WIN A 486-66 PC RATE YOUR PC MAKER'S SERVICE AND SUPPORT

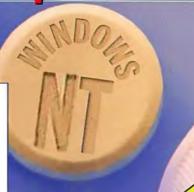
October 1993 \$3.95

MICRO

17 Graphics **Boards From \$135**

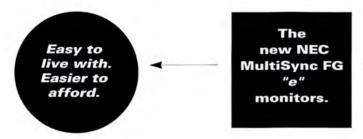
WordPerfect 6.0 for DOS: Special **Tear-Out Guide**

Battle of the NT **Machines: Pentium** vs. Alpha vs. MIPS



QUATTRO PRO 5.0.

Pardon us, but would you mind if we sat right here on your desk, a mere two feet away from you, for the next few thousand hours?



We realize that's a lot to ask. And we kept that firmly in mind when we created our new MultiSync* FGe* monitors.

More monitor for less money.

For less than you'd expect, they give



you everything you ever wanted in a monitor.

Big, roomy screens—15" for our 3FGe and 4FGe, 17" for our 5FGe*— provide plenty of space for Windows and multimedia video. Higher refresh rates deliver even crisper, steadier

images. They also offer broader compatibility with PC and Mac* platforms, including IBM**s XGA*-2 standard. Compliance with strict Swedish MPR II emissions guidelines. Even, a new 3-year limited warranty.



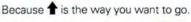
All for a price that's nothing short of phenomenal for monitors this great.

The image you deserve.

Above all, they give you image quality so sharp, colorful and bright, it'll give your work a whole new focus.

For more on the amazing MultiSync FGe monitors, call 1-800-NEC-INFO. In Canada, 1-800-343-4418. For details via fax call NEC FastFacts⁻¹, 1-800-366-0476, and request document 1521.

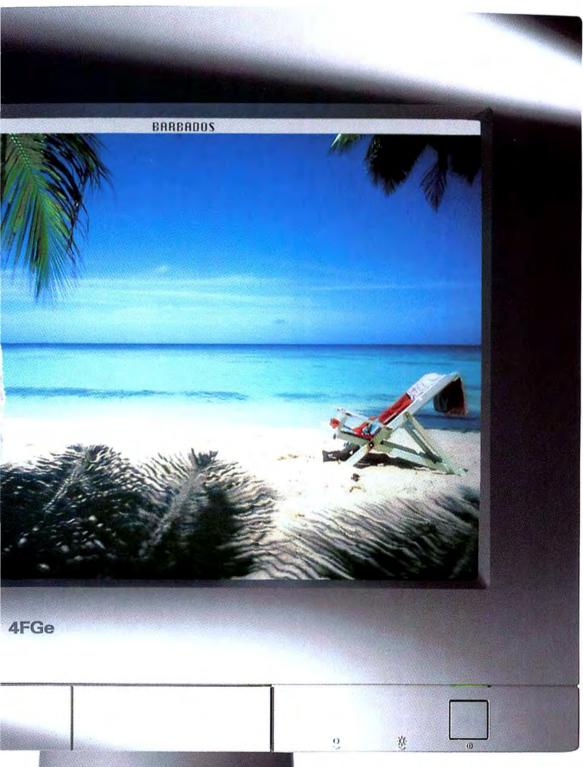
Thank you for inviting us onto your desktop.







But it'll be okay.





In cur new FGe series, the 'e' is for ergonomics. And economics. They're easy to live with—the way NEC monitors have always been. They're also easier to afford.



PC WORLD



Special Report

156 Windows NT: Changing the PC Landscape

Signaling a new era in desktop computing, NT brings unprecedented power to the familiar Windows interface. Should you make the switch, and if so, when? Here's all you need to know about NT systems, applications, and hardware to make the right decision.

164 NT PCs: Freedom of Choice

Our tests of 16 killer PCs—based on 486DX2-66, Pentium, MIPS R4000 and R4400, and DEC Alpha chips—point to leaders in the battle for best NT system.

185 NT Applications: The Waiting Game

The benefit of NT can be summed up simply: power. But applications that take advantage of that power may be a long time coming.

201 NT Peripherals: Plug and Play?

Our findings? Most peripherals will work with NT, though you may need new software for your scanner, CD ROM drive, and fax-modem.

Cover photography by Stan Muselik, digital composition by TX Unlimited

DOS

142 Troubleshooting DOS 6.0

Want all the benefits of DOS 6.0's new configuration options, commands, and compression without any of the reported hassles? Read on for tips for a trouble-free upgrade.

- 142 DoubleSpace Compression Tips
- 144 Managing Memory
- 144 CONFIG.SYS Simplified
- 145 Compatibility Alert
- 146 Taming the Other Utilities
- 148 Command Line Performance



Top of the News

78 Novell Teaches DOS New Tricks

DOS 7 includes preemptive multitasking and built-in peer-to-peer networking.

80 Plug In, Turn On, and Go With Presario

It looks like a Mac, acts like a Mac, but it's a Compaq—and an easy-to-learn PC.

82 Quicken Does More Than Write Checks

The latest versions have powerful financial management and planning features.

84 QPW 5.0 Adds Data Modeling, Scenarios

Improv-like modeling features let you twist and turn data to view it any way you want.

90 Lightning Sparks Ambras

IBM's Blue Lightning 33/66-MHz produces sizzling desktops; ThinkPad line extended with multimedia model.



Graphics

206 Turbocharging Windows

Put some snap back into Windows with an ISA or local-bus graphics board. Our tests of 17 boards priced from \$135 will show you how to save money and still get top performance.

208 Recommended Buys

210 A Graphics Glossary

213 How Acceleration Works

Communications

224 The Best of Online Services

When FedEx is too slow and phone tag's too frustrating, consider doing business online. Our experts take the online route to planning a trip, making investments, getting technical support, and more.

227 The Big Four

230 The Best in BBS's

238 Beyond the Mainstream: Enter the Internet

Service and Support

95 Win a 486DX2-66 PC

How satisfied are you with your PC?
Have you had problems? Or is your PC
trouble-free? Tell us about it! Fill out and
fax in this month's survey for a chance to
win an NEC Image 466 PC.



p. 9

Here's How



242 Help Line

253 Spreadsheets

262 Word Processing

272 Windows

286 Data Management

290 Publishing & Presentations

297 Communications

300 Hardware

304 Star-Dot-Star

309 Instant Reference Card WordPerfect 6.0 for DOS

Departments

17 In This Issue

19 Letters

37 Consumer Watch

63 Real Problems, Real Solutions

67 Business Fixtures

345 Games: Break Time

348 Home Office

Resources

10 How to Contact PC World

311 Mail-Order Shopping Guide

329 PC World Catalog

341 Advertiser Index

342 Editorial Product Index

346 Coming Up

New Products

- 97 CompuAdd Centura, Dell Dimension, NetPlex, and OptiPlex 486 PCs
- 98 TI TravelMate 4000E WinDX2/50 notebook PC
- 98 Logitech ScanMan Easy-Touch, Caere OmniScan
- 100 Netpower RISC PC Series-100
- 100 STB Pegasus and PCI graphics boards
- 104 Maxtor 7000 Series Hard Drives

- 104 DPT SmartCache III SCSI adapters
- 106 Harvard Graphics 2.0 for Windows
- 108 Altsys Virtuoso 2.0 illustration software
- 108 Avantos ManagePro 2.0
- 113 Resume for Microsoft Word, PFS:Resume & Job Search Pro for Windows
- 113 Powercore Schedule/DOS

- 116 Commence 2.0 personal information manager
- 116 Quarterdeck QEMM 7.0
- 120 AT&T Personal Video System Model 70, Fujitsu DeskTop Conferencing hardware and software
- 124 BeyondMail 2.0 for MHS
- 124 Enable PowerLine 1.2
- 126 Quick Takes

136 Marketplace

Prices for popular PCs nationwide

PC World** (ISSN 0737-8939) is published monthly at \$29.90 for one year (12 issues), \$59.80 for two years (24 issues), \$89.70 for three years (36 issues) by PC World Communications, Inc., 501 Second St. #600, San Francisco, CA 94107, Foreign orders must be prepaid in U.S. funds with additional postage And \$18 per year for Canada and Metrico; add \$45 per year for immail for all other countries, Canadian GST Registration ##12466960. Second class postage pard at San Francisco and additional mailing offices. POSTMASTER: Send address changes to PC World, Subscription Dept., P.O. Box 55029, Boulder, CO 80322 5029. Editorial and business offices: 501 Second St. #600. San Francisco, CA 94107, 415/243-0500. Copyright @ 1993, PC World Communications, Inc. All rights reserved. The following are trademarks of PC World.

Powerful, Fast And Loaded With Features.

THE PART OF BUILDING

FIRST QUARTER WORLDWIDE SALES

ZEOS° LOCAL BUS UPGRADABLES.

Upgradable to Intel's Pentium™ OverDrive™ architecture

Tested and approved for compatibility and thermal compliance!

Local bus video— VESA standard!

Local bus IDE hard drives

More power.
More speed. More features than ever before—and more than you'll get anywhere else in a local bus upgradable system!

We start with a brand-new motherboard—one that's faster, more integrated, and gives you even more reliability. We've increased the size of our local bus hard

drives (all the way to 528MB!) and your hard disk data throughput is faster than ever before. Even better, we've taken one of the two VESA local bus slots (which can also be used for standard 16-bit cards) and added a screaming local bus video card...for Windows performance that "blows all competitors away" (PC Magazine).

"It's hard to imagine a brighter upgrade picture." —PC World

Flash BIOS

On-board Adaptec SCSI option

.28mm noninterlaced SVGA color monitor in every package!



So that

you can easily upgrade your system as new technology is developed, we include such features as CPU upgradability to Intel's Pentium OverDrive; a Zero Insertion Force (ZIF) socket; Flash BIOS for easy BIOS upgradability, and room to expand as well—with eight expansion slots and plenty of drive bays. With ZEOS local bus upgradables, you're investing in a bright future!

STANDARD WITH EVERY ZEOS LOCAL BUS UPGRADABLE:

- RAM expandable to 64MB on the motherboard.
- Upgradable processors that let you upgrade to Intel's Pentium OverDrive architecture.
- Zero Insertion Force (ZIF) socket makes upgrading easy.



- 14" ZEOS color SVGA non-interlaced monitor. .28mm dot pitch.
 - Two serial ports and one parallel port integrated on the motherboard.

- Flash BIOS for easy upgradability.
- Eight expansion slots: two VESA local bus, five 16-bit and one 8-bit.
- ZEOS six-bay desktop case.
- Two cooling fans for increased reliability and product life.
- High-capacity 200W power supply with builtin suppression; switchable between 115/230V.
- Socket for inexpensive optional on-board SCSI.
- Shadow RAM support.
- ZEOS 101-key Reduced Size (RS) keyboard.
- FCC Certified Class B; UL Listed.
- 24-Hour-Toll-Free Technical Support, 30-Day Money-Back Guarantee, complete ZEOS Customer Satisfaction Package.



Packages 2, 3 & 4 come with your choice of either Ami Pro. Freelance, Improv. Organizer, or the hot new Lotus 1-2-3 Release 4!

ZEOS LOCAL BUS UPGRADABLE SYSTEMS SYSTEM Package 1 Package 2 Package 4 Package 3 2MB high-speed RAM107MB local bus ■ 4MB high-speed RAM ■ 214MB local bus ■ 8MB high-speed RAM ■ 426MB, 13ms local bus ■ 16MB high-speed RAM ■ 528MB, 12ms local bus HIGHLIGHTS Choose a money-saving IDE hard drive w/32K IDE hard drive IDE hard drive IDE hard drive package-or we can w/128K cache w/128K cache w/256K cache cache build a system to your Windows-accelerated ■ Windows-accelerated ■ Windows-accelerated ■ Windows-accelerated exact specifications! VL local bus video with 1MB RAM 1MB RAM 1MB RAM 1MB RAM ■ Both 1.2MB and Your choice of floppy ■ Both 1.2MB and ■ Both 1.2MB and NOW: Hard drives 1.44MB floppy drives 1.44MB floppy drives 1.44MB floppy drives ■ 14" ZEOS color SVGA drives up to non-interlaced monitor. non-interlaced monitor. non-interlaced monitor. non-interlaced monitor. 528MB and .28mm dot pitch ■ MS DOS 6.0, Tools, .28mm dot pitch MS DOS 6.0, Tools, .28mm dot pitch MS DOS 6.0, Tools, 28mm dot pitch ■ MS DOS 6.0 plus new lower Enhanced Tools Windows & new Windows & new Windows & new Microsoft Mouse, Microsoft Mouse, Microsoft Mouse, prices! plus choice of Lotus Windows application plus choice of Lotus plus choice of Lotus Windows application Windows application Lease Price \$59/mo. Lease Price \$61/mo. Lease Price \$90/mo. 4865X-25 \$1395 \$1695 \$1995 \$2495 Lease Price Lease Price Lease Price Lease Price \$94/mo. \$2595 4865X-33 \$1495 \$1795 \$2095 Lease Price \$61/mo. Lease Price \$72/mo. Lease Price \$83/mo. Lease Price \$101/mo. 486DX-33 \$1695 \$1995 \$2295 \$2795 Lease Price \$65/mo. Lease Price \$76/mo. Lease Price \$87/mo. Lease Price \$105/mo. 486DX2-50 \$1795 \$2095 \$2395 \$2895 486DX2-66 \$1895 Lease Price \$69/mo. \$2195 Lease Price \$2495 Lease Price \$90/mo. \$2995 Lease Price \$108/mo.

FAVORITE OPTIONS	
15-INCH MONITOR UPGRADE SVGA non-interlaced, 1024x768, flat screen	\$95
VERTICAL CASE UPGRADE Includes ten bays	\$95
DIAMOND VIPER VIDEO CARD Combine it with the ZEOS motherboard and you'll get speed that PC Magazine said "blew all competitors away Includes 1MB VRAM	\$149
INTERNAL CD-ROM DRIVE	
ARCHIVE 51250A INTERNAL TAPE BAC 80 to 250MB (with compression), includes EZTape for DC	
ADAPTEC SCSI CONTROLLER CHIP	\$49
SPECIAL OFFER: WE'LL REPLACE YOUR 5¼" DRIVE IN ANY PACKAGE	
WITH A CD-ROM PLAYER!	\$99

Hundreds of other affordable upgrades and options available. Call for details!



AWARD-WINNING SERVICE & SUPPORT.

We're the only company to win PC Magazine's Readers' Choice for Service & Reliabilityfor both desktops and notebooks—twice!

TOLL-FREE TECH SUPPORT AT ANY HOUR.

We're here for you 24 hours a day, 365 days a year, and always a toll-free phone call away.

WARRANTIES & GUARANTEES.

All ZEOS systems come with a One Year Limited Warranty, Express Parts Replacement Policy and a 30-Day Money-Back Guarantee. You're going to be very satisfied. We guarantee it!

CALL NOW TOLL FREE HOURS A DAY



Fax Orders: 612-633-1325, Government: 800-245-2449, TDD Orders: 800-228-5839, Outside U.S.

Fax Orders: 612-633-6325, Government: 800-245-2449, TDD Orders: 800-228-6839, Outside U.S. and Canada: 612-633-6131. Master-Card, VISA, Am Exp, Discover, Z-Card, COD and Leasing programs. Open 24 Hours a Day, 365 Days a Year!
Purchase orders from Fortune 1000 companies, governments and institutions subject to approval. Leasing programs available. All products and company names are trademarks or registered trademarks of their espective builders. The Intel Inside logs is a registered trademark of Intel Corporation. C1992 EDS International, Ltd., 2001 Industrial Bod., Minneapolis, MN 564B USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). UPGR-PCW-900

The ZEOS® Freestyle Notebook.



PACKAGE 1

386SL Freestyle: \$1295 486SL Freestyle: \$1695

- 2MB RAM (386SL); 4MB RAM (486SL)
- ■80MB IDE hard drive
- ■MS-DOS 6.0

PACKAGE 2

386SL Freestyle: \$1795 486SL Freestyle: \$1995

- 6MB RAM (386 SL): 4MB RAM (486 SL)
- 120MB IDE hard drive
- Custom nylon carrying case
- MS-DOS 6.0
- Microsoft Windows 3.1

PACKAGE 3

386SL Freestyle: \$2295 486SL Freestyle: \$2495

- 10MB RAM (386 SL): 8MB RAM (486 SL)
- 180MB IDE hard drive
- Internal 2400 bps V.42 bis modem with 9600 bps send/receive fax
- Custom leather carrying case
- Extra battery
- External charging stand
- DOS 6.0
- Windows 3.1

FULL DESKTOP POWER YOU CAN TAKE ANYWHERE!

What do our customers want in a notebook? Not only great looks, you said, but also great power. Lightweight too, like five pounds and change. And with built-in accessories that make it the ultimate in portable power.

The ZEOS Freestyle is the direct result of discussions with our customers. For the most power, now you can choose from either a 386SL or 486SL Intel processor. We've included such features as a built-in mouse key, floppy drive and soft carrying handle. And at only 5.6 pounds, you'll want to take it with you

Standard with every ZEOS Freestyle:

- 25MHz 80386SL or 80486SL Intel microprocessor.
- 386SL: 64K SRAM system cache; 486SL: 8K internal system cache.
- RAM expandable to 20MB (486SL) or 10MB (386SL).
- IDE hard drive.
- 256K (386SL version) or 512K (486SL version) video RAM.
- Internal 3.5" 1.44MB floppy drive.
- Serial, parallel, video and PS/2 ports.
- Supports an external SVGA color monitor with simultaneous display capability.
- 486SL version includes 3.3v technology for added battery life, built-in math coprocessor.
- Replaceable and rechargeable NiCad battery.
- 640 x 480 VGA backlit LCD display, 9.5" diagonal.
- Unique tilt and swivel display.
- 81-key keyboard with built-in mouse key, "inverted T" cursor keys and dedicated Home, PgUp, PgDn, and End keys.
- Power-saving features.
- FCC Certified Class B.
- 24-Hour Toll-Free Technical Support, 30-Day Money-Back Guarantee, Complete ZEOS Customer Satisfaction Package.

whenever you travel!

The Freestyle's perfect for frequent flyers. Because the



All ZEOS Notebooks have earned the EPA Energy Star logo for their energysaving capability. screen floats on a smaller footprint than a normally hinged screen, you can use it without fear of the person in

front of you cranking their seat back and doing a "screen crunch" on your system. And check out that great tilt and swivel display. It lets you adjust the screen to the perfect viewing angle. It's one of the few notebooks that can truly be used while sitting in your lap!

Parthage orders from Fortune 6000 companies, governments and instinctions subject to approval. Leaving programs available. All prices and specifications are subject to change without notice. Please call to confirm pricing, specifications and warmstry details. All products and company names are trademar

The ZEO Contenda Subnotebook.

PACKAGE 1

386SL Contenda: \$1295 486SL Contenda: \$1795

- 2MB RAM (386SL); 4MB RAM (486SL)
- 80MB IDE hard drive
- MS-DOS 6.0

PACKAGE 2

386SL Contenda: \$1595 486SL Contenda: \$1995

- ■4MB RAM
- 80MB IDE hard drive
- External 3.5" floppy disk drive
- DOS 6.0, Windows 3.1, Lotus Organizer

PACKAGE 3

386SL Contenda: \$1795 486SL Contenda: \$2395

- 4MB RAM (386 SL); 8MB RAM (486 SL)
- 80MB IDE hard drive
- External 3.5" floppy disk drive
- Custom leather carrying case
- Extra battery
- Internal 2400/4600/4800 send/receive fax modem
- DOS 6.0, Windows 3.1, Lotus Organizer

SOLID PROOF THAT GREAT THINGS COME IN 25MHz 80386SL or 80486SL Intel CPU. SMALL PACKAGES.

Smaller than a notebook. Lighter than your briefcase. The ZEOS Contenda subnotebook is proof that great things come in

small packages!

We start with a smart Intel SL processor—your choice of either a 386SL-25 or new 486SL-25. You'll find that the Contenda's processor extends your battery life significantly—because it's intelligent enough to power-down the memory, disks, modem and more when they're not in use.

What's more, the Contenda's features make it a pleasure to use.



- RAM expandable to 8MB for 486SL, 10MB for 386SL.
- IDE hard drive.
- Display: 640 x 480 VGA backlit, .23 dot pitch, Sharp 74" diagonal, up to 64 shades.
- 256K (386SL version) or 512K (486SL version) video RAM.
- 486SL version includes 3.3v technology for added battery life, PI local bus for Windows acceleration, high-speed floppy drive controller, built-in math coprocessor.
- Supports simultaneous display with an external SVGA color monitor.
- Replaceable and rechargeable NiMH battery.
- 80-key keyboard with embedded numeric keypad and easy-to-use built-in trackball.
- Serial, parallel and video ports, plus ports for optional internal fax/modem and external floppy drive.
- Fully-featured power management.
- 9.7" x 6.1"; 3.9 lbs.
- FCC Certified Class B.
- 24-Hour Toll-Free Technical Support, 30-Day Money-Back Guarantee, Complete ZEOS Customer Satisfaction Package.

Features such as a high-resolution backlit screen that's crisp and vibrant. A built-in trackball so you won't have to tote a mouse around. And with a standard 80MB hard drive, memory up to 10MB and weight of less than four pounds, it's one powerful, portable Windows workhorse!

ZEOS

CALL NOW TOLL FREE

Fax Orders: 612-631-1325, Government: 800-245-2449, Hearing Impaired (TDD): 800-228-5839, Outside U.S. and Canada: 612-633-6131.

Canada: 612-635-6151. Purchase Orders, Master-Card, VISA, Discover, Am Ex, Z-Card, "COD and affordable leasing pro-grams. Open 24 Hours a Day, 365 Days a Year!



ered undernation of their respective hidders. The Energy Star emblem does not represent EPA endorsement of any product or service, o 1993 ZEOS International, Ltd., 1301 Industrial EV-d., Manuspoin, MN 55413USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). PSSN-FCW-9010

Introducing the Portrait/15 Plus." It's the only 15" color monitor for Windows that lets



you see a whole 8½"x 11"of perfectly readable text. It also pivots to a landscape monitor in a flash. Plus, you get



resolution as high as 1024 x 768, refresh over 70 Hz, .28 dot pitch, and emissions so low



they meet MPR II. All for the special low price of just \$899.

Call 800-858-7744, Ext. 81



30-Day Money-Back Guarantee, Compatible With Popular Accelerated Graphics Cards.

Circle 231 on reader service card

PC WORLD

EDITOR IN CHIEF Philip Lemmons

EDITOR Cathryn Baskin
EXECUTIVE EDITOR Russell Glitman
ART DIRECTOR Robert Kanes

SENIOR EDITORS

Features Steve Fox User Issues Roberta Furger Reviews Owen Linderholm

EAST COAST EDITOR Randy Ross (617/422-8020)

SENIOR EDITOR, NEWS Joe Abernathy (713/781-6751)

EDITORIAL

Assistant Managing Editor Anne Kandra
Technical Editor Karl Koessel
Associate Editors Rex Farrance,
Bryan Hastings, Lincoln Spector
Assistant Editors Jeff Bertolucci,
Michael Desmond, Anita Hamilton,
Dan Miller, Christina Wood
Assistant Technical Editor Shane Rau
Asst. Editor, East Coast Laurianne McLaughlin
Editorial Assistant John Goddard
Editorial Intern Sarah Klein
Fact Checker Caroline Jones

Copy Chief Richard Johnson Senior Copy Editors Barbara Lewis, Marla Miyashiro, Peggy Nauts Copy Editors Nina Barringer, Kimberly Stein Electronic Typographer Henry Pham

Asst. to the Editor in Chief Cynthia Grossman Administrative Assistant Ken Blaylock

Business Manager Scott Danish Librarian Stella Chan

ART & DESIGN

Associate Art Director Greg Silva
Senior Designers Barbara Adamson,
Laura Guerin
Senior Design Associates Tim J Luddy,
Carolyn Perot
Designer/Infographics Jeff Berlin
Assistant Designer/Infographics Hope Winslow
Production Artist Marlene Tobias

CONTRIBUTING EDITORS

Anita Amirrezvani, Steve Bass, TJ Byers, George Campbell, Scott Dunn, Thom Foulks, Bronwyn Fryer, Brett Glass, Michael Goodwin, Judy Heim, Richard Jantz, Eric Knorr, Robert Luhn, Celeste Robinson, Richard Scoville, Gene Smarte, Ralph Soucie, Scott Spanbauer, Daniel Tynan, John Walkenbach

Founder David Bunnell Founding Editor Andrew Fluegelman

PC WORLD ONLINE

Director Jim Moody (America Online, PCW JimM; CompuServe, 71154,212) Manager Dennis Sheridan (America Online, PCW Dennis; CompuServe, 71154,362)

PC WORLD TEST CENTER

Director Gregory Smith
Senior Performance Analysts Dean Andrews,
Thomas Grubb
Performance Analysts Ulrike Dichlmann,
Susan Silvius
Coordinator Dawn Furseth

USER GROUP ADVISORY BOARD

Steve Bass, Pasadena IBM Users Group;
Roger Bender, Microcomputer Managers
Association; Jack Bolton, Atlanta PC User's
Group (APCUG); Brian Camenker, Boston
Computer Society; Rollie Cole, APCUG;
Paul Curtis, APCUG; Mary Dolec, Chicago
Computer Society; Sandy Frunzi, Las Vegas
PC User Group; Al Harrison, Houston Area
League PC Users; David Hoffman, NYPC;
Joseph Rigo, NYPC; Irving Samuels, Capital
PC User Group

PRESIDENT Patrick Kenealy
PUBLISHER Richard J. Marino

PC WORLD LOTUS EDITION

Executive Editor Eric Bender
Senior Associate Editors Richard Cranford,
Ann Kremers, Carrie Thomas
Associate Editors Cynthia G. Fitzgerald,
Andrea C. Powers, Carol White
Assistant Editor Catherine Kenny

LOTUS EDITION MAILING ADDRESS

77 Franklin St. #300, Boston, MA 02110 Phone: 617/482-8470 Fax: 617/426-0235

LOTUS NEWSLETTER DIVISION

Publisher Craig Pierce Editor in Chief Jennifer J. Smith Production Manager Andrew Ochrymowych

MULTIMEDIA WORLD SPECIAL SECTION

Publisher Ionathan Epstein Editor in Chief Don Menn Art Director Adrian Morgan Senior Editor, News and Reviews Paul Worthington Copy Editor Cynthia Klein Associate Publisher Patricia Navone Western Advertising Sales Manager A. G. Germano (415/978-3221) Eastern Advertising Sales Manager Isabelle Kane (617/361-4246) Sales Assistant Janett Kennedy (415/978-3208) Market Development Manager Damon A. Dean Circulation Promotions Manager Thomas Hsieh, Jr. Office Manager Paul Fitzgibbon

MULTIMEDIA WORLD MAILING ADDRESS

501 Second St., San Francisco, CA 94107 Phone: 415/281-8650 Fax: 415/281-3915 America Online: MMWorld CompuServe: 75300,2503 MCI Mail: MPC Prodigy: KAMD36B

Two Thumbs Up For ALR'S EVOLUTION V



"Best of Show, Spring Comdex, BYTE Magazine - May, 1993

"ALR has built a screamer."

Computer Shopper - May, 1993

"Expect to hear a lot more about the EVOLUTION V... ALR did its homework when it came to optimization."

Computer Shopper - May, 1993 Now Shunning Pentium Processor Power from just ALR EVOLUTION V with 60-MHz Pentium and MULTUS Disk Interface 66-MHz i486DX2 Powered PC With IDE Disk Interface The ALR EVOLUTION V ALR MODEL 1 **EVOLUTION V** Powerful Pentium Processing plus the Advanced Features shown at left --System Board Technology amazing power for such a low price 1. 60-MHz Pentium Processing Supports Pentium Write-Back Mode 2. 8-MBRAM MODEL 170DWM COMPLETE SYSTEM (Expandable to 128-MB); True 64-bit Data/Memory Path includes above features plus: 170-MB Integrated 256-KB Write-back Cache IDE Hard Disk high-performance local 4. Integrated MULTUS bus video adapter14" SVGA monitor (Multi-seeking) IDE Controller Six 32-bit ISA Expansion Slots MS-DOS 6.0, MS-Windows 3.1 and Mouse 6. 3 VESA VL Local Bus Slots \$3595 System Also Includes: Six DriveBays MODEL 340DW & 200Watt Power Supply includes Model 1 features plus 340-MB IDE Hard Disk, MS-DOS Model 170DWM 6.0, MS-Windows 3.1 and Mouse \$3445

Also Shipping 50-MHz i486DX/2 Sytems starting at \$1579



Low Cost 3 Year On-Site Service Now Available (Call for Details)

For more information please call



9401 Jeronimo Irvine, CA 92718 (714) 581-6770 FAX: (714) 581-9240

"With memory and data paths wide enough to support the new chip, the EVOLUTION VQ becomes an excellent file server..."

The ALR EVOLUTION VO/60



Computer Shopper - May, 1993

MODEL 8CM

ALR's high performance Quadflex Architecture, state-of-the-art Pentium Processing, tremendous expandability, -the ultimate network \$4495

with 66-MHz Processor ... \$4795 MODEL 480-16CVM

includes above features plus: 16-MB RAM total480-MB (Dual 240-MB) IDE Hard Disk ALR MULTUSTM multiseeking disk interfaceWD 90C31based Local Bus

\$5995 Video Adapter with 66-MHz Processor ... \$6295 MODEL 1.2-16CVS

includes Model 8CM features plus 16-MB RAM total1.2-GB SCSI Hard Disk with 32-bit SCSI Local Bus master controller WD

90C31-based Local Bus Video Adapter

\$7595 with 66-MHz Processor ...\$7895

Some systems shown with optional monitors. Prices and configurations are subject to change without notice. Prices based on U.S. dollars. ALR is a registered trademark of Advanced Logic Research, Inc. Intel Inside logic is a trademark of Intel, Corp. All other brand and product names are trademark of registered trademark of their respective owners. c1993 by ALR

Isn't it About Time Your Documents got an

Attitude?

Combria Campol Casual
Chancellor Ghill Chiefe Country Club
DALMATION DELHI Deily Country Club
EMPORE FRE FLAMINGO Flores
Rrankenfooter The Gaslight HORROR

Invitation Knarly Likable Lizard
LOOPE MOOGOO BEREZZIE A

MOINTHATOUT Nervous Nottingham Ornate
PENCILPOINT PRANTE RAHRAH RANSOWN
Renaissance Ahino Ripper Roady Rooster
Pube Courses Blade Coolingham

BUHR SAHARA SULON SORNAL SEASCAPE
SEEAR SLAIMIC SLAVIC SPANKY MANTAM
STKK MGANDA UNDERGROUND Puppercrust
Waterfall Whitemash Willroge 149 Zerlyn

(This is only a partial listing of the fonts in the package.)

The MasterPiece TrueType Font Library includes over 150 fonts in different families in popular text and one-of-a-kind display faces. The MasterPiece TrueType Font Library is a unique collection of fonts for the beginner as well as the advanced desktop publisher and word processor user. The Library installs automatically and

Special Offer

ONLY \$49.95

VISA, MC, AMEX, Discover, Check, MO, COD, PO's (OAC).

CALL 800-568-4607

Attitude, Inc. 14742 BEACH BLVD. SLITE 440 LA MIRADA. CA. 90638 (714) 680-8112 FAX (714) 680-6640

Circle 36 on reader service card

PC WORLD

HOW TO CONTACT PC WORLD

MAIL

PC World Editorial, 501 Second St. #600, San Francisco, CA 94107 Phone: 415/243-0500 Fax: 415/442-1891 America Online: keyword PC WORLD

CompuServe: GO PWOForum
MCI Mail: PC World Editorial or 179-3813

Internet: 1793813@mcimail.com

SUBSCRIPTION SERVICES, ADDRESS CHANGES

For PC World, PC World Lotus Edition, and the Multimedia World special section: Call toll-free 800/234-3498 (303/447-9330 in Colorado and Canada), or write Subscriber Services, P.O. Box 55029, Boulder, CO 80322-5029. To place new orders, call 800/825-7595.

PC WORLD ONLINE

You can contact the editors by sending electronic mail to the PC World Online areas of America Online and CompuServe. The areas feature current and back issues of PC World, PC World Lotus Edition, and the Multimedia World special section, a software library, and message boards. To obtain a free America Online starter kit, call 800/827-6364.

To join PC World Online on CompuServe, set your communications software to 7 data bits, even parity, and 1 stop bit. To find out your local access number, dial 800/346-3247 (modem) and type Phones at the Host Name ID prompt. Fill in the requested information. Then dial again using the local access number, and once connected, press <Enter>, Fill out the screen as follows:

Host Name: CIS User ID: 177000,5605
Password: COMPUSERVE Agreement#: PCWORLD
Serial Number: <Enter>

If you require further assistance, or if you would like to receive the *PC World* customized interface, call CompuServe customer assistance at 800/848-8990, 800/635-6225 in Canada. You may order membership kits for sign-up after business hours by calling 800/848-8199.

LETTERS TO THE EDITOR

Send editorial correspondence electronically to the Message Board on PC World Online or mail it to Letters to the Editor at PC World. Be sure to include your name, city, and state. We reserve the right to edit letters.

CONSUMER WATCH

Send consumer-related questions and complaints to Christina Wood, Consumer Watch, at PC World: to the Consumer Watch forum on PC World Online; or to MCI Mail, PC World Editorial.

REAL PROBLEMS, REAL SOLUTIONS

Send article ideas—including a brief outline of your company, job, problem, and solution as well as your name, address, and phone number—to Real Problems, Real Solutions at PG World; or send them electronically to the Real Problems, Real Solutions forum on PC World Online;

CompuServe, 72614,1534; 415/326-4304 (fax); or call us at 415/978-3212. PC World pays \$300 per published column.

HERE'S HOW, HOME OFFICE

Send questions electronically to the appropriate forum on PC World Online (for example, send *Help Line* questions to the Help Line forum) or to the online address below, or mail them to columnists at *PC World*.

Contact editors at the following addresses: Help Line: CompuServe, 74055,412; MCI Mail, 179-3813; Internet, 1793813@mcimail.com Spreadsheets: CompuServe, 72341,2727;

MCI Mail, 357-4517

Word Processing: CompuServe, 71571,222; MCI Mail, GCAMPBELL

Windows: CompuServe, 74055,412

Data Management: CompuServe, 74055,412
Publishing & Presentations: MCI Mail, RJANTZ;
mail make-over candidates, preferably clean and
unfolded, to Publishing & Presentations, MakeOvers at PC World

Communications: CompuServe, 75300,713; MCI Mail, 312-7737; GEnie, JUDY.HEIM;

Internet, 3127737@meimail.com Hardware: MCI Mail, 459-7102 Star-Dot-Star: CompuServe, 74055,412; Internet, rogue@well.sf.ca.us

Home Office: CompuServe, 71333,310

READER SUBMISSIONS

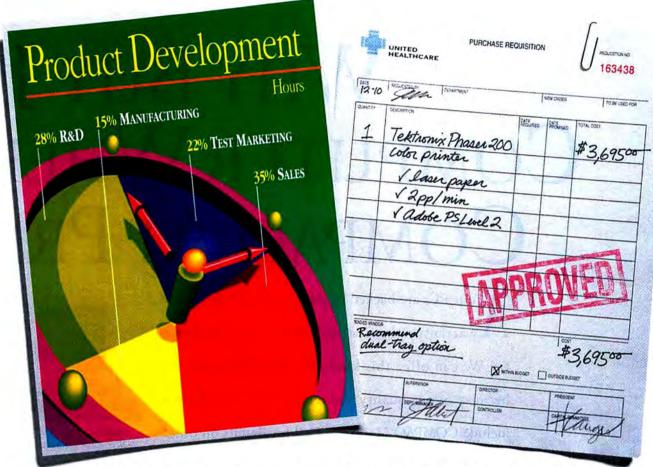
Send us your technical problems and solutions. PC World pays \$25 for each Power Tip we publish, \$200 to the user group featured in User Group Tips, \$25 to \$200 for Star-Dot-Star items, \$50 for questions used in the Here's How section, and \$200 for items made over in Publishing & Presentations. Keep submissions brief (Power Tips to 100 words or less); accepted submissions will be acknowledged by payment.

NEW PRODUCT ANNOUNCEMENTS

Address hardware and software press releases to New Products at PC World or call 415/978-3212.

REPRINTS AND PERMISSIONS

You must have permission before reproducing any material from PC World, PC World Lotus Edition, and the Multimedia World special section. To quote from or reprint any portion of any article, or to use artwork or photographs from the magazine, send a written request to PC World, Reprints and Permissions, 501 Second St. #600, San Francisco, CA 94107; include a phone number for a fast response. To order reprints of your company's editorial coverage in PC World or PC World Lotus Edition, call 415/978-3353. To order reprints of your company's editorial coverage in the Multimedia World special section, send a written request including your address and phone number to Paul Fitzgibbon, Multimedia World Special Section, 501 Second St., San Francisco, CA 94107. or call 415/267-1755.



Our new color printer not only looks great on paper, it looks great on paper.

True, the brilliant color produced by the new Tektronix Phaser® 200 is captivating. But the price is equally attractive. And though we've become the award-winning leader in color printers by frequently outdoing the

competition, this time we've even outdone ourselves. Introducing our newest business work group color printer.



The eye when it sees black and white.

The eye

The Phaser 200 is compatible with virtually any business software and can print two colorful pages per minute. No, not two minutes per page—two pages per minute. And even at a speed like that, it still manages to print eye-catching color on common laser paper or transparencies using a separate input tray for each. You select the medium you want at your computer keyboard. And it switches automatically from user to user just as easily, using its parallel, serial, Apple Talk,™ or optional Ether Talk™ and Ethernet™ ports.

It has all the advantages of a laser printer. True Adobe PostScript™ Level 2, networkability, Pantone® colors, speed and price. (Did you notice it's only \$3695, slightly below unheard of?) And when you add to that extremely high materials capacity and sparkling TekColor™ output—not just any color, but the indisputably best color in the business—you've got something even better than our previous best. Which is quite a feat.

So stop by your nearest Tektronix dealer or call us at 800/835-6100, Dept. 28I for a free

output sample. For faxed information call 503/682-7450, ask for document # 1223. You won't find another business investment that looks this good on paper.



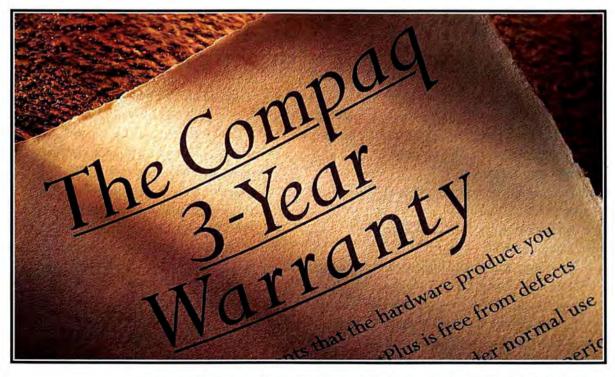


WHY BUY JU COMPUTER WHEN COMPAQ AT PRIC

All our PCs are backed by the COMPAQ free 3-year warranty[†]—the first such warranty in the industry. We can offer this kind of long-term guarantee because of our quality and testing standards. Prices include COMPAQ Monitors. Call for details on other COMPAQ desktops and notebooks, as well as printers.



COMPAQ ProLinea 3/25s 25-MHz 386SX, 2-MB RAM, 120-MB hard drive, VGA Color Monitor. An affordable entry-level desktop PC.



Restrictions and evolutions apply. Monitors, buttery parks and vertain options are covered by a one year warrants. Leaving is provided by GF Capital Corporation for a term of 16 monito, and is subject to appeared credit. Repetered U.S. Pares and Trackment Office Continue and Petawase to advantage of Computer Corporation. COMPAY Directly and Computer are wriver marked Compaq Computer Corporation. Problems, prices and go of Manual Computer and Intelligence of Computer Corporations of the Continue of Computer Corporation. Problems, prices and go of Manual Computer and Intelligence of Computer Corporations.

ST ANOTHER YOU CAN GET A ES LIKE THESE?



COMPAQ ProLinea 4/25s

25-MHz 486SX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. Great for everyday business applications.

DESKPRO/i Features

3%"1.44-MB diskette drive * Integrated QVision Graphics displays up to 256 colors at 1024 x 768 with 512-KB VRAM option ** 3 expansion slots #3 internal storage device positions + Security features *Business Audio * COMPAQ Color Monitor, preinstalled MS-DOS 6.0, Microsoft Windows 3.1 & Sound System Software, COMPAQ Mouse & Microphone.

Contura Features

3%" 1.44-MB diskette drive * Power conservation and security features * Battery Pack * AC Adapter * Preinstalled MS-DOS 6.0, Microsoft Windows 3.1 and EZ Help On-Line Library and a COMPAQ Trackball.



COMPAQ ProLinea 4/33

33-MHz 486DX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. Designed for more advanced applications.



COMPAQ ProLinea 4/66

66-MHz 486DX2, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. For high performance at an affordable price.





preinstalled MS-DOS 6.0

and Microsoft Windows 3.1

and a COMPAQ Mouse.

ProLinea Features 31/2" 1.44-MB diskette drive # 1024 x 768 local bus video graphics with 1-MB VRAM in up to 256 colors (on 486 models) # 3 expansion slots * 3 internal storage device positions + Security features * COMPAQ Color Monitor,

COMPAQ DESKPRO 4/25is 25-MHz 486SX, 4-MB RAM, 120-



COMPAQ Contura 3/25

25-MHz 386SL, 4-MB RAM, 120-MB hard drive, monochrome VGA display, 6.2 lbs. An affordable notebook loaded with features.



COMPAQ DESKPRO 4/33i

33-MHz 486DX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. For even faster performance in a Windows environment.



COMPAQ Contura 4/25

25-MHz 486SL, 4-MB RAM, 120-MB hard drive, monochrome VGA display, 6.2 lbs. Upgradeable to Active Matrix Color Display,

COMPAQ **DirectPlus**

1-800-888-0259

TIME IS AND CALLING CO CAN SAVE

We've put together these bundles to make it easy to get the hardware and software that you need in a complete system, at one special price. No matter what your computing needs, chances are that one of these bundles will fit the bill. Not only that, but the price you'll pay will fit well within your budget.

The Basics Plus.



COMPAQ ProLinea 4/25s 25-MHz 486SX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor.





WinFax PRO









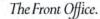
This entry-level system gives you a full range of business and personal applications as well as data and fax communications-all at a surprisingly low price.

> \$1,599 Or \$57 per month* Save over \$228



*Leasing is provided by GE Capital Corporation for a term of 36 months, and is subject to approved credit and certain terms and conditions. Call for details. ©1993 Compaq Computer Compaq Computer Corporation. COMPAQ DirectPlus is a service mark of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. All Corporation. The Intel Inside Logo is a trademark of Intel Corporation. 1Savings based on individual prices.

MONEY. MPAQ DIRECTPLUS **Y**OU ВОТН.





COMPAQ ProLinea 4/33 33-MHz 486DX, 4-MB RAM, 120-MB hard drive. SVGA Color Monitor.



WordPerfect for Windows

This general business solution, which is offered to you at a very competitive price, teams up two popular word processing and spreadsheet applications.

> \$1.899 Or \$68 per month* Save over \$274'

The Windows Office.



COMPAQ DESKPRO 4/33i 33-MHz 486DX, 4-MB RAM, 240-MB hard drive. 1024 Color Monitor.



The Microsoft for Windows

This solution can utilize COMPAQ business audio with the most popular Microsoft applications. The Microsoft Office includes Microsoft Excel, Word, PowerPoint and Mail.

> \$2.699 Or \$97 per month* Save over \$239'

The Office Pro.



COMPAQ ProLinea 4/50 50-MHz 486DX2, 4-MB RAM. 240-MB hard drive, SVGA Color Monitor.









Lotus for Windows

This solution offers data and fax communications with popular Lotus applications. Lotus SmartSuite includes Lotus 1-2-3, AmiPro, Freelance Graphics, Organizer and cc: Mail.

> \$2.899 Or \$104 per month* Save over \$279



COMPAQ **DirectPlus** 1-800-888-0259

Corporation. All rights reserved. Printed in the USA. Compaq, the COMPAQ logo and DESKPRO Registered U.S. Patent and Trademark Office. Prol.inca is a trademark of products are trademarks or registered trademarks, and Windows is a trademark of Microsoft and MS-DOS are registered trademarks, and Windows is a trademark of



Tough to crack. Easy to use.

Imagine for a moment the ideal data encryption. And protection against security system. encryption. And protection against thousands of viruses — even when

It meets NCSC Trusted Computing Base standards. Which means it's impenetrable.

It loads before DOS" and Windows." So it can't be bypassed.

It even tracks all attempts at access, so you can manage users and pinpoint intruders.

Best of all, it doesn't jam up your E-mail with disgruntled users trying to figure how this security thing is supposed to work.

Sound too good to be true? Then read on.

Because both DiskLock and SAFE combine high-level security with easy, transparent operation.

Both automatically blank screens and secure PCs when users leave them unattended.

And both make authorized access as easy as typing a password.

So how do you decide which package is right for you?

Just examine your setup.

Need to protect notebooks and laptops? Or powerful desktops?

Get DiskLock. It gives you autoresume protection for your laptops. And gi Multiple security levels. Two kinds of security.

encryption. And protection against thousands of viruses — even when they lurk deep inside compressed and archived files — with our unique virus scanner.

Got a more complicated distributed computing enterprise?

Get SAFE. Because no matter



All your users need to know about data security is their password — whether you're protecting individual portables and desklops, or LANs, WANs and complicated distributed enterprises.

how complex things get, no matter how many levels of security you need, SAFE gives you simple onepassword sign-on to any network or mainframe.

It also employs a patented labeling system to protect files as they move through the enterprise. It lets you configure and manage systemwide security from one central location. It even lets you define rules to protect files that haven't been created yet.

There's more. A lot more. So pick up the phone.

Dial 800-388-0362.

And give yourself a new sense of security.



Outside US & Canada call: (44) 494-442223

Announcing PC World's Monthly Service and Support Survey

now that awful feeling when you're en route to an important meeting, your car breaks down, and help is nowhere to be found? It's no worse than having your PC die just before the deadline for a vital report or presentation. We can't help with your car, but we think we can minimize your unpleasant experiences with PCs. Here's how.

We'll use our instant fax-back system to collect thousands of fresh reports on our readers' service and support experiences every month. We'll analyze the data collected and use it to rate the service and support available from the companies that make and sell PCs. It takes only a few minutes to fill out the fax-back form (see page 95). Each month when we receive your form, we'll automatically enter you in a drawing to win a topflight PC. And you'll get the benefit of the most up-to-date service and support ratings anywhere when you open your future issues of PC World.

Since shrinking differences in price and performance can make service and support the decisive issue in choosing a PC, we think that this additional information will make our product reviews more valuable than ever.

Send Good News as Well as Bad

When you choose a computer, you want to know not only how the maker handles service and support but also how often you're likely to need it. That's why we urge you to send us your fax ratings every month, including months in which your PC required no service. Reporting another trouble-free month is just as important as reporting a problem. It's even easier because you can skip much of our simple fill-in-the-dots form. And we'll enter you in the drawing for a great new PC whether you're reporting a new problem or continued trouble-free operation.

When you do report a service inci-

dent, please answer all questions about the nature of the problem and the promptness, type, and quality of service you received. You can fax us the form without a cover sheet, saving time and needless processing.

Please don't report the same incident more than once. Report it when it occurs, then just report trouble-free months until your PC needs service again.

Our reviews will incorporate this new service and support data as soon as we have tabulat-

ed three months of reports. Beginning in our March or April issue, ratings based on these surveys will be the largest factor in the overall service and support ratings that we use in determining Best Buys.

A word of warning to anyone who might even consider stuffing the ballot box: Our fax-back system makes it a snap for us to detect and discard duplicate ballots. We urge any vendors that are tempted to send multiple faxes praising their own service and support operation to save us the trouble of revealing the dastardly deed.

Windows NT Arrives

We believe "Windows NT: Changing the PC Landscape" provides the best guide anywhere to whether and when you can actually move your work to this new advanced operating system and to the advanced microprocessors that broaden your choice beyond Intel's realm. The special section also gives you a good summary of how the new RISC PCs stack up against Pentium and the foremost 486, the DX2-66, in running Windows applications. We put



great effort into the testing and research for this special report, and we hope that we have made it easy for you to see whether the latest batch

PC World Editor in Chief Phil Lemmons

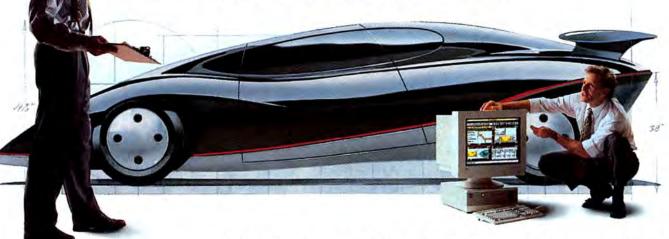
of technology will improve your computing life—or merely complicate it.

Thanks to Our Colleagues at PC Welt...

...for their fine article on DOS 6.0, which forms a major part of our discussion of that subject this month. To Dr. Michael Klein, editor in chief of our German-language counterpart, and the rest of the staff in Munich: We hope this won't be the last time we'll ask Ulrike Diehlmann of our Test Center staff to translate your articles. We appreciate Ulrike's extra effort. Thanks as well to others at *PC World* in San Francisco—including Senior Editor Steve Fox and Technical Editors Karl Koessel and Shane Rau—who amplified the translation and contributed new material.

Phil Lemmons, Editor in Chief

How To Manage The Future.



The Ultimate Combination Of Power And Ease-Of-Use. Now Available For Both Windows *And* OS/2.



Introducing the first project manager your entire company can use.

For power users, there are dozens of new fea-

tures, functions and an internal development language that makes creating advanced macros quick

and easy.

For beginners, the easiest, friendliest interface and shortest learning curve in the industry. ROSOFE NDOWS, PRATTRE

Buy one version, get the other FREE.

The new graphics and reporting options will make every user look like a

genius. And since it runs under Windows and OS/2, you won't be burning any bridges.



FOR A FREE DEMO DISK CALL 1-800 CALL CAI EXT. 240.

Call today to test-drive the awardwining project management

software that can help you manage the future.

you manage uture.

Today.

Software superior by design

New CA-SuperProject 3.0.

© Computer Associates International, Inc., One Computer Associates Plaza, Islandia, NY 11788-7000. All product names referenced herein are trademarks of their respective companies.

Notebooks and Navigation, Neglected OS's, Ragging on Reviews

Restricted Airspace

Your July article "What's the Easiest Notebook to Use at 30,000 Feet?" was comprehensive in its coverage of new products and its analysis of how easy they are to use in the cramped confines of an airplane cabin.

But a fundamental question you did not address is whether computers can be used at all at 30,000 feet. Many airlines prohibit using electronic equipment such as laptops during takeoff and landing because of possible electrical interference with the navigational system. Although it has not been proven that such devices interfere with navigation, some airlines have banned their use during the entire flight.

S. Colby Phillips, Portland, Oregon

Wondering About Windows

still have difficulty understanding the wonders of Windows. Windows takes up a heck of a lot of disk space and reduces the speed of my applications. And before I could say "Jack Robinson," it turned my screen into a chaotic mess of icons and windows. For years I've been a happy X'Tree user. Why is a mammoth required to perform the missing link of multitasking in my otherwise charmed life?

J. S. Bach-Hansen, Germantown, Maryland

Alienated by Adult Entertainment

'm disappointed that you accept advertisements for adult entertainment software. Other magazines have walked away from such ads because they give multimedia bad publicity. Do away with these ads, and you'll help the multimedia business avoid the stigma that still plagues 900 numbers.

Vincent R. Gerber, Bluffton, Indiana

Editor's response: PC World's policy regarding adult entertainment advertisements is to reject those that use sexually explicit or otherwise offensive language. —Roberta Furger

Keep Talking ...

Your magazine is great! Others get hung up on the technical aspects, but PC World is productivity oriented. You focus on "here's what you can do with all of this stuff" rather than "here's the best gizmo," and the Here's How sec-

tion is worth its weight in gold. Johnathan Crawford, Milwaukee

Tip or Torture?

've always wondered why people like Windows. Shane Rau has finally cleared it up [*Tip* of the Month, Help Line, June]: They have nothing better to do with their time.

Let me get this straight: To dial my phone in Windows, I press <Alt>-FN<Enter><Tab> plus about 100 other keystrokes or mouse clicks. Is Bill Gates paying your salaries? Where I work, we're too busy to futz with Windows.

Here's a tech tip for Shane: To dial a phone, pick up the receiver with one hand and use the index finger of the other to push the appropriate buttons.

John A. Palmieri,

Beverly Hills, California

Author's response: One person's futzing is another's investment. The "100 other keystrokes or mouse clicks" you refer to are required one time only, to set up the auto-dialing macro. Thereafter, the number of keystrokes or mouse clicks required to dial a phone number from within an app shrinks to 3. Dialing manually requires at least 7 keystrokes each time. —Shane Rau

PC World, Thrill Seeker

hil Lemmons's *In This Issue* [June] implies that the only way to harness the energy of Pentium and other pro-

cessing behemoths is to dive into NT.
Wry mention is made of Taligent, and
an attempt is even made to pin the Mac
interface on the PC donkey.

Why does UNIX not even rate a mention in this exalted but nonexistent company? Is it that a 20-year-old, stable,



mature technology just isn't enough of a thrill vehicle for PC World? Your readers may not share this dangerous enthusiasm for white-knuckle rides. They might prefer to hear about stuff that has worked reliably for years.

William Pool, Quarterdeck Office Systems UK, Chelmsford, Essex, England

Author's response: Although UNIX has a significant place in computing, it has failed to inspire mainstream business productivity applications. UNIX has never been one operating system with one interface to attract software developers. Many developers consider the Macintosh market too small to warrant major development, and there are millions more Macs than UNIX workstations. —Phil Lemmons

Praising With Faint Damns

Your review of the Auva 486DX/50 Model S10 ["486s for \$1250," June] is unfair, given the praise heaped on lesser machines. After ranking it at the top for speed and construction, Farrance and Riofrio launch a fusillade of



Phone: 510.

Parkway, Fremont, CA 94538, U.S.A.

Fax: 510-770-2640 1.800.845-8086, x 283

770-0100

lets you capture movies and imaginations for

WINDOWS TO MULTIMEDIA

OPENING

solutions for Windows"

i.

WinMovie, a monster of

WinMovie today. It's a scream

for

47900 1

Sigma Designs, Inc.,

tart the action as soon as you get your hands on it.

WinMovie provides real-time

nd entertainment. It even comes bundled with Windows, a \$200 value, so you can Microsoft* Video for

presents the only desktop digital video Designs*

xoard that

Circle 191 on reader service card

faint damns about the evanescence of dealers and lack of direct support from Auva.

Since they work for a national magazine, your writers should know that Auva sells through a large network of value-added resellers. My VAR, Solvent Systems, has been in business nearly ten years-a lot longer than some direct-sales companies advertising in PC World. Service and support for the 11 Auva-based PCs they've built for me is a local phone call away. Show some integrity, and recognize that VARs are an important segment of the industry.

James Carl, St. Louis

Editor's response: We base our evaluation of service and support on a company's policies and on anonymous calls to its tech support staff. We also consider its dealer support. Auva does not provide as much dealer support as many other companies, and because it offers no direct support for end users, we had to rate its support as poor.

Clearly, your VAR is exceptional. As we stated in our review, if you had confidence in the dealer that sold you the PC, the Auva would be a very good value. Otherwise, its support falls short. -Owen Linderholm

Ami Pro Proponent

wasn't surprised that Ami Pro 3.0 came out ahead in nearly every measure in "Word Processor or Desktop Publisher?" [June]. What amazes me is that most magazines still regard Word and WordPerfect as the standards. I'm often amused by the boasts of WordPerfect and Word users that they can do such and such in 12 undocumented steps-usually things Ami Pro users can do with a click of a Smartlcon.

David G. Imber, New York

486 Gets 86'd

fter reading "486s for \$1250" [June], I was drawn to the Packard Bell PB425/8 because of its 8MB of RAM, 245MB hard drive, 128K cache, and bundled 1-2-3 and Lotus Write. Since I hadn't needed support for my last Packard Bell, I wasn't concerned about the support problems you reported. So I tried to hunt down the PB425/8.

No luck, While I found a lot of Packard Bells, none had features similar to those you reviewed. I called Packard Bell and was told the model reviewed is no longer made. Instead, Packard Bell offers the Legend 135, which has less memory, a smaller hard

drive, and Microsoft Works rather than the Lotus programs. The rep blamed you-he said the machine reviewed was supplied to you months before the review appeared.

Lawrence N. Doreson, Florissant, Missouri

Author's response: When we invite vendors to submit systems for review, we specify our publication date. Occasionally manufacturers discontinue a system between PC World's press time and newsstand date, as was the case with the Packard Bell unit, To ensure that we're reviewing the newest systems possible, we're taking steps to reduce our production time. -Rex Farrance

Bum Rap for OS/2?

M hile many magazines seem to be Microsoft Bill-boards and fanzines, yours generally features accurate reporting. But the few articles I've seen in PC World on OS/2 2.0 or 2.1 are quick to point out OS/2's faults while misrepresenting or downplaying its strong points. With OS/2, IBM has seized a sizable share of desktops without the support of the publishing industry.

Microsoft's Windows NT is designed for LAN servers and not the desktop, according to Bill Gates himself. Why is OS/2 constantly compared to it? OS/2 is targeted at the desktop market as well as LAN servers. Matthew Pearson via PC World Online

Reversing a Replace

found a serious error in "75 Tips for Windows and DOS" [July]. Tip 7 tells readers to use Write's Find Replace command to replace 'Settings' with '&Filesets'. The correct procedure is to replace &Settings with &Filesets. As the tip was printed, users won't be able to open Control Panel, much less use the intuitive key combination.

Victor H. Auerbach, Ambler, Pennsylvania

Editor's response: To undo the damage done by an incorrect replace, you can always do the reverse. In this case, enter &Filesets in the Find What text box and Settings in the Replace With box, and click Replace All. Save the file, and Control Panel is restored. Then try the tip again with the correct syntax. -Michael Desmond

Debugging DEBUG

uly's "75 Tips for Windows and DOS" was very helpful. However, in Tip 60 you left out an important line in the DEBUG code. Once you type DEBUG at the DOS



High performance 486"DX2. Blazing 66MHz, backed by our exclusive turbo cache, for unparalleled workstation performance.



Two Full-length ISA Slots. Connections are everything. And this machine allows for plenty—Ethernet, video, you name it.





Optional Built-in 5.25" CD ROM. The medium with capacity for video clips, graphics, photo CDs, or an entire set of manuals.



PCMCIA Expandability.
The T6600C offers a huge wealth of communication and expansion options, including a 16mm PCMCIA 2.01 compliant slot large enough for a hard drive!

Built-in Stereo Speakers.

Quality audio adds another dimension to any program. With Microsoft* Microphone'* included, your work can speak for itself.

A technological tour de force that actually tours.

Take your entire show on the road. The new Toshiba T6600C Series represents the most advanced technology and muscle we've ever put into a portable. With its 486 DX2 processor, dual ISA full-slot expansion, and huge storage options, the T6600C Series delivers the power and capacity for the most demanding portable applications. From network analysis to software development to full-blown multimedia, if you need to tour with a great deal of force, this is your system. Feel the force. For your nearest dealer, call 1-800 457-7777.



In Touch with Tomorrow
TOSHIBA

The New T6600C Series

- Intel 486 DX2/66MHz
- . EMB RAM expandable to 40MB RAM
- 10.4" color active matrix TFT-LCD screen
- SVGA display with 640x480x256 color resolution
- 510MB HDD
- Two full length 16-bit ISA slots
- One 16mm PCMCIA 2.01 compliant slot
- · Built-in SCSI with external SCSI-II port
- Microsoft® Sound System"
- 5.25" half height 200ms double speed CD-ROM (T6600C/CD and T6600C/CDV models only)
- MediaShare*Mambo" DVI*/Ethernet" board (T6600C/CDV model only)

You just saved a bundle on PCs. Now, who's going to save you from the people who have to use them?

ow price alone doesn't equal value. A PC that can't do what you need is a PC you just can't afford. Fortunately, AST's Bravo family now includes everything from notebooks to minitowers. All packed with features and power. Consider the low-profile Bravo LP, a powerful yet energy-efficient desktop with EPA EnergyStar approval. Also EPA-approved is the Bravo MT, an upgradable, enormously expandable minitower. To get excellent Windows performance at a

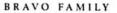


book you can actually afford. So before you choose, call us at 800-876-4AST. Your controller will like the price. Everyone else will like the computers.

AST COMPUTER

The Product Of Our Obsession.







Local bus graphics. Up to 256KB cache. Maximum 64MB RAM. Technical support 24 hours a day, seven days a week. One-year on-site, two-year carry-in coverage for hard-drive models.*

BRAVO LP

Low-profile chassis. EnergyStar certified. Two ISA slots, three drive bays. Intel 486SX/25, 486DX/33 or 486DX2/66 microprocessor; upgradable to Pentium OverDrive. Starting at under \$1000.

BRAVO MT

Minitower chassis. Six ISA slots, six drive bays. Intel 486DX/33 or 486DX2/66 microprocessor; upgradable to Pentium OverDrive. 200-watt power supply. Starting at \$1300.**

BRAVO LC

Midsize chassis. Five drive bays, four 16-bit ISA slots. Intel 486SX/25, 486SX/33, 486DX/33, 486DX2/50 or 486DX2/66 microprocessor; upgradable to Pentium OverDrive. Starting at \$900**

BRAVO NB

Notebook with Intel 486SX/25 microprocessor and integrated trackball. 9.5° monochrome, dual-scan color or TFT color display. One PCMCIA Type III slot. 20MB RAM. One-year carry-in warranty. Starting at \$1699.**

Call for more information.

800-876-4AST







AnthroCart's!

AnthroCarts will knock your socks off! Imagine how great it'll be when you find the perfect furniture for your equipment — just the right size, tough as nails construction and dozens of accessories.

And you'll find our service so real and responsive, you'll get a kick out of ordering direct!







Adjustable for all sizes

Lifetime Warranty.

Lots of choices.



800-325-3841

3221 NW Yeon St. Portland, OR 97210 Fax: (800)325-0045

GSA contract no. GS-OOF-5040A. Available for OEM applications. Prices from \$159.00 Anthro, AnthroCart and Technology Furniture are registered trademarks of Anthro.

LET TERS

prompt, you have to type A at the DEBUG prompt before the program will recognize any assembler commands.

Cheri Helregel, Danville, Illinois

A File by Any Other Name

n "75 Tips for Windows and DOS" [July], you refer to UNDELETE.COM in Tip 69. But DOS 6.0 doesn't have an undelete file with the extension COM. UNDELETE is an EXE file, so the proper command is **COPY UNDELETE.EXE A:**.

James Fitzpatrick, Leeds, Alabama

Corrections and Clarifications

Two August columns were printed in the wrong order. Windows begins on page 246 and ends on page 242, and Word Processing begins on page 248 and ends on page 244.

July's "Laser Printers From \$700" failed to credit the Star Micronics LS-5EX with having "hot ports." Also, average throughput measured in pages per minute was miscalculated in the reviews. The correct ppm ratings deduced from our hands-on tests are: Sharp JX-9600, 3.3; Epson ActionLaser 1000, 2.8; Star Micronics LS-5EX, 2.2; IBM LaserPrinter 4029 5E, 2.2; Texas Instruments microWriter, 2.2; Apple LaserWriter Select 310, 2.0; Canon LBP-4sx, 1.8; Hewlett-Packard LaserJet 4L, 1.6; and Panasonic KX-P4430, 1.6.

July's *Communications* should have said that the annual fee for MCI Mail is \$35.

June's *Quick Take* on the 2MB Diamond Viper VLB (page 89) should have stated that it supports 65,000 colors at 1024 by 768 resolution, with a 76-Hz screen refresh rate.

PC World regrets the errors.

PC World welcomes your reactions and ideas. See page 10 for contact information.



POWER TIP_{no.}293

Fast Formats

In DOS 5.0 or 6.0, you can pop a used disk in your drive and use the command FORMAT A: /Q /U for an "instant" format. The catch is that you won't be able to unformat the floppy if you discover you need some of the old files.

Richard Melville Albany, New York Lotus Lotus Approach

Lotus Preclance

SHAPPHICS

Lotus Lotus Approach

Lotus Preclance

SHAPPHICS

LOTUS LOTUS LOTUS

LOTUS LOTUS

LOTUS LOTUS

LOTUS LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

LOTUS

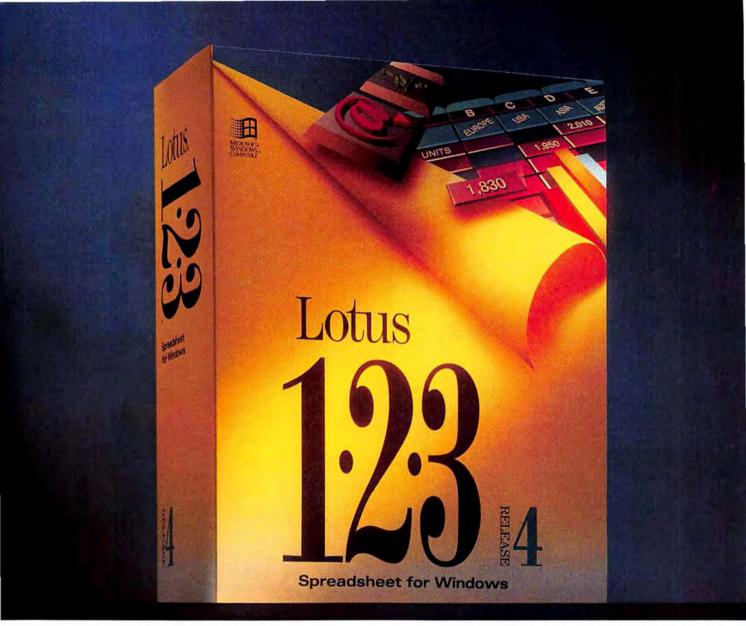
Lotus SIARISITES SIARI

Five award-winning applications for Windows

TO WINDOWS USERS, IT'S A"BUNDLE OF JOY."

(TO MICROSOFT, IT'S PANDORA'S BOX)

- PC Letter 6/7/93



Thousands of DOS users who wouldn't move to Windows™ for Microsoft® Excel are jumping for Lotus® 1-2-3® Release 4. As are many who already use Windows.

And they're getting a spreadsheet that's not only much easier for them to use, but a lot more powerful in a lot of ways.

The new 1-2-3 is the first spreadsheet designed to help people work the way they want to work. Which is often together.

A raft of powerful new usability features makes 1-2-3 easy to learn and a pleasure to use. These include a context-sensitive user interface. A Live Status Bar. In-Cell™ Editing.



One-step charting. A completely new graphical interface for database queries. And Worksheet Tabs for 3D spreadsheets that make labeling and manipulating the work much easier.

The close integration of 1-2-3 with other Lotus Windows desktop applications lets you easily transfer 1-2-3 information, formats and processes to other applications where you need them. But it's the Version Manager, and other Working Together® features, that turn the 1-2-3 spreadsheet into a potent workgroup tool by letting people share and track information in new ways.

See for yourself. Visit your Lotus Authorized Reseller or call **1-800-TRADEUP**, **ext. 9421*** to upgrade for just \$119 direct from Lotus. Or ask for a free demo disk. But first, turn the page and let's talk word processors.



"The SmartIcons in 1-2-3 for Windows are smarter and Lotus's approach to swapping different tool-bars in and out beats Excels and Quattro Pros."

PC/Computing 6/93

'Lotus's version manager blows away similar features in Excel and Quattro Pro.' Walter S. Mossberg Wall Street Journal 7/29/93

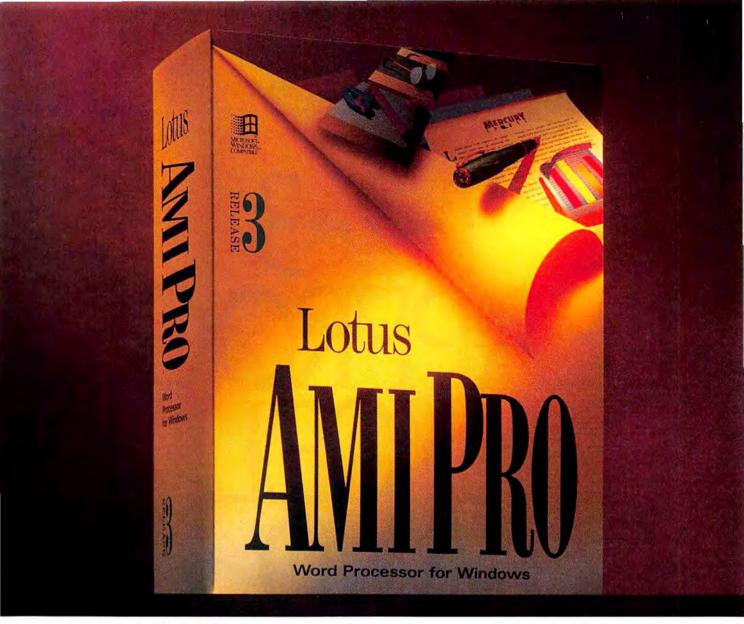
'Users who often collaborate on developing and refining worksheet data...will find Release 4 indispensable.'

PC Week 5/3/93

-PC World 6/93

1-2-3 for Windows has always had more powerful database features than Excel or Quattro Pro and now these features are also easier to use."

BYTE 6/93



Software reviewers and industry experts have convincingly and consistently chosen Lotus[®] Ami Pro[®] as the best word processor over both Microsoft[®] Word and WordPerfect[®] for Windows[™]

Again, in the August, 1993 PC/Computing Face-Off, Ami Pro soundly beat Word, and swept both DOS and Windows versions of WordPerfect in 8 out of 8 categories.

If you're in the least nervous about leaving WordPerfect, or think Word is the easiest way to face Windows, Ami Pro will feel like a breath of fresh air. Because no one comes close to Ami Pro for making even the most complex



documents fast and easy. Using customizable, editable Smartlcons® that give you one-click access to most tasks, and a SwitchKit that takes any trauma out of leaving WordPerfect, you'll understand why new Ami Pro users

rarely bother to open the manual.

Then consider the advantages of Ami Pro's tight integration with 1-2-3* and the other Lotus applications. With Ami Pro, you can not only exchange data, charts and functions with the other applications in a click, you can easily create hot links between applications.

Enough words. Visit your Lotus Authorized Reseller or call **I-800-TRADEUP**, **ext. 9421*** to order. Or ask for your free, full featured working model. Meanwhile, how happy are you with your presentation graphics software?



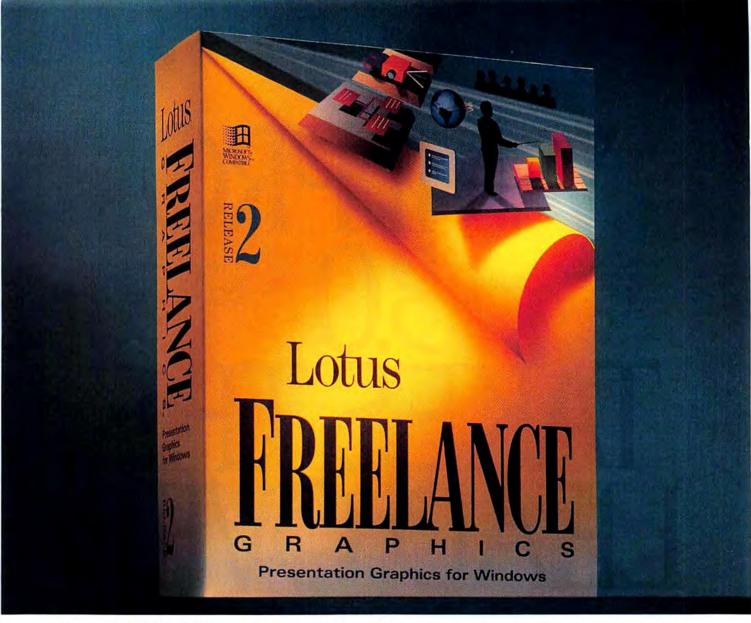
'Ami Pro 3.0 comes close to being perfect...It stands above Word and WordPerfect in both its function and in its speed.' Home Office Computing 1/93 You can learn to use Ami Pro, the Lotus word processing program for Windows, in about a day, Put the manual in a drawer as a first step.' Forbes 2/1/93

TAKESTHE LEAD OVER LEAD OV

'Usability, features, and performance – Ami Pro is the overall winner.' PC/Computing 8/93

"Users moving to Windows from DOS can fearlessly choose the latest Ami Pro Version."

PCWorld 3/93



Year after year. Lotus* Freelance Graphics* has dominated both Harvard Graphics* and PowerPoint* in industry awards. This year, Freelance Graphics 2.01 has again set new standards, winning top ratings from InfoWorld, PC/Computing. BYTE and Windows Sources.

Historically, building professional looking presentations, even with the best software, has been time-consuming work. But with Freelance Graphics 2.01, it's so simple and so fast that people are now punching out charts for small presentations and even for handouts used at informal meetings.

One click is all it takes to access some of the most powerful features in Freelance



Graphics, like more than 65 SmartMaster™ design sets, 500 symbols and 100 chart styles. And when you're done, you can

turn four-color overheads into black and white hand-outs with just one click.

The integration of Freelance Graphics with other Lotus applications is so complete that if you bring your 1-2-3* data into a Freelance presentation, and you later change a number in your 1-2-3 spreadsheet, it will be instantly reflected on the Freelance chart.

For your own live presentation, visit your Lotus Authorized Reseller. Or call 1-800-TRADEUP, ext. 9421* for a free, full featured working model. By the way, have you ever used a database?



'Creating a presentation of even (100 slides) is absurdly easy—and much easier in many ways than with competing products...

PC Week 2/15/93



"LOTUS FREELANCE GRAPHICS FOR WINDOWS SCORE: 9.2"

- Software Digest 7/93



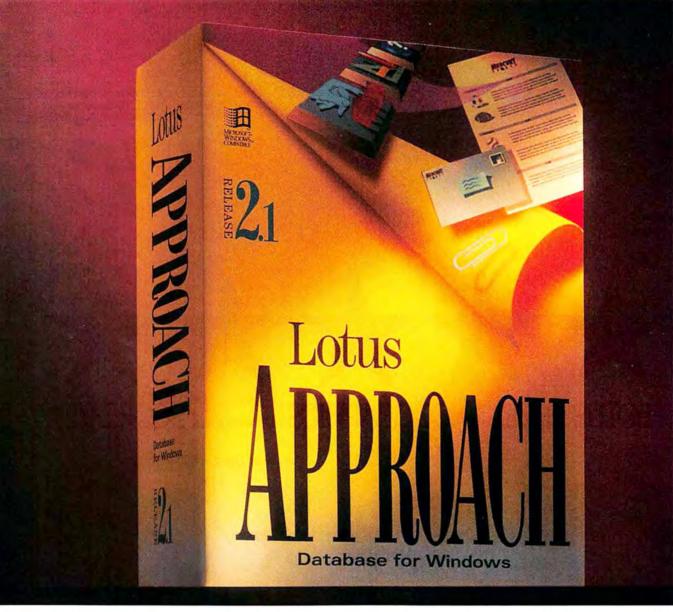
"MICROSOFT POWERPOINT FOR WINDOWS SCORE: 7.9"

- Software Digest 7/93

"(Freelance Graphics) outclasses the competition in features and ease of use."

InfoWorld 6/21/93

'The users in this study were more productive, more effective, and more satisfied with Freelance Graphics than PowerPoint...PowerPoint users took 64% more time to complete their presentations. Usability Sciences Corp. 3/93



Award-winning Lotus[®] Approach[™] defines a whole new database category: the full powered client/server relational database for the general business PC user. No longer do you have to be a programmer, or think like one, to experience the everyday advantages of a relational database.

Now you yes you can build and use your own databases as easily as you build and use your own spreadsheets. For sales reporting invoicing project management, customer tracking mailmerge or hundreds of other uses. Now PC users can enjoy easy, one-click, high-performance access to company data stored

in all the major formats (including dBASE.*

Paradox.* FoxPro.* Oracle.* SQL SQL Server and DB2.*) across all popular networks.



If you've never worked with a Windows™ database, or if you bought Paradox or Access

only to find they were unworkable. Approach will change everything. An independent study found that Approach users are up-to-speed and producing real results in two hours.**

And because Approach is designed to share with other Lotus Windows applications, using Approach databases to mailmerge with Ami Pro.* to share data with 1-2-3* spreadsheets, or to simply report on data is something anyone can do.

What a difference a database makes.

Visit your Lotus Authorized Reseller or call

1-800-TRADEUP, ext. 9421.* Or get the
whole suite and save a few hundred bucks.



"...Approach offers much easier-to-use databasecreation tools for individual users and easier access to big-time databases than either Microsoft Access or Paradox/Windows...Approach is a big. big winner." PC Week 6/28/93

"APPROACH... IS BOTH PRODUCTIVE

...Approach 2.0 is one of the few (software) packages...for which it's truly possible to never open the manuals.**

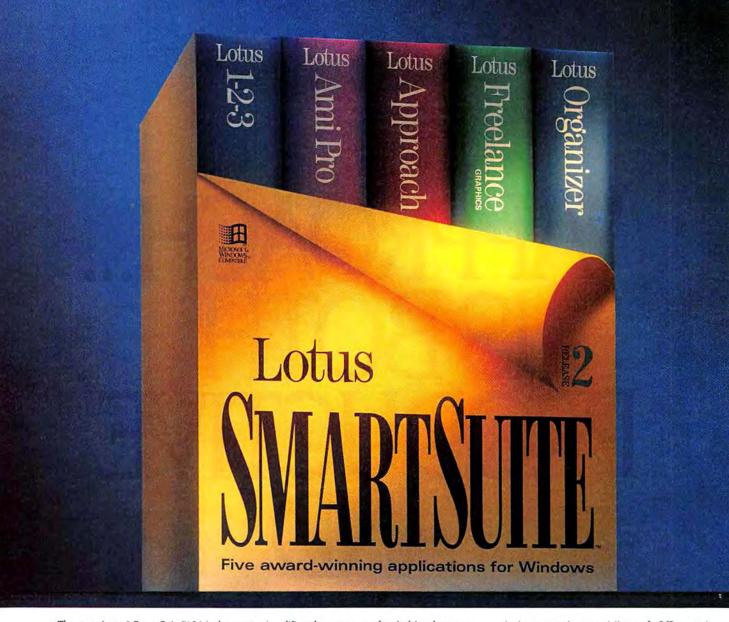
Windows Magazine 12/92

I JANUAR JANUAR ACCESS WILL ACCESS WILL OVERWHELD OVERWHELD FOR END-LI

-InfoWorld 1/17/93

'Best Buy Approach is the simplest and most straightforward relational database.' PC World 6/93

> "The most usable Windows relational database ever." PC/Computing 8/93



The new Lotus® SmartSuite™ 2.1 is the most complete desktop solution for Windows™ users. It brings together 1-2-3® Release 4, Ami Pro® Release 3.01, Freelance Graphics® Release 2.01, Approach™ 2.1 and Organizer™ 2.1 at an irresistible price (upgrade for just \$299••••). But it's much more than a deal on an all-star collection of Windows applications.

The applications in SmartSuite 2.1 are closely integrated sharing a consistent appearance and behavior. This reduces the time it takes for a user to learn each application. For example, the three most used applications in SmartSuite share 26 common SmartIcons* (In Microsoft* Office, they share 3).

Far beyond anything possible with Microsoft Office. Lotus's integration also sim-

plifies the process of switching between applications, sharing information across applications and using functions from one application while working within another.

For example, you can easily edit 1-2-3 charts from within Freelance Graphics.

Or use Freelance, or 1-2-3 functions within Ami Pro. All work easily with the Approach database. And all support industry standards, so they'll work with offerings from other vendors as well. This makes working in each

application, and the entire Windows platform, easier and more productive than ever before.

SmartSuite is also designed for working

in groups in ways Microsoft Office can't.

All applications are network ready and mailenabled with cc.Mail.™ The results of Working

Together* are easily manageable through

1-2-3's Version Manager. And each application features additional enhancements for full

integration with Lotus Notes.2**

Unlike Office users, SmartSuite users can call a single toll-free number for support.

For the whole story, visit your Lotus Authorized Reseller. Until 12/31/93, you can upgrade from any Lotus or competitive

product to SmartSuite 2.1 for just \$299.***
Or for a SmartSuite demo disk call

1-800-TRADEUP, ext. 9421.*



Lotus SmartSuite also includes a personal information manager, the award-winning Lotus Organizer.

"LOTUS SMARTSUITE REDEFINES

"Lotus now has a top rated product in each of a half a dozen categories...

Moreover, Lotus products have come to share a great deal of genuine integration..."

Soft*Letter 5/21/93

"When you buy...SmartSuite, the pieces really work together!...The point: There's more to a suite than cramming four boxes into a suitcase and cutting the price."

PC/Computing 8/93

APPLICATIONS SHOULD WORK TOGETHER"

"The level of integration in the SmartSuite makes complicated, cross-application tasks easier for users and lets them take full advantage of...the Windows environment."

Dataquest 6/15/93

-PC Letter 6/7/93



*In Canada call 1-800-CO-LOTUS **Consult your Lotus Representative for more information on how to incorporate Lotus Notes and ccMail into your communication strategy, ***5299 direct from Lotus Offer expires 12/31/93.

Qualifying competitive products are Microsoft Excel Borland Quattro* Pro Inot including SEI Microsoft Word WordPerfect, Wordstar* DisplayWrite* Microsoft PowerPoint Harvard Graphics Corel Draw, WordPerfect
Presentation Aldus* Persuasion Qualifying Lotus products include 1-2-3 fexcluding 1-2-3 for Homel Symphony. Amil Pro Freelance Graphics ccMail and Graphwriter* Lotus Notes and Graphwriter are registered trademarks and SmartStute and Lotus Organizer are trademarks of Lotus Development Corporation Quattro is a registered drademark of Borland International Inc Wordstar is a registered trademark of Wordstar international Inc Displaywrite is a registered trademark of International Business Machines Corp Aldus is a registered trademark of Aldus Corporation.

Choosing the Best Modem is \.\!

Easy to Buy. The Complete Communicator EZ gives you data, fax and voice mail communications for the price most others charge without voice capability. For under \$100, you'll get everything you need to be

up and running fast — including the industry's best fax, data and voice software.

Easy to Install. The internal version is easy to install because the fax, data and voice capabilities are all on

one card. Or just plug the external unit into your serial port. The simple software installation will get you up and running in less than 10 minutes.

Easy to Use. We've made the software for Windows and MS-DOS the same for our modem, so you won't have to learn two different programs. You can fax directly from either DOS or Windows applications. Plus, faxes and voice messages are received and sent in the background — so you can work uninterrupted.

Easy to Choose. With features like remote message and fax retrieval, personalized fax coversheets, 999 password-protected mailboxes and beeper notification, the choice is clear. Complete Communicator EZ

takes care of all your communications needs for less than the cost of a standard fax/data modem. So whether you're in the office or on the road, Complete Communicator

EZ keeps you in touch with the rest of the world. From the company that continues to bring you high quality products at great prices.



Copyright © 1993, The Complete PC, Inc. The Complete PC and Complete Communicator EZ are trademarks of The Complete PC, Inc. Other product names or company names mentioned are trademarks or registered trademarks of their respective companies.

CompleteCommunica

User Groups Offer Something for Everyone

hen Jean Feingold talks about the HogTown Hackers, a group of 100 or so computer users in Gainesville, Florida, it's with such enthusiasm that you can't help but get caught up in the excitement of the user group experience.

"They saved me," says Feingold, recalling how group members introduced her to computing. Shortly after a friend gave her a used XT and just a few words of advice, she sought the group's help. "I had no manual, no guide to DOS," she remembers, just a fear of the machine that sat idle on her desk.

Feingold found all the help she needed at the Hog Town Hackers' monthly meetings. With the help of more experienced users, she gradually gained enough confidence and expertise to use her computer to write a book and run a home office. And perhaps most gratifying of all, Feingold is now one of the experts that new users turn to for help.

Feingold's story exemplifies the mission of user groups: to inform people about computers through a friendly exchange. Run almost exclusively by volunteers, user groups have become an indispensable source of information on everything from buying a new PC to programming a spreadsheet macro to customizing Windows.

