 16C1:FB | F7 | EF | DF | BF | 7F | 01 | 02 | E5 | 18F1:A6 | 2D | A4 | 2E | A9 | 2B | 20 | D8 | 4B | 1B21:A2 | 84 | 1B | BB | 86 | BC | AD | B6 | 22 |
| 16C9:18 | E1 | 0B | 10 | 20 | 40 | 80 | 04 | E3 | 18F9:FF | E2 | AE | 4C | F9 | E0 | C1 | D9 | 2E | 1B29:1A | 70 | AE | 7A | 1A | A0 | 01 | 91 | 0C |
| 16D1:08 | 2C | 10 | 14 | 18 | 1C | 20 | 24 | DD | 1901:2C | A9 | 01 | 85 | A0 | EC | 1C | 4C | 59 | 1B31:1A | CF | D1 | 20 | D3 | 20 | A0 | 02 | 07 |
| 16D9:28 | 2C | 30 | 34 | 38 | 3C | 40 | 44 | E5 | 1909:6F | E1 | 9A | 5A | 0B | 1B | B7 | 42 | DE | 1B39:B1 | AE | 08 | 20 | DC | 20 | 85 | 1C | 85 |
| 16E1:48 | 4C | 50 | 54 | 58 | 5C | 60 | 64 | ED | 1911:78 | 00 | 5C | 46 | FA | 11 | 54 | C0 | F4 | 1B41:E2 | 20 | 86 | A8 | 4F | 22 | A9 | 1B | BD |
| 16E9:68 | 6C | 70 | 74 | 78 | 7C | 80 | 84 | F5 | 1919:02 | 18 | 53 | 39 | 1A | 1B | 39 | 30 | 30 | 1B49:18 | 65 | AE | C6 | 90 | E7 | AE | 00 | A8 |
| 16F1:88 | 8C | AC | B0 | B4 | B8 | BC | 29 | 51 | 1921:5E | 60 | 7D | 34 | 25 | 61 | E2 | 71 | 73 | 1B51:29 | F0 | 06 | AC | 01 | 29 | 4C | 5D | 86 |
| 16F9:B4 | F0 | 6B | 11 | 12 | 13 | 15 | 04 | 46 | 1929:72 | 1D | AE | 7E | 80 | 2F | 41 | E1 | BE | 1B59:20 | 68 | 68 | 68 | 92 | 8E | 2C | A9 | 1E |
| 1701:12 | 28 | 00 | 07 | 07 | CB | 71 | 8F | 8C | 1931:91 | 20 | 49 | 4E | 54 | 45 | 52 | 4C | EA | 1B61:63 | 20 | D1 | 0A | C8 | 91 | 85 | B7 | 7B |
| 1709:0B | 44 | 9F | 05 | 53 | 45 | 51 | 50 | B4 | 1939:45 | 41 | 56 | 45 | 3A | 20 | 20 | 31 | 41 | 1B69:80 | 08 | BC | 68 | 85 | 9B | A0 | 00 | 5C |
| 1711:52 | 47 | 55 | 53 | 52 | 52 | 45 | 4C | CC | 1941:3A | 00 | 4A | 9D | 4B | 86 | 0A | B0 | EC | 1B71:B1 | BB | 08 | 67 | D8 | F0 | 0D | C4 | 50 |
| 1719:E5 | B4 | 06 | 09 | 0C | F6 | 10 | E2 | F7 | 1949:0A | 32 | 52 | E0 | 4A | 30 | 4C | 00 | 11 | 1B79:B7 | 90 | F3 | A9 | A0 | 91 | AE | C8 | 3A |
| 1721:71 | 50 | C7 | 40 | 46 | 00 | 00 | 20 | 6B | 1951:4F | 84 | AE | 85 | AF | 48 | 84 | 70 | 92 | 1B81:C0 | 10 | D0 | F9 | E8 | 82 | 05 | 5A | 8B |
| 1729:41 | 00 | 0A | 5A | 1B | 20 | 1D | 08 | 7A | 1959:F1 | 0A | D0 | 24 | 23 | 13 | 38 | 54 | 8D | 1B89:8F | 1C | 4C | BB | 10 | AD | 04 | 22 | 35 |
| 1731:A9 | 01 | A2 | 2B | 85 | 2B | 86 | 2C | 8D | 1961:D0 | 02 | 18 | 24 | 90 | 10 | 98 | 82 | 3A | 1B91:85 | C5 | 0B | A0 | 66 | 63 | A4 | A2 | 14 |
| 1739:30 | 3F | 5D | 2B | 20 | 44 | E5 | 4C | D7 | 1969:D0 | 8D | 03 | F3 | 29 | 70 | A4 | 83 | DE | 1B99:29 | 4A | 86 | AF | 60 | 18 | A5 | AE | 20 |
| 1741:37 | C0 | 58 | AA | 9E | 67 | 22 | 20 | E7 | 1971:78 | 4C | C6 | 14 | B0 | 0D | C2 | A3 | F1 | 1BA1:69 | 05 | 85 | AE | 30 | EE | F4 | 2D | BD |
| 1749:07 | 0C | EC | 56 | 31 | 2E | 30 | 31 | D4 | 1979:AE | 99 | 00 | 29 | C8 | D0 | F8 | A5 | 1D | 1BA9:05 | 97 | 52 | B0 | 99 | 33 | 02 | 12 | 4D |
| 1751:20 | 0E | 2A | 2A | 0D | 1E | 40 | 14 | 70 | 1981:0F | E2 | 80 | 20 | A5 | D0 | A6 | 1C | D0 | 1BB1:8E | 9B | 24 | 00 | DC | 54 | 14 | 87 | 82 |
| 1759:88 | 50 | 59 | 52 | B0 | AE | 54 | 20 | 39 | 1989:B0 | D5 | 54 | 73 | 10 | A8 | 00 | C7 | 36 | 1BB9:45 | 42 | 11 | 20 | F1 | B7 | 86 | BA | 7D |
| 1761:31 | 39 | 39 | 33 | 20 | 42 | 59 | 20 | AD | 1991:39 | 8D | E0 | 00 | C8 | 09 | 8D | BD | 23 | 1BC1:20 | C3 | 21 | B0 | 07 | C9 | 59 | 0F | 49 |
| 1769:43 | 4F | 4D | A1 | 39 | 54 | 45 | 20 | 96 | 1999:F4 | 20 | 54 | 10 | 06 | D8 | 51 | 08 | 18 | 1BC9:9B | 45 | 50 | 3F | 0F | A1 | B8 | 62 | EF |
| 1771:50 | 55 | 42 | 4C | 49 | 43 | 41 | 54 | 58 | 19A1:1C | 45 | 10 | 41 | E0 | 20 | 20 | 59 | 6A | 1BD1:26 | AE | AE | 86 | 1A | AC | 87 | 1A | B1 |
| 1779:49 | 4F | 4E | 53 | 0D | 81 | F4 | 81 | F8 | 19A9:4F | 55 | 20 | 53 | 55 | 52 | 45 | 3F | CF | 1BD9:B6 | 81 | 10 | 5F | 03 | 01 | 24 | 0F | 37 |
| 1781:8C | 8D | 20 | 32 | 82 | A5 | 2B | A4 | 26 | 19B1:20 | 00 | 20 | CF | FF | C9 | 0D | F0 | 27 | 1BE1:10 | 11 | A5 | 14 | 8D | 2E | B8 | A5 | 96 |
| 1789:2C | 20 | 08 | A4 | 20 | 30 | E4 | 20 | CC | 19B9:06 | 8D | 68 | 2F | 4C | 2F | 1E | AD | 5B | 1BE9:15 | 8D | 8C | 9D | 00 | D0 | F8 | 0D | BB |
| 1791:96 | E5 | 7C | A0 | AD | 25 | 1C | 8D | E5 | 19C1:80 | 1A | C9 | 59 | 10 | CE | 56 | AD | B7 | 1BF1:20 | 92 | 17 | 0D | 50 | 52 | 4F | 47 | 42 |
| 1799:A2 | AD | 22 | 19 | 8D | A2 | AD | 22 | CE | 19C9:AE | 1A | AE | AF | 1A | 3E | 20 | 1E | BA | 1BF9:1E | B7 | 4D | 20 | A6 | 70 | 10 | 20 | 10 |
| 17A1:1A | 8D | A2 | AD | 22 | 17 | 8D | A2 | 9A | 19D1:19 | 1C | 3F | 06 | CB | 1D | 60 | CE | 42 | 1C01:41 | 44 | 44 | C0 | 5F | 53 | 11 | 80 | 6A |
| 17A9:60 | A9 | AC | 62 | 09 | C5 | 8E | 84 | 2F | 19D9:6E | 8E | 84 | 13 | 06 | BB | 18 | 0D | 05 | 1C09:5F | 20 | 24 | 00 | 9B | C8 | 28 | AD | 7B |
| 17B1:58 | A9 | 8A | A2 | 58 | 45 | 8E | 0E | F4 | 19E1:09 | 78 | CE | 8A | F0 | 03 | A9 | 31 | 51 | 1C11:10 | 05 | 20 | EF | 21 | A9 | 2F | 20 | C3 |
| 17B9:60 | AD | 23 | 86 | 15 | 08 | 48 | 24 | CD | 19E9:2C | A9 | 30 | 1B | 4E | A9 | 56 | 58 | 72 | 1C19:96 | AE | 02 | 29 | AD | 03 | 29 | 20 | 07 |
| 17C1:1C | 8D | 09 | 01 | 16 | 8F | 48 | 00 | 12 | 19F1:E9 | 15 | 68 | 19 | A3 | A7 | 13 | 84 | 63 | 1C21:CD | BD | 4C | 5B | 18 | 20 | E4 | 74 | 6E |
| 17C9:03 | AD | 90 | 1B | 8D | 01 | 01 | 70 | 8B | 19F9:5B | FC | 00 | 60 | A9 | 02 | 9E | DF | 91 | 1C29:2E | D9 | 21 | 20 | 57 | 80 | 4C | 43 | AD |
| 17D1:03 | 60 | 08 | E0 | 40 | F0 | 55 | 80 | 99 | 1A01:A9 | 0F | A6 | BA | A8 | 20 | BA | FF | 89 | 1C31:0C | D4 | A9 | 33 | 4C | 95 | 85 | 4B | 1C |
| 17D9:C6 | 22 | 16 | 2E | 8A | 24 | 4C | 74 | 8B | 1A09:3C | 3C | B0 | 90 |    |    |    |    |    |         |    |    |    |    |    |    |    |    |

# PROGRAMS

```

1C81:20 CC FF A9 0F 4C C3 FF C8
1C89:27 B0 0D 90 05 68 68 4C 8F
1C91:41 1C 60 48 28 C2 FF 0D 5B
1C99:20 FA 21 68 29 0F F8 18 DA
1CA1:69 90 69 40 D8 4C D2 FF 81
1CA9:08 2C 5E 9F 52 00 20 03 8C
1CB1:38 95 10 01 93 D9 80 01 83
1CB9:18 94 00 44 49 41 15 38 19
1CC1:43 91 15 54 43 48 0B CA 04
1CC9:4C 45 43 53 42 90 90 81 0E
1CD1:4D 41 3D 06 52 45 4E 41 8E
1CD9:4D 45 00 96 41 55 4C E4 50
1CE1:15 53 4B 45 57 00 54 52 EC
1CE9:41 C2 09 4C 4F 43 4B 00 77
1CF1:53 54 41 1A 4E FE AD 52 CE
1CF9:54 00 4B 49 4C 4C 00 D6 C4
1D01:00 43 4F 4C B0 00 00 D0 11
1D09:F5 13 1A 1D 08 1D 1D 1D 24
1D11:61 1C 94 1C 7D 21 17 1F 15
1D19:CB 1E 54 1E 87 1D F9 1D EE
1D21:CB 1F B4 1C 27 1D 33 1F 94
1D29:A2 1F 20 7C F7 20 46 1C 31
1D31:25 1C E4 20 80 F0 84 0A 7E
1D39:0F 82 0D 81 AA AA AA A5 50
1D41:22 D0 0E AF C0 85 00 58 91
1D49:A5 00 30 FC 24 20 70 FC AB
1D51:78 A9 00 85 30 8D 95 6E DB
1D59:F0 06 02 85 31 36 32 A9 96
1D61:28 8D 9C 24 04 8D 9D 01 7B
1D69:A9 10 85 21 85 44 81 F1 71
1D71:3B 85 2D 12 17 0D 0E 01 7B
1D79:2C A2 30 85 23 30 1E CA B1
1D81:D0 F6 88 D0 F3 C6 21 D0 CD
1D89:EF E4 44 F0 EB 86 EB ED CB
1D91:28 04 04 93 F3 03 93 3B A8
1D99:03 4C 9B 59 2A A0 00 C8 0E
1DA1:78 F4 42 18 C9 FF D0 C0 CF
1DA9:20 88 0A AA BD 93 90 05 64
1DB1:86 03 BD 94 03 8D 87 C0 0F
1DB9:CD FF FF 28 8A E8 4C 2A 18
1DC1:03 9F 03 EC 03 19 04 DE F7
1DC9:05 F0 05 35 E7 56 81 01 53
1DD1:9F B1 03 2C 4C 5A C0 14 CC
1DD9:85 45 97 01 1D C6 45 D0 8A
1DE1:98 4F 43 20 A5 16 85 12 49
1DE9:A5 17 85 13 0A EF A5 12 0C
1DF1:A8 B6 03 13 47 23 48 98 AF
1DF9:91 3A 8C 68 9B 62 10 CD F7
1E01:DA C9 CB 03 62 B9 B0 10 32
1E09:20 CF 03 62 EF 06 D0 EC F5
1E11:60 09 F0 7E 02 02 88 1B 0A
1E19:02 26 8D 02 01 DE C1 01 3E
1E21:AC 01 71 06 20 93 D3 A0 1A
1E29:06 4C B6 06 A9 12 1D F8 7B
1E31:62 06 A3 3B 11 3A BA 63 92
1E39:A1 A8 85 44 B7 54 44 22 3F
1E41:A2 04 DD 2C 07 CA B0 FA 0E
1E49:55 5C 7C E0 31 07 9A 60 20
1E51:68 3E 87 21 9E CF 81 21 AC
1E59:67 28 44 C9 94 EF 73 44 08
1E61:98 CF B1 F0 60 A2 E2 A2 19
1E69:FF 48 33 B7 21 20 5D 04 E1
1E71:68 61 89 A1 10 88 E3 80 70
1E79:E6 B8 81 20 11 6B 81 2D EF
1E81:E0 03 13 78 68 80 49 39 E9
1E89:06 A5 80 85 60 A5 81 85 E9
1E91:07 4C 9F 04 4C DE C6 6A 6E
1E99:30 3B 24 2C 30 27 24 2D 97
1EA1:30 23 20 AF E9 7C 1E 49 84
1EA9:A6 C5 12 D0 11 A5 17 C5 0D
1EB1:13 D0 0B A5 18 85 22 9D 20
1EB9:1B 2D 4C 54 2A FF 85 6A 64
1EC1:A9 09 60 A6 6A F0 10 1D DF
1EC9:17 28 04 12 44 04 40 E6 D6
1ED1:80 14 0E 02 4C 84 04 A0 52
1ED9:01 2C A0 03 4C 87 04 72 E0
1EE1:F9 7F 1D 03 B0 3F 40 55 27
1EE9:3A E5 34 D4 71 18 F4 A0 07
1EF1:BA 9C E3 00 01 5C 20 20 09
1EF9:E0 F8 C0 21 AE 00 02 AC 35
1F01:01 02 86 06 84 07 C5 3A 77
1F09:D0 0A A9 EC 37 5D B8 08 DE
1F11:CC 08 03 14 3F A5 06 85 97
1F19:18 A5 07 85 19 E1 69 C5 EE
1F21:73 C0 5A CA F0 E4 A9 93 43
1F29:E4 A3 13 D9 24 00 D0 ED 73
1F31:2F 08 D0 F0 91 39 D0 35 7A
1F39:FB 10 0D 2C F1 2D 30 F6 79
1F41:11 47 B8 18 A0 00 60 38 70
1F49:A9 01 60 C5 17 83 0E 17 FE
1F51:8B 05 B0 28 5C 88 C9 52 1A
1F59:D0 F1 85 24 9B AD AD 11 6F
1F61:90 25 00 C8 C0 54 F8 20 AB
1F69:97 F4 20 A6 05 C5 1A D0 63
1F71:02 18 60 60 39 38 84 D8 55
1F79:82 E4 C6 45 B1 F6 2C 4B 6C
1F81:B8 50 9C 95 53 00 07 20 E5
1F89:71 81 7A 29 10 59 16 06 DA
1F91:A2 FF 86 6A 4C 6E 41 F0 28
1F99:33 2F 07 20 2C 04 F9 54 18
1FA1:04 05 85 6A 20 5F 05 90 93
1FA9:A9 20 C1 04 4E AE 45 10 B4
1FB1:F2 A2 09 D7 72 CE FF 8C 04
1FB9:03 1C AD 6B 00 F1 09 C0 87
1FC1:14 20 18 45 C1 E4 50 FE AA
1FC9:20 00 FE 4C A0 C1 89 32 0E
1FD1:CA 82 09 F9 1C 09 04 CD B1
1FD9:2C 09 F0 11 68 2B A0 AA 7B
1FE1:B0 1C 83 CA 30 F5 60 4E 05
1FE9:82 8C 0D 06 07 85 07 60 4B
1FF1:24 6A 30 03 A9 00 2C 09 C1
1FF9:F0 E7 04 22 20 59 04 A5 61
2001:19 4C F7 06 1A 54 E0 02 26
2009:2C 10 D0 10 4A 4A 40 0D 87
2011:48 39 AA A5 21 5B 0E AA B0
2019:BD 1D 07 AE 4A D0 FB 40 19
2021:09 68 F7 14 0A 34 B4 70 3B
2029:50 D8 CA 4A 0A 10 F0 80 B8
2031:20 F1 06 68 A0 FF D0 BE AA
2039:C3 15 4C 1A 2F A2 60 52 E2
2041:20 17 07 20 66 01 A2 99 50
2049:8E 94 01 60 68 B9 32 C0 6B
2051:0F 07 0D 05 0B 03 09 01 44
2059:0E 06 0C 04 0A 02 08 00 4C
2061:29 1F 19 12 DB 2F 82 60 43
2069:68 28 20 74 06 A9 06 E1 08
2071:0C 60 F5 30 80 26 5E 01 DB
2079:A9 03 8D B0 16 4C 46 01 7B
2081:78 A9 7A 8D 02 18 C4 77 02
2089:20 A3 40 FD 20 64 01 EE 2E
2091:54 01 AD 96 01 C9 F4 F3 68
2099:4C 26 19 C8 00 69 48 0A 79
20A1:84 30 2B D0 F9 24 80 DA DE
20A9:21 48 68 EB A1 08 0A 0A A3
20B1:85 21 AD 50 03 0A EA 72 40
20B9:4D 16 01 8E 69 29 0F 05 42
20C1:2D 41 07 03 71 CC 60 20 93
20C9:9A 01 D0 3E A2 06 98 9B 8F
20D1:CC 98 EE A5 01 31 03 F4 9E
20D9:A2 B1 9A 48 05 FC 4C 4B AF
20E1:EB A9 00 65 0D 20 EC 85 21
20E9:18 85 1E AD 35 85 16 85 A7
20F1:12 AD A3 91 21 17 85 13 B7
20F9:CC 86 30 8A CB 2C 06 C4 D0
2101:FA 42 56 32 28 EA A2 BB 2D
2109:BD 0B 9D 15 24 E8 D0 F7 50
2111:E6 31 20 E9 F5 85 3A 20 10
2119:8F F7 E6 C2 20 21 04 A5 5D
2121:22 C9 12 D0 09 A9 05 C8 F7
2129:4F 8B 28 38 85 9B 03 86 A5
2131:CE 57 32 80 58 84 19 A1 A7
2139:23 84 1F A5 16 45 17 45 A5
2141:18 45 19 85 1A 20 34 F9 10
2149:E8 38 A4 1F B5 24 99 6A 70
2151:C8 22 39 08 02 E6 19 A5 AB
2159:19 C5 43 C6 CC A0 00 F4 4C
2161:02 14 05 0B C0 C4 A2 08 61
2169:A4 21 E9 B2 02 E3 92 F1 65
2171:F3 84 21 61 36 50 BD 04 7B
2179:06 D1 D9 0C EC D8 14 6A 8C
2181:05 12 B8 D1 1C CA D0 FA A7
2189:A0 BB B4 0B B9 00 95 09 54
2191:28 F4 E4 3C B1 30 54 0D 89
2199:C8 D0 F5 9D BD 01 06 50 5B
21A1:FE B8 8D 01 1C E8 E0 07 A0
21A9:D0 F2 9D 73 C2 A9 01 8D 48
21B1:D6 03 C6 19 D0 8C 20 00 83
21B9:1E A5 18 C9 28 F0 05 E6 7A
21C1:18 4C 45 03 7C C1 AF F7 3E
21C9:E4 70 08 E5 A0 18 60 48 68
21D1:A2 01 C5 22 F0 34 E5 22 C6
21D9:10 04 49 FF A2 FF 0A A8 20
21E1:A9 A0 85 45 8A 18 6D D0 86
21E9:E0 0D 03 85 1F BA 96 FC A6
21F1:05 1F 3C 97 A5 45 C9 90 E5
21F9:F0 02 C6 45 8D 8A 0B 2C 3B
2201:05 18 30 FB 88 D0 DA 68 39
2209:85 22 A2 00 A0 11 C9 24 ED
2211:B0 04 20 4B F2 A8 84 43 ED
2219:AD D0 E0 0F 29 9F 1D 82 F9
2221:04 8D 00 80 13 EE 8D 0C 4E
2229:1C A9 06 85 31 60 00 20 2A
2231:40 60 30 00 00 00 00 00 B3

```

Hong H. Pham, 17, says he didn't want to shell out \$60 for a speed-load cartridge, so he wrote TurboDOS instead. He enjoys Tae Kwon Do and table tennis in Antigonish, Nova Scotia, Canada.

## INSTANT ART

By Larry Cotton  
 Instant Art for the 64 creates fascinating multicolor high-resolution pictures based on a branch of mathematics known as linear cellular automata. The hypnotic patterns and colors can be varied almost endlessly and then saved to disk for a future "slide show."

**Typing It In**  
 Instant Art and its companion program, IA Slide Show, are both written in BASIC with machine language loaders.

To save you some typing, be aware that both programs share the same DATA statements. To help avoid typing errors, enter the programs with The Automatic Proofreader; see "Typing Aids" elsewhere in this section.

Begin by typing in the DATA statements in lines 10-180. Save them to disk with the filename DATA. Continue typing in Instant Art, and then save the entire program to disk with the filename INSTANT ART.

To begin entering IA Slide Show, first load DATA with the .8 extension. Then, continue entering lines 190-310 of the listing. Save IA Slide Show to disk with that name.