10,000 and Growing

The Association of Personal Computer User Groups (APCUG) estimates that there are 10,000 such groups in the United States, ranging in size from 3 members to 24,000. Once a haven for computer hackers and hobbyists, user groups now attract corporate users, who rely increasingly on the advice and expertise of fellow members when making business purchases. A 1992 study of 12 user groups conducted by California State University at San Bernardino

By Sarah Klein

found that nearly 30 percent of all members held the top post in their company. Members of the groups surveyed made or approved an average of \$89,000 worth of PCrelated expenditures per year in their business.

That kind of buying clout hasn't gone unrecognized by hardware and software companies. All the major vendors—and many smaller firms—routinely share their plans and products with user groups to gain insight into what features and functions mean the most to buyers.

Technical Help and More

or roughly \$30 a year, user groups provide members with a forum in which to meet other computer enthusiasts, a monthly newsletter filled with tips and product evaluations, a help line staffed by members, and access to huge libraries of public domain software.

Most of the action—and interaction—takes place in monthly user group meetings. These gatherings can feature anything from demonstrations of new hardware and software to how-to sessions to conversations with some of the computer industry's top executives. To accommodate the interests of members and the rapid changes in PC technology, most groups also hold meetings of smaller special interest groups (SIGs) to discuss specific issues, applications, or brands of PCs.

Now Playing at a City Near You

Whether you're a department manager responsible for a five-figure PC budget or an independent user setting up a home office, your local user group can be an invaluable resource. To find a

Who Joins User Groups... Professional/staff specialist Chair/president/owner Department head or manager Technical/mechanical/production 7.7% Supervisor 5.1% Vice president/general manager 3.7% Administrative assistant 1.8% Secretary/clerical staff 1.6% 6.1% . . . and What They Like Best 42.9% Monthly newsletter 14.8% Socializing with members 12.4% General meetings 12.2% Special interest groups 9.5% Training sessions 3.5% Special events 2.6% Shareware disks 1.3% Group purchase | 0.7% Numbers may not total 100 due to rounding. Source: California State University at San Bernardino, California, April 1992 user group demographic study.

> group close to home, check the following updated list. Although the majority of listings are for domestic groups, we've included international listings when available.

> Groups are listed alphabetically by state and city. If you don't find a group in your area, contact one of the following organizations:

America Online

8619 Westwood Center Dr. #200 Vienna, VA 22182 800/827-6364 (for AOL software membership), 703/448-8700 20 SIGs; TS; TE; SL; BBS

Association of Personal Computer User Groups Inc.

1730 M St. NW #700 Washington, DC 20036 914/876-6678 (user group locator service line) NL; BBS

ALABAMA

Birmingham IBM PC User Group Inc.

c/o Fred Hilbers P.O. Box 19248 Birmingham, AL 35219-9248 205/871-1939 \$20/yr.; NL; 10 SIGs; TS; TE;

ALASKA

Alaska Computer Society

P.O. Box 240945 Anchorage, AK 99524-0945 907/337-7829, 907/561-2480 (BBS) \$25/yr.; NL; 8 SIGs; TS; TE; SL; BBS

Polar PC User Group

c/o Glen Wilcox P.O. Box 72934 Fairbanks, AK 99707 907/452-2500 \$10/yr.; NL; TE; SL

ARIZONA

Bisbee Users Group

P.O. Box 5012 Bisbee, AZ 85603-5012 602/432-5087, 602/432-7854 (BBS) \$20/yr.; NL; 2 SIGs; TS; TE; SL; BBS

South Mountain Users Group

P.O. Box 50002 Phoenix, AZ 85076 602/759-3725 (7 p.m.-9 p.m.) \$30/yr.; NL; 2 SIGs; TS; TE; SL

Tucson Computer Society

c/o Lee Levin Box 1489 Tucson, AZ 85702 602/744-9654, 602/744-2314 (BBS) \$30/yr.; NL; 16 SIGs; TS; TE; SL; BBS

ARKANSAS

Central Arkansas PC Users Association

c/o Bob Wallace P.O. Box 24064 Little Rock, AR 72221-4064 501/225-9304, 501/225-7902 (BBS) \$24/yr.; NL; 6 SIGs; TS; SL; RBS

South Arkansas PC Users Group

2206 N. Jackson St. Magnolia, AR 71753 501/696-3650, 501/234-3361 (BBS) \$15/yr.; NL; TS; TE; SL; BBS

CALIFORNIA

Pasadena IBM Users Group

c/o Steve Bass 2303 Glen Canyon Rd. Altadena, CA 91001-3539 818/791-1600 (days), 818/571-0718 (BBS) \$48/yr.; NL; 10 SIGs; TS; TE; SL; BBS

Kern Independent PC Users Group

P.O. Box 2780 Bakersfield, CA 93303 805/322-8800 (BBS) \$30/yr.; NL; 1 SIG; TS; TE; BBS

Berkeley PC/Compatibles User Group

c/o Mel Mann 1145 Walnut St. Berkeley, CA 94707 510/526-4033, 510/845-4812 (BBS) No fee; NL; 2 SIGs; TS; TE; SL; BBS

The Valley Computer Club

c/o Grayce Hruda P.O. Box 6008 Burbank, CA 91510-6008 818/842-3707, 213/227-9684 (BBS) \$35/yr.; NL; 2 SIGS; TS; TE; SL; BBS

R&W IBM PC Users Group

2076 San Gabriel Ave. Clovis, CA 93611 209/294-8831 No fee; NL; TS; TE; SL

Orange Coast IBM PC User Group

P.O. Box 6100-211 Costa Mesa, CA 92628 714/843-2048, 714/843-9248 (BBS) \$36/yr. \$45/yr. family; NL; 25 SIGs; TS; TE; SL; BBS

Color America Inc.

c/o Robert Marvin 1466 Spruce Tree Dr. Diamond Bar, CA 91765 909/860-0090 \$25/yr.; NL; 2 SIGs; TS; TE; SL

Fresno PC Users Group

6751 N. Blackstone Ave. #395 Fresno, CA 93710 209/277-8368 (BBS) \$24/yr., \$18/yr. second adult, \$12/yr. junior, \$96/yr. supporting business; NL; 14 SIGs; TS; SL; BBS

Goleta DeskTop Publishing User's Group

c/o Dana Trout P.O. Box 2450 Goleta, CA 93118-2450 805/685-7937 \$15/yr.; NL; TS; TE; SL; BBS

MicroLink Personal Computer Users Group

15865-B Gale Ave. #1003 Hacienda Heights, CA 91745 818/961-6214, 818/968-0389 (BBS) \$25/yr.; NL; 2 SIGs; TS; TE; SL; BBS

Technical User Group Network

3926 Community Ave. La Crescenta, CA 91214 818/249-1629 \$24/yr.; NL; 7 SIGs; TS; TE; SL

Antelope Valley Microcomputer User Group

P.O. Box 2942 Lancaster, CA 93539 805/948-5166, 805/949-8151 (BBS) \$25/yr., \$10 initiation fee; NL; TS: TE: SL; BBS

Edwards Air Force Base Microcomputer Users Group

1519 W. Ave. H-11 Lancaster, CA 93534 \$10/yr.; NL; 3 SIGs; TS; TE; SL

Los Angeles Computer Society

P.O. Box 661189 Los Angeles, CA 90066 310/471-2726, 310/827-8171 (BBS) \$36/yr.; NL; 15 SIGs; TS; TE; SL: BBS

San Luis Obispo PC Users Group

c/o Bob Ward 2100 Andre Ave. Los Osos, CA 93402 805/528-0121, 805/528-6172 (BBS) \$20/yr.; NL; 2 SIGs; TS; TE; SL; BBS

Modesto PC Users Group

c/o W. V. Miller, secretary P.O. Box 5122 Modesto, CA 95352-5122 209/529-9612, 209/544-9810 (BBS) \$24/yr.; NL; 7 SIGs; TS; TE; SL; BBS.

Monterey Bay Users' Group-PC

c/o Michael Hagerty 177 Webster St. #A354 Monterey, CA 93940 408/373-6245, 408/373-3773 (BBS) \$25/yr.; NL; 15 SIGs; TS; SL; BBS

Napa Valley PC Users Group

P.O. Box 2653 Napa, CA 94558-0265 707/258-2509, 707/257-2338 (BBS) \$15/yr.; NL; 1 SIG; TS; TE; SL; BBS

North Orange County Computer Club

P.O. Box 3616 Orange, CA 92665 714/998-8080, 714/730-6743 (BBS) \$25/yr.; NL; 28 SIGs; TS; TE; SL; BBS

Channel Islands PC Users' Group

c/o Terry Lee, president P.O. Box 5025 Oxnard, CA 93031 805/983-4741 (9 a.m.-9 p.m.), 805/985-1657 (BBS) 530 first yr., \$20 thereafter; NL: 2 SIGs: TS: TE: SL: BBS

Redding IBM PC Users Group

P.O. Box 494778 Redding, CA 96049-4778 916/244-5961 \$20/yr.; 5 SIGs; TS; TE; SL

Ripon PC User Group 1146 7th St.

Ripon, CA 95366-2569 \$24/yr.; NL; 12 SIGs; TS; TE; SL

Riverside IBM Computer Club

c/o James Heidecke 7860 Live Oak Dr. Riverside, CA 92509-5339 909/685-5407, 909/352-2825 (BBS) \$25/yr.; NL; TS; TE; SL; BBS

State Microcomputer Forum

c/o Bill Mattingly 800 Capitol Mall MIC-47 Sacramento, CA 94280 916/654-8102 No fee; NL; 4 SIGs; TS; TE; SL

Peninsula Computer Club

222 Laurel St. #310 San Carlos, CA 94070-2363 415/593-9981, 415/571-9259 (BBS) \$25/yr.; NL; TS; TE; SL; BBS

IBM & Compatibles User Group

P.O. Box 87770 San Diego, CA 92138-7770 619/549-3787 No fee; NL (\$25/yr.); TS; TE; SL

BayTalk Computer Users Group (for Blind and Disabled)

4529 18th St. San Francisco, CA 94114 415/431-0245 (10 a.m.-10 p.m.), 415/864-6430 (BBS) \$12/yr.; Nt.; TS; TE; St.; BBS

PC Tech User Group

2440 16th St. #301 San Francisco, CA 94103 415/861-9321 \$30/yr.; NL; TS; TE

San Francisco PC Users Group 3145 Geary Blvd. #284

San Francisco, CA 94118-3300 415/931-3110, 415/621-2609 (BBS) \$40/yr.; NL; 18 SIGs; TS; TE; SI: BBS

United Sysop's Association

P.O. Box 28684 San Jose, CA 95159 408/522-8690, 408/739-8753 (BBS) \$25/yr; 2 SIGs; TS; TE; SL; BBS

Silicon Valley Computer Society

c/o Fred Townsend 2464 El Camino Real #190 Santa Clara, CA 95051 408/956-0864, 408/956-0317 (BBS) \$38/yr.; NL; 22 SIGs; TS; TE; SL; BBS

PC Users' Group of the Redwoods

P.O. Box 5055 Santa Rosa, CA 95402 707/527-8737 (recorded message), 707/823-9509 (BBS) \$30/yr., \$15/yr. students; NL; 5 SIGs; TS; TE; SL; BBS

Greater South Bay PC Users Group (GSBUG)

P.O. Box 6950 Torrance, CA 90504-0050 310/329-2804 \$25/yr.; NL; 11 SIGs; TS; TE; SL; BBS

North Bay Users Group

c/o Gloria Hutchinson 315 Nevada St. Vallejo, CA 94590 707/644-9327, 707/642-6284 (BBS) \$20 first yr., \$17 thereafter; NL; 4 SIGs; TS; TE; SL; BBS

Tule Fog PC Users Group

P.O. Box 1373 Visalia, CA 93279 209/636-2546 (BBS) \$29 first yr., \$24 thereafter; NL; 3 SIGs; TS; TE; SL; BBS

Diablo Valley PC User's Group

MSC 117 P.O. Box 8040 Walnut Creek, CA 94596-8040 510/943-6238 (BBS)

ABBREVIATIONS KEY

NL: newsletter
SIG: special interest group
TS: technical support
TE: training and education
SL: software library
BBS: bulletin board service

If It Were A Baseball Player, It Would Hit Home Runs, Toss No-Hitters, Steal Bases, And Sign For Under \$200.

Okay, it hasn't happened in baseball. But in the computer world, there's a major league player in the communications game that can pretty much do it all. Introducing CommWorks™ for Windows™ by

Traveling Software. The first complete communications package that gives you more flexibility than ever to do business away from the office. For starters, there's **LapLink*V**, the number one selling file transfer program. You can make unattended, regularly scheduled file transfers at anytime, from any place. And for local file transfers, use the included serial cable. CommWorks also

allows you to send and receive a

Fax

from your PC quickly, easily and privately. CommWorks also features **Remote Access**, which brings remote

files and printers directly to your PC wherever you are. And with

the online program, you can tap into

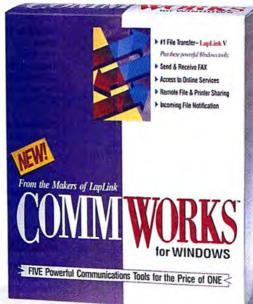
MCIMail® CompuServe® or other
Online Services

at the click of a button. What's more, the CommWorks Control Center puts all these communications tools at your fingertips. See your local dealer or call Traveling Software direct for \$50 off the introductory SRP of \$199.95. And get the

one who can do it

all. Without the

salary.



Introductory Offer Call for \$50 off (800) 472-8650

the obuckny offer good through Dec. 31, 1993 and 3-3 days — her purchased direct from Traveling Software, SRP \$22995, Introductory SRP good through Dec. 31, 1993, (b) 1993 Traveling Software, Inc. 18702 North Creek (way) 8 shell. (WA 98011, [206) 483-8089, John Moria was a characteristic and LopLink is a registered trademarks of Traveling Software. Other products are traveling to the product of the product o

Circle 243 on reader service card

CONSUMER WATCH

\$30/yr.; NL; 8 SIGs; TS; TE; SL; RRS

COLORADO

Mile High Computer Resource Organization

8175 Sheridan Blvd. #210 Arvada, CO 80003 303/286-7455, 303/752-2943 (BBS) \$25 first yr., \$20 thereafter; NL; 5 SIGs; TS; TE; SL; BBS

Metro Area Computer Enthusiasts

P.O. Box 440247 Aurora, CO 80044 303/368-1831, 303/797-8090 (BBS) \$20/yr.; NL; 2 SIGs; TS; TE; SL; BBS

The Alpha Micro Users Society (AMUS)

3200 Valmont Rd. #8 Boulder, CO 80301 303/449-6917, 303/444-2687 (BBS) \$65/yr.; NL; TS; TE; SL; BBS

PC Users Group of Colorado

P.O. Box 944 Boulder, CO 80306 303/278-1152, 303/530-9161 (BBS) \$25/yr.; NL; SL; BBS

Electric Locksmith PC Users Group

P.O. Box 15217 Colorado Springs, CO 80935-5217 719/390-0718, 719/390-9249 (BBS) \$24/yr.; NL; TS; TE; SL; BBS

Windows on the Rockies User Group

1681 S. Colorado Blvd, #284 Denver, CO 80222 303/331-2695 \$30/yr., \$60/yr. corporate; NL; 1 SIG; TS; TE; SL; BBS

Front Range PC Users Group

c/o Rick Mattingly 305 W. Magnolia #152 Fort Collins, CO 80521 303/223-8654, 303/484-0564 (BBS) \$25/yr.; NL; 6 SIGs; TS; TE; SL; BBS

Computer Users' Group of Greeley

3950 W. 12th St. #30 Greeley, CO 80634-2547 303/356-4171 \$20/yr.; NL; 3 SIGs; TS; TE; BBS

Pikes Peak Computer Applications Society Inc.

Box 85 Lake George, CO 80827 719/748-3462, 719/591-1453 (BBS) No fee; NL; 1 SIG; TS; TE; SL; BBS

Chaffee County Computer Club

P.O. Box 7 Poncha Springs, CO 81242 719/539-3739 \$18/yr.; NL; TS; TE; SL

CONNECTICUT

Central CT PC (PCjr) Group

c/o Bob Gauthier 781 Main St. Coventry, CT 06238 203/742-6083 \$6/yr.; NL; 1 SIG; TS; TE; SL

Connecticut IBM PC User's Group

P.O. Box 291 New Canaan, CT 06840-0291 203/762-0229, 203/359-9530 (BBS) \$25/yr.; NL; 5 SIGs; TS; SL; BBS

Business & Professional Micro Users Group

c/o Mr. Silversmith P.O. Box 271468 West Hartford, CT 06127-1468 203/242-6587 \$15/yr.; 10 SIGs; TS; TE; SL

DISTRICT OF COLUMBIA

Pentagon PC User Group

P.O. Box 47046, the Pentagon Attn.: LTC Kolbrener Washington, DC 20050-7046 703/696-6060, 703/614-4114 (BBS) \$12/yr; NL; 1 SIG; TS; TE; BBS

FLORIDA

Boca Raton Computer Society Inc.

c/o Glenn Stocking P.O. Box 273421 Boca Raton, FL 33427-3421 407/276-0867, 407/391-4884 (BBS) \$25/yr.; NL; 11 SIGS; TS; TE; SL; BBS

Manatee PC Users Group Inc.

C/o Larry Tyler, president 5726 Cortez Rd. W #286 Bradenton, FL 34210 813/795-0601, 813/748-7513 (BBS) \$20/yr.; NL; 27 SIGs; TS; TE; SL: BBS

Pinellas IBM-PC Users Group

1510 Barry Rd., Unit J-2 Clearwater, FL 34616-4444 813/443-4433 (recorded message), 813/733-8693 (BBS) \$25/yr.; NL; 20 SIGs; TS; TE; SL: BBS

Tandy MS-DOS User's Group

1801 Vancouver Dr. Clearwater, FL 34616 813/584-7128 \$15/yr.; NL; TS; TE; SL

Space Coast PC Users Group

P.O. Box 369 Cocoa, FL 32923-0369 407/254-1926 (10 a.m.-10 p.m.), 407/635-8833 (BBS) \$20/yr.; NL; 11 SIGs; TS; TE; SL: BBS

Crystal River Users Group

P.O. Box 2108 Crystal River, FL 34423 904/563-5047, 904/795-8743 (BBS) \$24/yr.; NL; 6 SIGs; TS; TE; SL; BBS

South Polk County PC Users Group

c/o Bill Goddard 815 N. Lake Reedy Blvd. Frostproof, FL 33843 813/635-3381 No fee; TE

The HogTown Hackers

c/o Bruce Ruiz 4623 N.W. 13th Ave. Gainesville, Fl. 32605 904/392-4828 (days), 904/378-9700 (evenings) \$15/yr.; NL; 3 SIGs; TS; TE; SL; BBS

Miami PC User Group

c/o Jeffrey Feinberg 4651 Sheridan St. #300 Hollywood, FL 33021 305/962-8889, 305/680-9481 (BBS) \$24/yr; NL; 6 SIGs; TS; TE; SL; BBS

Ridge Area Computer Club

c/o Web Austin 251 Tower Lakes Lake Wales, FL 33853-6802 813/676-5936 \$20/yr.; NL; 6 SIGs; TS; TE; SL

Central Florida Computer Society

P.O. Box 948019 Maitland, FL 32794-8019 407/332-2883, 407/831-9130 (BBS) \$25/yr.; NL; 12 SIGs; TS; TE; SL; BBS

Physically Challenged Users'

P.O. Box 16-1443 Miami, FL 33116-1443 305/274-0099 \$25/yr.; NL; 3 SIGs; TS; TE; SL

Charlotte County PC Users Group

c/o John Skinner, president P.O. Box 3530 Port Charlotte, FL 33949-3530 813/627-5231, 813/637-9303 (BBS) \$25/yr.; NL: 6 SIGs; TS; TE; SL; BBS

Tri-County Computer User Group Inc.

P.O. Box 7414 Port St. Lucie, FL 34985-7414 407/335-1458 \$25/yr; NL; 12 SIGs; TS; TE; SL: BBS

EpSuncoast Users' Group

c/o Dick Lee 1237 79th St. S St. Petersburg, FL 33707 813/343-2668 (days) \$15/yr.; NL; 2 SIGs; TS; TE; SL

Sarasota IBM PC User's Group

7107 Antigua Pl. Sarasota, FL 34231 813/922-0167 \$20/yr.; NL; 15 SIGs; TS; TE; SL

Sun City Center PC User's Group

1009 N. Pebble Beach Blvd. Sun City Center, FL 33573 813/634-3664 \$25/yr.; NL; 2 SIGs; TS: TE; SL

Univ. of So. Florida PC Users Group

SVC 4010 Tampa, FL 33620-6940 813/968-6080 No fee; NL; 6 SIGs; TS; TE; SL; BBS

Palm Beach PC Users Group

c/o Jack R. Cook

319 Sequoia Dr. West Palm Beach, FL 33409 407/689-8841 (7 p.m.-9 p.m.), 407/775-1338 (BBS) No fee; NL; 3 SIGs; TS; TE; SL; BBS

GEORGIA

Athens IBM User Group

P.O. Box 6652 Athens, GA 30604 706/769-5135, 706/354-0817 (BBS) \$25/yr.; NL; TS; TE; SL; BBS

Atlanta PC User's Group

c/o Jack Bolton P.O. Box 28788 Atlanta, GA 30358 404/393-1629, 404/808-4696 (BBS) \$30/yr., \$15/yr. students, \$45/yr. family, \$100/yr. corporate; NL; 22 SIGs; TS; TE; SL; BBS

CSRA Computer Society Inc.

c/o Rick Burwell P.O. Box 284 Augusta, GA 30903 \$20/yr.; NL; 5 SIGs; TS; TE; SL

Metro Atlanta Computer Klub

P.O. Box 813481 Smyrna, GA 30081 404/621-7990, 404/439-7350 (BBS) \$20/yr.; NL; 6 SIGs; TS; TE; SL; BBS

Perry MS-DOS User Group

98 Knightsvue Pl. Warner Robins, GA 31093 \$18/yr.; NL; TS; TE; SL

Warner Robins User's Group

218 Madrid St. Warner Robins, GA 31093 912/328-3228, 912/328-0923 (BBS) \$24/yr., NL; 3 SIGs; TS; TE; SL; BBS

Atlanta IBM Employees PC Club

c/o 3073 Batesville Rd. Woodstock, GA 30188 404/238-4525 (BBS) \$10/yr.; NL; TS; SL; BBS

HAWAII

TROA Users Group

94-1071 Leomana Pl. Waipahu, HI 96797 808/671-8268 \$10/yr.; NL; 3 SIGs; TS; TE; SL

ILLINOIS

Common User Group—PC Project

401 N. Michigan Ave. Chicago, IL 60611-4267 312/644-6610 \$60/yr., \$100/yr. corporate; NL; 27 SIGs; TS; TE; SL; BBS

New Wave Computer User Group Inc.

P.O. Box 87 Chicago, IL 60690-0087 312/326-4636 (recorded message), 312/326-4750 (BBS) \$15/yr. \$25/yr. family; NL; 10 SIGs; TS; TE; BBS

Chicago Computer Society

P.O. Box 27 Deerfield, IL 60015-0027

ABBREVIATIONS KEY

NL: newsletter
SIG: special interest group
TS: technical support
TE: training and education
SL: software library
BBS: bulletin board service

At last! A spreadsheet that's easier to learn and use than 1-2-3 and Excel!

Quattro Pro is the easiest Windows spreadsheet. (Ask anyone who's tried it.) And the same technology

that makes it the easiest also makes it the best.

FINALLY, A FRIENDLY SPREADSHEET

You're the reason why we made Quattro* Pro so easy. Because you told us you wanted a product you could understand right away. Well, Quattro Pro 5.0 is that easy. And it's leaps ahead of the competition.

BUILT-IN TUTORS GUIDE YOU ALL THE WAY

Quattro Pro's Interactive Tutors walk you through all the basics. But here's the good part. You can use your own data, instead of sample data you'll never use. So when you complete a lesson you get the work done, too. What a time saver! Neither 1-2-3 nor Excel can match this.

THE ENTIRE MANUAL IS NOW ON-LINE

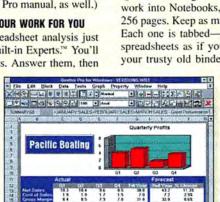
Getting help is as easy as pointing and clicking. In 1-2-3 or Excel, you have to trot out a big clunky manual, and waste time combing through it to find what you need. But in Quattro Pro, you just right-click your mouse button and-voila! You're taken to the exact portion of the manual you need. (You get a hard copy of the Quattro Pro manual, as well.)

QUATTRO PRO DOES YOUR WORK FOR YOU

To build a complete spreadsheet analysis just click on one of the 23 built-in Experts.™ You'll be asked a few questions. Answer them, then

sit back and watch as Quattro Pro does the work for you. Excel's "Wizards" are similar, but there are only two of them-and they're no match for Experts. In 1-2-3, you don't get any. Zero. Zip.

Quattro Pro answers "What if. . . ?" questions. The Scenario Manager lets you find out how changes to some of your numbers will affect your final



Quattro Pro Spreadsheet Notebooks with nameable pages make organizing and managing your data easier than you ever imagined.



outcome. Thinking about refinancing your mortgage, for example? Get all your answers in seconds.

ORGANIZE LIKE NEVER BEFORE

Quattro Pro organizes for you. It files your work into Notebooks, each one holding up to 256 pages. Keep as many open as you need to. Each one is tabbed—so you can flip through spreadsheets as if you were flipping through your trusty old binder. No other spreadsheet

> filing system keeps you as organized.

BUILT-IN GRAPHICS! READY-MADE TEMPLATES!

Quattro Pro's Intelligent Graphs make your spreadsheets stand out, and help you give high-impact presentations and electronic slide shows. You also get easy-touse drawing tools, 3-D charts, Harvard Graphics support, and more.

Need to generate professional-looking statements, schedules, and reports-fast? Just use the preformatted business templates included in Quattro Pro 5.0. You won't find them in any other spreadsheet.

ANALYSIS TOOLS GIVE YOU POWER, CONTROL

Now you have more ways to analyze dataand make better decisions. No other spreadsheet product, including 1-2-3 and Excel, offers anything like Quattro Pro's Data Modeling Desktop and Analytical Graphs. Quattro Pro gives you more scientific, engineering, statistical, and financial @functions than 1-2-3 or Excel, too.

DON'T SETTLE FOR LESS

Ouattro Pro is the easiest spreadsheet—and the best. You simply won't find a better value. Get your copy of Quattro Pro . . . today!

"So simple you'll find it hard to believe no one thought of it before".

-PC Computing

Limited-time Offer! Everyone qualifies!

90-day, Money-back Guarantee See your dealer today or call 1-800-336-6464, ext. 7116

In Canada, call 1-800-461-3327.

Power made easy[™]

Copyright © 1993 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. Quattro Pro for Windows and Spreadsheet Notebooks have patents pending. Offer good in the United States and Canada only. All prices in U.S. dollars. Dealer prices may vary. *\$39.95 upgrade price for existing Quattro Pro users. BI 5452.1

CONSUMER WATCH

312/794-7737 (recorded message), 312/879-9021 (BBS) \$40/yr.; NL; 18 SIGs; TS; TE; SL: BBS

No. Illinois Computer Owners League

c/o William Mivalaz 7611 Bloomingdale Elmwood Park, IL 60635 708/453-2514. 708/462-7560 (BBS). 708/795-4442 (BBS) \$10/yr.; NL; TS; TE; SL; BBS

Fox Valley Computer User Group

c/o Dorothy Bernardoni P.O. Box 28 North Aurora, IL 60542 708/293-9161. 708/851-4252 (BBS) \$20/yr.; NL; 7 SIGs; TS; TE; SL;

Corporate Association for Microcomputer Professionals

950 Skokie Blvd. #310 Northbrook, IL 60062-4017 \$95/yr. for two; 2 SIGs; TE;

Starved Rock Computer Users Group

219 Cactus St. Ottawa, IL 61350 815/433-6348, 815/795-6371 (BBS) \$15/yr.; NL; 5 SIGs; TS; TE; SL; BBS

Peoria Computer Club

P.O. Box 758 Peoria, IL 61652 309/266-4526 \$20/yr.; NL; 1 SIG; TS; SL

Binary Chautaugua Society

c/o Jack Beebe 307 W. Jackson St. Petersburg, IL 62675 217/632-7284 \$12/yr.; NL; TS; TE; SL

Fox Valley PC Association

P.O. Box 294 Plainfield, IL 60544 \$24/yr.; NL; TS; TE; SL

Sandwich Computer Users Group

P.O. Box 23 Sandwich, IL 60548-0023 815/786-9223. 815/786-7284 (BBS) \$20/yr. individual/family, \$10/yr. students; NL; 4 SIGs; TS: TE: SL: BBS

Fox Valley Computer Society

c/o Daniel J. Kairis P.O. Box 188 South Elgin, IL 60177 708/695-3195, 708/888-1112 (BBS) \$24/yr.; NL; 3 SIGs; TS; TE; SL;

Illinois Academy of Engineers, Anglers, & Computer Buffs

3105 Newmark Civil Engineering Bldg. MC-250 205 N. Mathews Ave. Urbana, IL 61801 217/333-3394 No fee; TS; TE

INDIANA

Anderson Council of Computer Users

c/o Roy Winkler 830 Harold St. Anderson, IN 46013-1628 317/646-3316 (days). 317/644-0006 (BBS) No fee; 1 SIG; TS; TE; SL; BBS

Elkhart PC Users Group

P.O. Box 13 Elkhart, IN 46515-0013 219/262-7312 No fee: NL: 2 SIGs: TS: TE: SL

Terre Haute PC User Group

P.O. Box 3174 Terre Haute, IN 47803-0174 812/237-4299 \$15/yr.; NL; TS; TE; SL; BBS

Lakeside User Group

P.O. Box 654 Warsaw, IN 46580 \$15/yr.; NL; TS; SL

IOWA

Central Iowa Computer User Group

P.O. Box 672 Ankeny, IA 50021-0672 515/964-8861. 515/964-7937 (BBS) \$25/yr.; NL; 4 SIGs: TS; TE; SL;

Quad-Cities Computer Society

c/o Robert Lay P.O. Box 2456 Davenport, IA 52809-2456 319/386-3484, 319/383-7199 (BBS) \$20/yr.; NL; 10 SIGs; TS; TE; SL; BBS

Hawkeye PC Users' Group

c/o Shelley Plattner P.O. Box 2592 lowa City, IA 52244-2592 319/335-1070. 319/363-3314 (BBS) \$15/yr.; NL; TS; TE; SL; BBS

KANSAS

Topeka PC Users Club

c/o Dean Jennings P.O. Box 1279 Topeka, KS 66601 913/273-0425

\$15/yr, individual/family, \$7.50/yr, students; NL; TS; TE;

Wichita PC Users Group

P.O. Box 781200 Wichita, KS 67278-1200 316/744-9815 \$25/yr.; NL; 3 SIGs; TS; TE; SL;

KENTUCKY

Central Kentucky Computer Society Inc.

1300 New Circle Rd. #105 Lexington, KY 40505 606/255-2527. 606/293-0154 (BBS) \$20/yr., \$15/yr. students and seniors, \$35/vr. family, \$150/yr. corporate; NL; 14 SIGs; TS; TE; SL; BBS

Kentucky-Indiana PC Users Group

c/o Mike Robinson P.O. Box 3564 Louisville, KY 40201 502/458-8972 (recorded message). 502/423-8654 (BBS) \$35/yr.; NL; 15 SIGs; TS; TE; SL: BBS

LOUISIANA

PAGE Computer User's Group Inc.

P.O. Box 7703 Alexandria, LA 71306-7703 318/473-8611 (after 6 p.m.), 318/449-1012 (BBS) \$24/yr.; NL; 3 SIGs; TS; TE; SL; BBS

Cajun Clickers Computer Club

P.O. Box 1947 Baton Rouge, LA 70821-1947 504/654-0483. 504/756-9658 (BBS) \$25/yr.; NL; 6 SIGs; TS; TE; SL;

Chalmette Computer Users' Group

P.O. Box 1515 Chalmette, LA 70043 504/279-8606. 504/246-2976 (BBS) \$20/yr.; NL; 4 SIGs; TS; TE; SL; BBS

New Orleans Personal Computer Club

One Galleria Blvd. #1707 Metairie, LA 70001-2082 504/838-9999. 504/486-7249 (BBS) \$30/yr., \$20/yr. students; NL; 6 SIGs: TS: TE: SL: BBS

MAINE

Maine State Employees PC **Users Group**

c/o R. K. Riley Dept. of Education, Station 23 Augusta, ME 04333 No fee; TS; TE; SL

Maine DOS Users Group

P.O. Box 8578 Portland, ME 04101-8578 207/839-8869, 207/854-1015 (BBS) \$25/yr., students free; NL; TS; TE: SL: BBS

MARYLAND

Computer Users of Baltimore (CUB)

c/o Emie Peek P.O. Box 23510 Baltimore, MD 21203 410/296-0501 \$15/yr.; NL; 3 SIGs; TS; TE; SL;

Central Maryland Microcomputer Users Group

9337 Angelina Cir. Columbia, MD 21045-5110 410/381-4762 \$20/yr.; NL; 1 SIG; TS; SL; BBS

Columbia-Baltimore User Group

P.O. Box 125 Columbia, MD 21045-0125 410/750-1253 (BBS) \$20/yr.; NL; 2 SIGs; TS; TE; SL;

Hagerstown Users Group

c/o Terry L. Smith 1136 Sunnyside Dr. Hagerstown, MD 21742-3044 301/790-2638 \$15/yr.; NL; 3 SIGs; TS; TE; SL;

Capital PC User Group Inc.

51 Monroe St., Plaza East Two Rockville, MD 20850 301/762-6775 (recorded message), 301/738-9060 (BBS) \$35/yr.; NL; 35 SIGs; TE; SL;

The Communal Computing Group

85 Catoctin Ct. Silver Spring, MD 20906 301/598-7838 \$18/yr.; NL; 2 SIGs; TS

MASSACHUSETTS

Boston Computer Society

One Kendall Sq., Bldg. 1400 Cambridge, MA 02139 617/252-0600 No fee; NL; 79 SIGs; TS; TE; SL; BBS

Boston Computer Society IBM-PC Users' Group

188 Needham St. #230 Newton, MA 02164 617/964-2547 (recorded message), 617/332-5584 (BBS) \$39/yr.; NL; 25 SIGs; TS; TE; SL: BBS

Pioneer Valley PC Users Group

P.O. Box 9671 North Amherst, MA 01002 413/568-1366 \$25/yr.; NL; 3 SIGs; TS; TE;

New England Computer Society

P.O. Box 363 West Springfield, MA 01090 413/786-8567 (after 6 p.m.), 413/538-8331 (BBS) \$15/yr.; NL; 3 SIGs; TE; SL;

MICHIGAN

South Eastern Michigan Computer Organization

P.O. Box 707 Bloomfield Hills, MI 48303-0707 313/398-7560. 313/728-4297 (BBS) \$20/yr.; NL; 12 SIGs; TS; TE; SL: BBS

Flint Area Computer **Enthusiasts (FACE)**

P.O. Box 69 Flint, MI 48501 313/230-8433 (BBS) \$15 first yr., \$10 thereafter; NL: 1 SIG (fee); SL; BBS

Delta DOS Users Group

1415 Michigan Ave. Gladstone, MI 49837 906/428-1014. 906/428-3425 (BBS) \$20/yr.; NL; 2 SIGs; TS; TE; SL;

Librarians Using Computers

c/o Blaine Morrow 10 Kercheval Grosse Pointe, MI 48236 313/343-2340 \$5/yr.; NL; 2 SIGs; TS; TE; SL

The Users' Personal Computer Organization

P.O. Box 80086

ABBREVIATIONS KEY

NL: newsletter SIG: special interest group TS: technical support TE: training and education SL: software library **BBS:** bulletin board service

Eclipse FAX: If It Were Any Faster, You'd Have To Send And Receive Your Faxes Internally.

Here's the inside story on Eclipse FAX - the fastest, easiest Windows fax software available today. With Eclipse FAX, you save time since all your faxing is done from your own personal computer. You can fax to or receive from any fax machine and easily

track, file, mark-up and store your faxes.

With a click, you can send or receive a fax - even if you're in a word processor or other Windows application - without being interrupted. And Eclipse FAX also includes OCR, which converts your faxes into editable text.

Of course, the nature of fax software has other unbeatable benefits. Like the ability to annotate and type comments on faxes with your PC; the ability to print out plain paper faxes from your PC; and the pri-

vacy and convenience of faxing from your own personal computer.

If you already own a fax software program, we'll let you trade up to Eclipse FAX for just \$59*. So pick up Eclipse FAX, because to fax any faster, you'd have to break a few laws. Of physics.









Phoenix Technologies Ltd. 846 University Avenue, Norwood, MA 02062 ©1993 Phoenix Technologies Ltd. Available now at Egghead, Comp USA, Computer City and other dealers.

*Competitive upgrade offer

CONSUMER WATCH

Lansing, MI 48908-0086 517/627-7609, 517/487-6452 (BBS) \$20/yr.; NL; 3 SIGs; TS; TE; SL; BBS

MISSISSIPPI

Oxford Computer User Group

P.O. Box 1408 University, MS 38677 601/232-7206 \$15/yr.; NL; TS; SL

MISSOURI

Kansas City IBM PC User Group

c/o Bill Meeker 221 E. 63rd St. Kansas City, MO 64113 816/444-8709 \$15/yr.; NL; 5 SIGs; TS; TE; SL

St. Louis Users Group for the Personal Computer

P.O. Box 69099 St. Louis, MO 63169-0099 314/878-7614 (BBS) \$35/yr.; NL; 15 SIGs; TS; TE; SL; BBS

NEVADA

Las Vegas PC Users Group

1350 E. Flamingo Rd. #188 Las Vegas, NV 89119 702/431-4333, 703/597-1931 (BBS) \$30/yr.; NL; 20 SIGs; TS; TE; SL: BBS

NEW HAMPSHIRE

Seacoast IBM User's Group

Dover Point Office Park #44H Dover, NH 03820 603/742-2233, 603/743-3385 (BBS) \$25/yr.; NL; TE; SL; BBS (\$10 extra)

NEW JERSEY

Association of Personal Computer Professionals

c/o N.B.C. Associates Inc. 808 Richard Rd. Cherry Hill, NJ 08034 609/779-0202, 215/673-8594 (BBS) \$45/yr; NI; 1 SIG; TE; BBS

PC User Group of South Jersey

c/o M. McConnell P.O. Box 427 Cherry Hill, NJ 08003 609/678-7179, 609/662-6923 (BBS) \$25/yr.; NL; 8 SIGs; TS; TE; SL;

Brookdale Computer Users Group

c/o Stuart Haber 8 Shiloh Rd. Manalapan, NJ 07726 908/536-4682, 908/739-3693 (BBS) \$15/yr.; NL; SIGs; TS; TE; SL; BBS

New Jersey PC Users' Group

c/o Charlie Stelling P.O. Box 14 Paramus, NJ 07653-0014 201/447-7111, 201/471-6391 (BBS) \$30/yr.; NL; 2 SIGs; TE; SL; BBS

Garden State Computer Users Group Inc.

c/o Robert McKinley, Jr.

89 Stratford Rd, Tinton Falls, NJ 07724 908/542-2113 (7 p.m.-9 p.m.), 908/888-4409 (BBS) \$15/yr.; NL; 5 SIGS; TS; TE; SL; BBS

Computer Connection

c/o Ted Hare P.O. Box 382 Voorhees, NJ 08043 609/783-7444, 609/784-9404 (BBS) No fee; TS; TE; SL; BBS

Philadelphia HUB PC Users Group

FAA ATCT Trenton Tower Bear Tavern Rd. West Trenton, NJ 08628 609/567-1283 No fee; NL; 3 SIGs; TS; TE; SL

NEW YORK

Long Island PC Users' Group

c/o Roy Linker 659 Stratford Rd. Baldwin, NY 11510-1031 516/223-1761, 516/546-7857 (fax and hotline), 516/546-8025 (BBS) \$24/yr.; NL; 5 SIGs; TS; TE; SL; BBS

Queensborough IBM PC Users Group

c/o John Frangos 53-32 213th St. Bayside, NY 11364 \$10/yr.; NL; TS; SL

Long Island Computer Association

c/o Al Levy P.O. Box 71 Hicksville, NY 11802 516/293-8368, 516/561-6590 (BBS) \$25/yr.; NL; 21 SIGs; TS; TE; SL; BBS

FAA Syracuse Hub-Empire Sector

Computer Resource Committee 1522 E. Maine Rd. Johnson City, NY 13790-4010 814/838-9742 (BBS) No fee; NL; TS; TE; SL; BBS

Catskill Power Users

30 Fraser Ave. Monticello, NY 12701 914/794-7111, 914/796-1136 (BBS)

ABBREVIATIONS KEY

NL: newsletter
SIG: special interest group
TS: technical support
TE: training and education
SL: software library
BBS: bulletin board service

We all have a strong mental '2

on too hard to work too hard to be so too long at our computers and that could lead to be so sive sourself the

warm-ups, breaks and stretches

Skull

\$30/yr.; NL; 4 SIGs; TS; TE; SL; BBS

Creative Computing Club

c/o Douglas Margolis 153 E. 57th St. #8-G New York, NY 10022 212/888-3953 (evenings), 212/870-4135 (shared BBS) \$15/yr.; NL; TS; SL; BBS

New York Amateur Computer Club

P.O. Box 3442 Church St. Station New York, NY 10008 212/505-6021 (recorded message), 718/539-3338 or 3560 (BBS) \$20/yr.; NL; 9 SIGs; TS; TE; SL; BBS

New York Personal Computer User Group

40 Wall St. #2124 New York, NY 10005-1301 212/686-6972, 212/533-6972 \$35/yr.; NL; 53 SIGs; TS; TE; SL; BBS

Suffolk Cty. (NY) CPA Computer Users Group

c/o Walter Schmidt Coughlin, Foundotos, Cullen & Danowski 10 Roosevelt Ave. Port Jefferson Station, NY 11776-3337 No fee; TS; TE; SL

Micro Computer Club

c/o Ron Belcher Bldg. 052, Dept. B25X IBM Poughkeepsie Poughkeepsie, NY 12601 914/485-3159 (evenings), 914/433-2246 (BBS) \$6/yr.; NL; 6 SIGs; TS; TE; BBS

Picture City PC Programmers Club

Box 20342 Rochester, NY 14602 716/442-9267, 716/723-8489 (BBS) \$30/yr.; NL; 5 SIGs; TS; TE; SL; BBS

Central New York PC Users' Group

c/o Sid Chong P.O. Box 6411 Syracuse, NY 13217-6411 315/455-6817, 315/455-5806 (BBS) \$30/yr.; NL; 7 SIGs; TS; TE; SL; BBS

Westchester PC User's Group

P.O. Box 349 White Plains, NY 10602-0349 914/962-8022, 914/667-4567 (BBS) \$30/yr.; NL: 5 SIGS (\$10 extra per SIG); TS; TE; SL; BBS

NORTH CAROLINA

IBM PC Users Group of Asheville North Carolina

c/o Tom Boscarino 34 Park Ave. Asheville, NC 28803 704/274-2269 \$15/yr.; NL; 3 SIGs; TS; TE; SL

Metrolina NetWare Users Group

P.O. Box 35375 Charlotte, NC 28235-5375 704/336-7212 (days) \$12/yr.; NL; TS; SL; BBS

Hendersonville Area Computer Society

P.O. Box 208 Hendersonville, NC 28793 \$15/yr.; NL; 3 SIGs; TS; TE; SL

OHIO

Akron-Canton PC Users Group P.O. Box 2151

Akron, OH 44309

216/928-7179 \$25 first yr., \$20 thereafter; NL; 3 SIGs; TS; TE; SL

The Northeast Ohio PC Users Group

c/o Dick Sieg P.O. Box 81281 Cleveland, OH 44181-0281 216/433-4387, 216/888-9943 (BBS) \$25/yr.; NL; 9 SIGs; TS; TE; SL; BBS

Columbus Computer Society

c/o Eagan Foster, president P.O. Box 1556 Columbus, OH 43216-1556 614/447-0227, 614/885-9829 (BBS) \$25/yr.; NL; 22 SIGs; TS; TE; SL: BBS

Ohio State University PC User Group

c/o Art Krumsee, OSU-ACS 1971 Neil Ave. Columbus, OH 43210 614/292-1558 \$10/yr. (or two blank disks); NE: \$1

Dayton Microcomputer Association Inc.

ASSOCIATION INC.
P.O. Box 4005
Dayton, OH 45401-4005
513/848-6362,
513/293-1754 (BBS),
513/229-3787 (BBS)
\$12/yr; NL; 7 SIGs; TS; TE; SL;
BBS

Newark Area Computer Club

c/o David P, Lantz 1373 Howell Dr. N Newark, OH 43055-1737 614/344-2323, 614/928-2259 (BBS) \$24/yr.; NL; 5 SIGs; TS; TE; SL; BBS

Toledo PC Users Group

c/o Norm Lingo, Public Relations P.O. Box 13085 Toledo, OH 43613-3085 419/255-7921, 419/693-8503 (BBS) \$20/yr.; NL; 2 SIGs; TS; TE; SL; BBS

Western Reserve IBM PC Association

c/o Joseph Waid P.O. Box 8828 Warren, OH 44484 216/294-3377 \$15/yr.; NL; TS; TE; SL

you need to be as productive as possible with our new stretch software.



Software

OKLAHOMA

OKC-PC Users Group

P.O. Box 12027 Oklahoma City, OK 73157-2027 405/791-0894, 405/348-9810 (BBS) \$25/yr.; NL; 22 SIGs; TS; TE; SL; BBS

OREGON

The Computer Group

P.O. Box 22233 Eugene, OR 97402 503/688-5855, 503/688-2056 (BBS) \$15/yr.; NL; TS; TE; SL; BBS

Eugene PC Users Group

c/o Larry Cotton P.O. Box 11436 Eugene, OR 97440 503/345-8601, 503/484-5334 (BBS) \$25/yr.; NL; 4 SIGs; TS; TE; SL; BBS

RACC Computer Club

c/o Robert Viehweg 1358 Willow Ct. Grants Pass, OR 97527 503/479-8629, 503/582-4860 (BBS) \$10/yr.; NL; 1 SIG; TS; TE; SL; RRS

PENNSYLVANIA

Computer Users of Erie

c/o Raymond Hric P.O. Box 1975 Erie, PA 16507-0975 814/838-7316, 814/866-5315 (BBS) \$25/yr.; NL; 7 SIGS; TS; TE; SL; BBS

Harrisburg PC Users Group

c/o Jack Stahl 1195 Fairmont Dr. Harrisburg, PA 17112 717/652-9097, 717/944-6877 (BBS) \$15/yr.; NL; 2 SIGs; TS; TE; SL; BBS

National PC Users Group

P.O. Box 1076 Lemont, PA 16851 814/237-5511 (4 p.m.-7 p.m.), 718/967-4644 (BBS) \$26/yr.; NL; TS; TE; SL; BBS

Delaware-Chester User Group

P.O. Box 299 Lionville, PA 19353 215/363-6625 (BBS) No fee; NL; 13 SIGs; TS; TE; SL; BBS

Windows User Group Network

126 E. State St. Media, PA 19063 800/946-8737 \$99/yr.; NL; TS; SL; BBS

CPA Computer User Group

c/o Ray Woodall P.O. Box 56 Narberth, PA 19072 215/664-6775 \$40/yr.; NL; TE; SL

Philadelphia Area Computer Society

c/o Steve Longo La Salle University 20th W. Olney Ave., Box 312 Philadelphia, PA 19141 215/951-1255 (days), 215/842-9600 (BBS) \$27 first year, \$25 thereafter; NL; 60 SIGS; TS; TE; SL; BBS

Pittsburgh Area Computer Club

P.O. Box 6440 Pittsburgh, PA 15212 412/766-8790, 412/881-1749 (BBS) \$20/yr.; NL; 5 SIGs; TS; TE; SL; BBS

Philadelphia Area Computer Society, IBM Group

989 Beechwood Pl. Warmister, PA 18974-1162 215/674-2739

White Rose IBM Computer Enthusiasts

P.O. Box 54 York, PA 17405-0054 717/246-1440, 717/244-3195 (BBS) \$15/yr., \$10/yr. students; NL; SIGs; TS; TE; SL; BBS

RHODE ISLAND

Providence Chapter, Boston Computer Society

c/o Harry J. Snyder 4 Teakwood Ln. Barrington, RI 02806-3217 401/245-5097 \$39/yr.; NL; 2 SIGs; TS; TE

South County Computer Users Group

c/o Chuck Jacques P.O. Box 493 Wakefield, RI 02880 401/783-6469, 401/783-7559 (BBS) \$10 (one-time fee); TS; TE; SL; RBS

SOUTH CAROLINA

Hilton Head Island Computer Club

16 Forest Dr. Hilton Head Island, SC 29928 803/671-2250 \$18/yr.; NL; 7 SIGs; TS; TE; SL

Orangeburg Computer Club

P.O. Box 474 Orangeburg, SC 29116-0474 803/534-0344, 803/531-5734 (BBS) \$25/yr.; NL; 1 SIG; TS; SL; BBS

The Keowee Computer Club

10 Cutter Ln. Salem, SC 29676-9208 803/944-1970 \$15/yr.; NL; 2 SIGs; TS; TE; SL

Anderson PC Users Group

110 Blake Dr. Townville, SC 29689 803/287-9080 \$12/yr., \$10 initiation fee; NL; 1 SIG; TS; SI.

SOUTH DAKOTA

Sioux Falls IBM and PC Compatibles Users Group P.O. Box 89701

PC NETWORKING IS COMPLICATED, EXPENSIVE AND SCARY.

Sioux Falls, SD 57105 \$10/yr.; NL; 1 SIG; TS; TE; SL

TENNESSEE

Cumberland Microcomputer Users Group

c/o Bill Snyder or Harry Jaquess P.O. Box 151 Cookeville, TN 38503 615/526-4869 \$20/yr., \$10/yr. students; NL; 2 SIGs; TS; TE; SL

East Tennessee PC Users Group

448 N. Cedar Bluff Rd, #184 Knoxville, TN 37923 615/690-8009 (evenings) \$20/yr. family, \$10/yr. students; NL; 12 SIGs; TS; TE; SL

Murfreesboro Area Computer Hobbyists

P.O. Box 8114 Murfreesboro, TN 37133-8114 615/895-2839 \$10/yr.; NL; 2 SIGs; TS; TE; SL; BBS

Music City PC Users Group

c/o Alan Ashendorf 488 Saddle Dr. Nashville, TN 37221 615/662-0322, 615/662-0632 (BBS) \$35/yr., \$45/yr. family, \$250/yr. corporate; NL; 12 SIGS. TS: TE: SL: BBS

Nashville Clippers Developers Association

488 Saddle Dr. Nashville, TN 37221 615/662-0322, 615/662-0632 (BBS) \$50/yr.; NL; TS; TE; SL; BBS

TEXAS

Central Texas PC Users Group

c/o Lindsey Allen P.O. Box 10169 Austin, TX 78766-1169 512/835-9476, 512/327-0235 (BBS) \$36/yr.; NL; 15 SIGs; TS; SL; BBS

Microcomputer Study Group, Dallas Section

Society of Petroleum Engineers 9424 Hunters Creek Dr. Dallas, TX 75243-6108 214/349-7988 No fee; NL; 4 SIGs; TS; TE; SL; BBS

North Texas PC Users Group

c/o Doug Gorrie P.O. Box 780066 Dallas, TX 75378-0066 214/746-4699, 214/387-2751 (BBS) \$24/yr.; NL; 40 SIGs; TS; TE; SL: BBS

Fort Worth IBM PC Users Group

c/o Jeff Libby P.O. Box 1476 Fort Worth, TX 76101-1476 817/551-5435, 817/274-9361 (BBS) \$24/yr.; NL; TS; TE; SL; BBS

Senior Education & Community Services Computer User Group

Tarrant County Junior College 1500 Houston St. Fort Worth, TX 76102-6599 817/877-2604 (BBS) No fee; 2 SIGs; TS; TE; SL; BBS

Houston Area League PC Users

1200 Post Oak Blvd. #106 Houston, TX 77056-3104 713/623-4425, 713/963-4100 (BBS) \$25/yr.; NL; 58 SIGs; TS; TE; SL; BBS

State Bar of Texas Computer User Group

c/o Harrison & Egbert (Al Harrison) 1018 Preston St., Republic Bldg. Houston, TX 77002 713/223-4034 \$20/yr.; NL; TS

Longview Computer Users Group

c/o Eddie Green P.O. Box 150071 Longview, TX 75615 903/759-4036, 903/236-7434 (BBS) \$25/yr.; NL; 5 SIGs; TS; TE; SL; BBS

Ft. Bend Computer Users Group

c/o Cal Wainwright 1706 Hawthorn Richmond, TX 77469 713/341-0220 No fee; 12 SIGs; TS; TE; SL

Alamo PC Organization Inc.

c/o Cynthia Thompson P.O. Box 65180 San Antonio, TX 78265-5180 210/491-0036, 210/496-5558 (BBS) \$25/yr.; NL; 22 SIGs; TS; TE; SL; BBS

The Temple Area PC Club

4506 Old Hoard Rd. Temple, TX 76504-9702 817/778-8575 \$15/yr.; NL; TS; TE; SL

Tyler Computer Club

c/o Marionetta Smith 3614 Paggy's Pl. Tyler, TX 75701 903/561-6136 No fee; NL; 6 SIGs; TS; TE; SL; BBS

UTAH

Southern Utah Computer Users Group

1242 South 450 West Cedar City, UT 84720 801/586-3348, 801/586-2067 (BBS) No fee; 1 SIG; TS; TE; SL; BBS

Utah Computer Society

P.O. Box 510811 Salt Lake City, UT 84151 801/521-7830, 801/561-2236 (BBS) \$20/yr., NL; 18 SIGs; TS; TE; SL; BBS

Introducing the Coactive, Do-It-Yourself Network.

Now—in less than 5 minutes—you can connect your computer to a network.

Without sweating through a complex installation process.

Without even opening your PC.
All it takes is the new Coactive
Connector. Just plug one Connector into



With the revolutionary Coactive Connector, installing a PC network is as easy as snapping in a phone cord.

Unlike other inexpensive solutions, a Coactive network gives you the file- and printer-sharing power of a real network. Without draining your PCs' RAM. The secret is a 32-bit microprocessor inside each Connector that handles all the networking tasks—freeing up your PCs to concentrate on your real work.

And since Coactive is based on industry-

In 5 Minutes We Can Change All That.

each of your PCs and you're networked.

In fact, you can even connect an old PC AT running DOS to a 486 screamer running Windows. And link both of them to a Macintosh.

Everything you need is in the box—hardware, software, cabling—at a lower cost than other networks.

There's nothing new to learn. You'll use familiar computer commands like "copy" or "drag and drop" to use the network.

And you won't have to become a "network administrator."

Because our CoAssistant software does the network diagnosis and troubleshooting for you.

standard technology, you're not locked into a proprietary hardware system.

Plus, don't forget that a Coactive Connector is so easy to install that we guarantee you can do it in 5 minutes. Or your money back.

So, if you've got from 2 to 32 PCs to connect, visit your favorite dealer today. Or, order direct for just \$159.95 per PC" by calling 1-800-825-2NET, Extension 102.

If you think networking has to be complex and costly, give us 5 minutes. And we'll give you a network.

Guaranteed.

The Do-It-Yourself Network."

CONSUMER WATCH

VIRGINIA

ACINSSPCUG

c/o Fred R. Bowen, Jr. P.O. Box 2031 Norfolk State University Norfolk, VA 23504 804/683-8790 No fee; 4 SIGs; TS; TE; SL

Tidewater User Group

c/o A. L. O'Toole 529 Heather Dr. Virginia Beach, VA 23462 804/499-7878 \$20/yr.; NL; 6 SIGs; TS; TE; SL; BBS

WASHINGTON

Olympia MS DOS Users Group

1967 Orchard Dr. NW Olympia, WA 98502 206/754-4083, 206/943-7567 (BBS) \$12/yr.; NL; 1 SIG; TS; TE; SL; BBS

Tacoma Open Group for Microcomputers

1808 Lenore Dr. Tacoma, WA 98406-1920 206/752-5582, 206/759-7298 (BBS) \$15/yr.; NL; TS; TE; SL; BBS

WEST VIRGINIA

Boot Hills PC User's Group

c/o Michael Davis P.O. Box 686 Wheeling, WV 26003 614/633-5095 \$25/yr.; NL; 2 SIGs; TS; TE; SL

WISCONSIN

Fox Valley Technical College Personal Computer Users Group

P.O. Box 2277, Mail Room 318 Appleton, WI 54913-2277 414/735-2414, 414/735-2513 (BBS) \$20/yr.; NL; 9 SIGs; TS; TE; SL; BBS

Central Wisconsin Computer Society Inc.

410 E. Main St. Auburndale, WI 54412 715/652-3175, 715/652-2758 (BBS) \$15/yr.; NL; 2 SIGs; TS; TE; SL; BBS

Madison PC User's Group

c/o Rod McKenzie P.O. Box 2598 Madison, WI 53701-2598 608/231-2725, 608/233-0286 (BBS) \$30/yr.; NL; 12 SIGs; TS; TE; SL: BBS

Milwaukee Area IBM PC Users Group

P.O. Box 2121 Milwaukee, WI 53201-2121 414/679-9075, 414/351-1817 (BBS) \$24/yr.; NL; 6 SIGs; TS; TE; SL

Rapid River PC Users Group

c/o Jim Suzda 6848 Hwy. 34 Rudolph, WI 54475-9531 715/435-3495, 715/435-3855 (BBS) \$12/yr; NL; TS; TE; SL; BBS

AUSTRALIA

Queensland Railway Institute Computer Club

P.O. Box 1819 Gladstone, Queensland 4680 Australia 079/722241, 079/724225 (BBS) \$25/vr.; NL; TS; TE; SL; BBS

Melbourne PC User Group

66 Albert Rd., 2nd fl. South Melbourne, VIC 3205 Australia 03/699-6222, 03/699-6788 (BBS) \$40/yr., \$10 initiation fee; NL; 29 SIGs; TS: TE: SL: BBS

CANADA

Calgary PC User Society

P.O. Box 6, Station M Calgary, Alberta T2P 2G9 Canada 403/246-4691 \$40/yr.; NL; 8 SIGs; TS; SL

Personal Computer Club of Toronto

P.O. Box 5429, Station A Toronto, Ontario M5W 1N6 Canada 416/633-6971 \$40/yr.; NL; SIGs; TS; TE: SL; BBS

Healthcare Computer Users Group

103-1592 S.W. Marine Dr. Vancouver, British Columbia V6P 6M1 Canada 604/266-7999, 604/432-7626 (BBS) \$15/yr.; NL; TS; TE; SL; BBS

Greater Victoria PC Users Association

P.O. Box 5309, Station B Victoria, British Columbia V8R 6S4 Canada 604/382-3934, 604/727-7374 (BBS) \$35/yr.; NL; 14 SIGs; TS; TE; SL: BBS

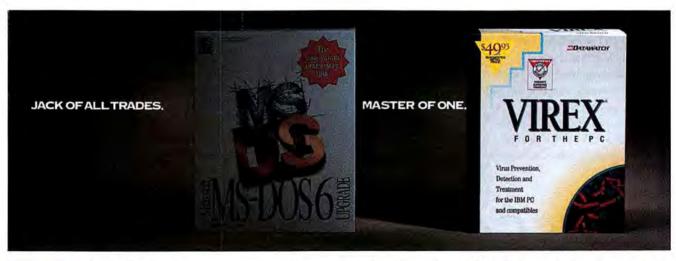
Winnipeg PC User Group Inc.

Winnipeg Pc User Group inc Box 3149 Winnipeg, Manitoba R3C E46 Canada 204/488-9796, 204/338-0272 (BBS) \$45/yr. \$25/yr. junior, \$125/yr. corporate; NL; 10 SIGs; TS; SL; BBS

RUSSIA

Windows Users Association

Moscow State University Lenin's Hills 119899 Moscow Russia 7095-939-1883-2226 NL; 2 SIGs; TS



HIGHEST RANKING PRODUCT

There are lots of reasons to upgrade to MS-DOS\$6. Virus protection, however, is not one of them.

The fact is, effective

virus protection requires a dedicated program. A program like Virex.**

Virex is the most potent anti-virus software around, defending against both known and unknown viruses. It uses less memory than the others. It scans faster. And it's easier to install.

What's more, Virex provides a better update service. Updates are issued more

INCLUDING ANTI-VIRAL SOFTWARE IN DOS-6
WAS A POOR CHOICE. SOME VIRUSES GO
UNDETECTED AND DISABLE THE SOFTWARE'S
MONITORING CAPABILITY.

Infosecuity News, July/August, 1993

150 units through our site licensing program and pay just \$12 per unit.

(And get updated free, on disk, to boot.) So ask your retailer for Virex,

or call us about site licensing, today.

And leave virus pro-

And leave virus protection to the experts. VIR

EDATAWATCH* 919-490-1277, ext 810 / FAX 919-490-6672 / BBS: 419-1602 (8,1,N) / Datawatch and Virex are registered trademarks of Datawatch Corp. *MS-DOS is a registered trademark of Microsoft Corp. Reference to MS-DOS 6 as utilized in this ad does not constitute an endorsement or any form of warranty by Datawatch Corp. for Microsoft Corp. products.

of all. Price. Purchase, for example,

often and are thoroughly pretested.

Now, the most impressive feature



GET THE HIGHEST

Gateway 2000 Goes To Extremes!

You never get middle-of-the-road performance or value from Gateway 2000. We've always had a reputation for going to extremes to be the *best* at giving you the *highest* performance and the *latest*-technology machines, at the *biggest* value you can find. We try to think of everything we do in superlatives. Just look what this means for you...

The Gateway P5-60

Introducing the ultimate, pinnacle-ofperformance Gateway 2000 P5-60, our super-powered PC, based on Intel's® Pentium[™] processor. It's the absolute maximum PC performer available today...at a typical Gateway how-low-canthey-go price of under \$3,600! And we haven't faltered on features to give you this incredible price. The P5-60 is loaded with the latest and greatest of technologies Intel's Pentium CPU, a screaming PCI bus, a 424MB hard drive, 16MB RAM, a 2X CD-ROM drive with a data transfer rate of 300KB per second, along with a 15-inch color monitor, new tower case, and all the extras that come with every Gateway 2000 PC.

CPU Performance

Intel's Pentium processor's 64-bit superscalar architecture moves instructions and data twice as fast as 486's — jumping to incredible heights of performance never achieved before. The Pentium processor

has 16K of internal cache, and the motherboard has 256K of additional cache with write-back performance.

New PCI Bus Technology

You'll achieve paramount performance with the P5-60's high-tech PCI bus. It's the bus of the future, here today. PCI subsystems are 10-15% faster than comparably configured VESA® subsystems. In addition to PCI performance, you also get the benefits of PCI's "plug and play" feature. Now you can add a modem, network cards, video cards and other peripherals without ever having to reconfigure your system. The PCI bus's



32-bit, high-performing and robust interface is the only logical choice to take full advantage of a Pentium CPU-based system's potential.

Extreme Graphics

Gateway has always lead the industry in graphics performance, and the P5-60 is no exception. You get the best overall graphics performance available on the market with the new ATI™ Ultra XLR 2MB

on the PCI bus. And the unique architecture of the XLR 2MB allows the card to interleave 2MB of DRAM and achieve true 24-bit color at 640 x 480 and 800 x 600 resolutions.

2X CD-ROM

To top it off, we've added a 2X CD-ROM drive to the P5-60. This latest CD-ROM drive transfers data at 300KB per second, twice as fast as a standard CD-ROM drive.

Tower Case

The P5-60 comes standard in Gateway 2000's new, smaller tower case, taking you to new levels of expandability. It has 5 external drive bays, 6 internal drive bays and a 300-watt power supply.

For the *utmost* in performance, and the *best* investment for your future computing needs, the P5-60 is the only system for you! When it comes to being the industry's value-leader, Gateway 2000 has always been a jump ahead of the competition. Call a Gateway sales representative today for more information on the P5-60.

Gateway's new tower case measures only 22.9-inches high, 9.9-inches wide and 18.6-inches deep. The tower case is also available as an upgrade for our VESA and new EISA/VESA systems.







GET THE MOST B A N G

You get all the bells and whistles in one great package with Gateway 2000's feature- and power-packed VESA local bus 486 systems. We've always made the biggest bang in the industry with these outstanding machines. You get the expandability you'll need to continually upgrade your system to tomorrow's technology. We're proud to toot our own horn about these local bus PCs. They're a rare combination of everything-you-need at a fantabulous price.

Hard Drives

Gateway customers have come to expect the huge hard drive capacities that we put on our VESA systems. They know that just like closet space, you can never have enough hard drive space. Our 32-bit local bus IDE with exclusive RIDE BIOS still provides you with the industry's leading disk throughput.

Video Performance

Although everyone tries to catch us—
they can never keep up. Our latest ATI
Ultra XLR video card still sets the standard
for VESA graphics performance. The
Ultra XLR also comes with special drivers
to accelerate tomorrow's video and
multimedia applications. And you get a
brilliant, crisp display with our 15-inch
CrystalScan® non-interlaced, .28 dot pitch
color monitor.

Cache

Secondary caches unlock the full performance potential of your CPU. Gateway VESA systems come standard with 128K cache, and the award-winning DX2-66V with 256K cache.

Your Choice of Software

Only Gateway gives you a choice of topshelf application software. VESA local bus and PCI systems include options like Microsoft® Word for Windows,™ MS Excel,™ Borland® Paradox® and Quattro® Pro for Windows, and more. Then we add Central Point's Tools on Top™ utility software, based on the award-winning PC-Tools for Windows. Systems with a CD-ROM drive include Gateway's famous



System CD containing Microsoft's Multimedia Pack,™ the Gateway Mall and much more. All software is pre-installed on your system at no extra charge.

AnyKey® Keyboard

Don't settle for a rigid 101-keyboard when you can have the flexibility of Gateway's exclusive 124-key AnyKey keyboard with programmable macros and keyboard remapping capabilities.

CD-ROM Drive

All DX2 systems come standard with a CD-ROM drive, giving you access to exciting new applications, databases and entertainment programs. All Gateway systems can be easily upgraded to include a CD-ROM.

Expandability

For those of you who still want to jazz up your PC ensemble, we're giving you all the instruments you need for expansion. You'll get 4 external drive bays for floppies, a CD-ROM drive, tape backup, and don't forget all the medias of the future. Three internal drive bays allow you to easily add hard drive space. Two VESA slots guarantee upgradeability to tomorrow's totally cool graphics and disk controller technology; and 5 ISA slots are compatible with 16-bit technologies.

Gateway has always had a reputation for marching ahead of the crowd by giving you the *greatest* values. Our award-winning VESA systems are no exception. Call Gateway 2000 today and ask your sales representative for more information on these VESA local bus systems.

Standard with VESA systems is our new Baby AT case measuring 16.9-inches wide, 6.6-inch high and 16.8-inch deep.





BIGGEST V A L U E

The tall and short of it is: Gateway 2000 elevates value to enormous levels on our integrated mini desktop systems... but still gives you pint-sized prices. We've gone to extremes to bring you all new mini desktop configurations with colossal features and performance in a new case. Whether you need a 486SX-25 processor, a 486DX2-66 processor, or anything in-between, Gateway has the system for you. And with prices lower than ever, you get a huge value without having to pay an arm and a leg.

Big Performance/Little Prices

Check out Gateway's new 4DX2-66 mini desktop —
it's a small package that packs a big punch for under \$2,000!
While other companies might slash their prices, you could
get the short end of the stick when it comes to features.
Gateway won't short-change you on anything. You get a
66MHz 486DX2 processor, 128K cache, a 340MB hard
drive, 4MB RAM and fast video performance. Our 4SX and
4DX models come standard with Microsoft Works™ for
Windows; 4DX2 models come with an extended selection of
application software. And all mini desktop models come
standard with MS DOS® 6 and MS Windows™ 3.1. All
application software comes pre-installed on the hard drive at
no extra charge.

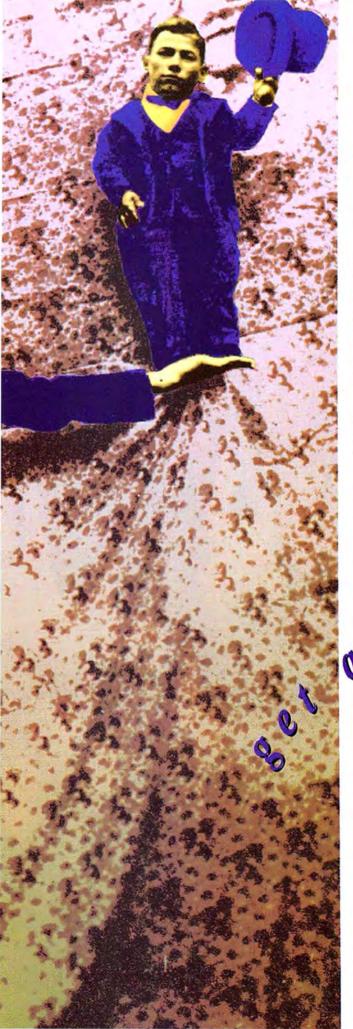
Local Bus Video

Our new integrated local bus video provides up to twice the video performance found in our previous mini desktop systems. In fact, Gateway's mini desktop video performance is similar to that found in many of our competition's high-end systems. With up to 1MB video DRAM, you get 1024 x 768 resolution and an array of colors. All this on our 14-inch CrystalScan non-interlaced, .28mm dot pitch color monitor.

Price/Performance

How can we give you all these features at such low prices? Gateway's engineers went out on a limb to design our mini desktops to include many subsystems incorporated on the motherboard. This means less cost to us, and a giant savings for you!





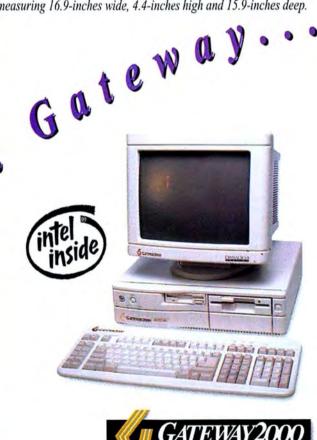
SMALLEST DESKTOP SYSTEMS

Increased Expandability

You won't have any growing pains with Gateway's new integrated mini desktop cases. They're small, but you get more flexibility and expandability than ever before. These cases come with one internal and one external 3 1/2-inch drive bays, and two external 5 1/4-inch drive bays so you can add a tape backup, CD-ROM drive or another floppy drive. You also get 5 expansion slots: more than you'll find in most small footprint PCs. And all Gateway mini desktop systems are upgradeable to Pentium technology.

With the *coolest* features at miniature prices, our mini desktop systems give you an unbeatable value. Call your Gateway sales representative today for more information on these power-packed mini desktop systems.

You get greater expandability with our new mini desktop cases, measuring 16.9-inches wide, 4.4-inches high and 15.9-inches deep.







THE LITTLEST THINGS

A little effort and ingenuity can go a long way. At Gateway 2000, our wheels are always turning to find new ways to become more environmentally conscious. And we haven't just jumped on the "green" bandwagon. Gateway has consistently gone to extremes to reduce waste and pollution, and to increase energy efficiency. When you get your Gateway 2000 system, you can be assured that we're doing our best to make your world a better place.

Recycling and Soy Inks

Gateway has always used recycled paper whenever possible. In fact, this advertisement is printed on recycled paper, using soy ink. Recycled paper is used internally for 75% of our printed materials including newsletters, letterhead, envelopes, invoices and sales literature. Soy ink is used to print 100% of these materials.

Friendly Packaging

All Gateway systems come in boxes made from 50% recycled linerboard. Packaging inside system boxes is made from expanded polyethylene. This environmentally safe packaging contains no CFCs or HCFCs and does not produce any toxic residue when incinerated or deposited in a landfill. Gateway's packaging is recyclable by the manufacturer.

We have also eliminated any ozone depleting chemicals at our North Sioux City, South Dakota, facility. In turn, we require our suppliers not to use CFCs on or in any parts shipped to Gateway.

On-Line Documents And CDs

Gateway's on-line documentation and System CDs also make a positive impact on the environment. Our On-Line User's Guide is fully interactive so you can learn about your Gateway PC without ever opening a manual. And the Gateway

CAN MAKE THE BIGGEST

DIFFERENCI

System CD contains software applications including Microsoft's Multimedia Pack. By putting software and manuals on CD-ROM, we reduce paper waste and other environmental costs of software documentation. It's also a way to replace most of the diskettes that would normally come with your PC. CD-ROMs will eventually replace much of the paper materials and thus, save trees.

Global Releaf

at 202-667-3300.

Gateway is a corporate sponsor of Global Releaf, a campaign of American Forests, dedicated to the improvement of the world's environment through the preservation and planting of trees and forests. With our donations, Global Releaf planted over 15,000 trees in 1992. You can help restore damaged forest ecosystems in the United States by calling Global Releaf for more information

Energy Star Program

The Environmental Protection Agency's Energy Star Program is fast-becoming the industry standard in the "green" movement. PCs and monitors with the Energy Star logo are capable of consuming 30 watts or less of electricity. This is right in line with Gateway's philosophy of being environmentally conscious and saving you money. And by providing a high performance computer that also consumes less energy, we're doing the right thing for our customers — and the world.

Gateway is making significant progress in our development of energy-efficient PCs with power-sensitive monitors, energy-efficient CD-ROM drives, high-efficiency power supplies and video cards, and low-power system boards.

We always search for the *newest and best* ways to conserve energy and reduce pollution, and to serve as an example of environmental consciousness for the corporate world. Call a Gateway sales representative for more information on our Energy Star-compliant PCs.



GATEWAY 2000
"You've got a friend in the business." ®

STRONGEST SERVICE AND SUPPORT

We're committed to bending over backward to please our customers. Gateway employees understand that there may be a time when your computer makes you feel a little weak in the knees. Never fear — our Midwestern people know the importance of a friendly voice and a helpful attitude on the other end of the phone. And they know you want the best in service. So you can count on Gateway 2000 employees to perform feats of great strength to take care of you.

Be assured that we'll be there for you far into the future. Our financial stability has always held steady in the ever-changing PC industry. And although we're not letting it go to our heads, Gateway is one of the largest PC makers in the U.S. and a Fortune 500 company.

Every Gateway system comes with excellent after-the-sale support. You get a **30-day money-back guarantee**. So, if you're not completely satisfied with your system, you can send it back within 30 days for a refund.

All Gateway 2000 systems have a one-year limited warranty and telephone technical support for the life of the system. When you need help with your PC, you want someone who will jump through hoops to help you. That's what you'll get with our support departments. In February and again in July of 1993, PC Magazine readers gave Gateway an excellent rating for service and reliability. And in June, BYTE readers chose Gateway 2000 as the company that provides the best service in the industry.

Gateway's automated fax service will supply you with detailed documentation on over 150 technical subjects. You'll also get a lifetime BBS membership for additional technical support and on-line forums.

We offer **on-site service** to most locations in the country (factory service only for notebooks). And **replacement parts** leave our factory as quickly as possible; we pay overnight shipping.

We also make it easy for you to buy a Gateway PC, with convenient payment options including major credit cards and C.O.D. terms Net 30-day term and leasing options are also available to qualified commercial customers.

Introducing The Gateway DuoLine MasterCard® Card

Here's another value-added way to get the latest technology: the Gateway 2000 DuoLine MasterCard now available only through Gateway 2000.

This innovative card enables you to make purchases from Gateway and anywhere else MasterCard is accepted, by giving you two lines of credit — one for Gateway purchases and one for all other purchases. For Gateway purchases, the card has no annual fee and a low variable interest rate of just 12.9% APR. For purchases elsewhere, you get a variable interest rate of 13.9% APR and a low \$18 annual fee.* If you already have a MasterCard, you may also apply for a Gateway DuoLine MasterCard. Lines of credit will vary by individual. For an application, call 1-800-846-1781.

*Cash advance fee is \$1 plus 2% of the amount of the cash advance, but not less than \$5 nor more than \$10. The Gateway 2000 Duoline MasterCard is issued by Dial National Bank.



At Gateway 2000, we strive to be extremists when it comes to bringing you the *highest*-performance systems, with the *most* features at the *lowest* prices...for the *greatest* value in the PC industry. We are committed to giving you the *strongest* after-the-sale support. And we will continue to find the "*greenest*" ways to increase energy efficiency and protect the environment. Call your Gateway 2000 sales representative today!





GATEWAY 2000'S COOLEST PCS

4SX-25

- Intel® 25MHz 486SX Processor
- 4MB RAM
- 3.5" Diskette Drive
- 170MB 13ms IDE Hard Drive
- Intel Pentium[™] Technology Ready
- Local Bus Graphics Accelerator w/ 512KB DRAM
- 14" Color CrystalScan® 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey® Keyboard
- Microsoft® Mouse
- MS-DOS,®Windows™ & Tools
- MS Works for Windows[™] 2.0

\$1295

4DX2-66

- Intel 66MHz 486DX2 Processor
- 4MB RAM, 128KB Cache
- 3.5" Diskette Drive
- 340MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Local Bus Graphics Accelerator w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

\$1995

4DX2-66V

- Intel 66MHz 486DX2 Processor
- 16MB RAM, 256KB Cache
- 3.5" Diskette Drive & 2X CD-ROM
- 424MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB ATI™ Ultra XLR Graphics
- w/IMB VRAM
- 15" Color CrystalScan 1572FS
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

\$2995

4SX-33

- Intel 33MHz 486SX Processor
- 4MB RAM
- 3.5" Diskette Drive
- 212MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Local Bus Graphics Accelerator w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- MS Works for Windows 2.0

\$1395

4DX-33V

- Intel 33MHz 486DX Processor
- 8MB RAM, 128KB Cache
- 5.25" & 3.5" Diskette Drives
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB Graphics Accelerator w/1MB DRAM
- 14" Color CrystalScan 1024NI
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
 - MS-DOS, Windows & Tools
- Choice of Application Software

\$1995

P5-60

- Intel 60MHz Pentium™ Processor
- 16MB RAM, 256KB WriteBack Cache
- 3.5" Diskette Drive & 2X CD-ROM
- 424MB 13ms IDE Hard Drive
- PCLATILIE VID AMD COLL
- PCI ATI Ultra XLR 2MB Graphics
- 15" Color CrystalScan 1572FS
- New 300W Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

\$3595

4DX-33

- Intel 33MHz 486DX Processor
- 4MB RAM, 128KB Cache
- 3.5" Diskette Drive
- 212MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Local Bus Graphics Accelerator w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- MS Works for Windows 2.0

\$1595

4DX2-50V

- Intel 50MHz 486DX2 Processor
- 8MB RAM, 128KB Cache
- 3.5" Diskette Drive & CD-ROM
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
 VLB ATI Ultra XLR Graphics
- w/IMB VRAM
- 15" Color CrystalScan 1572FS
 New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

\$2295

NOMAD 450DXC

- 50MHz 486DX2 Intel Processor
- 8MB RAM
- 3.5" Diskette Drive
 200MB IDE Hard Drive
- 8.4" Color Active Matrix Screen
- Simultaneous Video with 1MB
- Size 8.5" x 11" x 2.2", 6.2 Lbs.
- NiCad Battery & AC Pack
- 1 Parallel / 1 Serial Port
- 79-Key Keyboard & MS Ballpoint
 MS-DOS, Windows & Works for Windows

\$3995

4DX2-50

- Intel 50MHz 486DX2 Processor
- 4MB RAM, 128KB Cache
- 3.5" Diskette Drive
- 340MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Local Bus Graphics Accelerator w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

\$1795

66MHz Best Buy

- Intel 66MHz 486DX2 Processor
- 8MB RAM, 128KB Cache
- 3.5" Diskette Drive & CD-ROM
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
 VLB Graphics Accelerator
- w/IMB DRAM
- 15" Color CrystalScan 1572FS
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools

Choice of Application Software

Software Choices

If a system comes with "choice of application software," choose one of

- the following packages:
- Microsoft Excel for Windows[™]
- Microsoft Word for WindowstM
 Microsoft Word and Bookshelf'92,[®]
- CD-ROM Edition

 Microsoft PowerPoint for Windows™

 Microsoft Project for Windows™
- The MS Entrepreneur Pack(Works, Publisher, Money, and games)
 Borland Paradox* and Quattro*Profor Windows

Due to the volatibility of the DRAM market, all prices are subject to change. Details about our warranty, guarantee and on-site service program are available upon request.











HOTTEST

SOFTWARE & PERIPHERALS

SOFTWARE

Microsoft Office™— You can upgrade from a choice of application software to Microsoft Office, CD-ROM version, for only \$99! This single package has all the leading Windows applications: Word, Excel and PowerPoint. The diskette edition of MS Office is also available as an upgrade from a choice of application software for \$175, or \$499 as a second application.

Choice of Application Software -

If the system you want comes with MS Works for Windows, you can upgrade to a choice of application software for only \$100.

PERIPHERALS

Multimedia Upgrade Kit

Everything you need to add multimedia to your PC is included in this specially priced kit! You get:

Sound Blaster™ 16 Sound Card with Advanced Signal Processing. Simply the best sound card available! This 16-bit PC audio card offers CD-quality sound, Yamaha® FM music synthesizer, MPU-401 MIDI interface, joystick connector, built-in CD-ROM interface, and more. The Advanced Signal Processing chip delivers 4:1 real-time hardware data compression while reducing CPU demands by up to 65%. Provides 100% compatibility with all Sound Blaster applications, plus DOS and Windows sound support. You also get two Labtec® speakers that attach to your PC monitor.

CD-ROM Drive. Kit comes with the same highquality drive that we offer in our top-of-the-line 4DX2-66V system. You also get our free system CD with Microsoft Multimedia Pack™ and more!

Kit Price (with system purchase): \$395

Sound Kit

Get just the Sound Blaster 16 Advanced Signal Processing sound card and two Labtec CS-180 speakers. \$195



TelePath™ Fax/Modem

Internal fax/modem, 14,400bps modem, V.32bis, with 9,600bps fax capability. Package includes data communication software plus a free CompuServe® trial membership. \$195

Network Cards

Call for a selection of Ethernet cards and Token Ring adapters, installed and configured.

■ Microsoft Windows[™] for Workgroups

Networking made easy! Share files and printers, send electronic mail, schedule group meetings with the click of your mouse — and get everything you need in one inexpensive package. Price includes an Ethernet adapter and software. Hardware and software are factory-installed. \$159

■ Colorado Memory Systems[™] TBU

250MB internal automatic tape backup unit copies up to 9.5MB per minute with high-speed data compression. Comes with easy-to-use DOS software, one tape and cable. \$175

CrystalScan® 15-Inch & 17-Inch Monitors

Non-interlaced, .28 dot pitch color monitors. If your system comes with a 14-inch monitor, you can upgrade to the 15-inch model for \$100, or the 17-inch for \$600. If your system comes with a 15-inch monitor, you can upgrade to the 17-inch monitor for \$520. (Prices good only for upgrades at the time of system purchase.)

Panasonic® KX-P2123 Color-Capable Printer

Add color to your documents with this 24-pin dot matrix printer. Includes Adobe Type Manager.® Call for price!

■ Epson® Stylus™ 800 Ink Jet Printer

Great laser quality at an even greater value, Measuring only 17 inches by 10.5 inches, the Stylus 800 has 7 different typefaces and prints an extra-quiet 150 characters per second at 360 d.p.i. Parallel cable included.

Gateway 2000 Price	\$339	
cpson Mail-in Rebate*	-\$50	
	\$289	

*Your mail-in rebate will be delivered with your Epson printer. This special price is only good for orders taken through October 31, 1993.

Call and ask about our full-line of ink jet and laser printers.

The software and peripherals listed here are sold only with the purchase of a system. For details on our complete line of extras for Gateway customers, ask for our special add-on components division when you call.

We offer many other system options and upgrades. Call today!

SERVICE

Every Gateway 2000 system is backed by:

- 30-Day Money-Back Guarantee
- One-Year Limited Warranty
- Lifetime Toll-Free Technical Support
- On-Site Service Available to Most
- Lifetime BBS Membership
- FaxBack "Automated Fax Service





Tools on Top" is now included on all Gateway 2000 mini desktop, desktop and tower systems. Program includes file manager, desktop and emergency disk portions of Central Point's awardwinning PC Tools for Windows.