### Creating Art

After you've finished typing and saving, load and run Instant Art. Read the menu while the machine language portion loads. To create your first picture, press the up-arrow (↑) key. This switches the program from the text (menu) screen to the hi-res screen, where pictures are created. Then press Return to create a picture. Pressing Return generates a new random-pattern picture in a few seconds.

### Color Control

All menu options are available from the hi-res screen. Pictures have the potential of being displayed in up to 3 of the 64's 16 available colors. Only the first picture created after the program is run exhibits randomly generated colors. Each succeeding new picture is drawn in the same three colors as the previous one. You can change the colors with the function keys. Color can often greatly enhance what may otherwise be a so-so creation. Each function key cycles certain portions of the pictures in the same particular 16-color order. If you want to return to a particular color, just keep pressing the appropriate function key.

### Variants and Automatic Mode

Pressing V creates a variant of the existing picture in the same four colors. Often even a seemingly dull picture can be transformed into a work of art by pressing V. When you get tired of the manual mode, press A. Then sit back and watch the pictures appear in automatic mode.

### Saving and Loading

You can save and load pictures from disk by pressing S or L, respectively. Unlike normal hi-res screens, each of these consumes only one or two blocks of disk space. Naturally, any picture must be loaded using the exact name under which it was saved. If you want to view all of your creations sequentially, you must save them with consecutive filenames starting with A 1, A 2, A 3, and so on. Be sure to leave a space between the A and the number!

### Other Menu Options

Pressing P dumps your creation (unfortunately, in black-and-white) to any Epson-compatible printer. Simpler patterns create more interesting printouts. Printouts work fine with my Star NX-1000 printer and Xetec Super Graphic interface.

If a picture evolving onscreen seems dull, you can stop it at any point by pressing any menu key—Return or V are good choices. If you press a key not mentioned in the menu, the picture stops, and the program returns to the menu. Press Q to end the program.

### IA Slide Show

As mentioned above, you can sequentially view your masterpieces with IA Slide Show. You must have saved some screens as A 1, A 2, and so on from Instant Art. Load IA Slide Show now and run it. At the prompt, enter the number of screens that you want to see and press Return. Then sit back and enjoy a beautiful show! Press the Run/Stop-Restore combination to end the program.

### INSTANT ART

```
PK 5 REM COPYRIGHT 1993 - COMP
 UTE PUBLICATIONS INTL LTD
 - ALL RIGHTS RESERVED
GM 10 DATA160,32,132,251,132,2
 53,160,1,132,252,136,132
 ,250,162,199,134,166,162
 ,39
QB 20 DATA134,167,132,169,177,
 250,133,168,165,167,240,
 4,160,8,177,250,10,38,16
 8,42
XX 30 DATA38,168,42,41,3,133,1
 70,160,4,169,0,38,168,42
 ,38,168,42,72,101,170,10
 1
BA 40 DATA169,170,165,170,133,
```

```
169,104,133,170,189,0,23
 ,6,254,6,254,5,254,133,2
 54
XK 50 DATA136,208,221,145,252,
 24,198,167,16,40,162,2,1
 81,250,41,7,201,7,240,15
 ,56
BB 60 DATA181,250,233,55,149,2
 50,181,251,233,1,149,251
 ,208,6,246,250,208,2,246
 ,251
AQ 70 DATA202,202,240,223,198,
 166,208,144,96,162,2,181
 ,250,105,8,149,250,144,3
 ,246
PQ 80 DATA251,24,202,202,240,2
 41,76,172,23,27,65,8,13,
 10,27,75,64,1,0,165,197,
 201
HC 90 DATA64,208,219,76,35,23,
 160,32,132,251,160,0,132
 ,250,160,25,132,252,160,
 0
MM 100 DATA185,162,23,32,210,2
 55,200,192,9,208,245,16
 0,40,132,253,160,7,177,
 250
HH 110 DATA162,7,42,118,166,20
 2,16,250,136,16,243,169
 ,7,170,56,101,250,133,2
 50,144
DX 120 DATA2,230,251,181,166,3
 2,210,255,202,16,248,19
 8,253,208,217,198,252,2
 08,196
GG 130 DATA96,173,58,3,160,0,1
 53,0,4,153,251,4,153,24
 5,5,153,239,6,200,192,2
 51,208
QR 140 DATA239,96,173,59,3,160
 ,0,153,0,216,153,251,21
 6,153,245,217,153,239,2
 18,200
QR 150 DATA192,251,208,239,96,
 169,8,13,24,208,141,24,
 208,169,32,13,17,208,14
 1,17
XR 160 DATA208,169,63,133,216,
 169,0,133,215,168,145,2
 15,160,63,162,32,145,21
 5,136
SD 170 DATA208,251,198,216,202
 ,208,246,169,4,133,232,
 169,0,133,231,168,173,5
 2,3
JG 180 DATA162,4,145,231,200,2
 08,251,230,232,202,208,
 246,96
CG 190 CH=INT(154*RND(1))+1:CO
 =INT(16*RND(1))+0:G=INT
 (16*RND(1))+0:W=8192:X=
 8504
AK 200 V=53265:GOSUB600:R=RND(
 -TI):FE=255
KA 210 S=5900:FORI=STOS+241:RE
 ADA:POKEI,A:NEXT
XE 220 T=828:FORI=TTOT+45:READ
```

# PROGRAMS

```

A:POKEI,A:NEXT
KC 230 GETCS:IFCS$=""THEN230
CJ 240 I=ABS(ASC(C$)-132):IFI<
5THENONIGOSUB410,410,44
0,460:GOTO230
DC 250 IFC$=CHR$(13)THENGOSUB3
40:GOTO230
PK 260 IFC$="A"THENGOSUB580:GO
SUB760:GOTO230
HC 270 IFC$="L"THENGOSUB480:GO
SUB520:GOTO230
HH 280 IFC$="P"THENGOSUB790:GO
TO230
DH 290 IFC$="Q"THENCLOSE4:SYS8
32
PR 300 IFC$="S"THENGOSUB480:GO
SUB490:GOTO230
QB 310 IFC$="V"THENGOSUB580:GO
SUB360:GOTO230
SA 320 IFC$="↑"THENGOSUB580:GO
TO230
DH 330 GOSUB480:GOSUB600:GOTO2
30
SP 340 GOSUB580:Q$=""Z$=""FO
RL=1TO10:Z$=RIGHT$(STR$(
INT(RND(1)*4)),1)
DK 350 Q$=Q$+Z$:NEXT
HC 360 GOSUB550:Q=4*RND(1)+1:O
NQGOTO370,380,390,400
MD 370 Y=FE*RND(1)+1:FORI=WTOX
STEP8:POKEI,Y:NEXT:SYSS
:RETURN
QJ 380 Q=RND(1)*5:FORI=1TOQ:PO
KE8184+8*(INT(RND(1)*40
)),RND(1)*FE:NEXT:SYSS:
RETURN
PP 390 FORI=WTOXSTEP8:POKEI,FE
*RND(1):NEXT:SYSS:RETUR
N
MP 400 FORI=WTOXSTEP8:POKEI,0:
NEXT:POKE8352,FE*RND(1)
:SYSS:RETURN
JQ 410 IFI=1THENC1=C1+1:IFC1=1
6THENC1=0
EC 420 IFI=2THENC2=C2+1:IFC2=1
6THENC2=0
FM 430 CH=C1*16+C2:GOSUB580:RE
TURN
FS 440 CO=CO+1:IFCO=16THENCO=0
MS 450 GOSUB580:RETURN
RG 460 G=G+1:IFG=16THENG=0
CQ 470 GOSUB580:RETURN
RP 480 POKEV,27:POKEV+5,200:PO
KEV+7,21:POKEV+15,15:PO
KEV+16,1:POKE646,6:RETU
RN
AA 490 F$=""PRINT"{CLR}":INPU
T"{9 DOWN}{2 SPACES}PAT
TERN TO SAVE";F$:IFF$=""
THEN560
FF 500 OPEN3,8,1,F$:FORI=WTOXS
TEP8:PRINT#3,PEEK(I):NE
XT:PRINT#3,CH:PRINT#3,C
O
DD 510 PRINT#3,G:PRINT#3,QS:CL
OSE3:PRINT"{CLR}":GOSUB
580:RETURN
QE 520 F$=""PRINT"{CLR}":INPU
T"{9 DOWN}{2 SPACES}PAT
TERN TO LOAD";F$:IFF$=""
THEN560
RB 530 OPEN3,8,0,F$:FORI=WTOXS
TEP8:INPUT#3,J:POKEI,J:
NEXT:INPUT#3,CH:INPUT#3
,CO
SG 540 INPUT#3,G:INPUT#3,Q$:GO
SUB550:GOTO560
KM 550 A=5887:FORI=1TO10:POKEA
+I,VAL(MIDS(Q$,I,1)):NE
XT:RETURN
JK 560 CLOSE3:GOSUB580:IFF$=""
THENRETURN
FD 570 SYSS:RETURN
GM 580 POKE826,CH:SYST:POKE827
,CO:SYS851:POKEV+15,G:P
OKEV+16,G:POKEV,59
PG 590 POKEV+5,216:POKEV+7,24:
RETURN
ER 600 POKEV+15,15:POKEV+16,1:
PRINTCHR$(142)"{CLR}
{3 DOWN}{CYN}"TAB(7)"IN
STANT ART INSTRUCTIONS
PRINT"{BLK}"TAB(7)"
{24 T}
SK 620 PRINT"{RED}"TAB(7)"F1 -
CYCLE COLOR 1
PQ 630 PRINTTAB(7)"F3 - CYCLE
{SPACE}COLOR 2
MB 640 PRINTTAB(7)"F5 - CYCLE
{SPACE}COLOR 3
RG 650 PRINTTAB(7)"F7 - CYCLE
{SPACE}COLOR 4 & BORDER
GK 660 PRINT"{DOWN}{BLU}"TAB(7
)"↑ - HI-RES SCREEN
EB 670 PRINTTAB(7)"V - VARIANT
MQ 680 PRINTTAB(7)"A - AUTOMAT
IC
SA 690 PRINTTAB(7)"P - PRINT
GX 700 PRINTTAB(7)"S - SAVE
AE 710 PRINTTAB(7)"L - LOAD
HC 720 PRINTTAB(7)"Q - QUIT
JC 730 PRINT"{DOWN}{GRN}"TAB(7
)"RETURN - NEW SCREEN
RF 740 PRINT"{DOWN}{CYN}"TAB(7
)"OTHER KEYS RETURN TO
{SPACE}MENU
DH 750 PRINT"{BLK}"TAB(7)"
{25 T}":RETURN
QB 760 ONRND(1)*3+1GOSUB410,44
0,460:GOSUB340
RR 770 IFPEEK(198)THENRETURN
KK 780 GOTO760
SK 790 GOSUB480:PRINT"{CLR}
{10 DOWN}"TAB(7)"MAKE S
URE PRINTER IS READY
KF 800 PRINT"{DOWN}"TAB(9)"AND
PRESS ANY KEY. . .
MF 810 GETRS:IFRS$=""THEN810
HR 820 PRINT"{DOWN}"TAB(13)"PR
INTING. . ."A$=CHR$(10
):OPEN4,4,5:CMD4:SYS606
9
MP 830 PRINT:PRINT:PRINT:CLOSE
4:GOSUB580:RETURN
XB 840 C=INT(16*RND(1))+0:PRIN
TC:GOTO840

```

## IA SLIDE SHOW

```

PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
^- ALL RIGHTS RESERVED
GM 10 DATA160,32,132,251,132,2
53,160,1,132,252,136,132
,250,162,199,134,166,162
,39
QB 20 DATA134,167,132,169,177,
250,133,168,165,167,240,
4,160,8,177,250,10,38,16
8,42
XX 30 DATA38,168,42,41,3,133,1
70,160,4,169,0,38,168,42
,38,168,42,72,101,170,10
1
BA 40 DATA169,170,165,170,133,
169,104,133,170,189,0,23
,6,254,6,254,5,254,133,2
54
XK 50 DATA136,208,221,145,252,
24,198,167,16,40,162,2,1
81,250,41,7,201,7,240,15
,56
BB 60 DATA181,250,233,55,149,2
50,181,251,233,1,149,251
,208,6,246,250,208,2,246
,251
AQ 70 DATA202,202,240,223,198,
166,208,144,96,162,2,181
,250,105,8,149,250,144,3
,246
PQ 80 DATA251,24,202,202,240,2
41,76,172,23,27,65,8,13,
10,27,75,64,1,0,165,197,
201
HC 90 DATA64,208,219,76,35,23,
160,32,132,251,160,0,132
,250,160,25,132,252,160,
0
MM 100 DATA185,162,23,32,210,2
55,200,192,9,208,245,16
0,40,132,253,160,7,177,
250
HH 110 DATA162,7,42,118,166,20
2,16,250,136,16,243,169
,7,170,56,101,250,133,2
50,144
DX 120 DATA2,230,251,181,166,3
2,210,255,202,16,248,19
8,253,208,217,198,252,2
08,196
GG 130 DATA96,173,58,3,160,0,1
53,0,4,153,251,4,153,24
5,5,153,239,6,200,192,2
51,208
QR 140 DATA239,96,173,59,3,160
,0,153,0,216,153,251,21
6,153,245,217,153,239,2
18,200
QR 150 DATA192,251,208,239,96,
169,8,13,24,208,141,24,
208,169,32,13,17,208,14
1,17

```

```

XR 160 DATA208,169,63,133,216,
169,0,133,215,168,145,2
15,160,63,162,32,145,21
5,136
SD 170 DATA208,251,198,216,202
,208,246,169,4,133,232,
169,0,133,231,168,173,5
2,3
JG 180 DATA162,4,145,231,200,2
08,251,230,232,202,208,
246,96
EH 190 W=8192:E=8:V=53265:POKE
V+15,6:DIMJ(39)
PD 200 PRINT"{CLR}{WHT}
{3 DOWN}"TAB(10)"PLEASE
WAIT 3 SEC.
KA 210 S=5900:FORI=STOS+241:RE
ADA:POKEI,A:NEXT
XE 220 T=828:FORI=TTOT+45:READ
A:POKEI,A:NEXT
MR 230 U=36906:FORI=UTOU+65:RE
ADA:POKEI,A:NEXT
JG 240 PRINT"{DOWN}"TAB(10);:I
NPUT"NO. OF SLIDES";NS:
SYSU
SX 250 POKEV,59:POKEV+5,216:PO
KEV+7,24
PG 260 FORN=1TONS:OPEN3,8,0,"A
"+STR$(N)
FX 270 FORI=0TO39:INPUT#3,J(I)
:NEXT:INPUT#3,CH:INPUT#
3,CO:INPUT#3,G
RG 280 INPUT#3,Q$:CLOSE3:SYSU:
POKE826,CH:SYST:POKE827
,CO:SYS851
DR 290 POKEV+15,G:POKEV+16,G:F
ORI=1TO10:POKE5887+I,VA
L(MID$(Q$,I,1)):NEXT
SM 300 FORI=0TO39:POKEW+I*E,J(
I):NEXT:SYSS:NEXT
MF 310 GOTO310

```

Larry Cotton is the author of Gazette's "Beginner BASIC" column. He lives in New Bern, North Carolina.

## NUMBER BASE CONVERSIONS

By Bruce M. Bowden

Make conversions quickly and easily between any two number bases with this interesting utility for the 64. Even fractions are converted! A printer is optional.

There are many ways of representing numbers such as one-to-one correspondences, additive groupings, and so on. But every system centers around some definite basis for counting. In everyday work, for example, the majority of the civilized world counts by 10s. A very reasonable suggestion has been made that we use a number system built of ten basic

symbols (0, 1, 2, 3, 4, 5, 6, 7, 8, and 9) because we have ten fingers.

In our system of numeration, which has a base of 10, any number that we wish to represent is written as a collection of multiples of powers of 10. For example, the number 324 may also be written as  $4 \times 10^0$  (any number to the power of 0 is equal to 1) plus  $2 \times 10^1$  (any number to the first power is just the number itself) plus  $3 \times 10^2$ .

If there are digits to the right of the decimal point, they may also be represented as multiples of negative powers of 10. Hence, the fraction .175 may be written out as  $1 \times 10^{-1}$ , plus  $7 \times 10^{-2}$ , plus  $5 \times 10^{-3}$ . Combine these two numbers into one, and above each digit write the exponent of 10 that corresponds to each digit's multiplier to see the following pattern.

$$3^2 2^1 4^0 .1^{-1} 7^{-2} 5^{-3}$$

So you see, there's a specific way in which our numbers are written—first grouped by powers of the base and then with symbols representing multipliers of those powers. There are as many symbols as are needed to fill the gaps between the powers of the number base.

The positional method outlined above is a standard of the modern world. Of course, the choice of 10 as a base is purely arbitrary. The Mesopotamians used the sexagesimal system (base 60); the Mayans used a vigesimal (base 20) system mixed with a secondary base 5. The Roman system of numeration is a combination of base 5 with base 10.

Sometimes, even now, practical need requires that we deviate from 10 as our base. In computing, the on-and-off state of electrical switches lends itself naturally to a binary (base 2) method of numeric representation. An example of this is the compact representation of binary numbers in bases which are powers of 2, such as the octal (base 8) and hexadecimal (base 16) numbers.

In any base system, however, the same positional notation is applied as detailed above. The binary number 11010, for example, can be read from the right as  $0 \times 2^0$  plus  $1 \times 2^1$  plus  $0 \times 2^2$  plus  $1 \times 2^3$  plus  $1 \times 2^4$ .

Of course, for every base N in positional notation there must be N symbols. What happens when the base is larger than 10? In other words, what digit fol-

lows 9? Those familiar with hexadecimal numbers know that, by convention, the letters of the alphabet are used for these numbers.

Hexadecimal digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F. Extending this scheme, we can write numbers for any base ranging up to 36—at which point we reach the end of the alphabet, and no standard exists for continuation. Number Base Conversions will allow you to enter numbers from any base within the range of 2–36 and convert to any other base within the same range. Both the integer and fractional parts are converted for you.

### Typing It In

Number Base Conversions is written entirely in BASIC. To avoid typing errors, enter it with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. When you've finished, save the program before running it.

### Getting Started

When the NBC title screen appears, press any key to get a brief description of what the program does. Press a key again, and you'll be prompted to enter a starting base. We'll start at base 10, so type in 10 and press Return. Next is a prompt for the ending base. Let's use base 2, so type 2 and press Return. A prompt appears asking for the number which is to be converted from base 10 to base 2. For this example, type 85. After a brief pause, you'll see that 85 in base 10 converted to base 2 is 1010101.

### Options

Now that you've tried one conversion, you have a screen full of options to choose from by pressing the appropriate function key. By pressing f1, you can convert the same number in the same starting base you just used to a value in a different base. Let's do that.

Press f1, and you're prompted for the ending base. Type in 8 this time. The program does a quick calculation and reports that the decimal number 85 is 125 in octal, or base 8, notation.

There's every kind of option available from the function key menu. You can change the starting base, the ending base, and the number and ending base, or you can keep both the

# PROGRAMS

source and target bases but change the number being converted. You may also send your results to a printer or begin again fresh.

## Encryption

An interesting application of a base converter program like this is that since base 36 includes the entire alphabet, it's possible to encrypt messages.

Let's try an example by converting my name, Bruce Bowden. NBC prefers lowercase letters. Let's put a decimal between the names so the final result won't be too large. Let's enter *bruce.bowden* as a base 36 number, convert it to base 10, and then convert it to base 2. In base 10, the base 36 *bruce.bowden* that we enter becomes 19774814.324767927.

To further convert this base 10 number to base 2, press f5 and enter 2 at the prompt. NBC keeps track of the number so that we're not required to enter it manually. The conversion to binary produces 1001011011011110101011110.010100110010001111111010101001. (Whew!)

You may find several useful applications for NBC, but it also has theoretical applications. Here are some questions you may want to investigate: If the prime factors of the number 10 are 2 and 5, the base 10 representation of  $\frac{1}{2}$  is .5, and the base 10 representation of  $\frac{1}{10}$  is .1, does a similar relationship exist between a base, its prime factors, and the reciprocals of the prime factors in other base systems?

Are there recognizable patterns in the fractional parts of numbers that suggest that they may be more simply represented in a different base system?

How might two or more base systems be combined to create ciphers that are difficult to crack? There are deeper questions that you may wish to ponder also, such as properties of numeric representation which are invariant over different bases. See what you can discover!