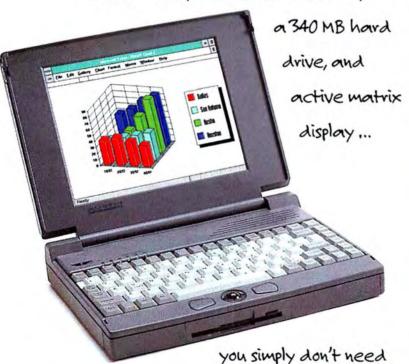
CALL FOR INFORMATION OR OTHER CONFIGURATIONS 1-800-331-1501



AUSTIN'S LOOP 360 BRIDGE

Austin has it all!

With Austin's powerhouse 486DX2-66.



a desktop computer anymore!







The freedom of fully portable, fully powered computing!

Austin 486 Notebooks

Discover the freedom to go anywhere the road takes you. Do anything, Anytime. Our compact, high-performance notebook computers prove it! The active-matrix color models provide crisp, clear screens with the advantage of simultaneous CRT and LCD display—a must for impressive, portable presentations.

The full-size keyboard is easy to use whether you're at your desk, in a plane, or on the road. The large 16mm trackball is located front and center for optimal comfort and control. The PCMCIA slots accept two Type II devices or one Type III device for communications and future multimedia options.

Powerful Portable!

The state-of-the-art Intel 486DX2-66 model packs all the speed and power of the best desktop workstation into a compact. lightweight case. A 32-bit local bus Windows accelerator provides the best notebook video performance available.

486DX2-66

§4,499

340 MB Hard Drive, 9.5" TFT Active-Matrix Color LCD Display

Affordable Portable!

4865X-25

\$1,899

130 MB Hard Drive. 9.5" Mono Display

Austin 486 Notebooks

Intel 486SX, DX, or DX2 Processors • 4 MB RAM Expandable to 32 MB • 130, 213, or 340 MB Hard Drive • 3.5" Floppy Drive • 32-Bit Local Bus Windows Accelerator Video • Monochrome Display or TFT Active-Matrix Color Monitor with Simultaneous Display • 85-Key Keyboard with 16mm Frontand-Center Trackball • Two Serial Ports, One Parallel Port • Two- to Five-Hour Battery Life • 11.1" x 8.58" x 2", 6.3 lbs. • Preinstalled MS-DOS 6.0, Windows 3.1 • One-Year Warranty

@ 1993 Austin Computer Systems. All rights reserved. The Intel Inside logo is a registered trademark of Intel Corporation. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. Prices and specifications are subject to change without notice.



Buy Direct 1-800

TEMS . AN IPC COMPANY . 10300 METRIC BOULEVARD, AUSTIN, TEXAS 78758 FAX: 512-454-1357 • OVERSEAS: 512-339-3500 • CANADA: 1-800-338-1565

Dealing With the Techknow-It-All

t's a nightmare: Your new employee, a "PC wizard," spends hours reading technical magazines and toying with software, but realworld concepts like deadlines and budgets seem incomprehensible. This month Marcia Lewis, owner of Palm Tree Publications in Doctors Inlet, Florida, recalls how she turned a potentially explosive relationship into a constructive one. -Ed.

A Guru Gone Awry

Throughout my years as a manager of technical writers, I've often been advised by computer consultants to "grow a guru," someone with sufficient technical expertise to take on the unofficial role of department support person. It's an attractive idea: Who better than a staff person to understand technical issues in a business context? And by handling support ourselves, we'd reduce our dependence on MIS. That's the theory, at least.

A few years ago, I managed 22 people in the technical publications department of a software development company. My "guru" arrived as we were moving our gigantic mainframe-based documentation library to a local area network. Once the transfer was complete, we'd be able to create our new documentation under Windows, using new high-resolution color monitors.

Unfortunately, big projects like this never happen quickly. We had a huge work load that we couldn't put on hold while we retrained everyone. To minimize disruption, we planned to implement the new technology in stages, over several months.

Enter the guru, whom I'll call Jack. Jack was one of those esoteric, earthshoe types who are fun and interesting-in small doses. He had a great deal of technical knowledge, but no idea how to apply it in the real world.

My boss was dazzled by Jack's apparent knowledge of computers and

placed him in my department as a technician and troubleshooter. Jack's role was loosely defined-his only assigned "project" was to produce a library on CD ROM. Otherwise, he was to be our "technical resource."

With such loosely defined responsibilities, Jack used to spend days tinkering with hardware and software, involving staffers in long chats about this or that new technology, and taking on little unauthorized "projects." Once, for example, I checked in

from an out-of-town seminar and learned that Jack had been reading the manual for our network printer and had decided to run a few tests. He reset the printer emulation to one that was incompatible with the standard print streams we used, and then took an extended lunch. The writers assumed the printer was broken and called for service. Print jobs were backed up for hours in the queue.

Eventually, most of the desktop publishers and some of the writers were up and running on the new PCs. Like the rest of us, Jack got excited about the flashy new software, and he received a steady stream of demo and test-drive disks. He often shared his newfound treasures with others, sometimes distracting our writers and desktop publishers for as long as an hour-which, given our staffers' salaries, probably cost the company about \$2000 a month.

Dealing With My "Problem"

Whenever I tried to talk to my boss about Jack, the focus inevitably shifted to me-maybe I just didn't have enough control over my department, he



speculated. To make matters worse, when I'd ignore Jack's technical advice, he'd tell everyone his feelings were hurt, and preach gloom and

Marcia Lewis. owner of PalmTree **Publications**

doom about the department's technological future. As a result, I felt compelled to spend more time gathering evidence to support my decisions.

One day, I noticed one of the desktop publishers playing with some shareware that had nothing to do with our work. When I questioned her, she said Jack installed the shareware on all the workstations for on-the-job entertainment.

That was the last straw. Clearly, I had choices to make: I could fly into a towering rage, quit my job, or develop a survival strategy. So I did the latter. In short, I made Jack part of the solution, instead of part of the problem.

My first move was to ask him to help me write a policy statement about the proper use of department equipment. Jack spent a great deal of time carefully analyzing and identifying the ideal software configuration for each workstation, abiding by my instructions to restrict

MONDO MONITOR®





An untimely flick of the joystick created an unusual juxtaposition in the spacetime continuum, causing Delmer more than a little trouble.

(Although later, women would comment that the colorful, high-resolution image of the MAG MX17F Monitor gave his complexion a very nice glow.)

WIN A MAG MX15F MONITOR, SEND YOUR CARTOON IDEAS WITH RETURN ADDRESS AND TELEPHONE NUMBER TO MAG INNOVISION AT 2801 SOUTH YALE STREET, SANTA ANA, CA 92704. IF YOUR ENTRY IS SELECTED, YOU WILL RECEIVE A MAG MX15F MONITOR. ALL IDEAS SUBMITTED BECOME THE PROPERTY OF MAG INNOVISION.

Circle 169 on reader service card



Circle 217 on reader service card

REAL PROBLEMS REAL SOLUTIONS

the configurations to approved application software already in place. Jack wrote guide-lines that allowed for use of company workstations for personal projects during the lunch hour and after work. With his help, I finished an overdue task, and he gained a sense of involvement and responsibility.

Next, I established a technology task force, headed by you-know-who, to evaluate department requests and make recommendations for new purchases. This forum allowed Jack to show off his technical knowledge. At the same time, his unrealistic proposals were tempered by his peers' needs to meet expectations and maintain standards. The team didn't hesitate to point out when Jack's ideas were impractical.

For example, when someone requested a dedicated printer for a workstation, Jack's first inclination was to propose an expensive color model. Instead, the group monitored the amount and type of print generated from that workstation over several days and decided that speed and resolution were the critical issues, not color. The group recommended an HP-compatible printer with an enhanced resolution feature. Because Jack's pursuits were harnessed to those of his peers, the team didn't humor him or play along. He didn't like having his ideas rejected by his peers and so began to adopt a more realistic outlook to gain acceptance.

Finally, I looked for a way that the work group could benefit from Jack's desire to share his technology discoveries without disrupting production. The solution was a "technology showcase" presented by Jack at the monthly staff meeting. I set aside 30 minutes for Jack to demonstrate or discuss new products. It worked: Employees were kept abreast of the latest technologies, but their work wasn't constantly interrupted while Jack shared his latest discovery.

I found that by refocusing Jack's efforts, I was able to benefit the department while saving my sanity. Eventually, Jack became an invaluable technical resource. In remembering Jack, I find it hard to summon those old resentful feelings that, at the time, I thought would do me in.

Edited by Bronwyn Fryer

If you use PCs to manage people and other resources in a business environment, Real Problems, Real Solutions wants to hear from you. See page 10 for contact information.











Introducing two new power hitters that cover all the bases.











Create high-powered queries, reports and graphs with the click of a mouse!

PowerViewer[™] lets you access virtually any database to create sophisticated, multi-table reports with *integrated business*

PowerViewer



graphics. The built-in
QuickStyles let you format your
data in just about any style
instantly — without programming. And the exclusive
Connect Profiles enable you
to move between two or more
databases with just a
mouseclick. Plus Powersoft's

exclusive **Database Connection Hotline** is there if you have any questions.

Create your own sophisticated database applications in minutes!

If you want even more power, PowerMaker™ gives you everything you get in PowerViewer plus the ability to create cus-

tom multi-table applications against multiple databases easily and graphically. You can connect to all supported databases, but you also get a powerful built-in relational database, WATCOM SQL. And once you've built your masterpiece Windows applica-

tions, you can distribute them with absolutely no user runtime fees.

PowerMaker



TAKE ADVANTAGE OF THESE SPECIAL INTRODUCTORY PRICES NOW!

CALL YOUR CORPORATE RESELLER, STOP BY COMPUSA OR PHONE POWERSOFT DIRECT.

CALL 1-800-273-2841 TODAY.



Powersoft.

A new kind of power for a new kind of computing



Powersoft Corporation, 70 Blanchard Road, Burlington, MA 01803

Prices listed do not include sales tax, shipping and handling. All trademarks and registered trademarks are property of their respective owners.

utrae

New Competitive Upgrade Can Save dBASE, FoxPro, Paradox, Access And ARAGO Users Up To \$1,291!

\$199 Includes Your Choice Of Any One Of These Absolutely FREE! Offer Good For Users Of Any Competitive DBMS - Call Today!



tions in one high-performance package. Raise your productivity with this valuable library.



Compile almost any dBASE IV application in three easy steps—and produce executable (EXE) files with the efficiency of CA-Clipper.



dEASE apps come alive with new CA-dBFast 2.0- the first dBASE-compatible database and language for Windows.

The Complete, Professional Programming Environment.

Competitive Upgrad

CA-Clipper

The Premier Application Development System

CA-Clipper® 5.2 is a robust language, an efficient linker, a flexible preprocessor and a high-performance compiler. It includes: an editor, debugger and make utility for creating PC and LAN-based applications.

Faster Access, Faster Screen Writes, Faster Performance.

Address up to 32 megabytes of virtual mem-

Feature	CA-Clipper	FoxPro	dBASEIV
Lexical Variable Scoping	YES	80	NO
User-defined Commands	YES	- 80	NO
Code Blocks	YES	NO	NO
Nested Multidimensional Arrays	YES	NO	NO
Fredefined Object Classes	YES	NO	NO
Variables Modifiable in Debugger	YES	NO	NO
Customizable Reactive Error Handling	YES	NO.	NO.
Beads and Writes FoxPro (CDX) Files	YES	YES	NO
Beads and Writes dBASE IV (MDX) Piles	YES	NO	YES
Reads and Writes Paradox (:DB/ PX) Piles	YES	80	NO

Comparison based on FoxPro Version 2.5 for DOS and dBASE IV Version 1.5.

ory - with shorter access times. New Expanded Memory System (EMS) capabilities including LIM 4.0 support, plus a Virtual Memory Manager that uses dynamic overlays to let you exceed available RAM.

New RDDs For FoxPro. Paradox and dBASE IV.

Replaceable database drivers for all the most popular development systems. Plus you can customize Clipper with user-defined commands and functions. And seamlessly









integrate modules from languages such as C, Assembly, dBASE and Pascal. There are no runtime fees, no additional licenses, no LanPaks.

So what are you waiting for?

Call right now and upgrade to the new standard in

Xbase development. Software superior by de

SEE YOUR LOCAL DEALER TODAY OR CALL 1-800 CALL CAI EXT. 176.

Operators are standing by to take your order. Offer good for a limited time only, so don't wait. Call today!

Computer Associates International, Inc., One Computer Associates Plaza, Islandia, NY 11788-7000. 1-800-225-5224. All product names referenced herein are trademarks of their respective companies.

New Screen Savers Turn Into Cost Cutters

lying toasters are too frivolous for your office? Just tell everyone you're doing your part for the Environmental Protection Agency's Energy Star Computers Program, a joint effort between the EPA and the PC industry to reduce power consumption through the use of energy-efficient PCs and peripherals.

The flying toasters—or prowling fish, if you prefer—are courtesy of Berkeley Systems, which has just developed a new version of its After Dark screen saver called EcoLogic, designed to work in conjunction with Energy Star-compliant monitors. The unique combination is one of many innovations coming to market in an industrywide push to meet "Green PC" standards (see "Power Miser PCs Save You Money," Top of the News, August 1993).

Nanao FlexScan E550iW

The 17-inch Nanao FlexScan monitor, a noninterlaced 1280 by 1024 model, was the first Energy Star product I looked at. It has its own microprocessor and memory, programmable from a 14-button keypad below its screen (although you really have to stretch to reach the power switch on the back).

The power-down system for the FlexScan (rated at about 110 watts at full power) operates simply. When the monitor senses a no-video signal from software, it switches its circuits to idle. You hear a click as relays pop open, and only a small LED remains lit on the front panel. Nanao says this mode could use less than 8 watts! But hit a key or move the mouse, and the screen returns to action after a few seconds' warmup.

Although the FlexScan's power-down system can be activated by any screenblanking software, until recently, users were forced to forgo their favorite After Dark images. Now, Nanao USA and Berkeley Systems have teamed up to

By Thom Foulks

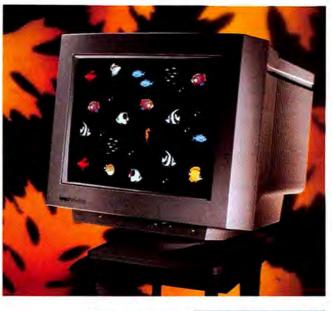
bundle the custom version of After Dark with the FlexScan. Using the new package, you can select how long you want the images to float around on screen before the display goes blank and the monitor powers down. In Windows or in DOS, you can set the length of time before the screen blanker kicks in, as well as select how long the FlexScan's kevboard waits (from 0 to 60 minutes) before reacting to the screenblanking software.

The power-saving aspects shouldn't overshadow other neat qualities of the FlexScan. It has a crisp .28mm dot pitch, offers an antireflective coating, features variable-frequency scanning, complies with the Swedish MPR-II guidelines for radiation reduction, and introduces a color-editing capability to match screen-image colors with printed output colors. It also features the circuitry and controls necessary to daisy chain several monitors to the same computer.

Nanao's monitors traditionally rank high in lab tests. The FlexScan rates a Foulks Favorite spotlight—even if its \$1599 price is too high for my budget.

Insight EcoSystem

A host of PC makers are introducing Energy Star-compliant PCs. The first one I've been able to get my hands on is the EcoSystem from Insight. My \$1699 base unit has a low-profile case, with MS-DOS 6.0 and Windows 3.1 preinstalled on the Western Digital 340MB IDE hard drive. The sleek case, like two stacked pizza boxes, still provides room for four drive bays and three ISA slots. The hard drive slots and Cirrus Logic local-bus graphics



video controller are built in, along with two serial ports, a parallel port, and a mouse port. A 486DX2-66 with a 15-inch noninterlaced SVGA color monitor lists for \$2399; a 486SX-33 with the same monitor costs \$1999. The computer and monitor make a handsome pair on my desk-and, at idle, they use less power than my 60-watt desk light beside them.

ATI DPMS Boards

ATI Technologies is

taking a different approach to monitoring power savings. Latched with a monitor that obeys the VESA Display Power Management Signaling (DPMS) system, ATI video boards using ATI's Mach32 chip can follow software commands to power down. Three modes standby, suspend, and off-time—are controlled from a Windows menu. Or, for DOS users, ATI offers a RAM-resi-

FOULKS FAVORITE:

The Nanao FlexScan
E550iW is more than
just energy efficient. It
features a crisp 7-inch
display and the latest in
ergonomic features.

ALSO FEATURED: EcoLogic, EcoSystem, Mach32 chip, Smartbar,

MonitorMiser, and more

BUSINESS FIXTURES

dent program that includes the same choices available under Windows.

ATI says the software necessary for such control will work with all its products carrying the Mach32 chip, like the Graphics Ultra Pro. The drivers with the DPMS feature may be downloaded from on-line services such as Compu-Serve or shipped directly from ATI's customer service department.

At deadline, I was unable to get my hands on a shipping monitor that was DPMS-compliant—but by the time you read this they should be available from Samsung, Nanao, NEC, and most other monitor manufacturers.

Smartbar

Many computer users consolidate their AC power plugs onto a power strip for the convenience of a single on/off switch. Smartbar from Sequence Electronics is a power strip and then some, turning today's PCs into tomorrow's energy savers.

The Smartbar, which comes in twoand six-outlet models, is a power strip/ keyboard adapter combination controlled by the company's Smartsoft TSR software. Smartsoft monitors your keyboard and computer activity to switch electricity on and off at the Smartbar. The \$199 Smartbar I has an outlet for the computer and a second outlet for peripherals, controllable separately via Smartsoft's menus.

Unlike Energy Star monitors, there is no low-power state involved—electricity is either on or off at the selected outlets. Although hitting a key or moving the mouse will activate the system and monitor, you'll have to wait while they power up. Given the delay, Smartbar will be most effective in offices where employees routinely leave their PCs on overnight, since it will automatically turn the unattended units off. The six-outlet Smartbar II sells for \$279.

Sequence offers other variations on the same theme, including sensors for light, motion, and telephone modem signals (the latter allows a computer to be turned on via signals from a remote modem). You can have Smartbar turn off your machine at night and still access those sales files from a distant hotel room, with a modem signal kicking Smartbar back into action.

Sequence, a Canadian firm, has traditionally marketed its products through energy service companies; but by the time you read this, the firm hopes to have the Smartbar series in U.S. retail channels. Sequence offers free software for large firms seeking to conduct energy audits of their PC power usage.

MonitorMiser

Another power strip unit, the \$79.95 MonitorMiser, may be the least expensive way to realize rapid savings

from reduced energy use. It monitors the keyboard, shutting off the monitor if no keys are touched for a pre-

defined period of time. No flying toasters, but you can't have everything.

Quick Fixtures

At first glance, it seemed like technological overkill: What was a mailing label program for Windows doing on its own CD ROM disk? Answer: Making room for the 1000 T/Maker WMF clip art images that ship with the latest version of MyAdvancedLabelDesigner (MALD) from MySoftware Company. MALD has long been a Foulks Favorite for creating everything from mailing labels to name tags. It's easy to use, prints crisply to any Windows-compatible printer, and can import data from dozens of other products. Also on the disk are more than 100 standard label layouts, supporting the full realm of Avery labels, as well as audiocassette labels, Rolodex cards, and other multiple-output formats. The CD ROM version is bound to be discounted at software houses from its \$79.95 suggested retail price. Fortunately, the package has a catalog of the images, listed by file name and subdirectory location.

No matter how much housekeeping I do, Windows WAV (audio) files keep accumulating on my hard disk. Many packages now include WAV files as part of the routine installation, and DOS file-naming limitations seldom explain what audio is contained in the file. Listening to them using standard Windows

3.1 tools is a pain—"Load," "Play,"
"Close," and so on. Past efforts to inventory these files have been more than irksome. That's before I downloaded Wave After Wave (WAVAWAV.ZIP) from PCW Online. It's freeware, and unfettered by the bells and whistles of other WAV-playing software. You point it to the subdirectory where the audio files are located and tell it to play them. Simple. In 20 minutes, I had culled my WAVs to what I wanted, recovering more than a half-megabyte of storage space.

If you're a Windows fan and hate the

Wave After Wave is freeware, unfettered by the frills of other WAV-playing software.

DOS prompt, Stacker 3.1 for DOS and Windows will probably please you immensely. As for me, well, after a month of flirting with the latest version, I've returned to Stacker 2.1, which I've used on three of my machines for over a year. (And, no, I don't care to debate relative differences between file-compression software or the problems that some have. For me, Stacker has worked faithfully.) Although performance ratings compare closely, the older version seems more responsive-especially when it's running on my 202MB SCSI drive, which I have stacked to nearly 400MB. The newer version does some things I wish it didn't, like frequently reminding me on screen of its presence and triggering its own utility on the use of CHKDSK. Newer is not always better.

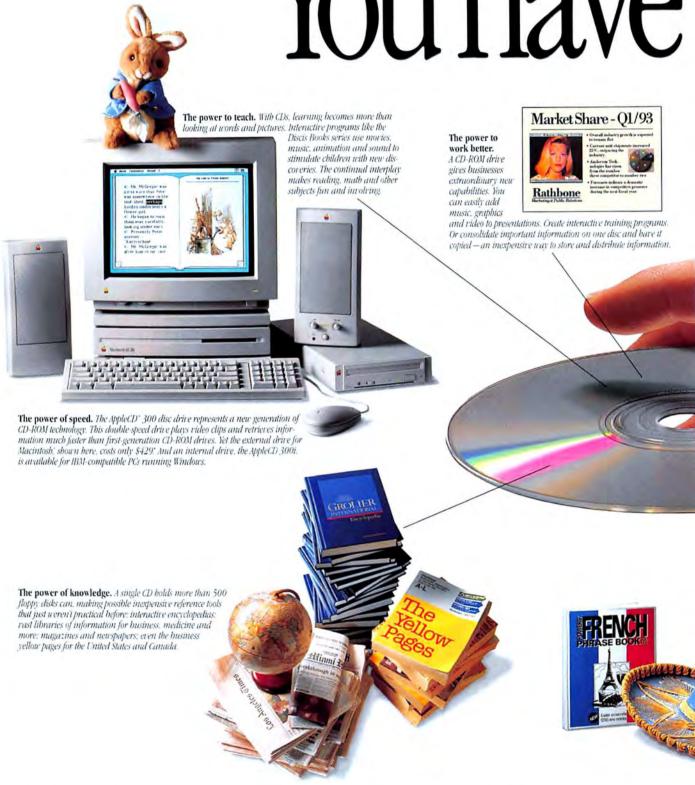
- EcoSystem Insight 800/927-7848 Reader service no. 672
- FlexScan Nanao USA Corp. 800/800-5202, 310/325-5202
 Reader service no. 673
- MonitorMiser Technology Marketing Partners, Inc. 415/940-7800
 Reader service no. 674
- Smartbar Sequence Electronics 800/663-1833, 613/257-4773 Reader service no. 675

Thom Foulks is a contributing editor for PC World.

Imagine if you could turn your computer into a librarian, an artist, a teacher, a research assistant, a historian, a marketing expert and an entertainer.

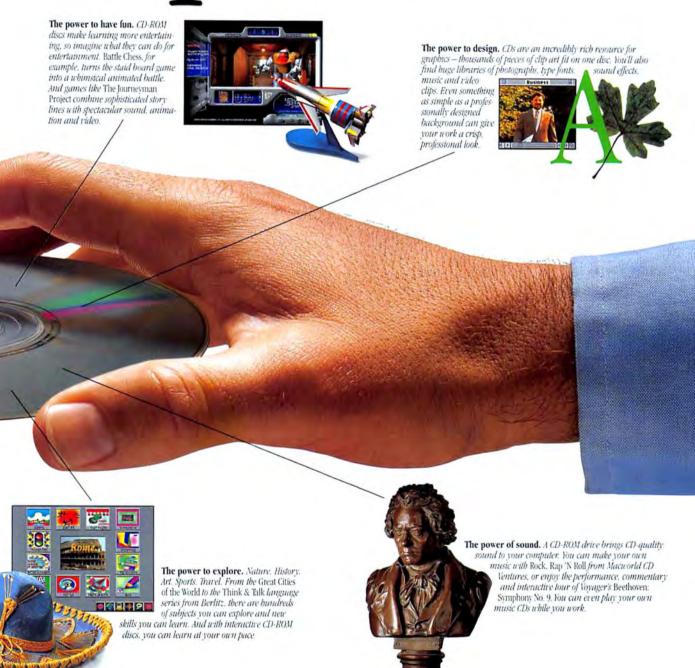


Youhave



You already know that a personal computer is an extraordinarily powerful tool for working with documents, spreadsheets and vast quantities of information. What you may not realize is that these capabilities represent only a fraction of the things a computer can do. It can also give you the power to work with sound, video, photographs, animation and other kinds of digital

the power.



information as easily as you work with words and numbers. You probably don't even need to buy a new computer. All you need to do is add a CD-ROM drive to the computer you already have. It's easy to do. It's inexpensive. And it can add an entirely new dimension to the way you work, learn and even have fun. So read on, and find out just how much more your computer can do.

Youhavet



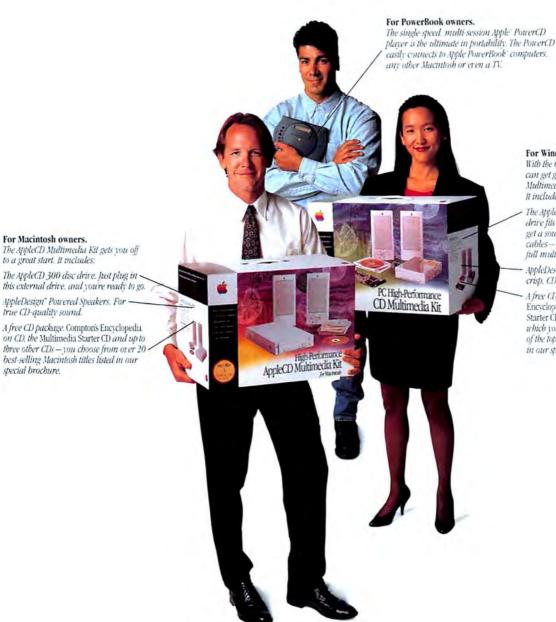
The most exciting software available today is only on CD-ROM discs. That's because CDs can hold an incredible amount of audiovisual information, making possible software that would be too impractical or too expensive with floppy disks, or even with a hard drive. Right now there are thousands of titles for Macintosh and PCs running Windows. They cover virtually every conceivable

he choices.



topic and interest, from business directories to cooking lessons, from nature programs to a street-by-street atlas of the United States. Only a fraction of the available CDs are shown here. New releases come out every week, and there are hundreds of titles in development. So if you don't have a CD-ROM drive in your computer, you're not just missing the fun. You're missing the future.

vounee



For Macintosh owners.

to a great start. It meludes:

true CD-quality sound.

special brochure.

AppleDesign Powered Speakers. For

For Windows owners.

With the CD Multimedia Kit for PCs. you can get going right away. And it exceeds Multimedia PC Level 2 specifications. It includes:

The AppleCD 300i. Our internal disc drive fits neatly inside a PC. You also get a sound card, software and cables-everything you'll need for full multimedia capabilities

AppleDesign Powered Speakers. For crisp, (D-quality sound

A free (1) package. Comptons Encyclopedia on CD the Multimedia Starter CD and up to three more CDs. which you can select from over 20 of the top titles for Windows listed in our special brochure.

If you have a Macintosh, or a PC running Windows software, you can take advantage of great deals on pre-The deals. mium multimedia bundles. The AppleCD" Multimedia Kit for Macintosh and the CD Multimedia Kit for PCs are each valued at over \$1500.* They're now available for less than half that. To get your kit, or the portable PowerCD, call today.

is the drive.



Recently, the AppleCD 300 disc drive was named *Macworld*'s Editor's Choice for Overall Value. Why? This double-speed drive is significantly faster than many other CD-ROM drives available today, yet it's still quite affordably priced. At \$429,* the AppleCD 300 is a great deal. And to get it, all you have to do is call the phone number above.

If there's a computer in your future, make sure there's a future in your computer.



Integrated Apple CD-ROM. From this point on, a computer without a CD-ROM drive won't allow you to take advantage of the best computing has to offer. So if you're thinking about a new computer, consider one of the many Macintosh' models with the AppleCD 300i already built in. That's the easiest way to start exploring the vast array of CD titles available for Macintosh, and the many more to come. Call 800-732-5151, ext. 100, to locate an authorized Apple reseller, and stop in for a demonstration. With a CD-ROM drive inside it, you'll find that a new Macintosh delivers the most impactful kind of power. The power to be your best. Apple

When some clown says he needs the report first thing Monday morning...



Show him some *real* magic!

It's Friday afternoon. SURPRISE! The report is due first thing Monday morning. Sharp, crisp and professional.

Don't clown around. Dazzle 'em with a little magic of your own. And wow the crowd, first thing Monday morning, without ever breaking a sweat.

The secret is the Brother HL-6 laser printer or the Brother HJ-400 ink jet printer. You get professional printing wherever, and whenever you want. Magically simple to use. With powerful productivity and text/graphics features.

The HL-6 has 60 fonts, a high speed bi-directional parallel port, and patented auto-emulation and interface switching. The HJ-400 prints at 360 DPI, has up to 30 fonts, 100-page automatic feeder, patented auto-interface switching and instant Apple[®] Mac and IBM[®] compatibility. Practically everything is automatic to make them easy to use. Both

print a variety of standard business papers and envelopes, and are backed by a two-year warranty. Both have everything you need for a "knock-em-dead" performance every time. (And all at a matinee price!)

With these powerful printers no one will ever know-or care-if you printed your work at that circus you call your office, or at home.

Face it: in a world of clowns, you need powerful business magic like the HL-6 laser or the HJ-400 ink jet to help you manage your work and your time.

The amount of work won't go away. But you can decide where and when to do it without compromising quality.

And isn't that real magic?

Call 1-800-276-PRINT, ext. 644 for the nearest dealer. (In California call 1-714-859-9700, ext. 644.)

HL-6 laser printer

- 6 page-per-minute speed at 300 DPI, PC compatible
- Special Windows driver
- Up to 60 fonts, including TrueType -compatible fonts
- Automatic, hassle free operation
- Two-year warranty







HOME HOFFICE

HJ-400 ink jet printer

- Laser-like output at 360 DPI
- PC and Macintosh® instant compatibility
- Windows and Quickdraw® drivers
- Up to 30 fonts, including TrueTypecompatible fonts
- Standard, automatic cut-sheet feeder
- Two-year warranty

Available at Sears Brand Central, Silo, Lechmere, Nobody Beats The Wiz, and other fine dealers.



Brother is a registered trademark of Brother Industries, Ltd. Apple, Macintosh and Quickdraw are registered trademarks of Apple Computer. TrueType is a trademark of Apple Computer, Inc. which may be registered in certain jurisdictions. Windows is a trademark of Microsoft Corporation. IBM is a registered trademark of International Business Machines.

All other brand and product names are registered trademarks or trademarks of their respective companies.

Top of the News

NOVELL TEACHES DOS



Vanilla DOS is history.

Novell's innovative version 7 includes built-in peer-to-peer network software, several powerful utilities, and preemptive multitasking. This could be the best DOS yet.

TEST DRIVE

Who would've thought that DOS, an aging, un-

derpowered operating system, could still grab headlines? With the recent introduction of Microsoft's DOS 6.0 and IBM's PC DOS 6.1—each bundled with memory management, backup, antivirus, and other utilities—DOS vendors have been aggressively topping each other in an effort to win the hearts and upgrade dollars of PC users.

Now it's Novell's turn. Ever since Novell bought Digital Research in 1991, industry watchers have expected Novell to add networking features to Digital's DR DOS. With the release of version 7 of the product, Novell doesn't disappoint: Novell DOS 7 features built-in peer-to-peer networking that allows you to set up a network without having to install additional LAN software such as NetWare Lite, LANtastic, or Windows for Workgroups. Novell DOS 7 users

can also access network drives and files located on a NetWare file server.

In addition to network connectivity, Novell DOS 7 offers a powerful set of utilities that matches—and often tops—those found in MS-DOS 6.0 and IBM PC DOS 6.1.

For disk backup and virus protection, DOS 7 features complete versions of Fifth Generation Systems' Fastback Express and Search & Destroy, as opposed to the scaled-down versions in MS-DOS 6.0. For data compression, Novell turned to Stac Electronics' Stacker 3.1, which offers compression ratios as high as 2:1. DOS 7 also offers preemptive multitasking, which allows multiple DOS applications to run simultaneously. For memory management, Novell's DOS Protected Mode Services (DPMS) is an application program interface (API) capable of loading DOS programs and data in extended memory (above 1MB). However,

Edited by Russell Glitman

NEW TRICKS

developers will have to write programs that support this API before users can take advantage of its facilities.

By combining its NetWare Lite peer-topeer network software with DOS 7, Novell has introduced the first LAN-ready DOS.

Designed for small-office or workgroup LANs, DOS 7's Desktop Server network software lets you perform basic LAN functions. For example, you can run applications and access files on another PC. Work-group users can also access resources such as printers and fax servers that are connected to the corporate NetWare LAN. Un-

fortunately, Desktop Server lacks Email. While this won't matter to DOS 7 work groups linked to the office network (which probably already has E-mail), stand-alone DOS 7 networks will require a third-party Email package such as Lotus's cc:Mail or Microsoft Mail.

To set up a client PC on a DOS 7 network (you'll need an Ethernet-equipped system), you type SETUP at the DOS prompt and then follow the straightforward menu-driven interface. Another boon for network users: Enhanced security lets you password-protect your system, and a single log-in gives you access to both your PC and the network.

While Novell gets high marks for making LAN installation as painless as possible (context-sensitive help is included), LAN neophytes will probably struggle with such arcane network terminology as base memory address and interrupt request line. Certainly, networking for the masses has a ways to go.

Multitasking DOS and More

DR DOS 6.0 lets you task-switch, or move between applications that are open but not active until you switch to them, but Novell DOS 7's Task Manager goes one step further by providing preemptive multitasking. Because of this capability, multiple DOS applications can be active simultaneously, though you can work with only one at a time. For example, 1-2-3 can print a spread-sheet file in the background while you're typing a document in WordPerfect.

Running a prerelease version of DOS 7, 1 was able to run two graphics-intensive DOS mapping programs simultaneously: The Software Toolworks' Travel Companion and Road Scholar's City Streets. However, Task Manager wouldn't let me load a third



News Monitor

CYRIX UPGRADES 386 TO 486: You can now upgrade your 386 to 486class performance simply and cheaply, thanks to the new Upgrade Microprocessor from Cyrix. The one-chip upgrade, which is moving into the retail channel after a field test of some 15,000 units, works with any system currently using a socketed 386DX-16, DX-20, or DX-25. The upgrade lacks a math coprocessor, which is built into the Intel 486DX series, but it will work in conjunction with one. Our informal testing shows that the chip roughly doubles a 386's performance but fails to match that of a 486, due in part to the relatively slow subsystems in most 386s. The chip achieves its speed via the combination of a 1K on-board cache, a proprietary fast I/O circuit, a hardware integer multiplier, and a clock doubler feature that's guaranteed to work with all clones. The Cyrix upgrade is \$299 for the Cx486DRx2 16/32, \$349 for the Cx486DRx2 20/40, and \$399 for the Cx486DRx2 25/50.

AN OLD-TIME REVIVAL MEETING:

Embattled Dell Computer went on the offensive—literally—at a recent Austin, Texas, event marking the introduction of the company's fall product lineup. It was the first (and perhaps last) time the press has been invited to one of the company's internal rollouts. With about 2000 screaming, stomping Dellies in attendance, a procession of the company's executives and some Texas celebrity impersonators took to the stage to savage Compaq, then Gateway 2000, then Compaq, then Bill Clin-

What's Best? DOS Prompts Dilemma

Novell DOS 7, \$99 to \$129	IBM PC DOS 6.1, \$189	Microsoft DOS 6.0, \$129.95
Built-in peer-to-peer networking; tight integration with NetWare	No networking features	No networking features
Task Manager lets multiple DOS programs operate simultaneously	Shell task-switches between DOS programs	Shell task-switches between DOS programs
Fastback Express; supports tape drives	Central Point Backup; supports tape drives	Microsoft Backup; no tape drive support
DOS Protected Mode Services loads TSRs and device drivers in extended memory (above 1MB)	RAMBoost memory manager loads TSRs and device drivers in upper memory	MemMaker memory manager, similar to RAMBoost
Stac Electronics' Stacker 3.1; de- compresses DoubleSpace drives	AddStor's SuperStor 3.1; reads DoubleSpace drives	Microsoft DoubleSpace; up to 2:1 compression
File and directory passwords; single log-in for PC and LAN	No password protection	No password protection
	Built-in peer-to-peer networking; tight integration with NetWare Task Manager lets multiple DOS programs operate simultaneously Fastback Express; supports tape drives DOS Protected Mode Services loads TSRs and device drivers in extended memory (above 1MB) Stac Electronics' Stacker 3.1; decompresses DoubleSpace drives File and directory passwords;	Built-in peer-to-peer networking; tight integration with NetWare Task Manager lets multiple DOS programs operate simultaneously Fastback Express; supports tape drives DOS Protected Mode Services loads TSRs and device drivers in extended memory (above 1MB) Stac Electronics' Stacker 3.1; decompresses DoubleSpace drives File and directory passwords; No networking features Shell task-switches between DOS programs Central Point Backup; supports tape drives RAMBoost memory manager loads TSRs and device drivers in upper memory AddStor's SuperStor 3.1; reads DoubleSpace drives

Top of the News

Continued from page 79

app (possibly because I was out of expanded memory, although Task Manager's error message didn't make this suggestion).

Novell DOS 7 uses EMM386 as its memory optimizer (on 386 or newer processors) to load TSRs and device drivers into upper

Novell DOS 7

This upgrade of DR DOS 6.0 offers a powerful array of tools at a competitive price.

Key Features: Integrated peer-to-peer networking • Preemptive multitasking

- DOS Protected Mode Services (DPMS)
- Stacker data compression
 Fastback
 Express backup
 Search & Destroy virus
 protection software

Pricing: \$99 to \$129 (estimate)

Availability: Immediate

Novell, 800/453-1267, 801/429-7000

Reader service no. 705

RAM. In addition, DOS 7's DPMS allows TSRs and device drivers to operate in extended memory, freeing more RAM below 1MB for other programs and data. DOS 7's disk cache, disk compression, Desktop Server, and other software utilities already use DPMS.

Stacker Data Compression

Novell DOS 7—like its predecessor, DR DOS 6.0—offers data compression, but it doesn't use a scheme based on Add-

Stor's SuperStor utility. Instead, Novell chose Stacker 3.1, the latest version of Stac Electronics' popular compression package. Company officials say that Novell DOS 7's Stacker is similar to the shrink-wrap version, minus a few utilities (such as a disk optimizer) that are already included with DOS 7. Stacker 3.1 provides file compression ratios



NOVELL DOS 7 includes Fifth Generation Systems' Search & Destroy for detecting computer viruses.

up to 2:1 and can decompress Microsoft DOS 6.0 DoubleSpace drives.

Windows users will appreciate the pointand-click interfaces for DOS 7's utilities, including those for Stacker data compression, Fastback Express backup, Search & Destroy antivirus, and Novell's security and LAN administration tools.

Plug In, Turn On, and Go With Compaq's

TEST DRIVE

The first of a new breed of Compaq PCs bridges

the gap between the ease of use of the Macintosh and the power and compatibility of Intel-based computers. Dubbed the Presario, this all-in-one PC insulates new users from the DOS prompt. Plug in the Presario,

> turn it on, and you're guided through a

custom installation of its extensive suite of bundled applications — without ever handling a floppy disk or

issuing a DOS command. When everything is ready, you land in a friendly Windows-based learning center.

The Presario 425, the first model of the Presario line, is a one-piece unit designed to compete with the Macintosh Classic and low-end retail brands such as Packard Bell. It succeeds so well that I finally feel I can recommend a Windows machine to the technologically challenged friends I previously steered toward the cozy world of the Macintosh Finder.

The Presario is based on an entry-level Intel 486 microprocessor, the 486SX-25, which lacks a math coprocessor. The system includes a socket that accepts the Intel OverDrive versions of the 486DX-33, 486DX2-50, and 486DX2-66, or the Intel 487SX math upgrade. The machine's low-power modes qualify it for the Environmental Protection Agency's Energy Star certification.

The Compaq Presario 425 includes 4MB of RAM expandable to 20MB, a 200MB hard drive, and a 1.44MB floppy disk drive. There are two expansion slots but no free drive bays, limiting you to external add-ons. Future Presarios will come in standard desktop and minitower configurations and provide additional expansion options. The system's built-in 14-inch monitor has a .28mm dot pitch and displays up to 256 col-

ors in 800 by 600 super-VGA mode, or 16 colors at 1024 by 768 resolution.

The Presario's digital signal processor (DSP) interacts with a built-in 2400-bps data/9600-bps fax-modem to let the computer sense whether incoming calls are fax, data, or voice and respond appropriately, acting as a digital answering machine when appropriate. The Presario will play back

Compag Presario 425

A new, easy-to-use, entry-level Compaq may mean more trouble for the Macintosh and low-end PC clones.

Key Features: Hands-off setup • Nice software bundle • Voice-data-faxanswering machine capability

Pricing: Around \$1400 on the street
Availability: Immediate from Compaq
resellers but not from Compaq Direct
Compaq Computer Corp., 800/345-1518,
713/378-8820

Reader service no. 704

Beta Tester Ratings

David Leaf, a DOS 7 beta user and service technician for Idea Works, a value-added reseller in Olympia, Washington, says DPMS is among the best new features of DOS 7. Since it uses DPMS to load its own device drivers and TSRs above 1MB, "I

BETA TESTER DAVID LEAF likes Novell DOS 7's DPMS technology, which can load drivers and TSRs in extended RAM.

All-in-One Presario

still have a huge amount of upper memory to load other stuff in," he says.

However, Leaf says he wishes future DOS versions would include his favorite utility: 4DOS from J.P. Software. This \$69 COMMAND.COM replacement comes with its own file browser, lets you use alias-

> es for common DOS commands, and performs other helpful tasks.

While pricing for Novell DOS 7 wasn't set at press time, company officials expect that the list price will fall between \$99 and \$129-making the product competitive with the latest DOS flavors from Microsoft and IBM. Considering DOS 7's impressive mix of powerful utilities and built-in networking, this could be the best DOS yet.

-Jeff Bertolucci

News Monitor

(continued from page 79)

ton, then Compaq. We aren't clear on how Clinton got in there, but we are clear on how the gang in Austin feels about things. The evening opened with the blowing up of an elaborate Compaq desktop mock-up and moved quickly to the ceremonial sacrifice of the Gateway 2000 cow. The cow, at least, was real; the sacrifice was obscured by a cloud of special effects. To round things out, "H. Ross Perot" took the stage and, cocking his considerable ear in the direction of Compag's campus, asked, "What's that? I think I hear a sucking sound coming from Houston." If they play as good a game as they talk, Dell's back.

voice messages with no extra hardware, but ing you to lose work. (It happened to me on

if you add a microphone you can record a greeting. By attaching a telephone handset, you can even answer calls through your PC.

The Presario automatically installs and configures the bundled applications when you flip the "on" switch for the first time. Included are PFS:WindowWorks, which contains a chart maker, a word processor, a spreadsheet, a database, a communications program, an address book, and a label maker; the Quicken for Windows checkbook manager; the Symantec Game Pack; MaxFax software for managing the voicedata-fax system; Prodigy and America Online; and the Compaq Welcome Center, which lets you select from Introduction, Learning Center, Customer Support, Registration, and Control Center. There's enough help here for a novice to get comfortable with the Presario in a day or two. One problem: The Control Center is a configuration utility that may reboot

your machine without

warning, potentially caus-

the preproduction unit we tested.)

There are some things Compaq could have done better. The Presario has a game port but no stereo sound capabilities. While it comes with a decent set of software, you don't get the original disks. And touch-typists may find the keyboard mushy and slow. None of these are fatal flaws, however.

-Joe Abernathy



PC PRICES CONTINUE TO PLUMMET: In

1994 you'll get more PC for your money-prices will drop 25 percent, and basic 486 systems will provide more RAM and bigger hard drives, predicts David Goldstein, president of Channel Marketing. The price slide won't come close to the 41 percent drop seen in 1992; in fact, it's level with the 25 percent drop predicted for 1993. But the steady decline could pay off for buyers who can wait a few months. Goldstein expects that in January 1994 a basic 486 with 2MB to 4MB of RAM and an 80MB hard drive will cost \$1000. In December 1994 that basic PC will sport 4MB of RAM and a 170MB hard drive and cost only \$750. Falling component prices on hard drives, microprocessors, and video chips will force PC prices down.

(continued on page 83)

Quicken: More Than Checks

Sure, you can begin TEST DRIVE using Quicken for basic personal finance tasks like paying your bills. Now with new financial planning calculators and portfolio enhancements, the latest DOS and Windows versions ease you into the sophisticated world of money management. It's almost like having a financial planner in a box.

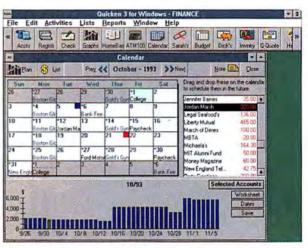
The beta versions of Quicken 3.0 for Windows and Ouicken 7.0 for DOS have similar capabilities, although the Windows version has more graphical details and other features. In the Windows program, for instance, the beefed-up portfolio manager offers 18 measures of investment performance; the DOS program has only 14.

Drag-and-Drop Payments

If you jot reminders about upcoming bill payments on your wall calendar, you'll love the new drag-and-drop functions in Quicken's Financial Calendar. From a list of previous transactions, you select one with your mouse, drag it onto the calendar, and then let it drop on the payment day. Next you indicate if it's a recurring or a nonrecurring payment. Quicken then lists future payments on the appropriate dates. The Windows calendar even shows the name of the payee. You can click on a payment date for more details about the transaction. You can also color-code days for special events. This feature is so useful that I wanted to print the calendar and tack it to the wall,

but alas, Quicken's calendar doesn't print.

A financial planning graph uses recurring payment data and projected income to show the ups and downs of your cash balance for up to two years. This graph is integrated with the budget spreadsheet that allows you to plan for future expenses in



* 60m0693

DISPLAY PAYMENT DUE DATES and a financial planning graph of your cash balances with Quicken 3.0 for Windows.

excruciating detail. This type of cash flow forecasting has long been available in business accounting programs, but this is the first time I've seen it implemented so elegantly for just plain folks.

In previous versions of Quicken, investment tracking seemed like an afterthought.

Word 6.0 for Windows: Scheduled to ship in the fall,

Microsoft Word 6.0 for Windows will feature Wizards, support for OLE 2.0, and improved keystroke compatibility with WordPerfect for DOS, Microsoft says.

First featured in Microsoft Publisher 1.0 and Excel 4.0, Microsoft's Wizards walk you through complex tasks such as creating a newsletter or writing a résumé. Support for OLE 2.0 provides better integration between Word for Windows and other OLE-ready apps;

for example, to edit an Excel spreadsheet embedded in your Word document, you simply double-click the spreadsheet. Excel tools then appear in the Word for Windows interface.

Word 6.0 includes a new version of WordArt, a utility for adding clip art and other images to your documents. WordArt 2.0 lets you access any TrueType fonts on your system. And Word 6.0's OLE 2.0

Key Features in the Latest Word

- · Wizards help with complex and unfamiliar tasks
- OLE 2.0 support
- Improved keystroke compatibility with WordPerfect for DOS
- · Easier to create bulleted and numbered lists



support means you can insert and edit a WordArt Image inside your document, rather than loading the WordArt draw program.

Changes to Word 6.0's interface include the addition of "tabbed dialogs" that let you click folder tabs to select options in dialog boxes. In an effort to woo the large community of WordPerfect for DOS users, Word 6.0 for Windows accepts more WordPerfect keystroke commands and is now better at converting WordPerfect documents to Word for Windows format, according to Microsoft.

> It seems like only yesterday (well, earlier this year, at least) that Word for Windows was still on version 2.0. Why the sudden jump to version 6.0? Reportedly, the new version will share code with the upcoming Word 6.0 for the Macintosh. Pricing for the program wasn't set at press time. Microsoft, 800/426-9400, 206/882-8080. Reader service no. 699

ILLUSTRATION: GORDON STUDER; PHOTO: JOHN GREENLEIGH

Past incarnations of the program's portfolio manager wouldn't satisfy the treasurer of a lemonade stand. Now you can select from six portfolio views (seven in DOS) showing your holdings; investment performance including percentage return on investment; current valuation; estimated income; and latest pricing changes. And you can customize two views by selecting from performance statistics like total dollar return and

current investment yield.

Unfortunately, Ouicken still doesn't calculate an annualized return for individual securities from date of acquisition. For example, the program may show an identical return on investment of 25 percent for two different mutual funds. However, if you've owned the first fund for five years and the second for just one year, clearly the second fund was the better buy. The program ignores a big factor in investment perfor-

mance: How much time it takes to earn money is an important consideration.

Quicken has five flexible financial planners that you can use to calculate loans, establish savings goals, set up a college education fund, compute your retirement nest

Quicken 3.0 for Windows, Quicken 7.0 for DOS

Personal finance package lets you keep track of your expenses and investments.

Key Features: Calendar display of payment obligations • Drag-and-drop transaction scheduling • Improved financial planning calculators • Automatic calculation of loan principal and interest • Improved online help

Pricing: \$69.95, upgrades (purchased directly from Intuit) \$29.95

Availability: September 30 Intuit Inc., 800/624-8742, 415/322-0573 egg, and plan the refinancing of existing obligations. After calculating what you need using one of the financial planners, you can allocate money within accounts toward a specific goal, such as a retirement fund. This useful feature helps you monitor your progress toward your personal investment objectives.

Loan tracking is improved. Not only can you see what you've already paid in princi-



PREPARE A CHECK in Quicken 3.0 for Windows by entering information in a check facsimile on screen.

pal and interest, but you can also project what you'll pay in the future, even if interest rates change.

The Windows version allows you to customize the scrolling icon bar for one-click access to frequently used reports and functions. You can select from more than 70 icons to represent up to 25 actions.

Quicken has always been strong on reporting capabilities, but its complicated filtering procedure made custom reports difficult to set up. The Windows version makes custom reports easier by listing check-off options on one screen.

Quicken's already good online help has been improved with Qcards, which offer automatic online help if you linger too long at a screen without taking action, and Coaches, which provide shortcut tips. You'll also find a comprehensive tutorial to learn the program and the usual context-sensitive online help. What started out as a simple bill-paying program has grown into a complete system for managing your finances.

-Richard Morochove



News Monitor

(continued from page 81)

PSION'S TALKING PDA: The Series 3a palmtop builds on its predecessor, the Series 3, with a processor that's twice as fast (7.7 MHz), a word processing application compatible with Microsoft Word for DOS, and a 1-2-3-compatible spreadsheet. The unit weighs less than a pound and has twice the screen size of the Series 3. Its CGA resolution fits 80 characters on 18 lines, and a zoom feature lets you change the three fonts from 6 point to 14 point. Maximum internal RAM is 512K and ROM is 1MB. You can exchange data with your PC via an optional \$130 six-pin serial/parallel link cable and PC software. The Psion 3a is \$495 for the 256K package and \$595 for the 512K.

THREE-WAY MERGER: SoftKey, Word-Star, and Spinnaker have announced plans to merge and form the 12th largest software company in the world, according to representatives of the three partners. The new company-to be named SoftKey Software Products, International-will have combined sales of approximately \$130 million and will be based at Spinnaker's current headquarters in Cambridge, Massachusetts. Initially SoftKey Software Products will offer 150 software titles, including Calendar Creator, PFS:WindowWorks, and WordStar for DOS and Windows. Company officials expect the merger to be final by November.

> Contributors: Joe Abernathy, Jeff Bertolucci, Russell Glitman, and Laurianne McLaughlin

QPW Adds Data Modeling, Scenarios

TEST DRIVE

Quattro Pro 5.0 for Win-

dows (QPW) enhances QPW 1.0's notebook metaphor, offers more analytical functions than Excel 4.0 or 1-2-3 release 4.0 for Windows, and includes potent innovations—notably an enhanced online help system and an Improv-like data modeling tool that provides flexible, multidimensional data views.

Let's start with a roundup of

Quattro Pro 5.0 for Windows; Workgroup Edition

modeling feature lets you twist and turn data to view it any way you want.

Key Features: Enhanced notebook design • Data modeling tool

Pricing: QPW \$99.95, Workgroup Edition \$495.95

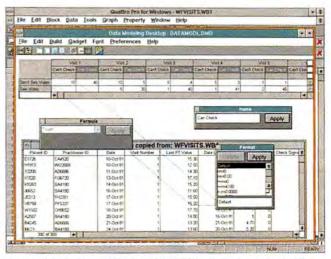
Availability: September 1 Borland Int'l, 800/331-0877, 408/438-8400

Reader service no. 706

the new and improved features found in a beta version. You can align a label within a range and drag and drop single cells as well as ranges. Right-clicking on a selection or an object now displays a pop-up menu of commands to act on it-copy, insert, and so on-in addition to commands to view or modify its properties, as in QPW 1.0. Excel aficionados will find that their favorite array formula tricks work fine in QPW 5.0, and as in Excel, you can create range names based on data headings. The Workgroup Edition of Quattro Pro 5.0 for Windows includes a spelling checker.

Analytical functions now total 265, and using them in formulas is easier. You can paste functions and get help with arguments, and color coding ensures balanced parentheses.

QPW's tool bars are customizable and easy to manage: You can include prepared buttons to launch commands or create your own to launch macros. You can display multiple tool bars at



GET FLEXIBLE, MULTIDIMENSIONAL VIEWS of your data with Quattro Pro 5.0 for Windows' data modeling feature.

once. You can also include sliders, radio buttons, text boxes, and so on; link them to cells in the spreadsheet; and use them to control your applications.

Automatic consolidation lets you combine data from multiple files or worksheet pages to create a new table of linked formulas. Change data in the original sheets, and the table updates automatically. The Consolidator tool bar is more intuitive than Excel's dialog boxes.

The new Scenario Manager feature lets you capture alternative sets of data values for a sheet or range and play the what-if game. QPW's scenario system is not nearly as powerful as 1-2-3 release 4.0's, but using it is a lot more straightforward. The Scenario Manager tool bar lets you manage stored scenar-

More Ways to Configure Windows: Hewlett-

Packard's new Dashboard for Windows 2.0 adds more features to help you customize your Windows desktop, including new hot keys for launching programs; new gauges for monitoring CD ROM, removable, and network drives; and the capability to enter DOS commands from within Dashboard itself.

At first glance, Dashboard 2.0 looks much like its predecessor: Via a long, rectangular control panel that slightly resembles a car's instrument panel, Dashboard lets you open Windows programs with a single mouse click and features graphic gauges for monitoring system resources. The program also provides tools that should be in Windows 3.1 but aren't. For instance, to fax a file, you simply drag it

from File Manager and drop it onto Dashboard's fax icon.

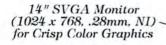
You now can display the Dashboard control panel vertically or horizontally, freeing up screen space where you need it most. Plus you can show Windows' program groups and Dashboard's Printer Manager as tool bars anywhere. For faster windowing, new user-

defined hot keys make it easier to launch programs and toggle between them. A new DOS Command Window lets you run basic operating system commands like DIR and COPY without shelling out to DOS.

Dashboard 2.0 also starts quicker, runs faster, and manages system resources better, according to Hewlett-Packard. It's \$99; upgrades are \$29 direct from HP. Hewlett-Packard, 800/554-1305, 408/ 749-9500. Reader service no. 700



Whether for Business, Home or Entertainment, Acma has a Solution to Make You Smile



170MB Hard Drive and 128K External Cache for Plenty of Room

Built-In High Performance Multisession CD-ROM Drive for CD-ROM, Photo CD & Audio CD Playback and Desktop Ergonomics

CD Software to Fit Every Interest*





Four Time PC World Best Buy Winner



Sound Card for Quality Sound*

> 1.44 or 1.2 Disk Drives for Flexible Input Options

Built-In High Performance Stereo Speakers for Desktop Ergonomics*

> Ready to Run All Your Windows, DOS, & OS/2 Applications

SPECIFICATIONS

WINDOWS

- Intel 486 Processor
- 170MB Hard Drives
- 4MB RAM Exp to 32MB
- 128K External Cache
- 14" SVGA Color Monitor
- VGA Card with 1MB
- IDE Controller
- 1.44 or 1.2 Drives
- Desktop Case
- 101 Enhanced Keyboard
- 3 Button Serial Mouse
- Built-In Stereo Speakers*
- CD-ROM Drive*
- Sound Card*
 - CD Software*

*MPC & MPC+ Systems Only

Your MPC Plus System comes with these CD-ROM software titles:

. . . m



Sound Library, King's Quest, Mixed Up Mother Goose Microsoft Bookshelf: American Heritage Dictionary, Bartlett's Familiar Quotations, The Concise Columbia Dictionary. The Concise Columbia Encyclopedia, The Hammond Atlas, Roget's Electronic Thesaurus

ACMA PC SOLUTIONS

\$1399 486SX/33 PC 486SX/33 MPC \$1699

\$1799

\$1499 486DX/33 PC

486SX/33 MPC+

\$1799 486DX/33 MPC \$1899 486DX/33 MPC+

486DX2/50 PC \$1599

486DX2/50 MPC \$1899

486DX2/50 MPC+ \$1999

\$1799 486DX2/66 PC \$2099

486DX2/66 MPC \$2199 486DX2/66 MPC+

The New Acma 486 Multimedia Computer. The Latest Addition to the Family of Solutions From Acma.





Prices & specifications subject to change without notice Prices do not include shipping & handling. Call to confirm configuration Intel Inside logo is a registered trademark of Intel Corporation







47988 Fremont Blvd., Fremont, CA 94538 Direct: (510) 623-1212, Fax: (510) 623-0818

Nat'1/Corp.: 800-786-6888 Government: 800-578-1888

Best Notebook Values.

he WinBook by Micro Electronics M gives you the power to run Windows and a unique, ergonomic design to make it easier to use.

It features a built-in, centered trackball which allows you to control cursor movements effortlessly without having to lift a single finger off the keyboard. Full-size keys and a sloping hand rest let you work in total comfort.

The WinBook comes with the power and speed needed to run Windows effectively. You get 4MB memory, the ultrafast 486SLC/E processor and the Motorola chipset which provides eight power-saving features. Plus, we have fine-tuned the WinBook's screen. In monochrome and in dual-scan STN color-you get sharper and clearer images with less cursor loss.

The WinBook was engineered for Micro Electronics, a division of MEI/Micro Center, Inc. MEI is America's leading direct source for computer products. Micro Center has been selling PCs for more than 14 years—longer than IBM or Compaq—with over 736,000 units sold. With over 2.2 million satisfied customers nationwide, we have developed a superior support staff including top engineers and technical specialists. So you always get the highest quality product at the lowest possible price.

Before you choose a notebook computer, look at the WinBook-the first notebook computer designed specifically for Windows.



WinBook Features

WinBook





1MB ROM for AMI BIOS

Motorola chipset 1k internal cache

Ergonomically engineered

The WinBook's ergonomic features include a sloping hand rest and keyboard, plus a centered dual-button trackball-allowing you to work in total comfort away from your desk.

Clean, sharp color display

The WinBook's advanced, dualscan color display gives you 99% shadow-free performance compared to other

single-scan passive matrix displays. You get near active matrix quality trix price!

The 5.4 lb. WinBook, designed by award-winning Palo Alto Design

Includes a 9600 baud send 4800 baud receive fax/2400 band modem.

- · Fast-acting, LCD screen for less cursor loss.
- Industry-standard PCMCIA
- 2.0 slot for future expandability.
- · 512k video RAM.

Mouse/keyboard, parallel, serial & VGA ports plus PCMCIA expansion



Docking station gives you desktop power

With the avail-

able docking station, your WinBook instantly becomes a full-function desktop computer. The two expansion slots and drive bays allow you to add peripherals such as monitors, hard drives, CD ROMs, I/O cards or an extended keyboard. It also includes parallel, serial, PS/2 mouse, external keyboard and VGA ports. And it's just \$399!

Longer battery life

The WinBook features NiMH 2200 MA batteries with goldplated contacts. This allows it to run much longer than units with traditional NiCAD batteriesand there's no memory effect.

Act now for a special offer!

PACKARD The HP DeskJet

Portable printer weighs only 4.7 pounds inkjet technology

as other Desklet models. only \$299*, you can't afford to miss this offer!

*\$299 after \$75 mail-in rebate. For more information, call 1-800-468-0215

Service, warranty and support

guarantee.

• Fax modem included!

- back guarantee.
- One-year limited warranty on parts and labor.

Convenient payment options

Use your MasterCard, VISA, Discover Card, personal check or P.O. with credit approval.



\$299







30-day, unconditional money-back guarantee

Monday-Friday, 8am-9pm EST . Saturday, 9am-4pm

 72-hour service turnaround Your satisfaction is unconditionally guaranteed for 30 days from 30-day unconditional money date of purchase. If for any reason whatsoever you are not sat-

- · 24-hour burn-in protection.
- Toll-free technical support for

Specifications

- Pointing Device
 16mm Alps dual action, Microsoft compatible trackball
- Up to 3 hours with power management (less 30 minutes for color)
- NAMH (no memory effect) 2230 MA with gold-plated
- Worldwide auto-sensing AC
- One built-in 1.44MB 3.5" adapter
 Quick 2-hour recharge. floppy drive

 Monochrome: Internal 120MB (15ms) hard drive

 Color Internal 200MB (16ms) hard drive Power Management
 • Eight power-saving features
- DOS 6 0 and Microsoft Windows 3.1
- Display
 Super-twisted 64 gray-scale: 10° LCD and 1024 × 768 for external monitor with 512x video RAM
- Color display
 Adjustable contrast and
- I/O Ports brightness
 Visible LED indicator on PS/2 mouselyboard interface keyboard interface PCMCIA 2 0 slot Q-oin connector
- Keyboard Full-function keyboard with: 85 keys and 4 inverted-T cursor control keys, 3 0mm keyboard spacing
- Modem
 Fax-9600 baud send/
 4800 baud receive/2400
 baud modem
- Video 15-pin connecto for CRT
 160-pin docking station Options
 - Coptocessor
 Docking station

isfied with your purchase from

us, we want you to return it. We

will be glad to repair the prod-

uctorgive you your money back.

PCMCIA 2 u Serial: 9-pin connector Parallel port Video: 15-pin connector

rse intertace/AT

1160 Steelwood Rd., Columbus, OH 43212 • FAX: 1-800-448-0308

© 1933 MEV/Mort Center, No. All nights reserved. Micro Center is a registered trademark and Micro Electronics and Wiolick are trademarks of MEI/Mort Center, Inc. All other trademarks and registered trademarks are properly all their respective compositions.

Best Pointing Devices.

"BUILT-IN POINTING DEVICES

vary in comfort and ease of use from the Apple PowerBook's large, front-mounted device to many smaller and less useful ones.

IBM's TrackPoint II and Micro Electronics' small, front-mounted trackball were the best."

PC Magazine, Cover Story, Portable PCs. August, 1993

Presenting an amazing deal on the IBM PS/NoteTM. We've teamed the quality and reliability from IBM® with added features and a price breakthrough that only Micro ElectronicsTM can deliver.

Small and lightweight, the PS/Note operates with the Intel 486 SL processor and has the power to run demanding business software. A larger, 170MB hard drive, 4MB RAM, included fax modem and added PCMCIA capabilities give you the features you want-all at a special price. Plus, the PS/Note comes loaded with popular software and bundled extras!

Your PS/Note is backed by IBM service and support. Rigorously tested and retestedyour PS/Note is guaranteed to meet IBM's high quality standards.

Don't miss this special offer. Act now!





Exclusive Micro Electronics Features

Easy add-ons with PCMCIA

PCMCIA capabilities give you options for future expansion and technology. Additional memory, adapters, and hard drives are easy to install.

Superior battery life!

The advanced power management hardware and software give you a longer battery life. With power management enabled, you can run the mono-chrome PS/Note for up to five ours with the NiMH 2200 MA batteries. And there's no memory effect.

The IBM PS/Note

A larger 170MB hard drive and built-in fax modem included! Plus:

- an Intel 486 SL/25MHz processor.
- 4MB RAM (expandable up to 20MB RAM).
- · 8k internal cache
- · a built-in 1.44MB 3.5" flappy
- · and a personalized nameplate.

software with your PS/Note -worth hundreds of dollars!

- MS-DOS 6.0.
- · Microsoft Windows 3.1.
- · PRODICY
- · America On-line, PS/1 edition.
- · PS/1 Fitness Index and Tutorial.
- plus your choice of Quicken, WinFax Lite or Calendar Creator Plus.

-familiar to the touch A keyboard with full-size keys-

The PS/Note features an excep-tional, full-size 85-key keyboard with the unique TrackPoint II pointing device. Control cursor movements with ease by moving and varying pressure on the eraser-like button



Serial, parallel, VGA, and PS/2 keyboard/PS/2 mouse ports





back guarantee.



Order today and also receive over \$4000 in discounts!

"Thank-You's from PS/Note" gives you discounts on travel, software and more! Ofer expires 12/31/93

Convenient payment options

Use your MasterCard, VISA, Discover Card, personal check or P.O. with credit approval.







Thank-you for your order!

Micro Electronics

30-day, unconditional money-back guarantee

Monday-Friday, 8am-9pm EST . Saturday, 9am-4pm 1160 Steelwood Rd., Columbus, OH 43212 • FAX: 1-800-448-0308

Your satisfaction is unconditionally guaranteed for 30 days from date of purchase. If for any reason whatso ever you are not satisfied with your purchase from us, we want you to return it.

keys and 4 inverted-T cursor control keys

Modem
• Fax-9600 baud send/
4800 baud receive/
2400 baud modem

- Service, warranty and support · One-year limited warranty with toll-free Express Maintenance. · 30-day unconditional money
- · On-line technical support for the life of the computer.

Specifications

- Size/Weight 11.7" X 8.3" X 1.9" Monochrome: 5.2 lbs. with battery
 Color: 5 B lbs: with battery
- Pointing Device

 TrackPoint II
- Monochrome, up to 5 hours with power management
- Dioc. up to a nous with power management
 NMH (no memory effect)
 2.2 AmpHours
 Universal AC Adapter
 Ouick 1-hour recharge when not in use
- Advanced Power
 Management
 Power management
 hardware and software
- . Color: up to 3 hours with . Automatic and manual
 - suspend/resume button
 Integrated logic and power
 system planar
 Internal variable-rate charging
 system
 - Processor and Memory
 Intel 486 SL 25MHz CPU
 4M8 RAM (expandable to
- 8k internal cache (nearly transparent to user) Orives
 for longer battery life • One built-in 1.44MB 3.5*
- hard drive
- oftware
 Cornes with MS-DOS 6 D,
 Microsoft Windows 3 1,
 Microsoft Works for
 Windows, PRODIGY, Amer
 On-line (PS/1 Edition), PS,
 Tutorial, PS/1 Index, PS/1
 Fitness, and choice of
- Display
 1024 x 768 for external monitor with 512k video RAM
- Monochrome Super-twisted 64 grayscale, 9.5° LCD
 Color: 256 colorscale 9.2°
- Adjustable contrast and
- parallel, VGA, PS/2 keyboard/PS/2

PCMCIA 2 0 slot

I/O Ports

Top of the News

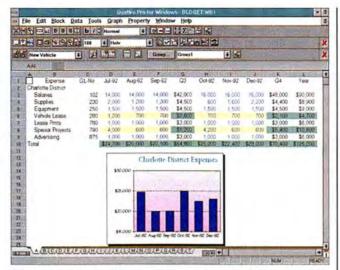
Continued from page 84

ios quickly, and when you store a scenario, QPW marks the changed data cells and the formulas affected by them with different colors. You can organize related scenarios into groups, each with its own baseline; by assigning a group to a block of cells, you can mix and match scenarios for different ranges. Finally, you can create a summary report that shows the changed values and the effect on the formula values.

Hold down the <Ctrl> key while you right-click an object, and a help panel identifies the object and offers to summon the appropriate help screen. In mastering QPW's new features, I made extensive and productive use of this "drill-down" approach to getting help.

If you need basic spreadsheet instruction, QPW 5.0's Interactive Tutors may fill the bill. Tutors provide step-by-step instruction for setting up spreadsheets and graphs, based on either your own data or canned examples.

A bevy of Experts helps you build graphics and steps you



QPW'S SCENARIO MANAGER lets you play the what-if game.

through spreadsheet consolidation, scenario management, and a series of new data analysis procedures, executable via an Analysis tool bar.

Improvement on Improv?

A data modeling program provides multidimensional views of data that you can rearrange by dragging labels around the edge of a cross-tab table, which recalculates on the fly. For example, you might use data modeling to summarize your company's sales by region, by product, by

quarter, by sales manager, or by any combination thereof.

You set up the cross-tab table by dragging field headings from the database view to the cross-tab table and by selecting a field to be summarized in its cells. Once you've set up your view, you can change it by dragging column or row headings to a new spot on the periphery of the cross-tab; the summary values change accordingly. Finally, you can DDE-link your results back to the spreadsheet to create a graph or report.

Most corporate spreadsheets are group efforts. QPW Workgroup Edition includes a Workgroup Desktop that lets spreadsheet users distribute templates or build collaborative worksheets across a network, E-mail system, or MCI Mail. The program that drives the Workgroup Desktop is called the Object Exchange, or Obex. I found it pretty tricky to set up but fairly easy to use. Obex maintains an address book of work-group members. To share a worksheet or page, you "publish" it to one or more work-group members, who "subscribe" to it and insert the pages into their own worksheets.

-Richard Scoville

Fast, Low-Cost Windows Printing

A new NEC personal laser printer features a promising new technology known as GDI (Graphics Device Interface) that reduces the need for expensive printer hardware.

NEC's Silentwriter Super-Script 610 delivers 300-dotsper-inch, 6-pages-per-minute printing at a \$649 street price. GDI printers understand the Windows GDI command set and don't require a controller to implement commands in a printer control language. NEC's uses a strippeddown controller to act as a buffer, boosting speed.

Generally, GDI printers work only from Windows. The SuperScript 610 Includes software-based PCL4 emulation, so it can print from DOS apps. One drawback: You can't network this printer.

The printer uses your PC to do its processing, so when you upgrade the PC, operating system, or RAM, printer speed improves. The Super-Script 610 meets the Environmental Protection Agency's Energy Star Computers program requirements. NEC plans a software upgrade to bring resolution to 600 dpl. NEC Technologies, 800/632-4636. Reader service no. 701

The Super-Script 610.

Quattro Pro's Quantum Leap Latest version offers competitive improvements Yes **Features** Automated multiworksheet consolidation . Automated what-if version management . Total analytical functions 215 265 147 47 0 Live data modeling cross-tab . Array formulas . Mail enabled Slide shows Excel's add-in lacks a light table.

The Next Generation Publisher...

PagePlus 2.0 for Windows

PagePlus 2.0 is packed with hot new features that make it more powerful, yet easier to use, for all



your publications. We've listened to our users, now PagePlus 2.0 can do just about anything you want - and then some. Check out this ad - it's designed and produced using PagePlus 2.0 with

full color separated output. Now it's so easy for everyone to look good in print, and with our 60-day Money-Back Guarantee you've nothing to lose.

NEW! Full Color Publishing including image colorize, Pantone® Color License and Full Process Color Separations. A major industry first!

NEW! Text Frames with unique column blinds give you the ultimate in text flow control.

NEW! Styles and Templates with AutoApply for great looking pages in a hurry.

	Serif PopoPlus 2.0	Aldus PageMaker 5.0	Microsoft Publisher 1.0
	PogoPlus 2.0	PageMaker 5.0	Publisher 1.0
Auto Text Flow	0	0	0
Kerning	0	0	0
Import Pictures	0	0	0
Drawing Tools	0	0	0
Rulers, Guides	0	0	0
Multiple Zoom Levels	0	0	0
Publishing Templates	0	0	0
Irregular Text Wrap	0	0	
Styles	0	0	
Pantone® Colors	0	0	
Process Color Seps.	0	0	
Free Rotation	0	0	- 54
Free & Frome Text	0		
Export as Picture	0		
ChangeBar	0		100

NEW! Export as Picture from PagePlus 2.0 to jazz up your WP document or spreadsheet.

NEW! Free Text lets you drag and drop text anywhere on the page or pasteboard.

NEW! Free Rotation of text and graphics. Wow! NEW! ChangeBar technology for dynamic onscreen changes. It couldn't be easier.

NEW! Even More Goodies like movable rulers, hint line, CleanUp, Status Editor, OLE, TrueType...

It's a Winner!

PagePlus 1.2 is the Winner of the Windows User Award for "Best desktop publishing

software" - the losers included MS Publisher, Aldus PageMaker and Ventura Publisher. Now, the best just got better -

PagePlus 2.0 keeps Serif out in front. It's a Winner



classic and decorative typefaces!

great new Publishing Packs. At just \$19.95 they're the lowest priced Windows add-ons. For all your applications - not just PagePlus! NEW! TypePlus 2.0 for eye catching text effects. Type on an arc, circle, button or bezier curve. NEW! ArtPack a professionally drawn collection of over 500 color images for superb results. NEW! FontPack over 100 (yes, 100) TrueType

We're launching PagePlus 2.0 at just \$59.95 and really is the Next Generation Publisher.

So call us Direct, or fax/mail the coupon today!



Serif, Inc. • PO Box 803 Nashua NH 03061 • Tel: (603) 889-8650 Fax: (603) 889-1127 Serif Europe • PO Box 15 Nottingham NG7 2DA England • Tel: +44 602 421502 Fax: +44 602 701022 NOTE: Please add \$7 S&H (\$12 international). Checks and Money Orders to SERIF, VISA, MasterCard, and American Express. Official POs from Education, Government and Fortune 1000. BumperPack is PagePlus and all Publishing Packs. 10-User Pack is BumperPack with Site License for 10 users in one location. You need Windows 3.1 or higher. All Serif product names are trademarks of Serif, Inc. All other trademarks acknowledged. Like all Serif marketing materials, this ad was designed and color separated using PagePlus.

- An Award-Winning Product, and already a Best Seller with over 50,000 enthusiastic users
- The Best Value and Lowest Price why pay more?
- FREE Product Support and Low-Cost Upgrades
- A 60-Day, No-Quibble, Money-Back Guarantee
- Great Software, Direct from the publisher

ow tr	y PagePlus 2.0 for just	
	in our Special Offer!	YES!

our Publishing Packs at only \$19.95 each. It's only possible because you're buying Direct from the publisher - Serif gives you high-end products at entry-level prices. Better still, get everything in our BumperPack for \$99.95 and save another \$20. (For education and larger groups you can get the BumperPack for 10 Users for \$249). Order now and find out for yourself why PagePlus 2.0

Please rush me. PagePlus 2.0 @ \$59.95

☐ TypePlus 2.0 @ \$19.95

ArtPack @ \$19.95

☐ FontPack @ \$19.95

BumperPack @ \$99.95 ☐ 10-User Pack @ \$249

I enclose a total of \$ Add \$7 for S&H (\$12 International).

Exp. Date

Telephone (.....)..... Please return to:

Serif. Inc. PO Box 803

Nashua NH 03061 Or Fax Toll-Free to: 800-869-8909

Lightning Sparks Ambras

TEST DRIVE

Attention, mail-order

shoppers: The current bluelight special is offered by Ambra Computer Corporation, a subsidiary of IBM. You'll find cutting-edge technology at bargainbasement prices.

The Ambra line consists of 16 base models; these are also available in custom configurations. The notebook lineup consists of a \$2449 enhanced passive color model and a \$3449 active-matrix color version, both of which are based on powersaving 486 chips and include 120MB hard drives. The desktops and servers range from a 486SX-based system with a 170MB hard drive and an SVGA monitor for \$1339 to a dual-Pentium server with an EISA bus, 16MB of RAM, a 540MB SCSI hard drive, and a CD ROM drive for \$6559.

Blue Lightning

We evaluated the \$1979 D466BL desktop system, one of the first to use IBM's Blue

Lightning chip, a clock doubler 33/66-MHz Intel 486-compatible processor with a 16K onchip cache (twice the cache on Intel's 486 chips). In PC World Test Center benchmarks, this system performed impressively, ranking slightly below the average for comparably configured 66-MHz 486DX2-based PCs that cost hundreds more. One caveat: This machine was slower than most 66-MHz 486DX2s in Excel tests, due in part to the Blue Lightning's lack of a math coprocessor.

The D466BL includes a roomy 240MB hard drive; 8MB of RAM upgradable to 64MB; a 15-inch, noninterlaced flat-screen monitor; and some nice extras, such as a SCSI-2 port and an ethernet 10Base-T network adapter. The D466BL also provides local bus video, two free VL bus slots, a mouse, MS-DOS, Windows, a 256K secondary cache on the mother-board, an upgrade socket for a Pentium OverDrive chip, and an IBM keyboard.

IBM's newest ThinkPad notebooks improve on their predecessors by adding multimedia features and improved expandability without significantly increasing the price. The ThinkPad 750 family, like the earlier 720 family, includes a color active-matrix and a monochrome version. But the similarity between the

similarity between the two lines ends there. The 750 family

offers a monochrome penconvertible model for under \$3000 and IBM'S 750C MULTIMEDIA NOTE-BOOK and docking station. Lift the keyboard to access components.

a dual-scan passive color model for about \$3695. The 750 units are powered by a 33-MHz 486SL CPU.

These notebooks are among the first to offer enhanced audio in the form of an on-board 16-bit stereo subsystem. We could not notice the improvements on the active-matrix 750C prototype's built-in speaker, however. When we attached stereo headphones, the sound quality was noticeably better.

For fancy business presentations, you may want to get the 750C's multimedia docking station, which includes two speakers and an optional CD ROM drive. (The docking station's price was unavailable at press time.) Together the docking station and 750C active-matrix notebook weigh a very luggable 12.6 pounds.

At 6.4 pounds, the ThinkPad 750C is more than a pound lighter than its predecessor. This machine is also easier to upgrade. By flipping two levers, you can raise the keyboard like

the hood of

a car to access the hard drive, floppy drive, and battery. The floppy drive can be removed to lighten the notebook by half a pound. In the future IBM expects to offer devices such as a cellular modem that can plug into the floppy's slot.

-Randy Ross

Two From Big Blue

Powerful low-cost desktops from IBM's Ambra subsidiary; multimedia notebooks extend the ThinkPad line.

Ambra D466BL

Pricing: \$1979

Ambra Computer Corp., 800/ 252-6272, 800/363-0066

IBM ThinkPad 750C

Pricing: About \$4695 IBM, 800/426-2968, 800/772-2227



"SpaceManager" finishes the job that MS-DOS_® 6 DoubleSpace starts!"



Why do you need SpaceManager?

How about better compression rates, improved system performance, and more control over the compression process! SpaceManager works in perfect tandem with MS-DOS* 6 and Windows to enhance the function and power of DoubleSpace. Team SpaceManager with MS-DOS* 6 and you'll have...

Your best disk space buy anywhere.

Dollar for dollar, SpaceManager is unbeatable. You'll pay about 25¢ for each and every MB you add to your disk capacity. Imagine! That's only \$5 for 20 MBs of extra disk space.

Sizzling disk performance.

You won't sacrifice even a millisecond of disk access speed with SpaceManager. It's like giving your disk drive a tune-up at a speed shop. Whomp!

Developed by the people who licensed

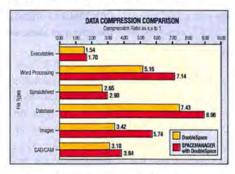
the technology to Microsoft® for use in MS-DOS® 6 DoubleSpace.

No need to worry
about compatibility
problems with MS-DOS
6 DoubleSpace. Vertisoft
is the pioneer of on-the-fly
disk compression for
the PC—as well as
the licenser of the
DoubleSpace technology,
so we know all the deepdown important secrets.

That's why SpaceManager is so fast and so powerful.

We didn't share all our space secrets with Microsoft. We held back on 6 of our crown jewels that'll make your life a lot easier.

- ❖ SuperCompress™—SpaceManager packs
 DoubleSpace compressed files tighter to give you
 up to 40% more available space on your hard disk,
 diskettes and removable storage media.
- ❖ SelectCompress™—Because some files don't compress well, and some applications take forever to perform operations on compressed data, SpaceManager gives you total control over the compression process. Just select the file types you want to compress and the level of compression. SpaceManager then automatically optimizes system performance by eliminating unnecessary processing time spent on compressed data.



- ❖ SuperMount™—Accessing data from removable media—floppies, Syquest*, Bernoulli* or Floptical* — is automatic. You never stop your work to issue time-consuming mount commands. Simply insert the media, compressed or not, and use it immediately from DOS, Windows, or any application.
- ❖ SuperExchange™—Load, access, read and write to DoubleSpace data on any system running

DOS 3.3 or later. Any files saved to your compressed floppy and removable disks—even by someone who doesn't have MS-DOS₀ 6—are automatically compressed.

❖ SpaceMonitor™— One easy-to-read screen gives you all the information you need about both compressed and uncompressed drives.

❖ FortuneTeller™—

While other compression programs assume all files compress at the same ratio, SpaceManager bases its space estimates on the specific type of file you're compressing.

SpaceManager is certified safe for use with MS-DOS_® 6.



Look what they're saying about SpaceManager!

"SpaceManager operates seamlessly with DoubleSpace." InfoWorld, July 12, 1993

"Data Compression help...SpaceManager augments DoubleSpace." Byte, July 1993

"SpaceManager, a product providing the viewing capabilities, downward MS-DOS compatibility and removable media support missing from DoubleSpace."

Computer Sources, July 1993

"SpaceManager offers higher compression ratios and the ability to share compressed data with everyone via floppies—whether or not the other people use DoubleSpace." DOS Resource Guide, Sept. 1993

SPECIAL INTRODUCTORY OFFER. PAY ONLY *395. SAVE \$\$!

System Requirements

- 286, 386, 486 or Pentium* IBM* PC compatible..
- Hard disk with 640KB of memory available (2MB of extended memory suggested).
- MS-DOS® 6 with DoubleSpace installed.
- Compatible with hard disks, floppy disks, Bernoulli*, SyQuest*, and Flopical* drives.
- SelectCompress and SuperCompress require at least 2MB of

FREE 30-DAY TRIAL!

Try SpaceManager free for 30 days. Simply pay the '9s shipping & handling charge with a major credit card. If you aren't thrilled by its amazing powers, just return it and you'll owe nothing more. But if you find SpaceManager indispensable—keep it—and pay a limited time price of *39s. Don't let this one-time offer pass you by!

Call now for your free copy!
1-800-456-6118
ext. 410



The company that licensed the data compresssion technology to Microsoft for inclusion in MS-DOS® 6 DoubleSpace.

© Vertisoft Systems, Inc 153-B Grace Drive, Easley, SC 29640 (803) 295-5875 • FAX (803) 269-2970



Easy-to-read rainbow and bar graphs show your disk space usage and compression ratios for any type of file you specify.

* All products are trademarks of their respective companies.

Communications From Any Windows Application

TEST DRIVE

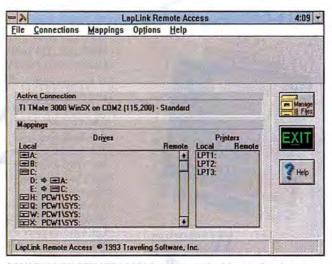
If there's a one-stop

shop for all your telecommunications needs, it's Traveling Software's CommWorks for Windows, an integrated kit that includes LapLink V and four modules for data communications, fax, remote access, and notification of file transfer. You can access LapLink and the modules quickly from within any Windows application via a floating tool bar, the Comm-Works Control Center.

The module that really grabbed my attention was Lap-Link Remote Access. Copying files between two linked computers, whether they're connected directly or over a modem, is a snap-it's just like copying files between your hard drive and drive A:. That's because for each session, Remote Access maps each computer's drives to the other machinefor example, a notebook's hard drive typically becomes drive E: on the desktop it's linked to. As a result, you can move files around using Windows' File

Manager, DOS's COPY command, or whatever copy utility you like. Remote Access is rife with other possible uses, from running applications on one PC while editing files located on another, to installing software on laptops that don't have floppy drives, to backing up laptop drives to a networked tape drive. This module even allows you to redirect output to a remote printer-for example, you could print a document for your boss back in San Francisco while you're holed up in a hotel room in Atlanta. Remote Access enables the two computers to become, in effect, a mini-peerto-peer network linked through a serial or parallel port via cable (which is supplied), modem, or even an infrared light link.