## NUMBER BASE CONVERSIONS

```
MS 10 REM COPYRIGHT 1993 - COMPUTE PUBLICATIONS INTL LTD - ALL RIGHTS RESERVED
SP 20 PRINT "{CLR}{3 DOWN}{N}": POKE 53280,6:POKE 53281,5
```

```
PF 30 PRINT "{YEL}":M$$="NUMBER BASE CONVERSIONS":GOSUB 960
KD 40 PRINT "{CYN}":M$$="BY BRUCE M. BOWDEN":GOSUB960:P
RINT "{2 DOWN}{WHT}"
FA 50 M$$="COPYRIGHT, 1992":GOSUB960:M$$="COMPUTE PUBLICATIONS INTL LTD":GOSUB 960
GK 60 M$$="ALL RIGHTS RESERVED":GOSUB 960:GOSUB980
ER 70 PRINT "{CLR}{4 DOWN}"
BR 80 M$$="BASECON WILL CONVERT NUMBERS FROM ANY":GOSUB 960
AD 90 M$$="NUMBER BASE LESS THAN OR EQUAL TO 36":GOSUB 960
SE 100 M$$="TO ANOTHER BASE IN THE SAME RANGE":GOSUB960
QB 110 GOSUB 980:IF S=0 THEN 230
JG 120 PRINT "{CLR}{2 DOWN}SELECT FROM ONE OF THESE FUNCTION KEYS:"
KP 130 PRINT "{2 DOWN}F1 ** USE THE SAME STARTING BASE AND {10 SPACES}NUMBER AS BEFORE"
EQ 140 PRINT "{DOWN}F3 ** USE JUST THE SAME STARTING BASE"
SH 150 PRINT "{DOWN}F5 ** USE THE ENDING BASE AS THE NEW {10 SPACES}BASE AND THE SOLUTION"
RH 160 PRINT "{6 SPACES}AS THE {SPACE}NEW NUMBER"
GB 170 PRINT "{DOWN}F7 ** KEEP {SPACE}THE SAME STARTING AND ENDING"
DS 180 PRINT "{6 SPACES}BASES":PRINT "{DOWN}F2 ** SEND {SPACE}RESULTS TO PRINTER"
DJ 190 PRINT "{DOWN}F4 ** EVERYTHING FRESH"
QK 200 GETA$:IFA$=""ORA$<"{F1}ORA$>"{F4}"THEN200
SC 210 XX=ASC(A$)-132:ONXXGOTO 370,300,860,440,890,220
GG 220 RUN230
JM 230 PRINT "{CLR}{2 DOWN}PLEASE ENTER THE STARTING BASE HERE:"
CK 240 PRINT "{2 DOWN}";TAB(12):INPUTS:IFS=>2THEN260
HA 250 PRINTTAB(8);"{2 DOWN}";S;"IS LESS THAN 2.":GOTO 280
SM 260 IFS<=36THEN290
EA 270 PRINTTAB(8);"{2 DOWN}";S;"IS GREATER THAN 36."
MD 280 PRINT "{2 SPACES}THE BASE MUST BE BETWEEN 2 AND 36!":GOSUB 980:GOTO230
FM 290 S=INT(S)
HC 300 PRINT "{CLR}{2 DOWN}PLEASE ENTER THE ENDING BASE HERE:"
KR 310 PRINT "{2 DOWN}";TAB(12):INPUTE:IFE=>2THEN330
PQ 320 PRINTTAB(8);"{2 DOWN}";E;"IS LESS THAN 2.":GOTO 350
CH 330 IFE<=36THEN360
AC 340 PRINTTAB(8);"{2 DOWN}";E;"IS GREATER THAN 36."
GH 350 PRINT "{2 SPACES}THE BASE MUST BE BETWEEN 2 AND 36!":GOSUB 980:GOTO300
SG 360 E=INT(E):GOTO440
DH 370 PRINT "{CLR}{2 DOWN}PLEASE ENTER THE ENDING BASE HERE:"
QS 380 PRINT "{2 DOWN}";TAB(12):INPUTE:IFE=>2THEN410
BB 390 PRINTTAB(8);"{2 DOWN}";E;"IS LESS THAN 2."
FJ 400 PRINT "{2 SPACES}THE BASE MUST BE BETWEEN 2 AND 36!":GOSUB 980:GOTO370
GM 410 IFE<=36THEN430
DD 420 PRINTTAB(8);"{2 DOWN}";E;"IS GREATER THAN 36.":GOTO400
FS 430 E=INT(E):GOTO470
BH 440 PRINT "{CLR}{2 DOWN}"
QQ 450 PRINT "YOU MAY NOW ENTER THE NUMBER WHICH IS {3 SPACES}BEING CONVERTED FROM BASE";S
BX 460 PRINT "TO BASE";E;"BELOW":PRINT "{2 DOWN}";TAB(12):INPUTNS
CJ 470 PRINT "{2 DOWN} {2 SPACES}PLEASE STAND BY FOR COMPUTATION...":X=1
RR 480 IFMID$(N$,X,1)=". "THEN690
PX 490 X=X+1:IFX<>LEN(N$)+1THEN480
RH 500 I$=N$:F$=""V=0
DB 510 IFS=ETHEN820
KB 520 IFS<>10THEN560
HE 530 IFI$<>" "THEN550
FC 540 I$=""
CK 550 T=VAL(I$):V=VAL("."+F$):GOTO700
JX 560 T=0:FORX=LEN(I$)TO1STEP -1:D=ASC(MID$(I$,X,1)):IFD<48ORD>57THEN580
DM 570 T=T+(D-48)*S↑(LEN(I$)-X)
GC 580 IFD<65ORD>90THENNEXT:GOTO600
PR 590 T=T+(D-55)*S↑(LEN(I$)-X):NEXT
GM 600 IFT<1E10THEN620
XS 610 PRINT "THIS NUMBER IS TOO LONG TO BE EVALUATED"
```

```

:GOTO110
GF 620 IFF$="0"THEN670
DF 630 V=0:FORX=1TOLEN(F$):D=A
SC(MID$(F$,X,1)):IFD<48
ORD>57THEN650
SQ 640 V=V+(D-48)/S↑X
ED 650 IFD<65ORD>90THENNEXT:GO
TO670
BR 660 V=V+(D-55)/S↑X:NEXT
GX 670 I$=STR$(T):F$=STR$(V):F
$=MID$(F$,2,LEN(F$)-1):
IFE=10THEN820
BS 680 GOTO700
QH 690 I$=MID$(NS,1,X-1):F$=MI
D$(NS,X+1,LEN(NS)-X):GO
TO510
SX 700 I$="":F$=""
CH 710 A=T/E:DP=INT(E*(A-INT(A
))+.5):IFDP<0ORDP>9THEN
730
HD 720 I$=CHR$(DP+48)+I$:GOTO7
40
QE 730 I$=CHR$(DP+55)+I$
RQ 740 T=INT(A):IFT<>0THEN710
MS 750 X=1:A=V*E
MM 760 IFINT(A)<0ORINT(A)>9THE
N780
DM 770 F$=F$+MID$(STR$(INT(A)
),2,LEN(STR$(INT(A)))):G
OTO790
RK 780 F$=F$+CHR$(INT(A)+55)
HR 790 V=A-INT(A):IFV=0THEN820
AF 800 X=X+1:IFX<151THENA=V*E:
GOTO760
GR 810 F$=F$+"..."
GR 820 PRINT"{CLR}{2 DOWN}THE
{SPACE}BASE";S;"NUMBER
{SPACE}";N$;" IS"
BK 830 IF E=10 AND F$<>"0" THE
N PRINT"{2 DOWN}{RVS} "
;I$;F$;" {OFF}{2 DOWN}"
EJ 840 IF E<>10 OR F$="0" THEN
PRINT"{2 DOWN}{RVS} "
;I$;".";F$;" {OFF}
{2 DOWN}"
HD 850 PRINT"WHEN EXPRESSED IN
BASE";E:GOTO110
QE 860 S=E:IF E=10 AND F$<>"0"
THEN N$=I$+F$
HH 870 IF E<>10 OR F$="0" THEN
N$=I$+"."+F$
JX 880 T=0:V=0:I$="":F$="":GOT
O370
QP 890 PRINT"{CLR}{2 DOWN}
{RVS}{7 SPACES}PRINTOUT
{SHIFT-SPACE}OF
{SHIFT-SPACE}THE
{SHIFT-SPACE}RESULTS
{10 SPACES}{OFF}"
XA 900 PRINT"{3 DOWN}"
SS 910 PRINT"BE SURE THAT THE
{SPACE}PRINTER IS SWITC
HED ON AND IS DEVICE #4
":GOSUB 980
MK 920 OPEN3,4,7:PRINT#3,"THE
{SPACE}BASE";S;"NUMBER
{SPACE}";N$;" IS"

```

```

JK 930 IF E=10 AND F$<>"0" THE
N PRINT#3,I$;F$
MF 940 IF E<>10 OR F$="0" THEN
PRINT#3,I$;".";F$
DP 950 PRINT#3,"WHEN EXPRESSED
IN BASE";E:PRINT#3,:CL
OSE3:GOTO110
AS 960 REM MESSAGE CENTERING R
OUTINE
KB 970 FOR MX=1 TO 20-LEN(MS$)
/2:PRINTCHR$(32);:NEXT:
PRINTMS$:RETURN
XX 980 PRINT"{HOME}{21 DOWN}
{YEL}"
JF 990 MS$="PRESS ANY KEY TO C
ONTINUE":GOSUB 960
GE 1000 GET A$:IF A$="" THEN 1
000
BX 1010 PRINT"{WHT}":RETURN

```

Bruce M. Bowden is a programmer at COMPUTE.

## QUICKSCREEN

By Danny English  
Say goodbye to boring titles, text screens, and menus. Quickscreen is a short machine language program that's easy to use and will add excitement to almost any 64 program. A simple SYS command can zoom text or character graphics on and off the screen at the touch of a key.

### Getting Started

Quickscreen is written entirely in machine language. To enter it, use MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following addresses.

Starting address: C000  
Ending address: C3B7

Be sure to save a copy of the program before you exit MLX. Load the program with the ,8,1 extension, type *NEW*, and then use the SYS commands that are listed below.

Quick Demo is a demonstration program that will give you a better idea of what Quickscreen can do and how to use it in your own BASIC programs. It is written in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; again see "Typing Aids." Save the demo on the same disk that Quickscreen is on because the demo loads and runs the main program. The

demo also shows you how to load Quickscreen into your own BASIC programs as they run.

### Using the Program

To use Quickscreen in your programs, refer to the table of commands printed below. As you start to program a title screen, for instance, first hide the screen with SYS 49152,7. This prevents any images from appearing on-screen until you're ready.

Next, create your title screen, menu, or text screen, using POKEs or PRINT statements as you normally would. Then store the screen to the Quickscreen buffer (SYS 49152,0). The next steps are to clear the screen and then to return the screen to normal with SYS 49152,8. Your screen is now ready to animate.

You have three methods (like those found in commercial programs) of scrolling text onto the screen. When it is time to clear the screen, a call to another command will scroll the screen out. Be aware that the buffer will be cleared as you clear the screen.

### Ideas

As you use Quickscreen, you'll find dozens of other uses for it. In addition to giving your title screens a professional look, you can also use Quickscreen in adventure games to scroll text in and out. Creating a custom character slide show would be a cinch with Quickscreen. The commands that scroll the screen out can be used to clear any screen. You can also use Quickscreen commands in direct mode.

| SYS Command | Function               |
|-------------|------------------------|
| SYS 49152,0 | Store screen in buffer |
| SYS 49152,1 | Scroll in 1            |
| SYS 49152,2 | Scroll out 1           |
| SYS 49152,3 | Scroll in 2            |
| SYS 49152,4 | Scroll out 2           |
| SYS 49152,5 | Scroll in 3            |
| SYS 49152,6 | Scroll out 3           |
| SYS 49152,7 | Hide screen            |
| SYS 49152,8 | Return screen          |

### QUICKSCREEN

```

C000:20 9B B7 8A C9 00 F0 2D 75
C008:C9 01 F0 2C C9 02 F0 2B F2
C010:C9 03 F0 2A C9 04 F0 29 61

```

# PROGRAMS

```
C018:C9 05 F0 28 C9 06 F0 27 CF
C020:C9 07 F0 05 C9 08 F0 07 0E
C028:60 A9 00 8D 11 D0 60 A9 53
C030:1B 8D 11 D0 60 4C 48 C2 59
C038:4C BE C2 4C EA C2 4C F3 9B
C040:C2 4C 4C C3 4C 57 C3 4C 4F
C048:A7 C3 20 C2 C0 C0 00 F0 B8
C050:1E A5 F8 18 69 28 85 F8 DA
C058:A5 F9 69 00 85 F9 A5 FC B4
C060:18 69 28 85 FC A5 FD 69 89
C068:00 85 FD 88 4C 4D C0 E0 8D
C070:00 F0 1E A5 FA 18 69 28 7F
C078:85 FA A5 FB 69 00 85 FB 42
C080:A5 FE 18 69 28 85 FE A5 29
C088:FF 69 00 85 FF CA 4C 6F EF
C090:C0 A0 00 B1 FA 91 F8 B1 77
C098:FE 91 FC C8 C0 28 D0 F3 66
C0A0:60 A2 07 A0 98 84 F8 86 35
C0A8:F9 A2 07 A0 C0 84 FA 86 4F
C0B0:FB A2 DB A0 98 84 FC 86 B5
C0B8:FD A2 DB A0 C0 84 FE 86 04
C0C0:FF 60 A9 00 85 F8 85 FA A5
C0C8:85 FC A9 04 85 F9 A9 C8 F1
C0D0:85 FB A9 D8 85 FD A9 E8 37
C0D8:85 FE A9 CB 85 FF 60 20 DB
C0E0:A1 C0 A0 00 B1 F8 91 FA 07
C0E8:B1 FC 91 FE C8 C0 28 D0 0F
C0F0:F3 20 13 C2 A5 FB C9 04 B7
C0F8:D0 E8 A5 FA C9 00 D0 E2 54
C100:60 20 A1 C0 A0 00 B1 F8 5D
C108:91 FA B1 FC 91 FE C8 C0 F3
C110:28 D0 F3 20 13 C2 A5 FB 47
C118:C9 05 D0 E8 A5 FA C9 E0 F7
C120:D0 E2 A2 04 A0 28 84 F8 01
C128:86 F9 A2 04 A0 00 84 FA 0B
C130:86 FB A2 D8 A0 28 84 FC 83
C138:86 FD A2 D8 A0 00 84 FE 6D
C140:86 FF A0 00 B1 F8 91 FA AA
C148:B1 FC 91 FE C8 C0 28 D0 70
C150:F3 20 DE C1 A5 FB C9 05 83
C158:D0 E8 A5 FA C9 B8 D0 E2 98
C160:60 A2 05 A0 90 84 F8 86 76
C168:F9 A2 05 A0 B8 84 FA 86 90
C170:FB A2 D9 A0 90 84 FC 86 F6
C178:FD A2 D9 A0 B8 84 FE 86 45
C180:FF A0 00 B1 F8 91 FA B1 FC
C188:FC 91 FE C8 C0 28 D0 F3 97
C190:20 13 C2 A5 FB C9 04 D0 7B
C198:E8 A5 FA C9 00 D0 E2 A2 A1
C1A0:06 A0 30 84 F8 86 F9 A2 16
C1A8:06 A0 08 84 FA 86 FB A2 2D
C1B0:DA A0 30 84 FC 86 FD A2 B8
C1B8:DA A0 08 84 FE 86 FF A0 CD
C1C0:00 B1 F8 91 FA B1 FC 91 13
C1C8:FE C8 C0 28 D0 F3 20 DE 0E
C1D0:C1 A5 FB C9 07 D0 E8 A5 AD
C1D8:FA C9 C0 D0 E2 60 A5 F8 4E
C1E0:18 69 28 85 F8 A5 F9 69 E3
C1E8:00 85 F9 A5 FA 18 69 28 9A
C1F0:85 FA A5 FB 69 00 85 FB BC
C1F8:A5 FC 18 69 28 85 FC A5 1F
C200:FD 69 00 85 FD A5 FE 18 D3
C208:69 28 85 FE A5 FF 69 00 EC
C210:85 FF 60 A5 F8 38 E9 28 63
C218:85 F8 A5 F9 E9 00 85 F9 47
C220:A5 FA 38 E9 28 85 FA A5 CF
C228:FB E9 00 85 FB A5 FC 38 27
C230:E9 28 85 FC A5 FD E9 00 2E
C238:85 FD A5 FE 38 E9 28 85 E3
C240:FE A5 FE E9 00 85 FF 60 C3
C248:20 C2 C0 A0 00 B1 F8 91 FA
C250:FA B1 FC 91 FE A5 F8 18 11
C258:69 01 85 F8 A5 F9 69 00 FA
C260:85 F9 A5 FA 18 69 01 85 79
C268:FA A5 FB 69 00 85 FB A5 9E
C270:FC 18 69 01 85 FC A5 FD 21
C278:69 00 85 FD A5 FE 18 69 06
C280:01 85 FE A5 FF 69 00 85 4D
C288:FF A5 F9 C9 07 D0 BE A5 F1
C290:F8 C9 E8 D0 B8 60 A2 C8 84
C298:A0 00 86 FB 84 FA A0 00 50
C2A0:A9 20 91 FA A5 FA 18 69 97
C2A8:01 85 FA A5 FB 69 00 85 D4
C2B0:FB A5 FB C9 CB D0 E9 A5 D4
C2B8:FA C9 E8 D0 E3 60 A9 93 DF
C2C0:20 D2 FF A9 18 8D F1 CF 50
C2C8:A9 00 8D F2 CF AE F1 CF F0
C2D0:AC F2 CF 20 4A C0 20 DF DA
C2D8:C0 CE F1 CF AD F1 CF C9 4C
C2E0:00 D0 EA A2 00 A0 00 4C F0
C2E8:4A C0 20 96 C2 20 DF C0 48
C2F0:4C C3 C2 A9 93 20 D2 FF 43
C2F8:A2 00 A0 0B 8E F1 CF 8C FC
C300:F2 CF A2 18 A0 0D 8E F3 15
C308:CF 8C F4 CF AE F1 CF AC BF
C310:F2 CF 20 4A C0 AE F3 CF 26
C318:AC F4 CF 20 4A C0 01 C5
C320:C1 EE F1 CF CE F3 CF AD 13
C328:F1 CF C9 0B D0 DE A2 0D DA
C330:A0 0D 20 4A C0 A2 0C A0 3D
C338:0C 20 4A C0 A2 0A A0 0A AB
C340:20 4A C0 A2 0B A0 0B 4C E9
C348:4A C0 20 96 C2 A2 0C A0 EB
C350:0C 20 4A C0 4C 5C C3 A9 40
C358:93 20 D2 FF A2 0B A0 00 8E
C360:8E F1 CF 8C F2 CF A2 0D 97
C368:A0 18 8E F3 CF 8C F4 CF C1
C370:AE F1 CF AC F2 CF 20 4A F1
C378:C0 AE F3 CF AC F4 CF 20 80
C380:4A C0 20 61 C1 CE F1 CF 74
C388:EE F3 CF AD F1 CF C9 00 BB
C390:D0 DE A2 00 A0 00 20 4A 1C
C398:C0 A2 0C A0 0C 20 4A C0 EA
C3A0:A2 18 A0 18 4C 4A C0 20 42
C3A8:96 C2 A2 0C A0 0C 20 4A 01
C3B0:C0 4C F8 C2 00 00 00 00 F6
```

MQ 80 PRINT"{3 DOWN}{WHT}"SPC(14) "{RVS}SELECT DEMO: {OFF}"

DJ 90 PRINT"{2 DOWN}{6}"SPC(5) "1) DEMO # 1 {GRN}- SCRE EN ROLL IN"

XE 100 PRINT"{DOWN}{6}"SPC(5) "2) DEMO # 2 {GRN}- SCRE EN SPLIT"

XM 110 PRINT"{DOWN}{6}"SPC(5) "3) DEMO # 3 {GRN}- SCRE EN MERGE"

PC 120 GET K\$:IF K\$="1"THEN 31 0

DP 130 IF K\$="2"THEN 370

BF 140 IF K\$="3"THEN 430

SP 150 GOTO120

MS 160 REM \*\* DRAW & STORE SCRE EN \*\*

AS 170 SYS 49152,7: REM \*\*\* SCRE EN OFF

MK 180 PRINT"{CYN}{CLR}"A\$;D\$; A\$

RA 190 FOR X=1024 TO 1984 STEP 40:POKE X,42:NEXT

QC 200 FOR X=1063 TO 2023 STEP 40:POKE X,42:NEXT

JH 210 PRINT"{HOME}{4 DOWN}"SPC(12) "{3}{RVS}QUICKSCRE EN DEMO"

HQ 220 PRINT"{2 DOWN}{WHT}"SPC(6) "A QUICK SYS COMMAND MOVES THE"

QC 230 PRINT"{2 DOWN}"SPC(12) "SCREEN IN OR OUT."

JJ 240 PRINT"{4 DOWN}{YEL} {4 RIGHT}CAN BE USED IN BASIC OR MACHINE"

DS 250 PRINT"{2 DOWN}"SPC(12) "LANGUAGE PROGRAMS."

RP 260 PRINT"{2 DOWN}{PUR}"SPC(9) "{RVS}{DOWN} PRESS A KEY CONTINUE {HOME}"

JH 270 SYS 49152,0: REM \*\*\* ST ORE SCREEN

GB 280 PRINT"{CLR}":{4 SPACES} REM \*\*\* CLEAR SCREEN

GG 290 SYS 49152,8: REM \*\*\* SCRE EN ON

HJ 300 RETURN

MX 310 REM \*\* DEMO # 1 \*\*

GG 320 GOSUB 160: REM \*\*\* DRAW & STORE SCR

PC 330 SYS 49152,1: REM \*\*\* MO VE IN # 1

QR 340 GET K\$:IFK\$=""THEN 340

EJ 350 SYS 49152,2: REM \*\*\* MO VE OUT # 1

DM 360 GOTO 40

FC 370 REM \*\* DEMO # 2 \*\*

BM 380 GOSUB 160: REM \*\*\* DRAW & STORE SCR

FM 390 SYS 49152,3: REM \*\*\* MO VE IN # 2

SQ 400 GET K\$:IFK\$=""THEN 400

PD 410 SYS 49152,4: REM \*\*\* MO VE OUT # 2

## QUICK DEMO

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
ES 10 IF PEEK(49152) <> 32 THE
N LOAD"QUICKSCREEN",8,1
AS 20 D$="{HOME}{24 DOWN}":A$=
*****{HOME}"
*****{HOME}"
EG 30 POKE53280,0:POKE53281,0
DC 40 PRINT"{CLR}":FOR X=0 TO
{SPACE}250:NEXT X
KC 50 PRINT"{4 DOWN}{YEL}"SPC(
14) "{RVS}QUICKSCREEN!
{OFF}"
BK 60 PRINT"{2 DOWN}{CYN}
{5 SPACES}BORING TEXT DI
SPLAYS COME ALIVE!"
SA 70 PRINT"{DOWN}{3}
{5 SPACES}CHARACTER GRAP
HIC DISPLAYS ZOOM!"
```



```

JS 420 GOTO 40
CG 430 REM ** DEMO # 3 **
GR 440 GOSUB 160: REM *** DRAW
 & STORE SCR
FF 450 SYS 49152,5: REM *** MO
 VE IN # 3
KB 460 GET K$:IFK$=""THEN 460
MP 470 SYS 49152,6: REM *** MO
 VE OUT # 3
BC 480 GOTO 40

```

Danny English is the author of *Power-sprite* (March 1993). He lives in Moreno Valley, California.

## ALTKEY

By Ron Loughran

The programmable function keys on the 128 are a great convenience. I liked them so much I wanted more of them. AltKey is the result.

The program uses the 128's Alt (Alternate) key in combination with any alphanumeric key (A-Z and 0-9) or other unshifted key, such as the comma, period, or semicolon. With them you can print anything, up to 16 characters in length, that you've assigned to that key. A few keys cannot be programmed. These include the space, the back and up arrows, the At key (@), and the British pound key.

AltKey can be used to print commands in immediate mode, to construct a program line, or to help you while you're working with the 128's machine language monitor. When you call up a defined key, it's only necessary to press Return to execute any command or series of commands assigned to that key. AltKey works on the 128 in 40-column mode.

### Typing It In

AltKey consists of three machine language programs that must be entered with MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. For the first program, when MLX prompts, respond with the following values.

**Starting address: 0C00**  
**Ending address: 0C8F**

When you've finished typing, be sure to save the program to disk with the filename PREP before you exit MLX.

For the second program, Juker, when MLX prompts, respond with the values printed below.

**Starting address: 1620**  
**Ending address: 1677**

When you've finished typing this program, save it to disk with the filename JUKER.ML.

For the third program, AltKey, when MLX prompts, respond with the values printed below.

**Starting address: FA29**  
**Ending address: FB00**

When you've finished typing, be sure to save this program to disk with the filename ALTKEY.ML.

The first program, Prep, prepares the area of memory where the key data will be stored by filling it with zeros. It then identifies the memory used for each key, marks the keys that aren't available, and installs data that is used for saves. Prep's 140 bytes save you from entering more than 800 bytes.

### Preparing Disks

When you first run AltKey, BLOAD all three programs and activate Prep by typing *SYS 3072*. Then put in a disk on which you want the finished AltKey program to reside. Type *SYS 5725* to turn on AltKey. Enter the machine language monitor by pressing f8. If your function keys have been redefined, type *MONITOR* and press Return.

Move the cursor to a clear area of the screen at least five lines above the bottom, hold down the Alt key and simultaneously press the At key (@). Two lines will appear onscreen. Move the cursor down to the line that reads *S"ALTKEY.ML" 8 FA29 FE2A* and press Return. Move the cursor back to that same line and change it to read *S"JUKER.ML" 8 1620 1674* and press Return.

This saves copies of AltKey and Juker to your work disk. Whenever you want to put AltKey on another disk, use this method, but don't use Prep. Prep will erase any key definitions that you may have entered.

### Using AltKey

BLOAD both JUKER.ML and ALTKEY.ML and type *SYS 5725* to start the program; *SYS 5719* to exit.

To assign characters to a key, type the desired key at the left margin fol-

lowed immediately by up to 16 characters of whatever you want that key to type. Mark the end of your text with a back-arrow key (←). Then hold down the Alt key and simultaneously press the back-arrow key. For example, type in the following line with four spaces between the quotation marks. Remember to hold down the Alt key while pressing the second (←)key.