Why would users bother with LapLink V, then, if they can get all their file copying and file management needs answered with Remote Access? Well, while the latter offers supersimple file transfer capabilities, the former automates that process. LapLink lets you bundle



COMMWORKS' REMOTE ACCESS maps remote drives as local ones. The drive map above shows a desktop connected with a TI notebook.

files together and schedule them to be sent at a later time and provides more security options, such as the capability to copy groups of files and directories quickly and control access to specific directories.

The data communications and fax portions of this app looked familiar-it turns out that Traveling Software licensed them from FutureSoft and Phoenix Technologies. The data communications module, TS OnLine, is virtually identical to Terminal Plus from FutureSoft. The TS Fax module, which closely resembles Eclipse Fax from Phoenix, includes many of the elements popular in high-end fax programs. You can move and rotate faxes, view them as thumbnails, and clean up spotty ones through an antialiasing tool. You can annotate and edit them. You can easily index faxes, give them names of up to 50 characters, and search for them alphabetically or by date or time. TS Fax also has features that automate fax correspondence. It supports the

Class 1, Class 2, and CAS protocols, making it a ready partner for almost any fax-modem.

Finally, Traveling Software included LapLink Alert, a small module that signals you, with a sound or a pop-up dialog box, when the contents of a directory have changed, such as when a file is received or deleted.

-Bryan Hastings

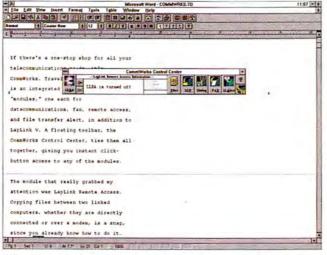
CommWorks for Windows

connectivity package that includes fax, data communications, remote access, file transfer, and file management tools.

Key Features: Quick access to all connectivity features

Allows two PCs to share drives simultaneously Lap-Link and Remote Access work in both DOS and Windows Pricing: \$199.95
 Availability: Immediate
 Traveling Software, 800/343-

8080, 206/483-8088 Reader service no. 707



THE CORE OF COMMWORKS is the Control Center, a tool bar for instant remote access, sending faxes, and file transfer management.

Get a hold of the best value in LAN power protection

Now just \$139! suggested list price

Blackouts, brownouts, sags... Your data and hardware are vulnerable to problems that surge suppressors and power directors are just not equipped to handle.

Now there's a complete Uninterruptible Power Supply solution to suit any budget. The Back-UPS™ 250 is reliable protection for LAN nodes, 386SX machines, 286, small PS/2 systems, and internetworking hardware such as routers, bridges, gateways and repeaters.

From the largest server to the smallest router, the Back-UPS Series will increase your productivity by providing a costeffective solution to power problems. Call for your free power protection handbook.

The Back-UPS 250 offers even more cost-effective protection for LAN nodes Back-UPS (typical runtime for a 386SX system is 10 minutes). NEW!



- ABSOLUTE™ Protection guarantees repair or replacement of equipment (up to \$25,000) if damaged by a surge while protected by a properly installed Back-UPS (See warranty for details).
- UL, CSA and Novell approved with a 2 year warranty
 - Full-time surge protection and line filtering
 - Most models include LAN interface for automatic-shutdown of Novell, LAN Manager, LAN Server, LANtastic, Banyan, SCO Unix, and others
 - Ask about PowerChute® UPS monitoring software and Novell compatible UPS monitoring boards
 - ■230V models available







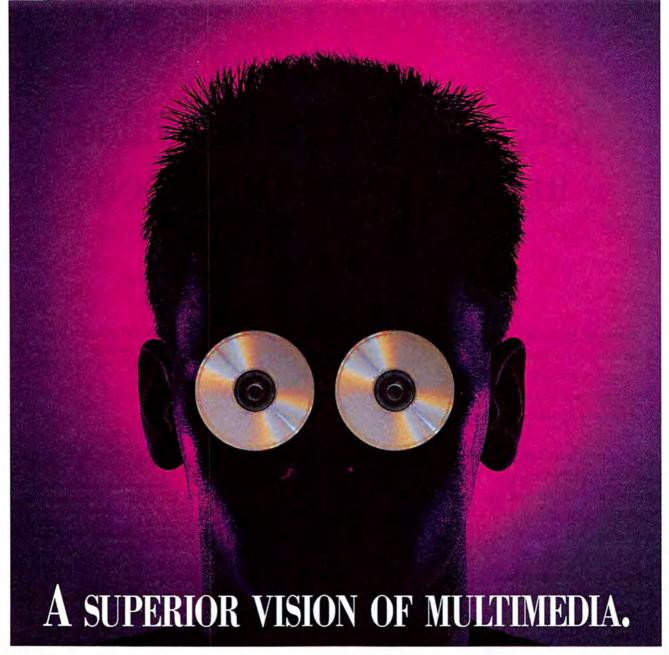
Model	Application	List	New List
Back-UPS 250	LAN nodes, 386SX, 286, internet hardware, POS	5169	\$139
Back-UPS 400	Desktop 386, 486 systems, 286 servers	5249	\$229
Back-UPS 450	Tower 386, 486 systems, servers	\$329	\$279
Back-UPS 600	Heavily configured systems, CAD/CAM workstations	5449	\$399
Back-UPS 900	Multiple systems, longer runtime applications		\$599
Back-UPS 1250	Multiple systems, LAN hubs, small minis, telecom equipment		\$799

(800)800-4APC, Dpt. P3

APC 132 Fairgrounds Road, West Kingston, RI (401)789-5735 APC Europe TEL: (+33)1.64.62.59.00 FAX: (+33)1.60.17.80.29

0.1992, Back-UPS, PowerChute, Guaranteed ABSOLUTE Protection are trademarks of APC. All other trademarks are property of their respective owners.

NEW



Introducing the 250ms Double-speed Pro 16 Multimedia Upgrade System II.

Looking for the ultimate multimedia experience? Why saddle yourself with a system that's strictly amateur? For an upgrade without equal, accept nothing less than the Pro 16 Multimedia System™ II.

This state-of-the-art MPC2 ready enhancement for your PC combines NEC's fastest double-speed CD-ROM drive at 300kB/sec and a blazing 250ms access time, with Pro AudioStudio™ 16, the world's best-selling 16-bit, CD-quality, sound card.

So whether you're enjoying an interactive CD software title, or navigating through your PC with the included Voice Recognition software — you experience the















acoustics of the top 16-bit sound product in the industry. Just ask PC Magazine, who awarded us an Editors' Choice Award for best PC Sound. And it's fully Kodak Photo CD compatible. Plus, you'll find eight of the best-selling CD program titles included in the Pro 16

System, Including Compton's Interactive
Encyclopedia, Mayo Clinic Family Health Book.
Carmen Sandiego Deluxe, Mantis Experimental
Fighter, Civilization, Battle Chess Enhanced,
Macromedia's Action! And PC Karaoke.

Purchasing all this separately would set you back twice what Pro 16 costs. Which makes it the best multimedia kit, and the best value.

So for uncompromising quality and performance, insist on the Pro 16 Multimedia System II. Now occupying the top shelf at your local computer dealer.



Call 1-800-845-5870 for information or a dealer near you. © 1993 Media Vision, Inc., 3185 Laurelview Court, Fremont, CA 94538. (510) 770-8600. Fax: (510) 770-9592. Pro AudioStudio and Pro 16 Multimedia System are trademarks of Media Vision, Inc. Any other trademarks are owned by their respective holders. Any and all bundled software subject to change without notice.



Instant Reprints via Fax

Call the PC World Reprints-by-Fax Hotline for instant delivery of the information you need.

Need the latest hot tips for Windows now? Want backup for a presentation on mobile computing you're giving this afternoon? Looking for a key software article you missed in PC World? In just 60 seconds the information you need can be in your hands!

PC World's new Reprints-by-Fax Hotline delivers the full text of key PC World articles instantly via fax wherever you are, around the clock.

Reprints-by-Fax are available in five key subject areas (see the complete list below). For the subject category you choose (one category per call), you'll receive the three most recent articles specially chosen by our editors to provide you with actionable information you can use now to save time and money and be more productive.

Here are the categories available now through the Reprints-by-Fax Hotline:

#001 Dress Up Your System for Today's Software

- Are Upgrades Worth It? (2/93)
- 486s for \$1250 (6/93)
- Ramping Up to Windows (1/93)

#002 200 Software Tips for Everyone

- 50 Super Spreadsheet Tips (6/93)
- 75 Windows and DOS Speedup Tips
- 75 Tips for Windows and DOS 6.0

#003 Getting the Most for Your Software \$\$

- Great Software Under \$50 (4/93)
- Work Smarter, Not Harder: 67 Timesavers for 16 Software
- Search and Destroy: Antivirus Software (5/93)

#004 Taking It on the Road

- Tips for a Productive Trip (7/93)
- Computers for the Mobile Exec (7/93)
- What's the Easiest Notebook to Use at 30,000 Feet? (7/93)

#005 Consumer Alert!

- How to Survive if Your PC Maker Doesn't (6/93)
- Danger at Your Fingertips (5/93)
- Is Your New Software Secondhand?

Ordering is easy 24 hours a day:

To order, simply call our automated Reprints-by-Fax Hotline and enter your category choice as directed by the system. For just \$4.95, you'll receive three complete articles (each 3-7 pages) delivered to the fax machine you specify, within minutes of your call. (One category request per call, please; touchtone telephone required.)

You can reach the Reprints-by-Fax Hotline two ways:

Call toll-free 1-800-234-0455, ext. 205.

The \$4.95 per category will be charged to your Visa or Mastercard account.

Or, call 1-900-773-2972.

The \$4.95 per category will be charged to your telephone bill. (Under 18 requires parental consent.)

Call now!



Touchtone telephones only. Please have 3-digit category number, credit card number (800 toll-free calls only) and fax number ready when you call. Under 18 requires parental consent. Please call 415/243-0500 with questions or comments.

How Confident Are You With Your Surge Protector?

I'm so confident in my surge protectors, I've placed high stakes on their performance. When it comes to protection, warranty and value, Curtis® beats

them all.

Superior Technology —

Our engineers have researched and developed the most superior line of surge protectors available today. They used the latest technology — High Energy Absorption MOVs — which give our surge protectors



the HIGHEST ENERGY rating in their class.

Thomas W. Judd President of Curtis Manufacturing



Best Value -

Curtis surge protectors incorporate superior technology with high quality construction. All of our surge protectors are value priced and backed by the most comprehensive warranty available.



Compare Protection, Compare Warranties, Compare Price — Curtis has it all inside and out!



Manufacturing Company, Inc.

CURTIS

30 Fitzgerald Drive, Jaffrey, NH 03452

©copyright 1993, Curtis Mfg. Co., Inc.
All Rights Reserved

For more information call Curtis 1-800-955-5544 Ext. 240

New Products –

Hardware 97 | Software 106 | Connectivity 120 | Quick Takes 126

New Dell and CompuAdd Lines Offer High Performance

wo leading direct marketing PC companies— Dell Computer and CompuAdd Computer—have made sweeping revisions to their product lines.

At CompuAdd the changes start with the new Centura line's sleek design. There are 47 models in four case styles-low profile, desktop, minitower, or tower-with ISA and EISA versions and CPU options ranging from a 486SX-25 to a 486DX2-66. Each system includes VESA local bus IDE hard drive interfaces and video controllers; dual-buffered serial ports for faster data transfers than traditional serial ports offer; and a bidirectional parallel port. All but the five low-profile units come with a CD ROM drive.

The ISA machines offer 4MB of RAM, expandable to 64MB; a 128K secondary cache, ex-

CompuAdd Centura Line

This completely new line of computers is designed for good looks outside and high performance inside.

CompuAdd Computer 800/627-1967, 512/250-1489 List price: \$1295 to \$4445 Reader service no. 620

New Dell Lineup

Rejuvenation of Dell's product line improves video performance.

Dell Computer Corp. 800/426-5150, 512/338-4400 List price: unavailable Reader service no. 621



COMPUADD'S CENTURA LINE includes 47 models in low-profile, desktop, minitower, or tower configurations—with processors that range from a 486SX-25 to a 486DX2-66.

pandable to 256K; and eight 16bit expansion slots, two of which are local bus slots (the low profile units have five slots, two of them local bus).

The EISA machines include 8MB of RAM, upgradable to 128MB (except the low profile, which has 4MB expandable to 64MB); a 256K secondary cache, expandable to 1MB; IDE and dual-channel SCSI-2 disk controllers; and eight 32-bit expansion slots, two of which support VESA local bus cards. Hard drive options range from 212MB to 2GB, and tape backup of up to 8GB is available.

CompuAdd recently filed for Chapter 11 bankruptcy protection after closing its computer retail stores. A spokesperson said that the filing will not interfere with CompuAdd's ability to compete.

Dell's Direct Assault

Dell's new line of 28 machines offers four basic configurations, including enhancements to the Dimension line; is based on Intel's 486DX-33, 486DX2-50, and 486DX2-66 CPUs; and is upgradable to Intel's Pentium OverDrive. A preproduction version of the Dimension XPS 466U performed above average in our benchmarks, running our Freelance test in 106 seconds, WinWord in 103, and Excel in 86. The Dimension XPS 450V and 466V, which offer 486DX2-50 and 486DX2-66 processors, respectively, come with 128K secondary cache, upgradable to 256K; 4MB of RAM, upgradable to 64MB; integrated local bus IDE hard drives in 170MB to 450MB sizes; seven expansion slots, two of which are VL bus; and a choice of three video cards: two configurations of Number Nine's #9GXE-VL or the Diamond Viper graphics card with 2MB of video RAM.

A multimedia configuration of the Dimension includes a Panasonic CD ROM drive, Sound-Blaster 16 Card, and speakers.

Dell has beefed up its corporate offerings, starting with the entry-level NetPlex 425/P SX- 25. The NetPlex series processors range from the 486SX-25 to the 486DX2-66. Units include Dell's local bus video on the motherboard. RAM ranges from 4MB to 32MB, and hard drive options run from 120MB to 500MB.

Flexible Frame

Also aimed at corporate customers is the OptiPlex line, which is available in the three-slot L and the five-slot MX models and includes Dell's integrated video. You can upgrade from an L to an MX, using Dell's innovative OptiFrame Chassis Kit, or move to one of the VESA local bus versions, dubbed the LV and MXV.

Processors range from the 486SX-25 to the 486DX2-66. RAM is 4MB, upgradable to 64MB, and hard drive options range from 120MB to 500MB IDE and 230MB and 330MB SCSI. The machines include a Pentium OverDrive socket and Dell Diagnostics in ROM.

-Joe Abernathy

TI Color Note Has Snappy Video, Great Keyboard

Texas Instruments TravelMate 4000E WinDX2/50

II ups the ante on the upscale notebook market with a new 486DX2-50 notebook featuring compelling attention to engineering detail.

Texas Instruments
800/527-3500
List price: \$4999 suggested retail
Reader service no. 622

he latest member of the Texas Instruments Travel-Mate family of notebook computers shows compelling attention to engineering detail. With an excellent keyboard, a stunning color display, and 486DX2-50 performance, the TI TravelMate 4000E Win-DX2/50 stands above ordinary color notebooks, although its battery life doesn't match that of monochrome machines.

The 4000E features an 8.4inch active-matrix color display with 256 colors at 640 by 480 resolution and the ability to simultaneously drive an external monitor with a resolution of 1024 by 768 in 16 colors, or 800 by 600 and 640 by 480 in 256 colors. Snappy video performance is delivered by a TI-designed video subsystem featuring 1MB of video RAM and a proprietary bus. DOS 6.0 and Windows 3.1 are preloaded on the 200MB hard drive. Windows loads in less than 30 seconds, and TI's Shutdown feature gets you out even faster.

TI's QuickPorts allow you to hot-plug TI's mouse on the right side of the machine or attach it to the left side with a cable. We find TI's mouse faster to use than any pointing device save IBM's TrackPoint eraser-style pointing device.

A suite of power management features and utilities called BatteryPro works with Microsoft's Advanced Power Management system to produce battery life of up to 3 hours, according to our field tests. The 4000E will scale back its speed as battery life drops, to squeeze out every

last minute. The optional backup battery includes a unique conditioning and recharging system that lets the TI's nickelcadmium batteries avoid the memory charge problems that have hampered that technology in other implementations.

The 4000E offers the only full 4mm-travel keyboard on a

notebook, for the feel of typing on a desktop. It includes 4MB of RAM upgradable to 20MB. The 4000E weighs 6.2 pounds and is 8.5 by 11 by 2.1 inches. The TravelMate line begins at a suggested retail price of \$1899 for the 4000 WinSLC, ranging up to \$4999 for the 4000E.

-Joe Abernathy

Plug-and-Play Hand-Held Scanner

oes it annoy you to fiddle around with IRQ settings, jumpers, and I/O addresses when you install a board in your PC? One solution is to plug into the parallel port. Several boards already do this, and now you can get a hand-held scanner that's as easy to install—Logitech's ScanMan EasyTouch.

The \$399 ScanMan Easy-Touch bypasses the often annoving board installation hurdle by plugging directly into the parallel port-a feature that lets you use the scanner with your notebook, though you'll still need the AC adapter. Scan-Man's pass-through adapter has a parallel-port connection on the end, so you can keep your printer plugged in as well. This cheese-wedge-shaped, 8-bit, 256 gray-scale unit is TWAIN compliant and scans up to 400 dpi. You also get a version of Caere's OmniPage Direct Any-Font OCR software and Logitech's own FotoTouch Color for image editing.

If you're willing to put up with installing a board, Caere's newest hand-held scanner, the \$449 OmniScan, follows the more traditional installation path but offers a generous software bundle and some easeLogitech ScanMan EasyTouch, Caere OmniScan

Two nifty hand-held grayscale scanners cost less than \$450 each.

Logitech Inc. 800/231-7717, 510/795-8500 List price: \$399 Reader service no. 623

Caere Corp. 800/535-7226, 408/395-7000 List price: \$449 Reader service no. 624

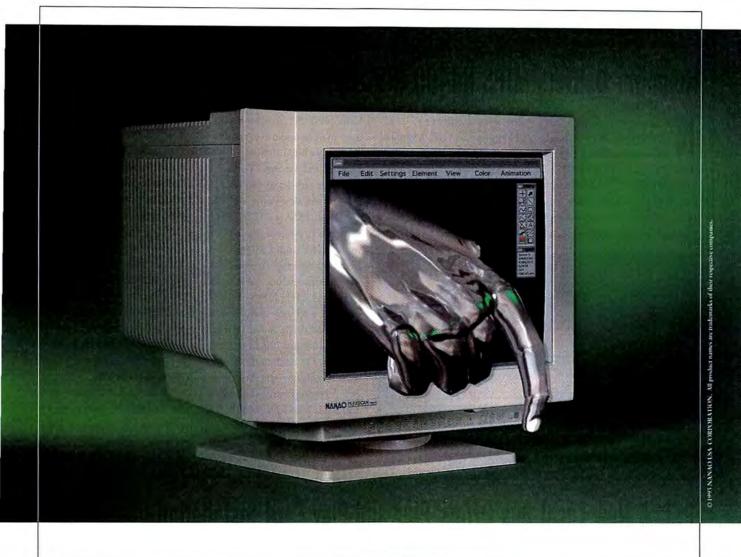
of-use advantages.

The Caere OmniScan performs 8-bit, 400-dpi scans in 256 shades of gray. You get OCR, image editing, and fax capabilities culled from Caere's retail products: OmniPage Direct, Image Assistant, and FaxMaster. While you don't get the full functionality of the retail versions, you do get the basics. OmniScan does not support the TWAIN standard, however, which is problematic only if you plan to use the scanner with applications that are not provided with the package.

-Anita Hamilton



COLORFUL BUT EXPENSIVE, the \$4999 TravelMate 4000E WinDX2/50 from Texas Instruments features an 8.4-inch active-matrix color display and a proprietary local bus for fast video performance.



____SO ADVANCED____ IT EVEN TURNS ITSELF OFF.





anao, the technical leader in monitors has done it again. In addition to being the top choice of today's CAD/CAM, DTP and Windows users, Nanao's award-winning FlexScan monitors

now have a remarkable energy-saving system -PowerManager.

PowerManager works with all green computer systems including VESA DPMS (Display Power Management Signaling). But users don't have to own a new green computer in order to take

advantage of the PowerManager to save energy. Our PowerManager works with any existing PCs with a screen saver software, including Windows 3.1 and After Dark. Activating when the blank screen of the screen saver appears, PowerManager cuts operating power to less than 8% of total consumption. It also automatically powers the monitor down

to a stand-by mode when the computer is turned off. The PowerManager can save users as much as \$63 per year on utility bills (Source: E Source). PowerManager has placed Nanao at the forefront of the Environmental Protection

Agency's Energy Star Program.

PowerManager is now the standard feature of our 15", 17", 20" and 21" monitors. All Nanao energy-saving monitors feature superior Invar Shadow Mask and Trinitron CRTs with non-flicker ultra-high resolution. Their ergonomic features

include compliance with MPR-II/TCO low radiation emission standards and anti-reflective treatments. Best of all, they can power down. So when you're not working, neither are they.

Nanao FlexScan monitors. Intelligently designed. Incredibly useful. And now, built to help protect our environment by reducing energy consumption.

"The Energy Star emblem does not represent EPA endorsement of any product or service.



HexSam T660i



FlexScan F550rW

NANAO USA CORPORATION 23535 Telo Avenue, Torrance, CA 90505 (310) 325-5202

Superior In Every Detail

1-800-800-5202

Netpower Delivers MIPS R4400 RISC-Based NT Systems

etpower is shipping a line of RISC-based PCs and servers designed for Windows NT. The RISC PC Series-100 uses MIPS Technologies' R4400 microprocessor and is optimized for networked and high-end graphics applica-

tions, the company says.

Netpower says the R4400 has as much as a 2-to-1 performance advantage over similarly configured Intel-based PCs in running apps. Standard features include 128K of secondary cache, integrated local bus video, two ISA expansion slots, a 3½-inch floppy drive, six disk drive bays, and ethernet, SCSI, parallel, and two serial ports.

R4400 includes Windows NT, 16MB of RAM, a 245MB hard drive, and a 14-inch super-VGA monitor, for under \$5000. The high-end desktop, designed for developers, includes Windows NT. a 134-MHz R4400, 32MB of RAM, a 525MB hard drive, a CD ROM drive, and a 17-inch SVGA monitor for less than \$10,000. The high-end network server includes the Windows NT Advanced Server Version, a 150-MHz R4400, 64MB of RAM, a 525MB hard drive, a CD ROM drive, and a 14-inch SVGA monitor, and lists for less

The entry-level 100-MHz

Netpower RISC PC Series-100

Start-up Netpower has built its first PCs for Windows NT. Each model uses MIPS Technologies' powerful R4400 RISC processor.

Netpower, Inc. 800/801-0900, 408/522-9999 List price: under \$5000 for an entry-level desktop, under \$10,000 for a high-end desktop, under \$15,000 for a LAN server

Reader service no. 625

than \$18,000. Netpower backs its systems with a one-year parts and labor warranty.

-Shane Rau



SILICON VALLEY START-UP NETPOWER has entered the Windows NT market with systems based on MIPS Technologies' R4400.

PCI: A New Local Bus Offers Plug-and-Play Card Installation

ust when you thought it was safe to buy a graphics accelerator, a new local bus standard makes the decision harder than ever. The new bus, called Peripheral Component Interconnect (PCI), offers wide 32-

PCI Graphics Boards

A collection of graphics boards designed for this highperformance local bus will soon reach the market.

Diamond Computer Systems 408/736-2000. 408/773-8000 (fax) Reader service no. 626

STB Systems 800/234-4334, 214/234-8750 List price: About \$799 and up Reader service no. 627

or 64-bit data paths and a 33-MHz bus clock speed to deliver graphics performance on par with VL bus systems.

While PCI-compliant PCs and graphics boards are beginning to ship, don't expect the immediate groundswell of products that followed VL bus. By most accounts, PCI boards will inhabit the high end of the market for close to a year. That's because complex PCI system chip sets—currently available only from Intel-help inflate the price of PCI systems. The payoff: PCI includes features that VL bus does not, such as easy plug-and-play installation, high-speed system compatibility (above 40 MHz), and support for more than three peripherals.

Like VL bus cards, PCI addin boards fit into specific slots, so motherboards must be designed for them. In the short term, look for PCI accelerators to be sold only as part of systems-though savvy buyers can choose among available boards when ordering. Most vendors expect PCI boards to become available through retail channels in the spring, once there is an installed base of PCI systems.

And expect to see some familiar names and product lines in the PCI arena. Among the first to announce PCI graphics boards were Diamond Computer (with the PCI version of the Viper) and ATI Technologies (with its Graphics Ultra Pro for PCI). Both boards should ship as part of PCI systems this fall. Equipped with 2MB of high-performance VRAM, both the Viper and Graphics Ultra Pro will display 16.7 million colors at 800 by 600

resolution and ergonomic refresh rates above 72 Hz. The top resolution of these boards is 1280 by 1024, with 256 colors. While ATI has yet to set retail pricing for the Graphics Ultra Pro PCI and is unlikely to have a retail version until 1994, Diamond expects to sell the Viper PCI for \$649, \$100 more than the Viper VLB.

And more boards are coming. STB Systems has introduced the \$799 Pegasus PCI, with S3's 928 chip and 2MB of VRAM standard.

While the major vendors expect to market PCI boards, some aren't concerned about being the first one on the block with a PCI product. Hercules is looking for the installed base of PCI systems to grow before entering the market.

-Michael Desmond



PRESENTATION TASK FORCE CLIP ART **KNOCKS OUT THE COMPETITION!**

For quality and value, there are NO contenders!

If you're looking for a comprehensive collection of high quality clip art that can be used with over 60 DOS, Windows and OS/2 business applications (see sidebar) ... consider Presentation TASK FORCE 4.0.



PTF 4.0 is the ONLY clip art library to give you 3,500 full-color CGM images in a MASSIVE, all-in-one collection. At only \$199.00, PTF 4.0 is widely recognized as today's best clip art value. Smaller collections, with far fewer images can cost you hundreds (often thousands) of dollars more!

And that's not all! PTF 4.0 includes a FREE "Color to **B&W"** Conversion Utility (\$59.00 value) that allows you to optimize PTF color files for dynamite-looking output on b&w printers.

Short on hard disk space? No problem. PTF images are uncompressed, and can be accessed directly from floppy disks. Install the complete collection, or any combination of individual image categories

You decide! It's unanimous! Presentation Task Force 4.0 delivers a powerful onetwo combination of

to your hard disk.

both quality and value, making it the undisputed heavyweight champion of the clip art world.



WORKS WITH:







ALDUS FREEHAND

AMI PROFESSIONAL

APPLAUSE II

CHARISMA

CORELDRAW!

DESIGNER

DRAWPERFECT

EXPRESS PRESENTER

EXPRESS PUBLISHER

FREELANCE GRAPHICS

FREELANCE GRAPHICS FOR WINDOWS

HARVARD DRAW

HARVARD GRAPHICS 3.0

HARVARD GRAPHICS FOR WINDOWS

HIJAAK

HIJAAK FOR WINDOWS

HOLLYWOOD

LOTUS 1-2-3

MICROSOFT EXCEL 4.0

MICROSOFT PUBLISHER

MICROSOFT WORD FOR WINDOWS

MULTIMATE

PAGEMAKER FOR WINDOWS

PERSUASION FOR WINDOWS

POWERPOINT FOR WINDOWS

PRESENTATION EXPRESS

PRESENTATION TEAM

PROFESSIONAL WRITE PLUS

QUATTRO PRO

SCRAPBOOK+

VENTURA PUBLISHER FOR WINDOWS

WINDOWS DRAW

WORDPERFECT 5.0, 5.1, 6.0

WORDPERFECT FOR WINDOWS

PLUS DOZENS MORE!

"Outstanding value & excellent art to boot! ...by far the best value of all the clip art libraries we reviewed."

PC Computing (May 1992)

Available at Software Resellers Everywhere!

PRESENTATION TASK FORCE IS A REGISTERED TRADEMARK OF NEW VISION TECHNOLOGIES INC. ALL OTHER PRODUCT NAMES ARE THE PROPERTY OF THEIR RESPECTIVE COPYRIGHT OWNERS. ALL PRICES SHOWN IN US DOLLARS (DEALERS MAY SELL FOR LESS), CANADIAN MSL 5229.0. CALL FOR INTERNATIONAL PRICING. NEW VISION TECHNOLOGIES INC., 38 AURICIA ORIVE, UNIT 13, NEPEAN, ONTARO, CANADA NEE BAS TEL (813) 773-818, FAX (613) 727-8190

Two w make a



If patience is a virtue, it would be tough to find anyone more virtuous than a 386 user.

Of course, you're not waiting to be canonized. You just want to get your spreadsheet crunched, printed and e-mailed before your boss's boss calls you looking for it.

Now if you had a 486, you wouldn't have this problem. But all that wishful thinking goes out the window when you consider the double-knots on your company's purse strings.

Performance Benchmarks			
(figures indicate relative performance)	Intel i386	Cyrix 486 Upgrade	
MS Excel 3.0	1.0x	2.1x	
MS Word 2.0	1.0x	2.8x	
Micrografx Designer 3.1	1.0x	2.6x	
Benchmark tests run on IBM PS/	2 Model 7	0/20MHz.	

The new Cyrix 386-to-486 Upgrade Microprocessor delivers application performance that's twice as fast. And that's twice as smart.

Fortunately, there's a smarter alternative to the downward migration path pictured above. It's called the 386-to-486 Upgrade Microprocessor." And it's only available from Cyrix, the smarter microprocessor company.

It's smarter because it's the only singlechip upgrade solution of its kind. And as such, the most cost-conscious way to replace

the pedestrian 386 computer you have, with the searing 486 power you want.

Our upgrade chip acts just like a 486, and with good reason. It has Clock Doubling, a 1K on-chip cache



and enhanced Cx486 technology. Which means it delivers twice the application performance, and 100





percent compatibility with all your software.

Talk about immediate gratification. Just use the chip removal tool provided to pull out your 386DX chip (16, 20, and 25 MHz versions only at the moment), and plug our Cyrix Upgrade Microprocessor into the empty socket. Then get ready for screaming 486 power Like DOS.

Windows and OS/2. Even Windows NT. It's also certified software compatible in Novell, Banyan and Lan Manager nodes.

What's more, it's easy to install (it takes all of 15 minutes), and costs under \$400. So it's also easy to justify to

even the stingiest bean counters.

Every Cyrix upgrade chip comes with the reassurance of a limited lifetime warranty, toll-free telephone support, and a moneyback guarantee.

So do the smart thing.

Call us directly at 1-800-46-CYRIX. Quick. Before your old 386 computer inadvertently takes flight.



Get Extra Storage With Maxtor Hard Drive Upgrade Kits



OUT OF STORAGE SPACE? Maxtor hard drives are now available through retail channels such as computer superstores, warehouse clubs, and consumer electronics stores.

he popularity of Windows, with its megabyte-gobbling graphical applications and huge swap files, has created an insatiable demand among PC users for storage. While that 80MB hard drive once seemed spacious for your DOS programs and data, it's now simply too small for Windows.

Spotting this trend, hard drive manufacturer Maxtor has begun selling its 7000 Series hard drives through retail channels such as computer superstores, warehouse clubs, and consumer electronics stores. Available in 130MB, 213MB, 245MB, and 345MB capacities, these 3½-inch drives target end users who

want extra storage capacity but aren't ready to trade in their old PCs for new systems.

The Maxtor 7000 Series comes in two flavors: the Complete Kit and the Basic Kit. If you haven't installed a hard drive before, you may prefer the Complete Kit, which includes preassembled mounting hardware, an adapter board, cables, a grounding strap, a manual, and installation software-basically everything you need to install the drive. The less-expensive Basic Kit includes mounting screws, a grounding strap, a manual, and installation software.

When you buy a 7000 Series drive retail, you'll get service and support directly from Maxtor. This includes toll-free phone support to guide you through installation. Maxtor also offers a 48-hour replacement policy for defective drives.

List prices for the 7000 Series drives are as follows: The Basic Kits in storage capacities of 130MB, 213MB, 245MB, and 345MB are \$289, \$389, \$419, and \$529, respectively; the Complete Kits in capacities of 130MB, 213MB, 245MB, and 345MB are \$339, \$439, \$469, and \$579, respectively.

-Jeff Bertolucci

DPT Improves SmartCache SCSI Adapters

SmartCache III

These three new SCSI host adapters offer faster performance yet cost less than their predecessors.

DPT 800/322-4378, 407/830-5522 List price: \$285 to \$595 Reader service no. 628

he new SmartCache III SCSI adapters from Distributed Processing Technology are faster and easier to install than their predecessors, according to the company, and they certainly cost less.

Replacing DPT's Smart-Cache Plus series, the Smart-Cache III family includes one ISA and two EISA adapter cards. The SmartCache III series has models for bargain hunters as well as power users. On the low end, the PM2021 (ISA) and PM2022 (EISA) are designed for desktop PCs and file servers. Controlled by the Motorola 16-MHz 68000 chip, these boards provide a 20 percent boost in processing power and shovel data 7 to 10 percent faster than their predecessors, which used the 12-MHz 68000.

In addition to being faster than their SmartCache Plus kin, the SmartCache III adapters cost less. The PM2021 (\$285) is about 50 percent cheaper, while the PM2022 (\$470) is about 25 percent less.

Power users seeking higher performance may prefer the \$595 PM2122. Based on Motorola's 20-MHz 68020 chip, this EISA-based SCSI adapter offers three times the processing power of its predecessor.

SmartCache III adapters are compatible with all major operating systems. Optional RAID Level 0, 1, and 5 support is available via a \$555 plug-in module that connects to the host adapter—useful for protecting your valuable data from system crashes.

You can add up to 64MB of cache RAM (the boards don't come with any cache) to your SmartCache III adapter, but first you must install an optional plug-in module, which costs \$555. When installing RAM, vou can choose between industry-standard SIMMs or DPT's Error-Correcting Code (ECC)protected SIMMs. While twice the price of standard SIMMs, DPT's proprietary RAM modules allow the host adapter to detect and correct 32-bit memory errors-a nice feature for preventing parity errors and system crashes. Floppy drive support will run you an extra \$25 for each SmartCache III model.

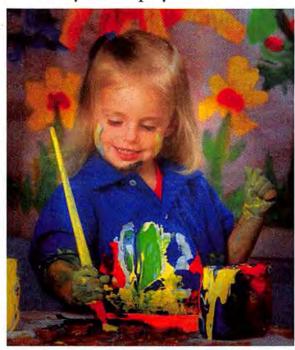
-Jeff Bertolucci

Maxtor 7000 Series Hard

You can now buy these 3½inch drives through retail channels—an easy way to boost storage capacity.

Maxtor Corp. 800/462-9867, 408/432-1700 List price: \$289 to \$579 Reader service no. 629

June 14, 1963. Cindy Smith plays with color.



Thirty years later her business depends on it.



Introducing the QMS ColorScript Laser 1000. Now your business has total freedom of expression.

For Cindy, communicating decision-critical information quickly, flawlessly and in brilliant color is now her livelihood. That's why she depends on the QMS ColorScript® Laser 1000 Print System. It frees her to print entire forms and letterhead with color logos, images and high quality text without changing paper. It saves her the cost of stocking special forms, letterhead and multiple sets of supplies and uses standard paper and transparencies. It improves her message by highlighting key data with color in multipage presentations and documents. Add direct connection to a variety of networks and anyone can realize both greater productivity and a per user cost that rivals personal printers. Plus, our easy software loadable upgrades virtually eliminate obsolescence.

Save money. Save time. Free yourself from limitations. Discover the advantages of the QMS® ColorScript Laser 1000 Print System.

- Laser color and monochrome printing Compatibility with PostScript™
 Level 2 and Level 1, HP PCL®5C and HP-GL® TrueType font scaling
- · Automatic collation · All four ports accept data simultaneously
- Automatically interprets incoming data and selects correct language from those available
 65 resident type fonts, all with multilingual character sets
- EfiColor[™] and Colorimetric color dictionaries and Apple ColorSync[™] device profile
 Supports DOS, Windows, Macintosh and Unix applications
- Software loadable system upgrades QMS Crown™ multitasking technology.

Expression is a serious business. Call QMS today at 800 972-6695 or 205 633-4300.



Harvard Graphics New Advisor Provides Step-by-Step Tutor

here's a golden rule for desktop presenters: Those who can, do; those who can't, fake it. While most Windows business graphics programs are packed with features for creating stunning presentations, few offer users the knowhow to use them effectively.

Harvard Graphics 2.0 for Windows seeks to be the exception. This \$495 package from Software Publishing not only gives you the tools, it takes you to school in the art of creating presentations.

Harvard Coach

Presentation neophytes can take their first lessons from Harvard's 5-Minute Coach—four brief, user-controllable tutorials that spell out the ABCs of presentations. From there, users graduate to the Harvard Graphies Advisor, a help box that sits next to each slide and provides step-by-step instructions on how to work with text and data, plus general design tips (for example, "use six words or fewer per bulleted item")

Harvard Graphics 2.0 for Windows

presentation know-how and clever interface enhancements make Harvard Graphics smarter and easier than ever.

Software Publishing Corp.
800/234-2500,
408/988-7518
List price: \$395; upgrades from previous versions of Harvard and competing presentation packages are \$89 through December 31, \$125 thereafter
Reader service no. 630

that help take the mystery out of creating effective charts.

The education continues when you open Harvard's dialog boxes. There you'll find Quick Looks—miniature versions of charts that let you pre-

view effects before you apply them to your data, reducing trial and error. Select the 3-D option for a bar chart, and the Quick Look instantly displays a sample chart with 3-D shading. When you click the option to modify, say, the x-axis of your chart, the Quick Look highlights that portion of the chart, teaching you charting lingo even as you work.

In Harvard 2.0, even the mouse has gotten smarter.

When you pass the mouse cursor over 2.0's new customizable tool bar, a description of each tool appears in the title bar at the top of the screen. Click on a line of text or a pie chart with the right mouse button, and you get a dialog box where you can change attributes like fonts or colors. Double-clicking on an object with the left button lets you edit the actual text or data. You can also drag clip art from Harvard's library of more than 530 images and drop it onto a slide, and use the mouse to add sound or animation clips to presentations by dragging files from Windows' File Manager.

Design Cheat Sheet

For art-school dropouts, Harvard provides 31 prefab presentation styles, featuring built-in fonts, colors, and charting options. You can create a master slide containing the elements you want to appear on every chart and specify exceptions for individual slides. For example, vard slide in an Ami Pro document, and edit the data in its original application by clicking on the object.

Finally, Harvard Graphics 2.0 provides new ways to deliver your dog-and-pony shows. You



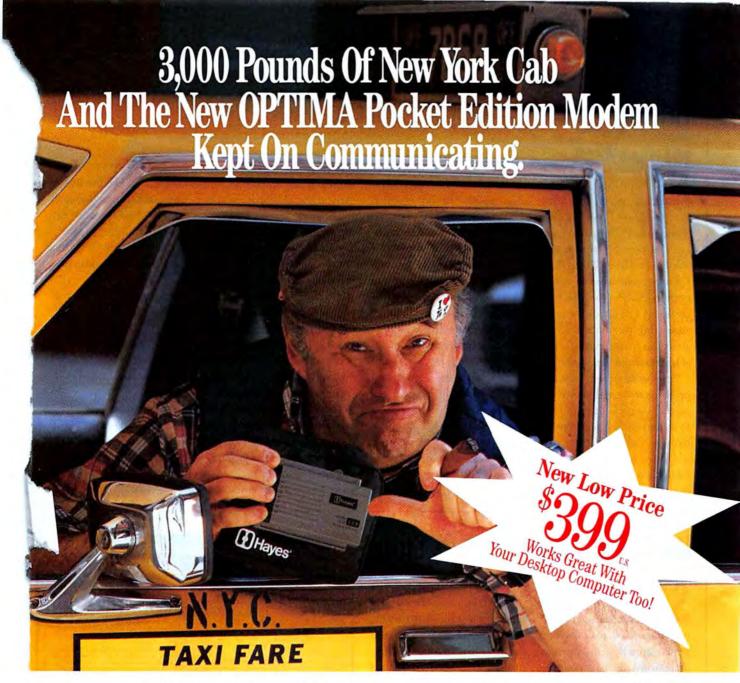
HARVARD GRAPHICS 2.0 FOR WINDOWS includes the Harvard Advisor, a help box that provides step-by-step instructions and design tips.

you can delete a company logo from a slide that's already overloaded with graphics.

Harvard 2.0 adds a satchel of features absent from 1.0. You can now automatically generate a build series for bulleted text, pie, bar, and line charts, adding text or data with each new slide. You can print speaker notes and use slides to highlight key points during on-screen presentations. The program comes with Harvard F/X, a utility that lets you bend text along a curve and create other effects for use in your slides, and an auto-save feature that will spare you hours of work when disaster strikes. And 2.0 is now a Windows OLE 1.0 client-server, which means you can embed, say, an Excel chart in a slide, or a Harcan distribute run-time versions of your presentation on disk that can be read by DOS and Windows users (with Macintosh support due by year-end), though you won't be able to embed sound or video. And you can deliver a presentation to remote users during a conference call. Harvard 2.0 lets you conduct on-screen presentations with 64 users at once, provided they're all attached to the same network server. You can pass control of the show to another user and send messages to other users via the network's messaging facilities.

Harvard Graphics 2.0 for Windows requires a 386 or 486 with at least 4MB of RAM and 8MB to 21MB of disk space.

-Daniel Tynan



OPTIMA" 144 + FAX144 **Pocket** Edition*

Picture this. It's four o'clock and you've closed the deal. But, you need to check the inventory data base at the plant and FAX the order confirmation by five. You jump out of the cab. Your portable modem falls. The cabbie takes off, and crunch. Now what? Well we ran over our new

OPTIMA" 144 + FAX144 Pocket Edition" in its soft carrying case and the OPTIMA still communicated ... flawlessly.

Now we're not recommending you try this, but who knows what can happen on the road. What's important is that the OPTIMA

Pocket Edition is from Hayes. It's for your PC or Mac." And its got it all. 144 speed. The convenience of FAX. Data throughput to 57.6kbps. Hayes Standard AT Command Set. Hayes "AutoSync to



Macintosh Edition also available



communicate synchronously with mainframes. AC or battery power. And, Smartcom[™] communications software that includes the new Smartcom for Windows, Smartcom Exec and Smartcom FAX for DOS, and Windows FAX

software. All, absolutely free! And it's all backed by our fast, efficient Technical Support team.

So whether you're on the road or work out of the office, the

OPTIMA 144 + FAX144 offers you the durability, reliability, speed and FAX you need at a very affordable price. For your nearest dealer or product Why settle for anything less?

In Canada, call 1-800-665-1259.

literature, call 1-800-96-HAYES. Hayes products have the computer world talking. More than ever.



Go Online With Hayes BBS; call 800-874-2937 or 404-446-6336.



Virtuoso: Professional Graphics Come to NT

hen graphics pros move to Windows NT, a Virtuoso will be waiting for them. Altsys, the original developer of Aldus's FreeHand, has created a \$695 illustration package that puts NT's muscle to work. As a 32-bit NT product, Virtuoso promises to speed graphics chores slowed by Windows 3.1's limited memoryaddressing technique and enable users to manipulate several large graphics files at once.

Virtuoso has the power and precision that graphics mavens crave. You get a bevy of free-form and predefined drawing tools, as well as complete control over object blends and Bézier curves. You can place objects to within a 10,000th of a

point and zoom in up to 1600 percent. Virtuoso supports a virtually unlimited number of layers, which can be assigned names and turned off to simplify drawings and speed their display. Ample prepress tools let you create spot- and process-color separations; 100 levels of undo and redo offer wide latitude for changing your mind.

Virtuoso's interface is built for speed. To apply color to an object, simply select a color swatch with the mouse and drop it on top of the item. An "inspector panel" lets you view and edit all of an object's attributes—line widths, fill patterns, and colors—at once, bypassing dozens of dialog boxes.

What's surprising is Virtuoso's

text handling and page layout savvy. You can pour text into framelike containers and link them to flow text between non-consecutive pages. A unique copy-fitting tool lets you expand or shrink text to fit the confines of a container, you can also wrap text around objects of any shape. Virtuoso's impressive typographical talents include control over word, letter, and line spacing; hyphens and justification; and widows and orphans.

However, while Virtuoso can create letter-size documents up to about 25 pages long, it lacks automatic page numbering, master pages, style sheets, and other tools that make long documents easier to manage. As a page layout tool, Virtuoso is

Altsys Virtuoso 2.0

This illustration package boasts enough drawing power to satisfy virtually any graphics pro and page layout tools for creating design-intensive documents.

Altsys Corp. 800/477-2131, 214/680-2060, 214/680-0537 (fax) List price: \$695 Reader service no. 631

more adept at brief, designintensive documents like fliers and brochures. But power hungry graphics pros may find Virtuoso a consummate performer.

-Daniel Tynan

Manager's Aide for the Work Group

Successful management demands steady focus and flexibility. ManagePro 2.0, the latest version of Avantos Performance Systems' management software, is a powerful case in point. The new version adds much-needed work group support while, improving the tools used to manage employees, projects, and goals.

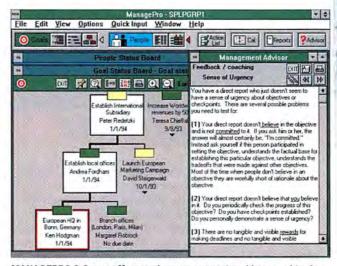
ManagePro 2.0

A compelling people-oriented management tool gets even better.

Avantos Performance Systems 800/282-6867, 510/654-4600 List price: \$395, ten-pack \$2995 Reader service no. 632

ManagePro 2.0 maintains its unique people-oriented approach to management, tracking projects and evaluating progress based on employee performance. The interface has two main parts: project management and people management. Both sections include tools such as flow charts, status boards, and time lines that let managers look at data in a variety of ways. The program includes scheduling functions to set up employee reviews and other appointments, and even goes so far as to give context-sensitive online management advice, ranging from strategic planning to the finer points of giving employee feedback.

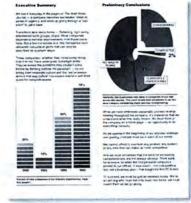
ManagePro now delivers plenty of work group features, such as VIM and MAPI E-mail support and simultaneous read/



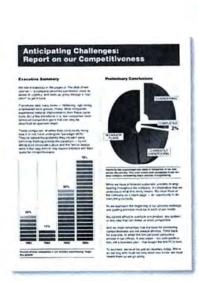
MANAGEPRO 2.0 now offers work group support and improved tools for managing employees, projects, and goals.

write ability that allows several networked users to work on a single database at the same time. File synchronization ensures only the latest data goes into your tracking system by comparing host and mobile computer databases and writing the most recent files to both. Cross-platform support now lets PC, Macintosh, and UNIX systems work from a common network database. While the software does not support OLE, it does support DDE, allowing ManagePro data to be linked with other documents.

-Michael Desmond



Start a paradigm shift.

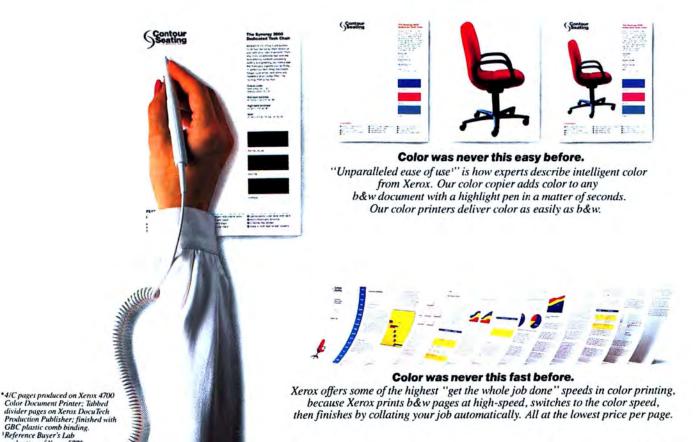




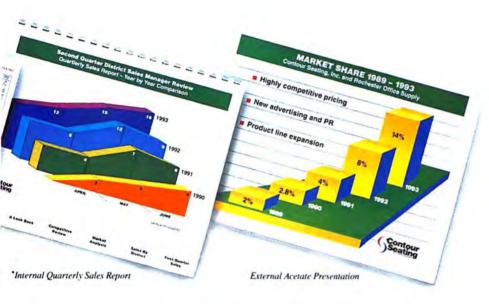
Xerox Introduces

A whole new way to work.





Intelligent Color. A whole new way to compete.





Color was never this compatible before.

With intelligent color from Xerox, everyone in your company can communicate more clearly. Users can print from virtually all mainframes, networks or PCs-from high-end graphics to simpler business applications. You can even print personalized, variable data in a highlight color.





"60% of our customers say that communicating with color gives us a strategic edge. -Len Tenner, Chief Information Officer

"Adding color to our organization gave us added control over time, price and quality." -Edward M. Gilbert, President

"You have to have leading edge technology to compete successfully these days." -Joel Cartun, President

To find out how you can become more competitive with intelligent color from Xerox, turn the page.

The rules of competition are anything but black and white anymore. Working the same ways, just harder and faster, doesn't work like it

Today, the pressure is on to find new ways of working that give you more powerful ways of competing.

That's what intelligent color from Xerox is all about. It's much more than just leading edge technology. It's a whole new way to work that adds power to every black and white document you produce.

It's a whole new way to compete because your competition will pale by comparison.

Intelligent color means that you can now put the communication power of color into more documents-faster than ever before. And only intelligent color fits so smoothly into your work ... so smoothly into your present technology.

It makes your presentation documents speak louder than words. And the facts and figures in reports jump off the page.

So if you're taking a few steps to become more competitive, we suggest you take a quantum leap instead.

Choose intelligent color. Only from Xerox.

Become More Competitive. Call The Xerox ColorConnection.

Call 1-800-TO COLOR

The Xerox ColorConnection

Now there's an expert resource for almost *everything* you need to be more competitive with intelligent color. In fact, one call gives you access to an extraordinary range of information, training materials, and *FREE* offers.

Call now to be more competitive

The Xerox ColorConnection is a unique interactive exchange system that lets you "browse" through our current information and offers—at your own pace, without sales pressure. It's that easy to start your own paradigm shift—so why not call *today* 1-800-TO COLOR (1-800-862-6567)!



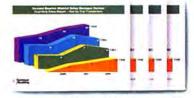
Win FREE use of a Xerox color copier or printer

Call now and you're automatically entered into the Xerox ColorConnection Sweepstakes* The grand prize is FREE use of the award-winning Xerox 5775 or the Xerox 4700 (your choice) for 12 months. Plus, every month we'll be drawing 6 additional names to win FREE use for 3 months. So pick up the phone now—because you have as good a chance of winning as anyone! (No purchase necessary to participate. Prizes include installation, service, and an initial supply package.)



FREE information

To help you become more competitive, we've put together an extraordinary collection of materials. Like "Adventures in Color," a FREE interactive disk that shows how you can save time and money with the Xerox 4700 color printer. And "Color in the Black and White World of Business Documents," filled with fascinating info on the power of color. Plus much more—so call now.



FREE color

Call now for details of how you can get FREE color copies or color print-outs.



FREE video

Hear a preview of several success stories—then order a FREE case study video or report about real people from real companies with real results.



The Xerox Total Satisfaction Guarantee

Only Xerox offers TSG, the guarantee that lets you decide when you're satisfied. You'll also be supported by a network of Xerox Sales Representatives, Analysts and Engineers—the industry's best-trained, best-equipped team.



FREE demonstration

See Xerox technology in action and talk to the experts at the next Trade Show or Xerox Color Symposium.

Xerox The Document Company

*NO PURCHASE NECESSARY. To enter, call 1-800-TO-COLOR or on a 3" x 5" plain piece of paper, hand print your name, title, company name, company address, city, state and zip code. Each entry must be mailed separately to: Xerox "ColorConnection" Sweepstakes, P.O. Box 651, Gibbstown, NJ 08027. Maximum 10 entries per company (whether by phone or mail). Sweepstakes begins 91/193, All entries must be received by 12/31/93. Prizes will be awarded to the company named on the winning entry rather than to the individual who submitted the entry. Prizes and estimated retail values; (1) Grand Prize: Use of either (your choice) a Xerox 5775 color copier or Xerox 4700 color printer for a period of 12 consecutive months (est. value \$18,000). (24) First Prizes: Use of either (your choice) a Xerox 5775 copier or Xerox 4700 printer for a period of three months (est. value \$6,000 ea.), Prizes include installation (except for excessive rigging), service, and an initial supply package, additional supplies are the responsibility of the winning company. Total retail value is est. at \$162,000. Sweepstakes is open to residents of the U.S., aged 21 or older who are employed by a company of 10 people or more. Odds of winning are determined by the total number of entries received. For a complete set of official rules, send a \$ASE before 12/31/93 to: Xerox: "ColorConnection" Official Rules, P.O. Box 651, Gibbstown, NJ 08027. WA residents omit return postage. This sweepstakes is sponsored by Xerox Corporation, Xerox Square—058, 100 Clinton Avenue South, Rochester, NY 14/644. Void in Puerto Rico and where prohibited. For a list of prize winners, send a \$ASE before 1/31/94 to: "ColorConnection" Sweepstakes Winners, P.O. Box 776, Gibbstown, NJ 08027. The product and/or company names used herein are trademarks of their respective owners. Xerox § The Document Company and the identifying product number names herein are trademarks of XEROX COR PORATION. Printed in USA. © 1993, Xerox Corp.

Software to the Rescue for Creating Your Résumé

wo new software packages can ease the stress of job hunting by helping you produce a solid résumé in less time. SWFTE's Resume for Microsoft Word offers preformatted templates, ready for your information. Job hunters who need help organizing their hunt should consider Spinnaker's PFS:Resume & Job Search Pro, which includes a résumé builder, contact database, and calendar.

SWFTE's \$49.95 Resume for Microsoft Word provides 50 résumé templates to view and edit using Word for Windows. The templates contain sample résumés, with layouts ranging from artful to conservative. Just choose a template and type

Resume for Microsoft Word

This Microsoft Word for Windows add-on provides 50 templates with sample résumésjust pick one and plug in your information.

SWFTE Int'I 800/237-9383, 302/234-1740 List price: \$49.95 each Reader service no. 633

PFS:Resume & Job Search Pro for Windows

With 10 templates and 22 additional layout choices, this software makes designing your résumé an easy point-and-click job.

Reader service no. 634

Spinnaker Software 800/323-8088, 617/494-1200 List price: \$79 (\$49.99 direct from Spinnaker) Reader service no. 635

your information over the sample-constructing a résumé doesn't get much easier.

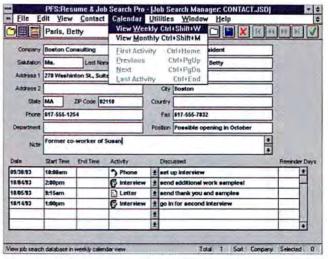
Some of the writing in the included résumés is mediocre, so don't expect to adopt much text. If you own SWFTE's Typecase collection of True-Type fonts (\$49.95), your résumé's fonts will match the sample résumés' fonts exactly. Otherwise, the program helps you plug in similar True Type or PostScript fonts before printing so there are no surprises. Resume also includes 20 sample cover letter templates.

For those who feel overwhelmed by job hunting, Spinnaker's \$79 PFS:Resume & Job Search Pro for Windows works well for résumé writing and helps organize your job search.

PFS:Resume shows prompts, such as 'enter your name here and press tab', in the templates instead of text. The user guide offers good sample résumés. PFS:Resume provides 10 templates, plus 22 more layout choices. PFS:Resume incorporates its own WYSIWYG word processor and includes three Bitstream True Type fonts.

Harried job hunters will appreciate the database feature, which organizes your job search by managing your contacts and schedule. Using it is simple; just enter each new contact into the database-there's space by each entry for notes and an activities box that keeps track of meeting dates, phone calls, and appointments. Then the program automatically enters the activity information into the calendar. One more helper: The database includes an easy-to-use mail merge feature for letters and envelopes.

-Laurianne McLaughlin



JOB HUNTING MADE EASY: Spinnaker's PFS:Resume & Job Search Pro features a database for managing your contacts and schedule.

A DOS Twin of Schedule+

icrosoft had a scheduling conflict: Its Windows group calendar, Schedule+, lacked hooks for DOS users. So Microsoft enlisted competitor Powercore to build a DOS version of Schedule+. The result, Schedule/DOS, looks and feels similar to Schedule+. Even more important, it runs on any Microsoft Mailequipped network and Novell networks using MS Mail.

Along with a daily appointment view, Schedule/DOS offers a prioritized task list, a planner for viewing multiple users' appointments, an "autopick" function that selects the first available slot for a group meeting, and the ability to set calendar access privileges. You can create recurring appointments, drag appointments around on your calendar, set reminders for meetings, and schedule rooms and other resources. If you work off line, when you plug back into the network your schedule

Schedule/DOS

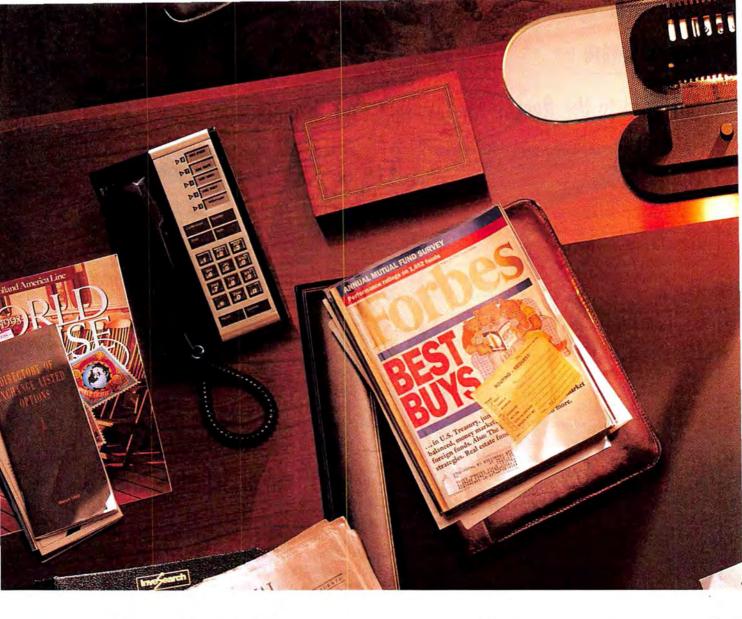
A DOS group calendar and scheduling program to complement Microsoft's popular Schedule+ for Windows.

Powercore Inc. 800/237-4754, 815/468-3737 List price: \$395 for 5 users, \$1349 for 20 users Reader service no. 636

is automatically reconciled with the group's.

Schedule/DOS's import and export facilities are fairly limited; you can't view your to-do list side by side with your appointments: weekly and monthly appointment views are inflexible. Nonetheless, the ability to work scamlessly with the installed base of Schedule+ users should be a powerful inducement to DOS users to get with the program.

-Steve Fox



Is this how you keep track

Regain control without the hassle.

If you're feeling overwhelmed by an endless stream of unfiled articles, reports, and folders, clear a path to your desk with PageKeeper™ from Caere.

PageKeeper is a whole new way to keep track of information that's on your desk, in your filing cabinets, and around the office. Simply use PageKeeper's built-in OCR to scan virtually any document into your PC, and PageKeeper reads and organizes it automatically. PageKeeper will even do the same for the information you already have stored on your hard disk.

Easy access to your accumulated information.

When it's time to do research for a report, locate a specific bit of information, or simply catch up on your reading, PageKeeper will have exactly what you're looking for on your screen in seconds. To find a document with PageKeeper, just type in some relevant words. PageKeeper will locate all the documents that could be of interest to you and automatically sort them in order of importance to your search. This unique search capability is called Weighted Relevance Retrieval; and it means that the most important information is always what you'll see first.



Caere Corporation, 100 Cooper Court, Los Gatos, CA 95030

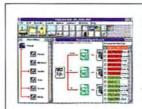


of information on your desk?

Organize your desk, or the entire office.

Once PageKeeper has organized your information, you can begin to take full advantage of it. You can share it with your co-workers over your network. Or you can fax out or e-mail documents right from within PageKeeper. If you're composing a letter or report, copy and paste text or graphics from anywhere in your document database. Or export whole documents in dozens of standard file formats for further use.

So get your information off your desk and start really putting it to use. For more information about PageKeeper or for the number of a PageKeeper dealer near you, call 1-800-535-SCAN.



PageKeeper's Document Agent Search" lets you use any document as an example or "agent" to find other documents with similar content.





Commence 2.0: Sophisticated PIM Adds Network Support

f you're seeking a customizable personal information manager for your work group or a small office, don't overlook Jensen-Jones' Commence 2.0. The latest version of this PIM offers helpful features including network support, new power to automate tasks, and file synchronization capabilities.

Many personal information managers provide the basics—contact database manager, calendar, to-do list, and notepad—but Commence has always done more. Its agent technology, which lets you pick preprogrammed functions from a list, automates routine tasks. For example, you could create a

command to print a list of any overdue assignments on the last Monday of the month.

On a LAN, Commence 2.0 can read all the to-do lists and calendars of your work group. Based on predetermined criteria, agents can reallocate workfor example, add a high-priority task from your to-do list to your partner's to-do list when you're away on a business trip. Commence 2.0 also performs workflow tasks, such as routing a document around the work group for comment. For security, Commence marks information as shared or private and provides four levels of passwords for added protection.

The new LAN support also enhances the contacts database. While each PC in the work group has a local copy of the database, one of the PCs has a "server" edition of the software, which updates each database copy whenever anyone makes a change. This way each user has a synchronized contact list but can continue working even if the network crashes.

A synchronization feature helps keep your notebook and

Commence 2.0

This powerful, highly customizable PIM improves with new LAN support.

Jensen-Jones 800/688-7080, 908/530-4666 List price: \$395, upgrade \$49.95 Reader service no. 637

desktop databases current. Here's how it works. Before traveling, you download a copy of the database onto a floppy and upload it to your notebook. (Commence compresses this file, so even large databases can be squeezed onto a floppy.) During your trip you add information to the database in your notebook. When you return, invoke the SyncLink feature, which scans for changes and saves them to the floppy. Then insert the disk into your desktop and click on SyncLink to update your desktop. Once you log on to the LAN, the "server" PC senses your changes and sends them to everyone.

-Laurianne McLaughlin

QEMM 7.0: Optimized for DOS 6

OEMM 7.0

Quarterdeck's respected memory manager is easier to install and optimized for MS-DOS 6.0.

Quarterdeck Office Systems 800/354-3222, 310/392-9851 List price: \$99.95, upgrade \$35 (plus \$5 shipping) Reader service no. 638

ow that Microsoft DOS 6.0 and IBM DOS 6.1 offer memory managers, stand-alone utilities like Quarterdeck's QEMM must prove their mettle by offering greater ease of use and advanced RAM management tools. QEMM 7.0 rises to the challenge by providing a simpler setup procedure and innovative management tools for device drivers such as MS-DOS 6.0's DoubleSpace compression utility.

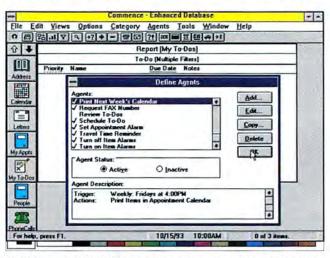
Like all memory managers, QEMM loads device drivers and TSRs into high RAM, freeing more space below 640K for DOS applications and data. Version 7.0 includes an express install option that automatically examines your system's CON-FIG.SYS and AUTOEXEC- .BAT files, then optimizes your memory configuration.

QEMM 7.0 includes a new feature, DOS-Up, which loads portions of DOS into high RAM. These chunks—including the DOS kernel, the DOS command processor (COM-MAND.COM), and DOS files, buffers, and stacks—would otherwise be loaded below 640K. Quarterdeck says that QEMM 7.0 should free at least 631K of RAM. My results were slightly better: QEMM 7.0 freed up 638K of RAM on my system with DOS 6.0 installed.

Version 7.0 is optimized for DOS 6.0 users. QEMM's new Stealth DoubleSpace feature can free 40K of RAM by loading DOS 6.0's DoubleSpace driver in the EMS page frame (a portion of expanded memory some applications use to store data that won't fit in conventional RAM).

If you need additional RAM, QEMM's VIDRAM utility can free up to 96K of additional conventional memory by using upper RAM addresses normally assigned to EGA or VGA graphics. However, you can't use graphical applications while VIDRAM is turned on.

-Jeff Bertolucci



PROGRAM YOUR OWN FUNCTIONS to automate routine tasks with the Commence 2.0 PIM's agent technology for maximum customizability.

The DacEasy Definition of a Great Deal.

NGW.

New (Noo) adj: Brand New! DacEasy Accounting and Payroll Version 4.4. Buy direct and save 20%. (See Free) Free (Fre) adi: Buy DacEasy Acco

Free (Fre) adj: Buy DacEasy Accounting, Payroll or BonusPack and get any Specialized Software System FREE! A \$200 Value. (See New)





Introducing...

The newest definition of accounting software value from the company that invented affordable accounting software - DacEasy Accounting Version 4.4. With 12 powerful modules that all work seamlessly together, new 4.4 gives you the most value in accounting software at *any* price! It's designed to follow Generally Accepted Accounting Principles for business peace of mind.

Bestselling DacFasy Accounting 4.4 includes over 25 enhancements such as new Fixed Assets, a Custom Forms Designer, pop-up memo for every record, new data import capabilities and more.

DacEasy Payroll 4.4 makes payroll chores a breeze. Use it to process the payroll for 1 or 10,000 - all with a single keystroke and stay on top of government tax requirements, too.

Limited Time Offer

When you try new DacEasy
Accounting, Payroll or the BonusPack 4.4
which includes both packages for more savings, choose any Specialized Software
System FREE! Take your pick. We've
teamed up with industry experts to bring
you powerful specialty software that works
with DacEasy Accounting to meet your
specific industry's needs. If you have a retail
store, Point of Sale 4.4 is the most flexible
system available. Preparing bids is a snap
with DacEasy Estimating. Tracking costs is
easy with Job Costing or handling high volumes of orders are quick with Order Entry.

Whichever one you choose, you'll get a \$200 value FREE. Plus, 20% off your order when you call us direct.

Once again, DacEasy redefines a great deal in accounting software. And you don't need a dictionary to see the value in that.

DacEasy Accounting for WINDOWS!

It's here, it's easy and it's for Windows. New DacEasy Accounting for Windows makes powerful accounting simple. It's the Windows accounting system you've been asking for and since it's DacEasy, it's affordable. With screens that look like their paper counterparts, DacEasy for Windows is incredibly easy-to-use. Try this brand new

Windows system RISK FREE*. Just \$99.95! (Save over 30%).

NEW



Limited Time Offer.

Call DacEasy direct to order DacEasy Accounting, Payroll or BonusPack 4.4 RISK FREE (60-day money-back guarantee) for just \$119.95 for Accounting or Payroll, or \$199.95 for the BonusPack (after 20% direct discount) and get your Specialized Software System FREE. Or visit your local reseller to buy them and send us a copy of your receipt to get your free software system. Be sure to specify which free system you would like. Or try new DacEasy Accounting for Windows for just \$99.95! Offer good through December 31, 1993.

Order Today!
Call DacEasy Direct at:
1-800-DAC-EASY
Offer valid in U.S. only

When orderina use code PCW

• 60-day Money-back guarantee excludes shipping and handling. Limit one free specialized software system per business. There is a \$7.50 shipping and handling change for the free specialized software system. Offer applies to single-user versions only. Note: Job Costing requires DacEasy Accounting in order to operate. Discounts off of the MSHP are not available at retail lexitons and are not valid with any other offers. All product names are trademarks of their respective corporations. All DacEasy products are trademarks of DacEasy, Inc. 2, 10750 Presson Road, Suite 890, Dallas, TX 7522. Copyright 10, 1993, DacEasy, Inc. 2, Il rights reserved.

The perfect laser for today.



THE EPSON
ACTIONLASER 1500

The Epson ActionLaser 1500 is a terrific laser printer, right out of the box, right now. But should your printing requirements change, the ActionLaser 1500, unlike some others, has the ability to expand with you.

The perfect laser for tomorrow.



Epson's RITech (Resolution Improvement Technology) increases the ActionLaser's normal 300 dpi print quality to eliminate jagged edges right

where you need it: in the curved lines of letters, numbers and images. And Epson's MicroArt Printing technology gives you blacker blacks and finer lines.



27 fonts (13 scalable) are standard. Should you expand your typographical horizons, unlimited fonts are easy to install via HP-compatible plug-in cartridges, available anywhere.

The ActionLaser has 150 sheet paper capacity (letter or legal), and handles stacks of labels, envelopes and overheads with ease. And there's an optional 250 sheet

auto-feed cassette, for a total of 400 sheets.



The ActionLaser 1500's top speed is six ppm, fifty percent faster than others in the same price range. That's fast.

The Action Laser 1500 comes standard with parallel and serial interfaces that allow two users to share a single printer. Add another interface and a third user can share the same printer. The ActionLaser 1500 can connect to everything from PCs to

IBM mini



If you have a DOS machine, but decide to get a Macintosh, do you need a new printer? Not with an ActionLaser 1500. Just add our EpsonTalk interface and your Mac plugs right in.



THE EPSON ACTION LASER 1500



It's easy to add more memory. Just pop in inexpensive, industry standard DRAM chips for a maximum of 5 MB.



and main-

frame computers.

PCL 5 emulation is standard. The extra power of Adobe PostScript is a simple plug-in option.



PC Computing Best Buy (June 93). The word is getting around. The Epson ActionLaser 1500 is the best choice in personal lasers.

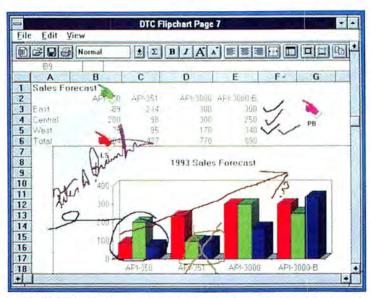
The ActionLaser 1500 comes with Epson's limited two year warranty. For help, call the Epson Connection. Quite possibly the best help line in the business.



The only printer worth buying today is one that can take you into tomorrow. That's why we designed so many expandable features into the ActionLaser" 1500. Test drive a few lasers. You'll soon discover the speedy, inexpensive ActionLaser 1500 is the one laser you want parked on your desk. For information on the Epson ActionLaser 1500, our ink jet and dot matrix printers, or scanners, call the Epson Connection at 1-800-BUY-EPSON (800-289-3776).



Desktop Conferencing: The Next Best Thing to Being There



FUJITSU's DESKTOP CONFERENCING combines screen sharing and remote control with pointing, editing, and annotation features for Windows.

t hasn't been easy, but hardware vendors may finally have developed a multimedia application for business users: PC-based desktop conferencing. The products in this emerging category let you use a PC to "meet," collaborate, and share data in real time with associates and customers in disparate locations, saving businesses time and money on travel, overnight mail, and faxing. Two new products from Fujitsu and AT&T provide a glimpse into the future of virtual travel.

See a Pin Drop

These offerings improve on existing desktop conferencing products by making it easier to share data with other conferees. The products described here use screen-sharing technologies that send a copy of your screen to a conferee's PC, letting everyone see and annotate the same data without tedious cutting and pasting.

If you need to see the person you're conferring with or view an object, consider AT&T's Personal Video System Model 70. It costs \$6995 per user in quantities of four. The Model 70 offers full-motion video and compatibility with the international videoconferencing standard known as H.261 or Px64. This feature lets you share video and audio, but not PC data, with compatible systems.

The Model 70 consists of a small fixed-focus camera that sits on top of your monitor; two AT cards; TeleMedia Manager Windows software; and for voice communications, either an ISDN communications board and speaker or AT&T's 8510T voice terminal, a special phone that supports the high-capacity ISDN phone service required by the product.

To make a video call, you fire up the included TeleMedia Manager software and dial the other party. When he or she answers the phone, a videoconference is established and a small window appears on both screens containing full-motion color video captured by each camera. To share a file, you call it up from inside the TeleMedia Manager and click the Share icon. The file appears in a second window on both PCs.

ISDN Needed

Like other products in this category, the AT&T Model 70 has its limitations. First, it requires ISDN phone service, which is not available in many areas. The product can connect only two PCs at a time. Finally, if you want full-motion video,

you will have to settle for a cigarette-pack-size image because of the current limitations of telecommunications technology.

If you need to communicate and share data with several people and video isn't important, there's Fujitsu's DeskTop Conferencing, a Windows application that uses Novell's IPX protocol to let you simultaneously view PC screens with anyone who can access your Novellbased LAN or WAN. DeskTop Conferencing costs \$299 per user and combines simultaneous screen sharing and remote control with pointing, editing, and annotation features. As many as eight users can participate, and the product supports simultaneous conferences (a typical Ethernet LAN can handle about ten simultaneous conferences). The product currently does not include video capabilities for viewing conferces.

Each conference has one Chair, usually the person who initiated the conference. The Chair enters a conference name in a dialog box that pops up when you select New in the Conference menu, then calls participants via phone. To join, a participant opens DeskTop Conferencing and chooses from a list of conferences in progress. At that point, the participant receives a real-time copy of the Chair's PC screen. The Chair retains the highest degree of control over data and applications being shared, but this role can be transferred to other participants during the conference.

A remote-control feature lets participants take control of the Chair's keyboard and mouse and make modifications directly to any conferenced data, including spreadsheets, documents, and layouts. The product also includes a Flipchart feature that provides conferees with tools for annotating the existing screen or a white-board area.

-Randy Ross

AT&T Personal Video System Model 70 and Fujitsu DeskTop Conferencing

based conferencing products let you meet, collaborate, and share data with associates and customers in distant locations.

AT&T 800/843-3646 List price: \$6995 per user in quantities of four Reader service no. 639

Fujitsu Networks Industry 800/446-4736, 203/326-2700 List price: \$299 single user, \$2490 for 10-user pack, \$17,900 for 100-user pack Reader service no. 640

SAMPO DELIVERS ADVANCED FLAT SQUARE COLOR DISPLAYS



THE COMPETITION JUST GOT TOASTED

Manufactured in our ISO 9000 certified factory, the AlphaScan 15e (15"), 17e (17") and 21e (21") are Sampo's new advanced flat square displays. They're not for everyone, just for the purists, those who demand the very best in a display. But don't take our word for it. Compare our products to the competitions' products, our specs to their specs, or simply compare the image in our ad to the image in theirs, assuming everyone shows their best. Sampo advantages are obvious.

- Ultra-high resolution VGA-up to 1600 x 1280 NI & 1280 x 1024 @ 75Hz.
- · MPR II-Low Emission Standard

- Edge-to-edge video—optimizes on-screen real estate.
- 20 microprocessor controls for sizing 10 pre-set and 10 user-adjustable.
- · Digital controls-adjust for pincushion and barrel distortion.
- · ColorKey System—user definable color calibration system.
- Invar Shadow Mask-enhanced brightness and contrast.
- Dynamic Beam Focusing and 0.28 dot pitch-pinsharp text and graphics, even in the corners.
- Flat square screen—no glare and no geometric distortion.

- 100% VESA compliant.
- Priced at the competitions' smaller displays.

To find out why businesses are turning to Sampo corporate grade displays, and for a dealer near you please call one of our fine distributors below.



(404) 449-6220

FAX: (404) 447-1109

NEW ENG. Hi-Link 800-683-9535 Action Data Dist. Scientific Devices, Inc. 508-359-4848

NEW YORK Micro Central 800-836-4276

800-631-1917

MID-ATLANTIC AW Industries ComStor 800-638-0520 800-955-9590 D&H Distrib 800-877-1200

SOUTH Crescent Computers 800-852-6294 Sesame Sys. Peripheral Dist 800-226-2000 800-876-6789

MID-WEST MicroUnited 800-755-8800

PC Wholesale 800-525-4727 Blue Ash, Inc.

800-762-5584

NORTH CENTRAL GTI 800-999-9382 TMG 800-745-7000

WEST COAST Colfax 415-968-3806 800-321-9932

CANADA Merisel 800-268-1220



Introducing the DOS word processor that fulfills your every desire. All 639 of them.

Before creating WordPerfect® 6.0 for DOS, we invited you to tell us everything you wanted in a word processor.

Obviously, you didn't hold back. And we didn't either.

When all was said and done, 639 features and enhancements were added to WordPerfect. Witness these examples:



"I WANT EASY DESKTOP PUBLISHING." You don't need extra training to make your work look great. Just use WordPerfect's new built-in features like drag-and-drop graphics, custom borders, wrap-around text, and more.



"MAKE FINDING FILES LESS INFURIATING." Take it easy. QuickFinder lets you locate files instantly

with just one key word or phrase.



"WHAT I SEE SHOULD BE EXACTLY WHAT I GET." Work in WordPerfect's new graphics editing mode, and you'll not only see its crisp, sculpted dialog boxes and Button Bars. You'll also see type fonts, sizes, and graphics exactly as they'll end up on paper. In page mode, you'll even see headers and footers.



"I'D LOVE TO SEE MORE HANDSOME TYPEFACES." For the clearest, sharpest typefaces, WordPerfect

displays and supports Bitstream Speedo,® TrueType,™ CG Intellifont, and Type 1 font technologies.





"PLEASE GIVE ME A BUILT-IN SPREADSHEET." With nearly 100 spreadsheet functions, WordPerfect

now lets you crunch numbers right within the program. Or you can easily import spreadsheets as usual.



"I'M BEYOND HELP." Not now, you're not. Just select "Coaches" for fast advice or step-by-step instructions.



"LET ME DO MORE THAN ONE THING AT A TIME." How about nine things at a time? WordPerfect lets

you open and edit up to nine documents

at once. And then lets you tile, cascade, and even cut-and-paste between them. That should keep you from getting bored.



"I WANT TO CHOOSE WHO MERGES WITH WHO." Go right ahead. Choose all the individual records you

want and merge them into your letters or reports. With WordPerfect, taking control is fast and easy.



"MAKE ENVELOPES EASY."

OK, addressing envelopes has been about as fun as licking stamps. But now

you can do it automatically, and even add bar codes to speed your mail along.



"GET ME OUT OF THE FAX LINE." Why not skip the fax machine altogether? With WordPerfect and a

FaxBios, Class I, II, or CAS compliant fax board, you can fax right from your PC. And without even leaving the program.

There are 629 more ways WordPerfect 6.0 for DOS delivers your yearnings for accuracy, impact, and a shot at leaving early for the weekend.

To find out what they are – and to experience the best toll-free support in the business – call (800) 228-2720 ext.105 for your free demo disk.

Or better yet, see your local reseller.

WordPerfect

BeyondMail 2.0 Adds Key Work-Group Computing Features

Beyond Inc. keeps pushing the envelope of E-mail technology. The vendor's latest release, BeyondMail release 2.0, adds a host of workgroup computing features, such as work-flow management and document imaging, and makes these complex technologies accessible to end users.

Work-flow management software helps you manage office projects and processes involving groups of people. For automating basic tasks-the processing of sales contact reports, for example-release 2.0 includes a Serial Routing Slip. This preprogrammed form lets the sender, usually a manager, select a group of recipients, request actions like read or comment, assign a sequential order for the document or message to travel, and assign due dates to each person. As the system routes the message, the manager is able to track when the document was received and forwarded, as well as any exception reports or problems.

Release 2.0 also includes Watermark Software's Explorer Edition, a Windows-based document imaging application that embeds images from a scanner

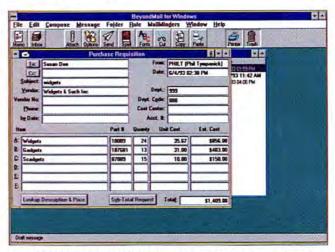
BeyondMail 2.0 for MHS

This revision includes key work-group applications, such as work-flow management, document imaging, and tighter integration with popular databases.

Beyond Inc. 800/845-8511 List price: \$995 for ten-user pack, \$30 per mailbox for existing customers Reader service no. 641 or fax application into E-mail messages that recipients can view and annotate. This feature is particularly useful when used with the Serial Routing Slip because it lets you easily route images of documents that may have originated as paper forms.

This upgrade includes new features for power users, including the ability to automatically retrieve and update data stored in popular database management products and support for forms created in other applications that lets you send these "live" documents as messages.

-Randy Ross



YOU CAN USE BEYONDMAIL 2.0 forms to access database information, manage work flow, and automate basic tools. A routing slip feature lets you send document images of paper forms.

The Friendlier Communications Enabler

ere's a general-purpose communications program that doesn't require a degree from Ma Bell Labs to use: Enable Software's \$149 Windows-based PowerLine resembles its dozen or so competitors in most ways but has several features that promise to make it friendlier.

Many online-service users, especially those who travel often, will appreciate the ease of installing a local access number. Enter your current area code, and PowerLine presents you with lists of access numbers for CompuServe, GEnie, MCI Mail, Delphi, and Dow Jones within that area code and automatically installs the numberno need to call the service to track down the local number. Dialing is also easier: Instead of the usual blank display on the terminal screen, you're greeted by the familiar image of a telephone. You can dial a number by mouse-clicking on its touchtone keys—a nice feature for first-time users of the terminal screen. If your computer has a sound board, PowerLine can "speak" the answers to your questions through its voice-enabled help. And while most programs come with tool bars, PowerLine lets you select between using only icons and mixed text and graphics icons on its tool bars. Enable makes its script programming language easier to learn, using BASIC-like commands.

PowerLine doesn't sacrifice features for ease of use. Unique to PowerLine is the ability to send files, receive files, and conduct keyboard chats at the same time. With this multisession feature, people with a single phone line for voice and data communications can "chat" through their computers' keyboards while a file transfer is in progress. (You need to have PowerLine on both ends for the multisession feature to work.)

PowerLine 1.2

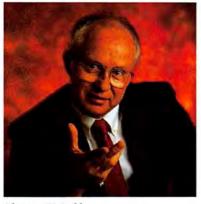
munications program with several ease-of-use features.

Enable Software 800/888-0684, 518/877-8600 List price: \$149 Reader service no. 642

Enable's product also offers features present in many highend data communications programs, such as multiple phonebooks, cut and paste with Windows clipboard, full mouse support, user-editable tool bars and menus, and DDE support.

PowerLine comes with tailored support for over 240 modems and includes the eight most popular terminal-emulation modes, including ANSI, TTY, and VT 100. When fully installed, PowerLine takes up 2MB of hard disk space.

-Bryan Hastings



Thomas W. Judd President of Curtis Manufacturing

The Curtis Solution— The Total Solution.

"I challenged our engineers to build a complete answer for surge protection... and they did."

PRICE-PERFORMANCE-VALUE

Introducing a completely new line of surge protectors from Curtis. Built to deliver maximum performance, priced to offer top value.

Highest Joule Ratings in their class

• Full Warranty Program - up to \$25,000 on connected equipment

Complete Line to cover all needs

Molded-in cable organizer

Internal safety feature protects equipment against current overload.

and fourth e protection.

SPF4P

surge suppression exclusive sine wave - 980 joules of protection total in its class

Rated at 196V maximum suppression – upperforming UL's 330V rating by 68%!

e EMI-RFI filtering for maximum on of electromagnetic (interference).

> For more information call Curtis today at 1-800-955-5544 Ext. 241





copyright 1993, Curtis Mfg. Co., Inc. All Rights Reserved









Quick Takes

V.32terbo Modems

Cardinal Technologies' new high-speed modems are among the first to support AT&T's V.32terbo protocol. This protocol transmits uncompressed data at speeds of up to 19,200 bits per second-33 percent faster than the 14,400-bps performance of conventional V.32bis modems. Available in internal and external models, Cardinal's V.32terbo modems include V.42bis and MNP data compression and error correction. The modems also send and receive faxes at 14,400 bps. Do you need a V.32terbo modem? If you transmit large data files over long distances, the increased speed can save you money on phone charges. Cardinal's V.32terbo modems are compatible with lower-speed modems, the company says. The internal model costs \$279; the external is \$299. Cardinal Technologies, 717/293-3000, 717/293-3055 (fax).