```
D?DEC(" ")←
```

This will define the D key to print code for converting a four-digit hexadecimal number into its decimal equivalent. Move the cursor anywhere on the screen, hold down the Alt key, and simultaneously press the D key. You should see the following line onscreen.

```
?DEC(" ")
```

Enter a hex address between the quotation marks—C000 for example—and then press Return. The 128 will print the decimal location, which in this example is 49152. You could have used the word *PRINT* instead of the question mark shorthand symbol, but it would have used more of your 16 characters.

### What's Been Defined?

After you've defined a number of keys, it may be difficult to remember which keys do what. Hold down Alt and press the up-arrow key (↑) to see a list of all the available keys and their definitions.

To save your defined keys, enter the ML monitor and remember to scroll the screen so that the cursor is at least five lines above the bottom of the screen. Then use the At key (@) as above. You'll see *@,S0:ALTKEY.ML* on the screen. Then, without moving the cursor, press Return. After the *SCRATCHED FILE* message appears, press Return again to save the new version of AltKey. Then, whenever you load AltKey in the future, you'll have those defined keys ready for use.

### Caveats

AltKey doesn't use the Kernal. It writes directly to the screen, so at times the first character will appear in reverse video. This is cosmetic only and doesn't affect anything. If whatever prints wraps

# PROGRAMS

to the next line, that line will not be linked. Move the cursor until it wraps to a new line and then use AltKey.

## PREP

```
0C00:A2 2A A9 FB 85 FC A9 00 5C
0C08:85 FB A0 00 A9 00 91 FB 62
0C10:C8 C0 0F D0 F9 8A 91 FB C4
0C18:18 A9 10 65 FB 85 FB 90 7D
0C20:02 E6 FC E8 E0 3C F0 18 13
0C28:E0 3E F0 14 E0 3F F0 10 95
0C30:E0 40 F0 08 E0 5B D0 D2 50
0C38:A9 67 D0 06 A9 80 D0 02 6C
0C40:A9 59 86 FA A0 00 AA BD 1C
0C48:00 0C 91 FB F0 04 C8 E8 67
0C50:D0 F5 A6 FA E0 5B D0 B6 9F
0C58:60 0E 0F 14 20 01 16 01 79
0C60:09 0C 01 02 0C 05 00 13 C7
0C68:22 01 0C 14 0B 05 19 2E 61
0C70:0D 0C 22 20 38 20 06 01 A7
0C78:32 39 20 06 05 32 39 00 BF
0C80:20 2C 13 30 3A 01 0C 14 1B
0C88:0B 05 19 2E 0D 0C 00 00 06
```

## JUKER.ML

```
1620:E0 08 F0 03 4C AD C6 AA 5E
1628:8D 01 FF 4C 3D FA A0 FE 36
1630:84 FE A9 10 2C A9 20 85 62
1638:FD 60 A9 04 A2 00 85 FC 0E
1640:86 FB 60 A5 E0 85 FB A5 CF
1648:E1 85 FC A5 EC 18 65 FB 4F
1650:85 FB 90 02 E6 FC 60 A9 06
1658:C6 A0 AD D0 04 A9 16 A0 66
1660:20 A2 3C 78 9D 01 03 98 E3
1668:9D 00 03 58 60 20 DD 02 8A
1670:A8 91 E0 60 00 00 00 00 77
```

## ALTKEY.ML