Reader service no. 643

PhotoMorph

PhotoMorph is a Windows animation package that uses a blending, or "morphing," technique to convert one image into another. With PhotoMorph you can merge the images of two people and create an image that reflects the characteristics of both. You can use your morphing sequences as video clips or export them as still images. PhotoMorph comes with a collection of special effects and image editing tools for cropping, scaling, and rotating images. The package includes a runtime version of Microsoft Video for Windows, which lets you play back your PhotoMorph video sequence—even on a PC without the program. Photo-Morph imports a variety of PC and Macintosh image formats, including CLP (Windows Clipboard), DIB, GIF, TIFF, Targa, PCX, PCC, RLE, BMP, JPEG, Macintosh PICT, and Amiga IFF. It exports all of the above formats, except for Macintosh PICT and Amiga IFF. Photo-Morph lists for \$149.95. North Coast Software, 603/664-6000, 603/664-7872 (fax).

Reader service no. 644

ClickArt Studio Series

Nothing succeeds like clip art in spicing up letters, brochures, or presentations. With ClickArt Studio Series from T/Maker you can choose from 1000 images in five separate packages: business art; artistry and borders; sports and games; illustrations; and animals and nature. All images are in WMF format and can be printed in color or gray scale. Each package lists for \$99; upgrades from the black-and-white ClickArt EPS series cost \$29.95 per package. T/Maker, 800/395-0195, 415/962-0195.

Reader service no. 645

SJ-144 Printer

Star Micronics' SJ-144 printer produces laser-quality color documents, yet costs less than some ink jet printers. It uses a heat-fusion printing process and offers 360-dpi resolution with print speeds of up to 382 characters per second. The SJ-144 can print

Buy Our New PRINT SERVER PLUS



- High Speed Printer Support
 - 46,000 cps serial
- 100,000 cps parallel
- Modem Support
- Low prices:
 - \$595.00 PS-4
 - \$395.00 HP MIO
- Made in the USA

- Netware®support
- Models available:
 - PS-4A: 4 parallel
 - PS-4E: 2 serial and 2 parallel
 - PS-4C: 4 serial
 - PS-MIO: HP MIO
- Printer Server Mode supports 32 queues on 32 file servers

Print Server Plus

For 17 years BayTech has set the standard for *HIGH* SPEED cost effective data communication products. Now our NEW Print Server Plus has features that NO ONE else offers.

For only \$595.00 users can combine up to four printers, modems or other asynchronous devices for high performance workstation communications.

color or monochrome images on plain or coated paper and on transparencies, which is useful for presentations. The SJ-144 printer comes with three paperfeed paths and includes a 30sheet paper tray. Also included are 8 bit-mapped fonts and 15 scalable True Type fonts. You can use the SJ-144's two-page mode to squeeze two pages onto one, the label mode for printing labels, and the zoom mode for reducing the size of your docu-

ments. The SJ-144 lists for \$599.
Star Micronics, 212/986-6770.
Reader service no. 646

Microsoft Access 1.1

Microsoft's relational database now offers additional drivers that improve connectivity with Oracle and Sybase SQL databases. It also provides faster access to Microsoft SQL Server data. Enhanced links to Microsoft FoxPro (versions 2.0 and 2.5) let you access and update information in FoxPro databases in real time, ensuring that you're always working with the most current data. Access 1.1 is better integrated with such popular applications as Excel, Word for Windows, and Paradox. For example, a new export option lets you convert data into Word for Windows mail-merge format. Also, Microsoft increased the maximum database file size from 128MB to 1GB. Access 1.1 lists for \$495; upgrades are \$14.95. Microsoft,

Edited by Jeff Bertolucci

Reader service no. 647

Picture Perfect

800/426-9400.

Want to capture and display full-motion video on your PC? In-Motion's Picture Perfect video capture board may be the ticket. This 16-bit ISA board can display images from your VCR, camcorder, or television at up to 30 frames per second. Picture Perfect saves digital video to disk so you can edit it electronically, or routes it to your display via an external connector. You can even play an AVI file from your hard drive while Picture Perfect displays



MORPH MADNESS: PhotoMorph lets you transform one image into another. You can merge two images to build the perfect beast.

And Connect Your Modems FREE

Modem Support

BayTech's *Print Server Plus* allows Network users to connect up to four modems or asynchronous devices for workstation communications.

Communications is accomplished through BayTech's utility software in conjunction with any popular communications software that supports EXTENDED BIOS 14 calls, such as MirrorIII® and Procomm® Plus for networks.

High Speed Printer Support

BayTech's *Print Server Plus* allows Network users to access up to four printers for the most cost effective, high speed, direct network printing available.

With our selection of models available, network users can connect a variety of parallel and serial printers. For users that need to connect printers further than standard parallel distances BayTech gives you parallel speeds up to 1,000 feet with *Tran-x*®, our high speed line of serial-to-parallel converters.

Take The BayTech Challenge

BayTech CHALLENGES you to try our products for 30 days. If you are not completely satisfied we will refund your money 100%, no questions asked.

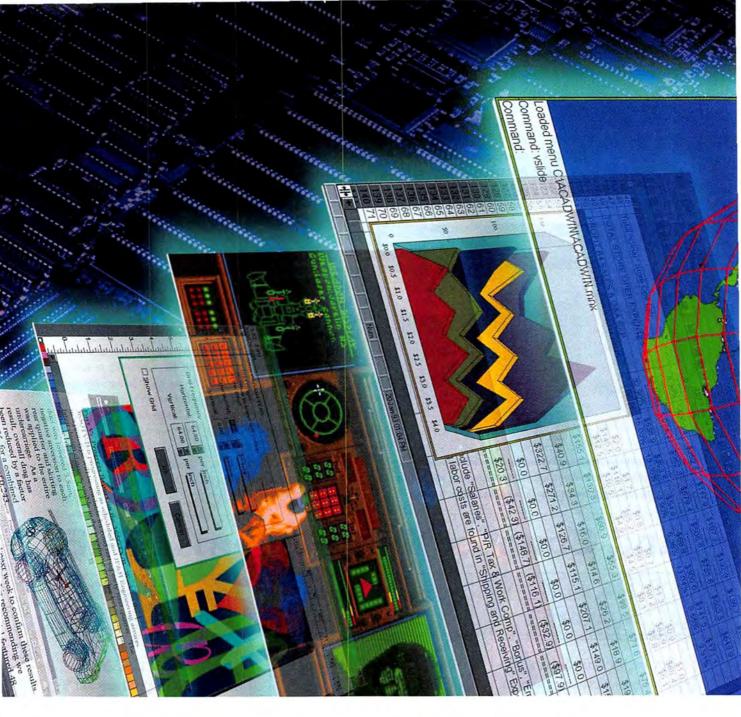
All product or Company names are trademarks of their respective holders.

Because Resources Should Be Shared



Data Communication Products Division 200 N 2nd St., P.O. Box 387 Bay St. Louis, MS 39520

Phone: 601-467-8231 or Toll-free **800-523-2702**



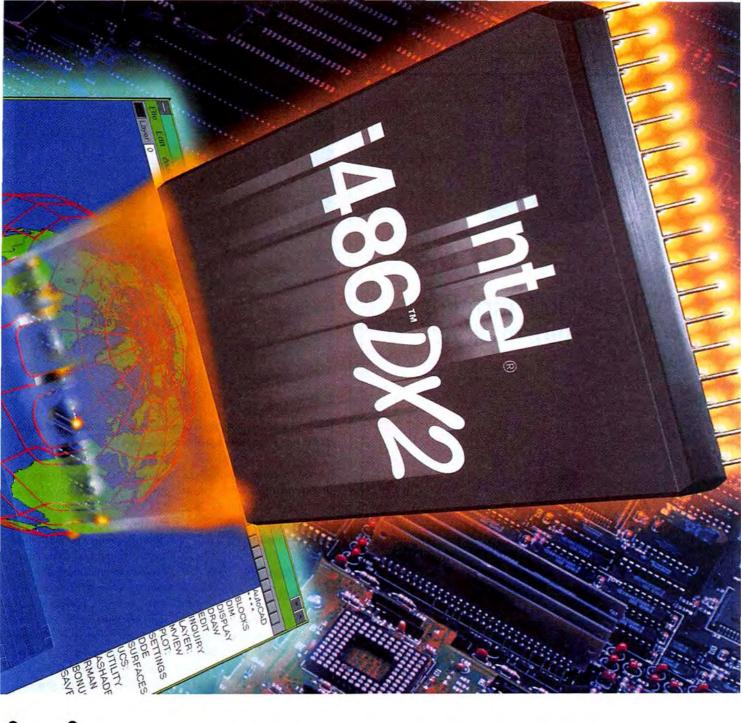
Catchar

The Intel486™ DX2 processor.

With its unique speed-doubling technology, the i486™ DX2 processor delivers twice the performance of our i486 DX processor at a comparable system price.

This means you get the performance you need for today's most popular applications. With performance to spare for demanding applications like video, using Intel's Indeo™ video technology, and new applications just around the corner.

And like all Intel486 processors, it's designed for



ising star.

future upgradability with an Intel OverDrive™
Processor so your PC can grow as your needs grow.

Performance, compatibility and room for the future—three reasons the i486 DX2 processor is today's best value.

So catch a rising star. And watch your software

performance reach new heights. To learn more about our i486 DX2 processor, call 1-800-395-7009 and ask for extension 14. Or see your local computer reseller.



Q.

"Where Do I Turn For More Information?"



- **1.** Turn to the Reader Service Card at the back of this issue of *PC World*.
- **2.** Find the Reader Service number of the product you want in the product or advertiser indexes.
- Circle the number, fill out the postage-paid card and send it in. It's that simple.

In return, our advertisers will send you more information on the products you want. It's just another way that *PC World* helps you make the best buying decisions for your company.

PC WORLD

Quick Takes



THE \$299 MOSESDOCK KIT includes adapters to connect your desktop PC and your notebook in a peer-to-peer network.

full-screen digitized video from an external analog source. It lists for \$499. In-Motion, Inc., 510/651-2626.

Reader service no. 648

Moses Computers MosesDock

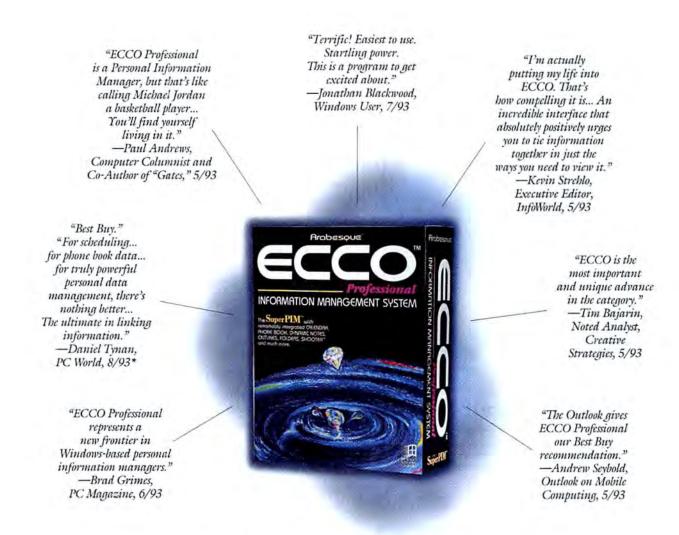
Sharing is not always easy, especially between two stand-alone computers such as a desktop and a laptop. You can find a good file-transfer package at a bargain price, but it will allow you to do only that—transfer files. You could buy a docking station to make your notebook computer the core of your office computer, but that can cost \$500 and up and is often notebook specific.

Moses steps in with an inexpensive alternative for highspeed, flexible laptop-desktop connectivity. For a \$299 list price, Moses offers a kit consisting of an internal adapter card that plugs into the desktop, an external adapter that plugs into the parallel port of the notebook, and a high-speed cable to connect the two computers at fast 4-mbps speeds. Moses-Dock, in essence, lets you set up a two-computer peer-to-peer network, giving you the ability to run programs on either computer from the other and use their peripherals. For example, you could write a proposal during a trip, connect the laptop to the desktop when you return to the office, and print out the proposal on the desktop's printer. From the notebook, you can run programs and call up files located on the desktop. Moses Computers, 408/358-1550, 408/ 356-9049 (fax).

Reader service no. 649

Access-EZ 3.1

This inexpensive program launcher and menuing system enables you to create a series of menus and macros for your DOS applications. Access-EZ 3.1 lets you use keystroke macros to perform common tasks: for instance, after loading your word processor, you could hit a hot key to bring up the pro-



We're not the only ones calling it a SuperPIM.

ECCO™ Professional. Because an organized life is an easier life.

Sure, computers have made certain things easier—writing letters, creating charts, that sort of thing. But what about the rest of your day?

Making calls, preparing for meetings, appointments, coordinating projects, and gathering random thoughts—then finding them again?

That's what ECCO, the world's first SuperPIM™ (personal information manager) for Windows is all about.

Introductory offer.
\$99
60-day money-back
guarantee. Regularly 8395.
Call 1-800-457-4243.

ECCO goes beyond traditional PIM and contact manager functionality, giving you a tightly integrated calendar, phonebook, to-do's and outliner. Plus, it lets you add dynamic notes to each entry, which can then be quickly

organized and cross-referenced. So you see all your information where you need it, when you need it.

And only ECCO has Shooter,[™] letting you send any information between ECCO and other programs. Instantly.

So try it. It won't just change the PIM category—it'll change your life.

Arabesque



Circle 84 on reader service card

PC WORLD

TAKING CARE OF BUSINESS THE PC WORLD SUBSCRIBER HOTLINE

Do you have a subscription problem that needs attention? Are you moving? Have an address change? Do you need to check your expiration date? For the fastest service simply call our toll-free subscriber hotline: 1-800-234-3498 between the hours of 6:00 AM to Midnight (M–F) Mountain Time and 7:00 AM to 5:00 PM Saturday. Or if you prefer, write us at:

PC World Subscription Service P.O. Box 55029 Boulder, CO 80322

PC WORLD

Quick Takes

gram's file selection screen. Enhancements in 3.1 include virus protection, a screen saver with a floating digital clock, and password security for individual menu items and submenus. Access-EZ also includes a scheduler, useful for backups or transferring files via modem after business hours. Access-EZ uses only 35K of disk space and is not memory resident. It lists for \$49.90 through December. Auratek Int'l, 800/888-4437, 510/937-2929.

Reader service no. 650

Digital Sound Pro 16

Adding CD-quality audio to your PC just got cheaper. Cardinal Technologies' \$159 Digital Sound Pro 16 card offers 16-bit stereo sound and supports a variety of audio formats, including the Windows Sound System, Compaq Business Audio, SoundBlaster, and the Multimedia Personal Computer standard. This sound card can record and play back sound at a high 48-kHz sampling ratedigital audiotape quality. An optional plug-in MIDI ROM chip provides a library of digitally recorded samples of musical instruments. Bundled software includes a Windows-based recorder for embedding voice messages and audio files into OLE-compliant applications. The Digital Sound Pro 16 lists for \$159; the Digital Sound Pro 16 Plus with a SCSI CD ROM interface lists for \$229. Cardinal Technologies, 717/293-3000, 717/293-3055 (fax).

Reader service no. 651

Claris FileMaker Pro 2.1 for Windows

Claris's cross-platform database for Windows and Macintosh PCs is now compatible with popular peer-to-peer networks such as Windows for Workgroups and LANtastic. Additional LAN support includes Banyan VINES, Novell Net-Ware, Microsoft LAN Manager, and other NetBIOS networks. FileMaker Pro 2.1 now supports Apple's QuickTime for Windows, which lets you add full-motion video, animation, and sound to your database records. New DDE support lets FileMaker Pro interact with other applications. For example, you could instruct Excel to create a chart from a spreadsheet file, and then send the chart to a FileMaker Pro 2.1 database. FileMaker Pro 2.1 costs \$129 through January 31; upgrades are \$20. Claris Corp., 408/727-8227.

Reader service no. 652

Quick Restart for Windows and DOS

Think of this handy program as an electronic bookmark. Quick Restart is an auto-resume utility for your PC. Simply hit a hot key or click the mouse; Quick Restart then takes a snapshot of all your open files and applications and saves the information to disk. You then turn your PC off. When you turn on the PC, Quick Restart loads all programs and files that were active during your previous session, returning you to where you left off. Quick Restart is particularly convenient if you work with slow-loading software such as desktop publishing or CAD applications. It lists for \$39.95. PowerPro Software, 415/345-9278, 415/345-5128 (fax).

Reader service no. 653

For more information about any product, contact the manufacturer or circle the number on the reader service card.



Why SETTLE FOR A DOT MATRIX PRINTER WHEN YOU CAN HAVE ALL THIS?

For about the same price as a dot matrix printer, the new TI microMarc gives you the same 300 dpi print resolution as most laser printers. And with its advanced inkjet technology, print quality stays constant for the life of the print cartridge, instead of fading like a dot matrix ribbon. The microMarc is so quiet, reliable, inexpensive to run and easy to use, it can help you do more with your printer than you ever thought possible. At a price you never thought possible. For more information and the dealer nearest you, call 1-800-527-3500.

EXTENDING YOUR REACH WITH INNOVATIONTM



If you've got the drive, you can be anything you want.

Scuba Diver



OceanLife™

Dive into the world's first CD-ROM-based field guide.

Volume 1 lets you swim with the exotic and elusive marine life of the tropical reefs of the Southwestern Pacific, \$39.95.

Volume 2 takes you to the seas of Micronesia, from Palau to Pohnpei. Larger 240 x 180 QuickTime™ images and narration bring a broad array of phyla to life. \$49.95. Order separately, or order the complete series—that's four volumes in all—for just \$149.95. Mac and Windows versions available.

Astronaut



Space: A Visual History of Manned Space Flight™

Now you can explore life in zero gravity. This exciting CD-ROM brings you a unique collection of narrated films from the NASA video library—featuring highlights from 30 years of U.S. space exploration. You'll get everything from the first Mercury flights, to Apollo moon walks, and on to the current shuttle flights. Mission profiles, spacewalks, histories, and more. This is the only CD of its kind. \$49.95. Mac and Windows versions available.

Movie Critic



QuickTime:™ The CD™

Judge the winners of the International QuickTime Film Festival for yourself. QuickTime: The CD 1992 contains digital films in categories including animation, commercial, education, experimental, narrative, documentary, micromovie, and more. \$29.95.

QuickTime: The CD 1993, a two-CD set, brings you nearly one gigabyte of films. See what the best in the world have been up to now. \$49.95. Available for Windows, QuickTime: The CD1992/1993, two-CD set. \$64.95.

Art Curator



The Art of Macworld™

If you're an art lover, you'll want to own this CD. It's the definitive collection of award-winning Macintosh-generated graphics and illustrations from the pages of Macworld* magazine.

The Art of Macworld is an electronic coffee table-style book based upon the work of the best-known Macintosh artists in the world. You'll find a complete overview of the artwork and be able to trace its evolution across an eight-year period. Contact information for all of the artists is also included. \$39.95.

Now you can be anything you want. All you need is a CD-ROM drive and a little help from Sumeria. To get started, call for your CDs today. Please specify Macintosh or Windows versions when ordering.

Call 800-4-SUMERIA to order in the U.S. and Canada.

Foreign orders, phone 415-904-0889. Fax orders, dial 415-904-0888.

For more information, contact: Sumeria, Inc., 329 Bryant Street, Suite 3D, San Francisco, CA 94107. To order by phone, please call 800-478-6374 and have your Visa® or MasterCard® ready. All orders payable in U.S. dollars. Domestic orders add \$2.50 per CD, foreign orders add \$5 per CD for shipping and handling. California residents add applicable sales tax. Please allow 4 to 6 weeks for delivery.

SUMERIA

Win an NEC Image 466 PC

LAST, FIRST NAME

Have you ever contacted your PC maker for service and support? Or has your PC been trouble-free? Tell us about it! Fill out and fax in the questionnaire below-even if you have no problems to report-and we'll enter you in a drawing to win an NEC Image 466, featured in this month's preview of Windows NT PCs.

HOW TO ENTER: Fax your completed questionnaire, along with your name and phone number, to PC World at 415/267-1779. If you have trouble connecting to this number,

don't have a fax ma	chine, you can mai	I your survey to Fa	OT fax a cover page, If you x Survey, Box 10-SS, <i>PC World</i> , our survey in no later than	DAYTIME PHONE NUMBER	10	0	_		0				
October 30.		7.			20	00	0	0	00	0	5 6	00	0
EAR IT OUT. Clearly numbers at right; fi then fill out the res	print your name (u Il the appropriate c t of the questionnal	ise block capital le ircle under each di ire. WHEN FILLING	OCOPY THIS PAGE; DO NOT etters) and your fax and phone igit of your phone number. THE CIRCLES, AVOID GOING id where prohibited by law.	3 4 8 8	0000000	000000000	000000000	0000000000	0000000000	0000000000		0000000000	0000000000
ABOUT YOUR	PC			PROB	LEM	REP	ORT						
	urer of the PC you use	most frequently?						C, was an	пу соп	ponent "dead on a	rrival"?		
O Acer	O Cornell	O Micron	○ Tangent	O Yes			Don't know						
○ Acma ○ ALR	O DEC	○ MIS ○ Mitac	Texas Instruments Toshiba	-		-	? (Check all t		-	Madam (for board	0		
Ambra	O DTK	O NCR	○ Tri-Star	O CD R		-	Graphics/video Hard drive	board	-	Modem/fax board Monitor/screen	-	ower supp ound boar	*
O Apple	○ Epson	O NEC	O Twinhead	O CPU	UM	-	(eyboard		-	Motherboard	-	ther	u
O AST	O Everex	O Northgate	O Unisys		by drive	-	Memory		-	Mouse	0	Mici	
Austin	O Gateway	O Packard Bell	O USA Flex	Citopi	oj dilito	0,	nemory		0	mouse			
O Axik	Grid Systems	O Panasonic	○ Wang	For the	followi	ng que	stions, descr	be your	most r	ecent HARDWARE-r	elated p	roblem w	th this PC.
○ Blackship	O Hewlett-Packard	O PC Brand	○ Wyse	Did you o	contact	the ma	nufacturer fo	r	Wha	at was this problem	finally	Identified	as?
○ Canon	O Hyundai	○ Samsung	○ Zenith	repair se	rvice or	techni	ical support?		0	Faulty component		O Devi	ce conflicts
○ Compaq	○ IBM	○ Sharp	○ Zeos	O Yes					0	Incorrectly installed	softwar	e O os	roblem
○ CompuAdd	○ Insight	Swan	Other (specify):	O No					_	Wrong configuration		O Othe	,
Compudyne	 Leading Edge 	○ Tandon		O Not s						Faulty peripheral		O Don	t know
○ CompuTrend	Micro Express	○ Tandy		100	0.5 2 3 30 3 4		which one wa		1		~ .		
100011-4		5 Jan 193		O Batte			Graphics/video	board	-	Modem/fax board		ower supp	*
Is this PC a?	Where did you	When did you buy this PC?	O CD R	MOM	_	lard drive		_	Monitor/screen	_	ound boar	đ	
O Desktop	O Local deale		O This month	O CPU	no delesa	-	Keyboard			Motherboard	0)ther	
O Notebook/laptop			1-3 months ago	O Flopp		77.			-	Mouse			
O Hand-held		n field sales force	O 4-6 months ago			have y	ou had a pro	blem		v recently did this			PURCHASI
Is this PC a?	~	ip discount store	○ 7-12 months ago	with this		Alma	O Four			blem occur? This month		his proble ess than 1	
O Pentium/586 O 80486	O Computer: O Home/elec	The state of the s	O More than 12 months ago Not sure	O This	was iirs	tume	O More t	han four	_	1-3 months ago	-	-3 month	
0 80386	O Retail store	ctronics store	Would you buy this brand	O Three			O More to	ian iour		4-6 months ago	-	-6 month	
0 80286	O VAR	•	of PC again?			necur	under warran	642	-	7-12 months ago	-	-12 mont	
Other (specify):	O Other (spe	ciful.	O Yes	O Yes	problem	occur	under warran	ty t	_	More than 12	-	More than	
Odici (specify).	O duici (spe	City).	O No	O No					months ago	_	nonths		
			C 110	O Not s	sure				0	Not sure		lot sure	
Do you use this PC a	t? In t	terms of PC skills, wo	uld you describe yourself as	- 7									
O Work O Home		Novice O Int	termediate O Experienced	For the	follow	ing que	stions, descr	ibe your	most r	recent SERVICE or S	UPPOR	T experien	ce.
				What typ	e of se	rvice/s	upport did yo	u receive	?	If phone service, ho	w long	were you	on hold?
				O Phon		-	express system			Not at all	-	-10 min.	
120 - 2- N/ W				O On-si		-	express compo	nent swa	4	Less than 1 mir	-	10-20 min	
Are you reporting?		O		O In-sto	ore help	0	Factory return			1-2 min.	01	More than	20 min.
A problem during		O No problems ever						15.		○ 2-5 min.	12 14	8 00 01	4
An older problem	the ten was and a service	O No problems sinc	e last responded to survey				fore you talk			How long did it tak	e to res	olve the p	roblem
reported in this s							lly helped you 3-5 days	?		completely? Less than 1 wee	10	Inre than	1 month
	rting a problem, please			O 1-24			1 week			1-2 weeks	-	Vever resol	
To REPORT a probl	em, fill out the Problem	m Report (right colum	in).	O 1-2		-	More than	1 week		3-4 weeks	0,	10101 10001	
UPTIME REP				100	problem		ved to your	- 31990		Based on the service would you buy this			
How many consecuti	ve months has your PC	been trouble-free?		O Yes		lo				○ Yes ○ No			
O 3 months O 9 months O 15 months O More than 18 months O 6 months O 12 months O 18 months				On the whole, how satisfied were you with the service and support you received? 1 2 3 4 5				1e	How likely is it that you would recommend this brand of PC to a friend or colleague? 1 2 3 4 5				
STOP HERE If you'	re not reporting a prob	lem.		Not at all		tisfied	Extremely sati	sfied		Not at all Likely		extremely like	y

Marketplace

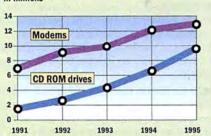
A Monthly Survey of Prices on Popular Models

Over the Counter	Configuration			lational —	
	10 /	1 6		Ust price	Average street price
What you pay for popular	3 / 3	1		price	Tage
PCs (with monitors) CP	U/speed RAM	1	ard \\	8	Str
\	(MHz) (M	D) \	(MB)	1	etT
n/a = not applicable		1	//	\	rice
ly a list application		1		1	
386-class desktop PCs					
ALR Flyer SC 3/33s	1386SX-33	2	170	\$1268	\$1174
AST Bravo 3/33s	AMD386SX-33	4	120	\$1495	\$1342
Dell Dimension 386DX/33	1386DX-33	4	212	\$1449	\$1449
DECpc 333sx LP	i386SX-33	4	52	\$1399	\$1399
HP Vectra 386/33N	1386SX-33	4	80	\$1898	\$1655
486SX-class desktop PCs					
ALR Flyer SC 4/33s	i486SX-33	2	240	\$1568	\$1419
AST Bravo 4/33s	1486SX-33	8	213	\$2360	\$2135
Compaq ProLinea 4/25s	1486SX-25	4	240	1	\$1695
CompuAdd 433S	1486SX-33	4	200	\$2285	\$2285
Epson America Progression 486SX/25	1486SX-25	4	240	\$2538	\$2017
HP Vectra 486/25N	1486SX-25	4	212	\$2338	\$2008
Gateway 2000 4SX-33	1486SX-33	4	212	\$1495	\$1495
IBM PS/2 Model 85XP 486 ²	1486SX-33	8	212	\$4739	\$4220
NEC Image 425	1486SX-25	4	170	\$2319	\$2078
ZDS Z-Station 433Sh	1486SX-23	4	200	\$1992	\$1992
203 2-Station 433SH	140034-33	*	200	\$1992	\$1994
486DX-class desktop PCs					
AST Bravo 4/66d	i486DX2-66	8	210	\$2660	\$2427
Compaq ProLinea 4/33	i486DX-33	4	340	1	\$2242
CompuAdd 466	1486DX2-66	8	340	\$2995	\$2995
DECpc 466d2 LP	1486DX2-66	8	245	\$2949	\$2949
Dell 466/M	i486DX2-66	8	320	\$3249	\$3249
Gateway 2000 4DX2-66	i486DX2-66	8	340	\$2495	\$2495
HP Vectra 486/66U PC	i486DX2-66	4	240	\$4358	\$3465
IBM Ambra T466DX	1486DX2-66	8	340	\$2479	\$2479
IBM PS/ValuePoint 433DX/D	1486DX2-33	4	120	\$2049	\$2049
NEC Image 466	1486DX2-66	4	340	\$3374	\$3035
Zeos 486DX/33	i486DX-33	8	214	\$2295	\$2295
Portable PCs			-		1
	1386SL-25	4	60	\$2099	\$1902
AST PowerExec 3/25SL				1	
Compaq Contura 3/25	1386SL-25	4	80		\$1528
Compudyne Slimnote 486DX2/66	1386DX2-66	4	210	\$2999	\$2999
Dell 320SLi	1386SL-20	2	120	\$1699	\$1699
Epson ActionNote 4SLC/25	486SLC-25	4	120	\$1672	\$1672
Gateway 2000 Nomad 450DXL	1486DX2-50	8	200	\$2995	\$2995
HP 95LX	NEC V20-5	1	n/a	\$799	\$602
HP OmniBook 300	Am386SXL-25	2	40	\$1932	\$1932
IBM ThinkPad 700	IBM486SLC-25	4	80	\$2750	\$2575
NEC UltraLite SL/20	i386SL-20	2	80	\$1499	\$1300
NEC UltraLite Versa SL/25C	1486SL-25	4	120	\$4269	\$3748
TI TravelMate 4000WinDX	i486DX-25	4	120	\$2799	\$2412
Toshiba T4400C	1486SX-25	4	120	\$3999	\$3545
ZDS Z-Note 325Lc	i386SL-25	4	120	\$3306	\$3306

From a national survey of more than 180 dealers by International Data Corporation. Figures are based on at least four price quotes for each machine. Prices are based on manufacturer's standard configuration with monitor.

Vendors Target Growing Base of CD ROM and Modem Users

Installed base of CD ROM drives and modems

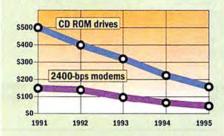


A growing number of software programs as well as information and interactive services require either a CD ROM drive or a modem. These devices offer unique benefits. CD ROMs provide convenient installation for large applications, and new CD products make shopping easier. IBM's CD Showcase, for example, lets you try out up to 80 software applications and call for a code to activate the application if you find one you like. Modems offer access to time-sensitive data, such as financial and marketing information, an area in which online services have the edge because they get updated constantly. The future holds more interactive services-such as a classified directory that pops up the address and directions when you select an advertiser-but vendors are still deciding between CD ROM and online delivery.

Source: BIS Strategic Decisions, Dataquest Inc.

CD ROMs and Modems Become More Affordable

U.S. street prices



Thanks to falling prices, analysts say, most PC users can afford a CD ROM drive, a modem, or both. Moreover, a budget-pressed office needs only one CD ROM drive, says Jeff Silverstein, editor of the Software Industry Bulletin. For modems, prices are getting so low "there's no reason not to buy," says Joe Noel, director of networking research at Dataquest. A basic 2400-bps modem will soon cost less than most software. Prices are dropping even for faster modems: A 9600-bps modem will cost \$300 in 1994, predicts Noel, compared with \$903 in 1991.

Source: InfoCorp, Dataquest Inc.

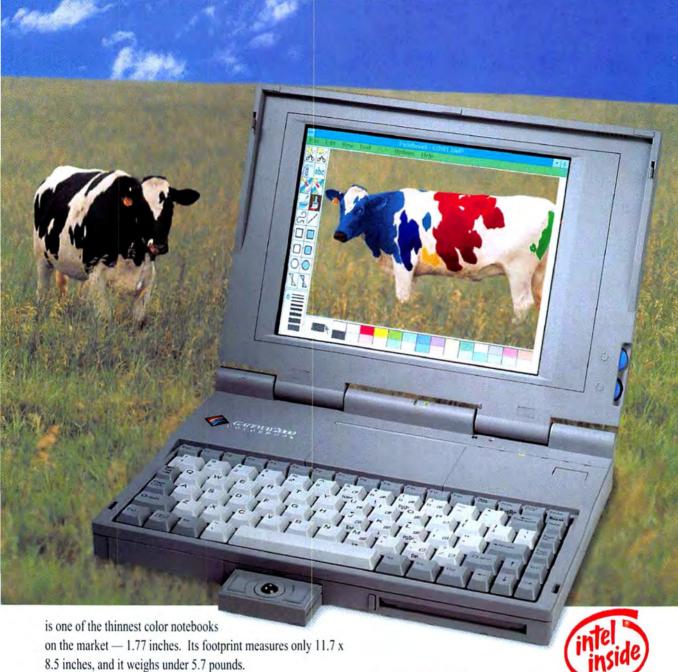
¹ No list price available. 2Uses MCA bus.



The Choice Is

No Longer

Black And White.



486 Power

You don't have to sacrifice performance to have color, either. ColorBook models are based on SL Enhanced Intel486® CPUs. Both ColorBook models include a floppy drive, 4MB of RAM (upgradeable to 20MB), and a large, fast removable hard drive. These notebooks are powerful enough to become your only computer!

Integrated Track Ball And PCMCIA Slots

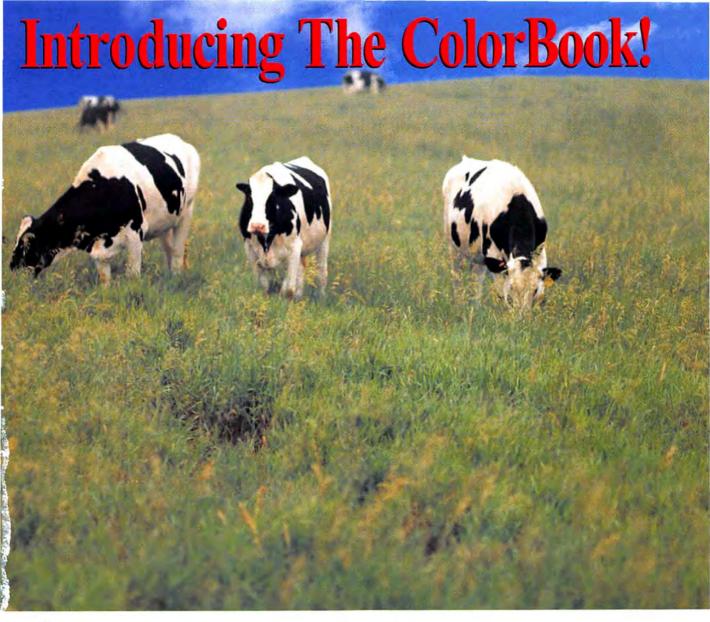
The ColorBook includes a built-in track ball, which is much easier to use than a mouse in most portable situations. You also get two PCMCIA Type II card slots so you can plug in dozens of available PCMCIA peripherals.

Greener Pastures

The grass is greener on the ColorBook side of the fence! It's an extraordinary value even by Gateway's standards — and we wrote the book on value! We have a reputation for offering the best prices on high-quality products with exceptional service from friendly folks in the Midwest. That's why the choice of a computer supplier is black-and-white, even when you're buying a color notebook! Give us a call.



8 0 0 - 8 4 6 - 2 0 3 0



For the same money, you can have a black-and-white 486 notebook. Or you can have a color 486 notebook. Which is it going to be? Hay, it's not too hard to spot the best deal: the ColorBook from Gateway 2000! The new ColorBook has everything you're looking for in a portable at a price you'd expect to pay for a monochrome system. That's a special breed!

Exploding The Myth

Why do you expect to pay so much more for a color portable? Because other manufacturers always charge a plump premium for color. They've been milking the market, brainwashing you into thinking high-quality color costs a lot more to manufacture. It doesn't! We're selling the ColorBook for our usual cost-plus-small-margin. Now other companies will have a hard time perpetuating the color portable price myth. (Competitors absolutely *hate* us! Isn't it great?)

Experts' Reaction

We gave several PC trade publication editors a sneak preview of the ColorBook. Here's what they said about it: "Way cool!" "Dead on." "You won't be able to make enough of these."

Dazzling Color Display

The editors were impressed by the bright, crisp color graphics from the latest-technology, dual-scan STN display. It's a 9.4-inch VGA LCD, backlit for use in any lighting conditions. The editors said the ColorBook has the best STN color display they had ever seen! When they learned one model was priced *less than \$2,000*, they were convinced the ColorBook will cause a stampede in the industry.

No Compromise On Size

Adding color to a portable usually means adding weight and bulk. Not so with the Gateway 2000 ColorBook. The ColorBook

Introducing The ColorBook!



The ColorBook is one of the thinnest color notebooks on the market - 1.77 inches. Its footprint measures only 11.7 x 8.5 inches, and it weighs under 5.7 pounds.



You'll appreciate the convenience of using PCMCIA cards. They're as easy to carry as credit cards, and they plug right into your ColorBook.



The integrated track ball slides out from a compartment by the space bar on the keyboard. You simply pull it out and go to work. Finished? Just slide the track ball back into the ColorBook.

FEATURES

480 resolution.

Size

SL Enhanced Intel 486® Processor

ColorBook notebooks are based on Intel's new SL technology 486 microprocessors, which makes them powerful enough to serve as your desktop PC with an external mouse, keyboard and monitor. Supports simultaneous video on an external monitor at 640 x

With the ColorBook, you get great color at a great price while maintaining excellent portability.

Dual-Scan STN Color Display

Dual-scan STN color is the latest technology in portable color displays, and it looks fabulous! You get 256 colors with the ColorBook running in VGA

PCMCIA Type II Slots

Add a modem, network card or any of dozens of available PCMCIA-compatible peripherals. The ColorBook's two Type II slots can also be used for one Type III PCMCIA card.

COLORBOOK

- Weight: Under 5.7 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- SL Enhanced Intel 486 Processor
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- Removable Hard Drive
- 9.4" Backlit VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots
- Integrated Track Ball (2 Buttons) 85-Key Keyboard
- Parallel, Serial & PS/2 Mouse Ports
- External CRT Port
- MS-DOS®6 and Windows™3.1

- 486SX-25
- 25MHz SL Enhanced Intel 486SX Processor
- 80MB IDE Hard Drive

\$1995

486SX-33

- 33MHz SL Enhanced Intel 486SX Processor
- 170MB IDE Hard Drive

\$2395

486DX-33

- 33MHz SL Enhanced Intel 486DX Processor
- 170MB IDE Hard Drive

\$2695

TRAVELER'S PACK

- Carrying Case
- Extra NiMH Battery

With PCMCIA 96/24 Fax/Modem

\$329

With PCMCIA TelePath™ Fax/Modem

\$449

COMBO PACK

- 124-Key AnyKey Keyboard
- MS Mouse
- 15" Color CrystalScan 1572FS

Options include: PCMCIA fax/modem cards, PCMCIA network cards, 4MB or 16MB RAM upgrades, carrying case and extra NiMH batteries. Call for details.





610 Gateway Drive • P.O.Box 2000 • North Sioux City, SD 57049-2000 • Phone 605-232-2000 • TDD 800-846-1778 • Fax 605-232-2023 • FaxBack 605-232-2561 Sales Hours: 7am-10pm Weekdays, 9am-4pm Saturdays (Central Time)

Rlowcharting

Easier and Faster than ever before!

HavenTree has cranked up the power on EasyFlow with a release that lets you create your own shapes, offers a host of new text handling features, exports charts in a wider variety of graphics formats than any other flowcharting program and supports more printers and plotters than any other DOS-based competitor. We've even given our already highly intelligent line router an IQ boost. These new and improved features, combined with those listed below, make EasyFlow the World's #1 flowcharter.

- · Create new shapes or modify existing ones.
- Automatic off-page connectors and adjacent-page mapping help make complex charts easier to read.
- Automatic page borders and numbering.
 - · Automatic text formatting.
 - Context-sensitive help.
 - Support for LIM expanded memory.
 - Runs on your network.
 - Exports charts to ASCII, CGM, DXF, EPS, GEM, PCX, HPGL, SYM, TIFF and WPG file formats.
 - Charts compatible with EasyFlow Mac version.
 - Improved color output HP DeskJet 500C, HP PaintJet, Epson LQ2550.
 - Tutorial included.

Introducing EasyFlow 8.0 (for DOS)

EasyFlow is also available for the Mac

See your dealer today or call now:

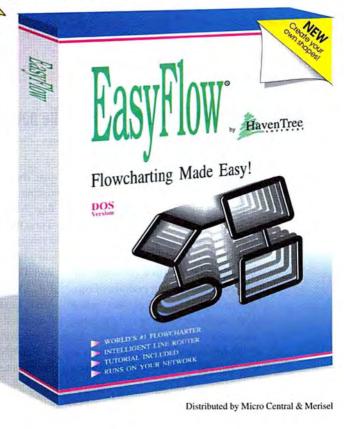
1-800-267-0668 ext.47

(In Canada: 613-544-6035)

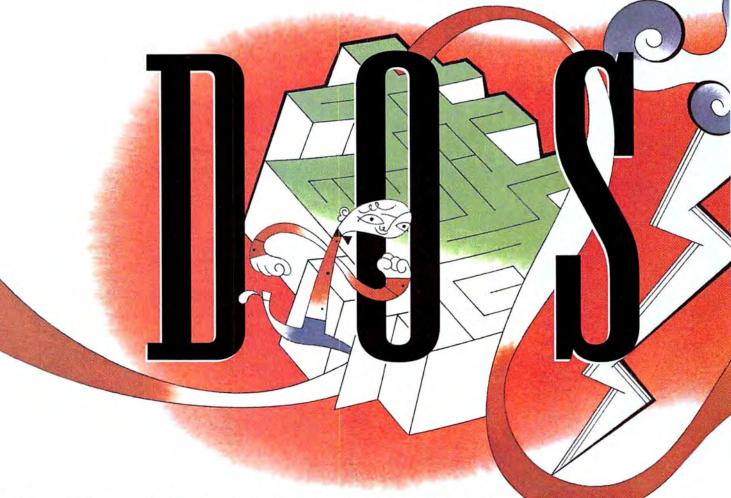


HavenTree Software Limited P.O. Box 470-M. Fineview, NY 13640-0470 AD0007-930107

Circle 79 on reader service card



Troubleshooting



You want the new configuration options, the new commands, and the compression, but you don't want

hinking of upgrading to DOS 6.0? Maybe you're nervous because you've heard the rumors that this new DOS is bedeviled by bugs and other inconsistencies. We heard the rumors, too, and decided to look into them. We came up with a compendium of tips, undocumented features, and, yes, a few bug reports that will help make your upgrade path a smooth one.

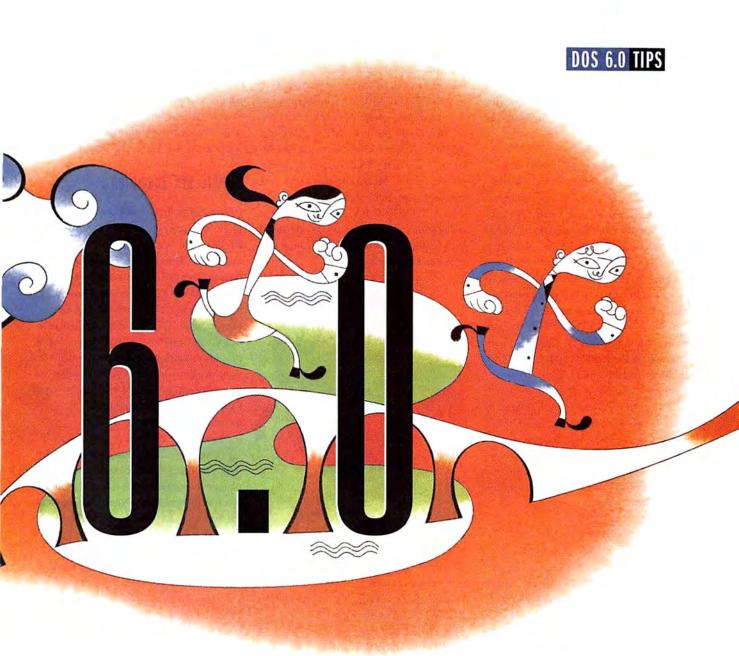
We had lots of help. The editors at PC Welt, PC World's German counter-

part, contributed their expertise, stresstesting DOS 6.0 in their search for any flaw Microsoft might have missed. Then we did more testing and added a few goodies of our own. We divvied our advice into six sections: Compression Tips, Managing Memory, CON-FIG.SYS Simplified, Compatibility Alert, Taming the Other Utilities, and Command Line Performance. And for all you Windows users, we added icons to highlight Windows-specific tips. In the meantime, happy upgrading.

Compression Tips

The Limits of DoubleSpace

Here's an undocumented goody: A drive compressed with MS-DOS 6.0's compression utility, DoubleSpace, is limited to 512MB. Even more vexing, if you have a 340MB or larger drive that's almost full, DoubleSpace will probably tell you it has insufficient space to compress your files. If that happens, don't give up hope. Back up about 100MB of data to a floppy or an



the headaches. Read on: We identify the major problem areas and show you how to avoid them.

external device, then delete those files from your hard disk and run Double-Space. Afterward, copy the backed-up files to your hard drive and run DoubleSpace again.

Keeping Your RAM Drive Where It Belongs

If you use DoubleSpace, don't be surprised to find that your RAM drive suddenly has a new drive letter. When you install DoubleSpace, it creates a new drive, skipping the first four available drive letters and inserting a DEVICE=DBLSPACE.SYS line into your CONFIG.SYS. If this line appears before the DEVICE=RAM-DRIVE.SYS line in CONFIG.SYS, DOS will reassign your RAM drive to the first letter following the Double-Space drive. This won't do any damage to your RAM drive, but it might confuse you a bit. If you'd like to reinstate the RAM drive to its original letter, make sure that RAMDRIVE.SYS is loaded before DBLSPACE.SYS in CONFIG.SYS.

Avoid DoubleSpace on Windows NT

On dual-boot DOS/Windows NT systems, don't compress any drives you need to use with NT. Windows NT doesn't load the DoubleSpace driver when it boots, so you won't be able to call or view compressed files at NT's version of the DOS prompt.

Don't Compress the Compressed

There are files that should not reside on a DoubleSpace drive. For instance, ZIP and ARC files, as well as com-



pressed video and sound files, should be placed on an uncompressed drive. Double-Space doesn't recognize if a file was already compressed and will try to compress the data again, which is time consuming and ineffective.

Network Mayhem Courtesy of DoubleSpace

DoubleSpace disks on local machines don't always agree with network drive mappings. That's because by default, a network logs in to the first available nonlocal drive. Unless you have a LASTDRIVE= statement in your CONFIG.SYS, DOS reserves drives A: through E:, and the network chooses F: as its log-in drive-a fairly common scenario. If you do have a LASTDRIVE= statement, say LASTDRIVE=P, the network assumes drives A: through P: are reserved by the local PC and chooses Q: as its log-in drive. DoubleSpace, however, reserves a number of drives immediately following your PC's last physical drive for itself. It's not uncommon, then, for Double-Space to have laid claim to drive F: as a compressed drive. To avoid the problem, network administrators need to rewrite their log-in scripts so users can log in to a drive DoubleSpace hasn't reserved.

Windows for Workgroups Crashes

WINDOWS If you're running Windows for Workgroups over DOS 6.0, your PC may lock up when you load DBLSPACE.SYS into high memory in CONFIG.SYS. To avoid this dilemma load PROTMAN.DOS first, then DBLSPACE.SYS. The two lines don't have to be back to back, as long as they're in the right order.

Managing Memory

The Shadow of Your ROM

If your PC doesn't offer video or BIOS ROM shadowing, DOS's EMM386 memory manager can do the shadowing for you. In your CONFIG.SYS, include a line such as 'DEVICE=C:\DOS\EMM386.EXE ROM=C000-C7FF ROM=F000-FFFF'.

This will copy the slow video or system BIOS ROM from the indicated memory addresses into fast working memory. In some cases this shadowing will be faster than that offered by many PCs. And if you have an expansion board that needs a memory location EMM386 shouldn't touch, add RAM=xxxxxxxxx to your EMM386 line.

Disappearing Redirections

MemMaker configures your PC's memory, but it deletes any redirections you may have in your AUTOEXEC.BAT in the process. For example, your AUTOEXEC.BAT might include the line 'LH C:\MOUSE.COM > NUL, which redirects the installation message to the NUL device, keeping it off the screen. MemMaker, as part of its memory management, however, reworks your AUTOEXEC.BAT, stripping out any redirections. To get the NUL command back, open AUTOEXEC.BAT in a text editor and replace it manually.



MemMaker Replaces Variables

When MemMaker manipulates the AU-TOEXEC.BAT file, it replaces environment variables with a hard-coded constant variable. For example, if your AUTOEX-EC.BAT includes the lines: SET DRIVE=D %DRIVE%:\DOS\DOSKEY

MemMaker will change them to: SET DRIVE=D

LH /1:xxxx D:\DOS\DOSKEY

If you want to make sure your AUTOEXEC.BAT command continues to use variables, you'll have to edit your AUTOEXEC.BAT manually.

What's MEMMAKER.INF?

If you're a do-it-yourself memory manager type, there's a handy though undocumented file in DOS 6.0. Called MEMMAK-ER.INF (see the screen on the next page), it's a text file that provides information about which programs or drivers MemMaker should ignore or disable during optimization. Drivers and programs marked with an asterisk (*) need to remain in conventional memory, and MemMaker will not attempt

to load them into upper memory. Drivers and programs without an asterisk will be disabled by MemMaker, then reactivated when the optimization is finished. If you've installed a program and you'd like MemMaker to keep its mitts off, you can always add it to the MEMMAKER.INF file.

CONFIG.SYS Simplified

Clearer Multiconfiguration Names

DOS 6.0 lets you doctor your CON-FIG.SYS file so your PC offers a start-up menu of different configuration options at boot-up. But the DOS manual is sketchy in its explanation of how to name those configurations (called *configuration blocks*) for easy identification. The title of the configuration block can be as long as you desire, but it cannot contain spaces. For instance, if you want to offer two options—one that logs on to a network and one that doesn't—your CONFIG.SYS entry could read:

menuitem=Network menuitem=No_Network

For an even fuller, less cryptic start-up menu, you can add a comma and an explanatory comment after the configuration block as in 'menuitem=Network, Log on to the network' and 'menuitem=No_Network, Don't start the network'.

In the start-up menu, you'll see the explanatory comments instead of the configuration block titles.

Drivers for Every Configuration

New programs often load new drivers into the CONFIG.SYS file, which can wreak havoc with carefully designed multiconfigurations. Since most installation programs add drivers to the end of CONFIG.SYS, it's likely a driver could be loaded for one configuration and not for any others you might have. To ensure this won't happen, be certain that the last line of CONFIG.SYS is [COMMON] (see the screen on the next page). Now any drivers added to the end of the file will be in the [COMMON] block and will be shared by all configurations. And don't worry if you have another [COM-MON] elsewhere in CONFIG.SYS; you can have more than one.

Keep Configuration Block Names Unique

If you use the command GOTO %configuration block% in your AUTOEXEC.BAT or other batch files to jump to a configuration block variable, make sure none of your configuration labels starts with the same eight characters. This differentiation is important because the GOTO command looks only at the first eight characters of a label. So if one configuration block is labeled Windows_network and another is labeled Windows_no_network, the batch file command GOTO Windows_no_network won't take you to the proper place. The batch file will always jump to the first eight-character match (Windows_network) and never find the second one.

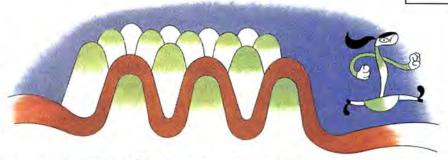
Separate CONFIG.SYS for Laptop Transfers

The Interlnk utility lets you transfer data between a laptop and a host PC. But for Interlnk to work, you must load the device driver INTERLNK.EXE into your CONFIG.SYS file, tying up 9K of RAM. Unless you use Interlnk constantly, this is a waste of space. So why not create a multiconfigured CONFIG.SYS that loads Interlnk when you want it? Make sure the Interlnk configuration block includes the line DEVICE=C:\DOS\INTERLNK.EXE.

The Long and Winding PATH

DOS 6.0 has a new trick up its sleeve: It allows a PATH longer than 122 characters. In your CONFIG.SYS file, type SET PATH=followed by all the directories you want to include in your PATH. Note that this command doesn't work in AUTOEXEC.BAT; in fact, a PATH statement there or in any other batch file will reset your PATH.

Of course, when you enter PATH at the command line, DOS will still display only 127 characters (your directories plus the five



characters in 'PATH='). The directories beyond the initial 127 characters, however, will have been added to your PATH. But just because DOS offers a feature doesn't mean you must take advantage of it. In this case, the real trick is to avoid the temptation to use an overly long PATH statement. The larger the PATH, the longer it takes DOS to find a command you're calling.

Compatibility Alert

Don't Mix and Match Disk Tools

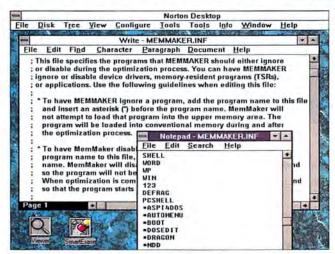
A few rules of thumb: Never use one operating system's utilities on another's drives. Don't use any disk management tools that haven't been upgraded specifically for use with DoubleSpace, and don't try to use two memory managers at the same time. Here are some specifies:

- Avoid using DOS's Defrag on an OS/2 partition. It almost always results in severe data loss.
- PC Tools 7.0's PC Shell doesn't show any files on a DoubleSpace drive. You'll need to upgrade to PC Tools 8.0a, which is fully compatible with DOS 6.0.
- Norton Utilities' WipeInfo and the SpeedDisk option 'Unfragment Free Space' don't support DoubleSpace drives.

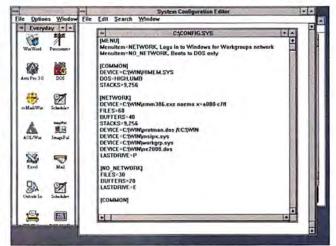
Where to Expect Problems

Will your applications and hardware run under DOS 6.0? Most will, but we've heard reports of several that won't. Fixes may be available by the time you read this.

- SpeedCache Plus 4.03, which ships with lomega drives, is incompatible with DOS 6.0. The updated version, 4.04, works under DOS 6.0 and is available for \$14 plus shipping from Iomega (800/456-5522).
- The ASPI driver for SCSI drives may have problems with MemMaker and the regular DOS Setup. Setup requires ASPI4-DOS 3.1 or later. If you want to run Mem-Maker and you have ASPI4DOS 3.0 or earlier, make sure ASPI4DOS.SYS appears before HIMEM.SYS in CONFIG.SYS.
- With various versions of Clipper you may get the error message 'Not enough memory'. You can generally fix this by adding the parameters NOEMS NOVCPI to EMM386.
- If your Iomega Bernoulli drive is your bootable drive and you're using the OAD driver, expect problems with DOS 6.0's Setup. The workaround is to disable the OAD driver. After you've installed DOS, you can reinstate the OAD driver.
- The Interlnk program doesn't work with the Xircom Parallel Port Multiplexor.



MEMMAKER USES MEMMAKER.INF to track programs or drivers it should disable or ignore during memory optimization.



PLACE [COMMON] AT THE END OF A MULTICONFIGURATION CON-FIG.SYS and commands beneath it will be used by all configurations.

DOS 6.0 TIPS

- Dell 486DX-50 PCs lock up when you access the CMOS if EMM386.EXE is loaded with the parameter HIGHSCAN. The workaround is to add the line I=F000-F7FF after the EMM386.EXE line in CON-FIG.SYS. Or if you don't need an additional 32K of upper memory, you can delete the HIGHSCAN parameter.
- DoubleSpace is incompatible with the BIOS in some Sharp and Canon PCs and with BIOS 1.2 version 4, found in some Acer computers. In these systems, the PC locks up when DoubleSpace is installed. If you have this problem, reboot with a DOS 5.0 or 6.0 boot disk that does not have the file DBLSPACE.BIN on it, then delete the file DBLSPACE.BIN (a system, hidden, and read-only file) from the root directory of your C: drive. To do this in DOS 6.0, enter DELTREE C:\DBLSPACE.BIN. If you're using DOS 5.0, enter ATTRIB -S -H -R C:\DBLSPACE.BIN and then enter DEL C:\DBLSPACE.BIN.
- The Compaq LTE's Hibernation Mode is incompatible with DoubleSpace. You'll need version 2.11 of the Power Conservation utility (PWRCON) available on the Compaq supplemental programs disk for MS-DOS 6.0. Call Compaq support at 800/345-1518.
- If you use a Logitech mouse, you may get an error message after installing DOS 6.0 that your mouse driver is outdated. Users can download the latest Logitech mouse driver free of charge from the company's bulletin board (510/795-0408) or expand the Logitech mouse driver on disk 2 of Windows 3.1 (use the command C:\DOS\EXPAND A:LMOUSE.CO_ C:\DOS\MOUSE.COM).
- If you're using DOS 6.0's DoubleSpace with Mountain Network Solutions' FileSafe backup software, be careful. If you choose the image/full backup option, you may lose data. Choose selective (sequential) backup instead, and you should have no problems.
- If your machine is equipped with Quantum's Hard Card XL or Hard Card II and no hard drive, you'll need to get a new chip from Quantum's technical support (408/434-9262) to run MemMaker and DoubleSpace. You may also encounter problems running MemMaker if you have a Hard Card EZ. If so, disable the HardCard driver, run MemMaker, then load the Hard Card driver into high memory manually.

Don't Believe Everything You Read

According to the DOS 6.0 documentation, the memory manager QEMM386 from Quarterdeck is incompatible with the new DOS, but it ain't necessarily so. Turns out it's DOS's MemMaker that QEMM386 can't stomach. DOS 6.0 works just fine with QEMM386 as long as you stick to Quarterdeck's memory analysis and reporting utility Manifest rather than DOS's MemMaker.

Taming the Other Utilities

Stalled Installations

In case you missed it, here's a bug we noted in July's Consumer Watch in the Bug Watch section. If you install DOS 6.0 without some combination of Microsoft Anti-Virus, Backup, or Undelete and later decide to install some or all of these utilities using the recommended SETUP /E command, watch out. If your DOS directory appears in your path in lowercase letters, Setup won't be able to find it, resulting in an error message and a terminated installation. To work around this problem, quit Setup and use the PATH command to change the DOS directory name to all uppercase letters. Restart Setup and installation should go without a hitch.



If You Already Have a Virus

Microsoft Anti-Virus is supposed to ferret out viruses, but it has one major design flaw: It doesn't check the memory and hard disks for viruses during installation. So if you have a virus on your system when you install DOS 6.0, the operating system and all its utilities can be infected. It's therefore possible that Anti-Virus could contract a virus the first time you call on the DOS virus scanner. If the virus is halfway intelligent, Anti-Virus will not find it. To be safe, it's a good idea to use an antivirus program from a write-protected, bootable floppy disk before you install DOS 6.0. You can download a copy of McAfee Associates' popular antivirus shareware programs Viruscan (SCANV106.ZIP) and Scan for Windows (WSCAN102.ZIP) from the Virus folder on PC World Online's Software Library.

DOS Undelete Doesn't

■WINDOWS The DOS version of Undelete is unable to recover deleted directories. The Windows version can, but this is small consolation to DOS diehards who've accidentally gotten rid of the wrong directory with an errant DELTREE command. And once the directory is gone, the files are irretrievable as well.

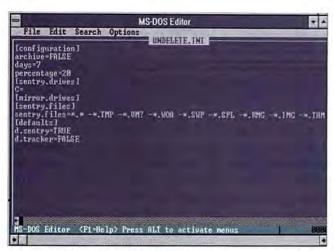
Put the Sentry Directory on a Diet

The Sentry directory—a secret directory that stores any deleted files automaticallyprovides the highest level of security against accidental file erasure. But at its default setting, it allocates 20 percent of your hard disk to the Sentry directory. That's a lot of disk space to sacrifice, especially if you don't have much to spare. To change the percentage, you'll need to alter the file UNDE-LETE.INI, which is in your DOS directory. (If you don't have an UNDELETE.INI file, you're not using the Sentry option. If you have a reference to Undelete in your AUTOEXEC.BAT file, edit it to read **UNDELETE** /Sd, where d is the drive whose files you want to protect; if you don't have an Undelete line, add it. Reboot your PC and DOS will create an UNDELETE.INI file for you and activate the Sentry option for whichever drives you've specified.)

In any text editor, open UNDELETE-.INI and search for the line 'percentage=20'. Change the value to 10 or any figure you're comfortable with, and save the file. If you decide you need to allocate more or less space later, simply change the percentage again.

Teach Undelete a Few Tricks

If you use the Sentry option, Undelete checks with UNDELETE.INI whether it should transfer a deleted file into the SENTRY directory (see the screen on the next page). You can give Undelete some



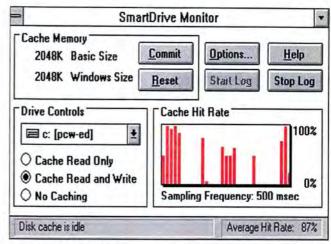
EDIT UNDELETE.INI TO CHANGE the percentage of your disk that DOS 6.0's Sentry option allocates for storing deleted files.

highly specific instructions if you know your way around UNDELETE.INI. As in the previous tip, open UNDELETE.INI in a text editor. Search for the line that begins with 'sentry.files=*.* -*.TMP -*.VM?'. The '*.*' tells the Sentry to hang on to all deleted file types, but the rest of the line (file types preceded by minus signs) lists the exceptions—those files Sentry can ignore. If any of these exceptions make you nervous, you can remove them from the list and Sentry will be on the lookout for them.

Although this feature is not documented, Sentry is smart enough to recognize a list of files and file types that it should save as well as ones it should ignore. So if there are specific files and file types that you want Sentry to hang on to—and you don't care about retaining the rest—modify the 'sentry.files=' line to read something like SENTRY.FILES=*.DOC *.TXT *.DB? *.WK? MYFILE.SPL. Now you can keep your Sentry directory small and still be sure of recovering your most important files.

Where's Undelete in File Manager?

WINDOWS: If you chose to install the Windows versions of Anti-Virus, Backup, and Undelete, DOS 6.0 creates a new Windows Program Group, called Microsoft Tools, and installs the three appropriate icons. Equally handy, DOS adds a menu item called Tools to File Manager so you can initiate Anti-Virus and Backup. But what happened to Undelete? It's there too, but you'll find it under the File menu. If you're running Windows for Workgroups, DOS goes one better, installing icons for all three utilities in File Manager's tool bar.



OPTIMIZE SMARTDRIVE 4.0 with the handy SmartMon utility, which is included in DOS 6.0 but not mentioned in the documentation.

Undelete Before Defrag

Having the Undelete command at your fingertips probably gives you a sense of security. But unless you're using the Sentry option, don't feel too secure. If you run Microsoft Defragmenter, Undelete won't help you recover files you deleted before defragging. That's because Defrag overwrites clusters containing deleted files with actual files. So before you defrag, type UNDELETE/UST to display a list of deleted files, then undelete any you might need later. Now you can run Defrag with impunity.

Does Defrag Damage Swap Files?

After you defragment your disk, Windows may report that its permanent swap file is damaged and ask if you want to delete it. This is a bug, since the swap file is probably fine. But we still recommend you answer Yes and allow Windows to delete the swap file. Now in Control Panel, double-click on 386 Enhanced and select Virtual Memory • Change • OK • Yes • OK • Restart Windows to re-create a new permanent swap file.

Getting More Memory for Defrag

When defragmenting huge or highly fragmented hard disks, Microsoft Defragmenter sometimes displays the error message 'Not enough memory' and aborts. To work around this problem, you'll need to free up as much conventional memory as possible—even if it's only temporary. Your best bet is a configuration that loads as few drivers as possible. Reboot your computer, and when the phrase 'Starting MS DOS' appears, press <f8> to step through your CONFIG.SYS file one line at a time, choosing which devices and drivers to load. Answer Y (Yes) to the 'DOS=High' line and the HIMEM.SYS device line, and N (No) to everything else, including the request to process your AUTOEXEC.BAT.

When you next reboot, you should have plenty of conventional memory—enough to give Defrag a better chance of working.

The Hidden Cache Monitor

■WINDOWS You won't find it in the manual, but DOS 6.0 has added SmartMon, a handy little utility that accompanies the SmartDrive 4.0 disk cache. SmartMon gives you a visual reading of cache activities and lets you optimize SmartDrive settings interactively (see the screen at top right). The catch: Though it comes with DOS 6.0 and installs itself in your DOS directory, it's accessible only from Windows; it isn't even mentioned in DOS 6.0's online help.

To activate SmartMon, switch to Windows' Program Manager or File Manager, select File Run and type C:\DOS\SMARTMON, or double-click on the file SMART-MON.EXE in File Manager. The monitor will appear on screen and you can play with various cache options until you find the best settings. If you plan on using this utility often, open File Manager, locate the file SMARTMON.EXE, and drag it into a Program Manager group to create an easily accessible SmartMon icon.

Don't Set Your Watch From the DOS Shell

The Power program, which loads into CONFIG.SYS, saves battery reserves on a laptop. If you use a DOS shell, though,

DOS 6.0 TIPS

you'll quickly notice an unwanted side effect: The status line's system time display is no longer accurate.

Command Line Performance

DELTREE the Destroyer

As its name implies, the new DELTREE command removes entire directories and their contents. Unfortunately, the command is not particularly well designed. For in-

stance, if you want to delete the directory C:\LETTERS but mistakenly type DEL-TREE C;\LETTERS (using a semicolon instead of a colon) and press <Enter>, DOS won't tell you that it hasn't removed the directory. Similarly, if you direct DOS to delete the C:\LETTERS directory and its contents from within C:\LETTERS, DELTREE will delete all files and sub-directories without removing the parent directory. Again, it wouldn't be unreason-

able to expect some sort of notification that DELTREE won't remove the current directory.

On the plus side, once you've issued the DELTREE command, you're asked to confirm whether you want to delete the directory and its subdirectories. A response of Y starts the deletion process. For the adventurous, Microsoft has enabled the /Y switch for this command, which will bypass the confirmation request. Use the /Y parameter only in controlled routines such as batch files, since the command DELTREE/Y *.*, if issued from the root directory, will clean your hard disk without requesting confirmation.

CONTORTIONISTS BEWARE. KINESIS PUTS AN END TO TWISTING WRISTS, ARCHING FINGERS, STRETCHING HANDS: THE AWKWARD, STRESSFUL GYMNASTICS OF TRADITIONAL KEYBOARDING. INSTEAD, THE KINESIS ERGONOMIC KEYBOARD FITS THE SHAPE AND MOVEMENTS OF YOUR BODY. WORKS WITH YOU, HOWEVER YOU CHOOSE TO WORK: IN FAMILIAR QWERTY, DVORAK OR A KEY LAYOUT OF YOUR OWN DESIGN. WITH ENERGY-SAVING MACROS, PALM RESTS, OPTIONAL FOOT SWITCHES.

WRIST ASSURED

STUDIES

AT INDEPENDENT LABORATORIES PROVE THE KINESIS IS HUMANKIND...

AND USERS AGREE: THE KINESIS KEYBOARD REDUCES EFFORT,

ADDS TO COMFORT AND PRODUCTIVITY, WITH MINIMAL ADAPTATION.

LET KINESIS STRAIGHTEN OUT YOUR ACT - CALL 800 454 6374.



KINESIS ERGONOMIC KEYBOARD. \$390. 30-DAY GUARANTEE.

3-YEAR LIMITED WARRANTY. MAJOR CREDIT CARDS ACCEPTED.

800 454 6374 (800 4 KINESIS)

206 455 9220 FAX 206 455 9233

A Path of Two DOS's

If you use multiple PATH statements in your AUTOEXEC.BAT, specifying the DOS directory in the first one (PATH C:\DOS;C:\BATCH, for example) and using the variable %path% in others (as in PATH %path%;C:\WINDOWS), you're in for a surprise. DOS 6.0's Setup will add the DOS directory to each PATH statement that doesn't already list the DOS directory (changing the second example to PATH C:\DOS;%path%;C:\WINDOWS). That statement will cause the DOS directory to be listed twice in your environment's PATH. Manually edit AUTOEXEC.BAT to reinstate your original PATH statements.

Useless Files

DOS 6.0 searches your system during installation, but it still installs files you may not need. Unless you're running Windows 3.0 in Enhanced mode, for instance, you can pick up 9349 bytes in disk space by deleting WINA20.386 from your root directory. And if you're on a 286, delete the following files from your DOS directory—they require a 386 to run: CHKSTATE.SYS (41600 bytes), EMM386.EXE (115294), MEMMAKER.EXE (118660), MEMMAKER.HLP (17081), MEMMAKER.INF (1652), MONOUMB.386 (8783), SIZER.EXE (7169), VFINTD.386 (5295).

The following people contributed to this article: from PC Welt, Hermann Apfelböck, Detlef Borchers, Rainer Bumke, Detlef Eschmann, Martin-Roger Jones, Michael Klein, Georg Renelt, Wolfgang Sommergu, and Alexander Wilde; from PC World, Steve Fox, Eric Knorr, Karl Koessel, and Shane Rau.

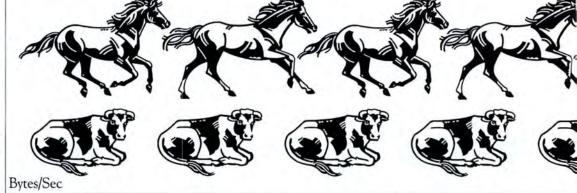
HOTTEST TECHNOL GATEWAY

DELL DIMENSION XPS.
PCs DESIGNED FOR THE HIGH
PERFORMANCE USER.

VS HALF-

DELL

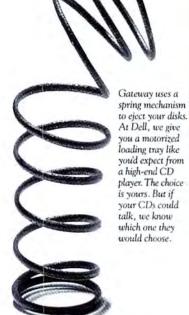
GATEWAY



With faster access and nearly double the data transfer rate, our double-spin CD ROM makes Gateway seem positively sluggish.



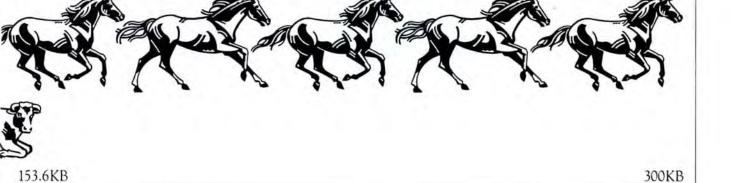
Thanks to our multi-session CD technology, you can have the disk printed on up to four different times, storing up to 100 color photographs in all.





Whistle while you work. Or tap your foot.
Or sing along. Our audio center
CD ROM software lets you play disc jockey
while you carry on with the important
work of the day.

CDS FAST CDS.



When you buy a Dell Dimension™ XPS 450V or 466V equipped with a CD ROM, you get a CD ROM drive that runs circles around Gateway's.

Our CD ROM drive gives you nearly twice the performance of Gateway's thanks to advanced doublespin technology that doubles the transfer rate and helps to speed up access time. In short, it's faster.

And that's just the start.

Our drive has the automatic, push-button motorized tray you'd expect to find on a high-end CD player. So your CDs glide in and out effortlessly.

Gateway's has a manual spring-load reject, uh, eject button. It's still push-button, but your CDs don't glide effortlessly. In fact, they don't glide at all.

Ours is obviously a lot easier and more pleasant to use. And our CD ROM drive is built to last.

Our CD ROM is Kodak Photo-CD compatible. Which means you can take advantage of the latest in CD technology and view photographs on your PC screen.

What's more, our CD drive is multi-session. Which means you can have the disk printed on up to four different times. Storing up to 100 pictures in all.

Our CD ROM also comes with software that lets you play your favorite tracks from any audio CD.

So you can listen to Mozart as you crunch numbers or bop along to the Beatles as you cruise your local BBS.

So if you want the best CD ROM technology for your money, make a fast decision and call Dell today.

After all, there's absolutely no reason why you should settle for a CD ROM that's behind the times.



800-241-5865

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT IN CANADA, CALL 800-668-3021. PLEASE REFERENCE #11DBW

AND NOW, FO VIDEO ON PL

The Viper Video Card. At 60 million WINMARKS, it's the fastest PC graphics accelerator on planet Earth. Stock equipment on the Dell Dimension XPS 466V Ultimate.

Super fast double-spin CD ROM drive.

Five available expansion slots that let the 466V Ultimate expand to meet your wildest ambitions.

It ships with 16MB. It can be stuffed with up to 64MB. It is one fast machine. For just \$167 you can add two amplified, full-powered Labtec CS-550 stereo speakers and a 16-bit Sound Blaster stereo CD-quality sound card to your Dell Dimension XPS 466V Ultimate.

450MB local bus IDE hard drive.

60 MILLION WINMARKS

> Enhanced Spacesaver keyboard.

> \$3,198

Business Lease 9: \$118/MO.





Promotional price expires 9/30/93. *Performance measured by naming WinBench version 3.11 at 1024 x 768, 256 colors, using Viper Video Driver ver. 1.1. **Dell assumes no responsibility for face-usarping acceleration injuries. *Prices valid in the U.S. only. Some products and promotions not available in Canada. MS-DOS is a registered trademark and Windows is a trademark of Microsoft Corporation. The Intel Inside logo is a registered trademark and i486 is a trademark of Intel Corporation. *Leasing arranged by Leasing Group, Inc. Dell disclaims proprietary interest in the marks and names of others. ©1993 Dell Computer Corporation. All rights reserved.

R THE FASTEST ANET EARTH.

If you've been bitten by the speed bug, sink your teeth into our Dell Dimension™ XPS 466V Ultimate. A high-performance i486™



machine that's ready to take on all challengers.

Featuring the Diamond Viper VL video board configured with 2MB video

RAM (the fastest PC graphics accelerator board on planet Earth), this speed demon is the perfect solution for color publishing, multimedia and high-end graphics applications.

Thanks to the Viper, the 466V Ultimate features a virtually flicker-free display at all resolutions, a palette of up to 16 million colors, and turbo drivers to drive all Windows™ 3.1 applications even faster. Before we forget, the Viper has 2MB of VRAM for the face-warping acceleration™ that leaves others way behind.

The 466V Ultimate comes fully decked out. With 16MB of RAM upgradeable to 64MB. A 450MB local bus IDE hard drive. High-speed 256KB static RAM external cache. Five available 16-bit expansion slots — one of which can support an additional high-speed VL device. A 15-inch UltraScan™ 15FS non-interlaced monitor with 1024 x 768 pixel display. One internal diskette drive. Our double-spin CD ROM drive. Configured with MS-DOS* 6.0, Windows 3.1 and of course, a mouse.

The Viper board is available as an upgrade from Gateway. But the Dell Dimension XPS 466V Ultimate certainly is not.

So if you want speed now, call Dell. And leave everyone else blinking in the dust.



800-348-8342

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT IN CANADA* CALL 800-668-3021. PLEASE REFERENCE #11DBX



DELL DIMENSION™ 486/33 i486™ DX 33MHz SYSTEM

\$67/MO.

- 4MB RAM 64MB MAX RAM
- 230MB (17ms) HARD DRIVE
- UPGRADEABLE PROCESSOR
- . 6 16-BIT ISA EXPANSION SLOTS AVAILABLE
- ACCELERATED LOCAL BUS VIDEO
- ULTRASCAN™ 14C MONITOR (14", 1024 x 768, .28mm, NI)
- DUAL DISKETTE DRIVES (3.5" AND 5.25")
- SPACESAVER KEYBOARD
- MS-DOS* 6.0/MICROSOFT* WINDOWS** 3.1/ MOUSE



DELL DIMENSION XPS 450V i486 DX2 50MHz SYSTEM

\$2,199 | BUSINESS LEASE | \$81/MO.

- 8MB RAM 64MB MAX RAM
- 230MB (17ms) HARD DRIVE
- 128KB SECOND LEVEL EXTERNAL CACHE
- UPGRADEABLE TO PENTIUM™ OVERDRIVE™
- 6 16-BIT ISA EXPANSION SLOTS AVAILABLE, 1 ON VLBUS
- VL #9GXE VIDEO ACCELERATOR CARD WITH VIDEO CONTROL PANEL SOFTWARE
- 1MB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15," 1024 x 768, .28mm, NI)
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MS-DOS 6.0/MICROSOFT WINDOWS 3.1/ MOUSE



DELL DIMENSION XPS 450V i486 DX2 50MHz SYSTEM

\$2,498 | BUSINESS LEASE | \$92/MO.

- 8MB RAM 64MB MAX RAM
- 340MB (17ms) HARD DRIVE
- 128KB SECOND LEVEL EXTERNAL CACHE
- UPGRADEABLE TO PENTIUM OVERDRIVE
- 5 16-BIT ISA EXPANSION SLOTS AVAILABLE, 1 ON VL-BUS
- VL #9GXE VIDEO ACCELERATOR CARD WITH VIDEO CONTROL PANEL SOFTWARE
- 1MB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15, 1024 x 768, .28mm, NI)
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MULTI-SESSION, DOUBLE-SPIN CD ROM DRIVE
- MS-DOS 6.0/MICROSOFT WINDOWS 3.1/ MOUSE

Promotional price expires 9/30/93.



Now that you have seen all the sheer technological

superiority Dell wields over Gateway, there are only two questions left to ask.

Which Dell Dimension™ XPS PC is right for you? And what do you want to go with it?

That's right. You can order your software at the same time you order your Dell Dimension PC. That way you'll be up and running the minute you open the box.

And with the ReadyWare[™] program you can choose from 100 of the most popular MS-DOS and Windows software applications and have them pre-loaded onto your system for just one flat \$15 installation fee.

Should you need something else later, you can get that from us too. Through our DellWare™ sales program. A selection of over 2,400 software applications and peripheral products for your Dell* system.

Of course, all of this is backed up



EWAY T CHNOLOGY.



DELL DIMENSION XPS 466V i486 DX2 66MHz SYSTEM

\$2,799 | BUSINESS LEASE | \$104/MO.

- 8MB RAM 64MB MAX RAM
- · 450MB (12ms) HARD DRIVE
- 256KB SECOND LEVEL EXTERNAL CACHE
- UPGRADEABLE TO PENTIUM OVERDRIVE
- 5 16-BIT ISA EXPANSION SLOTS AVAILABLE. **10N VLBUS**
- VL #9GXE VIDEO ACCELERATOR CARD WITH VIDEO CONTROL PANEL SOFTWARE
- 1MB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15," 1024 x 768, .28mm, NI)
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MULTI-SESSION, DOUBLE-SPIN CD ROM DRIVE
- MS-DOS 6.0/MICROSOFT WINDOWS 3.1/ MOUSE



DELL DIMENSION XPS 466V i486 DX2 66MHz SYSTEM

\$2,999 | BUSINESS LEASE | \$111/MO.

- 16MB RAM 64MB MAX RAM
- 450MB (12ms) HARD DRIVE
- 256KB SECOND LEVEL EXTERNAL CACHE
- UPGRADEABLE TO PENTIUM OVERDRIVE
- 5 16-BIT ISA EXPANSION SLOTS AVAILABLE. 1 ON VLBUS
- VL #9GXE VIDEO ACCELERATOR CARD WITH VIDEO CONTROL PANEL SOFTWARE
- 1MB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15," 1024 x 768, .28mm, NI)
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MULTI-SESSION, DOUBLE-SPIN CD ROM DRIVE
- MS-DOS 6.0/MICROSOFT WINDOWS 3.1/ MOUSE



DELL DIMENSION XPS 466V ULTIMATE i486 DX2 66MHz SYSTEM

\$3,198 | BUSINESS LEASE | \$118/MO.

- 16MB RAM 64MB MAX RAM
- 450MB (12ms) HARD DRIVE
- 256KB SECOND LEVEL EXTERNAL CACHE
- UPGRADEABLE TO PENTIUM OVERDRIVE
- 5 16-BIT ISA EXPANSION SLOTS AVAILABLE. 1 ON VI-BUS
- VL DIAMOND VIPER VIDEO CARD FASTEST PC GRAPHICS ACCELERATOR BOARD
- 2MB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15," 1024 x 768, .28mm, NI)
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MULTI-SESSION, DOUBLE-SPIN CD ROM DRIVE
- MS-DOS 6.0/MICROSOFT WINDOWS 3.1/ MOUSE

with the unsurpassed service⁴ and support of Dell. The world's third largest industry-standard PC manufacturer.

Call our technical support line and your call will be answered in five minutes or less. In 90% of all cases, any problem you may experience with one of our systems can be solved over the phone.

In the rare event that it can't, we promise you nextbusiness-day service.

And that service and support is guaranteed. So now that you know the whole story, pick the machine you want. Pick your favorite software. And pick up the phone. We're ready to serve you.



TO ORDER, CALL

HOURS MON-FRI ZAM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT IN CANADA, CALL 800-668-3021. PLEASE REFERENCE #11DBY

NT Machines pg. 164 · Applications pg. 185 · Peripherals pg. 201

Windows NT Changing the PC Landscape

Bringing new levels of power and more freedom of choice,

Windows NT has finally arrived. But is it the best choice for your

computing needs? By Nicholas Baran

As I'm writing, Microsoft is racing to get Windows N'T out the door, and it may succeed before you read this. [Editor's note: N'T shipped just before we went to press.] But is a powerful, expensive, and untried operating system like N'T right for you? In this special section, we'll take a look at NT and what it means to use this new operating system in the real world, We'll consider the software that is coming out for NT, talk about which hardware peripherals it will work with, and take an early look at N'T's performance on a variety of hardware platforms, some of which are not what we think of as PCs.

As we've discussed in previous articles (see "Windows NT: The New DOS?" June 1993), Windows NT looks and feels like Windows, but it is substantially more powerful and in all probability more

dependable. It has preemptive multitasking, which allows you to run multiple programs simultaneously without frequent crashes, and multithreaded processing, which makes applications written to make use of multiple processing threads more responsive. Unlike DOS, which needs to be tricked into handling more than 1MB of RAM, NT can address up to 4 gigabytes as a matter of course. NT also has built-in security to protect your system and your data from those who shouldn't see it. To top it off, NT supports symmetric multiprocessing, letting NT take maximum advantage of computers with multiple CPUs for better performance.

Unlike DOS, where networking capabilities are tacked on as an afterthought, NT supports networks from the ground up. If you're already on a LAN, your



NT system will probably work fine as a node; the drivers needed to run an NT machine on a Novell NetWare network come in the box. What's more, NT includes a peer-to-peer network—compatible with the one in Windows for Workgroups—so you can set up a small, simple network of NT and Windows machines. Finally, through a special version called the Windows NT Advanced Server, Windows NT will compete with NetWare as an advanced network operating system for large and complex LANs.

NT can run on hardware platforms that DOS couldn't dream of touching. In addition to 486 and Pentium computers (technically, NT can run on a 386, but that's not recommended), NT will run on computers using DEC's Alpha and MIPS's R4000 and R4400 processors—with other versions on the way. This broad-based support gives you a wider performance range to choose from, and possibly lower prices as Intel contends with its new competitors in the NT market. In theory, at least, NT applications will only need to be recompiled to run on these various chips.

But what about old-fashioned DOS and Windows applications? You can run these on NT just fine—even to the point of exchanging data between Windows and NT programs—although there will be a performance loss. Performance loss is of particular concern on non-Intel platforms, where NT has to emulate an x86 processor to run the application. Microsoft licensed the emulation technology, by the way, from Insignia Solutions, whose SoftPC product line allows Macintosh and UNIX boxes to run DOS and Windows.

But for NT to succeed on platforms other than Intel, there will have to be some strong incentives to go with a non-Intel system. The most obvious ones are price and performance. If workstation chips can clearly outperform the Intel offerings at a comparable or lower price, NT could be very successful on those platforms.

Says Michael Feibus of MicroDesign Resources, "The only real chance for non-Intel systems is higher performance at the same price or similar performance at a lower price." To find out if this chance exists, the PC World Test Center timed NT systems using the 486 and Pentium processors, the MIPS R4000 and R4400 RISC CPUs, and the DEC Alpha. Two of the systems sup-

ported multiple processors. In "NT PCs: Freedom of Choice," Bryan Hastings and Owen Linderholm report on the results. Remember, however, that as we go to press, Windows NT is still in beta testing and several of the systems we tested it on are prototypes as well. Our tests point out trends, but specific systems may be faster-or slower-when they and NT both hit the market.