```
FA29:20 E5 FA 20 43 16 A0 00 BD
FA31:B1 FD F0 07 91 FB C8 C0 DC
FA39:10 D0 F5 60 E0 40 F0 0E 28
FA41:E0 5E F0 2A E0 5F F0 68 CE
FA49:20 29 FA 4C DD 02 20 43 38
FA51:16 A9 78 20 4D 16 20 2E FE
FA59:16 20 2F FA 98 20 4D 16 ED
FA61:20 35 16 20 2F FA A2 40 64
FA69:20 29 FA 4C 6D 16 20 3A 1C
FA71:16 A2 29 86 FA A0 00 E6 E9
FA79:FA A5 FA C9 5B F0 CC C9 54
FA81:40 F0 F2 90 02 E9 40 91 05
FA89:FB 20 AA FA A6 FA A9 02 01
FA91:20 4D 16 20 E5 FA 20 2F 3A
FA99:FA C0 12 B0 05 20 AB FA 85
FAA1:D0 F7 A9 12 20 4D 16 D0 87
FAA9:CC C8 A9 20 91 FB C8 60 DD
FAB1:A0 00 B1 E0 F0 95 C9 3E EB
FAB9:B0 91 C9 2A B0 06 C9 1B 94
FAC1:B0 89 69 40 20 E6 FA A5 DB
FAC9:FD D0 02 C6 FE C6 FD C8 77
FAD1:C0 11 F0 E0 B1 E0 C9 1F 5C
FAD9:F0 06 91 FD D0 F1 F0 D4 E0
FAE1:A9 00 F0 F6 8A 38 E9 2A 6D
FAE9:0A 0A 85 FD A9 00 85 FE 4F
FAF1:06 FD 26 FE 06 FD 26 FE 92
FAF9:A9 FB 65 FE 85 FE 60 00 49
```

Ron Loughran lives in Flemington, West Virginia. □

## TYPING AIDS

MLX, our machine language entry program for the 64 and 128, and The Automatic Proofreader are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each Gazette Disk and are printed in all issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write to us, and we'll send you free printed copies of both of these handy programs for you to type in. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope. Send a self-addressed disk mailer with appropriate postage to receive these programs on disk.

Write to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

## ATTENTION WRITERS PROGRAMMERS

Gazette wants to purchase and publish your utilities, applications, games, educational programs, and tutorial articles. If you've created a program that you think other readers might enjoy or find useful, send it and the documentation on disk to

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COMPUTE Publications  
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Greensboro, NC 27408

Please enclose an SASE if you want to have your materials returned.

## ONLY ON DISK

Here are bonus programs that you'll find only on this month's Gazette Disk.

### Video Tape Supervisor

By Tom Rich  
Austin, TX

Video Tape Supervisor is a great database program for the film buff who has a large video library. With VTS you can inventory and organize your videotapes. Use it to display movies alphabetically; by tape number; or by category, such as adventure, comedy, Western, drama, and so on. Create your own specialized film lists, locate the tape on which a film is recorded, and track data for up to 200 tapes and 450 movies.

### Stock Holdings

By William F. Rose  
Wantagh, NY

A few months ago Gazette called for useful applications to use with COMPUTE's SpeedCalc spreadsheet. Stock Holdings is a template that William Rose has used for more than five years to track his stock portfolio. Stock Holdings tracks the dollar value of each stock and calculates the total value of all holdings for each week during a year. The template can be easily edited to suit your own portfolio.

### Screen Gems

Henning Vahlenkamp  
Matawan, NJ

These graphical programs for the 128 appeared in a tutorial in last month's Gazette, but several readers asked to have these BASIC 7.0 gems on disk. Here they are for your convenience.

You can have these program and all the others that appear in this issue by ordering the June Gazette Disk. The price is \$9.95 plus \$2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

## AST POWEREXEC

I've always felt that the only fair way to evaluate a laptop is to take it on the road and see how well it performs. I wasn't disappointed with the AST PowerExec.

This handsome little computer has all the features you'd expect in a top-of-the-line desktop, and it makes for a very powerful piece of carry-on luggage. The unit I reviewed, the 3/25SL Model 123/W, came equipped with a 123MB hard drive, a 25-MHz Intel 386SL processor, VGA LCD display, a 2400-bps modem, and a built-in mouse. As for software, it comes with Microsoft Windows 3.1, MS-DOS 5.0, and Smart Help online documentation.

For me, perhaps the best feature of the PowerExec is the built-in mouse. It's comfortably mounted on the computer case just below the space bar and operates in the same fashion as the one on the Apple Powerbook.

The PowerExec's Intel microprocessor has a 64K CPU cache and is upgradeable. It's the first laptop in the industry that allows you to upgrade to a high-performance 486, 32-bit processor with 3-volt technology. This feature gives you added power when you need it, conserves battery life, and offers a little insurance in an ever-changing computer market.

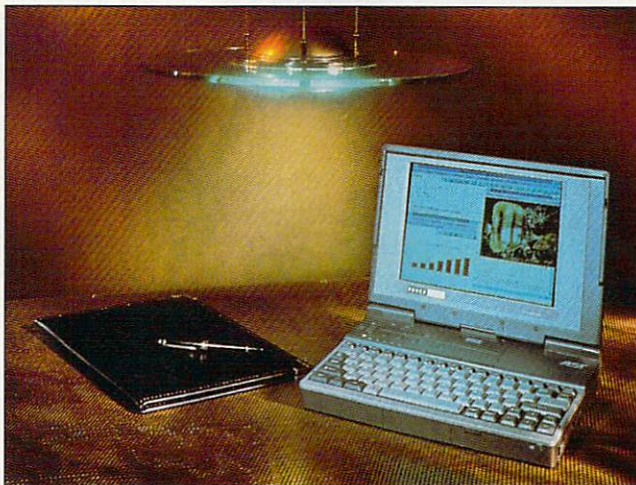
AST has included the wonderful new PCMCIA technology in the PowerExec. PCMCIA slots work in much the same way as the ISA slots do in your desktop computer, except that instead of plugging in huge expansion cards, you use credit-card-sized ones.

Besides the two PCMCIA expansion slots, you get plen-

ty of standard ports. There's a serial port; a parallel port; an external VGA video port; an expansion port; and a selectable port for 101-key enhanced keyboard adapter, numeric keypad, or PS/2 mouse.

The PowerExec comes standard with a 9½-inch

ly useless if stolen. You have the ability to establish two unbreakable passwords, one for the end user and another for an MIS administrator. For added protection, there are no hidden overrides to password protection, and there are no hardware jumpers in the sys-



*The AST PowerExec passes the road test, offering a wealth of impressive features that deliver when they're needed.*

CCFT side-lit film-compensated triple-supertwist LCD VGA display. It's upgradeable to a passive- or an active-matrix color LCD display.

The PowerExec provides a significantly longer battery life than most laptops on the market. With a single 90-minute charge from the provided PowerCharge, you can use the computer from four to six hours. The nickel metal hydride battery pack, more efficient power supply, low-power components, and host of intelligent power-management features allow the PowerExec to offer exceptionally long battery life.

A powerful multifeatured notebook like the PowerExec just isn't complete without security features. AST provides several. One renders the computer complete-

tem to disable password protection.

Last, but certainly not least, a computer needs an excellent service program. I believe AST has a good one: AST ExeCare Plus. You get free, 48-hour repair/replace service for the first year; it costs \$130 each additional year. Should something happen, all you pay is the Federal Express delivery charges required to get the computer to AST; the return postage is paid by AST.

In my opinion, the AST PowerExec has everything you could ask for in a notebook computer, including an attractive list price of \$2,795. You get great speed, excellent power management, security, an upgradeable architecture, and great service—and all those advantages are backed by

a name that you can trust.  
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\$2,795 (modem \$279)

Circle Reader Service Number 434

## STEPWAY

You're a hard sell, you home computer user, and who can blame you? Like so many other not-so-affluent PC owners, you'd rather not spend major bucks on Windows, GeoWorks, or any other fancy task swapper, but you still want a multifeatured package. The kids need to write term papers, you need an address manager to keep up with friends and distant family, and, of course, you all could use a calendar maker to keep one step ahead of schedule. That's what you bought a PC for, right?

Want more? How about a household inventory program, a powerful paint program, a recipe filer, a card shop, and a banner maker? Stepway from Step One packs these modules and then some into a single package. Too good to be true? Perhaps. Like other all-in-one solutions, some Stepway features have room for improvement.

Consider the Art Shop module. Far more advanced than its Windows counterpart, Art Shop considers your every scribble an object. Later, you just click on one of these objects to move, resize, delete, or shuffle images from back to front. Multiple fill types and flexible text-manipulation options make sophisticated effects painless to perform—you can rotate and slant your words at will. Everything you might need for original painting waits right

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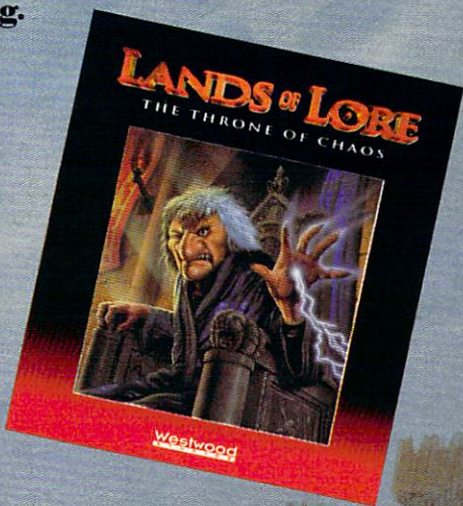
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here, but no import-export options exist outside the Stepway program itself. Saved Art Shop files transfer to Word Shop or Card Shop, but not to other paint programs. Nor can you import an image file in PCX or BMP format—troublesome for artists who'd like to mix and match visual data.

Card Shop offers many of the same options you might find in a product such as Brøderbund's Print Shop: borders, multiple card layouts, text input, and freehand drawing. Not bad—except for the shortage of quality clip art. Again, an image import option would make this module far more useful. On the other hand, Sign Shop does just fine without any special graphics: The filled polygons and outsized text at your disposal here can generate some effective banners and posters.

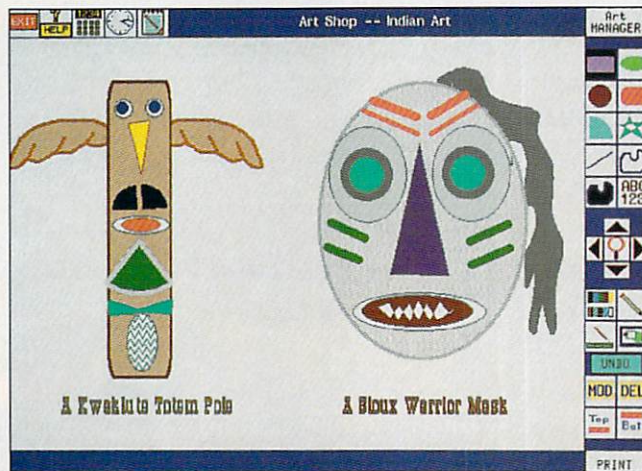
The Inventory module tracks your possessions readily with data fields for values, descriptions, and the other pertinent information you'll need should you ever suffer the ravages of fire or theft. The Address Book program offers multiple fields. When you need a hard copy, you choose and arrange which data to print. This allows for customized lists that require very little paper.

For kitchen help, Stepway's Recipe module arrives with a list of common recipe ingredients, ready for you to click them into your own foodstuff formulas. A spacious area for instructions ensures that cooks will know with a glance what steps they must take next. The To Do module renders shopping trips and spring cleaning simple affairs with high and low priorities for each task. And when you de-

sire a vacation, the Calendar program can show you your commitments on a monthly, weekly, or daily basis. No time for an extended break? Try your hand at one of the seven solitaire variations available—everything from Klondike to Demon and Beleaguered Castle, all

pleasures of correspondence without a grumble. Most domestic uses won't strain its resources.

Ever present in Stepway, the notepad, calculator, and clock allow you to pass notes, numerical data, and alarm settings from one application to another. The one-



*Though some of its features could stand improvement, Stepway offers an inexpensive alternative to Windows or GeoWorks.*

of them engaging games.

Least impressive of all the Stepway modules, Word Shop feels a bit clumsy to experienced word processor users. Instead of using a flashing cursor, Word Shop indicates your position on the page with a below-line arrow—disconcerting at first. The familiar cut-and-paste options are here, but again, no recourse for importing non-Stepway files, even vanilla ASCII text. Some of the included fonts print well enough for school reports, but without stronger scaling you might hesitate to submit them in a corporate setting. Word Shop will not wrap text around Art Shop art, but it does an acceptable job of printing graphics and text within the same document. Otherwise, this word processor handles the chores and

click approach to computing—Stepway doesn't distinguish between left and right mouse buttons—puts you where you want to be with a minimum of fuss. Perhaps best of all niceties, however, Stepway's exhaustive online help, with its highlighted hypertextual keywords, means you'll never need the manuals. The 11 flimsy leaflets would profit from three-ring binding, though their internal layout proves logical enough.

Step One promises more Stepway modules; hopefully, a file-conversion or import utility and a slicker word processor will be among them. For now, minor failings such as these shouldn't stop anyone in the market for a multipurpose home-computing solution. After all, where else can you

get all of the above and screen savers, too?

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## JDR 33-MHZ 486 CACHE SYSTEM

If you're in the market for a 486DX/33 computer with quality components and support at a mail-order price, consider this JDR system. With 4MB RAM, a 210MB IDE hard drive, a 64K external cache, a Super VGA monitor, a mouse, and Windows 3.1 and DOS 5.0 preinstalled, it packs power and value.

One of the great things about the 486 microprocessor is that it zips Windows apps right along, something you'll notice and appreciate if, like me, you've found yourself staring at the Windows hourglass too much on a 386 system. This JDR system ran Ami Pro, Excel, and the other Windows apps I tried without a hiccup and without undue waiting for screen redraws. Because this is a DX system, it offers the built-in coprocessing capabilities of the microprocessor for those programs that take advantage of one.

Inside the system box, you'll find an AMI BIOS with shadow RAM and password protection. Two of the eight bus slots on the motherboard are occupied, leaving three 8-bit slots and three 16-bit slots available for expansion. The motherboard accommodates up to 32MB of RAM using the increasingly familiar (and easy-to-install) SIMMS, and, with the memory board fully populated, you can have a total of 64MB of RAM. Of the three



horizontal bays, one is occupied by a high-density 5¼-inch floppy drive, one contains the Conner hard drive, and one is available for another peripheral, such as a CD-ROM drive or a tape drive. The 3½-inch high-density floppy drive mounts to the right of the other bays.

Seven screws must be removed to get inside the box, more than I'm accustomed to. But it's a sturdy box, roomy enough for good ventilation and relatively easy access. I added a Creative Labs Sound Blaster Upgrade Kit and had to remove the vertically mounted drive to access the screw holes for the middle bay where I mounted the CD-ROM drive. That turned out to be easier than expected, though. While the working space between the bays and the power supply required some care and patience, the installation proved relatively easy.

This system comes standard with two serial ports, which allowed me to install the supplied three-button JDR serial mouse and a portable fax/modem. I found the mouse comfortable and responsive, the buttons just a tad more difficult to press than those on a Microsoft mouse. You also get a parallel port, a game port, and, of course, a port for the keyboard. JDR supplies a BTC 101-key enhanced keyboard with status lights for Num Lock, Caps Lock, and Scroll Lock. I would've preferred a slightly firmer action in the keyboard, but otherwise it was just fine.

Video has come to play an increasingly important role in computing comfort and satisfaction, and the JDR system delivers on both counts. Equipped with a 14-inch .28-mm dot-pitch

JDR noninterlaced Super VGA monitor and a 16-bit Super VGA card capable of displaying 1024 × 768 graphics in 256 colors, this system is ready to handle today's demanding applications. While the card manufacturer's name doesn't appear in the documentation,

cards to fully appreciate your software.

JDR's system comes with concise guides to MS-DOS 5.0 and Microsoft Windows 3.1, as well as floppy copies of DOS (but not Windows). You'll also find disks with a mouse driver and utilities, video drivers and utilities, spe-



*Expect efficiently packaged power in the JDR 33-MHz 486 Cache System, which comes loaded with software and features.*

the STB PowerGraph name appears on the labels for the drivers disks. I like the front controls for STB's monitor, and it performed well for me. A pronounced screen bounce proved to be the only disconcerting problem for me; it occurred when I switched between text and graphics modes.

According to PC Probe's microprocessor benchmark test, this computer performs as if it were a 110.82-MHz IBM AT. The disk benchmark test turned in a fast 15-ms random seek time and 3-ms track-to-track time, with a disk-to-memory data-transfer rate of 1031.33K per second.

In addition to the speed, power, and storage, this system offers one of the better internal speakers I've heard. It's clearer and louder than most, though you really should invest in one of today's inexpensive sound

cards to fully appreciate your software.

I found the JDR manual good on most counts: diagrams, descriptions, a glossary, and troubleshooting. For questions not answered in the manual, I found courteous and responsive help through JDR's tech support line (a toll-free number). The system comes with a 30-day money-back guarantee and a limited one-year warranty. Need accessories or peripheral upgrades? JDR has a catalog full of them, along with a lot of tips.

JDR has been around since 1979, and its experience selling quality components is evident in this solid system. I recommend it.

MIKE HUDNALL

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## OUTSIDE IN FOR DOS AND WINDOWS

The original Outside In from Systems Compatibility Corporation (SCC) is a DOS memory-resident utility that allows you to view and insert into your word processor text or data from other applications. SCC has now released an upgraded DOS version and an enhanced Windows version. Each has the ability to view and copy data from a file into a word processing document.

This latest version of Outside In for DOS has a few improvements over earlier versions. The most important change is that it now allows you to define noncontiguous sections of a file to import.

Outside In for DOS is easy to use. Once you've installed it, you simply press Ctrl-I to view or import text or data. If you switched to Outside In while in a word processing document, you can easily select another file to view and import from. Outside In retains character attributes such as bold, underline, and italics. The program will allow you to view almost any type of file, whether it be another word processing document, spreadsheet data, or a database file. In fact, the documentation lists more than six dozen file formats Outside In will read.

Outside In for DOS is highly intuitive. If you can't figure out the easiest way to accomplish the task at hand, you can access the program's good onscreen help.

I tried importing data from Lotus 1-2-3, Quattro Pro, dBASE III+, and several DOS word processing documents. Outside In did a



# Wolfenstein 3D

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*Wolfenstein 3-D* requires an IBM or 100% compatible computer with 640K RAM, a VGA graphics card, and a hard disk drive. Extended memory (XMS), expanded memory (EMS), joystick, and mouse are optional. IBM is a registered trademark of International Business Machines, Inc. Sound Blaster is a registered trademark of Creative Labs, Inc. AdLib is a registered trademark of AdLib, Inc.

good job importing data from all of these files. I tried viewing and inserting from one Windows application, Word for Windows. Outside In did view the file—and you certainly could read and import the Word document—but the program couldn't read the formatting codes and gave cryptic codes such as *SYMBOL 183 V 'Symbol' ls 10 th*. I can't recommend Outside In for DOS if you plan to import data from Windows applications into a DOS word processor. But if you use DOS applications extensively and you need the ability to view data from another file or to import data from one file to your DOS word processor, Outside In for DOS is an easy-to-use option.

The original Outside In for Windows has some of the same strengths as its DOS sibling. However, many of its functions simply duplicate tasks that can be accomplished with functions built into Windows. The latest version retains the original's ability to, automatically on installation, add a macro to Ami Pro, Word for Windows, and WordPerfect for Windows. The Outside In macro allows you to bring up Outside In from these word processors instantly.

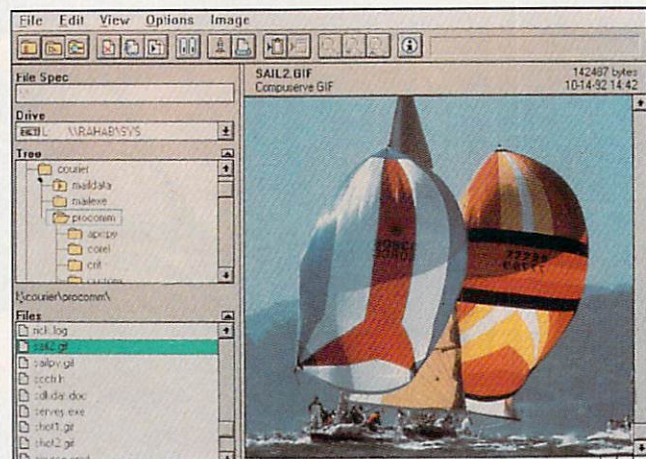
Outside In for Windows Version 2 includes some important enhancements. Its strengths are its ability to view, search, copy, and launch applications, as well as allowing you to view and copy data from DOS applications into your Windows word processor—a useful and handy utility. More than 30 text formats are supported, as well as seven spreadsheet, five database, and five integrated formats, such as Enable. Outside In also works with all major elec-

tronic mail programs to provide a simple way to view mail attachments.

But Version 2's most compelling feature may be its ability to view graphics and compressed files. I tried viewing and copying several graphics to Word for Windows with no difficulty. The

## FLY THE GRAND CANYON

How many of us have flown over the Grand Canyon on a commercial flight to Los Angeles or New York? The view, even from the wing, can take your breath away.



*The upgraded version of Outside In makes it easier than ever to import things to your word processing documents.*

advantage to using Outside In to add graphics to Word over the Insert Picture feature of Word is Outside In's view feature. With Outside In you can look at the graphic before inserting it. Viewing and copying from compressed files was also effortless.

Outside In for Windows Version 2 performs as advertised. Its interface is easy to use, especially if you're familiar with Windows. I recommend Outside In for Windows Version 2 if you do a lot of copying from one Windows application to another, need to copy from DOS applications into Windows, or regularly import pictures into your word processing files.

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What would you give for a leisurely tour of that same spectacle? Now an excursion into natural wonder requires little more than a PC and 3-D glasses as poor man's virtual reality comes home. Fly the Grand Canyon puts you in the cockpit and sets the limits of exploration at the horizon.

Utilizing not one but two variations on the old 3-D imaging system, Fly the Grand Canyon comes complete with a sturdy pair of red lens/blue lens glasses for you and a cardboard pair for your passengers. According to the manual, the filtering effects of the lenses tricks the human brain into seeing a stereo image on-screen. In truth, the CRT displays a mass of red and blue lines. This stereo effect might well work for some, but for many others 3-D

glasses bring only headaches and eyestrain. For these unfortunates, Fly the Grand Canyon offers two monochromatic modes, yellow and white. The resulting maps possess almost as much depth as their stereo counterparts.

Flight along the treacherous Snake River can result in more than a few crashes, but, as a simulation, Fly the Grand Canyon proves quite forgiving: It starts you over in the same vicinity immediately after a crash. The controls of your plane allow for simple banking, but you can't roll this craft. Climb too high and you'll likely crash—the program, that is. Otherwise, the canyon scrolls below and, should you hover at zero knots per hour, you can choose to have the program display the rugged cliffs in greater detail for your viewing pleasure. Normally the terrain moves past in perhaps half of the maximum resolution—an attempt to engender greater speed in slower machines.

For the most part, Fly the Grand Canyon simply isn't the next best thing to being there. The simplified maps, though based on accurate geological survey data, lack sufficient shading, texture, and density to support any such illusions. Push the throttle forward for more speed and the landscape begins to jump past; smooth scrolling would make all the difference in this flight simulator. Gaps between lines seem paltry enough when you can skim precipices with the speed of wind. Here you sometimes pass through an obstacle before the controls can respond.

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to afternoon lighting effects, and shadows fill the valleys. You can't fly through a shadow, however, as they're visible only in pause mode. Still, the most convincing 3-D effects occur at this point; you might find yourself reaching for the screen just to touch them.

The flight recorder will save memorable jaunts to disk, and you'll want to save them to show your friends. The Grand Canyon offers some amazing sights, and even from the limited perspective of Fly the Grand Canyon they're worth paying to see.

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## INTERPRETER TAPEXCHANGE 300TX TAPE BACKUP

Discriminating users looking for what may well be the ultimate in external, portable tape backup units would do well to turn their attention to the sleek TapeXchange 300TX Tape Backup from Interpreter.

This unit combines form and function by putting blazing performance in a package that's easy to carry (and look at). The 300TX is lightning fast, not only in its backup and restore times, but also in its installation time: under five minutes for both the hardware and software phases.

Once the software installation is complete, several read/write tests are automatically performed by the software to ensure that all of the connections are solid. These

tests take about four or five minutes to complete, but they're good insurance because the data transfers in both directions will be at speeds up to 10MB per minute, depending on your CPU speed and use of data compression. These safety checks are exactly what

ed and underway in well under a minute with just a couple of menu selections. For example, using the preassigned default values, to do a complete backup of the entire hard drive, all you do is select Full Backup, choose Overwrite, and hit Return. Full override of all default op-



*Cover your ears and rest easy: It may be noisy, but you know your data's secure with the TapeXchange 300TX Tape Backup.*

you'd expect from a high-quality, high-performance product like this.