Nevertheless, we got some impressive results for the MIPS and DEC platforms, which ran up to twice as fast as the fastest Intel-based machines, making them viable platforms for NT. The question is whether they will be cheaper than Pentium and 486 multiprocessor systems. The early indications are that prices for the MIPSbased, DEC Alpha, and Intel Pentium workstations will start somewhere in the vicinity of \$4000 for basic configurations (with 16MB of RAM and large hard drives) and go all the way

up to \$37,100, depending on configuration.

workstation, or

vertical applications

In any event, N'T's portability is a benefit because it will spark fierce price competition among the various chip vendors, and not only for Pentium, Alpha, and R4000 chips. For one thing, multiprocessor 486 systems will be economical and formidable competition for those higher-speed uniprocessors. In addition, N'T is likely to appear next year on several other hardware platforms, such as Intergraph's Clipper and the PowerPC developed jointly by IBM, Motorola, and Apple.

Hardware Requirements

Even if you stay with your traditional Intelbased PC, Windows NT will still require a considerable hardware investment. We

NT or Not NT? That Is the Question You should... If you... Wait for Windows 4 (Chicago) Use a stand-alone PC with ordinary Windows applications Wait a year and reevaluate Run ordinary business applications Consider upgrading to NT Run specialized applications requiring when the applications a lot of power you need are available Run workstation-class Upgrade to NT as soon as the applications on UNIX applications are ported or minicomputers Faster, Faster, Faster... Upgrade your system to... If you want to... **Run basic Windows** applications **Run Windows business** Pentium applications and want all the speed you can get right now Alpha, R4000, R4400, Run high-power graphical, CAD, or Pentium

don't have official requirements yet, but Microsoft admits that NT will probably need 16MB of RAM to perform decently. What's more, the fully installed operating system, without applications, takes close to 70MB of disk space, so you may need to buy a new hard drive (NT initially won't work with any disk compression programs, even with DoubleSpace, which comes with Microsoft's own DOS 6.0). NT is designed for 256-color super-VGA, preferably with a resolution of 1024 by 768 pixels.

In addition, some of your peripherals won't initially work with NT, which isn't compatible with the DOS and Windows device drivers that hardware vendors supply. Shane Rau examines this issue in detail in "NT Peripherals: Plug and Play?" and

finds that common peripherals like modems and printers run under NT but that some of the more exotic and sophisticated devices—such as CD ROM drives—won't. All this means that your peripherals and your operating system may not be compatible until the hardware manufacturer comes out with an NT device driver.

And if you are thinking of switching to a non-Intel platform to run NT, the lack of device drivers may be an even bigger issue. Some peripherals manufacturers are waiting to see how the non-Intel market for NT shapes up before they even start to develop drivers.

Software Availability

Some of NT's advantages, including security and crash-proof multitasking, are there whether you're using traditional 16-bit Windows programs or the more powerful 32-bit programs written especially for NT. But others, such as the multithreading capability that allows applications to perform some tasks in the background while they simultaneously respond to your orders up front, exist only in applications written for NT. What's more, 16-bit applications will run more slowly on NT than on DOS and Windows, while 32-bit Windows applications

(some of which will work under Windows 3.1) will perform better with NT.

In his article "NT Applications: The Waiting Game," Eric Auchard takes a look at the 32-bit programs that are being written for NT. Auchard finds that the CAD and graphics developers are among the first to

convert their applications to the new system. This discovery is not surprising, since these high-end applications require heavy-duty hardware anyway and have always struggled with DOS's limitations.

Auchard reports that NT's

32-bit architecture along with its large memory space greatly improve the performance and capabilities of numeric-intensive applications such as AutoCAD. For example, AutoCAD will be able to store much larger drawings in memory on NT than was ever possible with Windows or DOS. In addition, AutoCAD users will be able to perform multiple operations simultaneously—like plotting one drawing while working on another—a major boost to productivity. But Autodesk says that the company's new version for NT will not be available until sometime next year.

Of the more mainstream companies, Lotus is moving quickly to port its Lotus Notes product to NT. Notes will take advantage of the multitasking and server capabilities of NT, making it more efficient as a groupware product.

On the other hand, many software devel-

Some manufacturers are waiting to see how the non-Intel market for NT shapes up before they even start to develop drivers.

opers are taking a cautious approach to NT, opting to write their first 32-bit applications in accordance with a programming model called Win32s that makes them compatible with NT and Windows 3.1. These versions don't take full advantage of NT—in particular, they don't offer multithreaded processing, application-level security, or other advanced NT functions (all of which are crucial to high-end products such as Auto-CAD). Whether Win32s apps show better performance than their 16-bit cousins when running on Windows 3.1 has yet to be established. We'll let you know.

Other Ways to Run Windows on Non-PCs

t's an office work-flow nightmare: Graphic artists use Macs, scientists and engineers use UNIX workstations. and everyone around them uses DOS-with or without Windows. So how do the artists and engineers run the same word processors and spreadsheets as their co-workers? One way is with software that runs DOS and Windows applications on non-PC-compatible computers. Windows NT will let you perform this trick on DEC Alpha and MIPS R4000 and R4400 machines, but products like Insignia Solutions' SoftPC and SunSelect's Wabi technology may prove to be more practical.

SoftPC is available on Macintosh and most major UNIX platforms such as Sun, Hewlett-Packard, DEC, and Silicon Graphics workstations. It comes bundled with licensed copies of Windows 3.1 and DOS (Microsoft in turn uses Insignia technology to run DOS and Windows programs in NT). SoftPC emulates a 286 chip as a subtask, letting you run DOS or Windows applications within your host operating system. You can cut and paste between the SoftPC window and other applications on your system.

The big drawback with this sort of emulation is that binary instructions take a lot longer to execute in software than in hardware. On a fast computer like a DECpc AXP 150 or a Sun SPARC-station, SoftPC performs like a

386SX (Insignia claims that Soft-PC has reached 486 performance on some high-speed UNIX systems); on a Macintosh, it simply crawls.

SunSelect's Wabi takes a slightly different approach. Instead of emulating the Intel instruction set, Wabi converts Windows programming calls to equivalent X-Window calls that are then executed on the host processor. X-Window is the windowing system used in Sun and other UNIX-based workstations, and SunSelect (a Sun subsidiary) is licensing Wabi to other UNIX vendors. Sun claims that Wabi will run much faster than software emulators like SoftPC, but we can't confirm these claims

because the finished product wasn't ready at press time. Wabi is expected to be available for Sun workstations and PCs running Solaris for Intel by the time you read this.

Microsoft is skeptical of Sun's performance claims and doubts Wabi will be able to keep up with new versions of Windows. But Microsoft could have the same problem with NT. NT's Windows emulator will also have to be updated when new versions of Windows are released.

There is a performance tradeoff when you run Windows in emulation software. But if you absolutely need Windows in your non-Intel NT, Mac, or UNIX environment, it's the only way. What's more, software applications on non-Intel platforms will probably emerge more slowly than on Intel platforms. Although Microsoft claims that applications are fully portable, requiring a "simple recompile," it's not that easy. Software developers have to perform that recompilation and then test the ported version for bugs. This takes time and a commitment to sup-

port the platform. Like peripherals manufacturers, some software developers are waiting to see how the market shapes up before porting their applications to the MIPS or DEC platforms.

According to Jeff Henning, an analyst for BIS Strategic Decisions, "the challenge for DEC and MIPS is getting the ISVs to produce software that will run on their architecture." It looks like the old chicken-and-egg scenario. "The processors can't penetrate the market unless there's software for them, and soft-

ware won't be produced until the processors achieve a market share," Henning says.

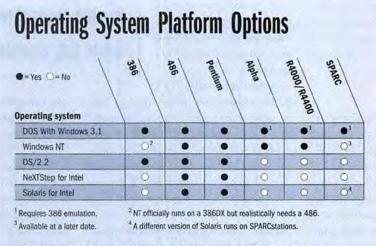
Judging from early performance results, the MIPS and DEC platforms will offer software developers outstanding performance. That may be enough to persuade developers to port their applications.

The Competition

Windows NT isn't your only choice for a powerful 32-bit operating system. IBM has just released a new version of OS/2 (version 2.1) that seems to have solved many of version 2.0's problems—the new version runs Windows 3.1 apps adequately, takes up less disk space, and can run on laptops and notebook computers. Oddly enough, NT's higher price and additional networking and security features reposition OS/2 as a less powerful (although not necessarily less appropriate) middle-level operating system. Next month's issue will include an article comparing the shipping versions of NT, OS/2, NeXTStep 486, and Solaris. Because we will then have access to the final shipping version of NT, we'll have some definitive answers for you.

Two competitors from the UNIX world— Sunsoft's Solaris for Intel and NeXT's NeXTStep for Intel—both shipped last spring. Solaris lets 486 and Pentium computers run the same operating system as Sun's high-end SPARCstations, which have been used mostly by the scientific and engineering communities.

So who will use Solaris for Intel? Probably



YOU CAN RUN WINDOWS 3.1 APPLICATIONS on a number of platforms and with operating systems other than DOS or NT. But traditional Intel architectures give you the most choices.

scientists and engineers, especially those who have to use the same word processors and E-mail programs as everyone else in their companies and would prefer to use them on the same box as their applications. Besides, as PCs get more powerful without getting more expensive, Solaris for Intel makes them a viable, low-cost alternative to workstations.

Sun will continue to make its own computers, but NeXT has gotten out of the hardware business altogether. With NeXT-Step for Intel, NeXT Computers will be offering its UNIX-based operating system—known for its powerful and elegant user interface—to high-end PC users (the company will continue to update NeXT-Step for its existing hardware user base). NeXT hopes to target the desktop publishing, financial analysis, and in-house development markets.

The key question is whether enough business applications will appear on NeXT-Step to make it a viable competitor in the Intel world. Developers may be a little gunshy in the aftermath of NeXT's failure as a hardware company.

Will You Be Among the First Buyers?

N'T probably won't interest the average home or small-office PC user right away. It has many features that would become extra baggage to most Windows 3.1 users, such as security and built-in networking. Besides, Microsoft is already working on another 32bit Windows operating system, code-named

> Chicago, which will have the preemptive multitasking that is probably NT's greatest attraction. (It will be awfully nice to type in your word processor and print at the same time.) In fact, Chicago may be the operating system you're waiting for—not NT.

> Then again, NT may prove attractive to large offices with big computer systems—corporate nets, systems requiring high-level security, computer departments that want to downsize from minis or mainframes. But even these business-

es have a wait-and-see attitude. According to Dan Adachi, head of product management at Software Professionals, a software development firm near San Francisco, "there are a lot of different opinions at our company. The jury is still out." Adachi says the company will "watch NT. But in the near term, most clients are just barely settling into Windows 3.1. In terms of volume, I don't expect NT to be an important factor in the marketplace for at least two years."

The bottom line is, NT must prove itself in the market. If it's relatively bug-free, provides seamless, secure networking, is truly scalable, and has outstanding performance, Windows NT should be a big hit. Someday. Our advice is, do what the software developers are doing: Proceed with caution. Unless you absolutely need the capabilities of NT right now, it might be wise to let the dust settle and see how it performs in big corporate settings before you buy.

Nicholas Baran is the coeditor of Pen-Based Computing and the author of Windows from the Keyboard, John Wiley & Sons, New York, 1993.



Small Business Genius Reveals Accounting Secret.

Easy To Learn, Easy To Use, Easy To Afford.

When it comes to accounting software, this is

CA-Simply Accounting Easy Street. It's the friendliest, easiest, most powerful small business accounting software ever developed. With simple instructions, terrific tutorials and friendly, colorful menus, you'll be up and running in minutes. Just click the



mouse to write a check, process a bill, prepare an invoice or do your entire payroll. And it

has all the accounting modules your small business needs: General Ledger, Accounts Payable and Receivable, Job Costing, Payroll and even Inventory Control. They're all completely integrated and let you generate all kinds of great-looking reports with the push of a button.

It's everything you need so you can spend less time on accounting and more time building your business.

See Your Local Dealer Or Call 1-800-225-5224, Dept. 33108.

For under \$89, even the price GOMPUTER and make it easy on yourself.



'A-Simply Account

IMPROV 2.1. BECAU DO NOT ALWAYS TH

There's more than one way to look at data. And chances are good that the Brand Manager's way will be different from the CFO's. And the Corporate Planner's will be different still. And so on.

If you and the people you work with are spending a lot of time rebuilding spreadsheets and reworking data, you should know the good news. It's called Lotus* Improv,* and it is unlike any spreadsheet you've ever seen.

DYNAMIC VIEWS. NOT JUST A NEW FEATURE SET. IT'S A NEW MIND SET.

With its Dynamic Views. Improv lets you rotate, hide, show, collapse and expand worksheets in ways no traditional spreadsheet can.

Rather than spending hours reconstructing worksheets to gain new perspectives, the new view is created on the spot.

A Regional Sales Manager with a major sporting goods manufacturer uses Improv to track sales activity. Dynamic Views lets her blend sales analysis with market trend data twelve months out and beyond. Improv's flexibility gives her the edge she needs for street-smart decision making.

THE ONLY SPREADSHEET THAT SPEAKS YOUR LANGUAGE.

With Improv, you write your formulas in plain English, like 'Gross Margin = Revenue –

Cost of Goods.* Besides being more natural than (A10 – B10), this has several big advantages. First, it's easy for anyone you work with to follow the spreadsheet's logic, even if they're looking at it for the first time.

		- 34	A HELP	A FILE	333	207(11)	1
his Year		_	M. America	Loren		Tessi	(Inger
100	(Acceptant		1,626	13,566	6,998	27,100	
	Cost of Goods		5,294	5,811	3,843	14,549	
int Cities	Crime Margin		4,332	4,795	3,145	12,231	
	Lucian	Total	1,403	1,776	1,218	4,297	
	But However		2,929	2,579	1,927	7,834	
	Name of Street		3.244	3,494	1,455	8,193	
	Cost of Goods		1,794	1,822	800	4,586	
tetter Skates	Green Margin		1,468	1,577	655	3,647	
	Copensors	Total	5/97	651	7,354	3,597	
	But However		868	921	-1,699	96	
	Name and		1,772	3,863	3,964	11,599	
Front Recovery	Cost of Goods		2,075	2,125	2,180	6,379	
	Green Married		1,637	1,738	1,794	5,270	

Ever see everyone get what they need from one spreadsheet? Here's the corporate financial data arranged by product.

And the formulas are general, so they can be applied to many cells at once. No matter how much you shift or expand your data, the formulas remain unchanged — there's none of

t of Goods		-	-
This Yes		Roller Seales Ter 1784-70	2074.6E
Rest Ye		7141.64	2489.53
This Yes		1921.76	2124.45
Heat Ye	6973.56	7306.04	2549.9
This Yes	3043.40	800.25	2169.71
Next Ye	MILTER	968.30	7515.24
This Yes	14509.00	4506.15	6379.45
Next Ye	179798.803	5407.30	7655.3
Naxt Ye	179391.80	5407.30	7655.1
	oods = Revenue * 55%		

Just drag and drop for a new view, by region Dynamic Views makes the change instantly.

the cutting and pasting of traditional spreadsheets and none of the potential for error.

A Market Trends Analyst relies on Improv to lay out trends in demographics and sport



SE GREAT MINDS INK EXACTLY ALIKE.



participation and give his people more confidence in their numbers. With Improv there are no cryptic formulas. Everything is spelled out in a way that makes sense. And there's no longer the fear of forgetting to update that one cell.

-	227		-	_		
his Year		_	N. America	Police .	Asset	Total.
		Gulf Clabs	9,626	10,566	5,900	27,160
Street,		Roller Skates	3,244	3,454	1,455	8,193
		Tennis Racquets	3,777	3,863	3,964	11,599
		Golf Clabs	5,794	5,811	3,643	14,545
Cost of Goods		Roller Skates	1,794	1,572	900	4,586
		Tennis Hacquite	2,575	7,125	2,988	6,379
		Golf Chain	4,332	4,755	3,145	12,231
tone Name		Boller Shales	1,460	1,572	655	3.687
		Tennit Haugests	1,097	1,730	1,781	5,225
		Golf Child	1,403	1,774	1,210	4,397
****	Total	Roller Shisters	592	101	2,354	3,587
		Tenna Battorite	767	500	617	1,954
d Berry		Golf Chuba	2,579	2,579	1,527	7,634

Drag and drop again for yet another view. You can save different views for future reference.

INTRODUCING IMPROV RELEASE 2.1— DESIGNED TO WORK WITH WORKGROUPS.

4. Aprenice						
			Cost of Goods	Cons Ultra	Total	
of Chin	This Year	1,0%	5794.36	4,332	1,403	2,525
	Nest Year	11,551	E253.16	5,198	1,684	3,514
affer Skelen	This Year	3,244	1784.79	1,460	592	860
	Next Yest	3,893	2141.04	1,752	710	1041
amele Katapate	This Year	3,772	2074.68	1,6	S I	1 2 1 2
ALC: UNK	Best Year	1,526	2409.52	7.8	A	1 department
NAME OF TRANS	-			-	12	
	of Goods = Re	venue * 559		-		
	s Margin = Rev				2	-1121
3 Expe	nses Total = gr	oupsum(Ex	penses)		100	condition of
4 Not F	Revenue = Gros	s Margin - E	Expenses	Total	-	
	on Total = sum				20	
	Yage = This Ye	PRODUCTION AND ADDRESS OF		Participal V	-	

Another drag of the mouse to view the data by year. And because the formulas are right there, in plain English. it's easy to Jollow.

The new network ready edition of Improv with Q+E Extend* gives you unlimited flexibility to query and access database information. The Application Field Exchange feature enables OLE linking between Improv cells and Lotus Notes* fields. And Improv offers file compatibility with Microsoft* Excel and 1-2-3* files, including the new 1-2-3 Release 4 .WK4 file format. So you can work more easily with your data. And share this data more easily with your colleagues.

A consultant working with management teams uses Improv with Q+E Extend to access over 20 external databases containing sales, production, inventory and payroll information. He can bring data directly into Improv's multidimensional structure with ease, then immediately shuffle the data to see it in a variety of perspectives.

ADD IMPROV TO YOUR SPREADSHEET ARSENAL FOR JUST \$199.

Improv has already sold more than 200,000 copies and is hard at work in all kinds of businesses. That's because Improv, as a companion to an existing spreadsheet or as a stand-alone, does some revolutionary things, things your traditional spreadsheet was not designed to do. And right now, you can buy Improv as a companion to your existing spreadsheet** for just \$199 (SRP). Call 1-800-TRADEUP, ext. 9057*** for a free demo disk. Or visit

Lotus IMPROV

your Lotus Authorized Reseller.

THE FIRST DYNAMIC SPREADSHEET FOR WINDOWS

NT runs on a wide array of the most powerful PCs ever—Intel 486 and Pentium, MIPS R4000 and R4400, and DEC Alpha. Our tests of 16 systems provide solid guidelines for choosing the best NT PCs on the desktop today.

By Bryan Hastings and Owen Linderholm

NT PCs Freedom of Choice

This is not your typical system roundup. At test time, fewer than half the computers we looked at were ready for market. Furthermore, Windows NT—the system these computers ran—was still in preproduction. No applications were available to the consumer, so we couldn't create a standard test suite.

But with Windows NT, an operating system that's received *Jurassic Park*—level hype, we felt we should bend the rules. While we can't hand out Best Buys at this stage, we can provide advance information on how well NT runs on a variety of 32-bit computers. We'll include basic configuration information and price ranges. And we'll suggest who should consider

switching to NT and when, and offer guidelines on the type of platform that may suit you best.

NT: Nifty Talents

The Windows NT operating system is the key common denominator among the machines tested. Note that we confidently call NT an operating system. Unlike previous versions of Windows, Windows NT does not simply overlay DOS. It is a complete operating system in its own right, with true preemptive multitasking, free from the limitations of the nonmultitasking DOS. True Windows NT applications running on advanced processors such as the Pentium, the MIPS R4000 and R4400, and the

DEC Alpha can take advantage of multiple CPUs in a symmetric multiprocessing system, shifting program execution into overdrive.

NT's most exciting dimension, one that may mark a watershed in the PC market, is its capability to run on a wide range of full 32-bit computers. Unlike previous versions of Windows, which are bound to Intel processors and their clones, NT is designed to run on a variety of Reduced Instruction Set Computer (RISC) platforms and may be the catalyst for the merging of high-end PCs and even more powerful workstations. In one bold stroke, NT dashes the conventional notions that a PC must run DOS, that it must be based on a single processor,

Testing by Dean Andrews • Research and support by Dawn Furseth and John Goddard



and that the processor must be an Intel CPU or clone. The smorgasbord of systems we received tells the story. Of the 16 we looked at, 9 are based on Intel processors (80486DX2-66 or Pentium), 6 are based on MIPS processors (R4000 or R4400), and the entry from Digital Equipment Corporation is based on that company's own 150-MHz 21064 Alpha, While most have a single processor, the NCR Panther runs with a pair of Pentiums, and the Wyse 7000i tower is decked out with five 486DX2-66s.

NT is complex, but many of its features appeal directly to the mainstream business user. It looks nearly identical to Windows 3.1, the planet's most popular PC operating environment, and this makes the move from 3.1 relatively painless. And NT appears to be more stable than its predecessors.

Previously, some DOS users were reluctant to move to the crash-prone Windows. Now we have a solid Windows-based operating system. Even the unfinished versions of NT we worked with felt more stable than Windows 3.1. Theoretically, 3.1 lets you close a malfunctioning application without affecting other apps, but too often you're

forced to reboot, losing unsaved data. None of the few available applications we worked with were in their final form, so we expected problems, but we were always able to shut down a crashed app and continue working in NT.

Improved security is another NT benefit. You have to log on and enter a password every time you turn on your NT machine. NT also lets you set permissions to allow other users to create, delete, and perform other functions on files in your system after they've logged on with their own ID and password, either at your workstation or over a network of NT systems. Thus a single nonnetworked computer can become a multiuser station. Essentially, you can timeshare the computer: Different users can use the computer at different times without disturbing other users' data. Setting up a multiuser station using Windows 3.1 is possible but very difficult, and it offers little security.

Did we say network? NT is its own network operating system, compatible with Windows for Workgroups. It can work alongside a number of existing office networks, including Novell NetWare, using the same cabling and network adapters. NT offers popular network features such as E-mail (MS Mail) and a group scheduler (Schedule+). NT also adds a new group in Program Manager-Administration Tools-allowing users with permission to become, in effect, network administrators and perform such tasks as adding and deleting other users from the network and monitoring the computer's performance.

Making Sense of the Processors

Windows NT is exceptionally rich in features and demands a lot of computing power. We looked at five platforms that claim to offer the power it needs: the 486DX2-66, the Pentium, the MIPS R4000 and R4400, and the DEC Alpha.

In terms of raw power, the hot-rod 486DX2-66s actually trail this very speedy pack of processors. These 32-bit chips have 8K of onchip cache and an internal floating-point processor unit (FPU) and run at 66 MHz, but they are relegated to 33-MHz motherboards. The other Intel CPU featured in this roundup, the Pentium, is the newest generation of Intel processors. While Pentium clock speeds are similar to those of the fastest 486 (it comes in 60-MHz and 66-MHz models), it runs on motherboards that match its speed. The 32-bit Pentium has two instruction processing units (like two 486s under one roof). Add an improved internal math coprocessor and 16K of internal cache (8K for data, 8K for instructions), and the Pentium has two to four times the computing power of the 486DX2-66.

Next up the power chain come the MIPS R4000 and R4400 family of processors. These 64-bit processors range widely in power, from the low-end 50/100-MHz R4000 with 16K of internal cache

to the 75/150-MHz R4400 with

32K of internal cache. Both processors are clock doubledlike Intel's 486DX2, they run at twice the speed of their motherboard. The MIPS processors use a RISC design and can be made more simply and easily than microprocessors based on more complex architectures like the Pentium. RISC processors

are often cooler to operate. This tendency was evident when we looked inside the computers. Most of the Intel-based CPUs-especially the Pentiums-had large heat sinks and at least two cooling fans and were mounted in open, airy places inside the computer. The RISC-based MIPS chips were more likely to be hidden away under a drive cage or power supply.

King of the microprocessors is the 150-MHz Alpha, running on a 25-MHz system board. This 64-bit chip comes with 16K on-chip cache (8K instruction cache plus 8K data cache) and an internal FPU. The Alpha, in theory, should leave the other contenders in its silicon dust.

Testing, Testing

In one bold stroke, NT dashes conventional

notions that a PC must run DOS, that it must

be based on a single processor, and that the

processor must be an Intel CPU or clone.

Since we couldn't put together a test suite that avoided prerelease, or beta, code, we crafted one using two sets of applications—some beta, some not-and tested each machine using the latest available beta version of NT. We were not able to run all the tests on all the systems due to the beta nature of the machines, the operating system, and the applications. Nevertheless, we did get broadly comparable results for the different classes of processors.

The first application set consists of three true 32-bit Windows NT applications: Procomm Plus for Windows NT, Texim Project for NT, and PV-Wave. Procomm Plus is a leading data communications program. Texim Project, a comprehensive project planner, includes multilevel organizational structures, resource scheduling, and risk analysis. PV-Wave is a visual data analysis package. You can pour large amounts of data from any source into PV-Wave and display it in different 3-D graphics formats to spot trends and anomalies. This package is ideal for tasks such as risk assessment, portfolio management, and geographic analysis. We performed two types of tests for PV-Wave. One emphasized the program's visual aspects and made heavy use of the video subsystem. The other stressed math-intensive operations and made heavy use of the math coprocessor. As it turned out, the eight systems on which we tested PV-Wave performed the video-intensive and math-intensive tasks more or less equally well, since the better overall performers tended to have higher-powered video subsystems.

Lotus's Freelance Graphics and Microsoft's Excel-the second set of test applications—are prime examples of the Windows applications we run today. We chose Freelance for its heavy power demands and Excel for its enormous popularity; in addition, both programs are part of the Windows test suite used in our system reviews. Since Windows 3.0 and 3.1 were designed to run on 16-bit 80286 computers, all pre-NT Windows apps, also called Win16 programs, are written accordingly. Windows NT is a full 32-bit operating system, however, so it relies on 32-bit code that isn't part of existing Windows apps. Since the Pentium is compatible with 386 and 486 architecture, it can run 16-bit Windows apps just fine. But the non-Intel systems—the MIPS and Alpha machines—have to run Win16 apps through an emulator, a process like having a translator assist people who speak different languages. Thus, the Freelance and Excel tests reflect how well the Win16 emulation function is implemented more than they do raw processing capability.

Promising Performance

Bear in mind that all the true NT programs we used were still in preproduction. For this reason, we can't offer buying recommendations for specific machines. Our experience indicates that the DECpc AXP 150's performance should improve considerably by the time the system is final and a full version of NT is ready for it. Both the Pentium- and the R4000- and R4400-based systems, espe-

cially the Pentiums, will also improve performance by the time all products are shipping.

That said, how do the platforms we tested measure up? The axiom "It's not what you have, it's what you do with it" applies here. In tests of the true Windows NT applications, where we expected the Alpha computer to top the charts, three other systems, including a Pentium, finished ahead. The Silicon Graphics (SGI) 75-MHz and 70-MHz R4400-based computers easily and clearly locked up the top two performance spots. DEC's Alpha system, the DECpc AXP 150, came in about 40 percent slower than SGI's boxes and at about the same speed as the fastest Pentium-based system. While you might expect MIPS machines to take the next few spots, the other Pentium-based systems and even a 486DX2-66 box beat them out. Once the manufacturers work the kinks out of their preproduction models, there is sure to be a dramatic reshuffling of the NT performance placings. We expect to see the DECpc AXP 150 and the Pentium-based systems improve noticeably.

Most of the computers ran true NT applications at impressive speeds. But what about your current Windows apps, which you may have to stick with for a while longer? We compared the results of the Freelance and Excel test on the NT computers with those from 486DX2-66 systems running Windows 3.1. The result? The 16-bit programs bogged down considerably in NT in nearly all platforms.

This makes sense. The 486DX2-66 PCs that ran 16-bit Windows apps in NT fared worse than their kin running the same apps in Windows 3.1 in our standard reviews. Even though NT runs Win16 applications natively on Intel platforms—that is, without relying on

Average Windows NT Performance on Different Platforms

Average times	Win32 Procomm	Win32 Texim	Win32 PV-Wave Video	Win32 PV-Wave FPU	Win16 Freelance	Win16 Excel
486DX2-66	5:57	3:24	14:55	9:46	2423	3:11
Pentium-60	4:30	2:41	11:18	8:23	1:47	1:47
MIPS R4000-100	6:59	2:31	(III)		7:02	8:19
MIPS R4400-100	5:48	2:10	12:37	8:48	5:12	7.15
MIPS R4400-140+	2:31	1:15	8:51	4:36	W* M 1/11	
DEC Alpha-150	4:48	1:31	9:04	6:55	•	

*Unable to complete testing.

Times in minutes:seconds.

Methodology

We tested using the March NT beta (except on certain machines that arrived loaded with a more recent version). If we had to install NT, we used the default express installation. We configured NT on all systems with a Hewlett-Packard Laserlet III as the default printer, set print options to print directly to port, and attached a null printer to LPTI. Using vendor-supplied video drivers, we set the resolution to 1024 by 768 pixels in 256 colors when possible. Finally we loaded the test applications, test files, scripts, and Microsoft Test (automation software).

Procomm Plus for Windows NT

We create a new dialing directory and import 225 new entries from a text file. Then we look up 30 entries in that

directory. A text file is displayed in a scrolling window. Finally, a text file is read from disk and written to a new file.

Texim Project for NT

We perform a time analysis on a critical path chart for a construction project. We perform 400 simulations.

PV-Wave

We run 20 scripts. Each script takes numerical data and displays 2-D, 3-D, or full-motion format. Of the scripts, 10 are video intensive. The other 10 scripts make heavy use of the floating-point unit (FPU).

Freelance Graphics for Windows 1.0

We load a single-page starter file (built from a standard template included with Freelance) containing a U.S. map with each state as a separate object. Then we enter preformatted text on the page in preset headings, add a

second page, and enter text as bulleted items. We add three pages, each with a single 3-D bar chart, and import data from a WK1 file; then we add a sixth page with four 3-D pie charts and preview a slide show using a vertical-louver fade effect between each slide. We apply various views to the presentation and preview the slide show four more times, applying a different fade effect between slides each time. Finally we save the presentation to disk.

Excel 4.0

We perform several data extracts; build and format a financial statement from scratch and print it; and open a mortgage analysis, scroll, move blocks, change the interest rate, print preview the statement, and save the file.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved. the emulator—NT requires so much more computing power than Windows 3.1 that overall performance drops. The much greater power of the Pentium offsets the performance hit Windows NT imposes, and in fact, the Pentium-based PCs constitute the only platform to run Excel and Freelance faster than the DX2-66 PCs run them in Windows 3.1. The R4000- and R4400-based machines performed worst of all, especially the R4000. This result also makes sense. The R4000- and R4400-based machines suffer the double whammy of running a resource-hungry operating system and running Win16 apps through a 386 emulator. We did not test the DECpc AXP 150 because it couldn't run in emulation mode at test time, though it will certainly do so by the time it comes to the market.

The message? If you plan to run a lot of current-generation Windows applications, stick with Windows 3.1 for the time being.

Should You Buy NT?

We don't expect everyone to leap for Windows N'T—at least not right away. N'T's requirements are onerous; it needs nothing less than a full 32-bit system with at least 16MB of RAM and 100MB of hard disk space. Realistically, you'd want more like 32MB RAM and 400MB hard disk space. For now, expect to find N'T used mostly for server and high-end apps such as software development, high-quality, real-time graphics, and scientific number crunching.

The system choices are mind-boggling. The units we received range from the familiar to the arcane. Most of the DX2-66 PCs and even some of the R4000 and R4400 machines have a very familiar desktop feel and sell for a not-so-unfamiliar \$4000 to \$6000. Others in this review, however, are hulking, intimidating workstations and servers with hulking, intimidating prices of \$20,000 and more. Is it worth taking a chance on a non-Intel machine that doesn't have the history of the general business market behind it? You could invest in one of these systems only to have the company pull out of the general computer market and leave you holding the bag.

Our answer to these concerns: If you're interested in having NT run your mainstream business applications as a possible replacement for 3.1, don't whip out your billfold quite yet. If you require more performance for your current Windows applications, get a Pentium system. If you are developing your own 32-bit applications or are ready to move now to a 32-bit Windows NT application, look carefully at all your needs. If all you want is raw speed, check out the top-of-the-line R4000 and R4400 machines or the DEC Alpha system. If you want better performance at an economy price, look at the cheaper R4000 and Pentium systems. And if you need 32-bit power but also need to run existing Windows applications well, get a high-end Pentium.

For most people, we recommend waiting a year until true NT business programs are out in force. Then see how well NT settles into each of the various platforms. The advance information our guide provides will give you a leg up when you're ready for your upgrade to an NT machine.

Bryan Hastings is an associate editor and Owen Linderholm a senior editor for PC World. They can be reached on PC World Online (see page 10 for contact information).

For more information about all products in this article, circle reader service no. 900.

The 486s



iven enough RAM and storage space, the 486DX2-66 PC makes a capable Windows NT machine. Because the 486 is a solid Intel platform, we came up with an abundance of test results for both 32-bit and 16-bit

applications, except for the power-hungry PV-Wave program. We used our test results for these 486s as the baseline against which to compare the NT machines we tested. We looked at machines with a variety of bus types including ISA, EISA, and MCA as well as proprietary local bus. Secondary cache sizes varied, as did video and drive controllers. With the dramatic exception of Wyse's five-processor 7000i, the systems you see here bear a striking resemblance to the 486DX2-66 systems that have been gracing our review pages for the last six months.

These 486s represent the state of the art before NT, and all are perfectly capable in their own right. Some need feature enhancements to match our minimums for a basic NT workstation, but overall they will serve well in that capacity.

AST Premmia 4/66d Model 343W

AST's system initially appears to be a typical 486DX2-66. This desktop computer's most unusual feature is its EISA-based system board; most systems in this class are ISA-based.

A closer look turns up little extras that distinguish this machine from a standard Windows 3.1 computer. For example, the Premmia came with a 17-inch monitor with advanced image controls on the monitor base; 486DX2-66 PCs typically come with 15-inch monitors. This system came loaded with 256K of secondary write-back cache. Ditto for hard drive and RAM—the AST came with a 340MB drive and the minimum 16MB of RAM for NT. The AST's video is handled by an ATI 68800 video controller with 2MB of DRAM. Four free EISA slots round out the package.

The Premmia came with a 238-pin socket that will allow for processor upgrading when such an upgrade becomes available. Initially intended for use with a Pentium OverDrive, this socket may now be used for an upgrade based more on 486 technology. Intel has had trouble producing a Pentium-based part, and rumors abound that a clock-tripled upgrade may go in this socket instead. Either way, you should see a 40 to 60 percent performance gain once this upgrade appears.

The \$4426 price is steeper than the average 486DX2-66 carries, but that's to be expected with a unit that meets NT's hardware requirements. The extra RAM and secondary cache, the larger drive, the loaded video board, and particularly the 17-inch monitor all push the price up. This machine is a good choice for a basic NT workstation, especially since the large monitor will help you work better in the higher 1024 by 768 and 1280 by 1024 resolutions—which will be the norm in the higher-powered NT environment.

Compaq Deskpro 66M

This standard desktop box is actually one of Compaq's most flexible units. The same system doubles in this review as Compaq's Pentium entry—we simply swapped out the 486 processor and dropped in a Pentium eard. This switch demonstrates just how easy



CLOCKWISE FROM UPPER RIGHT: AST Premmia 4/66d Model 343W, Compaq Deskpro 66M, Wyse Series 7000i Model 760MP, HP Vectra 486/66XM, and NEC Image 466. We were unable to photograph the NCR 3350.

such an upgrade can be and why a CPU daughterboard solution to future upgrades can be very workable.

Compaq used its QVision proprietary graphics controller on this system, but we were able to get it working with NT only at the standard 640 by 480 VGA resolution. Compaq threw in a huge amount of memory, with 40MB of RAM and a 256K secondary cache as well as a fast 510MB IDE hard drive and four free EISA slots. All in all, this is a good NT starter system, particularly because you can easily upgrade it to Pentium. But we'd prefer better video resolution, especially to take advantage of the 20-inch Compaq monitor. A CD ROM drive wouldn't hurt either. The highly configured system we looked at would cost about \$8200—much higher than for a regular 486DX2-66 but typical for an NT workstation.

HP Vectra 486/66XM

This desktop is yet another 486DX2-66 that's suspiciously similar to a typical Windows 3.1 system—more so, in fact, than AST's entry because it comes with an ISA bus and a 450MB hard drive. Like the Premmia, however, the Vectra came with 16MB of RAM and a

256K secondary cache. Video chores are capably handled by an S3-928 local bus video controller with 2MB of VRAM.

HP added some nice design touches, in particular a long narrow power supply that tilts up to reveal the CPU. This configuration means the fan in the power supply also cools the CPU.

HP included the Pentium OverDrive socket that is becoming standard on higher-end 486s. The socket will accept an eventual processor upgrade in the same manner as the AST system. Nevertheless, this machine doesn't look as promising on specifications for running NT as others in the review. It is relatively cheap at \$4973, but we recommend you spend more to beef up the features. In particular, you'd want a larger monitor, probably a larger hard drive, and possibly an EISA bus. HP offers Vectra systems with these enhanced spees.

NCR 3350

Like most 486DX2-66s, the NCR 3350 looks to all the world like an unassuming Windows 3.1 computer. But a peek inside quickly reveals its higher-powered destiny. Most remarkable is its Micro Channel bus, which may be able to give your peripherals a throughput edge over ISA and even EISA. Its whopping 40MB of RAM is hardly less unusual. The 3350's 128K of secondary write-through eache and 340MB SCSI hard drive are still considered above the norm for 486DX2-66 systems. System cooling is exemplary, with two fans—one for the power supply and one drawing air across the motherboard and CPU.

NCR included a video board in a proprietary local bus slot, but we couldn't get it working with the early NT beta version. Fortunately, the 3350 also came with an integrated local bus video controller. Likewise, the SCSI drive connector is integrated into the motherboard. Given this high degree of integrated

functions, it's no surprise that three MCA slots were left free.

The CPU and cache are held on a daughterboard that plugs into a proprietary slot, allowing for easy and flexible upgrading. This design makes the 3350 an excellent NT system to start out with. Later you can increase capability by swapping in a Pentium board or perhaps boards based on other processors. The massive 40MB of RAM that came with our test unit may be enough for most users, but we suggest pushing secondary cache up to 256K. At \$5200, this machine is a little expensive for a 486, but the expandability options may well outweigh the additional expense.

NEC Image 466

To look at the features of this slim desktop—an ISA-based system with 16MB of main memory and 256K of write-through secondary cache, an NEC-enhanced integrated Tseng ET4000/W32 video controller with 1MB of VRAM, and a 340MB IDE hard drive—you'd expect a solid but unremarkable performer in the 486DX2-66 NT class. However, the NEC Image line has scored very well in recent *PG World* tests and continues to do so here. Not only was it

one of the best-performing 486DX2-66 NT machines, it also completed all the Win32 and Win16 apps. This success is a tribute to NEC's careful attention to system integration.

Even a fast 486DX2-66 like the NEC runs NT only adequately at best. You may want to beef up this PC if you plan on heavy-duty NT computing. Consider replacing its 15-inch NEC 4FG monitor with a larger unit such as the 17-inch 5FG. The video board RAM should also be increased to 2MB. Since NT is completely scalable to RAM, the more system memory, the merrier—you can stuff up to 64MB in this PC. NEC throws in an ethernet card, a nice advantage; most NT machines will be connected on a network, often acting as servers initially, so you'll want one of these cards. The system includes both 5%- and 3%-inch floppy drives as well as four spare 16-bit ISA slots. The price is \$5385.

Wyse Series 7000i Model 760MP

This sleek charcoal-gray tower not only has class, it has substance. Unlock the case, lift off a side panel, and you will find a tough chassis and a 13-slot system board packed with *five* 486DX2-66 processors. Each of the CPUs in this multiprocessor system sits on an expansion board with its own 256K of secondary cache and a substantial amount of additional circuitry that serve to synchronize communication between the processors. These expansion boards plug into a Wyse Wyde 64-bit bus The system uses a pool of main

memory for all processors. In addition, the system's nine EISA slots provide ample room for expansion.

The unit we evaluated came with 64MB of RAM. The system also holds a SCSI-2 controller, a 420MB hard drive, and a Toshiba CD

ROM drive. It holds up to 52 gigabytes (GB) of mass storage and can support well over 250 active users, making it an exceptional server or multiuser PC. One neat touch is the unit's heat sensor: If the system starts running too hot, the sensor has the PC close its applications and shut itself down.

Test data only hints at the Wyse's potential performance. The unit we examined was a preproduction machine, and the five processors operated together only intermittently. Since NT's symmetric multiprocessing support was still a little flaky at review time, we rarely got NT to acknowledge more than two of the five processors. In addition, our test applications were single threaded, which means they use a single, serial pathway for instructions. As a result, the Wyse 7000i operated more slowly than we expected. Once NT is final and multithreaded NT applications appear, expect a performance boost of up to 80 percent with each processor board you add to the system.

With its multiple processor boards and steep \$37,100 price, the Wyse 7000i is clearly intended for multiuser systems rather than for service as an individual's mainstream business tool. Even if this system is the machine you've been looking for, we advise holding off until NT and NT applications are properly multithreaded and make full use of symmetric multiprocessing. Once this capability comes into its own, this system has the potential to outdistance all the other machines here.

The Pentiums

f there's one platform that spans the PC and workstation worlds, it's the Pentium. The Pentium architecture uses two parallel instruction-processing units that operate simultaneously, as well as an advanced math coprocessor that can blast through floating-point calculations ten times faster than that in the 486. Throw in advanced memory architecture, superb caching, and some architectural tricks to improve overall data throughput, and you have one of the highest-performance microprocessors going. Pentium's biggest advantage is its backward compatibility with Intel 386 and 486 CPUs, which makes it instantly capable of running the widest range of software—and running it faster than any previous platform.

The Pentium also excels with Windows NT. For Win32 apps, Pentium machines were strong performers, in many cases surpassing the MIPS and DEC Alpha NT stations. Where the Pentium really shines is in executing existing 16-bit Windows 3.0 or 3.1 applications under NT. Since the Pentium is 386 compatible, it doesn't have to rely on a software emulator to run these older applications. Consequently, it provides a 60 to 100 percent speed

increase over the 486DX2-66. In contrast, the other new processors, forced to pass all the instructions through a 386 emulator, actually show a performance drop on 16-bit applications. Pentium is also designed to fit well into multiprocessor systems.

We received four Pentium systems for review. Three of them made it through our tests; only two ran the Texim program, and

only one made it through PV-Wave. This indicates how difficult it can be to produce systems based on a brand-new processor, especially in the case of the Pentium. System developers must cope with design issues such as jumping to a 64-bit data path, keeping this super-scalar processor fed with information from main RAM, and even keeping the thing cool. The Pentium generates more heat than any other processor here, with the possible exception of the Alpha. In addition, Intel released few early chips. Given these hurdles, it's no surprise we had more trouble finding Pentium systems and pushing them through our NT tests than we did even the R4000- and R4400-based units.

The Compaq Deskpro 5/60M is a straightforward desktop workstation; the HP NetServer LM 5/60 tower is clearly intended for multiuser environments; and the NCR 3360 Panther is a hybrid, with two Pentium processors in a symmetric multiprocessing arrangement, and could function as either a workstation or a server. The systems were also configured differently, particularly with respect to video and hard drives. The HP NetServer had 4GB of mass storage consisting of four 1GB hard drives; the NCR managed with a mere 1GB, and the Compaq had a comparatively measly 510MB. The NCR had the fanciest video, using an ATI controller with 2MB of memory; Compaq used a QVision graphics board, also accelerated; and HP used a basic VGA card, because video performance is not a real requirement on a server.

Compaq Deskpro 5/60M

We upgraded this system from the 486-based Compaq Deskpro 66M by swapping out the 486 processor daughterboard and swapping in the Pentium board. Otherwise the machine retained its configuration, which was pretty high level for a 486. The 40MB of RAM is hefty by any standard, but the 510MB hard drive is not particularly big for a Pentium-based unit. Of course, you can buy any size hard drive you want.

We couldn't get the Compaq video working at higher than 640 by 480 resolution, even though the QVision adapter is capable of much more. We'd like to have seen it run at least 1024 by 768, especially since its 20-inch monitor was the largest in the review. The four free EISA slots are perfectly adequate on a desktop workstation and will probably be standard for any desktop NT system. For the moment, the Compaq would be a good choice for those needing to move up to Pentium-level performance, regardless of whether they want to run NT. If you absolutely need the fastest 32-bit application performance, an R4400-based machine might be better, but otherwise we recommend Pentium to gain the edge in running 16-bit applications under NT. This unit costs \$9700.

HP NetServer LM 5/60

This system is pure server. It came configured with a staggering four 1GB hard drives. Fortunately it has the superstructure to exploit such cavernous storage fully. Hewlett-Packard used a 32-bit Adaptec caching SCSI controller in this system, plugged into one of the eight EISA slots. Combined with the Pentium processor, it delivers enough throughput to keep this server dishing out the goods on a high-speed network.

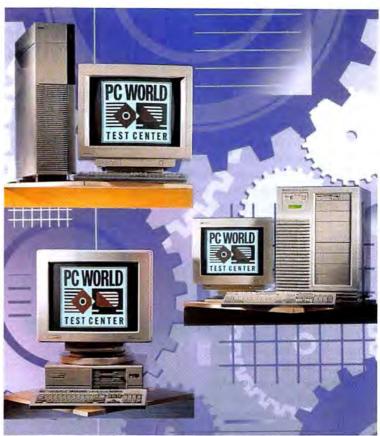
The NetServer is almost cubic, resembling a shrunken dormroom refrigerator. The system came with 256K of secondary cache, perhaps a little low on a Pentium system. The video subsystem is more basic than most available today. It is perfectly suitable for a server, however, where the only on-screen interaction occurs during network and server management and administration.

This system is a solid example of an NT server. At about \$18,100 it is fairly expensive, but 4GB of mass storage costs money, no matter how you look at it. This system also has plenty of room for further mass storage and peripheral expansion with four free drive bays and a ton of free EISA slots. You might want to bump up the RAM a little from 32MB and add more secondary cache, but this machine is probably most representative of where NT will be running for at least the first year of availability.

NCR 3360 Panther

This system is a powerful and versatile beast. It is designed to operate with either one processor or with two Pentiums running simultaneously in a symmetric multiprocessing design. Its optimal functions are as a high-power workstation or as a server.

We had only one problem testing the system—when we removed the cover and started it up, the machine refused to boot. A quick call to NCR revealed that the unit is designed not to operate with the cover removed. The airflow within the system is supposed to funnel air over the processor chips to keep them cool. With the



CLOCKWISE FROM RIGHT: HP NetServer LM 5/60, Compaq Deskpro 5/60M, and NCR 3360 Panther.

cover removed, the airflow decreases, and there is a risk of overheating. This scheme is a neat design touch and illustrates the need to keep the Pentium cool.

This system came with a staggering 64MB of RAM, and each of the two installed processor boards had its own 256K of secondary cache. We received a single 1050MB hard drive, but the system can manage up to 6GB internally and can take an incredible 512MB of memory. It came equipped with a CD ROM drive and a 1.44MB 3½-inch floppy drive. There are also five full Micro Channel slots available. This level of expansion space makes it possible to set the 3360 up as a heavy-duty server. However, it also comes with a fast ATI graphics board driving a great 19-inch monitor; these, coupled with dual-Pentium processing power, make the Panther suitable as a high-power desktop workstation.

Unfortunately, as with the Wyse 7000i, our tests couldn't take advantage of the unit's multiprocessing features. Even so, the Panther ran near the front of our pack. We expect that when this system runs multithreaded apps with the final version of NT, it will rival or even outpace the blazing SGI R4400-based workstations that dominated our performance tests.

The price—about \$26,000—makes the Panther one of the most expensive systems in the review. But for the money you get a very flexible and fast NT machine that can handle any task you throw at it. It is typical of the high-end Pentium-based systems we will see, and it's capable of taking on high-end workstations at their own game. Once multithreading-enabled 32-bit NT applications appear, it will come into its own.

The R4000 and the R4400s

he R4000 and R4400 processors have been associated with Windows NT from the start, with the idea that the MIPS platform would provide an alternative to Intel. If you judge by system availability, the R4000 and R4400 lead Pentium at this writing. We were able to procure more R4000-based machines for our tests than those based on any other platform except the 486. Some R4000- and R4400-based computers have

been available for several months, most going to NT test sites.

While the low-end MIPS machines in this group are not particularly fast (somewhere between 486DX2-66s and Pentiums), the faster R4400-based machines are scorchers, trouncing all the other machines we tested for 32-bit performance. Part of this difference is due to system configuration, but the fastest available MIPS R4400 chip is clearly faster than the Pentium. MIPS plans to have its next-generation processor out by next year, well ahead of Intel's plans for its successor to the Pentium.

So what is the MIPS R4000 family? It's based on a RISC design that follows a very different philosophy from that of the 486, although not so different from the Pentium's. It is designed to work with a smaller set of instructions that theoretically are limited in scope but that execute extraordinarily quickly. The ease with which RISC chips can be designed and manufactured has led

to many architectural improvements, including the capabilities to run multiple instructions simultaneously, to line instructions up in advance and schedule their execution for optimum speed, and to deal more quickly with memory and cache systems. The MIPS R4000 is the core design and runs at 100 MHz in a 50-MHz system, just as Intel's clock-doubled 486DX2-66 runs at 66 MHz in a 33-MHz system. It has 8K of cache on the chip to handle data and 8K of cache to handle instructions. The more advanced R4400 comes in models that can run at 150 MHz and doubles both the data and instruction caches for a total of 32K, as well as improves some of the data pathways between processor, cache, and memory.

The MIPS-based machines vary widely in design and capabilities. At the low end, they are essentially basic PCs, recast with a new processor and a reasonable level of memory and disk space. This approach was designed to reuse as much existing PC technology as possible to keep prices low. Consequently, low-end MIPS machines are actually priced competitively with 486DX2-66s.

At the high end, the MIPS-based machines use system boards running at 75 MHz—far faster than any PC. They require a complete redesign of the system board with specialized components, driving up cost but offering superior performance, MIPS-based systems' major problem is their requirement for a 386 emulator to run

16-bit Windows applications under NT. While this solution is completely robust and runs existing DOS and Windows apps well, it is equivalent to running every instruction through a translation process, slowing performance dramatically. As a result, low-end MIPS-based machines run existing Windows apps far more slowly than a DX2-66, more at the level of a 486SX-25. Even high-end MIPS machines come in no better than DX2-66s, if not worse, at running 16-bit DOS and Windows applications.



CLOCKWISE FROM UPPER RIGHT: AcerFormula 4400, Deskstation Evolution rPC/44, Tangent Carrera 4, Carrera Workstation 4, and Silicon Graphics Magnum 4400.

AcerFormula 4400

The 4400 is a typical example of the lower end of the MIPS system spectrum. Designed almost entirely by Acer, this system has a smallish 128K secondary cache, 32MB of RAM (upgradable to 128MB), an Acer S3-based video accelerator with 1MB of video RAM, and a 520MB SCSI hard drive. Our unit also came with a CD ROM drive, an ethernet board, and a SCSI adapter. The

system included only two ISA slots and three proprietary local bus slots, nearly all populated by adapters and controllers.

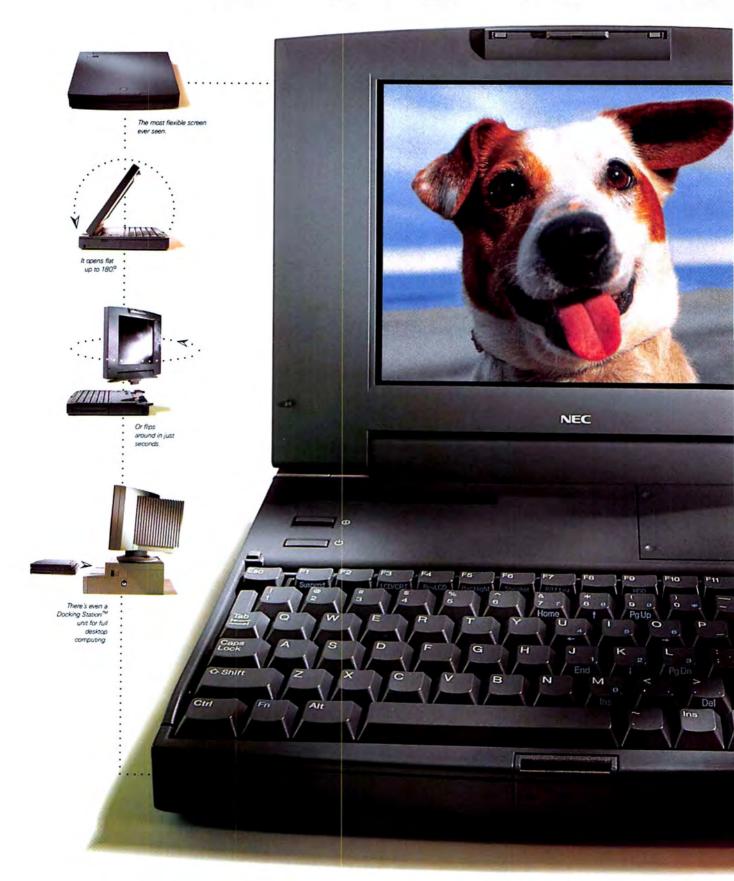
Nevertheless, this is a fairly well configured system compared with a 486DX2-66, and its \$5995 price makes it look pretty good. It would serve best as a basic NT workstation—an inexpensive one at that. One drawback with the system we received was its 14-inch monitor, and you'd want to go beyond that for almost any NT-based work. For running existing 16-bit Windows applications, the Acer-Formula 4400 (and other MIPS-based machines) will be unfortunately slow. Once 32-bit Windows NT applications appear, however, it will be a cost-effective solution.

Carrera Workstation 4

This system from Carrera may never be offered directly to the public, since Carrera is principally a system board designer and sells its

It sits, lies down, and does back fips.

Good b





The UltraLite Versa is truly a breed apart. It's versatile and adapts easily to meet your changing needs, whatever and wherever. For example, switch from a mono to color screen, or put in more hard-drive memory. And despite its heavy-duty technology, the Versa weighs as little as 6 pounds.

Then there's the most sophisticated and flexible display on the market. Use it as a basic notebook, flip it around for presentations, or use it as a penbased tablet. Plus, Versa's screen provides sharp contrast and brilliant graphics, monochrome or color.

With up to 10 hours of battery life, the one thing it won't do is play dead.

Yes, the Versa notebook knows a lot of tricks. Its i486™SL processor is fast and powerful, yet conserves power. Simply swap the floppy drive for an extra battery, doubling battery life.

And what's a notebook computer if you can't take it for long walks? Advanced PCMCIA communications capability means you can easily send and receive faxes and retrieve data.

We'll even come when we're called.

In addition to a standard 3-year limited warranty, you get UltraCare; an enhanced, full-service program providing fast response and support anytime, anywhere, at home or overseas.*

Begging for more? Call 1-800-NEC-VERSA or for info via fax, NEC FastFacts™ at 1-800-366-0476, request document 8583772.

Because f is the way you want to go.



Communications Features



Using thin, credit-card-sized cards, you can send and receive faxes, talk to your network, or ensure secure data storage. And for advanced, real-time mobile communications, Versa is even ready for wireless and collular connectivity and also incorpo-rates the newest PCMCIA technology.

- Accommodates two Type II cards or one Type III card
- Simultaneous card capability: data/fax modem, LAN, storage
- · QuickSwap^{†M} compatibility, for features such as changing cards without powering down



The I litral ita Varen is the first of a new senes of computer products from NEC designed to work together with enhanced functionality and advanced ergonomics.

With the UltraLite Versa you can choose your own best friend.

Features/Options



Versa's many standard and optional features provide exceptional upgradability and flexibility, to give you the power to choose the system you need today and then enhance its features as your needs change

Battery

- DoubleTime^{†M} technology, for increased battery power
- Long-life NiMH battery pack: 2.5 to 5 hours (color) and 4 to 6 hours (mono)
- Optional secondary battery, for a total of 5 to 10 hours (color) and 8 to 12 hours (mono)

Storage and memory

- . Choice of 120MB, 180MB, or 250MB easily removable hard drives; no tools required
- · Slide-in memory cards, for upgradability from 4MB all the way to 20MB**

- i486SL processor, 25MHz or 33MHz
- · Built-in numeric coprocessor and 8KB cache Screen
- High-speed local bus video and desktop-level 640 X 480 display
- · NEC-upgradable to pen capability. mono or color
- · Standard 9.4° STN sidelit Super VGA monochrome screen, with 64 shades of gray
- Optional 9.45* TFT active-matrix Super VGA color screen, with wide-angle viewing and 256-color display out of a possible 226,000

Docking Station

- · 2 full-sized ISA slots, for expandability
- *3 drive bays: 2 external 5 25" and 1 internal 3.5"
- · Integrated microphone and headphone ports

Pointing Device

· Custom Ballpoint mouse standard

VersaPad









NEC's new VersaPad™, the ideal platform for corporate pen computing Perfect for data collection and transmission needs, including inventory control, sales force auto-mation and merchandising

- Full-function i486SL portable tablet computer
- Slim 4-pound design with VGA transflective screen for clear indoor/outdoor viewing
- · 2 PCMCIA Type II slots, for flexible communications and storage
- NiMH battery options and advanced power management, for long battery life
- Avarable with all major pen computing environments, including. Windows for Pen Computing™ and PenPoint™ software.



products through system vendors who put their own names on them. Nevertheless, because similar systems will be appearing from a number of vendors (including Tangent), it merits a look here. This system is a minitower. It came with 16MB of RAM, expandable to 256MB. Carrera sent an advanced video board, the Carrera Jaguar, which uses a 64-bit data path and came with 2MB of video memory. Unfortunately, the 14-inch monitor doesn't begin to do justice to the advanced graphics card.

We also received a 409MB hard drive and CD ROM drive. The system has four EISA slots, a single proprietary 32-bit slot, and two short slots for a mouse and network card. The motherboard layout is crammed, and reaching the processor and one of the SIMM cards was difficult.

This Carrera system is a typical low-end R4000-based workstation. It has, in effect, a standard EISA-based PC board layout with the system logic revised to work with the MIPS processor. The result is a \$5000 system that will serve you well as a desktop NT platform for 32-bit applications. Two caveats bear repeating: You'll need a 17-inch monitor, and your existing 16-bit Windows programs will run relatively slowly.

Deskstation Evolution rPC/44

Like Tangent's offering, this tower system uses the R4400 at 100 MHz on a 50-MHz motherboard. It came with a respectable 512K of secondary cache and 32MB of main system memory. The video board was a solid S3 911-based Orchid Fahrenheit 1280. Deskstation also included a 500MB hard drive driven by an Adaptec caching SCSI controller, a common choice for NT machines. The Deskstation also had some room to grow with six EISA slots, three of which were left open. A CD ROM drive rounded out the mass storage options.

Overall this system is slightly better equipped than the Carrera Workstation, but the units are quite similar. The \$7950 price is steep (though not as high as the Tangent's), but you get much more performance than with a typical 486-based system. As we advised for most MIPS-based stations, we suggest holding out until 32-bit versions of your favorite apps become available before you buy.

Silicon Graphics Magnum 4400/70, 4400/75

These two machines represent the top of the line for MIPS-based workstations, finishing way out in front in our 32-bit NT tests across the board. We tested both Magnums, but since they were identical except for minor processor speed and performance differences, we cover them together. One ran the R4400 at 140 MHz on a 70-MHz motherboard, the other at 150 MHz on a 75-MHz motherboard.

Some reasons for these units' spectacular finish, apart from their blazing processor, include a tremendous 1MB secondary cache, 32MB of main memory, a super-fast video subsystem (the 64-bit Jaguar graphics processor), and a double-width path to cache memory. These two systems use a full 128-bit path to cache memory from the processor and a 64-bit path to main memory. This allows the processor to receive data at full speed and feed it to the Jaguar video board fast enough for it to really shine. The other MIPSbased systems actually underused their video boards' capabilities.

These Magnum systems came with four EISA slots, a 500MB hard drive, and a proprietary ethernet adapter, plus a CD ROM drive. The case is densely packed with masses of cabling. Silicon

Graphics also supplied a 19-inch monitor of exceptional quality.

Currently the Magnums are available only to software developers. SGI has not vet decided whether it will make these computers available through standard retail channels, but if the company does, it estimates retail prices at \$8495 for the 4400/70 and \$9995 for the 4400/75. Such prices may be well worthwhile for these fully loaded NT systems that run 32-bit NT applications two to three times as fast as a 486DX2-66.

Tangent Carrera 4

As its name indicates, Tangent's system is based on a Carrera design. It uses the R4400 operating at 100 MHz on a 50-MHz motherboard, which provides performance improvements over the base R4000 without drastically changing the design. Tangent's system is housed in a jet-black tower with matching monitor, keyboard, and mouse, offering a sleek, almost sinister appearance. Tangent settled on a relatively small 236MB SCSI hard drive but included a CD ROM drive. The Carrera 4 came with 32MB of RAM expandable to a hefty 256MB. It used the Carrera Jaguar 64-bit graphics adapter teamed with a sensible 17-inch monitor.

At \$11,000, the Tangent is priced much higher than the Carrera, but that difference reflects the larger monitor and better processor. This system would also be a good NT workstation, but you won't get any additional speed until a next-generation MIPS processor comes out. The 50-MHz R4400 is the fastest processor that can fit in this box. And again, think twice about buying this machine if you run a lot of existing 16-bit Windows applications.

The DEC Alpha

e had a single entry in this hottest-of-the-hot processor category, not surprisingly from the same company that designed the processor. DEC is shipping its Alpha system—the DECpc AXP 150—for \$9995.

Of the NT systems we looked at, the DECpc AXP 150 was in the most unfinished state. DEC was the last company to get ready



THE LONE ALPHA-BASED NT SYSTEM: Digital Equipment's DECpc AXP 150.

FEATURES COMPARISON

NT Systems Give New Meaning to the Phrase "Power PC"

O No	Model Acerformula	AST MASS NO SECTION AST NO SECTION A	Carrera A Carrera Workstation A	Compan Compan	Compad	DECDE PRE 150	Deskstation Evolution	HP H	Nectra MP	1
Standard features		62						\		1
Estimated direct/street price	\$5995	\$4426	\$5000	\$9700	\$8200	\$9995	\$7950	\$18,100	\$4973	\$5200
Case	desktop	desktop	minitower	desktop	desktop	desktop	tower	tower	desktop	desktop
Processor						C 1 2 1 1 1 1				
Туре	R4400	486DX2	R4000	Pentium	486DX2	Alpha	R4400	Pentium	486DX2	486DX2
Clock speed (MHz)	66	66	100	60	66	150	100	60	66	66
Number of processors	1	1	1	1	1	1	1	1	1	1
Memory			12.00.0000				MORE AND A			
Installed/maximum RAM (MB)	32/128	16/128	16/256	40/136	40/136	32/128	32/64	32/384	16/64	40/192
Secondary cache installed (K)	128	256	0	256	256	512	512	256	256	128
Data bus width										
Between cache and CPU (bits)	64	32	64	64	32	128	64	32	32	32
Between cache and RAM (bits)	64	32	64	64	32	128	32	64	32	32
Video					12.55					
Monitor size (inches)	14	17	14	20	20	17	17	14	15	15
Video controller	Acer local bus adapter	integrated ATI 68800	Jaguar 64-bit adapter	Compaq QVision adapter	Compaq QVision adapter	QVision adapter	Orchid Fahr- enheit 1280 adapter	Western Digital VGA adapter	integrated S3-928 local bus	ATI 68800
Installed video RAM (K)	1024	2048	2048	2048	2048	1024	1024	512	2048	1024
Tested resolution, colors, screen refresh (Hz)	1024 x 768, 256, 60	1024 x 768, 256, 72	1024 x 768, 256, 72	640 x 480, 16, 60	640 x 480, 16, 60	1024 x 768, 256, 72	1024 x 768, 256, 60	640 x 480, 16, 60	1024 x 768, 256, 72	1024 x 768, 256, 72
Mass storage										
Hard disk space (MB)	520	340	409	510	510	426	500	4000	450	340
Number of hard drives	1	1	1	1	1	1	1	4	1	1
Hard disk interface	integrated SCSI	integrated IDE	integrated SCSI	integrated IDE	integrated IDE	SCSI adapter	SCSI adapter	SCSI adapter	integrated IDE	integrated SCSI
CD ROM drive	•	0	•	0	0	•	•	0	0	0
Total slots							The same			
ISA	2	0	0	0	0	0	0	0	4	0
EISA	0	5	4	5	5	6	6	8	0	0
Proprietary local bus	3	0	1	0	0	0	0	0	0	1
Micro Channel	0	0	0	0	0	0	0	0	0	3
Total bays										
3 1/2-inch externally accessible	1	0	1	0	0	1	0	1	1	1
5 ¼-inch externally accessible	3	3	1	3	3	3	6	7	1	1
3 1/2-inch internal	2	2	2	1	1	1	0	0	2	2
5 ¼-inch internal	0	0	0	0	0	0	0	0	0	0
Ports	100						100			
Serial	1	2	2	2	2	2	2	2	1	2
Parallel	2	1	1	1	1	1	1	1	1	1
SCSI	1	0	1	0	0	1	1	0	0	1
Mouse	1	1	1	1	1	1	0	1	1	1
Bundled software	Windows NT	DOS 6.0, Windows 3.1	Windows NT	DOS 6.0, Windows 3.1	DOS 6.0, Windows 3.1	Windows NT	Windows NT	NetServer Assistant	DOS 6.0, Windows NT	DOS 6.0, Windows 3.1
ervice and support ²		100	The state of	U Maria		118 1	- 16 Table	The In	AL DE	while of
Warranty (months)	12	36	12	36	36	12	12	36	36	36
elephone number		800/876-4278,					800/793-3375,	The Chicago Spice of the Land	Control of the Contro	800/225-5627,
Reader service number	408/432-6200	714/727-4141	/14//07-5051	713/378-8820	713/378-8820	800/332-4636	913/599-1900	415/857-1501	415/857-1501 662	663

Includes Micrografx PhotoMagic.

² All vendors offer on-site service and toll-free support.

3360 3360	NEC 466	AAOO)	Silicon Graphics Magnin Magnin	Model Tangent Tangent Carrera A	Wyse Toodi
\$26,000	\$5385	\$8495	\$9995	\$11,000	\$37,100
tower/desktop	desktop	desktop	desktop	tower	tower
Pentium	486DX2	R4400	R4400	R4400	486DX2
60	66	140	150	100	66
2	1	1	1	1	5
64/512	16/64	32/256	32/256	32/256	64/512
256 per CPU	256	1024	1024	0	256 per CP
200 par or o	1 200				200 per or
64	32	128	128	64	64
128	32	64	64	64	64
1					
19	15	19	19	17	17
integrated ATI 68800	Integrated Tseng ET4000/W32	Integrated Jaguar 64-bit	Jaguar 64-bit	Jaguar 64-bit adapter	S3-928 adapter
2048	1024	2048	2048	2048	1024
1024 x 768, 256, 76	1024 x 768, 256, 72	1024 x 768, 256, 72	1024 x 768, 256, 72	1024 x 768, 256, 72	1024 x 76 256, 72
1050	340	500	500	236	420
1	1	1	1	1	1
integrated SCSI	integrated IDE	Integrated SCSI	integrated SCSI	Integrated SCSI	SCSI adapter
•	•	•	•	•	•
0	4	0	0	0	0
0	0	4	4	4	9
5	0	0.	0	0	0
3		U	U	0	U
1	0	0	0	0	0
2	2	3	3	4	4
4	2	0	0	0	0
0	0	3	3	3	2
2	1	2	2	2	2
1	1	1	1	1	1
1	0	1	1	1	1
1	1	1	1	1	1
Windows NT or UNIX	DOS 6.0, Windows 3.1 ¹	none	none	Windows NT	MS-DOS 6 Windows I
1907 - 1	The Park		W.W		SPA.
36	12	3	3	12	12
800/225-5627,		415/960-1980	415/960-1980	800/800-6060, 415/342-9388	800/438-99 408/473-12
513/445-5000				666	

for NT. In addition, Microsoft is only *helping* DEC prepare the Alpha version of NT rather than producing it, as it is the Intel and MIPS versions. These factors mean the Alpha hardware and software we tested is in a much earlier stage of development. Consequently, we expect Alpha's performance figures to improve noticeably, and we withhold firm judgment of this system at this time.

The DECpc AXP 150 looks like a conventional Intel-based machine, but it's actually just shy of being a supercomputer, according to current government definitions. This is because the heart of the AXP is Digital's own 150-MHz Alpha processor. In fact, DEC has a faster version of the Alpha processor but opted to use the slower chip so its new PC would not be classified as a supercomputer, with the heavy export restrictions that would entail.

You'll be familiar with many features of this system, which can serve as a desktop or a minitower. The front panel is laid out simply, with a 3½-inch floppy drive and a CD ROM drive. While the floppy drive accepts 2.88MB floppies, it also works with 720K and 1.44MB floppies. The back panel has two PS/2 ports for keyboard and mouse, two 9-pin serial ports, and a printer port, plus connectors for a monitor, ethernet, and SCSI devices. Accompanying the AXP is a 17-inch monitor, which displays up to 1024 by 768 resolution.

Getting inside the box proved surprisingly easy. Removing two large screws let us slide the side panel off, exposing a large power supply and drive cage, which included a Digital 426MB hard drive, the floppy drive, and a CD ROM drive. Lifting a second, internal metal panel revealed the system board. There were few surprises. The system board has six 32-bit EISA slots, three of which hold an ethernet adapter, the video controller, and Adaptee's SCSI controller for the hard drive and CD ROM drive. The serial and parallel ports are integrated on the system board.

Cabling is neatly arranged. Only the two flat-ribbon drive cables pass through the system board chamber. The rest are confined to the chamber that holds the power supply and the drive cage.

With a processor clock rate almost 2½ times faster than that of the fastest PC available, DEC gets serious about heat dissipation. The processor is mounted near the front panel and is crowned by the largest heat sink we've ever seen. The CPU is snuggled up to a big ventilation fan that spans the width of the front panel. Half the front panel and much of the rear panel have vent slats, and the half of the system board on which the CPU resides is left clear to allow cooling air to pass from back to front. The only items in this air channel are 32MB of ½-inch-high SIMM.

DEC duly impressed us with its design, but what about performance? We need to stress the computing *potential* of this machine, because it was the earliest prototype we received. It was one of the few machines that couldn't run Win16 applications, because DEC hadn't fully implemented the emulator by test time. With the true Windows N'T programs, however, the AXP performed quite well, particularly in the 'Texim and PV-Wave tests. Once the AXP ships, it promises to be a trailblazer in the emerging N'T system market.

Once this system is ready, it should be considered as a high-end NT workstation. We expect it to compete well with the higher-end R4000- and R4400-based and Pentium machines, probably approaching the MIPS-based machines' performance at slightly lower cost and beating out the Pentiums at slightly higher cost. For the moment, however, it's early to judge exactly where Alpha-based machines are headed. We advise you to wait and see.

Introducing AMBRA. A new kind of standard doesn't equal average. Speed 66 MHz performance at 33 MHz prices.

AMBRA: Ready when you are.

If you're like many sophisticated PC users, you're ready for the latest and leading technology. Not later, but right now. At the right price.

AMBRA, a new IBM subsidiary, is ready to do business with you.

To begin, we source worldwide, getting the best late-breaking technology from high-quality suppliers, including IBM, Intel, Microsoft, and more. We buy smart and bargain

aggressively, keeping our operations streamlined and our overhead low. And when you buy direct from us—whether it's a single standalone system or a server powered by dual Pentium™ processors—we pass our savings directly along to you.

But we know you're looking for much more than low price. That's why we run our computers through comprehensive testing to ensure industry-standard compatibility. It's why we've contracted with IBM to back AMBRA systems with the best in service and support. It's why we custom-configure to order—at no extra cost. And deliver to your door without delay.

Interested? We invite you to keep reading, then give us a call. We're ready to send you complete details on AMBRA computers and the services we offer, including our 30-day money-back guarantee.^{1,2}

company that's **fast** on its feet. Where isn't synonymous with **EXPENSE**. We deliver

And Pentium technology. Ready to RUN.



AN IBM SUBSIDIARY

We're raising industry standards by giving you more.

Combining industry-wide resources with independent responsiveness, AMBRA provides you with immediate access to the latest technology.

If it's industry-standard, we've got it for you now. If it's coming soon, we're positioned to get it — from advanced video to the latest microprocessors.

We're committed to giving you more for your money. Like extra cache at no added cost. Accelerated local bus without accelerated prices. Upgradeability to Pentium processing, without a premium.

Along with extra features, we believe in giving you extra flexibility. Each and every AMBRA model is custom-built to your exact specs. With no penalty in terms of time or expense.

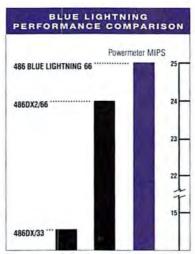
We offer hundreds of brandname hardware, software and peripheral options — everything from Hayes® modems to Lexmark® printers. To make sure that every possibility is open to you.

All AMBRA computers carry a 30-day money-back guarantee.^{1,2} They're backed by quick onsite service and round-the-clock support — the kind of service and support that never lets you down.



BLUE LIGHTNING: AN ELECTRIFYING AMBRA ADVANTAGE...

IBM's 486 Blue Lightning™ processor builds on the best features of Intel microprocessors. including performance, instruction set and upgradeability. IBM optimized the instruction set. added a I6KB internal cache. lowered power consumption and improved power management. The result: Blue Lightning doubles internal clocking to 66 MHz, while maintaining full 486 compatibility. AMBRA harnesses the power of Blue Lightning to deliver 66 MHz system performance at 33 MHz prices.



All processors were tested on the same IBM motherboard. MIPS = millions of instructions per second.

Built to your order, exactly.

AMBRA will custom-configure any and every computer for you—and it won't cost you an extra day or an extra dime! You have your choice of chassis, processors and a full range of memory sizes. Hard and floppy disks, tape drives, CD-ROM drives, multimedia kits, and more. Plus high-quality, low-radiation AMBRA monitors, network cards, you name it. You get it all preinstalled, from a single source.

Preloaded software.

We automatically preload AMBRA computers with MS-DOS® 6.0 and Windows™ 3.1. Purchase any of our large collection of software, and we'll preload it for you at no additional installation charge.

True-blue service and support.

You're backed by a one-year IBM onsite warranty. So you can count on 10,000 technicians at 190 locations nationwide to deliver service within two days of your call, Monday through Saturday. Plus, you get toll-free technical support 24 hours a day, seven days a week.

Convenient payment options.

Our lines are open every weekday 8 am to 9 pm, and Saturday 10 am to 6 pm (ET). We accept American Express, Visa and MasterCard. Purchase orders may be used by qualifying businesses.

Fast, to-your-door delivery.

We ship within three days of confirmation of your order. If, for any reason, we can't meet that deadline, we'll tell you up front—and give you a firm delivery date.

1 - 8 0 -



66 MHz performance at 33 MHz prices.

With Blue Lightning AMBRA models, you reap the benefits of 66 MHz system performance — at 33 MHz prices.

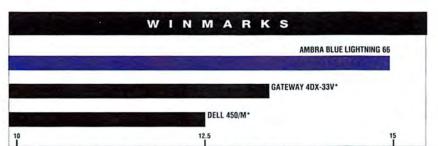
	AMBRA	GATEWAY	DELL
Model	486 Blue Lightning 66	486DX-33V	433/L
Internal clock	66 MHz	33 MHz	33 MHz
External clock	33 MHz	33 MHz	33 MHz
System case	Desktop	Desktop	Desktop
RAM	8MB	8MB	BMB
Cache	256KB	128KB	-
Floppy	One	One	One
Hard disk	340MB	340MB	340MB
Onboard SCSI	~	-	-
Local bus	✓ VESA	✓ VESA	~
Video	Win accel w/1MB	Win accel w/1MB	Win accel w/512KB
Color monitor	15" FST*	15" FST	15" FST
Pentium-ready	~	~	~
DOS 6.0, Windows 3.1, mouse	~	✓ MS Works for Windows	~
Network-ready	Ethernet (10BaseT)	-	-
Tech support	24 hours, 7 days/week	Mon-Fri, 6 am to midnight Sat, 9 am-4 om	24 hours, 7 days/week
Warranty/Service	1 year onsite	1 year onsite	1 year onsite
Price	\$2,079	\$2,025	\$2,699
*Upgraded from 14" S	VGA at no extra	cost. See special of	offer



Intel Pentium processing, within your reach.

AMBRA is one of the few who can offer you Pentium technology today — and we offer it at a price you can afford.

	AMBRA	DELL
Processor	Intel Pentium 60 MHz	Intel Pentium 60 MHz
	64-bit proc complex	64-bit proc comple
Bus type	EISA	EISA
System case	Desktop	Tower
RAM	8MB	8MB
Cache	256KB	256KB
Floppy	One	Two
Hard disk	540MB SCSI	500MB IDE
Onboard SCSI	✓ Dual 32-bit	-
Local bus	✓ VESA	~
Video	ATI™ Ultra Pro w/2MB DRAM	Win accel w/512KB
Color monitor	15" FSI *	15° FST
DOS 6 0, Windows 3.1, mouse	~	~
Tech support	24 hours, 7 days/week	24 hours, 7 days/week
Warranty/Service	1 year onsite	1 year onsite

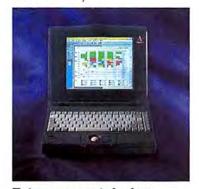


*Results measured in millions of Winmarks!** Reported in Window Sources (Ziff Davis), June 1993. Call AMBRA for specifics of this graphics Winmarks test.



Solid products, hot prices.

Competitive prices shouldn't mean mediocre machines. Example: AMBRA's low-cost Model S425SX. It puts you in touch with tomorrow's innovations. That's because it's Pentium-ready — and supports memory upgrades to 36MB. It features the upgradeable 486SX 25 MHz processor, cache to spare, a fast local bus, and Windows accelerator with IMB video memory.



Extra compact design. Extra color.

At 6.4 pounds, our 486SX 25 MHz SL-Enhanced notebook packs a lot of performance. You get 4 MB of expandable memory; a 120MB hard disk; STN dualscan, passive-matrix screen for vibrant color and easy mouse tracking; plus integrated fax/modem and built-in trackball. All for \$2,449.

AMBRA custom-building lets you cover all the bases.

HERE ARE JUST A FEW MODELS WE'LL MOLD TO MEET YOUR NEEDS:

Model S450SL

- 486SLC2, 50 MHz
- 4MB RAM max: 16MB
- 64KB processor cache
- 3.5" floppy
- · 120MB (19ms) hard disk
- · Windows accelerator with IMB video memory
- · Slimline case
- 3 I6-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$989

(Monitors start at \$200)

Model S425SX

- 486SX, 25 MHz
- Pentium technology ready
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" floppy
- 170MB (17ms) hard disk
- 2 VESA local bus slots
- Windows accelerator with IMB video memory
- 14" SVGA LR color monitor
- Slimline case
- · 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$1,339

Model S433DX

- 486DX, 33 MHz
- Pentium technology ready
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" floppy
- · 240MB (15ms) hard disk
- 2 VESA local bus slots
- · Windows accelerator with IMB video memory
- I4" SVGA LR color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$1,689

NC425 SL Notebook

- 486SX, 25 MHz, SL-Enhanced
- · Dual-scan STN color screen $(640 \times 480 \times 256)$
- Fax-modem 2400/9600 baud
- 4MB RAM max: I2MB
- 120MB hard disk
- 3.5" floppy
- 9.5" screen
- Integrated trackball
- 8.6" x 11.4" x 2.0", 6.4 lbs
- · MS-DOS 6.0, Windows, MS Works for Windows

\$2,449

Model D466BL/CD

An AMBRA Best Buy!

- 486 Blue Lightning 66 MHz
- · Pentium technology ready
- 8MB RAM max: 64MB · 256KB processor cache
- 3.5" floppy
- 440MB (12ms) hard disk
- Onboard SCSI
- · 2 VESA local bus slots
- Windows accelerator with IMB video memory
- · CD-ROM drive and software
- Media Vision 16-bit sound card
- Stereo speakers
- 17" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows. mouse

\$2,869

(For minitower, add \$50)

Model D466BL

- · 486 Blue Lightning 66 MHz
- Pentium technology ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 240MB (15ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with IMB video memory
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows,

\$1,979

(For minitower, add \$50)

Model D466DX

- 486DX2, 66 MHz
- · Pentium technology ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 340MB (12ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with IMB video memory
- CD-ROM drive
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet IOBaseT)
- Desktop case 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

\$2,599

(For minitower, add \$50)

Model D466E/VL

- 486DX2, 66 MHz
- · Upgradeable to 64-bit Pentium technology
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 440MB (12ms) hard disk 2 VESA local bus slots
- S3 video accelerator with IMB DRAM
- ★ 15" Flat Square LR color monitor. NI
- Desktop case
- 7 32-bit available EISA
- MS-DOS 6.0, Windows,

\$2,699

Model DP60E/VL

A Pentium Powerhouse!

- Intel Pentium processor, 60 MHz
- 64-bit processor complex
- VESA local bus with I available slot
- 8MB RAM max: 64MB 256KB processor cache
- 3.5" floppy
- 540MB SCSI hard disk
- · Onboard dual 32-bit Fast SCSI
- · ATI Ultra Pro Mach 32, 2MB DRAM
- ★ 15" Flat Square LR color monitor, NI
- Desktop case
- 7 available 32-bit EISA
- MS-DOS 6.0, Windows, mouse

\$4,259

SPECIAL OFFER: GET THE BIGGER PICTURE!

★ Purchase any model that boasts a 66 MHz or Pentium processor, and AMBRA upgrades your view— from the standard

14-inch SVGA to a 15-inch Flat Square color monitor. At no extra cost to you! Limited-time offer. Call for details. Warranty and 30-day guarantee information available through AMBRA. Please call 1-800-252-6272 for details regarding AMBRA's money-back guarantee and limited warranty. Copies of the terms of AMBRA's money-back guarantee are available in certain locations. Pletum shipping and insurance charges are the responsibility of the customer. 3 Offerings may differ in Canada. 9 Fetum shipping and insurance charges are the responsibility of the customer. 3 Offerings may differ in Canada. 9 1993 AMBRA Computer Corporation. AMBRA is a trademark of ICPL tot. and used under locense therefrom. The long-type are trademarks of AMBRA Computer Corporation. Mist have a registered trademark and Blue Lightning is a trademark of Intel Corporation. Mist have a registered trademark and Windows is a trademark of Microsoft Corporation. The Intel Inside logs and Intel are registered trademarks of Intel Corporation.

names are trademarks or registered trademarks of their respective suppliers. Offerings, prices and products are subject to change without prior notice. Prices do not include shipping.

In Canada,3 call 1-800-363-0066, Ext. 857 EXT. 281 1 - 8 0 0 - 2 5 2 - 6 2 7 2 ,

1-800-25 AMBRA

NT Applications

The Waiting Game

NT is here, but where are the applications? Here's what to expect, when to expect it, and what to do in the meantime.

By Eric Auchard



The rules of the desktop computing game are changing. On one side of the field, you've got the new ultrafast hardware platforms-such as Intel's Pentium, the MIPS R4000 and R4400, and DEC's Alpha chip—that leave today's high-powered 486s in the dust. On the other side, there's Windows NT, an operating system that puts this power to use. Because NT is pledged to support all the major hardware platforms, companies will be able to standardize on the Windows interface no matter what CPU they choose. As a result, NT promises to narrow the gap that separates PCs from the big leagues of corporate computing: mini and mainframe systems.

But the most important part of any game is the players—the new and updated business applications that take advantage of NT's preemptive multitasking, built-in networking, and 32-bit architecture. Whether users switch their allegiance from the aging but familiar DOS and Windows team to NT will depend largely on the benefits these new applications provide.

Initially, NT will bring the power of workstation and high-end server applications to the desktop. According to Microsoft, approximately 500 NT applications will be available by year-end—most of them dedicated publishing systems, scientific and financial modeling packages, and custom business applications. Eventually NT promises a whole new class of personal productivity software featuring full-motion

video, voice recognition, and other state-ofthe-art enhancements.