Calling the 300TX a screamer is a good way to describe both its performance and its noise level. Make no mistake about it: This is a noisy drive. In operation, it emanates a high-pitched sound throughout the entire backup or restore operations. However, this noise doesn't usually last too long, thanks to the drive's high speed.

The 300TX also gives you a choice of the type of media you can use: cassette, QIC cartridge, or DAT. If you elect to use DAT cartridges, you can store up to four gigabytes per tape.

A backup can be institut-

tions is possible, of course.

The user manual is adequate in its coverage of the hardware installation (two paragraphs are sufficient for covering it, since it only entails plugging the drive into the parallel port and attaching the power adapter to the 300TX). The portion devoted to using the software is also adequate, augmented by screen shots of important sections and full explanations of possible error messages within the pages. No mention of Windows can be found anywhere in the manual—or anywhere in the package, for that matter—so all activity connected with the drive takes place from the DOS prompt.

The 300TX has a built-in

carrying handle for easy transportation. This feature, combined with its external connection via the PC's parallel port, makes it ideal for office settings where several PCs need to be backed up on a regular basis. It's also a most serviceable and convenient way of transporting large blocks of data from one PC to another without having to rely on floppies. This drive's real ace in the hole, however, is its speed. During a full backup of the 250MB hard disk on the 486/33 I used for the review, the 300TX reached a transfer rate of more than 6MB per minute.

If speed and portability are the name of the game for you and you don't mind some noise, the Interpreter TapeXchange 300TX Tape Backup might be just what you're looking for.

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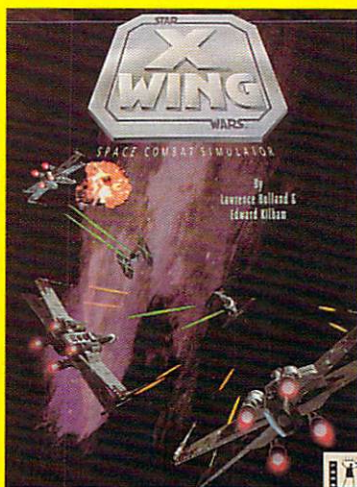
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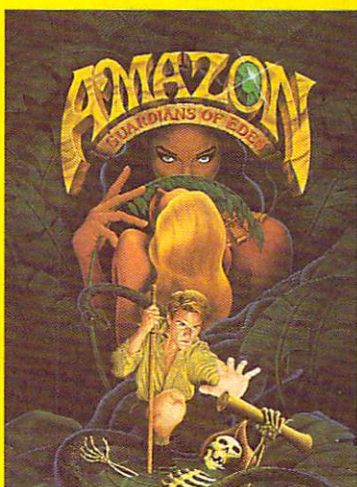
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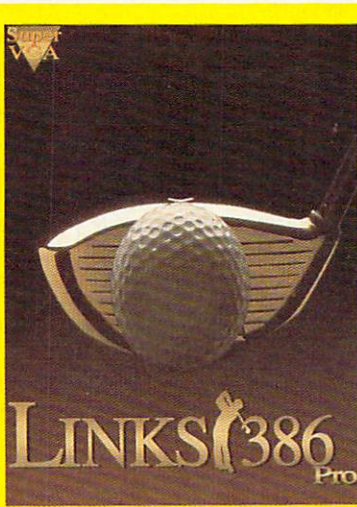
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mind, including battle, diplomacy, and espionage. (This is not a politically correct game; most people today would characterize taking countries by armed aggression as evil.)

PowerMonger is from Bullfrog, the maker of the prize-winning Populous. PowerMonger uses the same basic interface, built around an entertaining 3-D terrain map on a war-room tabletop. From your overhead perspective, you see small people, houses, workshops, sheep, trees, boats, and other objects as they move through their daily activities. A palette of game control icons surrounds the map, and the figures of your general and his captains loom over the table.

You use the icons to control your followers and wrest control of the land from the natives. When you attack a small settlement, for example, an army of tiny animated vassals marches across the countryside to the target and engages in battle. Little souls fly into heaven as soldiers die. Once you've won the settlement, you commandeer its equipment (weapons, boats), seize its food (soldiers have hearty appetites), and move on. The degree of aggressiveness you've assigned to your captain controls his rapaciousness. Only at the highest aggression setting does he completely strip the settlement of food and supplies, leaving the peasants to starve.

It sounds simple, and it is—for a while. The first few of the 195 territories fall easily, but as you continue, the natives become stronger and willier. You encounter marauding armies suspiciously similar to your own. Simple methods of attacking, seiz-

ing resources, and advancing no longer work. You must become more clever.

The far-reaching effects of your decisions come back to haunt you. If you order your craftsmen to make catapults, for instance, they're likely to strip the neighboring forests; this al-

tion is excellent. It includes a detailed strategy guide that explains how to gain control of the first 30 or so territories. You can add a whole new dimension to the game by hooking up with a second player by modem.

So, wait for a day when the Saddam Hussein in you

wide by 16½ inches long. Still, Acma has managed to pack plenty of impressive goodies into this system.

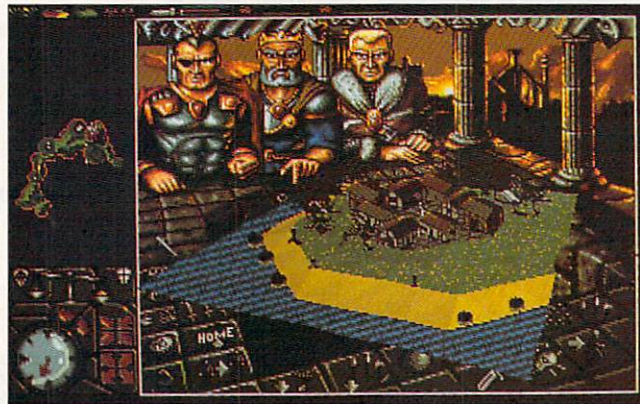
The system comes standard with 4MB of RAM (expandable to 64MB), a reasonable amount for most of your computing needs, even in Windows. The hefty 240MB hard drive that came with this system offers twice the storage of the standard hard drive. With today's enormous apps, this drive gives me all the elbow room I need. Another upgrade for this muscle machine, the Promise SuperIDE caching hard drive controller (with 512K of cache RAM, expandable to 8.5MB), gives me lightning-fast performance.

To speed up graphics performance, Acma included another extra: a Diamond Stealth VRAM accelerated video adapter capable of resolutions of 1280 × 1024 with 16 colors, 1024 × 768 in 256 colors, 640 × 480 with 32,000 colors).

One of the current computing jokes making the rounds—"The magic of Windows: It turns a 486 into an XT"—doesn't apply here at all. Thanks to the Stealth video card, Windows operations are considerably accelerated, as are the majority of the complex graphics and animation displays currently available for the PC.

The 15-inch MAG MX15F noninterlaced SVGA monitor, yet another extra, provides significant sharpness and subtlety in graphics display, not only enhancing GIFs and gameplay, but also greatly reducing eyestrain in text-based operations. If you use Windows much, your eyes will appreciate this larger display.

For extra fast communications, Acma includes a Quick-



*Sack and pillage with impunity playing PowerMonger from Electronic Arts, a game that rewards your worst impulses.*

ters the weather patterns and delicate ecological balance of the land. Inattention to proper routes to new battle sites can string your men out too far and leave them open to attack. Tribes you've allied with can become too strong, forcing you into battles you cannot win.

You won't learn the nuances necessary to succeed at PowerMonger overnight. There's plenty of challenge in the ever-increasing need to fine-tune aggressive tendencies, battle strategies, logistics management, ecological management, and diplomatic relations. As you progress, the antics of the little people who populate your tabletop map are a joy to watch—except, of course, when the angel-winged souls gently rising into heaven happen to be those of your soldiers.

The game's documenta-

needs some exercising—or exorcising. PowerMonger can relieve those tensions and teach valuable lessons about the consequences of wielding power.

RICHARD O. MANN

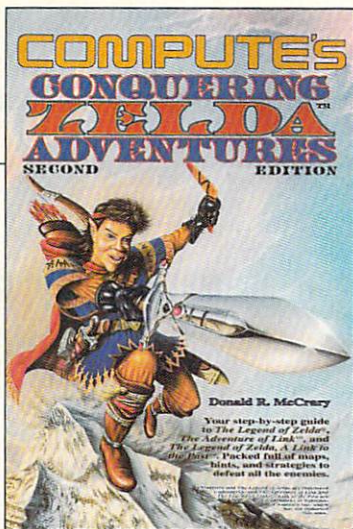
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Circle Reader Service Number 440

## ACMA 486SX/25

Impressive speed, storage, power, and graphic capabilities—that's what makes the Acma 486SX/25 a real muscle machine. While the configuration I tested is more expensive (by \$1,000) than ACMA's standard 486SX, it also boasts a number of features that many people will find attractive.

If desk space is in short supply, you'll appreciate the small footprint of the system box—a modest 15 inches



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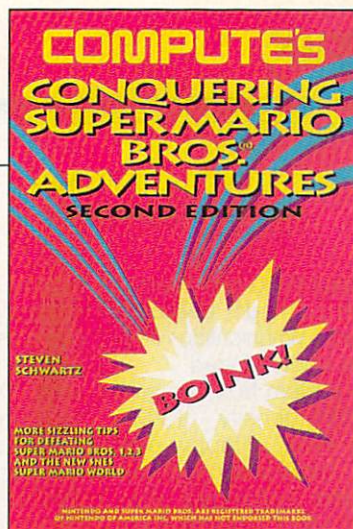
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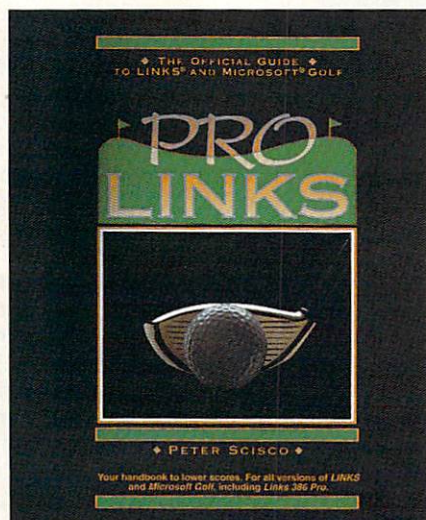
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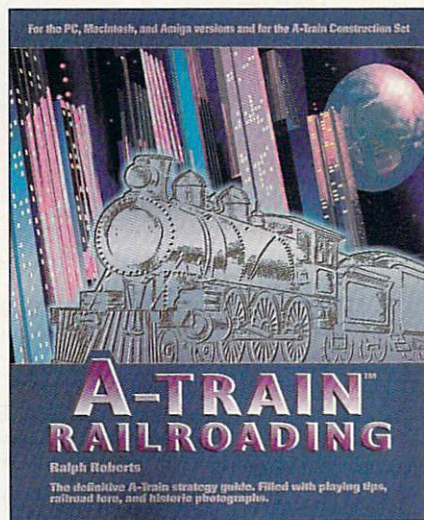
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com Spirit 9600-bps internal modem package. QModem 4.5 Lite communications software is also included.

The system box contains two high-density (1.2MB and 1.44MB) floppy disk drives. There's also the now standard enhanced keyboard, which I found quite satisfactory—quiet, firm, and fast.

The system comes already loaded with DOS 5.0 (set up to use high memory) and Microsoft Windows 3.1, the latter containing an on-line glossary of computer terms, courtesy of Acma.

While the unit I used didn't contain documentation for either DOS or Windows, Acma's support line assures me that documentation for both is routinely included with each system. The Acma 486SX/25 is certainly well-documented in every other area, from the Acma user's manual through individual manuals for the ISA-486 main board, Stealth video card, KW-524H serial/parallel adapter, Spirit modem, and Promise caching controller. In addition to QModem, Acma includes software for the installation of the Stealth card, the disk controller, and WinRix-DCS, a graphics application for use with Windows.

Whether or not the Acma 486SX/25 has any significant weaknesses depends on what you intend to do with it. If a lot of your work involves number-crunching, you may decide that you really need a 486DX, which has a built-in math coprocessor. If you measure a machine chiefly by how far you can expand it, you'll find the Acma 486SX/25 to be moderately expandable. The motherboard comes with seven 16-bit expansion slots and one 32-bit slot de-

signed to accommodate a memory board. However, since the unit I tried included the video card, the modem, the I/O card, and the hard drive controller already in four of these slots, there were only three 16-bit slots available to be used for expansion.

fers from the standard configuration chiefly in that the latter has half as much hard drive space (120MB), a slightly smaller (14-inch) SVGA monitor with a lower resolution (1024 × 768), a standard SVGA card, a standard IDE controller instead of the caching controller,



*It's worth paying extra for the ACMA 486SX/25, a high-powered 486 that does a lot in a relatively small amount of space.*

The small footprint of the CPU, while taking up less desk space, also means that things are a bit crowded inside. Digging around in its guts may result in a rather high PUI (Profanity-Usage Index) for ham-handed technophobes like myself. The potential for internal drive addition is also a bit limited: The CPU contains three 5¼-inch drive bays and one 3½-inch bay; three of these are occupied by the two floppy drives and the hard drive, so there's just one 5¼-inch bay available for a CD-ROM drive, a tape backup drive, or other add-on.

The configuration of the Acma 486SX/25 I tried dif-

fers from the standard configuration chiefly in that the latter has half as much hard drive space (120MB), a slightly smaller (14-inch) SVGA monitor with a lower resolution (1024 × 768), a standard SVGA card, a standard IDE controller instead of the caching controller,

and no modem. It also differs in the trifling matter of price—about \$1,000 worth. The standard Acma 486SX/25 runs \$1,495, while the unit sent for review checks in at \$2,495 with the fun stuff added—but the fun stuff just might make the extra expense worthwhile.

With this much muscle available, you'd expect the Acma 486SX/25 to be a delight to play and work with—and it is.

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## VISUAL BASIC FOR DOS

It wasn't much of a stretch for DOS die-hards to look wistfully at Microsoft's Visual Basic, the most popular Windows programming environment on the market, and wish that some of the pixie dust would rub off on QuickBASIC. Five years old and counting, QuickBASIC is an excellent value, but lately it's really been showing its age. When Microsoft, with its huge investment in Windows, announced that QuickBASIC wouldn't be updated, my heart sank; this didn't bode well for me and millions of other QuickBASIC programmers.

What I didn't know was that QuickBASIC was to be replaced by Visual Basic for DOS, a worthy successor with advantages even its Windows counterpart lacks. If you're not familiar with Visual Basic for Windows, here's a brief rundown on how it works. This description will also apply to Visual Basic for DOS.

A Visual Basic program, like a Windows program, is inextricably tied to its user interface. The program is made up of windows (which Visual Basic calls forms); controls, such as buttons and scroll bars; and BASIC code. Typically, you design the user interface first by "drawing" it in form view—adding forms (a.k.a. windows), check boxes, combo boxes, and so on. You've probably already figured out that this is an incredible time and money saver because you don't have to buy a windowing library and it allows you to create a prototype of the application at the very start. This eliminates a lot of communica-





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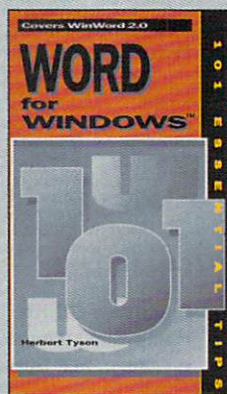
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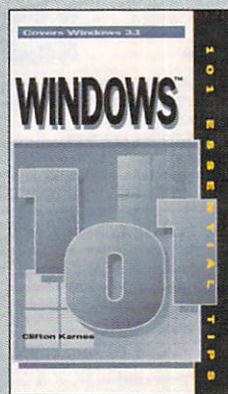
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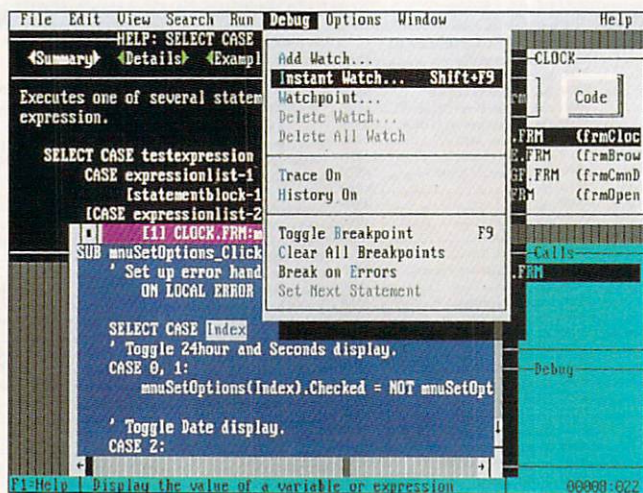
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## REVIEWS

tions problems if anyone else is involved in the design of your application (for example, the person paying you!).

And let's face it—it's a lot more fun than laboriously designing the user interface on graph paper and then figuring out endless function calls to the windowing system. (There's also the potential drawback that the windowing interface isn't to your liking, but that can happen with any code library. In Windows, that's not a concern because the whole point is that all applications share a common GUI. The DOS world is more individualistic—so consider yourself warned. I will say that Microsoft has created a text-windowing scheme that's snappy and well designed, with the added benefit that it's one that works almost the same under DOS as it does under Windows.)



Take heart, QuickBASIC programmers: Microsoft's Visual Basic for DOS more than adequately replaces your old favorite.

Program code gets triggered by events in the user interface—a click of a button, the cursor passing over a control, the user's entering text into an edit field, and so on.

What makes it all happen so smoothly is the way code is attached to forms and controls. For each conceivable event, the user inter-

face object has its own method, or subroutine. For example, one of the button methods is called Click. To run code when that button is clicked, double-click on it in form view and you're switched to code view (in DOS, they're two separate programs due to memory limitations, but the context switch is quite rapid).

If you've just added the first button to the form, you'll be popped into a program-editing window for a subroutine already named SUB Command1\_Click(). Enter whatever code you want, and that's it. No muss, no fuss. There are no resource editors and WM\_PAINT routines à la Windows and C, and it's substantially easier even than BASIC add-on windowing libraries.

Visual Basic for Windows lets you create your own control types, but you must do so in C—and programming Windows in C is not a pretty sight. You can graft them on to Visual Basic's palette as if they were born there, however, and Visual Basic won't know the difference. Amazingly, Visual Basic for DOS lets you create custom controls in BASIC—a boon for users who bought BASIC to get away from C in the first place. My favorite control with Visual Basic for DOS is the text editor, which is a

complete editor—mouse and all—that you can roll into your compiled applications (royalty free!) and which will handle up to 32K of text.

The forms/controls/code paradigm is a good one. I'm a slow learner, but I caught on to it fast, and I prowled CompuServe's MSBASIC forum for weeks without finding anyone who had problems with it. The toughest nut to crack is realizing that you lack control over the user's actions: You must be ready for any button click at any time or for the window to be resized at the user's whim. What surprised me about writing programs this way was that they become much better organized and easier to understand, and the slight amount of extra code is more than made up for by the thousands of lines of code saved by the windowing and control code Visual Basic for DOS already has built into each application.

The worst aspect of Visu-

al Basic for Windows was its incompatibility with the DOS version, but amazingly, the DOS version doesn't have that problem. Your old, non-windowed code will compile exactly as it did before, so moving to Visual Basic for DOS is utterly painless. The documentation helps here, too; the world-class docs that came with Professional Basic 7.1 but not QuickBASIC are back, and they're better than ever. Ditto for the online help, which obviated my need for the manual. Code quality is the same as its DOS predecessors.

Visual Basic for DOS is a worthy and splendid successor to QuickBASIC. Don't hesitate to make the upgrade if you were concerned about documentation, speed, overall quality, or ease of learning.

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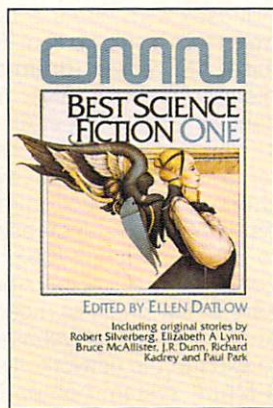
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Are you tired of waiting for your video display to catch up with your fingers when you're word processing or desktop publishing in Windows? Can you take a snooze in the time it takes for your paint or draw applications to bring a complex graphic up on your monitor? Do you sometimes think your system has gone out to lunch while you're waiting for a screen refresh or redraw in your CAD or rendering program? If you answered yes to any or all of these questions, then you're suffering from the slow-video blues. The good news is that the Paradise Accelerator Card for Windows is a sure cure for what ails you—so cheer up!

This half-length card installs easily into any available 16-bit expansion slot

and has a standard 15-pin D connector on its mounting bracket. A five-position DIP switch is also located on the bracket, and the switches set the active video mode on the card. Using combinations of switch settings, it's possible to select Super VGA modes of 800 x 600 or 1024 x 768 at different timing rates to accommodate the timings of different monitors.

In addition to the DIP switches, the Paradise Accelerator Card also has a pair of jumper blocks that can be configured to further tailor the card's operation to specific system requirements. The first jumper block is used for generating a zero-wait state if the host PC is fast enough to operate that quickly (most 386SX and higher machines are), and the default configuration for this jumper is with the cap on the pins (feature enabled). The second jumper is used for selecting the address-latch enable line to work via the video controller



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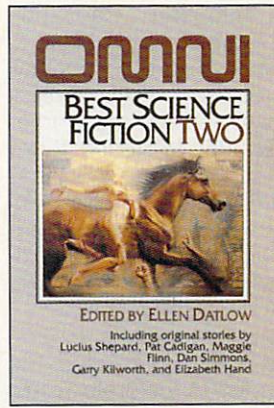
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card or the expansion bus; the default setting is with pins 1-2 capped to enable the line tied to the card. This is the configuration that should work with the vast majority of PCs, with only a few odd machines requiring a change to jumper pins 2-3 instead.

Installation is easy and should take less than half an hour even for a novice user, since the factory default settings will work perfectly for most installations.

The software drivers that accompany the card are also easy to install. The Windows drivers install directly from the Windows Setup section, and they're ready for use upon restarting Windows after the file copy is completed. DOS drivers are also provided for AutoCAD and AutoShade, Cadvance 3.0, Generic Cadd Level 3, Lotus 1-2-3 and Symphony, MicroStation, PCAD Level 2, VersaCAD Design, VersaCAD 386, Microsoft Word 5.0 and 5.5, and WordPerfect 5.0 and 5.1. A disk with video utilities is also provided. It includes the VESA utility as well as a VGA mode-switching utility.

By virtue of its built-in high-color capabilities, the Paradise Accelerator Card for Windows proves that computing can be a colorful activity indeed. The card boasts a 32,768-color palette and is capable of resolutions up to and including 1280 x 1024. Refresh rates up to 72 Hz in 1024 x 768 256-color mode are supported for flicker-free viewing on noninterlaced monitors.

Western Digital puts 1MB of RAM on the board to give it the oomph required for really fast video processing, and this combination works well. I ran some impromptu comparisons against a stan-

dard 512K VGA card I've used for quite some time, and the Paradise card was 8-10 times faster for DOS applications and 10-15 times faster for some Windows applications. The increase in speed was particularly dramatic with complex graphics-oriented programs like

25 feet of two-pair telephone wire, installation software, and a large scroll of documentation.

At a cost of \$99 per node, you can affordably connect as many as eight PCs. Adaptive Throughput Control optimizes communication speed between net-

work cards in each computer. These cards allow the network to pass information between the connected computers. PromiseLAN uses 1.79-Mbps (million bits per second) DUAL Netcards that have two connector ports. Installation was quite easy. The factory settings worked with three of the four computers in our network. For heavy network usage you can purchase a high-performance version of PromiseLAN called PromiseLAN Fast, which features a 4-Mbps net card. It retails for \$299.

Moses also offers a network that's a step up from PromiseLAN called (drumroll, please) ChosenLAN. You can upgrade PromiseLAN to it. ChosenLAN, which lists for \$399 and comes with DaVinci E-mail, accommodates 53 users—increasing to 250 users in 1993. It comes with a four-port hub card and a single-port card, and it can be daisy-chained to expand the network. It's a 4-Mbps system compared to the 1.79-Mbps PromiseLAN. A like-priced network called SwiftLAN (sorry, no more Biblical allusions) designed for use with laptop and notebook computers comes with two external adapters. All of Moses's network products are compatible with each other. Moses offers information about its network products through an automated fax line (800-882-6673, extension 200) that immediately sends a fax containing information you request.

We had no trouble hook-



*The Paradise Accelerator Card for Windows makes it easy for you to speed up graphics-intensive activities.*

GEM Artline 2.0 and Ventura Publisher.

So, if you're down in the dumps with the slow-video blues, isn't it about time you took a trip to Paradise? This accelerator card is the only ticket you'll need.

TOM BENFORD

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## MOSES PROMISELAN

Looking for a low-cost plug-and-play network for your home or office? Moses Computers has recently released a powerful peer-to-peer LAN called PromiseLAN. The package comes complete with a network card,

worked PCs, which prevents slower computers from bogging down your network.

PromiseLAN comes with an easy menu installation program. It works with all IBM PCs and 100-percent compatibles (XT, AT, 286, 386, 486). It meets all IBM NetBIOS standards and provides file and record locking. You can easily add additional PCs to the network. For added versatility, any PC in the network can be configured as a server, redirector, or peer. With PromiseLAN you can quickly connect computers and begin sharing peripherals, data, and software.

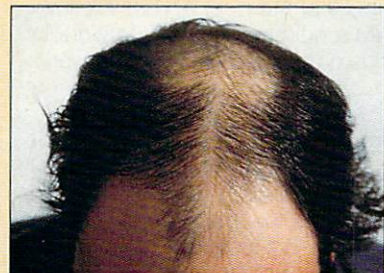
We installed the network in a four-person technical department. Since the computers are all close to one another, we used the 25-foot, two-pair telephone wire included

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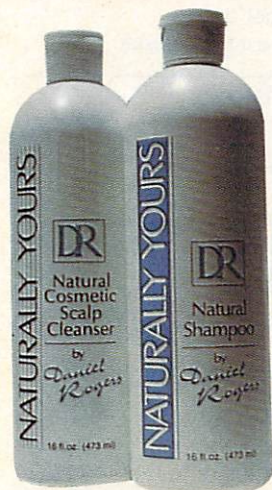
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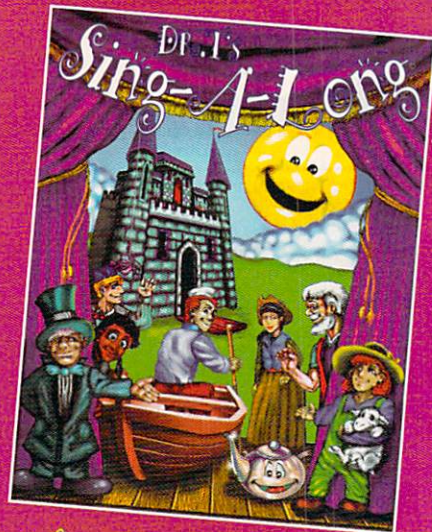
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## REVIEWS

ing up PromiseLAN. With the network cards installed, all that was left to do was run the telephone wire. The PCs were as easy to connect as a telephone. They were daisy-chained together, with each having two possible connections—one from the network and the other to the next node.

Software installation proved similarly painless. All it takes is inserting the installation disk in a floppy drive and typing *install*. The appropriate directories are created, and the software is copied to your hard disk. The final step is to configure the software on each computer. NetMenu walks you through the process. In a nutshell, you must select a unique network name (we used first names), choose the option to configure as a peer, and specify which of your resources will be shared by other network members.

PromiseLAN claims to be 100 percent compatible with Windows. The network uses the LAN network driver for IBM PCs provided with Windows 3.1. Unfortunately, this wasn't clear at the time we were installing PromiseLAN, and we couldn't get all network features to work. For example, we couldn't use a network printer under Windows. We contacted Moses's technical support personnel, but they couldn't answer our questions and said they would contact us. Well, we never heard from them and have since removed PromiseLAN from our computers until we receive a legitimate response or Moses parts the Red Sea again, whichever comes first.

To get an idea of the network performance, we decided to copy the contents of one network hard drive to another. Not surprisingly, this brought PromiseLAN to the floor. Peer-to-peer LANs aren't designed to carry this kind of burden, of course, but we wanted to see what would happen. Keep this in mind if you're in the market for a network. If it's high performance you seek, you'll have to shell out some bucks to get it. Otherwise, we had no trouble either with running software from remote machines or with file maintenance.

Low-cost peer-to-peer LANs, like PromiseLAN, are designed for convenience. They're great for transferring files between computers and for sharing peripherals. If you're thinking about buying a couple of printers for the office, you may want to consider purchasing a low-cost LAN instead. You could save money by sharing a single printer through a network, rather than buying more printers. Other ben-

efits include sharing software and files. Keep in mind that there will be some memory overhead and an overall loss of performance, although Moses claims that PromiseLAN has the lowest RAM requirement of any network in the industry. It uses 10K RAM for a workstation, 16K for a server, and 26K for a peer.

PromiseLAN did everything that it claims, with the exception of being 100 percent compatible with Windows. We found out later that the problem had an easy solution, but technical support never returned our calls to tell us about it. The network is easy to install and easy to operate, and it comes with a lot of documentation. So if you're in the market for a peer-to-peer LAN, PromiseLAN is a low-cost option.

BRADLEY M. SMALL and TROY TUCKER

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## CREATIVITY KIT: LITTLE PEOPLE FARM CREATIVITY KIT: LITTLE PEOPLE MAIN ST.

What is it with Fisher-Price's Little People? They have no apparent appendages, Day-Glo clothes, and molded plastic hair that would make even Wayne Newton cringe. Yet they're perennially popular, their peg bodies never failing to fit perfectly into the wells of the cars, tractors, and jumbo jets they pilot around the floors of America's living rooms.

My five-year-old son has liked Little People since he was old enough not to choke on them, playing with the wee ones' Farm at home and Main St. at day care. It seemed natural that animated versions in a computer program would go over big, and the little studs didn't let me down.

These Fisher-Price Creativity Kits combine limited animation with print capabilities, and a few sheets of heavy paper and drawing tools are also thrown in. As a printing and coloring program, the Creativity Kits work about as well as the ubiquitous print kits available for everything from *Beauty and the Beast* to "The Itchy and Scratchy Show."

As character animation programs, they're pretty much what you'd expect from the big F-P: A little slow and elementary for grownups, just right for kids.

The programs are recommended for ages 3-8. Both work on the same ba-

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sic principles. Each provides a tour of its respective setting, allowing you to zoom in on different features of Main St. or the Farm. On Main St. you can see what's shakin' inside the pet shop or the grocery store. Down on the Farm, you can view various animals in action or examine the nooks and crannies on different sides of the barn. Even on a 486, the Creativity Kits plod along at the kind of methodical pace five-year-olds appreciate, offering slow, smooth zooms in and out of different scenes.

As with Fisher-Price's molded plastic toys, you get plenty of bright colors and crisp, well-designed scenes. The various shops on Main St. offer a more interesting set of views, though on the Farm you get more details for each scene, with four separate screens appearing at once representing the animal or object in each of the four seasons. Both games display a gentle sense of humor: The Farm's summer cow is a scuba cow decked out in snorkel and face mask; inside Main St.'s barber shop, you can open a cabinet to find a little barber mouse cutting the hair of a little mouse customer.

If your child can maneuver a computer mouse, he or she will be able to use these programs immediately. They'll work with a keyboard, though a mouse is recommended for good reason. It helps if your child can read a few words, including animal names and such directions as "go back," though even that's not essential. Once you've pointed out the "go back" button, your child should be able to find it easily whether or not literacy has been achieved.

Even if you're new to computers or you're just introducing their capabilities to your child, the Creativity Kits are almost as easy to use as the toys they serve as tie-ins. Running the programs from a floppy or installing them to a hard drive is equally painless and swift. After answering a few basic questions about your system's capabilities, you'll be ready to enter the world of the Little People.

It's a nice place to be, even if nobody there can open a door for you. If your child falls within the suggested age range of the Creativity Kits, either the Farm or Main St. would be a good way for a child to direct his or her attention to the computer screen without having to leave the comfortable surroundings of familiar toys.

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## PRINTSPRINT

Tired of waiting for your Windows application to print to your HP LaserJet? Need a solution that's transparent? If you've tried speeding up your printing by disabling the Window's Print Manager but still aren't happy with the speed, you may want to consider installing PrintSprint.

To use PrintSprint, you'll need to install both hardware and software. You have to install both a printer controller card in your PC (you must have available a full-length 16-bit expansion slot) and the PrintSprint HP video interface adapter. The interface adapter installs in the printer's optional I/O slot. If you've never installed a card in your PC, you may find the experience a bit intimidating, but the installation instructions included are clear, concise, and easy to follow.

Installing the PC controller card in our PC required that we change the preset I/O jumper address in order to get PrintSprint to work with our network. The default address is 300-30F, which should work for most systems. But if you're connected to a network or have some other configuration that might be using this address, you'll need to change the I/O address jumper on the PC controller. Again, this wasn't difficult with help from the documentation.

Once you've installed the two hardware cards and connected the cable included with PrintSprint, all that's left to do is install the PrintSprint printer driver—another simple task given the easy-to-follow documentation.

After spending 20 minutes installing PrintSprint, we were ready to see if it lived up to its claims of print-



*Windows users looking for more speed from their HP LaserJet printers may find what they need in PrintSprint.*

ing "2, 3, even 10 times faster." On a Gateway 2000 386SX/16, most Windows applications printed about twice as fast. Generally, we were pleased with the results. With the Windows Print Manager disabled and PrintSprint in place, printing from PageMaker was noticeably faster.

Since PrintSprint is designed to work only with Windows applications, the documentation says that you must leave both your original cable (whether serial or parallel) and the PrintSprint cable connected so you can print from non-Windows applications. PrintSprint isn't designed to have any effect on printing from non-Windows applications.

Should you go to the expense of purchasing and installing PrintSprint? Like anything else, it depends on the speed of your computer, how much printing you do, and from what applications you print. If you do a lot of printing from your 386, you'll find PrintSprint worth investigating.

STEPHEN LEVY and PAM PLAUT

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## DRIVEPRO

DrivePro, a hard disk set/diagnostic/maintenance product, more than lives up to its name. At \$129.95 suggested retail, its superb documentation (both online and printed), extensive capabilities, and pile-on-the-bells-and-whistles design makes it perhaps the best deal around.

If you don't know an ESDI from an IDE or whether a sector editor might come in handy, you probably don't need DrivePro. If you're still with me and if you have at least a 286 (it won't work on a slower CPU), read on, because DrivePro is a real barn burner. You're expected to operate it from a high-density floppy disk. DrivePro has a dazzling user interface and comes with a lot of extras, so it takes up just short of a megabyte of disk space. Don't expect to run it on a 360K floppy, although DrivePro will squeak by on a 720K low-density 3½-inch drive.

DrivePro has everything you need to diagnose a hard disk, repartition it (even to boot from multiple operating systems), replace FDISK with a far superior utility, examine the BIOS drive

table, search or edit particular sectors of the disk, and so on. There are some even more interesting features, however. Unlike most other such programs, its disk analysis can be adjusted from a quick look-see to a downright anal-retentive thoroughness. DrivePro can also low-level format just *parts* of a drive. That's a fantastic help in the case of a drive that doesn't work because of bad sectors, but which still has intact data on it you can't get to. Another intriguing feature is the ability to create a master boot record for a custom hard disk that's not in the BIOS table. So if your BIOS is slightly out of date and the disk is new, you can patch information about the disk into the boot record—even though the BIOS itself doesn't support that disk type—and still use the disk.

I continue to be impressed by the printed documentation, which is rife with all of the illustrations, tables, and definitions I needed, right where I needed them. One of my favorites lists cluster and partition sizes for all major versions of DOS, including the wacky Compaq 3.31. Why was I so happy? Because it's typical of DrivePro's documentation in that it made the difference between my being able to fix or not fix a DOS 4.0 hard disk.

Another very strong area is the chapter on physical drive installation, which shows every kind of controller cable, power-supply socket, and interface connections you need to know about. So if you're faced with a hard disk of unknown origin and have never before seen an ESDI, you can use this chapter to identify it correctly (as I did). Other



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| Coaster               | 25 | Data Disk ea         | 17 |
| Comanche              | 42 | Harpoon Designer     | 32 |
| Mission Disk          | 25 | Harpoon Signature    | 49 |
| Combat Classics       | 31 | HARRIER Assault      | 34 |
| Comic Book Creator    | 17 | Headline Harry       | 37 |
| Cohort 2              | 19 | Health & Diet Pro    | 26 |
| Conquered Kingdom     | 35 | Heaven & Earth       | 30 |
| Conquest of Japan     | 35 | Heimdal              | 19 |
| Contraption Jack      | 25 | Heros of 357h        | 25 |
| Creepers              | 29 | Hole in 1 Golf Dlx   | 25 |
| Crusader Drk Savn     | 39 | Hong Kong Mahjong    | 32 |
| Cuckoo Zoo            | 31 | Hoye Bk Game 2       | 22 |
| Cyber Space           | 34 | Hoye Bk Game 1/3     | 30 |
| Demonsgate            | 32 | Humans               | 25 |
| Dagger of Amon Ra     | 39 | Inca                 | 29 |
| Dark Half             | 39 | Incredible Machine   | 29 |
| Darklands             | 38 | Indiana Jones 4      | 37 |
| Darkseed              | 39 | Inspector Gadget     | 35 |
| Dark Sun              | 47 | Island of Dr. Brain  | 29 |
| Daughter of Sertip    | 31 | Jack Nicklaus Sign   | 33 |
| Dix Paint Animation   | 85 | Jeopardy Silver      | 25 |
| Dix Paint II Enhnd    | 85 | Jeopardy Super       | 25 |
| Deja Vu 1 & 2         | 31 | Jettigrater 2        | 39 |
| Design Yr Own Hm      | 39 | Adv. Mission Disk    | 19 |
| Design Your Lair      | 35 | Bundle Price         | 49 |
| Designasaurus II      | 23 | John Madden 2        | 31 |
| Diet Pro DOS/Win      | 35 | Jump Jet             | 38 |
| Dinosaur Adventure    | 34 | KGB                  | 19 |
| Dog Fight             | 37 | Kid Cuts             | 35 |
| Dr Jam Wind           | 59 | Kid Desk             | 35 |
| Dr. Quandy            | 31 | Kid Pictures         | 19 |
| Dragon                | 39 | Kid Pix              | 35 |
| Dragon's Lair I       | 25 | Kid Pix Companion    | 25 |
| 2 or Single Castle    | 37 | Kid Works 2          | 35 |
| Dragon Lair III       | 39 | Kings Ransom         | 34 |
| Dune 2                | 36 | Kings Quest 1 VGA    | 37 |
| Dungeoneer            | 29 | King's Quest 6       | 45 |
| Dynamix Bundle        | 42 | Knowledge Advent     | 42 |
| Eagle Eye Mystery     | 31 | L A Law              | 31 |
| Eco-Quest 1 or 2      | 29 | Land Of Lore         | 31 |
|                       |    | Laffer Utility       | 22 |

|                       |    |                       |    |
|-----------------------|----|-----------------------|----|
| Leather God Phb 2     | 24 | Print Shop, New       | 36 |
| Legacy Necromancr     | 19 | Graphics (ea)         | 22 |
| Legend of Kyranida    | 31 | Print Sp Companion    | 31 |
| Legends of Valour     | 38 | Privateer             | 47 |
| Legion's of Krelia    | 37 | Pro League Baseball   | 35 |
| Leisur Suit Larry 5   | 39 | Prophecy*             | 22 |
| Lemmings              | 29 | Prophecy of Shadow    | 38 |
| On No More Addon      | 22 | Protostar             | 39 |
| Lemm-Oh No More       | 31 | Putt Putt Parade      | 32 |
| Lemmings 2            | 35 | Putt Putt Fun Pack    | 26 |
| Liberty or Death      | 35 | Quest for Glory 1     | 22 |
| Life and Death 2      | 32 | Quest for Glory 3     | 39 |
| Line in the Sand      | 25 | Rags to Riches        | 35 |
| Links 386 Pro         | 39 | Railroad Tycoon       | 19 |
| Course Disk ea        | 16 | Reach For The Skies   | 19 |
| 386 Courses ea        | 19 | Reader Rabbit         | 35 |
| Lord of Rings 2       | 37 | Reader Rabbit 2       | 35 |
| Lost File Sheriff H   | 41 | Ready for Letters     | 35 |
| Lost Treas Infocod    | 42 | Read'n Roll VGA       | 31 |
| Lost Treasures 2      | 29 | Reading Adv in Oz     | 36 |
| Lost Tribe            | 25 | Red Baron             | 39 |
| Lost Vikings          | 29 | Mission Disk          | 17 |
| Return of the Phntm   | 33 | Realms                | 19 |
| ReX Nebular           | 37 | ReX Nebular           | 37 |
| Riders of Rohan       | 31 | Risk for Windows      | 29 |
| Ring World            | 34 | Risky Woods           | 25 |
| Risk for Windows      | 29 | Road & Track Pres     | 35 |
| Risky Woods           | 25 | Road to Final Four    | 37 |
| Road & Track Pres     | 35 | Robosports Wind       | 34 |
| Road to Final Four    | 37 | Rodney Fun Screen     | 31 |
| Robosports Wind       | 34 | Rock & Bach Studio    | 35 |
| Rodney Fun Screen     | 31 | Romance 3 King 2      | 39 |
| Rock & Bach Studio    | 35 | Rome                  | 29 |
| Romance 3 King 2      | 39 | Rule Engagemt 2       | 38 |
| Rome                  | 29 | Sargon V              | 36 |
| Rule Engagemt 2       | 38 | Science Adventure     | 42 |
| Sargon V              | 36 | Scotter Magic Castle  | 32 |
| Science Adventure     | 42 | Scrabble Deluxe       | 30 |
| Scotter Magic Castle  | 32 | Sea Rogue             | 19 |
| Scrabble Deluxe       | 30 | Sea Team              | 37 |
| Sea Rogue             | 19 | Second Front          | 20 |
| Sea Team              | 37 | Sort Weapon Luftw     | 39 |
| Second Front          | 20 | Tour of Duty ea       | 20 |
| Sort Weapon Luftw     | 39 | Sesame St. Lrn Cls    | 31 |
| Tour of Duty ea       | 20 | Sesame St. Publish    | 25 |
| Sesame St. Lrn Cls    | 31 | Sesame St. Vol.1/2/17 | 17 |
| Sesame St. Publish    | 25 | Seven Cities of Gold  | 38 |
| Sesame St. Vol.1/2/17 | 17 | Shadow President      | 39 |
| Seven Cities of Gold  | 38 | Shadow Prohecy        | 30 |
| Shadow President      | 39 | Shadowgate            | 27 |
| Shadow Prohecy        | 30 | Shadowlands           | 29 |
| Shadowgate            | 27 | Shanghai II           | 31 |
| Shadowlands           | 29 | Siege                 | 44 |
| Shanghai II           | 31 | Dogs at War           | 20 |
| Siege                 | 44 | Sierra Action Five    | 25 |
| Dogs at War           | 20 | Sierra Award Winner   | 47 |
| Sierra Action Five    | 25 | Sierra Family Fun     | 32 |
| Sierra Award Winner   | 47 | Sierra Starter Bndl   | 39 |
| Sierra Family Fun     | 32 | Silent Service 2      | 19 |
| Sierra Starter Bndl   | 39 | Sim Ant               | 34 |
| Silent Service 2      | 19 | Sim City              | 30 |
| Sim Ant               | 34 | Sim Ant French        | 35 |
| Sim City              | 30 | Sim City Windows      | 34 |
| Sim Ant French        | 35 | Sim Earth             | 39 |
| Sim City Windows      | 34 | Sim Life Dos/Wind     | 35 |
| Sim Earth             | 39 | Simpsons              | 31 |
| Sim Life Dos/Wind     | 35 | Snap Dragon           | 32 |
| Simpsons              | 31 | Snoopy Game Club      | 29 |
| Snap Dragon           | 32 | Solitaire Window      | 29 |
| Snoopy Game Club      | 29 | Solitaires Journey    | 35 |
| Solitaire Window      | 29 | Space Ace 2/Bort      | 36 |
| Solitaires Journey    | 35 | Space Adventure       | 42 |
| Space Ace 2/Bort      | 36 | Space Hulk            | 37 |
| Space Adventure       | 42 | Space Quest 4         | 37 |
| Space Hulk            | 37 | Space Quest 5         | 39 |
| Space Quest 4         | 37 | Spaceward Ho          | 35 |
| Space Quest 5         | 39 | Spear of Destiny      | 39 |
| Spaceward Ho          | 35 | Special Forces        | 29 |
| Spear of Destiny      | 39 | Spectre               | 35 |
| Special Forces        | 29 | Speed Reader          | 31 |
| Spectre               | 35 | Spellbound            | 31 |
| Speed Reader          | 31 | Spellcast 301         | 35 |
| Spellbound            | 31 | Spell Craft           | 35 |
| Spellcast 301         | 35 | Spell-I Plus          | 30 |
| Spell Craft           | 35 | SpellJammer           | 37 |
| Spell-I Plus          | 30 | Sports Adventure      | 33 |
| SpellJammer           | 37 | Sprout                | 39 |
| Sports Adventure      | 33 | Star Control 2        | 35 |
| Sprout                | 39 | Star Legions          | 37 |
| Star Control 2        | 35 | Star Trek 25th Aniv.  | 37 |
| Star Legions          | 37 | Star Trek AudioClip   | 34 |
| Star Trek 25th Aniv.  | 37 | Next Generation       | 38 |
| Star Trek AudioClip   | 34 | Star Trek Screen Sav  | 37 |
| Next Generation       | 38 | Sticky Math Tutor     | 30 |
| Star Trek Screen Sav  | 37 | Sticky Pre-School     | 30 |
| Sticky Math Tutor     | 30 | Sticky Read Tutor     | 30 |
| Sticky Pre-School     | 30 | Sticky Spell Tutor    | 30 |
| Sticky Read Tutor     | 30 | Storm Across Europe   | 38 |
| Sticky Spell Tutor    | 30 | Storybook Weaver      | 29 |
| Storm Across Europe   | 38 | Strike Commander      | 48 |
| Storybook Weaver      | 29 | Strike Poker 3        | 32 |
| Strike Commander      | 48 | Data Disk (ea)        | 17 |
| Strike Poker 3        | 32 | Studyware for ACT     | 30 |
| Data Disk (ea)        | 17 | GMAT, GRE, SAT        | 30 |
| Studyware for ACT     | 30 |                       |    |
| GMAT, GRE, SAT        | 30 |                       |    |

|                      |    |                          |     |
|----------------------|----|--------------------------|-----|
| Swayer Biology,      | 36 | <b>C D ROM</b>           |     |
| Calc., Chem., Econ., | 22 | Aesops Fables            | 33  |
| Physics, Statistic   | 25 | Aircraft Encyclopa       | 45  |
| Studyware LSAT       | 37 | Aloha Hawaii             | 45  |
| Stunt Island         | 37 | Amer Bus. Phnk           | 39  |
| Summer Challenge     | 34 | Amer Hert Pct Dct        | 75  |
| Super Tetris         | 31 | Arthur Teacher Tbl       | 41  |
| Take a break X-Word  | 29 | Arduon Mammals           | 37  |
| Pinball *            | 28 | Autodesk Explorer        | 119 |
| Task Force 1942      | 37 | Barney Bear Goes         | 26  |
| T.M.N.Turtle Arcade  | 25 | To School                | 26  |
| T.M.N.Turtle Advrnt  | 32 | Into Space               | 26  |
| Tengens Arcade Hit   | 25 | Batik Designs            | 45  |
| Terminator 2029      | 39 | Battlechess              | 49  |
| Termin 2 Cyberchess  | 35 | Beauty & Beast           | 30  |
| Tetris Classic       | 31 | Beethoven Ninth          | 59  |
| Tetris Tno           | 30 | Beritz Think & Talk      | 105 |
| The Legacy           | 33 | French                   | 105 |
| The Last Vikings     | 29 | Spanish                  | 105 |
| Time Riders America  | 35 | Bible Library            | 49  |
| Time Treks           | 36 | Bibles & Religion        | 30  |
| Time Quest           | 37 | Bookshelf                | 129 |
| Tom Landry Football  | 30 | Britanica Family Ch      | 75  |
| Tommy LaRussa Base   | 17 | Business Master          | 32  |
| Tony LaRussa II      | 37 | Buzz Aldrin Race         | 59  |
| Expansion Disk       | 15 | Carmen World Dlx         | 65  |
| Top Class Series ea  | 16 | Career Opportunities     | 42  |
| Traders              | 19 | Cautious Condo           | 45  |
| Treasure Cove        | 35 | C D Game Pack            | 55  |
| Treasure Math Storm  | 35 | C D Speedway             | 57  |
| Treasure Mountain    | 35 | Challenge 5 Realms       | 37  |
| Treeshouse           | 35 | Christmas Carol          | 33  |
| Tristan Pinball      | 32 | CIA World Fact           | 39  |
| Trolls               | 25 | CIA World Fact M/M       | 42  |
| Trump Castle 3       | 29 | Cilpat Goliath           | 30  |
| Turbo Science        | 30 | Conan Cimerion           | 36  |
| Turtle Tools         | 69 | Conr Draw Upgd           | 139 |
| Ultima 7             | 47 | Crossword Cracker        | 32  |
| Ultima 7 Part 2      | 47 | Deathstar Arcade         | 25  |
| Ultima Trilogy 1     | 37 | Dictionaries & Lang      | 30  |
| Ultima Trilogy 2     | 47 | Don Quixote              | 33  |
| Ultima Underworld    | 47 | Education Master         | 32  |
| Part 2               | 47 | Electronic Cookbook      | 75  |
| Ultrasoft            | 37 | Elect. Home Library      | 49  |
| Uninvited Windows    | 31 | Elect. Traveler/Call     | 33  |
| U.S. Atlas DOS       | 31 | Encarta Encyclop         | 249 |
| Utopia               | 29 | European Monarchs        | 49  |
| V for Victory 1/2 ea | 49 | Family Doctor            | 59  |
| Vegas Games Win      | 19 | Font Master              | 39  |
| Veil of Darkness     | 37 | Food Analyst             | 49  |
| Virtual Reality St 2 | 59 | Fresh Arte               | 49  |
| Wacky Funster        | 37 | Front Page News          | 29  |
| Waxworks             | 35 | G Force                  | 19  |
| Wayne Gretzky 3      | 35 | Game Master              | 32  |
| Western Front        | 22 | Game Pack 2              | 39  |
| When 2 Worlds War    | 35 | Gettysburg/MM Hist       | 43  |
| What's My Angle      | 30 | Golf Winkies Adv         | 33  |
| Wheel Fortune Vana   | 25 | Golden Immortal          | 28  |
| Where Cam San Diego  | 39 | Great Cities Vol 1       | 49  |
| America's Past       | 32 | Guinness Book Rec        | 59  |
| Europe               | 30 | Guy Spy                  | 32  |
| Time                 | 30 | Ham Call                 | 49  |
| USA                  | 30 | Inspector Gadget         | 37  |
| USA Deluxe           | 44 | Interactive Old Time     | 52  |
| World Deluxe         | 44 | Interactive Storytelling | 45  |
| Wild Science Arcad   | 35 | Int'l Bus & Econ Atlas   | 39  |
| Wilson Pro Staffing  | 25 | Into Games Fr/Sp         | 79  |
| Ween: The Prcly      | 34 | Jazz: Multimedia Hist    | 69  |
| Willy Beamish        | 25 | Jets & Props             | 55  |
| Wing Commandr 2      | 47 | Jones in Fast Lane       | 37  |
| Wizardry Trilogy     | 31 | Just Grandma & Me        | 36  |
| Word Muncher         | 30 | Jutland                  | 54  |
| Word Tutor           | 30 | Kings Quest 5            | 42  |
| Ital. Gem. Span      | 25 | Land Of Lore             | 34  |
| Wordtris             | 29 | Languages of World       | 99  |
| World Atlas DOS      | 39 | Learn to Speak Span      | 59  |
| World Circuit        | 34 | Leisure Suit Larry       | 42  |
| Writer Rabbit        | 30 | Library of Art:Renais    | 65  |
| X Wing               | 39 | Libry of Art:Overvie     | 65  |
| Yr Prsnl Train SAT   | 30 | Library of Future        | 99  |
| Zodiac Signs         | 39 | Loom                     | 39  |
| Zoo Keeper           | 36 | Lovely Ladies II         | 49  |
| Zug's Spelling Adv   | 22 | MacMillan Child Dic      | 49  |
| Adv of Eco Island    | 22 |                          |     |
| Dinosaur World       | 22 |                          |     |
| Race Thru Space      | 22 |                          |     |

|                     |     |                      |      |
|---------------------|-----|----------------------|------|
| Manhole             | 49  | <b>Sound Cards</b>   |      |
| Magazine Rack       | 45  | Ad Lib Microchannel  | 69   |
| Manis               | 45  | Ad Lib Gold 1000     | 179  |
| Marketing Master    | 39  | ATI Stereo F/X       | 109  |
| Mavis Beacon        | 39  | VGA Stereo/FX 1MB    | 369  |
| Mixed Up Moth Gse   | 37  | Covox Snd Mster II   | 149  |
| Monarch Notes       | 75  | Gravis Ultra Sound   | 125  |
| Monkey Island       | 39  | Logic Soundm 179     | 33   |
| M S DOS Archives    | 35  | Media Vision         | 139  |
| MM Music: Mozart    | 33  | CDPC / XL            | 1199 |
| MM Music: Vivaldi   | 33  | Pro Audio Spec + 139 | 50   |
| North Amer Fax Bk   | 55  | M.M. Upgrade Kit     | 765  |
| North Amer Indians  | 55  | Pro Audio Spec 16    | 190  |
| Officers Bookcase   | 50  | Pro 16 Multimedia    | 49   |
| Our Solar System    | 29  | Upgrade Kit          | 955  |
| PC Game Room        | 49  | Thunderboard         | 95   |
| Peter & Wolf        | 45  | Thunder & Lightning  | 229  |
| Pool Shark          | 19  | Sound Blaster        | 99   |
| Presdnt:It Strt Geo | 105 | Sound Blaster Pro    | 189  |
| Programmers ROM     | 69  | S B Pro 16           | 239  |
| Publish #1          | 69  | S B Multimedia Kit   | 560  |
| Reference Library   | 59  | S B M.M. Starter Kit | 450  |
| Reform/Airball/Time | 35  | S B CDROM Intrnl     | 360  |
| San Diego Zoo       | 49  | Sound Machine incl   | 30   |
| Secret Weapons      | 59  | SB, Speaker, Joystk  | 375  |
| Seventh Guest       | 59  | Roland SCC-1 GC      | 95   |