But most vendors of today's workhorse desktop apps are hedging their bets—waiting for the market to dictate their next move, or developing 32-bit applications that run under Windows 3.1 as well as under NT and access only a subset of NT's powerful features. Even Microsoft is advising



"If we were to move to NT, we would be talking about a complete upgrade of hardware."

PETER STOKES
MIS Specialist
San Francisco Civil Service Commission

most business users to skip NT and wait for the next upgrade to Windows 3.1, due next year and code-named Chicago. While virtually all the new NT apps will support Intelbased CPUs, support for competing platforms is less certain (see "The Soul of the New Machines"). So this new ball game may leave many PC users on the sidelines.

The Price of Power

NT's appeal can be summed up in one word: power. Unlike the DOS and Windows 3.1 duo, NT's preemptive multitasking easily and safely juggles several CPU-intensive jobs at once. Its support for multithreading means you can multitask inside applications—for example, you can open and edit one file while formatting or printing another. NT's 32-bit architecture promises faster memory access and swifter calculations. Built-in networking and E-mail let you create, manage, and use peer-to-peer LANs, while Windows NT's Advanced Server version handles more sophisticated, enterprise-wide networks.

"The user's question is, Do I need more power, memory, or multitasking?" says Rikki Kirzner, a senior analyst for Dataquest in San Jose, California. "If I do, then I need more than DOS and Windows, and my choices are NT and UNIX. If I want seamless integration, more or less, then NT is my choice."

All this power doesn't come cheap. Microsoft concedes that to run NT you'll need at least a 386 with 16MB of RAM, though a 486 is a safer bet. NT alone gloms on to at least 70MB of hard disk space, making a 200MB hard drive seem small once applications are loaded. For many users, that may be too big a price to pay.

"If we were to move to NT, we would be talking about a complete upgrade of hardware," says Peter Stokes, an MIS specialist with San Francisco's Civil Service Commission. His department is looking to migrate from a 10-year-old Wang VS that manages 30 client PCs—mostly 386SXs with 40MB hard disks and 4MB to 8MB of RAM. "The needed upgrade is light-years from what we've got," says Stokes.

Not surprisingly, the most likely NT users will be power addicts: designers and manufacturers using CAD/CAM programs, stock market traders looking for sophisticated financial analysis tools, and engineers and medical researchers hungry for the latest 3-D modeling and simulation programs.

Win32s: 32-Bit Windows

For users of spreadsheets, word processors, PIMs, and other personal productivity tools, the benefits of NT are less clear. Only the largest software publishers can afford to split development efforts between separate Windows 3.1 and NT versions, and no one is willing to focus exclusively on the new operating system at the risk of sacrificing sales to established 3.1 users.

"There are some classifications [of software] where there isn't any need to go to a native NT version," says Edmund Muth, worldwide manager of Digital Equipment Corporation's N'T developer programs in Elk Grove Village, Illinois. "Having a version that runs ten times as fast on Alpha is just not of value to their customers."

As a result, some vendors are developing versions of their applications using Microsoft's Win32s development kit. Win32s apps can take advantage of N'T's architecture while bringing 32-bit power to Windows 3.1 and remaining compatible. According to Doug Henrich, Microsoft's manager of developer relations for Windows N'T in Redmond, Washington, some 32-bit prototypes of popular software titles have proven to be two to three times faster, while others are "fairly close to a wash." The trade-off for going to Win32s is that some advanced N'T features, such as multithreading, are not accessible.

At an NT developers' conference sponsored by Microsoft earlier this year, 90 percent of the 300 companies represented were focused on developing Win32s applications, according to Henrich. "There are only so many database and CAD makers that are using the full NT features set so far," he says.

Harvard Graphics, the top-selling PC presentations package, should come out early in 1994 with a Win32s version, says Leon Hilton, representative of Software Publishing Corporation in Santa Clara, California. But the company is still deciding when or whether to do a full Windows NT version, "We'll try and follow that up, depending on how the NT market goes," Hilton says.

This refrain was echoed by dozens of other mainstream PC developers. Borland, for example, is developing a Win32s version of its C++ programming language, but the Scotts Valley, California, software giant has announced no plans for moving Quattro Pro or its line of database products to NT. "You have to be where people are," says Susan Nicolls, a Borland representative, "and Windows [3.1] is where people are."

When it comes to word processors, some analysts believe the question isn't when high-performance N'T versions will ship, but if they will ship. To date, none of the leading word processing vendors except Microsoft have announced plans to release N'T versions, though all insist that they will

be ready when the market shows a demand.

"A lot of this is still so far away," says WordPerfect representative Liz Tanner in Orem, Utah. "If NT becomes a major platform, we will be there to support it."

Even Microsoft has put NT applications on the back burner, promising only to deliver NT productivity applications sometime in 1994. A Microsoft representative hinted that Word and Excel would be among the first of these.

When they do arrive, Microsoft applications will be issued as native NT programs running on the DEC Alpha, MIPS, and Intel platforms—initially for Intel, then MIPS, and last on the other platforms. But customers looking for dramatic feature enhancements may be disappointed. NT versions of the applications "will most likely not have any optimized features because of where we are in the product development cycle," according to Microsoft representative Gaby Adams.

Microsoft officials say openly that, for now, most desktop PC users will find few uses for Windows NT. "Personal productivity is the area we focus upon least," says David Thacher, group products manager for Windows NT. "If you're just running personal productivity apps, then Windows 3.1 is the right platform."

Where the Apps Are

Still, NT has succeeded in wooing a handful of desktop applications to its side, most of them for 486- and Pentium-based machines, though few are expected to ship soon or in great numbers.

Datastorm Technologies is planning an NT version of Procomm Plus that will run on hardware platforms other than Intel, although the Columbia, Missouri, company has not announced a release date. Among other benefits, NT's multithreading would enable the communications package to connect with several remote services at once as long as multiple modems were available. According to a company representative, Datastorm plans a small initial product run because it believes NT will attract only 10 percent of desktop users.

Network-based Lotus Notes is also set to take advantage of NT's advanced features. "We built the Notes server product to

The Soul of the New Machines

indows NT's support for the DEC Alpha, the Silicon Graphics MIPS R4000 and R4400 series, and other RISCbased, non-Intel hardware means users will be able to choose an operating system without being tied to a specific CPU. Several of the new systems based on these CPUs may offer performance and price advantages over machines using Intel's Pentium chip, provided that 32-bit applications appear for them (see "NT PCs: Freedom of Choice"). But the key to their success will be the hardware vendors' ability to convince mainstream software vendors to support their platforms.

At first glance, it looks easy. Once an application has been written for NT, all it takes is a simple recompile by the developer in order to run the program on a different hardware platform. But many PC software developers say they are hesitant to issue non-Intel versions of their software due to the additional costs of providing technical support.

Even software developed for multiple platforms, such as

Frame Technology's desktop publishing application FrameMaker, currently supports only Intel under NT, despite apparent performance boosts from competing chips. Though Frame's internal tests have suggested that "DEC Alpha was far and away the fastest chip," says product marketing manager Craig Yappert, "we prefer to wait until there is a market for the other platforms."

The Alpha and MIPS chips can already run thousands of 16-bit Windows and DOS applications. But really show-stopping speed is inhibited by the Windows or DOS emulator that non-Intel platforms depend on for compatibility. By contrast, the Pentium gives 16bit apps an immediate and sizable performance boost. That's why makers of the RISC-based platforms are counting on PC software developers to crank out 32-bit versions of their products. Only when an application moves to a 32-bit architecture do the faster processors begin to show their stuff.

"[DEC is] aggressively looking for state-of-the-art developers that push the edge of what's possible," says Edmund Muth, worldwide manager of DEC's NT developer programs. "We're not just looking for a big list of applications to ship."

At press time, DEC was developing more than 300 applications for the Alpha, most of them custom business or technical apps. The company is talking to 1000 more developers, including the makers of all the leading business productivity tools. Silicon Graphics, on the other hand, has not been as aggressive in courting developers. The company would not indicate how many applications it is developing to take advantage of the platform, but the programs most likely to appear first are high-end graphics and CAD packages that are migrating down from MIPS workstations.

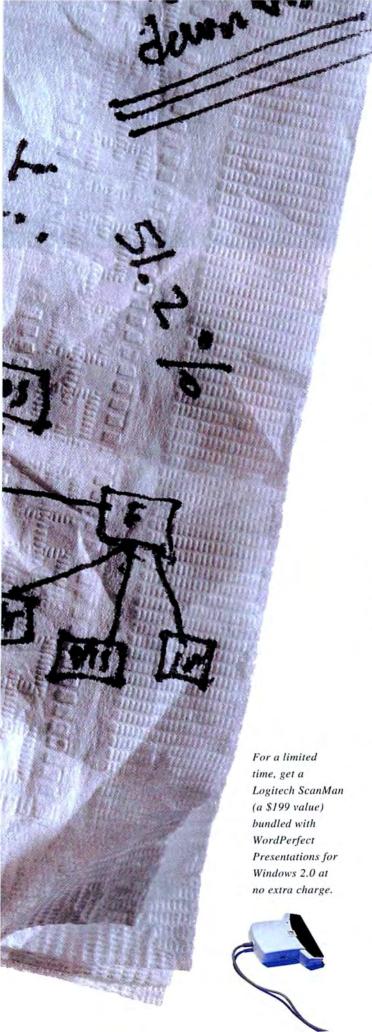
The MIPS series and DEC Alpha are just the first of several low-cost RISC platforms. Intergraph, the CAD workstation maker, has said it will have a Windows NT version for its Clipper microprocessor series, which is used solely in the company's own scientific and technical workstations. Company

representative Diane Tyler says that by the end of 1994, more than 500 Intergraph worksta-

that by the end of 1994, more than 500 Intergraph workstations and server applications will run on NT.

Still, the Pentium will likely have the early edge, thanks to its capability to turbocharge existing 16-bit apps. Ultimately, as more 32-bit applications emerge, the other platforms' speedy performance—and in some cases their cheaper prices—may prove irresistible to users. Massive user interest could start a chain reaction, spurring developers of business productivity apps to support the new machines—and, in turn, make NT the power users' operating system of choice.

Ru. 69 System y. 76.18 3.27 COLIS A REL me A



OK. The presentation looks great.

On a napkin.

But you can't pass that around a boardroom.

Now you're stuck.

You can't draw. You can't paint.

And faking a heart attack is out of the question.

Introducing WordPerfect® Presentations for Windows. The most comprehensive software of its kind. With it creating impressive presentations with overheads, slides, 3-D charting, sound, and video clips is a cinch. Even if the last picture you drew was in summer camp. And no other major presentations package comes with more clip art images or lets you scan and customize your own. Just think, you may never need to take another sick day again. For a free demo disk call 1-800-526-5058.

When it's got to be perfect,

it's got to be WordPerfect Presentations.



WordPerfect Presentations

If You Think Only A Heavy 486 Power, We Suggest You

"A Winner... The Ultimate Subnotebook."



Computer Can Give You Attach This Handy Peripheral.

PC/Computing, July 1993.

COMPUDYNE SUBNOTE: A POWER-PACKIN' PROCESSOR IN A PENCIL-PUSHIN' PACKAGE

For those who would rather develop third quarter projections than triceps, Compudyne offers the most powerful processor

available in a subnotebook—the Intel486™ at 25

MHz—in a tiny 3.9 pound package. Subnote adds an on-board math co-processor, 4MB of RAM, 8K of cache memory, an

80 MB removable hard drive, and Microsoft®

DOS 6 and Windows™ 3.1, so it's big on the inside, but small on the outside.



FLEXIBILITY

Subnote has an internal expansion compartment, a PCMCIA II slot, and more ports than most wine shops: parallel, RJ11, serial, external

floppy, AC adapter, PS/2™ mouse/keyboard, and VGA. Its 3.5", 1.44 MB external floppy drive comes standard.



FULL-SIZED FEATURES

Subnote's full-size, fulltravel 79-key keyboard has inverted-T cursor control, editing and function keys, a numeric

keypad, and a built-in trackball with side panel buttons. You don't get cramps lifting it; you don't get cramps using it.



A SHAMELESS DISPLAY

Not straining your back doesn't mean you have to strain your eyes. Subnote has a built-in 640 x 480 VGA

backlit LCD screen with an 18 to 1 contrast ratio, plus a handy LCD indicator panel for system status.

LIGHT, TRAVEL LONG

SL 3.3 volt power manage-

ment gives you up to four hours of use on the advanced Nickel Metal Hydride battery, or use the optional AA alkaline pack adapter. Optional fast charger and 12 volt auto adapter also make your work less draining.



OPTIONAL EQUIPMENT

- 2400 bps data modem with 9600 bps send/receive

- Spare rechargeable NiMH battery for 4 extra hours of battery life
- · Extra 80 or 120 MB hard disk drive
- · 4 MB or 16 MB RAM upgrade
- · Spare compact AC adapter/charger
- Spare external 1.44 MB 3.5" floppy drive
- · 12V auto adapter
- · Fast charger
- Numeric keypad

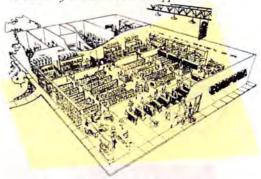
COMPUDYNE FROM COMPUSA: \$2 BILLION STRONG AND GROWING

The muscle behind Compudyne is none other than CompUSA*, the Computer Superstores, a publicly traded, \$1.3 billion company with 50

locations across the United States.

For the direct customer, this means that the full inventory of an entire superstore—over

5,000 products—is only one number away (that handy one below). Each system will be custom configured, tested, and shipped from your local CompUSA by a team of technicians dedicated exclusively to local customer support.



Compudyne and CompUSA team up to give you personal service, quick delivery, and the widest selection of name-brand items in the business, all at super low prices, every day.



In The Dog-Eat-Dog We Offer You More Ways

Desktop Systems That Will Make Your Rivals



486 POWER AND SX AFFORDABILITY: OUR 4865X/33 SYSTEM

- Intel486™SX/33 CPU
- 4 MB RAM
- · 1.44 MB 3 1/2" Floppy Drive
- · Super I/O Board
- 512K Video Card
- 170 MB Hard Drive
- MS-DOS 6/Windows 3.1
- Keyboard and Mouse



We feature Intel inside every computer



50 MHz PERFORMANCE AT A GREAT PRICE: THE 486DX2/50

- Intel486™DX 2/50 CPU
- · 4 MB RAM
- · 1.2 MB 5 1/4" Floppy Drive
- 1.44 MB 3 1/2" Floppy Drive
- 250 MB Hard Drive
- 1 MB Super VGA Video Card
- Compudyne I/O VESA Local Bus Motherboard
- MS-DOS 6/Windows 3.1
- Keyboard and Mouse





AFFORDABLE MULTI-MEDIA TECHNOLOGY: THE MULTIMEDIA MACHINE

- Intel486™SX/33 CPU
- 4 MB RAM
- · 1.44 MB 3 1/2" Floppy Drive
- 245 MB Hard Drive
- Dynamic Microphone
- PCTV Card with Capture
- · Multimedia Card
- · CD-ROM Drive
- · 2400 bps Data Modem with 96/96 Send/Receive FAX



- 1 MB Local Bus Video
 - Compudyne I/O VESA Local Bus Motherboard
- MS-DOS 6/Windows 3.1
- · Keyboard and Mouse



IT'S LOADED! COMPUDYNE'S **66MHz INCREDIBLE** OFFICE MACHINE

- Intel486™DX2/66 CPU
- · 4 MB RAM
- 1.44 MB 3 1/2" Floppy Drive
- · 345 MB Hard Drive
- 250 MB Tape Backup System
- · 1 MB Super Local Bus Video Card
- CD-ROM Drive
- · 2400 bps Data Modem with 96/96 Send/Receive FAX



- Compudyne I/O VESA Local Bus Motherboard
- Compudyne 15" .28 NI Monitor
- · MS-DOS 6/Windows 3.1
- · Keyboard and Mouse

UPGRADABILITY

Our VESA Local Bus board and low-insertion force socket let you upgrade all the way to Intel's Pentium" Overdrive™ processor.



RELIABILITY

Our desktop systems are assembled and tested at your local CompUSA by a team of tech-

nicians dedicated exclusively to local customer support.

CONFIGURABILITY

If one of these bundled solutions doesn't fit the bill, custom configure



one from our stock of over 5,000 products.

RETURNABILITY

All systems come with a 30-



day, no questions asked return policy." It makes buying a computer care free.

SUPPORT Toll-free technical support. On-site service for desktops'. Training classes available.

WARRANTIES 30-day, no questions asked, return policy: "
1 year limited warranty. Extended warranty available.

HOURS 7am-10pm (CDT) Mon.-Fri.; 9am-5pm (CDT) Sat.

GOVERNMENT/EDUCATIONAL SALES CALL:

8 0 0 - 8 6 2 - 3 0 8 8 *

FAX: 214-888-5783 · COMPUSA GSA#: GS00K93AGS-6319

World Of Business, To Chew Up The Competition.

Run Home With Their Tails Between Their Legs.



THE ULTIMATE 66MHz CAD WORKSTATION. AT THE SMALLEST PRICE AROUND.

- Intel486™DX 2/66 CPU
- + 8 MB RAM (1 MB x 8)
- · Dual 3 1/5" 1.44 MB/5 1/4" 1.2 MB Floppy Drive
- · 345 MB Hard Drive
- · 250 MB Tape Backup System
- 1 MB Super Local Bus Video Card
- Compudyne I/O VESA Local Bus Motherboard



Compudyne 17" SVGA .28 NI Monitor

MS-DOS 6/ Windows 3.1

AutoDesk AutoSketch

· Keyboard and Mouse



TOWER OF POWER: THE AFFORDABLE **66MHz SERVER** SOLUTION

- Intel486"DX 2/66 CPU
- 16 MB RAM (4MB x 4)
- 1.44 MB 3 1/2" Floppy Drive
- · 540 MB Hard Drive
- 250 MB Tape Backup System
- · 800 x 600 Video Card
- · Compudyne I/O VESA Local Bus Motherboard
- MS-DOS 6/Windows 3.1
- Keyboard and Mouse



Every computer shown is Microsoft'

Ready-to-Run

SERVICEABILITY



We offer knowledgeable salespeople, on-site and in-store technical support, training classes, and toll-

free phone support.

ACCESSIBILITY

- · Atlanta · Baltimore · Boston · Chicago
- · Cincinnati · Dallas · Denver · Detroit
- · Greensboro · Houston · Kansas City
- · Las Vegas · Los Angeles · Miami · Milwaukee
- · New Orleans · New York City · Norfolk
- · Philadelphia · Phoenix · Pittsburgh
- · Providence · Rochester · Sacramento
- · San Diego · San Francisco · St. Louis
- · Tampa · Washington, D.C.

*Leasing arranged through Leasing Group, Inc., payments based on 36-month open-end rate. **Must be returned *as new in original packaging. *Within the continental United States. Each system will be shipped from the nearest CompUSA Superstore **CompUSA is not responsible for typographic/tecknical errors. Other limitations apply. Training courses not offered as vocational training or as qualifying one for any particular employment. Course credits not transferable to any accredited educational institution. In Texas, Nevada and Connecticut, classes are offered as employer sponsored courses, not open to general public. Prices and specifications subject to change without notice. Intel 486 and the Intel Inside logo are trademarks of the Intel Corp. **18/*(*) Trademarks belong to their registered owners. On-site service for notebooks optional. CompUSA Direct, 15167 Business Avenue. Dallas, TX 75244.

COMPUDYNE SLIMNOTES WHOLE LOTTA MUSCLE, NOTTA LOTTA MOOLA.

Compudyne's Slimnotes offer the raw power of the Intel486 DX2/66, the fastest processor available in a notebook. The only advantage you'll

have to working in the office is a place to set your coffee.



Our monochrome Slimnote is slightly thinner (at 1.6") and weighs in at only 5.8 pounds with its 10" VGA 640 x 480 brilliant LCD screen.



The 6.2 pound, 8.5" x 11" x 2.2" color Slimnote puts that incredible power behind an 9 1/2" TFT active matrix 256-color screen.

- 210 MB hard drive
- 4 MB RAM (expandable to 20 MB)
- Internal 3.5", 1.44 MB floppy drive
- Full-size 84-key keyboard with 10 function keys, including dedicated 'Page up/down', 'Home', and 'End' keys
- Integrated trackball
- Rechargeable NiMH battery with 2.5 hour battery life.
- Expansion chassis, PS/2 mouse/keyboard, parallel, serial, and external video connectors
- Preloaded with Microsoft DOS 6 and Windows 3.1





CANADA: 214-702-0055 24 HR FAX: 214-888-5743 INTERNATIONAL ORDERS WELCOME

ON OUR 24 HR FAX LINE: 214-888-5706



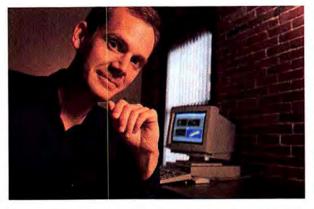
Circle 19 on reader service card

exploit multitasking and multiprocessing," says Alex Morrow, Lotus's general manager for cross-product architecture in Cambridge, Massachusetts. "NT is an ideal platform; it means more people per server." The NT version of Lotus's corporate communications tool will ship by the end of 1993, Morrow says.

Lotus is also working on a full-featured version of 1-2-3 for NT. A prototype of the spreadsheet showed performance benefits as a result of

NT's straightforward memory addressing scheme, 32-bit environment, and multithreading capabilities, according to company officials. Aside from Notes, however, Lotus does not plan to release NT applications before the second half of 1994.

Graphics-intensive applications with huge appetites for RAM, such as Adobe's Photo-



shop, will benefit from NT's capability to access up to 4 gigabytes of memory. With NT's wider address base, Photoshop can look at RAM as one large memory pool, making it easier to work with multimegabyte color files. Adobe says it is working on an NT version of Photoshop, but has not announced a ship date.

Expo was shut out of the PC market due to memory constraints imposed by DOS and Windows.

STEVE CLARK
President
Leading Market Technologies

CAD and Custom Applications

The most heated competition among NT packages in 1993 will come from CAD applications, including some migrating to NT from UNIX. Early CAD arrivals will include Parametric's Pro/Engineer, a mechanical design automation tool that integrates the entire process from design through manufacturing, and GrayTech Software's CAD X11, which handles standard 2-D drafting. Market leader Autodesk is also jumping on the bandwagon, though the company does not expect to deliver Auto-CAD for NT until at least mid-1994.

Financial trading programs are also busy with NT development plans. Prior to NT, only high-priced Wall Street traders could afford the hardware to run a program such as Leading Market Technologies' Expo, which offers graphical display and analysis of financial data on UNIX-based workstations. Steve Clark, partner and president of the Cambridge, Massachusetts, firm, says Expo had been shut out of the PC market due to its intensive online data demands and memory constraints imposed by DOS and Windows. The combination of new and more powerful hardware and software coming for NT should make financial trading programs much more widely available.

With the NT version of Expo due out the day NT itself ships, Clark foresees his product making a big impact among financial researchers, salespeople, brokers, and other professionals who are slightly down-market from actual securities traders. "The reason I'm excited about NT is that it allows us to reach a whole tier that wants access to financial data," Clark says.

Other NT developers in the financial trading arena include Reuters America of Hauppage, New York, maker of Reuter Terminal software, a real-time price information package with news and graphical

NT Applications on the Horizon

This list shows the plans of some major vendors to move their applications to Windows NT and the processor platforms that run the new operating system.

n/a n/) O
n/a n/) O
n/a n/ n/a n/	a •
n/a n/ • n/	a •
• n/	
	a n/a
	•
	n/a
n/a C	0
	0
• 0	0
• n/	a n/a
0 0	•
• 0	0
n/a C	0
	•
n/a n/	a •
0	•
n/a n/	a •
	•
	•
• n/	a n/a
• n/	a n/a
	n/ n/



More computer users prefer to keep their important data safe and sound on 3M diskettes than any other brand. That's because inside and out, each diskette is built for reliability and tested for 100% error-free performance. Just what you

expect from the world's leading manufacturer of diskettes.

Whether you use 2 megabyte diskettes or 21 megabyte Floptical® diskettes, you can depend on 3M. That's why more businesses protect important information on 3M data storage products than any other brand in the world. For more information call 1-800-888-1889, ext. 56.

The most preferred safe deposit box.



NT Applications Trickle Out

Even if you don't have the bucks for a Pentium, you'll still be able to run NT and Win32s applications on your 386 or 486. This timetable outlines when some of the more notable packages will be available for 80x86-based machines.

Third quarter 1993 Fourth quarter 1993 1994 and beyond When NT ships Accounting Vision/32 Series, Intellisoft Adobe Type Manager, Adobe Systems HyperWrite, Looking Glass Software 1-2-3, Lotus Development Borland C++, Borland Interleaf 5, Interleaf AutoCAD, Autodesk CorelDraw, Corel DEC C++ for Windows NT, DEC DesignView, Computervision Informix database products, Informix Excel, Microsoft Lotus Notes, Lotus Development Microsoft Money, Microsoft Expo, Leading Market Technologies FrameMaker, Frame Technology Microsoft Project, Microsoft GrayTech CAD X11, GrayTech **Great Plains Dynamics, Great Plains** Hyperion, IMRS Image-In-Color Professional, Image-In Microsoft Publisher, Microsoft Microsoft Works, Microsoft Oracle, Oracle Ingres Intelligent Database, Ingres Photoshop, Adobe Systems Procomm Plus, Datastorm Technologies Ingres/Net, Ingres Pixar Typestry, Pixar Zortech C++ for Windows NT, Symantec Ingres/Windows 4GL, Ingres PowerPoint, Microsoft Picture Publisher 4.0, Micrografx SAS package, SAS Institute Sybase, Sybase SQL Server for Windows NT, Microsoft Visual C++, Microsoft Word for Windows, Microsoft Virtuoso 2.0, Altsys

applications, and Quay Financial in Dublin, Ireland, which is developing an NT version of a program that distributes and displays financial quotations.

Initially, however, the vast majority of NT titles will be custom business applications for a wide range of markets—pharmaceutical research, oil and gas exploration, insurance, materials testing, and medical imaging, to name a few. According to a survey conducted by Microsoft, more than 50 percent of the first 35,000 NT software developer kits were sold to companies building industry-specific custom applications.

Servers and Beyond

With its Advanced Server version of Windows NT, Microsoft is setting its sights on a loftier goal: handling large-scale server applications and enterprisewide operations that have been the traditional domain of mainframes and minicomputers. The Advanced Server will incorporate the centralized client-server networking features of Microsoft's LAN Manager, but with greater security and stability. As a result, many industry analysts see NT as Microsoft's attempt to extend its reach into the corporate marketplace.

A Microsoft official claims to have signed up 100 percent of database server vendors already, including industry standard-bearers Oracle, Ingres, Sybase, Informix, and DEC. Corporate businesses rely on software from vendors like these to build on-line transaction and inventory management systems.

"What NT buys us is performance and multithreading capabilities," says Stuart Reed, director of marketing for Oracle's desktop products division. "There aren't too many other environments with named pipes support, just [UNIX System Laboratories, recently acquired by Novell], OS/2, and now NT."

With its R/3 product line, Microsoft has also won over several high-end financial reporting systems, including Dun & Bradstreet Software Services' SmartStream suite and a system from Munich-based developer SAP, AG. Both vendors offer a full set of client-server applications for financial reporting, inventory tracking, human resources, and manufacturing process controls that formerly existed on mainframes.

Still, it remains to be seen whether corporate software developers' support for N'T changes the way people do business. "At this point we're definitely treating [Windows N'T] as just another OS," says Oracle's Reed. "If everybody buys it, we will elevate its status. If no one buys it, we will devalue it. We try pretty hard to be neutral."

Waiting for Chicago?

With the release of Windows NT, Microsoft has expanded our notion of desktop computing, but not necessarily in ways many users were expecting. NT will enable highend applications, formerly restricted to UNIX or other operating systems, to mi-

grate down to the desktop provided you have the horsepower to run them. And it will allow large companies to standardize on a single graphical interface for all their computing needs.

If hardware prices continue to plummet and a new class of NT-based personal productivity programs emerges, Windows NT may one day reach most desktop users. For the time being, however, it is a system to grow into.

Despite Microsoft's initial marketing campaign, NT is not the new DOS that users have been waiting for. That title may fall to Chicago. Early indications are that Chicago will merge the features of Windows and DOS into a full 32-bit operating environment centered around OLE 2.0 object-linking technology that allows users to access several applications from inside a single document. It all depends on how long it takes for Chicago to appear versus how long it takes for a wide range of NT-based business productivity apps to appear. If real NT applications reach the market quickly, then NT will take off for everyday use.

"The one problem Microsoft might have is if they make Chicago too good," says Kimball Brown, an industry analyst for Info-Corp in San Jose. "If Chicago does most of what NT does, then NT will always be a niche product."

Eric Auchard is a freelance writer based in Washington, D.C.

Todays PCbuyers are pretty demanding.

But thati OK...





We're up for it!

"You don't have to sacrifice performance and reliability for price."

All NCR i486TM-based WindowsTM workhorses are designed, built and tested by us to run today's power-hungry applications with ease. After all, who wants fledgling performance, no matter how great the price? Our PCs are built under the most exacting standards. NCR uses the highest-quality components from the



best manufacturers, such as Conner, Quantum, Western Digital, and, of course, Intel.

And, you can rest assured that every PC is fully tested before it's delivered to you. This guarantees you optimum performance and reliability right out of the box ... at a price you'll feel good about.

"Forward-thinking technology that won't box you into a corner."

As technology changes, we'll make sure you can keep up. These NCR PCs feature:

- built-in VESA Local Bus Video to let you breeze through Windows applications
- a real migration path, so you'll be ready for new upgrades such as Intel OverDriveTM and future PentiumTM OverDrive microprocessors

- complete compatibility —
 we're dedicated to building open
 systems ... systems that work with
 your networks and peripherals
- available on-site consulting and upgrade assistance by our NCR Systems Engineers
- ZIF (Zero Insertion Force) socket and Flash BIOS for easy processor and BIOS upgrades

"Here's what makes NCR support superior."

In this business, you're only as good as your support. That's why **our own**

5,000+ factorytrained Service Specialists are located in over 700 locations throughout the U.S. We know that when you



need service, you need it now. And, NCR on-site Field Engineers can service most brands and models – not just our own.

Day or night, we're there to help you with our **24-hour**, toll-free Techline which is staffed by

some of the best-trained and most helpful folks in the industry.



It's absolutely free for as long as you own your NCR system.

Our goal is to resolve 100% of your questions the first time you call.

"You're covered with an industryleading warranty."



We take customer satisfaction personally.

So, you get a **30-day, no-questions-asked, money-back guarantee.** You also get a three-year, on-site, industry-leading warranty that includes the monitor!* That's right, three years of next-business-day, on-site protection.

"Help in selecting what's right for you."

It's easy to find a computer company that's willing to sell you something. But how about one that cares about what you really need? Together, we'll figure out what kind of system you need and why.

In the end, you'll get a PC customized for you at an off-the-shelf price. And, the buying experience will be a satisfying one.

^{. 3-}year on-site warranty available in U.S. only.



NCR 486SX/25

\$ 1.395 \$50.00/ month

· Intel Pentium OverDrive Ready

- Intel486SX/25 (upgradable to 50MHz)
- · 120MB 17ms Hard Drive (max. 1GB)
- 4MB RAM (70ns)
- · 8KB Cache (max. Write-back 256KB)
- 3.5" Flex Drive
- 14" SVGA VESA Flicker-Free Econo-Monitor
- · VESA Local Bus Video
- Windows TurboCharger w/1MB VRAM
- · Pre-loaded Productivity Pak & 101-Keyboard
- · 3-year on-site warranty
- · 3 slots/3 bays

Windows on a Budget!



NCR 486SX/33

\$ 1.745 \$1.875 (w/486DX/33)

- · Intel Pentium OverDrive Ready
- Intel486SX/33 (upgradable to 66MHz)
- · 160MB 17ms Hard Drive (max. 2GB)
- · 4MB RAM (70ns)
- 8KB Cache (max. Write-back 256KB)
- · 3.5" Flex Drive
- · 14" SVGA VESA Flicker-Free Econo-Monitor
- · VESA Local Bus Video
- · Windows TurboCharger w/1MB VRAM
- · 2 VESA Local Bus Expansion Slots
- · Pre-loaded Productivity Pak & 101-Keyboard
- · 3-year on-site warranty
- · 6 slots/5 bays

Entry-Level Power & Upgradability!



NCR 486DX2/50

\$82.00/ month

- · Intel Pentium OverDrive Ready
- · Intel486DX2/50
- · 240MB 17ms Hard Drive (max. 2GB)
- 4MB RAM (70ns)
- · 8KB Cache (max. Write-back 256KB)
- · 3.5" Flex Drive
- · 14" SVGA VESA Flicker-Free Monitor
- · VESA Local Bus Video
- · Windows TurboCharger w/1MB VRAM
- · 2 VESA Local Bus Expansion Slots
- · Pre-loaded Productivity Pak & 101-Keyboard
- · 3-year on-site warranty
- · 6 slots/5 bays

Affordable Super-Performance!



NCR 486DX2/50

\$ 2.495 \$90.00/ month

Mouse

Windows 3.1

MS DOS 6.0

· Intel Pentium OverDrive Ready

- Intel486DX2/50
- 240MB 17ms Hard Drive (max. 2GB)
- 8MB RAM (70ns)
- · 64KB Cache (max. Write-back 256KB)
- . 3.5" Flex Drive
- · 14" SVGA VESA Flicker-Free Monitor
- VESA Local Bus Video
- Windows TurboCharger w/1MB VRAM
- · 2 VESA Local Bus Expansion Slots
- · Pre-loaded Productivity Pak & 101-Keyboard
- · 3-year on-site warranty
- · 6 slots/5 bays
- Great for Home or Office!



NCR 486DX2/66

\$ 3,165 \$107.00/ month

· Intel Pentium OverDrive Ready

- Intel486DX2/66
- 340MB 13ms Hard Drive (max. 2GB)
- · 12MB RAM (70ns)
- 64KB Cache (max. Write-back 256KB)
- 3.5" Flex Drive
- · 14" SVGA VESA Flicker-Free Monitor
- VESA Local Bus Video
- · Super Graphics Accelerator w/2MB VRAM
- 2 VESA Local Bus Expansion Slots
- · Pre-loaded Productivity Pak & 101-Keyboard
- · 3-year on-site warranty
- · 6 slots/5 bays

Terrific for High Intensity Graphics!



NCR 486DX2/66

\$134.00/ month

· Intel Pentium OverDrive Ready

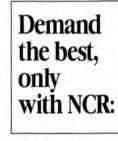
- · Intel486DX2/66 Tower Case
- . 520MB 10ms Hard Drive (max. 2GB)
- · 16MB RAM (70ns)
- 256KB Write-back Cache
- · 3.5" Flex Drive
- · 600MB CD ROM w/SCSI-2 Adapter
- 14" SVGA VESA Flicker-Free Econo-Monitor
- · Super VGA Graphics Adapter
- · 2 VESA Local Bus Expansion Slots
- · Pre-loaded Productivity Pak & 101-Keyboard
- · 3-year on-site warranty
- · 6 slots/5 bays

Outstanding File Server!

All NCR Desktop Systems include a pre-loaded **Productivity** Pak:

Options: fax/modem and networking cards, memory/ disk upgrades, printers,

and a variety of popular applications ... call us.



· Real configurations for real applications.

· Maximum configurability - you make the choice.

- · Free 3-year on-site warranty monitor included.
- · Next-business-day service.
- Industry standard VESA Local Bus.







Call NCR Direct Connect: 800 237-2864

Stay connected on the road.

NCR's Road-Ready Systems are part of our Mobile
Networked Computing strategy that combines NCR's
innovative portable technology with AT&T's global
communications skills. Our notebooks are smaller,
lighter, faster and better-connected than ever before with
available features to elevate you to a new level of mobile networking.

Road-Ready Systems-Key component of the award winning Virtual Office.



3150 Color Notebook

\$ 3,75 or \$127.00/ month

- Intel486SX/25 (487 upgradable)
- · 170MB Removable Hard Drive
- · 3.5" Internal Flex Drive
- TFT Active Color Screen (9.5" diag.)
- · Local Bus Video
- · Simultaneous LCD/CRT display
- 4MB RAM/512KB Video Memory
- . 1 PCMCIA slot (Type 2)
- 6.3 lb. Compact Unit/Featherweight 8 oz. AC adapter
- · 3-4 Hour battery-life (NiMH)
- Snap-on cableless TrackBall
- Enhanced pre-loaded software: DOS 6.0, Windows 3.1, Bitfax, TourGuide, AT&T Mail, AccessPLUS and on-line Windows documentation
- · 3-year Warranty (first year on-site)



Mono Notebook

3150

\$ 2,195

or \$79.00/ month

- Intel486SX/25 (487 upgradable)
- · 170MB Removable Hard Drive
- · 3.5" Internal Flex Drive
- · Mono Screen (9.5" diag.)
- · Local Bus Video
- · Simultaneous LCD/CRT display
- · 4MB RAM/512KB Video Memory
- · 1 PCMCIA slot (Type 2)
- 5.5 lb. Compact Unit/Featherweight 8 oz.
 AC adapter
- · 3-4 Hour battery-life (NiCAD)
- · Snap-on cableless TrackBall
- Enhanced pre-loaded software;
 DOS 6.0, Windows 3.1, Bitfax, TourGuide,
 AT&T Mail, AccessPLUS and on-line
 Windows documentation
- 3-year Warranty (first year on-site)

NCR is completely dedicated to satisfying the needs of demanding buyers — people like you. From the best products to the best service to the industry's most experienced and knowledgeable support staff. And, at NCR you'll never talk to an order-taker — our Sales Consultants are the absolute best in the business. Buy from NCR Direct Connect with complete confidence.

"Because you wouldn't settle for anything less."

How to Order:

Just call an NCR Sales Consultant today with your Visa, MasterCard or American Express card. Corporate Purchase Orders also accepted. We also offer creative financing and lease options, available through AT&T Capital Corporation. Call for details.

800 237-2864

Call NCR Direct Connect to get the latest configurations and pricing.

Hours: 8 AM to 8 PM EST, Monday through Friday.







NCR: Performance, Price, Service and Support. We're ready for the challenge.







Call NCR Direct Connect: 800 237-2864

NCR is the name and mark of NCR Corporation. AT&T and the AT&T globe design are registered service marks and trademarks of American Telephone and Telegraph Company. The Intel Inside Logo, Intel486 and Pentium are trademarks of the Intel Corporation. DOS and Windows are trademarks of Microsoft Corporation. All other trademarks acknowledged. Prices and money-back guarantee do not include shipping. Shipping charges are calculated according to weight and distance. Appropriate sales tax will be added. NCR Corporation is not responsible for errors in typography or photography. ©1993 NCR Corporation.

NT Peripherals

Plug and Play?

If you choose NT, you'll want to bring your peripherals and add-on boards along. Will most hardware make the transition smoothly?

By Shane Rau



For months now, Microsoft has touted Windows NT's ability to bring a familiar interface to realms beyond that of the traditional Intel-based PC, NT not only runs on 486 PCs, it runs on computers based on Intel's new Pentium chip as well as those based on foreign-sounding and more powerful processors, such as the MIPS R4000 and R4400 and the DEC Alpha. That's all well and good, but whether you install NT on your existing 486 or buy an NT-ready machine of another platform, you need to know whether your peripherals will be welcome. If NT or the system you plan to run it on won't support your devices, you have some tough choices: Ditch the peripherals, drop the system, or do without NT.

Two Questions to Consider

If you want to buy a new NT system, especially one not based on an Intel processor, you need to address two issues: Can I plug my devices into the new system? Will NT work with my devices?

Fortunately, most people will answer yes to the first question. Not only do Intelbased NT systems, including Pentium PCs, continue to use standard ports for our peripherals, most non-Intel NT systems use the same slots and ports. Deskstation's Evolution Series PCs, for example, use the

MIPS R4000 and R4400 processors but stick with the standard serial, parallel, and SCSI ports for external devices, and the EISA bus for internal plug-in cards. DEC's Alpha-based systems also support PC port and bus standards. Most non-Intel platforms, however, don't support the VESA local bus standard, a real concern for owners of VLB add-in cards. As always, check the physical compatibility of your peripherals.

Just because your printer, fax-modem, and mouse attach smoothly to your computer, however, doesn't mean they'll work with it. As with any operating system, NT needs drivers to communicate with its peripherals. These miniprograms carry instructions to peripherals on behalf of the operating system, much like an executive assistant distributes a manager's instructions to the office staff. A printer driver, for example, carries instructions to your printer to bold-

face, underline, and double-space a document. A video driver carries instructions for your video controller to draw objects on your display. Drivers can vary between each make and model of each device. For example, an HP LaserJet III requires a different driver from an HP LaserJet IID.

Every operating system needs a driver for each peripheral. Although NT runs DOS and Windows applications, it doesn't run DOS and Windows drivers; NT's architecture demands that drivers communicate differently than they do in DOS and Windows. In fact, every peripheral's device driver needs to be rewritten. Adding to the significant weight of the driver effort are the need to write drivers for Intel and non-Intel systems alike (a device needs a specific driver for each type of system) and the need to support the great numbers and types of peripherals. NT means a broader selection

of platforms for buyers but a greater burden on driver developers.

Impossible to Cover All Bases

Microsoft, peripherals manufacturers, computer manufacturers—all that have a stake in Windows NT's success—are furnishing drivers. They know that lack of peripherals support can kill NT.

Eager to make good, Microsoft is offering greater driver support for NT than for any of its other operating environments. Even so, this support is not comprehensive. The company acknowledges it can't get NT to support every peripheral. Says Windows NT product manager Richard Greenberg, "It's impossible to test every combination of drivers in every computer, so we identified a core set of devices based on our own experiences and what customers have said. For instance, we expect more NT users to

Down and Dirty With NT

hen the assignment came to write about Windows NT and its support of peripherals, it was time to become an NT user. As it happened, we had an idle NT machine in the office of Senior Editor Steve Fox. While Steve was away on his honeymoon, I moved into his office and began wedding five peripherals pulled from my 386 Windows 3.1 desktop system to Steve's 486DX2-66 NT machine.

I knew that moving my peripherals—keyboard, mouse, video card, modem, and Bernoulli Box—to NT was supposed to be simple. Since Windows NT and Windows 3.1 share the same interface, configuring the peripherals should just be a matter of going into Windows NT Setup, selecting a driver, and restarting NT.

I started with the most basic peripherals, the keyboard and the mouse. For my Everex 101-key enhanced keyboard, the driver already active on the NT machine worked fine. Adding my Logitech three-button MouseMan serial mouse was about as easy; though there was no specific driver for the MouseMan, the Logitech serial mouse driver worked fine. Installing my desktop modem was a piece of cake—it took just a few minutes to plug it into a serial connector. Since NT uses a common communications driver for modems, I didn't have to bother selecting a driver.

Next on the list was the Everex Viewpoint SVGA video card. The supported drivers listed in NT's Setup included all the resolutions of the Viewpoint's Tseng Labs ET4000 chip set as well as standard VGA (640 by 480, 16 colors) and VESA VGA (800 by 600, 16 colors). The VGA and VESA VGA drivers were already present on my system, but the Tseng Lab drivers weren't. I found them, however, on my Windows NT CD ROM. I tried each driver up to the resolution limits of my display, and everything worked flawlessly.

All these successes girded me for the greatest challenge—

installing my lomega Bernoulli Transportable. In my 386 system. this removable-cartridge drive uses a proprietary 8-bit interface card and lomega's own driver. Finding no lomega drivers on the NT installation disks, I called Iomega's technical support department and confirmed my worst fears: lomega's adapter was not yet supported by NT, and the company couldn't tell me when an NT driver would be available. (In all fairness, note that I placed this call while working with NT beta and weeks before NT shipped.)

A closer look at the NT hardware compatibility list that accompanied the NT beta saved the day: The UltraStor 24F SCSI host adapter already installed on the system for the CD ROM drive could also serve as an adapter for the Bernoulli box. Most users probably would not be this lucky. Furthermore, this last install was not without hitches—I had to scrounge a SCSI cable. Soon I was saving files and launching applications from my Bernoulli.

My experience was not a tearout-your-hair episode. It reinforced, however, what I learned in researching NT's peripherals sup-



port: Popular and mainstream devices, such as standard keyboards and mice, using standard interfaces and with standard features, will find support readily in Windows NT. Feature-laden devices and nonstandard devices such as my Bernoulli box may have to wait for a driver from the peripherals manufacturer.

have SCSI devices, so we're weighting the list towards these devices." Other devices featured prominently on Microsoft's NT hardware compatibility list include printers and graphics chip sets. Greenberg claims Microsoft's testing efforts have identified thousands that are compatible with NT and says that number is growing.

Microsoft is encouraging the availability of drivers for non-Intel NT systems by asking developers to write portable driversdrivers written so they can be tailored easily for different processors. This effort could slow development, however, because writing a driver with two or three platforms in mind is more complicated than writing with just one platform in mind. As one developer put it, "Portability across platforms has to be designed from the ground up."

Non-Intel Driver Development

Makers of non-Intel systems have launched NT device driver development programs of their own. DEC, MIPS, Deskstation, and Intergraph all speak of having defined a core set of peripherals they will support, either by writing drivers themselves or by enlisting peripherals manufacturers to write drivers specifically for their platforms. DEC claims its Alpha platforms will support many mainstream PC peripherals, including Adaptec's SCSI adapters and many ethernet controllers. Andy Keane, MIPS product marketing manager for microprocessors, says, "We can get a few manufacturers and encourage them to develop drivers." By seeding the market with drivers from key manufacturers, Keane hopes to induce other manufacturers to follow. "Once critical mass is attained, you'll soon see drivers for all the major peripherals," he says.

Factors in Driver Support

While NT supports most peripherals, it leaves some devices out in the cold. Owners of non-Intel systems may find some of their peripherals temporarily or even permanently ignored. From the peripherals manufacturers' point of view, non-Intel systems are unproven in the market, and these vendors will wait and see what the demand for these systems is before committing to supporting them with drivers. One printer manufacturer said bluntly, "All I care about now is Intel [platforms]. Intel is a reality to be dealt with. I'll deal with the others as they become a market force."

Older peripherals, even for Intel systems, will see less NT support because fewer users will demand it. Microsoft's hardware compatibility list shows support for video cards based on Tseng Labs ET4000 video chips set but not for the cards based on the company's older ET3000 chip set, for example. Owners of devices whose manufacturer has gone out of business or discontinued production will likely be out of luck.

Also, the more sophisticated the peripheral, the less likely that an NT driver taking full advantage of its features will be available immediately. Owners of simple peripherals such as unlabeled VGA cards and modems will find drivers on the NT installation disk(s). Owners of more complex and feature-filled peripherals, however, such as color printers and multimedia boards, may have to bang on the door of their peripherals manufacturer for driver support. They may have to wait, too, while the manufacturer accommodates the complex functions and high performance that these products require.

Last, if you have a nonstandard peripheral, you probably have to go to its manufacturer for driver support, since you're unlikely to find the driver on the NT install disk. Most devices that connect through standard serial, parallel, and SCSI ports are supported already; those that don't aren't. Note that some peripherals manufacturers offer the same device for both standard and proprietary connectors, such as Chinon with its Series 435 CD ROM drive. A call in mid-August to Chinon's product information line revealed that a Series 435 drive with an Adaptee SCSI adapter was already covered by an NT driver, but a drive with Chinon's proprietary adapter would have to wait a couple of weeks.

For users concerned about the availability of the driver for their peripheral, MIPS's Keane advises, "If you have a card that uses a standard port such as a parallel or serial port or standard SCSI, then the driver is basically an unlabeled driver that already exists. An example here is your modem, which talks to a standard [COM] port." However, for users of older devices or devices with sophisticated or proprietary features, Keane suggests, "You must make sure that the driver for that card exists. It can even be between cards from the same manufacturer. An old card may not have a driver, but the new card may."

The Prognosis

The outlook for NT's support of peripherals is good, and as time goes on, fewer and fewer people will have to replace any of their peripherals to accommodate NT. All the major players involved say they are serious about NT peripherals support; our extensive research, informal discussions with consultants and users, and experiences with NT at PC World indicate that the players are indeed serious.

Shane Rau is assistant technical editor for PC World. He can be reached on PC World Online (see page 10 for contact information).

Windows NT **Peripherals Support**

The chart below lists groups of peripherals and the level of NT driver support you can expect for them.

GO! Near-total driver support



Keyboards Mice Floppy drives SCSI and IDE hard drives Modems Dot matrix, ink jet, and laser printers Devices that use standard SCSI adapters

Proceed with caution



High-resolution video cards **Color printers** Older hard drives **Digitizers Plotters**

STOP! Check carefully



Fax-modems1 Scanners² CD ROM drives² Magneto-optical drives² WORM drives² Removable disk-cartridge drives²

- 1 Some fax programs use their own drivers, which may need replacement before program will work with NT.
- 2 Non-SCSI.

IBM offers you great software, and some things

WORD PROCESSOR

DeScribe* 4.0 for OS/2*

MM66880 \$299.00

Lotus* Ami Pro* 3.0

MM55236 \$249.00

Microsoft* Word for Windows*
2.0

MM64932 \$299.00

WordPerfect* 5.2 for Windows

MM77919 \$289.00

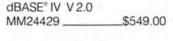
WordPerfect 6.0

MM25299 \$289.00

WordPerfect 5.2 for Windows

Upgrade

MM11090 \$109.00



OS/2 AND MISCELLANEOUS

OS/2 2.1 (3.5*)
61G0900 \$224.00

OS/2 2.1 CD-ROM
61G0904 \$197.00

Microsoft Windows V3.1

MM32816 \$99.00

Microsoft Windows V3.1

Upgrade
92F4007 \$65.00

IBM VoiceType™ Control for Windows
71G1591 \$99.00

71G1591	\$99.00
AutoMap™ for V	Vindows
MM39914	\$55.00

Calendar Creator Plus™ for Windows MM15841_____\$59.00



DacEasy® Accounting 4.3 MM33840 _____\$89.00

Microsoft Profit for Windows MM59917 ____\$129.00

Peachtree[™] Accounting 2.0 for Windows MM50120 \$129.00 Peachtree Complete Accounting MM36650 \$179.00 Quicken* 2.0 for Windows MM45870 \$45.00 Quicken 6.0 for DOS

INTEGRATED

\$45.00

MM79785

Lotus SmartSuite 2.0

MM34323 _____\$459.00
Microsoft Office for Windows
V3.0
MM36837 ____\$479.00
Microsoft Works for Windows
V2.0
MM30487 ___\$129.00

IBM ValuePoint Mini-Tower Server

486DX2-33/66 MHz, 527MB Hard Drive, 8MB RAM 3.5" Diskette Drive, Mouse, Keyboard, 6318 Display 128KB L2 Cache, IBM LAN Adapter for Ethernet.Pre-installed with OS/2 LAN Server 3.0 Entry (5 users) or NetWare from IBM Version 3.11 (5 users)



DESKTOP PUBLISHING

Aldus PageMaker" 5.0 for Windows MM23291 _____\$579.00



Microsoft Publisher for Windows MM61204 _____\$125.00 Quark Xpress[®] for Windows MM06878 ____\$589.00

GRAPHICS/ ILLUSTRATION

CoreIDRAW™ 2.5 for OS/2 MM93906\$139.00
CorelDRAW 3.0 for Windows & CD
MM26062\$139.00
Harvard Graphics* for Windows
MM37744\$369.00
MicroGrafx* Designer™ for OS/2
MM06760\$455.00
MicroGrafx Designer for

_\$379.00

Windows

MM88283 ___

Software at hardto-beat prices.

SPREADSHEETS

Quattro Pro* for Windows 1.0

MM18334 ______\$99.00

Lotus 1-2-3* 4.0 for Windows

MM32629 _____\$309.00

Microsoft Excel™ 3.0 for OS/2

MM52680 ____\$319.00

Microsoft Excel 4.0 for

Windows

MM53253 ___\$319.00

DATABASE

Paradox* 4.0 MM63325 _____\$529.00 Paradox for Windows

MM18660 _____\$135.00

prices on computers, you can't put a price on.

PRESENTATION

Freelance Graphics for OS/2 MM86534 _____\$409.00

Freelance Graphics for Windows

MM35166 _____\$339.00

Norton Desktop[™] for Windows MM26705 _____\$119.00

Norton Utilities® 7.0

MM23453 _____\$119.00

Carbon Copy™ for

Windows V2.0 MM17651____

LapLink® V

MM22188____

COMMUNICATIONS

Delrina WinFax Pro 3.0 MM13632_____\$79.00

_\$135.00

_\$109.00

Stacker® 3.1 for WIN/DOS MM29205 \$95.0

IBM Multimedia ValuePoint Entertainment

486SX2/25 MHz, 120MB Hard Drive, 4MB RAM 3.5" Diskette Drive, Mouse, Keyboard, SVGA Display Sound Blaster 16, IBM Double Speed Internal CD-ROM Drive, External

Sound Blaster 16, IBM Double Speed Internal CD-ROM Drive, External Speakers, Pre-installed with DOS, Windows 3.1 plus 4 Reference and 6 Game Titles



Microsoft PowerPoint for Windows V3.0 MM12531 _____\$329.00

UTILITIES

386Max* 7.0 MM95283 _____\$49.00 Central Point Anti-Virus 2.0 DOS

MM34733 _____\$89.00

Central Point PC Tools™ 8.0 MM28903 _____\$129.00

Mac-in-DOS Windows MM22857 _____\$99.00 Procomm* Plus for Windows MM29863 _____\$95.00

Symantec pcANYWHERE MM64512 ______\$79.0

Call to find out about other solutions for:

Home Office Small Business Business Professional Advanced Business Professional Whether you're buying a single piece of software or a complete ready-to-run system from us, you're not only getting an extremely competitive price, you're getting something other companies just can't compete with.

IBM's service and support, quality and reliability.

In addition, we offer some of the most popular software, pre-configured systems and other products. Not just from IBM, but many other manufacturers, as well.

Then there's the IBM HelpCenter."
Where instead of a machine, you can talk to a real person. 24 hours a day. 7 days a week.

And if ever there's a problem, that's no problem. Because we have a staff of over 10,000 IBM service representatives nationwide.

Of course, when you deal with IBM PC Direct, we don't promise you satisfaction. We guarantee it. With a 30-day moneyback guarantee.

So if you're starting to consider that price isn't the only major consideration when buying computer products, call IBM PC Direct. And get the best money can buy. And some things it can't.

IBM PC Direct

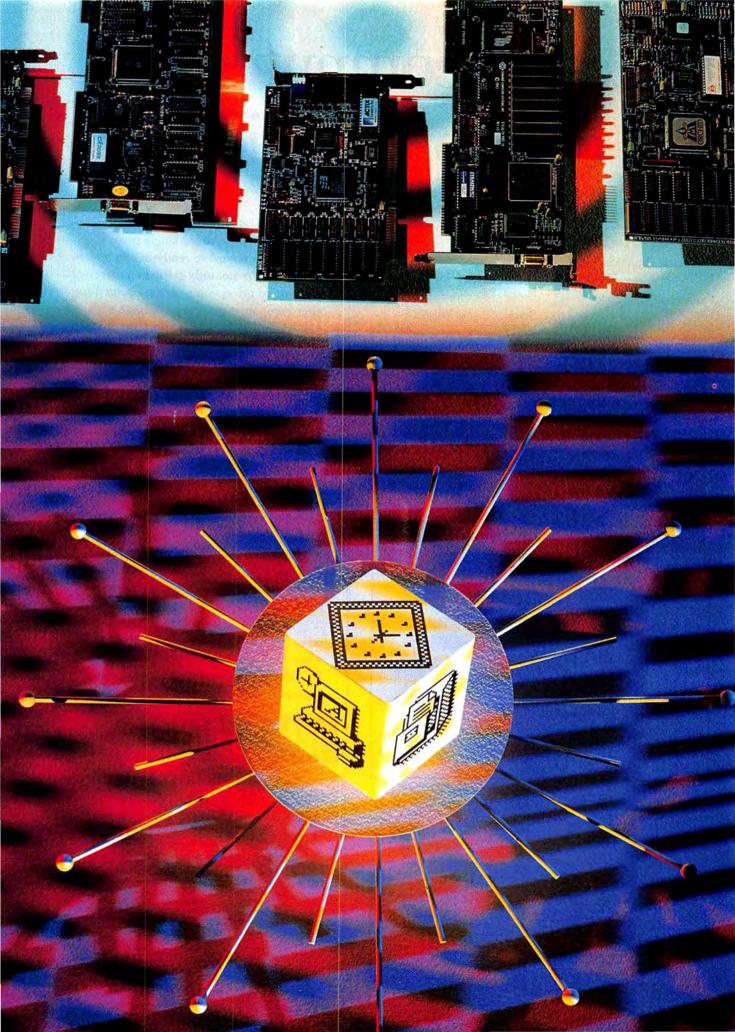
Call 1800 IBM-2YOU

1 800 426-2968, refer to CBR,

8 am-midnight, M-F, EDT; 8 am-7 pm, Sat., EDT.

IBM prices only. The offerings, prices and products are subject to change or withdrawal without prior notice. Products you acquire may not be counted under any existing Volume Purchase Agreement. Shipping and handling charges are extra. IBM, HelpCenter and OS/2 are registered trademarks and VoiceType and ValuePoint are trademarks of International Business Machines Corporation. PC Direct is a trademark of Ziff Communications Company and is used by IBM under license. All other products and company names are trademarks and/or registered trademarks of their respective holders. Call 1 800 426-2968 for a copy of IBM's money-back guarantee. © 1993 IBM Corp.





The problem: Windows is slow and money is tight. The solution: One of these 17 affordable graphics accelerators designed to keep up with Windows' graphics demands.

Turbocharging Windows

indows is many things, but quick isn't one of them. It burdens almost every component of your PC with extra work, none more so than your graphics subsystem. Every time you open a window, the CPU and graphics adapter have to assemble a whole new screen of information. Scroll through a spreadsheet, and your PC has to redraw the screen over and over again. The result: Even the most powerful system slows down when handling graphics.

What can you do? If you're using an older system (which means anything bought before this calendar year), one of the easiest solutions is to upgrade your graphics adapter. Graphics hardware has advanced quickly, so last year's adapters are already out of date. A new low-priced graphics accelerator not only uses the latest tech-

By Michael Desmond and Dan Miller • Testing by Ulrike Diehlmann

GRAPHICS SPEED-UP BOARDS

niques to speed up graphics, it also gives you the resolutions and colors you need with easy-on-the-eyes refresh rates. It's the surest way to put some snap back into your Windows work.

The biggest problem with shopping for a graphics board, however, is the overwhelming number of choices. A buyers' guide in *PC World* last December lists 83 products, but more than 100 met our criteria. To help you choose a graphics accelerator, we've collected 17 boards representative of what's on the market right now. We specifically looked for an illustrative mix of vendors, graphics chips, bus types, and memory configurations. We decided initially to limit our search to boards that cost under \$600 on the street; we were pleasantly surprised to find that the most expensive card we collected actually costs just \$412.

We weren't able to test every board on the market. So in addition to looking at the boards we review here, you should use the information and buying guidelines outlined below to evaluate boards from other video board vendors.

The Color of Speed

When people consider graphics boards, the first question they ask is, "How fast is it?" Despite an endless parade of industry benchmarks and numerous attempts to determine how fast is fast, the honest answer remains, "Well, it depends...." The problem is that no single number can accurately define the effect a graphics accelerator will have on your system, with your applications, and under your specific computing demands.

To help make sense of the performance puzzle, we installed the boards in a 486DX-33 system (configured with 8MB of RAM, a 325MB hard drive, a 256K secondary cache, an AMI BIOS, a Forex chip set, and MS-DOS 5.0). We then ran the machine through our suite of applications-based Windows tests. For our tests, we set each board to produce 800 by 600 resolution with 256 colors and a 70- or 72-Hz refresh rate—the resolution and color depth we figure best represents real-life business use.

Unlike many graphics benchmark tests, which measure how fast a board can move pixel data from one part of your system to another, our test suite measures how each accelerator affects overall system performance. Our reasoning: Choosing a graphics accelerator isn't about counting pixels—it's about *perceived* performance, about how fast your computer feels with an accelerator installed.

And the Winner Is...

When all the numbers were in, we were surprised by what they told us. Based on our testing you will have a hard time noticing any speed differences among the graphics accelerators in this price range. Of the 17 boards we tested, only one finished more than 10 percent behind the fastest overall score.

Part of the reason our scores were so uniform is that all Windows accelerators do essentially the same thing. Windows uses a limited set of graphics commands to create screen displays. Usually, your system's CPU has to perform these commands and then tell your graphics adapter what to do. Graphics accelerators intercept and implement these commands, freeing the CPU for more important business. Because accelerators are designed specifically for Windows graphics, they can handle these operations much more quickly than a general-purpose CPU. And because all accelerators offload the same set of commands from the CPU, they all improve overall

Recommended Buys

Talk about a photo finish: The graphics adapters we tested all completed our performance tests within a whisker of each other. So earning our recommendation means delivering more than just speed—it also means supporting the right refresh rates at the resolutions and colors you use for everyday Windows business apps, all at affordable prices. The ISA and VL bus boards listed below are our picks as the best boards for your buck.

For the ISA bus:

- 1. Genoa WindowsVGA24 Model 8500
- 2. Orchid Fahrenheit VA
- 3. Actix GraphicsEngine 32plus
- 4. Diamond Stealth Pro



For the VL bus:

- 1. Orchid Fahrenheit VA-VLB
- 2. CardExpert Cardex W32
- 3. STB Horizon VL
- 4. Diamond Stealth Pro VLB



system performance to roughly the same degree.

For everyday Windows use, the majority of graphics acceleration is achieved by speeding up two functions: bit-block transfers and area fills. Bit-block transfers (often abbreviated as BitBlts) occur when an object is moved from one part of the screen to another—for example, when you reposition an icon in Program Manager. Area fills occur when Windows paints a single color into a confined area, such as a wedge in a pie chart; Windows also uses area fills to draw lines, treating them as very thin rectangles.

Other graphics accelerator functions, such as hardware cursor, off-screen caching, and line draws, have a limited impact on Windows performance but do contribute to the look and feel of the interface. The hardware cursor function, for example, doesn't deliver a speed benefit—it provides ergonomic value by keeping the cursor image stable when you move it around the screen. Off-

screen caching is commonly used to store fonts and drop-down menus, allowing them to snap crisply onto your screen without having to be redrawn. Finally, line draws, like caching, are used extensively by engineering applications but rarely by Windows.

Because Windows acceleration is based on speeding a few common functions, the performance of a graphics board really boils down to the efficiency of the coprocessor that drives it. While there are hundreds of boards on the market, they are all based on the small group of graphics chips that, more than any other variable, determine their overall performance.

Not all of these chips are created equal. The Weitek Power 9000 and S3's 86C801 and 86C805, for example, do an excellent job handling BitBlts and other common Windows functions, and the boards that use these chips did well in key applications such as Excel and Word for Windows. On the other hand, boards based on IIT's AGX-015 chip lagged in Freelance but blazed ahead of the pack in our Video for Windows suite. The test results show that boards based on identical chips perform similarly. Our advice: Check our test results and compare each chip's performance in the types of applications you use, and then pick the chip that's right for you.

Note that, even though these accelerators don't vary that much from one another in overall performance, they are still clearly faster than their nonaccelerating alternatives. We put an Orchid frame-buffer board in the same system we used to test the accelerators and ran it through the same test suite. On the average, these accelerator boards were 25 percent faster than the frame buffer; in our Word for Windows test, they were an average of 45 percent faster.

Get On the Bus That Takes Me to You

Next to the chip, the most important factor in graphics performance is the bus the board runs on. Until recently, bus type was hardly a consideration: 90 percent of all PCs used the ISA bus. But boards are now available for the VESA local (VL) bus, which is present on most 486-class systems sold these days. With a 32-bit data path twice as wide as that of the ISA bus and running at system clock speeds four or five times faster than the ISA's 8-MHz clock, the VL bus transports information from your CPU to your graphics board much more quickly.

Despite their theoretical advantage, VL accelerators produced only slightly faster performance scores than ISA boards. The VL bus Orchid Fahrenheit VA-VLB (based on the S3 86C805 chip), for example, performed just 3 percent faster than its ISA twin, the Fahrenheit VA (based on the S3 86C801). Likewise, the Diamond Stealth Pro VLB edged out the Stealth Pro ISA by just 5 percent.

Why the narrow margin between the two buses? Because the typical businessperson's graphics configuration as specified during our testing—800 by 600 pixels with 256 colors—doesn't require enough pixel data to overwhelm the ISA bus. But we were still curious

If you're going to run graphics-intensive applications at high resolution or with high color, or if you're experimenting with motion video, VL bus is the way to go. Otherwise, either bus will do.

about how the VL boards would perform if we deliberately stressed the I/O bus with a much larger volume of graphics and video data.

That's why we came up with a new video stress test, which ran a subset of our Excel script in one window while playing a Video for Windows file in another. In this test, the VL bus version of the Orchid Fahrenheit VA-VLB was 14 percent faster than the ISA model, while the Diamond Stealth Pro VLB finished a whopping 37 percent faster than the ISA version. Our conclusion: If you're going to run graphics-intensive applications at high resolution or with high color, or if you're experimenting with motion video, VL bus is the way to go to maximize performance. Otherwise, for regular business use, either bus will do.

Of Software and Silicon

Another factor to consider when shopping for a speedy accelerator is memory type. Graphics accelerators give you two choices in memory: VRAM and DRAM. The difference between the two is simple. DRAM is cheap but relatively slow; VRAM is fast but pricey. Though recent innovations in memory management schemes have improved DRAM performance dramatically, VRAM is still faster because it is dual ported. That means you can write data to VRAM at the same time data is being written from VRAM to the screen; with DRAM, these reading and writing operations must be performed separately.

Again, despite the theoretical advantage, our tests indicate that unless you're going to use very high resolutions and color depths, VRAM won't increase performance greatly. There was virtually no difference in system performance between the two memory types in our tests. Unless you really need the added throughput for demanding graphics work, VRAM may not be worth the extra cost.

The final crucial ingredient in good graphics board performance is driver software, the basic programs that let Windows and various DOS applications talk to your graphics accelerator. While buyers rarely consider drivers when choosing graphics accelerators, the fact is that the software may be more important than the coprocessor, the bus, or the type of memory in determining how well—or even if—your graphics board will work.

During our tests, unfinished and unpolished drivers caused system crashes, odd screen displays, and slow performance. Beta prod-

GRAPHICS SPEED-UP BOARDS

ucts from ATI and Matrox, both of which arrived with prerelease driver software, had trouble in our test suites, frequently crashing or producing bizarre screen displays. (See "ATI and Matrox: Tales From the Bleeding Edge.") And while the Orchid Fahrenheit VA-VLB and the Volante Warp10 LB are nearly identical in configuration, the Fahrenheit outpaced the Volante by 3 percent—thanks largely to its drivers.

But how do you go about shopping for drivers? It's not as though you get your choice of drivers when you buy a board. Our only advice is to remember that sometimes it takes vendors a couple months of tinkering before a board's drivers are really debugged and fully tweaked. If you want to buy a board that's new on the market, we'd advise you to be patient and give the vendor time to work out

A Graphics Glossary



Bit-block transfers

Also known as BitBit, this is the most important Windows acceleration feature. BitBit defines screen images as blocks of bits, which can be moved around the screen quickly and easily. Common BitBit actions include dragging icons, moving windows, displaying menus, and scrolling.



Area fills

Next in the line of most important Windows graphics functions, an area fill is used when a rectangle or other polygon is filled with a single color. While area fills are most common in drawing programs like CorelDraw, many applications use area fills to shade cells, to display scroll bars, and even to build large-size fonts.



Line draws

Used only in CAD and programs that handle lines as point-to-point vectors (which means you need special drivers to take advantage of this function). Nearly all Windows programs define lines as area fills, so line draws are less common.



Hardware cursor

Maintains the cursor as an independent element on the screen. When you move the cursor, neither it nor the screen behind it needs to be redrawn. The result, a more stable cursor image, has an ergonomic benefit but doesn't improve speed.



Font caching

Uses off-screen memory to hold bit-mapped characters that are displayed frequently or were used recently. Font caching is most important for word processing and spreadsheet apps, which require more scrolling and text display than other apps.

the kinks. But if you insist on buying a board as soon as it hits the shelves, don't worry; you can usually download updated drivers from vendors' bulletin board services.

What Price Speed?

While there isn't much difference in system-level performance from board to board, there are certainly major differences in price. The products we looked at had street prices ranging from a high of \$412 to a remarkable low of \$133.

Like performance, prices clump together by chip. Boards using the Cirrus Logic CL-GD5426, the Tseng Labs ET4000/W32, and S3's 86C801 and 86C805 chips were least expensive, while boards using the Weitek Power 9000, S3's 86C928, and both IIT chips cost the most.

You'd think that the most expensive boards would be the fastest, and the cheapest the slowest. In our tests, however, that's not always true. For example, while the Diamond Viper VLB is both the most expensive and the fastest, the second-place STB Horizon VL is one of the cheapest boards here at a street price of \$142.

The question is: How much are you willing to pay for incremental increases in speed? If Board X is 10 percent faster than Board Y but costs 50 percent more, does it make sense to buy Board X? For most buyers, the answer will be no.

Talking 'Bout Some Resolution

So what else are you paying for if not performance? There's more to graphics than speed—things like resolution, colors, and refresh rates. The problem is that virtually all video board vendors make the same claims about specs: They'll tell you their boards support resolutions as high as 1280 by 1024, more than 16 million colors, and ergonomic 72-Hz refresh rates.

But while virtually all of today's reasonably priced video boards support high resolutions, colors, and refresh rates, none supports all three at the same time. And most business users simply don't need the highest possible resolutions and colors. What you should really look for is a board that gives you the resolutions and colors you need for your specific applications at high, easy-on-the-eyes refresh rates.

If you listen to the hype, you might think you can't live without 1280 by 1024 resolution. The fact is that 1280 is just a checklist item, a feature that vendors can't enter the market without, but that few buyers can actually use. The only people who need it are desktop publishers who must see entire two-page spreads on screen. Even then, 1280 requires a large monitor (17 inches or more).

Using 1024 by 768 resolution makes a bit more sense, but it's still not necessary for most users. Images are viewable at this resolution on a 15-inch monitor and the setting is useful for looking at large areas of spreadsheets (as long as you're using reasonably large fonts). But for most users, 800 by 600 is the maximum resolution that can be displayed comfortably on one of today's standard screens.

So how can you be sure a graphics adapter will give you the resolution you need for everyday business applications? By buying virtually any board on the market today.

Color Your World

The importance of color specs, like that of resolution, tends to be overblown. Practically every board out there can give you 16.8 million colors (at 640 by 480 resolution). The question is, who needs it? Once again, if you're engaged in specialized graphics work, such as

The new OS/2® 2.1 lets you run the latest Windows™ 3.1 applications, in addition to the DOS, Windows and OS/2 applications

you're already running-almost any application in the PC universe. Now we've added TrueType fonts, select Windows applets, File Manager and Windows 3.1 printer and display driver support, including 32-bit seamless SVGA support.

You'll also get Advanced Power Management (APM) support for portables, improved multimedia support, pen-based capabilities, CD-ROM and AS/400® terminal emulation support. Plus all the features that made Version 2.0 an award-winner, like true pre-emptive multitasking, OS/2 Crash Protection™ and the easy-to-use object-oriented Workplace Shell™ interface. But now, you also get a new world

of possibilities.

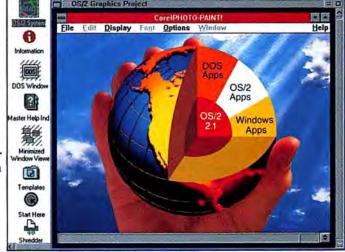
OS/2 2.1 is now also available on a single CD-ROM. It comes with exciting multimedia samplers, full-motion video demos and more. With our free demo diskette, you can find out even more about all the powerful



Call for your free demo diskette.

Demand OS/2 2.1 preloaded on your next PC.

features OS/2 2.1 has to offer. For your copy, to find out more about OS/2 2.1, or to order, call 1 800 3-IBM-OS2. In Canada,



Introducing Version 2.1

With OS/2 2.1 at the heart of your PC, you can run a world of DOS, Windows and OS/2 applications.

call 1 800 465-7999. OS/2 2.1 is also available at your local software dealer.

Operate at a higher level."



There's no need to buy DOS and Windows to run DOS and Windows applications.

IBM, AS/400 and OS/2 are registered trademarks and OS/2 Crash Protection, Workplace Shell and "Operate at a higher level" are trademarks of International Business Machines Corporation. Windows is a trademark of Microsoft Corporation. TrueType is a trademark of Apple Computer, Inc. @1993 IBM Corp.



GRAPHICS SPEED-UP BOARDS

photo retouching with Photoshop or composing full color pages with QuarkXPress, you can use all the colors you can get. For every-day business Windows use, however, 256 colors are plenty.

How do you know if your board can give you the number of colors you want at the resolutions you really use? Check out the board's memory. For example, say you want to render a 1024 by 768 image in 256 colors. How much memory will you need? First multiply 1024 by 768 and you get a total of 786,432 pixels on screen. Then you have to assign a color to each pixel. To specify one of 256 colors, you'll need 8 bits per pixel (2 raised to the 8th power is 256).

Multiplying 786,432 by 8 gives you 6,291,456 bits. Divide that by 8 (to translate from bits to bytes), and you're back to 786,432, or about .75MB. That's how much video RAM you need to hold the image.

Fortunately, 1MB is the minimum standard these days, so just about any board you buy should be able to show you your picture. You need 2MB when you want larger or more colorful images—displaying 16.8

million colors at 640 by 480 requires just .9MB, but displaying the same number of colors at 800 by 600 takes up 1.4MB.

You'll notice that your accelerator board often has a bit more memory capacity than your graphics settings require. Your board uses that extra memory to cache fonts and drop-down menus. Some boards (in this review, the AMI Fast View VLB and the Diamond Viper VLB) actually dedicate an extra 256K or 512K of RAM for off-screen caching. This extra memory means the board can give you plenty of colors at high resolutions and still deliver the performance boost of off-screen caching.

I Can See Clearly Now

The importance of resolution and color spees may be overstated, but there is one video board spee that should concern even the most undemanding Windows user: vertical refresh rate. This term refers to the number of times per second the board redraws (or refreshes) the screen, going from top to bottom.

Refresh rates matter because they determine the stability of the image on your screen (unstable images are said to be suffering from *flicker*). More than just a harmless irritant, screen flicker can cause eyestrain and perhaps even mental fatigue; according to some European research, your brain notices the difference between slow and fast refresh rates even if your eyes don't.

If your video board refreshes at less than 70 Hz (in other words, it redraws the screen fewer than 70 times per second), chances are you'll notice some flicker (try looking at your monitor out of the corner of your eye). The ultimate goal of graphics board makers is a 110-Hz refresh rate—the visual equivalent of looking at paper. In the European market, where display ergonomics have long been an issue, refresh rates of 80 Hz are not uncommon.

To be sure you'll get the right vertical refresh rate at the resolutions you'll be using, look for a high *horizontal* refresh rate. And to find out if a board has the right horizontal refresh rate, you'll have to do some more arithmetic.

Say you want to display 1024 by 768 with a 70-Hz vertical refresh rate. Multiply the desired vertical refresh rate (70) by the vertical resolution (768), and then multiply the result by 1.09 (a fudge factor

that takes into account the amount of time it takes the electron guns to move from the lower right corner of the screen at the end of one redraw to the upper left to start another). The result, 58,598; 58 KHz is the minimum horizontal scan rate required to achieve a 70-Hz refresh rate at 1024 by 768 resolution.

Note that all refresh rates discussed here are *noninterlaced*. Noninterlaced boards redraw every line at each pass. Some boards boost resolution and refresh spees by *interlacing*, which means they redraw every other line during each pass from the top to the bottom of the screen. The result is more flicker. It's also worth noting that

Some boards boost resolution and refresh specs by interlacing, which means they redraw every other line during each pass from the top to the bottom of the screen. The result is more flicker.

even if your board supports an ergonomic refresh rate, your monitor, particularly if it's a year or more old, may not. Check your monitor's documentation to be sure its maximum horizontal scan rate is high enough to keep up with your graphics board.

So which of these cards will give you the best-looking display? We can't really pick one because image quality depends on your monitor and ambient conditions (overhead and background lighting, even the color of the wall behind your system). That's why the best way to buy a card is to test-drive it in your system, with your monitor, at your desk.

If you can't do that, look for a board with the right *combination* of spees, such as the maximum number of colors the board can display at a given resolution with a reasonably high refresh rate (such as 70 or 72 Hz). Among the boards we looked at, the best spees belong to the Number Nine #9GXE, the Diamond Viper VLB, the AMI Fast View VLB, the Metheus Premier 928, the CardExpert Cardex W32, and the VidTech GraphMax LB.

Plugging In and Turning On

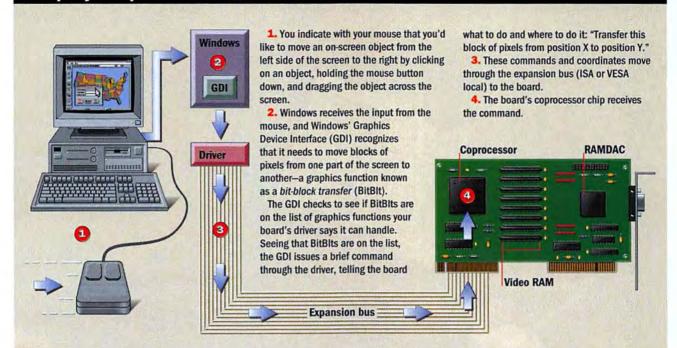
All these considerations of performance and ergonomics aren't worth much if you can't get the board to work. For example, do you have to use jumpers on the board itself to set the refresh rate? If you buy a board from Actix, AMI, Metheus, Orchid, VidTech, or Volante you do. The others let you set the refresh rate in software.

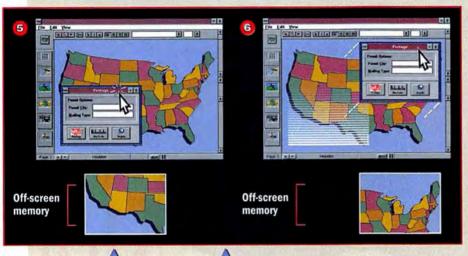
Or what about installing the drivers? We like boards that come with a menu-driven DOS utility for driver installation. Until recently, many boards required you to copy driver files onto your hard disk manually. Fortunately, all the boards in this review provided menu-driven installation routines.

We also like boards that come with Windows utilities for changing the resolution. It used to be that you had to exit Windows and use the board's DOS utility software to switch from 640 by 480 to 1024 by 768. Now, however, some boards come with a Windows utility that lets you point at and click on the resolutions and color depths you want. All you have to do is restart Windows, and your new resolutions will be installed.

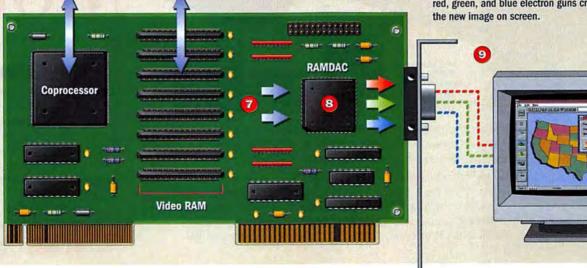
Finally, while these boards are particularly interesting for Windows users, vendors haven't forgotten about DOS. Every one of

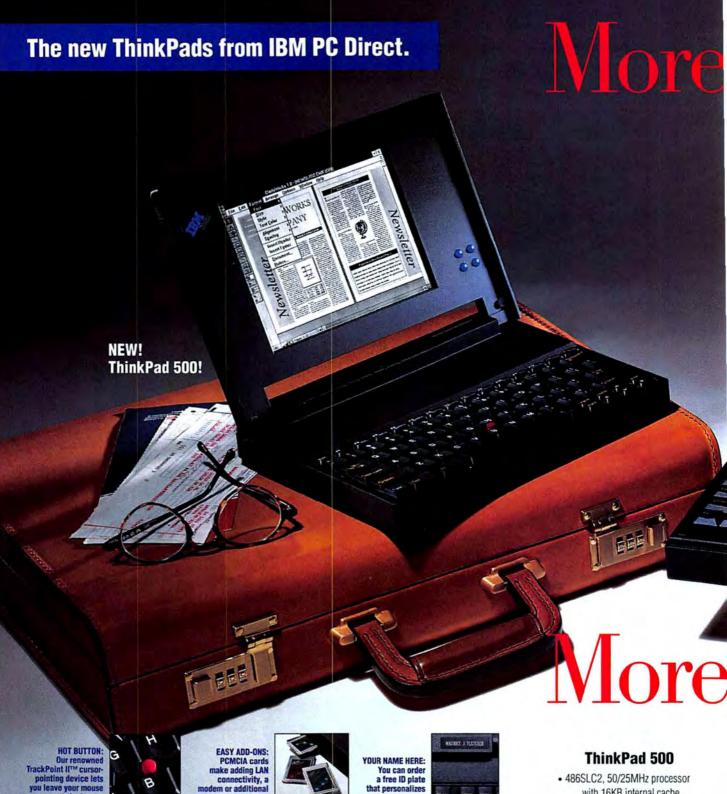
Step by Step: How Acceleration Works





- 5. The chip looks at the screen image in the video board memory and finds the blocks of pixels to be moved.
- 6. It does the arithmetic necessary to calculate the new position and writes the block of pixels back into memory at the new location, often moving whatever is behind them to off-screen memory. The coprocessor then redraws-or calls from off-screen memory-whatever was behind the moved
- 7. The memory dumps the current screen image to the RAMDAC 70 times a second (or 60, 72, or more, depending on the vertical refresh rate).
- 8. The RAMDAC converts the digital description of the screen into red, green, and blue signals of varying strengths.
- 9. The signals go to the monitor, where red, green, and blue electron guns create





IBM PC Direct™ has two new ThinkPads with more of what you want, and less of what you don't: More features and power. Less size and weight! The new ThinkPad® 500 is a sleek 3.8 pounds. Yet, it packs enough high-speed horsepower to let you take your most sophisticated desktop applications on the road.

Now - want to carry off color with ease? Then call us about the new ThinkPad 350C. You get a 9.2" backlit, 256-color, passive-matrix LCD display. There's plenty of power for your current needs. And ample space to upgrade for more. All in an easy-to-take 5.7-pound package. Both of these lightweights get the heavyweight backing of IBM's HelpWare®, including a 30-day moneyback guarantee1 and around-the-clock telephone assistance. You'll find them at IBM PC Direct. To order these, or any of our other critically acclaimed IBM ThinkPads, call 1800 IBM-2YOU.

- with 16KB internal cache
- . 4MB RAM/85MB hard drive
- 10.1"w x 7.5"d x 1.6"h/3.8 lbs. with battery pack
 - 7.4" monochrome passive-matrix LCD display, 64 grey scales
 - · 81-key keyboard w/integrated TrackPoint II
 - · PCMCIA slot
 - · IBM DOS preinstalled
 - · 1-year international traveler's warranty2

* (IBM Credit Lease \$72/mo.**)

"IBM prices only. The offerings, prices and products are subject to change or withdrawal without prior notice. Products you acquire may not be counted under any existing Volume Purchase Agreement. The same offerings and products may be available through IBM Authorized Remarkaters. Remarkaters Prices may vary. Shipping and handling charges extra. "IBM Credit Lease Prices quoted for 36-month terms. Lease rates quoted are good through 10/31/93, after which time rates are subject to change without notice. Lease available to qualified commercial customers only." At no additional charge during warranty. ThinkPad 500, ThinkPad 350C and ThinkPad 350 are manufactured in U.S. IBM, ThinkPad and HelpWare are registered trademarks and EasyServ and Trackpoint II are trademarks of International Business Machines Corp.



ThinkPad 350C (color)

- · 486SL, 25MHz processor with 8KB internal cache
- . 4MB RAM/250MB hard drive. 3.5" 1.44MB diskette drive
- 11.7"w x 8.3"d x 2.0"h/5.7 lbs. with battery pack
- . 9.2" STN backlit LCD, 256-color display
- . Full-size keyboard w/integrated TrackPoint II
 - · PCMCIA slot
 - · IBM DOS preinstalled
 - · 1-year international traveler's warranty2

* (IBM Credit Lease \$108/mo.**)

ThinkPad 350

- 486SL, 25MHz processor with 8KB internal cache
- . 4MB RAM/125MB hard drive. 3.5" 1.44MB diskette drive
- 11.7"w x 8.3"d x 1.9"h/5.2 lbs with battery pack
- . 9.5" monochrome STN backlit LCD display, 64 grey scales
 - · Full-size keyboard w/integrated TrackPoint II
 - PCMCIA slot
 - · IBM DOS preinstalled
 - . 1-year international traveler's warranty2

\$72/mo.**)

* (IBM Credit Lease

IBM PC Direct

We're putting the personal in personal computing.