| Sherlock Holme      | 39  | Roland Carvas        | 559  |
| Shel Holmes 2       | 42  | Roland MA-12C ea     | 105  |
| Sleeping Beauty     | 37  | SPEAKERS Shielded    | 28   |

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## REVIEWS

pluses include an extensive, well-illustrated glossary and plenty of screen dumps, right where you'd expect to find them. Nothing is gratuitous or out of place in DrivePro's manual—a rarity, especially for highly technical tools such as this one. My only complaint is with the index, which covers only a dozen and a half topics (but covers them extensively).

Owners of IDE drives will find a host of new features mentioned in the README file but not in the manual. One of the most amazing is the /IDE command line switch. It figures out which drive type to write to the CMOS, partitions that drive, and does a high-level format of each partition—in a minute.

Another useful option I wish I'd known about (I forgot to read the README until later) is the /G switch, which steps you through the installation of a hard disk automatically. This is the perfect solution for in-between users like me, those who aren't afraid of playing with the precious innards of a hard disk but who aren't yet experts at it. I hope the next version of DrivePro makes it a menu option.

Perhaps the best freebie is DrivePro's Tables and Databases option. This alone is worth the product's price if you're involved in the ongoing process of maintaining systems. It's an online listing of drive-controller card specifications, names and address of hardware companies, an interrupt table, a list of BIOS calls used by the hard disk, and 80x86 assembly language opcodes! Bells and whistles to be sure, but bells and whistles that could save you hours or even days of research.

DrivePro is truly a pro, and it represents a great value for its price.

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## SUMMER CHALLENGE

The spirit of competition shines brightly in this dynamic sports simulation, the latest from Jeff Sember and Mike Benna, designers of Hardball III and Joe Montana Football. A perfect party game, up to ten players compete in eight Olympic-style events. Although each sport has seen action in previous titles, rarely have they been presented with such style and vivacity.

Key to the game's success is an outstanding blend of bitmapped anima-

tion and ultrafast 3-D polygon backgrounds rendered in brilliantly shaded 256-color VGA. Onscreen characters move with lifelike agility, complemented by a full range of digitized sound effects. Another major asset is the streamlined control system, making each event instantly accessible to all players, regardless of experience. A short-throw joystick, such as the Gravis PC GamePad, is highly recommended.



It's hard to know where to begin lavishing praises on Summer Challenge.

The game offers both practice and tournament play, complete with opening and closing ceremonies. Players choose their alter egos from male or female athletes representing 16 countries. Computer competition is culled from the same stable, divided into three skill levels: amateur, professional, and world class. These computerized opponents are merely benchmarks, however, providing formidable records for you to break. Instant replays of particularly valiant efforts can also be saved to disk for later review. Use this feature's incremental forward and rewind to pinpoint performance strengths and weaknesses.

The designers score their first bull's eye in the Archery event, a surprisingly accurate simulation of strength, controlled tension, and precision aiming. Equestrian competition offers the best depiction yet of this challenging sport. Viewed from behind horse and rider, the event requires a flawless combination of speed, position, and meticulous timing to survive the 16-obstacle course.

Kayaking makes a big splash in its breakneck run down a one-kilometer flume, through a series of 25 gates and hairpin turns. The illusion of speed and buoyancy is magnificent, created by rapidly changing sections of shaded polygons. Similar effects are used in the 400-meter Hurdles and Cycling, two events that showcase the game's smooth animation. Both contests require constant button action to maintain top running and pedaling speed. Use an autofire joystick to limit fatigue and get an edge on the competition.

# Advertisers Index

| Reader Service Number/Advertiser      | Page       | Reader Service Number/Advertiser      | Page   | Reader Service Number/Advertiser   | Page                                             |
|---------------------------------------|------------|---------------------------------------|--------|------------------------------------|--------------------------------------------------|
| 162 8-Bit                             | G-23       | 300 ID Software                       | 95     | 143 Sierra OnLine                  | 47                                               |
| 133 Advanced Gravis                   | 23         | 231 Jackson Marking Products Co. Inc. | 118    | 109 Smart Luck Software            | 124                                              |
| AICS                                  | 25         | 140 JemimaSoft                        | 121    | 196 SMC Software Publishers        | A-19                                             |
| 142 Amazing Sources                   | 121        | 197 KF-PD Software                    | G-9    | 121 SMC Software Publishers        | 123                                              |
| 268 Amish Outlaw Shareware Company    | 123        | Kid Secure of America                 | 125    | 126 SoftShopper                    | 123                                              |
| 244 Antigrav Toolkit                  | G-21       | 282 Lawrence Research Group           | 109    | 195 Software Studio, The           | A-19                                             |
| 298 Bare Bones Software               | A-29       | 117 Legacy Software                   | 122    | 190 Software Support International | G-7                                              |
| 152 Bear Technologies                 | G-10       | 136 Legendary Des.Tech.Inc.           | A-28   | 297 Software Support International | A-29                                             |
| 151 Bear Technologies                 | A-23       | 137 Legendary Des.Tech.Inc.           | A-19   | 210 Software Support International | 123                                              |
| Best Personalized Books               | 119        | 146 Living Proof, Ltd                 | G-21   | SOGWAP Software                    | A-9                                              |
| 288 BIX                               | 35         | 255 Logitech                          | 14,15  | SOGWAP Software                    | G-13                                             |
| 173 Blue Valley Software              | 122        | 235 LWS Software                      | 116    | 184 SONY                           | 6,7                                              |
| 293 BlueJay Systems                   | 118        | 260 Mad Man Software                  | G-9    | 286 Spectrum Holobyte              | 43                                               |
| 218 Body Cello                        | 121        | 280 Mallard Software                  | 53     | 158 Spirit of Discovery            | 75                                               |
| 304 Cal Ad Software                   | 121        | 225 Masterclips, Inc.                 | 48     | 130 Starware Publishing            | 121                                              |
| 181 Caloke Industries                 | G-10       | 194 MegageM                           | A-19   | 127 StepWay                        | 1, 51                                            |
| 149 Chips & Bits                      | 99         | 176 Merit Software                    | 41     | 179 SubLogic                       | 44,45                                            |
| 294 CIE                               | 65         | 200 MicroMagic Productions            | 125    | 147 Thrustmaster                   | 117                                              |
| 139 CMD/Creative Micro Designs        | G-11       | 289 MicroStorm Software               | G-21   | 144 TSI/Texas Star Inc.            | 123                                              |
| 128 ComPro Software Systems           | 120        | 191 Needham's Electronics             | 116    | 242 Tycom Inc.                     | G-10                                             |
| 150 CompSult                          | 124        | 135 New Horizons Software             | G-21   | 301 U.S. Robotics                  | IBC                                              |
| 108 CompuServe                        | 16,17      | 201 New World Computing               | 97     | 138 Villa Crespo Software Inc.     | 79                                               |
| Computer Business Services            | 118        | 141 Odyssey OnLine                    | 124    | 132 Virgin                         | 90,91                                            |
| 254 Computer Friends, Inc.            | 122        | Oldsmobile                            | 11     | 183 Virgin                         | 87                                               |
| 284 Computer Technologies             | G-10       | 192 Origin                            | 54     | 155 Virtual Reality Labs           | 18                                               |
| Comtrad Industry                      | 13         | 134 Panasonic                         | 119    | 154 Virtual Reality Labs           | 49                                               |
| 125 Creative Labs                     | 3          | 164 Parsons Technology                | 29     | 172 Wedgwood Computer              | 124                                              |
| 113 Creative Pixels                   | G-10       | 106 Parth Galen                       | A-28   | Windows                            | 900, 120                                         |
| 226 Crosley Software                  | 122        | 273 Passport Designs                  | 71     | Classifieds                        | 126, 127                                         |
| Daniel Rogers Int'l                   | 107        | 186 Patch Panel Software              | 122    | Product Mart                       | 116, 117, 118, 119, 120, 121, 122, 123, 124, 125 |
| 161 Delphi                            | 27         | 250 PC Enterprises                    | 122    | 104 COMPUTE Books                  | 57, 101, 104, 105, 120, A-7, G-9                 |
| 131 DemoSource                        | 119        | Pendragon Software Library            | 123    |                                    |                                                  |
| 238 DevWare Video                     | 122        | 107 Penthouse Modem                   | 125    |                                    |                                                  |
| 193 Digital Expressions Research      | A-19       | 103 Penthouse OnLine                  | 109    |                                    |                                                  |
| 253 Disks O'Plenty                    | G-21       | 153 Performance Peripherals Inc.      | G-21   |                                    |                                                  |
| 208 Disk-Count Software               | 111        | 185 Poor Person Software              | A-19   |                                    |                                                  |
| 275 Dr. T's Music Software            | 108        | 193 Professional Cassette             | 115    |                                    |                                                  |
| D&K Enterprises                       | 119        | 277 Professional Cassette             | 93     |                                    |                                                  |
| 258 Electronic Arts                   | 83         | 256 Profit Group, The                 | 117    |                                    |                                                  |
| FGM Connection                        | G-23       | 165 Psynosis                          | 67     |                                    |                                                  |
| 285 Finetastic Computers              | A-9        | Pure Entertainment                    | 112    |                                    |                                                  |
| 115 Free Spirit Software              | 103        | 198 Puzzle Factory Inc., The          | A-23   |                                    |                                                  |
| Gateway 2000                          | IFC, 1     | 257 Ramco Computer Supply             | A-19   |                                    |                                                  |
| 215 Genesis Electronic Services, Inc. | A-23, A-29 | 199 Realism Entertainment             | 55     |                                    |                                                  |
| Grapevine Group,                      | The A-29   | 204 Revell-Monogram, Inc.             | 38, 39 |                                    |                                                  |
| 145 Grapevine Group,                  | The G-17   | 212 SafeSoft Systems Inc.             | 123    |                                    |                                                  |
| Hope Career Center                    | 118        | 112 School of Computer Training       | 118    |                                    |                                                  |
| 234 Horse Feathers Graphics           | G-13       | 116 SeXXy                             | 124    |                                    |                                                  |
| IBM                                   | 5          | 148 Sierra OnLine                     | BC     |                                    |                                                  |

|                              |      |
|------------------------------|------|
| Amiga Best Utilities Disk    | A-11 |
| Gazette Disk Subscription    | G-13 |
| Gazette Index                | G-17 |
| Gazette Productivity Manager | G-19 |
| Gazette Single Disk Order    | G-40 |
| Gazette Specialty Disks      | G-2  |
| Gazette SpeedScript          | G-23 |
| SharePak Disk Subscription   | 61   |

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Pole Vaulting is by far the game's toughest event—an arduous blend of speed, agility, and timing, with little margin for error. Players are given three chances to clear the bar, which can be adjusted from 4 to 6.2 meters in height. High Jumping requires comparable strengths and is only slightly less demanding. Once again, bar height can be changed from 1.7 to 2.5 meters. Jump too soon and your on-screen athlete will perform a painful back flop in the cinders, yelling, "Agh! That hurt!"

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## DVORAK ON TYPING, TYPING TUTOR 5+

Typing lessons have certainly come a long way since the early 1980s: Back then, I sat in a windowless basement room at my high school, clattering away on elderly electrics along with 25 or 30 other teenagers. (I always sat near the back so I could trade insults with a cheerleader I knew.) With Interplay's Dvorak on Typing and Typing Tutor 5+ from Que Software, you get everything Mrs. McIntyre taught in the privacy of your own pod, along with such nice-

ties as digitized speech prompts and typing games.

The programs work on similar principles, although there are clear differences in their interfaces, teaching styles, and games. Dvorak on Typing is the chatty one, talking you through the entire program (unless you turn the sound off). Typing Tutor 5+, its mute competitor, keeps mum but offers a more conventional, Windows-like interface.

Dvorak on Typing trades on the name of the alternative keyboard, boasting development input from "world-renowned computer columnist" John C. Dvorak. Its speech capabilities resemble those of a speech-equipped car—you know, "Your key is in the ignition." It begins by asking, "What is your name?" and concludes by prompting, "Are you ready to quit?"

In between, you get a test to determine whether you're a beginner, an intermediate, or an advanced typist; helpful typing drills; dictation practice from the digitized voices; progress reports; and the Sword Fighting Game, in which your typing prowess can boost the efforts of a saber-wielding knight. While its interface differs from the Windows standard—you merely type *L* to begin Lessons, for instance, with no Alt-key combination—it's an intuitive setup that requires no effort to learn using either a keyboard or a mouse. The program has an attractive, uncluttered feel.

Dvorak on Typing's voice prompts amount to aural clutter, for the most part, although the program's speech capabilities give it an edge when it comes to actual teaching. During typing drills, it says errant key-

strokes out loud and changes their color. While the Windows version doesn't precisely match the descriptions on the box and manual, there are no substantive failings. You don't get to choose the child's voice for speech prompts, for example, but that's no great loss.

I never did get to try the "faster-to-use but exotic and uncommon" Dvorak keyboard, unfortunately. While the manual indicates it can be loaded from the program's Preferences screen, a supplementary Windows information sheet indicates that the keyboard must be loaded in Windows (if you have the necessary driver; I don't), at which point Dvorak on Typing will employ it automatically.

I discovered no such discrepancies using either the DOS or the Windows version of Typing Tutor 5+. I mostly used the Windows version of Typing Tutor 5+, but the DOS version appeared roughly equivalent—despite a markedly less attractive interface. The program lacks Dvorak on Typing's speech capabilities, and its user interface is relatively more complicated, though nothing that will surprise anyone familiar with graphical user interfaces. To start a lesson, you must select New or Open from the File menu rather than answer a prompt as you do at the beginning of Dvorak on Typing. Once you're in, Typing Tutor 5+ lets you begin just as easily as Dvorak on Typing to learn basic typing skills or, if you're experienced, improve your work on everything from ampersands to asterisks.

Typing Tutor 5+ includes elements I love and loathe. Unlike Dvorak on Typing, which indicates finger posi-

tions with an unobtrusive graphic of two static hands moving slowly, Typing Tutor 5+ shows a graphic of ghostly hands flying over the keyboard—a terrible distraction. It's easy to turn off, fortunately. Some of the sentences in the Typing Tutor 5+ lessons are horribly wordy and convoluted, making it unnecessarily difficult to practice your typing (unless you find it natural to type *poetic tachism, neoconstructivism, poptical art, or realism!*).

It bothers me that both programs' drills require you to type two spaces after each sentence, an outdated hold-over from the days before word processors. But I like the way Typing Tutor 5+ allows you to do warmup typing sessions before beginning skills tests. And I loved its game: Unlike Dvorak on Typing's diffuse, nebulous knight contest, Typing Tutor 5+ features a terrific Space Invaders knockoff called Letter Invaders. In it, you zap killer characters and words by typing them before they hit the ground.

Both programs have strengths and weaknesses, but I don't think you'd stray with either. Whether you're a novice interested in learning to type or a veteran looking to hone your skills, either Dvorak on Typing or Typing Tutor 5+ should provide all the instruction you need. You'll have to provide your own cheerleader.

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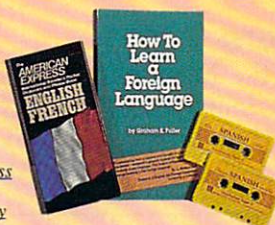
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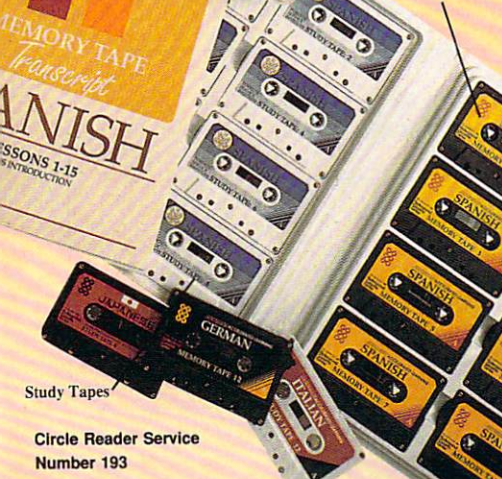
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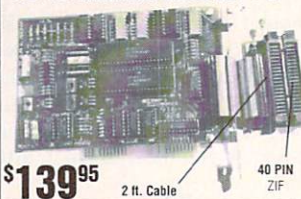
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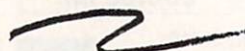
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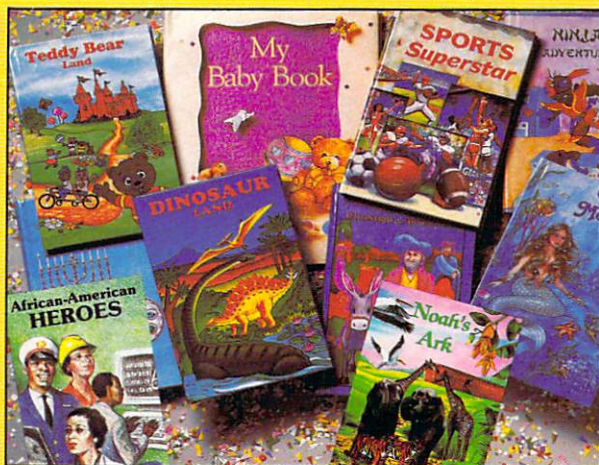
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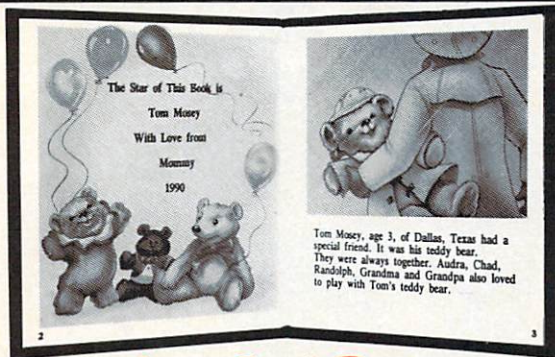
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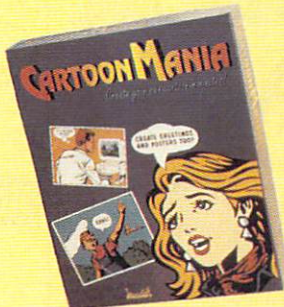
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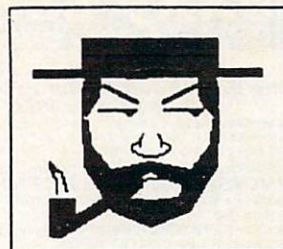
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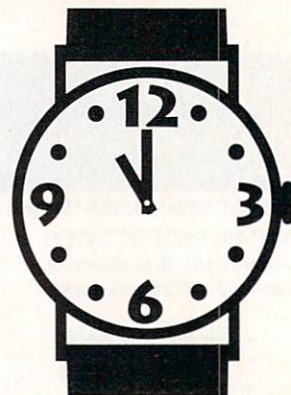
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## Help for Bombed Businesses

MBS Technologies of McMurray, Pennsylvania, offered its FileRunner software free to World Trade Center companies whose operations were disrupted by the February 26 bombing. FileRunner is a sophisticated file-transfer program that allows computer files to be transferred error free from one PC or Mac to as many others as necessary. The software aided disaster recovery by allowing companies to keep track of their latest versions of Mac and PC files while they worked out of temporary offices.

## Design a Dungeon

Strategic Simulations Incorporated (SSI), best known for its line of Advanced Dungeons & Dragons fantasy role-playing games and products, is holding a "Dungeon Design Contest." Running from April 1 to June 30, 1993, the contest challenges players to create a one-level, one-map dungeon using SSI's Unlimited Adventures: Fantasy Construction Kit. A panel of judges will choose the top six designs, based on challenge and originality of art and monsters, which will then be uploaded to America Online for its 150,000 subscribers to play and select the grand-prize winner. Prizes will also be awarded for best monsters, best art, and best dungeon. For more details, contact SSI at 675 Almanor Avenue, Suite 201, Sunnyvale, California 94086; (408) 737-6800, (408) 737-6814 (fax).

## It Does Windows

Dynasty, the home-computerizing software from Home Automation Laboratories (HAL), is now Windows-friendly. Once it's installed, running your home security, audio, video, weather-monitoring, and communications systems

along with lighting and appliances can now be as easy as pointing and clicking on a button in Windows.

## Renting Is Big Business

The computer-rental business is now a \$500 million industry growing at a 35-percent annual rate, according to PCR, a Cranbury, New Jersey, company that specializes in renting computer equipment and peripherals anywhere in the United States. Businesses need extra computers for seminars, trade shows, seasonal peaks, and for employees on sick or maternity leave (a growing market segment). And there are also the home users and freelancers who rent laptops for travel. What questions should you ask before renting? First, suggests PCR, know the processing speed you require (for instance, for desktop publishing or for spreadsheet work), and decide beforehand if you need color. When you're ready to make a selection, find out whether brand names or clones are available, if the equipment is tested prior to each rental, what support and maintenance are available, how soon you can get the equipment, how it will be delivered, and what, if any, delivery restrictions apply.

## Talk Radio on the PC

Internet Talk Radio, an entirely new dimension in broadcasting, was scheduled to begin airing a weekly half-hour interview program over Internet in late March. With the sound support offered by Sun Microsystems, Apple, NeXT, IBM, and other vendors, and with Internet's electronic mail protocols' support for multiple data types, the Talk Radio program will use encoding formats and conversion programs to support audio playback in all major environ-

ments. For now, Internet Talk Radio, which is sponsored by Sun Microsystems and O'Reilly & Associates, will air its program "Geek of the Week," featuring interviews with notable members of the Internet community. Later programs will air more frequently and include book reviews, short features, and such nontechnical features as reviews of restaurants in exotic places.

## The Future of Floppy Drives

Signaling what will surely be a future trend, Dell Computer is now offering Sony's 3½-inch 4MB floppy drives as a custom option for Dell's new 486-based family of computers. The new 4MB floppy (2.88MB formatted capacity) offers 100 percent more capacity than conventional 2MB floppies, along with full backward compatibility with 1MB and 2MB disks.

## CompuServe Provides Knowledge Index

CompuServe and Dialog Information Services announced that beginning in early April, CompuServe would become the exclusive U.S. carrier of Knowledge Index, Dialog's after-hours online research service for consumers.

Knowledge Index provides access to more than 120 of the most popular databases on DIALOG, an online information service used by professional research specialists. Research databases include the complete text of 33 major newspapers, scientific abstracts, corporate news, government publications, legal information, and reference sources.

Available during off-peak hours (nights and weekends) according to local user time, Knowledge Index is targeted primarily at students, educators, and business and scientific professionals. □

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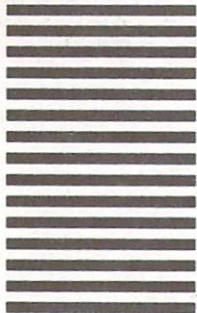
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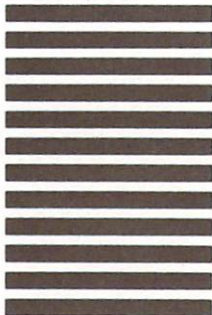
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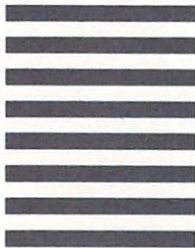
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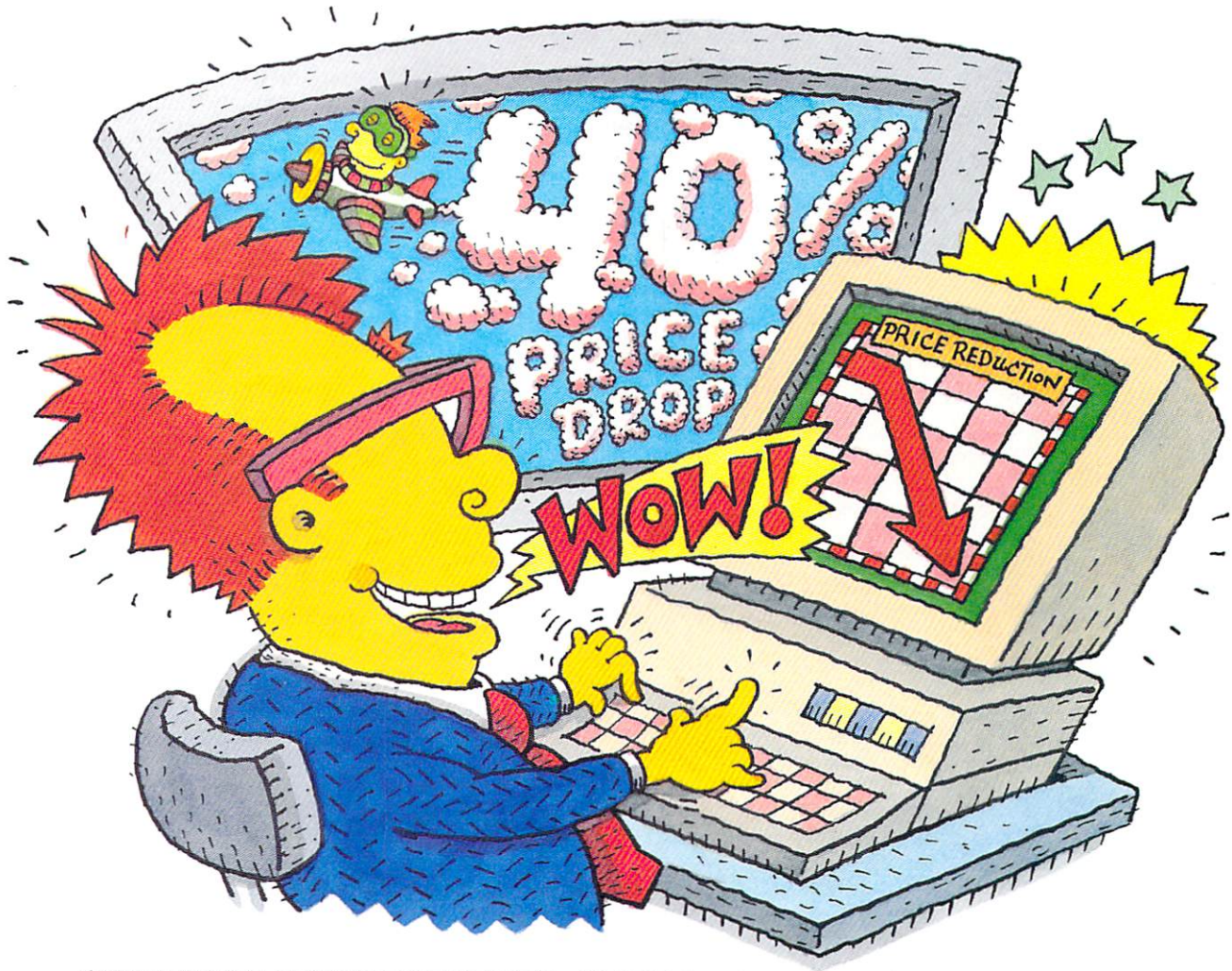
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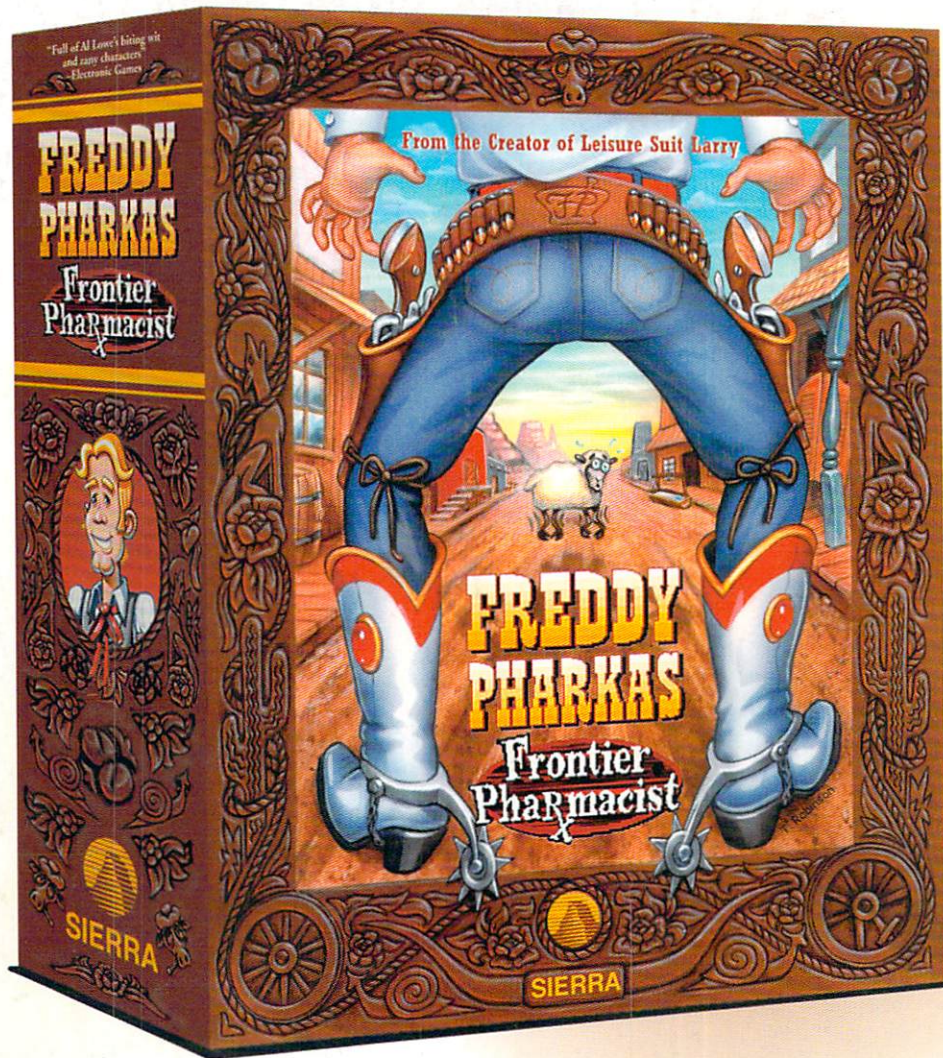
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