Order Now! 1800 IBM-2YOU

1 800 426-2968, refer to: DKM 8am-midnight M-F, EDT; 8am-7pm Sat., EDT.







Purchase order is available for qualifying customers.

PC Direct is a trademark of Zifff Communications Company and is used by IBM under license. © 1933 International Business Machines Corporation. 1 Warranty and 30-day guarantee information available through IBM and IBM Authorized Dealers. Please call 1 800 425-2963 for details regarding IBM's moneyback guarantee and limited warranty. Copies of the terms of IBM's moneyback guarantee and limited warranty available upon request. I International Traveler's Warranty Service available in countries where ThinkPad is sold. Carry-In Repair and ThinkPad EasyServ™ available in U.S.

GRAPHICS SPEED-UP BOARDS

these boards comes with a driver for AutoCAD; most also include drivers for a selection of other popular CAD programs. They also come with a selection of drivers for certain DOS word processors and for 1-2-3, which allow you to use these apps at higher resolutions and add some snap to print previews.

Of the boards we looked at, both Fahrenheits from Orchid, the Genoa WindowsVGA24 Model 8500, the Number Nine #9GXE, and the two Stealth Pros from Diamond are easy to install and come with a good supply of drivers. The Orchid boards are also particularly notable for including some basic sound capabilities.

The Big Picture

So, taking price, performance, ergonomics, and ease of use into account, which of these Windows accelerators represents the best value? Among the ISA boards, the best values are the Genoa WindowsVGA24 Model 8500, the Orchid Fahrenheit VA, the Actix GraphicsEngine 32plus, and the Diamond Stealth Pro. For VL sys-

tems, your best bets are the Orchid Fahrenheit VA-VLB, the Card-Expert Cardex W32, the STB Horizon VL, and the Diamond Stealth Pro VLB.

The point is that virtually all these boards will perform acceptably and give you the resolutions, color depths, and refresh rates you need for everyday computing. That makes price your primary buying consideration. It may make sense to find the least expensive accelerator and, as long as it meets your refresh needs, buy it. If you need fancier graphics, go for the high-performance, high-resolution, high-price boards. But for most of us, cheapest may be best.

Michael Desmond and Dan Miller are assistant editors for PC World, They can be reached on PC World Online (see page 10 for contact information).

For more information about all products in this article, circle reader service no. 901.

ATI and Matrox: Tales From the Bleeding Edge

We would have liked to include two other vendors in this review—ATI and Matrox. Both companies produce consistently high-quality graphics adapters and both have new boards coming to market.

Unfortunately, production-level models of these new boards were not available in time for testing. Still, we wanted to see how they would stack up against the others in this review, so we asked ATI and Matrox to send us beta copies for testing.

ATI Graphics Ultra Pro

ATI was one of the first vendors we called when we started ordering boards for review. We requested the ISA and VL bus versions of ATI's popular Graphics Ultra Pro board, which has been on the market for about a year. ATI said it would rather have us test the latest versions of the Graphics Ultra Pro, which feature a revised chip set. We agreed to take a look.

When we received the new boards, we put them into the same test bed we used to test all of the boards in the review (a DX-33 system from Micro Express with both ISA and VL bus slots). Unfortunately, we couldn't get the ATI boards to work. The beta hardware and software dropped dead during our standard Windows suite.

When we called ATI's tech support to ask about this, they suggested we try testing the boards in a Gateway system, with which they knew the boards were compatible. So we

plugged the boards into a Gateway. Once again, the boards just sat there like soggy driftwood. Finally ATI sent us a new set of drivers and, again using the Gateway system, the boards worked.

To establish a point of comparison between the ATIs and the other boards in the review, we inserted the Orchid frame buffer,

As with the ATI boards, we had to use beta drivers in our testing of Matrox's MGA board, and those drivers just weren't ready for prime time.

to which we'd compared all the other boards in the review, into the same Gateway system. The results: The ATIs are faster than the Orchid to the same degree as some of the fastest boards in the review. Our conclusion: Once ATI gets the kinks out of the new Ultra Pro hardware and drivers, these boards should be plenty fast.

Matrox MGA Ultima VL

Matrox may not be as familiar a name to video board buyers as ATI, but it should be. The company has been making excellent high-end graphics adapters for years and is

now bringing that expertise to the mainstream business market with its new MGA graphics boards.

To see how successful this migration has been, we asked Matrox to send us an MGA Ultima board for inclusion in the review; it's the only Matrox board that's under our \$600 price point. The Ultima did great in our Word

for Windows and Excel tests—it was one of the fastest boards we tested—but it bombed our Freelance test. In this one test, the MGA accelerator was even slower than the unaccelerated Orchid dumb-frame buffer board we used as a baseline standard.

Walt a minute, we said, this makes no sense. The MGA should be one of the fastest

boards here. It has a sophisticated 64-bit internal architecture (other chips in the review are 32-bit designs), it runs on the VL bus, and it uses fast VRAM. Why the slow Freelance score?

Once again, it's the drivers. As with the ATI boards, we had to use beta drivers in our testing of the MGA board, and those drivers just weren't ready for prime time. Based on its blazing WinWord and Excel times, we expect the MGA Ultima to be one of the fastest boards on the market in this price range once Matrox has a chance to finalize the board's software.

The

Before you sink a penny into MS-DOS* 6, consider a better way to maximize the return on your PCs—the new PC DOS 6.1 from IBM.

It's got utilities that earn the highest rating. The automatic antivirus scan detects nearly twice as many viruses as MS-DOS, while taking up a fraction of the space (just 1K-6K, versus 7K-44K for MS-DOS).

What's more, it's got utilities you don't get with MS-DOS. Such as the full-screen Program Scheduler and the Integrated E Editor. Full

Screen Backup gives you differential backup of modified files, as well as

best.

utilities

Introducing

PC DOS 6.1

investment on

the

incremental, tape and NetWare* file attribute backups—and it can resume interrupted backup. Also, high-speed floppy disk support is two to three times faster.

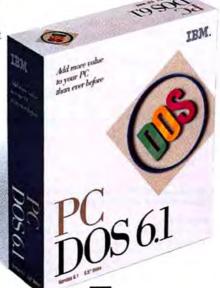
Your memory management will pay dividends, too. The Memory Optimizer not

only gives you more available memory, but also a configuration watcher to help run your system more efficiently.

And you can bank on the best service and support in the business. Including a 24-hour helpline you can actually reach, and 60 days of free support.

To order PC DOS 6.1, see your local software dealer. Or call 1 800 342-6672. (In Canada, call 1 800 465-7999.) When you consider all the options, PC DOS 6.1 is the only one to pick.

Features and Functions	PC DOS 6.1	MS-DOS 6
Backup—Tape support;	x	
High-speed floppy disk support	x	
Approximate number of viruses that can be detected	>1,400	800
Automated system configuration optimizer	x	
PCMCIA II support	×	
Enhanced editor	х	
Program scheduler	x	1



market.

IEM

IBM is a registered trademark of International Business Machines Corporation. MS-DOS is a registered trademark of Microsoft Corporation. NetWare is a registered trademark of Novell Corp. © 1993 IBM Corp.

PC WORLD TEST CENTER REPORT

New Graphics Accelerators Pick Up the Pace

Board Processor	Bus	Freelance for Windows 1.0	Word for Windows 2.0	Excel 4.0	Paradox 3.5 in DOS window	Video stress test
Diamond Viper VLB Weitek Power 9000	VLB	182	144	121	197	347
STB Horizon VL* Cirrus Logic CL-GD5426	VLB	178	158	129	190	60
Diamond Stealth Pro VLB* S3 86C928	VLB	172	150	136	199	43
Orchid Fahrenheit VA-VLB* S3 86C805	VLB	173	154	131	197	530
CardExpert Cardex W32* Tseng Labs ET4000/W32	VLB	175	162	131	197	389
AMI Fast View VLB Weitek Power 9000	VLB	205	144	125	197	400
Number Nine #9GXE S3 86C928	VLB	178	153	141	192	440
Genoa WindowsVGA24 8500* Cirrus Logic CL-GD5426	ISA	188	166	130	198	70
Volante Warp10 LB S3 86C805	VLB	174	156	140	200	56
Hercules Graphite Card VL IIT AGX-015	VLB	206	152	133	197	52
Orchid Fahrenhelt VA* S3 86C801	ISA	187	156	135	194	
Cardinal VideoSpectrum XL Cirrus Logic CL-GD5426	ISA	189	170	134	199	71
VidTech GraphMax LB	VLB	211	159	131	198	61
Diamond Stealth Pro* S3 86C928	ISA	188	155	141	199	
Metheus Premier 928 S3 86C928	ISA	200	155	146	195	5
Actix GraphicsEngine 32plus* S3 86C801	ISA	204	157	145	198	5
Hercules Graphite Card ISA	ISA	243	175	141	200	359

*Recommended

Boards arranged in order of overall speed, from fastest at top to slowest at bottom. All test results in seconds.

Methodology

Boards were tested on systems configured with a 486DX-33 processor, 8MB of RAM, a 325MB hard drive, a 256K secondary cache, an AMI BIOS, a Forex chip set, and MS-DOS 5.0. We ran our Windows benchmark using the program's default installation. We configured Windows on each system with a Hewlett-Packard LaserJet III as the default printer, disabled Print Manager, and attached a null printer to LPT1. Using vendor-supplied video drivers, we set the resolution to 800 by 600 pixels in 256 colors using small fonts. We set the vertical refresh rate to 72 Hz (or 70 Hz). Finally, we loaded the test applications, the test files, the scripts, and Microsoft Test automation software.

Freelance for Windows 1.0

We load a single-page starter file containing a United States map, with each state a separate object. Then we enter preformatted text on the page in preset headings, add a second page, and enter text as bulleted items. We add three more pages—each containing a single 3-D bar chart—and import data from a WK1 file. Next we add a sixth page containing four 3-D pie charts and preview a slide show using a vertical-louver fade effect between each slide. We apply various views to the presentation and preview the slide show four more times, applying a different fade effect between slides each time. Finally, we save the presentation to disk.

Word for Windows 2.0

We spell-check and scroll through a 27-page document; create, format, print, and save a single-page business letter; and open a business proposal, add a paragraph, then preview and print it.

Excel 4.0

We perform several data extracts; build and format a financial statement from scratch and print it; and open a mortgage analysis, scroll, move blocks, change the interest rate, print preview the statement, and save it.

Paradox 3.5 in DOS window

We perform a variety of data entry, record searching, and updating tasks. Then we generate reports against a simple customer list.

Video stress test

We play a 3MB Video for Windows clip (15 frames per second, 320 by 240 pixels at 256 colors) continuously. With the video playing, we measure the time required to load a 400-row Excel worksheet containing automobile statistics and perform a series of data extractions.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



MediaMagic. The Trick to Mastering Multimedia.

A family of audio boards that perform like magic.

Looking for the ultimate in multimedia sound? Then take a look at what we have up our sleeves. Introducing MediaMagic, a family of Digital Signal Processor (DSP) audio boards and sound systems that bring superior concert-hall sound to your PC.

Whether you need an inexpensive solution for professional digital sound, or a total sound solution with wave table sampling, stateof-the-art, real-time MPEG II audio-data compression, packaged with high-performance SCSI CD-ROM drive, high quality speakers and popular CD-ROM titles, MediaMagic delivers. And if you think that sounds good, you'll really enjoy hearing about MediaMagic's 16-bit digital stereo playmixing and editing features which add new dimensions to business presentations, educational programs and computer games. What's more, MediaMagic audio boards support MIDI to enhance your applications for original music creation.

Products:	Digital Audio	Up- grades	Wave Table	CD ROM	Real-Time MPEG Audio
MediaMagic DSP-16 Plus	16-bit 48 Khz	Yes	Standard	SCSI	Yes (encode/ decode)
Sound Blaster 16 ASP	16-bit 44 Khz	Yes	Optional	Propri- ctary	No
ProAudio Spectrum -16	16-bit 44 Khz	No	No	scst	No



back and recording capabilities with full ____ All MediaMagic products are compatible with Windows Sound System applications and DOSbased Sound Blaster™ games providing total compatibility with all current sound applications on the market today.

> MediaMagic audio boards are a snap to use, featuring plug and play operation.

No complicated switch settings. No jumpers. No kidding.

Our open architecture lets you add more advanced features and technologies as you need them, while other sound boards just become obsolete.

For additional information call our toll-free number below

USA: Austin Computer Systems 10300 Metric Boulevard, Austin, Texas 78758 Tel: 800-624-8654 Fax: 512-454-1357. International: IPC Corporation LTD. 23 Tai Seng Drive, Sinapore 1953 Tel: 65-744-2688 Fax: 65-287-6806.

FEATURES COMPARISON

More for Your Money: Graphics Boards Pack a Wealth of Features

• Yes	RECOMMENDED ACHTA	AMI Fast View	Cardex Cardex	Cardinal VideoSpectrum	MENDED PRECOM Diamond Stealth Pro	MENDED Diamond	Niper Viper
O No	Is one x	4	" E E	ostina	11 11	113	7 701
n/a= not applicable	\ SER	1	Dent	Dect.	Pio a	Piga	2
tandard features	Bine		\	THE N			
Street price as of 7/93	\$175	\$380	\$147	\$133	\$249	\$247	\$412
Bus	ISA	VLB	VLB	ISA	ISA	VLB	VLB
Video processor	S3 86C801	Weitek Power 9000	Tseng Labs ET4000/W32	Cirrus Logic CL-GD5426	S3 86C928	S3 86C928	Weitek Power 9000
Accelerator functions		- 1.51	Mindle Wo				
Bit-block transfers	•	•	•	•	•	•	•
Area fills	•	•	•	•1	•	•	•
Hardware cursor	•	•	•	•	•	•	•
Line draws	•	•	•	•	•	•	•
Font caching	•	•	•	0	0	0	•
Accelerates at all resolutions	•	•	•	•	•	•	•
Memory					- War		
Туре	DRAM	VRAM	DRAM	DRAM	VRAM	VRAM	VRAM
Amount (MB)	1	2.54	1	1	1	1	2.255
Maximum (MB)	2	2.54	2	1	1	1	2.255
Maximum horizontal scan rate (kHz)	64	80	57	56	77	77	79
Maximum noninterlaced vertical refresh rate	(Hz) at						Par Line
640 x 480	90	72	72	72	72	72	72
800 x 600	90	72	72	72	72	72	72
1024 x 768	80	70	72	70	72	72	76
1280 x 1024	60	n/a	n/a	n/a	72	72	74
Maximum colors at 8			and the state of t				
640 x 480	16,777,216	16,777,216	16,777,216	65,536	16,777,216	16,777,216	16,777,216
800 x 600	65,536	16,777,216	256	256	65,536	65,536	16,777,216
1024 x 768	256	65,536	256	256	256	256	65,536
1280 x 1024	n/a	256	n/a	n/a	16	16	256
Itilities and drivers			de Nucl. 19				- Mary
Software specification of refresh rates	0	0	•	•	•	•	
Windows utility for changing resolution	•	0	0	0	•	•	•
Drivers included							
Microsoft Word	•	0	0	•	•	•	0
WordPerfect	•	0	•	•	•	•	0
WordStar	0	0	•	•	0	0	0
1-2-3	•	0	•	•	•	•	0
0S/2	•	0	•	0	0	0	
AutoCAD	•	•	•	•	•	•	•
CADkey	•	0	0	0	•	•	0
CADVance	•	- 0	0	0	•	•	0
Generic CADD	•	0	0	0	•	•	0.
MicroStation	•	0	0	0	•	•	0
VersaCAD		0	0	0		•	0
Telephone number	800/927-5557, 408/986-1625	800/828-9264, 404/263-8181	408/748-1118	800/775-0899, 717/293-3000	408/736-2000	408/736-2000	408/736-2000
Customer fax	408/986-1646	404/263-9381	408/748-0346	n/a	408/730-5750	408/730-5750	408/730-5750
Reader service number	676	677	678	679	680	680	681

¹ Not available at 640 x 480 with 16 million colors.

² Full acceleration at 16 and 256 colors; partial acceleration at 64,000 and 16 million colors.

³ Partial acceleration at 16 million colors.

MENDED SER	5 CT #	S S &	928 Prem	#96X	23 CK	MENDED REGON 돗질의	F 57	8 N 4 C	26
Genoa 4GA2A Mindows 4GA2A Model 8500	Hercules Graphite Card ISA	Hercules Graphite Card VL	Metheus premier 928	Number Nine #9GXE	Orchid Pahrenheit NA	MENDED Orchid RECON	Horiton VL	VIdTech Microsystems Microsystems GraphMax LB	Volante LB Warp 10 LB
o its					\$. \	\	8 11 1	
\$136	\$277	\$359	\$373	\$379	\$215	\$244	\$142	\$320	\$238
ISA	ISA	VLB	ISA	VLB	ISA	VLB	VLB	VLB	VLB
Cirrus Logic CL-GD5426	IIT AGX-014	IIT AGX-015	S3 86C928	S3 86C928	S3 86C801	S3 86C805	Cirrus Logic CL-GD5426	IIT AGX-015	S3 86C805
•	•	•	•	•	•	•	•	•	•
•1	•	•	•	•	0	0	•	•	0
•	•	•		•	•	•	•	•	
0	•	•	•	•	•	•	0	•	•
0	•	•	•	•	•	•	0	0	•
•	O ²	O ²	•	•	•	•	03	•	•
DRAM	VRAM	VRAM	DRAM	VRAM	DRAM	DRAM	DRAM	VRAM	DRAM
1	1	1	1	2 ⁶	1	1	1	1	1
1	1	1	1	37	1	2	1	2	2
60	77	77	80	76	56	56	56	64	65
00			80	10	30	50	30	04	65
114	120	120	72	100	72	72	72	72	70
90	120	120	72	100	72	72	72	72	70
75	80	80	72	100	70	70	70	72	70
n/a	n/a	n/a	72	76	n/a	n/a	n/a	60	60
16,777,216	16,777,216	16,777,216	16,777,216	16,777,216	256	256	16,777,216	65,536	256
256	65,536	65,536	65,536	16,777,216	256	256	65,536	65,536	256
256	256	256	256	65,536	256	256	256	256	256
n/a	n/a	n/a	n/a	256	n/a	n/a	16	16	n/a
10-									
•	•	•	0	•	0	0	•	0	0
•	•	•	0	•	•	•	•	0	0
•	0	0	•	•		•		0	
•	0	0	•	•	•	•	•	•	•
•	0	0	0	0	•	•	0	0	0
•	0	0	•	•	•	•	•	0	•
•	0	0	0		•	•	•	0	
•	•	•	•	•	•	•	•	•	
0	0	0	•	•	•	•	0	•	
0	0	0	•	•	•	•	0	0	•
•	0	0	•	•	•	•	0	0	•
0	•	•	•	•	•	•	0	•	•
•	0	0	•	•	•	•	0	•	0
800/934-3662,				800/438-6463,	800/767-2443,		800/234-4334,	800/752-8033,	800/827-879
408/432-9090					510/683-0300	510/683-0300	214/234-8750	612/780-8033	512/329-505
408/434-0997	510/623-1112	510/623-1112		617/674-2919	510/490-9312	510/490-9312	214/234-1306	612/780-2040	512/329-632
682	683	683	684	685	686	686	687	688	689

6 1MB of VRAM, 1MB of DRAM.

4 2MB of VRAM, 512K of DRAM.

5 2MB of VRAM, 256K of DRAM.

⁸ With 70-Hz (or higher) noninterlaced

refresh rate.

7 2MB of VRAM, 1MB of DRAM.

OUR REVOLUTIONARY new COMPUTER is clearly FAMILY COMPATIBLE.



From the start, the Tandy Sensation was bound to be a family favorite. It's practical, but fun. Sophisticated, but easy to use. No wonder this Radio Shack multimedia



PC has already won the hearts of so many experts. Now, though, it's your seal of approval we're after. Because we designed the Sensation with families

And APPARENTLY, CRITIC COMPATIBLE, TOO.

"The Tandy Sensation is a rich collection of well-integrated programs and hardware in a clean, handsome package."

> -Jim Canning, Michael McCarthy InfoWorld

"It's a dandy multimedia computer. The Sensation is worth serious consideration if you're shopping for the multimedia experience."

-Larry Blasko
AP

"Tandy's Sensation is aptly named. I urge anyone looking for a good all-around MPC system to test-drive the Sensation."

-Greg Loveria
BYTE

"The Sensation is not only easy to use, but quite a multimedia Swiss Army knife."

-Selby Bateman CD-ROM Today

"The Sensation is an excellent machine that does a lot and does all of it well."

-Eddie Huffman

Compute

"Tandy's Sensation is a state-of-the-art home computer that works well and offers a lot for the money."

> -Howard Blumenthal Hardware Review, United Feature Syndicate

like yours in mind. Its multimedia capabilities and user-friendly technology mean everyone in your home can put it to use. So why not put it



to the test? Experience the Sensation firsthand at your neighborhood Radio Shack. Chances are, you'll find it's compatible with you, too.

Radio Shaek



Hate waiting on hold? Tired of waiting weeks for a reply to your letters? Our guide to online services shows you how to let your modem do the walking.

Let's face it: If you want to check out some hot new stocks, plan your next trip, or send the perfect birthday gift to your biggest client, there are times when the phone, the mall, and the mail are old hat. Who has time to drive around town all day or spend weeks playing phone tag with the travel agent or broker? In this get-it-done fast world, where tomorrow isn't soon enough, a modem-equipped PC can make the difference between losing a client...and saving your sanity.

Using an online service like CompuServe, GEnie, Prodigy, or America Online is like having your personal assistant, financial counselor, and shopping mall rolled into one (see "The Big Four: Who's Who in Online Services"). Not only can these services give you information on just about everything, there's practically no better way to find soulmates, make new friends, or generally hobnob. Best of all, the added convenience and services come at a cost of only \$10 to \$20 per month.

To see how robust these services are, we compared how easily we could complete everyday tasks using both traditional means (phones, faxes, and so on) and an online service. We chose business and personal tasks to highlight the versatility of the services and to demonstrate where they excel—and where there's room for improvement.

Our conclusion? While an online service is excellent for locating financial information or making travel reservations, it isn't the place to shop for bargains. And don't expect an online service to replace a good technical consultant—or a doting butler.

By George Campbell and Judy Heim

Online Services

COMMUNICATIONS ONLINE SERVICES

Ticket to Ride: Planning Your Next Trip

It was convention time, and a trip to San Francisco was in order. I'd already contacted a business travel agency to take care of the reservations. But I wondered if I could come up with comparable or better airline fares and hotel accommodations using an online service.

While I knew that America Online, GEnie, and CompuServe provide access to travel databases and reservations services, I'd heard that Prodigy offers the most extensive travel information around and decided to check it out.

This was the first time I used Prodigy's travel services, so I wasn't sure what to do. I clicked on "Jump" on the bottom of the screen and guessed that typing 'TRAVEL' would take me to the travel database. I was right: Prodigy displayed a list of travel services and databases, and I soon found my way to the Eaasy Sabre airline and hotel reservation service.

Signing up for Eaasy Sabre was simple—I just entered my name and credit card number. When I indicated that I wanted low-cost tickets from Madison, Wisconsin, to San Francisco, an on-screen form appeared for me to fill in my departure date and favorite airlines. There was even space to identify preferences for aircraft type, stop-over cities, and seating. Eaasy Sabre instantly came up with a list of budget flights—many on Midwest Express, my favorite lux-ury airline. (It serves champagne on every flight and has big, comfy leather seats.) Once I picked my flight (\$328 round trip—nonstop) Eaasy Sabre displayed a seating map, and I picked a spot and specified my meal preference.

Tickets in hand (or at least taken care of), I backed out to the hotel reservation menu and Eaasy Sabre offered a list of hotels near the Moscone Convention Center. I searched the list by hotel chain, rates, bed types, and view preferences and came up with several candidates—all at affordable prices. Rather than making a reservation, though, I exited Eaasy Sabre and went to Prodigy's online version of the Mobil Travel Guide, which includes reviews of hotels in major cities. I used this guide to narrow the list even further.

While rambling around the travel databases and forums, I stumbled on a mother lode of good advice about my destination city. Prodigy has surveyed its users to learn their picks and pans for all

major cities in the United States. In just a few minutes, I was able to get the inside scoop on dozens of tourist sites in San Francisco, the best playgrounds for kiddies, and the perfect spot for a romantic evening.

Meanwhile, my travel agent came up with an itinerary. The airfare was \$25 more than the flight I found on Prodigy; the plane stopped in as many cities as a Greyhound bus; and the ultra-pricey hotel where the agent had booked a room for me specialized in bleeding innocent convention-goers.

Since I had already paid for the tickets from the travel agency, it was too late to send them back. But the next time I have to travel on business, I intend to plan my trip through Prodigy. —Indy Heim

Dialing for Dollars: Investing Online

To find a good investment, you can spend weeks prowling the library, flipping through magazines, and sifting through prospectuses. Or you can spend a few hours analyzing the wealth of financial data available on popular online services. Which option would you choose?

While all the major online services—especially Prodigy—offer good financial information services, none can compare with CompuServe's bevy of financial databases and research data. I was in the market for some good growth stocks, so I logged on to CompuServe and typed GO S&P for Standard & Poor's Online. It costs only \$2 to access the S&P Investment Ideas list, which tells you which publicly held stocks are hot and why. I found several intriguing options on the list, including GTE, Microsoft, and some of the Baby Bells.

For more information on these firms, I accessed the S&P company profiles; they cost just \$1 to read. I also wanted a wider perspective of the market, so I headed to CompuServe's Company Analyzer (GO ANALYZER), which summarizes company ownership, price, and financial information from a variety of CompuServe databases, including the Standard & Poor's list. The cost to access the information varies from \$1 to \$30, depending on what kind of information you're after and how long you spend browsing—but it's still a lot quicker than trying to find this information manually.

CompuServe's price-volume graphing is a nifty feature. (Enter the company name or ticker symbol and the date range and CompuServe will paint a revealing graph of the issue's price and trade volume fluctuations.) To display the graphs, you must run frontend software—such as CompuServe Information Manager, OZCIS, or Procomm Plus for Windows—that can display graphs online. You can also display the graphs from the Analyzer menu or by typing GO TREND. Cost is \$1 per chart.

Experienced investors will want to take advantage of CompuServe's stock screening services. (To use them, just type 60

> coscreen.) You can screen stocks by a wide range of variables including their book value, market value, growth rate, debt/ equity ratio, market/book ratio, earnings/share ratio, price/earnings ratio, and yield. The cost for using this is \$5 per screen, plus 25 cents per issue.

> For a current market quote on any stock, simply enter the ticker symbol at any CompuServe prompt. Quotes are free if you head to the Basic Quotes menu by typing GO BASICQUOTES. If you like, you can get previous prices for 5 cents per quote by typing GO PRICES.

To investigate mutual funds, Money Magazine's mutual fund



PRODIGY'S TRAVEL PLANNING SERVICES beat the traditional method hands down. The airline fare was cheaper—and the flight more direct—than that obtained by a travel agent.

online database (GO FUNDWATCH) can't be beat. Use of the database is free with a standard CompuServe subscription, and FundWatch lets you screen funds by type (for example, growth, balanced, or grownincome), performance periods, loads, expenses, and other variables. Once you find a few intriguing prospects, you can display about two screens full of vital particulars on them, ranging from ratings to asset allocation.

After wandering through these databases, I narrowed my investment choices to Ameritech, Southwestern Bell, Microsoft, and the mutual fund Fidelity Select Home Finance Fund. In the Investors' Conference (GO INVFORUM), I learned that telecommunications analysts are sour on Ameritech, while they're bullish on Southwestern Bell. Microsoft is always a hot topic in the Investor's Forum, and so it was again. Half the messages recommended buying, half said pass. Gossip about Fidelity funds is always rife in the forum, but I saw no mention of the Home Finance Fund.

I could have made my stock purchases online through any of CompuServe's three online brokerages: E-Trade Securities (GO ETRADE), Max Ule (GO TKR-1), and Spear, Reese, and Company (GO SPEAR). Instead I called Fidelity's Online Xpress electronic brokerage, available only to Fidelity members. With a handful of keystrokes, I made my stock and mutual fund purchases. I logged off with the sense that searching for investments the old fashioned way—with a newspaper, library, and telephone—is downright prehistoric. —J. H.

Phoning Is Better: In Search of Technical Support

It was a bad day in PC City. I couldn't figure out how to use fonts in WordPerfect, my new 14,400-bps modem was acting up, and Windows was being a brat. But worst of all, my new hard disk was beginning to signal bad sectors and lost files.

While other online services—particularly America Online and GEnie—offer some limited support forums, the consensus among hardware and software vendors

seems to be that anyone who's serious about getting online tech support uses CompuServe. In fact, all the vendors I needed run technical support forums there.

Finding the forums on CompuServe was a snap. All I had to do was type GO followed by the vendor name. GO SUPRA took me to Supra Corporation's forum, where I tapped in a message asking

The Big Four: Who's Who in Online Services

With millions of subscribers across the country, CompuServe, GEnie, Prodigy, and America Online are the undisputed champions of online services. But they vary widely in their offerings, interface, and appeal to different audiences. Depending on what you want to do online, one or more of these services—for a basic subscription fee of around \$10 a month—may be right for you.

CompuServe

CompuServe is the Swiss army knife of all online services. The largest of the Big Four services, CompuServe is functional, dependable, and has something for almost everyone. It is also the most valuable service for business users. If you work in high technology, CompuServe is an absolute must-have.

The service features excellent E-mail, as well as a wide array of forums where you can discuss just about anything with anyone. And there's perhaps no better place to find shareware or tech support from the major hardware and software vendors. The service also provides easy access to Dialog, Nexus, and other large research services.

While CompuServe's pickings are considerably slimmer if you're looking for entertainment or family-oriented information, it's a great business investment for the flatrate service of \$8.95. The CompuServe interface can be daunting to novices, so another good investment is CompuServe Information Manager, a package for DOS and Windows that makes roving the service much easier. CompuServe, 800/848-8199, 614/457-8650. Reader service no. 695

GEnie

If you want to send electronic mail to your cousin in Muskogee, General Electric's GEnie is the online service for you. This family and hobbyist-oriented BBS offers an active chat line, where you can "talk" with other subscribers. Entertainment forums

covering such fields as film and literature are broadly represented. The service offers fewer hardware and software technical support forums than CompuServe, but excels at shareware support. The GEnie interface, however, is slow and daunting—both to new and experienced users—so a third-party interface, such as Aladdin, is a must. Fortunately, Aladdin comes free when you subscribe to GEnie. GEnie, 800/638-9636, 301/251-6415. Reader service no. 696

Prodigy

Like GEnie, Prodigy is a family-oriented service, but it's infinitely easier to use than GEnie. But be careful: Prodigy's interface is so friendly that your 5-year-old might use it to chat with faraway friends. Prodigy, at \$14.95 per month, offers good financial conferences, as well as a host of domestic conferences on subjects such as cooking, child care, and shopping. You can also find a wide array of travel and entertainment information. Citing its family orientation, Prodigy reserves the right to censor any messages that it finds offensive. Prodigy Services Co., 914/993-8000, 914/684-0278 (fax). Reader service no. 697

America Online

If fun is what you're after, America Online also offers a feel-good interface that lets you pick areas of interest by clicking on colorful icons. As its name implies, the service (\$9.95 monthly) is a great way to meet people nationwide, and there's no better way to play transcontinental games. While you can find technical support from companies such as Microsoft on America Online, it's difficult to find a wide variety of information. The electronic-mail offering, however, is very good: You can transfer files and post and receive mail quickly, so networking is a real snap. America Online, 800/827-6364, 703/448-8700. Reader service no. 698

-Bronwyn Fryer

why the digital display on my SupraFaxModem was flashing '14.4' when I was connected to another computer at only 2400 bps.

Then I typed GO MICROSOFT and landed in the Microsoft conference. I picked my way through menus to get to the Windows tech support area. I typed a message asking for tips on running a high-speed modem with Windows.



Austin has it all!

Austin people are friendly, professional, and upbeat.
Austin Computer Systems sells complete system solutions. Awardwinning systems backed by free expert consultation, lifetime toll-free telephone support, and free on-site service for a year!
And, Austin is one of the few computer companies to have a Novell-certified testing lab in-house to assure 100% compatibility!
Austin Computer Systems is a five-time winner of the PC Magazine Editors' Choice Award. It recently

received the
PC Magazine Readers'
Choice award for
excellent service and
reliability, and
PC World rated Austin
#1 in service and
support. No wonder 70%
of orders are from
repeat customers!

The Ultimate 486 High Performance System

The Works!

We'll put you in a position of power!

If ultimate performance is your top priority, get "The Works"—our 486DX2–66 with 16 MB of memory, 256 KB L2 cache, 525 MB 10ms SCSI hard drive, Toshiba 200ms dual speed CD-ROM, 14.4 Kbps modem with Trio DataFax software, STB Pegasus VL-Bus Windows accelerator with 4 MB VRAM, and 17" digitally-controlled SVGA color monitor. Powered by Intel's fastest

486 processor—ready to upgrade to next-generation
Pentium™ technology — The Works is an outstanding value with workstation performance. Perfect for CAD or desktop publishing.

"The Works"

486DX2-66

\$4,999

16 MB (expandable to 64 MB), 256 KB L2 Cache, Dual Floppy Drive, 525 MB Hard Drive, CD-ROM, Modem, 17* Digital NI SVGA Monitor

Austin Custom Solutions

Need a network-ready PC or one of our MediaMagicTM multimedia systems? Austin Computer Systems is ready to custom configure a system for you.

Give us a call!

More 486 High Performance Systems with CD-ROM

If you demand maximum speed and access to the growing library of CD-ROM based applications, you need our 486 High Performance Systems. An STB Powergraph VL24 local bus Windows accelerator provides the speed you need for Windows. And, with the digital controls on your 15" NI Super VGA color monitor, your monitor remembers the size and position settings for each video resolution.

Performance Plus CD-ROM!

486DX2-66

\$2,999

8 MB (expandable to 64 MB), 256 KB L2 Cache, Dual Floppy Drive, 424 MB Hard Drive, CD-ROM, 15" Digital NI SVGA Monitor

So much for so little!

Like the city itself, Austin

Computer Systems offers a wide

variety of attractive features

at an outstanding value.



BARTON SPRINGS POOL



Call toll-free 1-800-331-1501

AUSTIN COMPUTER SYSTEMS . AN IPC COMPANY . 10300 METRIC BLVD., AUSTIN, TX 787

486 Austin Green PC Systems

EPA Energy Star!

Austin Computer Systems offers the first complete Energy Star systems. Austin's advanced power management circuitry reduces energy consumption to less than 24 watts (including monitor) when the system is idle. And, Austin's design lets you choose any monitor and still exceeds EPA conservation guidelines!

In typical use, you can save more than 67% on your system's energy consumption good for the environment, and great for savings.



Energy conservation doesn't mean low performance or high price. The Austin Green PCs have Intel 486 processors, local bus Windows accelerators, and still offer outstanding value.

> "Of the models we tested, Austin's Green PC ... was the clear winner."

- PC World, August, 1993

Save Energy — Save Dollars!

486DX-33

4 MB (expandable to 32 MB), 128 KB L2 Cache. Dual Floppy Drive, 250 MB Hard Drive, 1 MB LB Windows Accelerator, 14° NI SVGA Monitor







Low-Cost 486 LB Systems

Austin's low cost 486 local bus systems outperform and out-feature the competition. Compare them to anyone else's systems and you'll agree.

486SX-25

4 MB (expandable to 32 MB), 3.5° Floppy Drive, 212 MB Hard Drive, 512 KB Windows Accelerator, 14° SVGA Monitor

Austin, the city, and

Austin Computer Systems, the company, both

AUSTIN'S TOWN LAKE

Standard for all Desktop Systems

101-Key Keyboard, High-Resolution Mouse, Preinstalled MS-DOS 6.0, Windows 3.1 and choice of Lotus Organizer, Lotus Write, or Lotus 1-2-3 for Home, Purchasers of The Works and 486 High Performance Systems can choose from Lotus 1-2-3 for Windows, Lotus Improv, Lotus Ami Pro, or Lotus Freelance. All systems include a limited two-year parts and labor warranty, one-year on-site service, and lifetime technical support.







"The Works" System

16 MB RAM Expandable to 64 MB 8 KB CPU Cache and 256 KB Level 2 Cache 525 MB 10ms SCSI Hard Drive Toshiba 3401 200ms Dual Speed CD-ROM Drive

STB Pegasus VL-bus 4 MB VRAM Windows Accelerator

17" NI Super VGA Color Monitor with Digital Controls and Multi-Mode Memory

14.4 Kbps Modem with Trio DataFax Software

Desktop Case with Three 5.25" HH Bays, Two Internal 3.5" HDD Bays and 200 Watt High Efficiency Power Supply

486DX2-66

525 MB SCSI 10ms

\$ 4,999

486 High Performance Systems

8 MB RAM Expandable to 64 MB 8 KB CPU Cache and 256 KB Level 2 Cache Choice of High Performance IDE and SCSI Hard Drives Sony 31A CD-ROM Drive Dual 5.25" and 3.5" Floppy Drive

STB Powergraph VL24 VL-bus 1 MB Windows Accelerator 15" NI Super VGA Color Monitor with Digital Controls and Multi-Mode Memory

Desktop Case with Three 5.25" HH Bays, Two Internal 3.5"HDD Bays and 200 Watt High Efficiency Power Supply

486DX-33	250 MB IDE 13ms	\$ 2,499
486DX2-50	340 MB IDE 13ms	2,649
486DX2-66	424 MB IDE 13ms	2,999

486 Austin Green PC Systems

4 MB RAM Expandable to 32 MB 8 KB CPU Cache and 128 KB Level 2 Cache Choice of High Performance IDE Hard Drives Dual 5.25" and 3.5" Floppy Drive

Integrated Local Bus 1 MB Windows Accelerator

14" NI Super VGA Color Monitor

Low Profile Case with Two 5.25" HH Bays, One 3.5" Bay, One Internal HDD Bay and 150 Watt High Efficiency Power Supply

486SX-25	212 MB 13ms	\$ 1,539
4865X-33	212 MB 13ms	1,599
486DX-33	250 MB 13ms	1,789
486DX2-50	340 MB 13ms	1,949
486DX2-66	340 MB 13ms	2,149

Low Cost 486 LB Systems

4 MB RAM Expandable to 32 MB 8 KB CPU Cache and 128 KB Level 2 Cache Choice of High Performance IDE and SCSI Hard Drives Dual 5.25" and 3.5" Floppy Drive

STB Horizon VL24 VL-bus 1 MB Windows Accelerator 14" Super VGA Color Monitor

Desktop Case with Three 5.25" HH Bays, Two Internal 3.5*HDD Bays and 200 Watt High Efficiency Power Supply

Die ripo boj.		and a mercia	1 . a.i.e. sabb
4865X-25	14" SVGA	212 MB	\$ 1,449
4865X-33	14" SVGA	212 MB	1,499
486DX-33	14" NI SVGA	250 MB	1,789
486DX2-50	14" NI SVGA	340 MB	1,899
486DX2-66	14" NI SVGA	340 MB	2,149

@1993 Austin Computer Systems. All rights reserved. MediaMagic is a trademark of IPC Corporation LTD. The Intel Inside logo is a registered trademark and Pentium is a trademark of Intel Corporation. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. All other company names and products are trademarks or registered trademarks of their respective owners. The ENERGY STAR™emblem does not represent EPA endorsement of any product or service. Prices and specifications are subject to change without notice.



COMMUNICATIONS ONLINE SERVICES

In the Norton Symantec conference (GO SYMANTEC), I left a long, painful description of how Norton Desktop's Disk Doctor utility kept finding new bad sectors on my disk.

Finally, I typed GO WORDPERFECT to get to the WordPerfect forum. There I asked why I couldn't use True Type fonts in WordPerfect for Windows.

I sat back and waited for the quick responses.

And I waited. And waited.

Two days passed, and I hadn't received any answers. I dialed tech support at each company and received answers to all my questions after waiting on hold a maximum of 3 minutes. By the end of the day, I received only one answer on CompuServe—that was to my WordPerfect question: To run True Type fonts I need to use a Windows printer driver. (WordPerfect always has good tech support.)

Several more days passed. E-mail answers started to dribble in. A Supra techie wrote that my modem was flashing '14.4' because that was the PC's serial port speed, not the connect speed. He gave me the command to make it flash the connect speed instead. A Symantec techie left a message listing the many ways I could diagnose my disk's ailments. Although it took them a few days to get back to me, these replies were more in depth—and more technically accurate—than the hurried answers I got on the phone.

In the Microsoft forum I got a message that I'd posted my question in the wrong place. So I thrashed through more menus and reposted it correctly. A week passed and I never got a response. In a way, that's no better than the response I got from Microsoft on the phone. Their tech told me he knew of no tips for getting high-speed modems to run faster or more efficiently under Windows. When I told him that I had read some tips recently in several computer magazines (see "Troubleshooting Windows 3.1" *PC World*, November, 1992 and *Communications Q&A*, August 1993), he said gleefully, "Let me tell you something about those computer magazines. They usually don't know what they're talking about."

Uh-huh. -J.H.

A Note to Bill: Writing the White House

I've written letters to various presidents, but my missives have seldom drawn anything more than a brief "Thanks for writing. We're working on it."

But things are different now. Did you know that you can E-mail your concerns about the economy, the environment, or whatever political problem moves you, directly to the White House? That's right: The Clinton administration has gone online, with electronic mail boxes on most of the major online services, *plus* Internet. Who knows, I thought, maybe they'll even respond.

To send a message to President Clinton, I headed to CompuServe first. CompuServe offers a special White House Forum (type **GO WHITEHOUSE** at any prompt) where users can debate administration policies. Whether anyone from the White House actually logs on and reads messages here is doubtful, but CompuServe spokespeople hint that every once in a while someone from the White House *might* stop in.

The Best in BBS's

While traditional online services such as CompuServe, GEnie, Prodigy, and America Online are very popular, many users find their online joy in less well-known venues. There are currently more than 20,000 local and national BBS's, all of which offer many of the same options as the big mainframe-based services. Some smaller services charge for access, while others are free. Some are independent ventures, while others are run by hardware and software vendors to provide support for their customers. All the choices are great, but with that many systems online, how do you pick one that suits your needs?

The Local Option

For many, the best BBS is the one next door. Most communities of any size sport one or more systems, the best of which are free and are run by local user groups. On them, you'll find hundreds or thousands of files for downloading, plus a membership that is responsive to your questions. You might even make a friend or two online. Best of all, it's a local call, so you can avoid telephone charges.

Finding a local BBS can be a challenge, though, since few are listed in your phone book. One good method is to contact a local user group; another is to download a list from a commercial online service. You'll find USBBS.ZIP on PC World Online. It contains hundreds of BBS's, listed by area codes.

Files, Files, Files

Without question, the most popular BBS feature is the diversity of available software. Whether it's the latest and greatest shareware program, a collection of clip art images or TrueType fonts, or the latest driver for your video card, you'll find it online. While the commercial systems offer extensive files, their online charges and often slow modem access can make downloading expensive.

To solve this problem, there are many national BBS's geared specifically toward file transfers. These systems aren't free, but all support high-speed modems, batch-file transfer protocols, and extensive file lists.

Exec-PC, for example, offers multiple gigabytes of files, including the complete shareware collection from PC-SIG, a major shareware distributor. Sporting 280 phone lines some specifically designed for hard-to-match high-speed modems—this system has logged more than 5.8 million calls over its nine years online. A blazingly fast searching tool makes it easy to find the files you want. Most shareware authors upload their latest versions directly to this system as soon as they're available. E-mail and public message areas are other features.

Exec-PC charges \$75 per year or \$25 per quarter for full, 600-minute-per-week access. For most users, Exec-PC is a long-distance call, but the system supports lower-cost access by the PC-Pursuit or Global Access packet systems. Nonsubscribers can explore most areas without charge, but have limited access to file transfers. To explore Exec-PC, or to sign up, call 414/789-4210 (300 to 2400 bps) or 414/789-4360 (high-speed modems).

Conversation and More

While all online systems offer messaging and E-mail capabilities, there's one system that's

Since I couldn't remember the White House E-mail address (for a private letter) and couldn't find it in CompuServe's user directory, I scoured the conference for some mention of it. Other people were looking for it too, but it wasn't noted anywhere (it's 75300,3115).

I headed to MCI Mail. There you can send Bill Clinton E-mail by simply addressing it to 'White House'. MCI Mail also offers, for an added fee, the full text of Clinton's speeches, comments on important issues, and White House news releases. (CompuServe and America Online offer the same services for free.)

On America Online, type **WHITEHOUSE** to get to the White House forum, similar to CompuServe's. To send mail to the prez, either click on the icon Send Mail to the President or type in his E-mail address (ClintonPZ).

Prodigy also has a presidential E-mail feature, but it's more lowtech. You type an E-mail message to the president and someone at Prodigy's Washington, D.C. office prints it, stuffs it in an envelope, and drops it in a mailbox. Prodigy bills your credit card \$2.50 for this service.

From the look of it, Joe and Jane Public have really warmed up to the E-mail option. The White House has been so deluged with electronic mail that its online mailboxes frequently brim past capacity. The system still has some kinks that need to be worked out, though, so don't expect a personalized reply by E-mail. For now, at least, the system is shooting out form-letter acknowledgements, with more detailed responses sent later by mail. (As of this writing, I'm still waiting for the follow-up package.) The White House's Internet addresses are: president@white-house.gov, 75300.3115@compuserve.com, or clintonpz@aol.com. To reach Al Gore, address your message to vice.president@white-house.gov. —J. H.

Roger and Me: Contacting a Celebrity

Elected officials aren't the only "names" tapping into online services. A small but growing number of celebrities are active on one or more services, and one of these pioneers is noted movie critic Roger Ebert. I don't always share his taste in movies, but I generally respect Ebert's opinion on a range of film-related topics. And being a movie buff myself, I was curious to know what he thought about the effect of film violence on society.

I tried a telephone call to the *Chicago Sun-Times*, his home base. I struck out there, though, since he was in France at the Cannes Film Festival. Online, however, was another story.

I first checked GEnie. Using Procomm Plus I typed INDEX at a GEnie prompt, then typed EBERT and ROGER EBERT to begin my search. GEnie didn't show anything under that name, so I headed over to CompuServe. Using the Services•Find command, I searched for EBERT and discovered an entire online forum hosted by the reviewer. Sadly, there was no way to leave him a message there (although I could access reviews and film descriptions).

All was not lost, however. Scrolling through the options, I selected Feedback/Talk to Roger. It directed me to CompuServe's SHOWBIZ forum. (Select Services • Go, then type SHOWBIZ.) Sure

totally dedicated to online communications. The WELL, established in 1985 by the folks who brought you the Whole Earth Catalog, is a free-wheeling conferencing system with forums on every topic you can imagine and some you've never considered. From music and computing to alternative lifestyles, you're

bound to find kindred spirits here. Companies can even set up private conference areas.

The WELL also offers files for downloading, plus international access to the Internet and Usenet. All this comes at a cost of \$15 per month, plus \$2 per hour while you're online. You can access the WELL directly or through

the same packetswitching nodes used by Compu-Serve at an additional charge (typically \$4 per hour). Users with an existing Internet account can access the WELL at no additional charge.

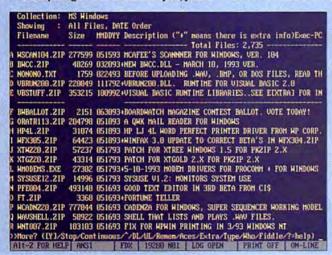
Contact the WELL or sign up online by calling 415/332-6106 with your modem set at any speed from 300 bps to 2400 bps or through your local CompuServe node number (call 800/848-8980 for the number nearest you). If you are an Internet user, the WELL's Internet address is well.sf.ca.us. Log on as GUEST for a tour of the service, or as NEWUSER to sign up. The WELL, 415/332-4335, 415/332-4927 (fax).

Online Support and More

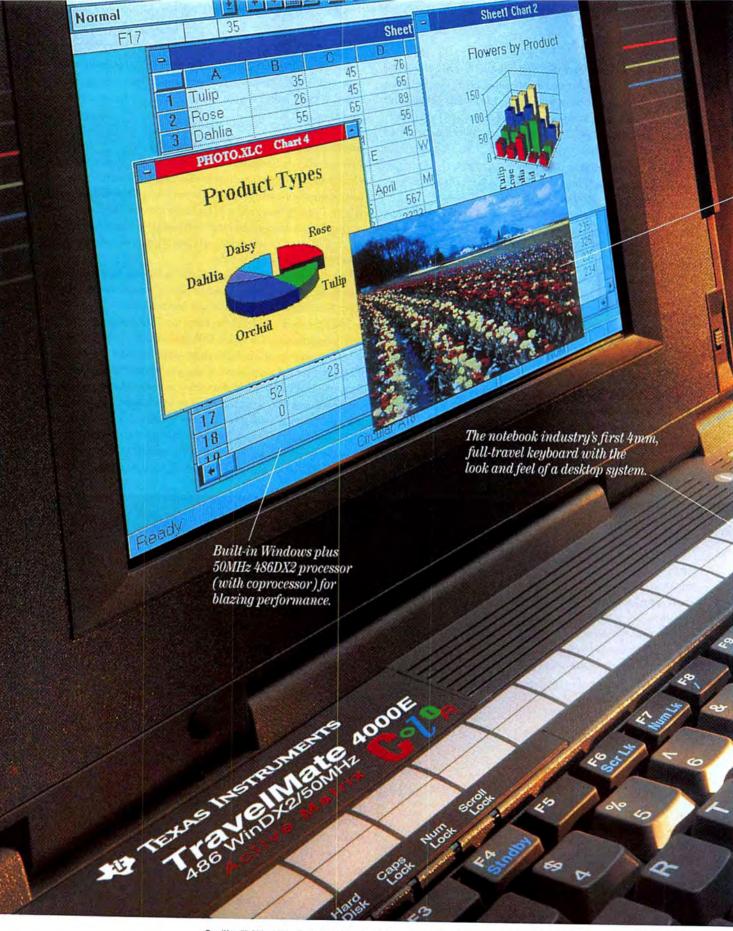
Need a new driver for your super whiz-bang scanner? How about some expert support for a recalcitrant program? You could call the company's technical support number and wait your turn, but there's a better way.

Most computer hardware and software companies run a dedicated support BBS. You'll find those software updates and information to solve your trickiest problems. There are hundreds of these systems, but they're almost all unknown to users. To find them, try your manual or software help screens. If that's no help, you'll need a list. There's a great one in the file VENDOR.BBS, available on PC World Online and other on-line services.

-G. C.



IF YOU'RE LOOKING FOR FILES to download, Exec-PC offers thousands, plus a fast searching tool to locate the file you want.









ACTIVE COLOR.

486DX2 50MHz Power.

WINDOWS IN 15 SECONDS.

HEY, WHAT ARE YOU

WAITING FOR?

New TI TravelMate™ 4000E WinDX2™/50 Active Matrix Color

If you've been waiting for an active matrix color notebook with true desktop power, your wait is over. Thanks to the new TravelMate 4000E WinDX2/50 Active Matrix Color notebook

> from Texas Instruments.

> With 256 brilliant, simultaneous colors and a 50MHz 486DX2 processor, this power-

function keys.

house doesn't just whisper color, it screams it.

And yet the TravelMate 4000E
weighs a mere 6.2 pounds, including battery. This convenient size
and weight gives you more
performance* than the
leading 486 notebooks.

New, desktoplike keyboard
with separate

Thanks to the built-in Windows 3.1 and useful TI

utilities, you can power up to Windows in just 15 seconds. And the TravelMate 4000E is Windows NT-compatible. With 4MB of main memory, expandable to 20MB, you're ready for today's and tomorrow's software.

Using the mouse on the TravelMate 4000E is a snap. The Microsoft BallPoint™ mouse with QuickPort™ connection snaps on and off and needs no cable, giving you more flexibility and better ergonomics than a built-in mouse. With the

industry's first 4mm, full-travel keyboard, the TravelMate 4000E gives you the feel of a desktop.

If you work on the go, you'll also go for the rugged 200MB hard disk drive, the high-speed

video bus and 1MB of video RAM, as well as the full range of connectivity options – snapon modules for Ethernet® LANs, SCSI-compatible devices and an internal 14,400 bps V.32 bis modem with 9,600 bps send/receive fax capability.

50MHz DX2 processor with coprocessor provides desktop performance in a notebook.



Of the leading active matrix color notebook manufacturers, only TI offers the desktop performance of a 50MHz DX2 processor.

Active Color Notebook	Weight (lbs.)	486 Processor	Speed	Coprocessor
TravelMate 4000E	6.2	DX2	50MHz	Yes
Toshiba T4600C	6.9	SL	$33 \mathrm{MHz}$	Yes
Compaq LTE Lite 4/33c	6.5	SL	33MHz	Yes
IBM ThinkPad 720C	7.6	SLC2	50MHz	No

Texas Instruments offers over 10 models of 486 notebooks for you to choose from.

TI TravelMate 486DX2 Notebooks



For more information about the only 486 notebook family that won five Editor's Choice awards in PC Magazine's August issue, call 1-800-527-3500.

EXTENDING YOUR REACH WITH INNOVATION™



Circle 244 on reader service card

COMMUNICATIONS ONLINE SERVICES

enough, there was a message area called Ask Roger Ebert. I used the Message Browse command to read some of the current messages, found one written by Ebert, and clicked Reply. I posed my question, but I didn't expect an answer because Ebert was in France.

A couple days later, when I logged into the SHOWBIZ forum, I had a message waiting. When I chose Messages Waiting Messages, there was a brief response to my question.

Celebrities are still fairly scarce on the online services, but you can find characters like Rush Limbaugh on CompuServe, the science fiction writer Jerry Pournelle on GEnie, and a few others here and there. As the popularity of these services grows, more and more celebrities (or their publicists) will log on, so keep your eyes open. Don't be afraid to ask questions or make comments; the few online celebrities are more than accessible.—George Campbell

Growing Your Own: Getting Small-Business Information

To incorporate, or not to incorporate: that's the question. Should I set up my newsletter business as an S-corporation, or wait until it's big enough to acquire Computer Shopper? My local library brims

with business how-to's, but Γ d have to take the bus downtown, then slog through aisles of books. Yawn. Finding information on growing a cottage business would be much simpler online.

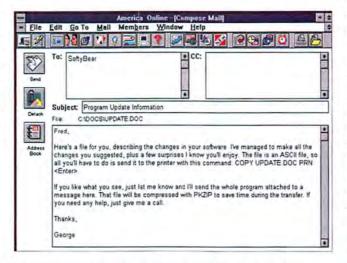
I started my search in the Microsoft Small Business Center on America Online, where a how-to library offers hundreds of articles on topics ranging from organizing for trade shows to marketing on a shoestring budget. I didn't find much on incorporation, but I spent several pleasant hours reading juicy tidbits.

America Online's Small Business Center Forums include members of the Service Corps of Retired Executives, or SCORE (a group that helps launch small businesses), management consultants, and authors of start-up how-to's. In fact, SCORE members are online one night a week to answer entrepreneurs' questions. I found the message forum discussions lively and wide-ranging. I discovered a couple message strings addressing the question of incorporation, but nothing answered my questions completely.

Heading over to CompuServe, I found the pickings slim. There



AFTER A SHORT SEARCH, YOU CAN FIND WELL-KNOWN PEOPLE such as Roger Ebert on CompuServe. Even though he was in France, our question on film violence got an answer within two days.



BY USING AMERICA ONLINE TO SEND A DESCRIPTION FILE for a program update to a client, you can save both time and money—and give your clients an extra measure of service.

is a small-business forum, and one on working from home, but most of the messages contained questions about starting a business, while few provided answers. CompuServe suffers from a paucity of experts.

I hit pay dirt on GEnie. GEnie's user interface is miserable, and I spent about 25 minutes waiting for the 1000-plus message topics in the Small Business RoundTable to scroll over the screen. Lo and behold, I found five applicable, brimming message strings. The discussions were indepth, thought-provoking, and covered the differences between various types of incorporation, as well as state and federal tax considerations.

I found many other message strings of interest, including one on newsletter publishing, many on desktop publishing, and lots on running a home office. That's what's great about online conferences: they let you easily network with professionals in different vocations, in different parts of the country. —J. H.

Getting It There Fast: Transferring Data Online

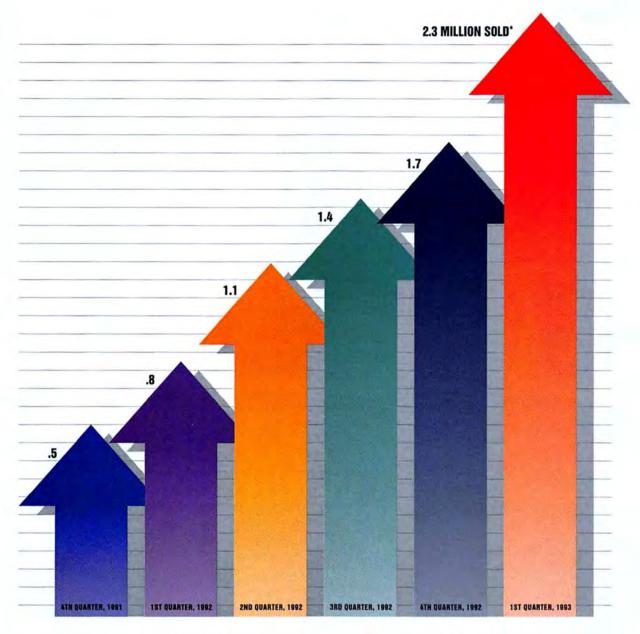
One of my sidelines is custom programming, and occasionally a client will request changes in an application I've created.

That's easy (well, not that easy), but there's always a time crunch. If I send the changes on disk, it will take at least a full day to get there, even using an overnight shipping service. Plus I run the risk of a damaged disk or lost shipment.

Online, though, I can send a new file almost instantly, if my client uses an online service. Recently, for example, I made changes to a program and wanted to notify a client of the alterations. I knew the client used America Online, so I used the Windows version of the access software to log on at 9600 bits per second.

Once online, I selected Mail*Compose Mail in the access program. In the resulting dialog box, I entered the client's screen name, typed a brief message, then clicked Attach and double-clicked on the name of the file I wanted to send. Then I clicked Send and less than a minute later, my file was on its way.

I called the client to let him know I sent the file. Within 5 minutes, he collected the text file and replied, saying the changes were fine. I called AOL again and sent my client the full program, com-



APPARENTLY, WORDPERFECT REALLY IS THE WINDOWS WORD PROCESSOR EVERYONE HAS BEEN WAITING FOR.

People learned to like Windows. But with WordPerfect*5.2 for Windows, it's definitely love at first sight. Not only has no software product — not even Windows itself—ever sold more at the start. With 51.2% of first-quarter sales, it's now the biggest selling Windows word processor. What's more, WordPerfect 5.2 for Windows offers advanced new features like Grammatik*5 (the #1 grammar tool), Adobe Type Manager (with 12 new fonts) and DDE and OLE support. Powerfully improved zoom edit and drag-and-drop. As well as innovations you'll find nowhere else: QuickFinder, a versatile indexing and text

retrieval system, mail enabling, QuickMenu, a one-click shortcut to Button Bars, and ExpressDocs, for automating documents or forms. But we haven't forgotton what's made us the sales leader. Release 5.2 is still fully file-compatible with WordPerfect 5.1 for DOS and Windows. And it's still backed by

the best toll-free support in the business. So call WordPerfect today at (800) 526-5198 for details, or to order the ExpressDocs upgrade for your previous version. Better yet, just visit your favorite local reseller.





If (wait) this (wait) is (wait) how

(wait) your (wait) computer (wait)

does (wait) Windows, (wait)

have (wait) we (wait) got (wait) a

(wait) PC (wait) for (wait) you.







Don't wait. Put one of our Image" Series 486 PCs on your desk immediately. You'll get Windows performance that really screams.

And we're not the only ones who



NEC pioneered local bus video technology to speed up graphics-based applications like Windows. Today, as other makers develop firstgeneration local bus video, we offer advanced, second-generation technology.

feel that way. In a recent review of the Image Series, PC World wrote, "Say goodbye to waiting in Windows."

Making it fast.

Our ingenious Image Video™ technology com-

bines second-generation local bus video with a powerful graphics accelerator, so even the most complex, most demanding graphics applications run full blast. And with our True Color support for over

16.8 million colors and photo-realistic images, those applications will have the impact of a speeding freight train. The bottom line: Your produc-

tivity takes a fast turn skyward. Our new Image PCs are built for easy, 238-pin ZIF-socket upgrades to the next generation of Pentium-based Intel OverDrive™ processors. We've also given them an on-board SCSI II interface, for quick connections to a wide range of peripherals.

But wait: it gets even better.

In addition, NEC's OptiBus™ technology can make those peripherals perform up to 30% faster than ordinary systems. While our ImageSync™



feature delivers flawless, flickerfree images with no adjusting when used with one of our award-winning MultiSync® FG™ monitors.

The NEC Image Series. Just part of a whole family of great personal computers, from our affordable PowerMate® PCs, to our expandable Express™ servers. So (why wait?), call 1-800-NEC-INFO or NEC FastFacts™ at 1-800-366-0476, request document 46243.



Beyond the Mainstream: Enter the Internet

Beyond commercial conferencing systems such as CompuServe lies a world-spanning network of computer networks called the Internet, offering a buried trove of information treasure to those who can decode the map.

As the model for Vice President Al Gore's "data superhighway," the Internet has emerged from a 20-year incubation in defense, research, and higher education to embrace up to 15 million users in more than 30 nations. One of Gore's last legislative acts as a Senator was to push through \$5 billion in funding for the network's growth over five years beginning in 1992. His follow-up legislation, recently reintroduced in Congress, seeks to extend Internet access to small businesses.

The plan to broaden access to the Internet has generated great enthusiasm, and for good reason. The network offers some of the best minds and hottest emerging technologies in science and industry. Among the many notable business entities on "the net" are a number of Wall Street firms, dozens of manufacturing giants, nearly every significant high-tech company, and an increasing number of sole proprietorships, who use the Internet to leverage their customer support and outreach programs.

Government, too, is getting into the act. The White House has an Internet mailbox and Congress is wrestling with how to handle its newfound access to the Internet. The Securities and Exchange Commission provides Internet access to its new EDGAR database, which will become the central depository of documents for all publicly traded companies.

No Shortage of Controversy

Many of the features that make the Internet attractive to diverse users have also raised debate over its use. Reaching further and faster than any other online service, the Internet has become a cauldron of controversy, defying control by the government that gave it life, tearing down international and cultural barriers, and spawning battles over free speech and privacy.

The net is unique in that you will find blatantly illegal activities and material along with an active police presence trying—often unsuccessfully—to track such material. Elementary and high schools in Texas and New York are dealing with how to provide PG-13 exposure to a network loaded with pirated software and sexually explicit material. Despite protests, the decentralized nature of the network has prevented the removal of any of the controversial material.

Access Options

Access to the Internet comes in several flavors. You can send E-mail to roughly 15 million fellow users through an account on MCI Mail, CompuServe, and America Online. Users on these services also gain access to Internet's thousands of special-interest mailing lists ranging from ecology to music. With some experience, you can start your own mailing list for interaction with others in your profession, or for ad-hoc work groups within your company (see "Resources").

Beyond E-mail, a second tier of Internet access offers exciting capabilities—at additional cost. This second level, which actually defines a real Internet account, allows you to log on to machines remotely anywhere on the net and use such activities as file transfer. You'll find millions of public domain software titles and other documents (including pirated software, so be sure to offer reminders on ethics and the law in your company's Internet training). Full access also lets you join Internet Relay Chat, a live roundtable talk facility that lets you chat with thousands of others around the globe, on any topic.

The cost of Internet access ranges from the price of your subscription to an online

service (for E-mail only) to dedicated, full organizational access, which can be had for as little as several thousand dollars for a full T1 bandwidth (1.54MB per second). (Delphi system and several regional dial-in bulletin board users enjoy full access as well.)

One of the traditional attractions of the Internet has been its flat-fee pricing structure, which makes for easy budgeting and easygoing experimentation. While rumors of new pricing schemes have been rampant, nothing tangible has yet emerged. Future changes may apply more to educational and research sites—with their wide-open access policies—than to the individuals and businesses who are used to paying their own way.

-Joe Abernathy

Want to learn more about the Internet?

Consider one or more of these recent books, all of which are excellent guides for newcomers.

- For a gentle introduction to the Internet, we recommend Zen and the Art of the Internet: A Beginner's Guide, Brendan Kehoe, Prentice-Hall.
- An invaluable companion for learning your way around the Internet and its various services is The Whole Internet User's Guide and Catalog, Ed Krol, O'Reilly & Associates.
- To survey the many malling lists that can be subscribed to through E-mail, we recommend Internet Mailing Lists, published by Stanford Research Institute.
- For a tutorial on how to exchange electronic mail between Internet and various commercial online services, please download the document TUTOR.ZIP from PC World Online on America Online.
- For a list of regional and national Internet service providers, please download NETLIST.DOC from PC World Online on America Online.

plete with revisions. At 9600 bps, it took less than 5 minutes to transfer the entire 45K update.

I saved several hours—and a few dollars, too—by sending those files to my client over AOL. Online file transfer costs just pennies, compared to the sometimes exorbitant cost of overnight air service. Most commercial online services (with the exception of Prodigy)

offer file transfer capabilities. That's the way to go when tomorrow at 10 a.m. just isn't soon enough. —G. C.

An Ounce of Protection: Upgrading a Virus Product

Although most PC users will never be hit with a computer virus, most of us would just as soon protect our files with antivirus software



Here's some really big news for the little guy. Introducing the world's first EASY laser printer. The Citizen ProLaser 6000."

The Citizen ProLaser 6000 is the only laser printer you can get with the features you want, and the "easy" you need. Just like the big-guys, we have a

list of impressive features (you techies can check it out below). But what's really important is that it's easy to buy because everything's included. It's easy to use because you just plug it in and it works. And it's easy to look your best with lots of internal fonts and print quality that'll make you OOH and AAH.

So why do we put so much in a laser printer that costs more. Pretty good, so little? Hey, we're Citizen. We've been making dot-matrix printers that way

for years. And besides, someone's got to look out for the little guy.

ProLaser 6000 Easy To Buy, Easy To Use, Easy To Look Your Best.

The Citizen ProLaser 6000's features include a

single component imaging cartridge, HP LaserJet III

cartridge, HP LaserJet III (PCL-5) compatibility, a reliable internal paper tray, 34 internal fonts, 6 PPM output, a 32-bit RISC processor and much more. Pretty good, huh?

© 1993 Citizen America. Citizen ProLaser 6000 is a trademark of Citizen America. All other trademarks are the property of their respective holders.

COMMUNICATIONS ONLINE SERVICES

than take the risk. Trouble is, old viruses change and new ones crop up all the time. You need to update your software regularly.

Depending on the antivirus software you use, updating your copy can mean calling the software publisher to place an order, then waiting at least two or three days for your new disks to arrive.

Online users, however, don't have to wait. I use McAfee's ViruScan for virus detection on my computers. When I heard about a new virus, I decided to see if an update was available. I called GEnie, using Procomm Plus for DOS.

Once online, I couldn't remember where virus updates were, since I hadn't updated for a while. I typed INDEX at a main prompt, then searched for the keyword VIRUS. GEnie quickly located the Virus and Security Round Table moved me there with a keystroke. In the RoundTable, I selected Search File Directory from the menu and typed VIRUSCAN as the search text. Within a few seconds I had a list of the latest Windows version of my software, made available just a week before.

I pressed D to download the skimpy information and noncomp file, chose YMODEM as a transfer protocol, then started the download in Procomm. The transfer took about 20 minutes because I was logged on at a slow 2400 bps. Once the transfer was finished, I used PKUNZIP to

The same forum also offered the latest virus definition files for Norton AntiVirus, shareware antivirus software from other vendors, and scores of text files on the subjects of viruses and computer security. Similar sections are available on most online services that offer file transfers. By searching for VIRUS in a service's index or directory, it's quick and easy to find the updates you need. —G. C.

extract the files from the download, then I installed the program.

Shopping Without Dropping: Bargain-Hunting Online

In spite of crowds, fighting for a parking spot, and long lines, there's one good thing about shopping the old-fashioned way: You can see, touch, test, or try on whatever you're buying. Online shopping, however, is another matter.

I needed some floppy disks and was looking for a camcorder. First I priced some in local stores, then I compared the prices in some mail-order catalogs. The catalogs definitely beat the local

WHATEVER ANTIVIRUS SOFTWARE YOU USE, you'll find updates online. It's the fastest way to protect against new virus threats.

```
Enter #. (P)revious, or GDelp75

GEnieHall ZBEST Aisle 5
CAHCORDERS

1. CANON (UC1) ULTRA SHALL BHH CAHCORDER WITH REHOTE $759.00
2. CANON (UC3) ULTRA LIGHT HI-BAND BHH CAHCORDER WITH HI-FI STEREO $1195.00
3. CANON (L1) DIGITAL HI-BAND BHH CAHCORDER WITH HI-FI STEREO $1559.00
4. CANON (A-1) DIGITAL HI-BAND BHH CAHCORDER WITH HI-FI STEREO $1559.00
5. CANON (E61) BHH CAHCORDER WITH WIRELESS REHOTE CONTROL $639.00
6. CANON (E65) BHH CAHCORDER WITH UIDEO LIGHT AND WIRELESS REHOTE $759.00
7. GE (CG683) FULL SIZE WIS CAHCORDER W. FLYING ERASE HEADS $95.00
8. GE (CG812) BHH CAHCORDER W. FLYING ERASE HEADS A REHOTE CONTROL $599.00
9. HITACHI (WH5480A) FULL SIZE WIS CAHCORDER W. IA-1 DIGITAL ZOOM $739.00
10. HITACHI (WH5480A) FULL SIZE WIS CAHCORDER W. IA-1 DIGITAL ZOOM $739.00
11. HITACHI (WH528A) BHH CAHCORDER WITH 64-1 DIGITAL ZOOM $739.00
12. HITACHI (WH528A) BHH CAHCORDER WITH 64-1 DIGITAL ZOOM $799.00
13. HITACHI (WH528A) BHIST & SHOOT BHH CAHCORDER W. 64-1 DIGITAL ZOOM $799.00
14. PANASONIC (PU18) WHS-C PALHOORDER WITH LIGHT & REHOTE $749.00
15. FAMASONIC (PU22) WHS-C PALHOORDER WITH LIGHT & REHOTE $749.00
ENTER #, (P)revious, (H)elp,
or (RETURN) for more?_
Enter #, (P)revious, (H)elp,
or (RETURN) for more?_
Enter #, (P)revious, (H)elp,
```

WHILE YOU CAN SHOP FOR A VARIETY OF GOODS and services online, skimpy information and noncompetitive prices limit their appeal.

stores, but I'd have to wait to get my stuff. Why not see what's online?

All commercial online services offer shopping areas where you can buy goodies ranging from cookies to the latest consumer electronics. To shop on CompuServe, for example, type GO SHOPPING to see a menu of lots of stores. Unfortunately, the terminal mode for these services gives you only long lists of items, so it's hard to imagine what you might be getting. On America Online, type SHOPPING to get to the Shopping and Travel section, with about a dozen businesses ranging from computer supplies to florists. Prodigy's service is similar, but improves over the others by displaying grainy pictures of some items.

I tried shopping on the other services, but I wanted to see what GEnie had to offer. At the main prompt, I typed MALL, and headed into a maze of menus. First I looked for floppy disks. I selected the Computers & Computer Products main menu entry, then picked Direct Micro from the next menu. A couple menus later, I was looking at the price list for floppy disks. I was interested in preformatted 3½-inch high-density

disks, and found them at 99 cents each in any quantity. Since I could get them from a mail-order source for 10 cents each, I passed. I checked some other sources in the GEnie Mall, but did no better.

Time to look for a camcorder. I pressed P to move back through the menus one at a time. I saw an entry for Z Best, an appliance and electronics dealer, and selected it. More menus. When I finally got a list of available camcorders, I looked for the best price on a full-size VHS unit. One was \$595, about the same price as the local electronics superstore. I pressed P a few more times to back up through the menus, and used Z Best's main menu to check out its shipping policies. Z Best ships within 48 hours, but that's not as fast as the superstore's immediate service. I opted for the local store.

Shopping online has been touted as one of the benefits of commercial online services. But with a variety of outlets, you may find a better price or faster delivery in more conventional channels, and you won't spend your online fees hunting for products. —G. C.

George Campbell, Bronwyn Fryer, and Judy Heim are contributing editors and Joe Abernathy is a senior editor for PC World.

Subscribe today and you could

The Home Office from Brother:
the Intellifax 800 desktop PHONE, FAX and COPIER,
the HJ-400 ink jet PRINTER,
and the P-TOUCH III ELECTRONIC LABELING SYSTEM.
With all three, you're ready to take on the world.

Share and exclusive news and reviews

Chicago

Los Angeles

P.C. WORLD

P.C. WOR

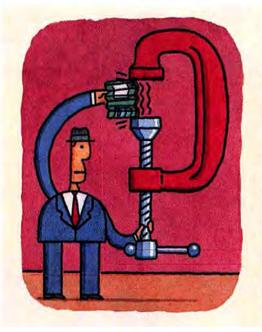
PC WORLD'S ON LINE ONE

Dial 1 800 827 6364 ext. 7831 and get ten FREE hours of PC WORLD Online when you subscribe to America Online®

Here's How

Contents: Spreadsheets 253 | Word Processing 262 | Windows 272 |

HELP LINE Q & A



Tip of the Month

UNDOING DOUBLESPACE: There's an easy way to remove DOS 6.0's DoubleSpace disk compressor. At the DOS prompt, enter DBLSPACE / LIST. In the CVF Filename column, the drive letter preceding the file name(s) similar to DBLSPACE.000 is the uncompressed host drive. Delete unnecessary files from your local hard drive(s), including the Windows swap file, if any,

Log onto each compressed drive, and enter DBLSPACE /SIZE to reallocate its free space to its host drive. Then XCOPY as many files and directories as you can from each compressed drive to its host (XCOPY C:*.* H: /S, for example). If you can't copy all of a compressed drive's files to its host, delete the files and directories you did copy, shrink that drive again using DBLSPACE /SIZE, and copy more files. Repeat this procedure until the uncompressed drive holds all your files.

If you're removing a compressed C: drive, copy C:\COMMAND.COM to the root of its uncompressed host drive. Then, for each host, log to the host's root directory and type DELTREE DBLSPACE.* to remove its compressed drives. Remove references to DBL-SPACE from CONFIG.SYS and AUTOEXEC.BAT, reboot your PC, and run DEFRAG.

Robert Luhn, Contributing Editor

TEMP Pipe Router

When I issue the DOS command DIRIMORE, the output shows two files with bizarre names like 102A2852. DIR lists their sizes as 0 bytes, and their dates show they're created the instant I issue the command. When I subsequently enter DIR/P, the files have vanished. They've had no noticeable effect, but could they indicate a virus? Nick Nordberg,

Federal Way, Washington

The files result from the normal activity of DOS's pipe (the | character), not a virus. The pipe signals DOS to write the output of the command on its left into a randomly named intermediate file, then use that file as the input for the command on its right. When done with the intermediate file, DOS deletes it. For proof of this process, place a write-protected disk in drive A:, enter A: to log onto drive A:, and enter DIR | MORE. You'll see the message 'Intermediate file error during pipe' because DOS tries, by default, to write intermediate pipe files to the current directory (which, in this case, is write-protected).

With a floppy, you can just remove the write protection and try again. But how do you perform piped commands on permanently write-protected media such as network drives with read-only permission or CD ROM drives? You could log on to a non-write-protected drive first, then issue the command with the target path included (for example, DIR E: MORE). A more elegant solution is to add SET TEMP=path to AUTOEXEC.BAT, where path is an existing directory on a writable drive (SET TEMP=C:\TEMP, for example). With this environment variable set, pipe operations write intermediate files to the TEMP directory and execute without a hitch (and faster).

Check Your CHK Files

I recently ran the DOS command CHKDSK /F, which converted a large number of lost allocation units. The files contain strange symbols, and each is almost 1MB. Also, there are several large TMP files in my Windows directory. Where did these files come from? Can I delete them?

Mike McNabnay via America Online

Allocation units of a DOS hard disk are analogous to page numbers of a book. The root directory, whose entries list a file's name and the number of that file's first allocation unit, is analogous to a book's table of contents. Files are like chapters, except that a disk does not always store a file in sequential allocation units. To track which allocation units a file occupies, the disk has a file allocation table (FAT). For example, the directory might indicate that a file starts with allocation unit 12, and the FAT might indicate that the file continues in allocation units 13, 14, 32, 33, and 29. This sequence is called a chain. Allocation units are "lost" when the FAT lists a chain but the directory doesn't have an entry that points to the chain's first allocation unit. They may have become lost when your system crashed after a file's directory entry was deleted but before the allocation units that the file's data still occupied were marked as OK for another file to overwrite. Because no file is associated with the lost allocation units, DOS file handling routines cannot read them. As long as they cannot be overwritten, the

Data Management 286 | Publishing & Presentations 290 | Communications 297 | Hardware 300 | Star-Dot-Star 304

disk space they occupy is unrecoverable. When CHKDSK/F finds lost allocation units, it creates root directory entries (FILE0000.CHK, FILE0001.CHK, and so on) for the chains.

It's always a good idea to look through the CHK files created by CHKDSK. One may contain all or part of a crumpled yet valuable database, spreadsheet, or word processing file. You can usually rescue the CHK file by using a text editor to clean it up, then the original app to import the data back into an appropriate file. Since your CHK files contain gibberish, there's probably not much you can do except delete them.

The TMP files you discovered are created by Windows apps as a normal part of file editing. The apps usually delete these temporary files, but a Windows crash or inadvertent system reboot keeps apps from completing their housekeeping. As a result, TMP files may start to accumulate. You can delete these files, as well as any files starting with the tilde (~) character. Always exit Windows before deleting TMP files—deleting them from within Windows can cause data loss and crash applications or Windows itself.

A Window on Multimedia Databases

I'm currently evaluating FoxPro for Windows, Access, and Paradox for Windows to use with a multiuser, multimedia Windows database. My main concern is ease of development, but performance and forward-thinking database design are also important. I'll be building applications for the medical imaging market and veterinarians. Are there other multimedia database development environments I should look at? RayNeXT via America Online

A Most modern database systems including the ones you name, Claris's FileMaker Pro, and Lotus's (formerly Approach Software's) Approach—offer minimal support for multimedia data in the form of generic binary fields (Borland calls them BLObs, for Binary Large Objects). The database program usually offers no way of capturing or playing clips. Windows' general solution for this is the Object Linking and Embedding (OLE) specification, which lets you embed a multimedia object in a binary field. Once embedded, Windows' Media Player applet provides playback controls. For Media Player or an OLE server app to operate properly, the app and necessary media drivers must be on every user's workstation.

Alternatively, and for about the same price, you can get a system with built-in multimedia capabilities. Most, including Asymetrix's quick-and-dirty Instant Database, Software Publishing's Superbase 2.0, Multimedia Software's Media-Desk (written in Superbase), and Videomail's VideoBase, support multiple media types and often let users control hardware such as sound boards, scanners, video capture boards, and laser disk players from within the app.

- Approach for Windows 2.0 \$399; introductory offer \$99 until 9/31/93; Lotus Development; 800/277-7622, 415/306-7890
 - Reader service no. 602
- FileMaker Pro for Windows 2.0 \$129; Claris Corp.; 408/727-8227 Reader service no. 603
- Instant Database 2.0 \$69; Asymetrix; 800/448-6543, 206/462-0501
 Reader service no. 604
- MediaDesk 1.0 \$395; Multimedia Software; 508/756-3848
 Reader service no. 605
- Microsoft Access 1.1 \$495;
 FoxPro 2.5 for Windows \$495;
 Microsoft Corp.; 800/426-9400, 206/882-8080
 Reader service no. 647
- Paradox for Windows \$149.95; Borland International; 800/331-0877, 408/438-8400
 Reader service no. 607
- Superbase 2.0 for Windows \$795;
 Software Publishing; 408/986-8000,
 408/988-7518
 Reader service no. 608
- VideoBase 1.0 \$295; Videomail; 800/366-7288, 408/747-0223
 Reader service no. 609

USER GROUP OF THE MONTH

NPCUG

This month's user group tips come from the National PC User's Group. NPCUG's monthly newsletter, The PC Lifeboat, features 60 pages of product reviews, tips, and other articles, plus discounts for members on computer books and magazines. Members get assistance by telephone from expert volunteers listed in the newsletter. The group offers a BBS boasting more than 250MB of public domain software and shareware. The library, available online or by mail, includes DOS and Windows programs and back issues of The PC Lifeboat. NPCUG holds an annual public meeting in March at Pennsylvania State University's Computer Fair. For more information, contact Richard Shoemaker at P.O. Box 1076, Lemont, PA 16851. You can call NPCUG's voice line at 814/237-5511 or log on to its BBS at 718/967-4644. Yearly membership is \$26 and includes a free disk of shareware.

Reader service no. 614

HANDY WINDOWS SCREEN BLANKERS: You can make Windows' screen savers blank the screen on demand: Look for the screen savers with an SCR file extension in your Windows directory and copy, don't just rename, each SCR file to an EXE file (for example, copy SSFLYWIN.SCR to SSFLYWIN.EXE). In Program Manager, select File • New and click Program Item • OK. Type a description and the screen saver's EXE file name in the Description and Command Line text boxes. Add /S to the command line and click OK. When you want the screen blanked, double-click your new icon.

Richard Shoemaker National PC User's Group



In Search of a Software Pharmacopoela

I'm looking for a good source of information on medical software. I have found a few isolated companies, but no general listings or catalogs. I'd even buy a CD ROM drive if I could find a CD ROM listing textbooks, diagnostic software, and the like.

David M. Levitt, M.D., via America Online

The Medical Software catalog from Medical Software Products lists hundreds of apps for diagnostics and decision support, drug information, continuing education, office management, patient records, Medicare coding, prescription writing, and scheduling. The company also sells palmtop applications geared to physicians and full-text CD ROMs of medical publications such as the New England Journal of Medicine.

For medical software news, reviews, and buyers' guides, read the bimonthly MD Computing and the monthly Physicians and Computers magazines. For the latest market analysis of medical practice management software, contact Jewson Enterprises in Menlo Park, California. The firm tracks satisfaction ratings for over 1200 applications.

 Medical Software biannual catalog, free; Medical Software Products; 800/444-4570, 408/370-9440, 408/370-3393 (fax)

Reader service no. 610

- MD Computing \$55 per year (personal rate), \$109 per year (institutional rate) for 6 issues; single issue \$8.25 Springer-Verlag New York, Inc.; 201/348-4033, 800/777-4643
 Reader service no. 611
- Physicians and Computers \$24 per year for 12 issues; single issue \$3 Moorhead Publ., 708/615-8333
 Reader service no. 612
- Jewson Enterprises 415/368-6570
 Reader service no. 613

DoubleSpace Compression

Goleta, California

After I upgraded to DOS 6.0, I was pleasantly surprised to discover that the new DoubleSpace disk-compression utility works with floppy disks. I thought this was great because I often need to transfer large files using floppies. To my dismay, however, I've found that I'm often unable to copy files to a compressed 1.44MB floppy, even when DOS's CHKDSK and DBLSPACE/INFO commands tell me there's more than enough space available. Is this a bug in DOS 6.0?

When you create a compressed volume file (CVF) on a blank 1.44MB disk, DBLSPACE /INFO should show approximately 2.64MB (2,768,896 bytes) of free storage space. Look carefully and you'll also see that

the *estimated* free space is based on DoubleSpace's arbitrary compression ratio of 2 to 1 (usually expressed as 2:1). In fact, different kinds of files compress to varying degrees, and even files in the same format will compress differently depending on the data they contain. As a result, DoubleSpace has no way of knowing in advance how much data it will be able to squeeze into a CVF.

FIGURE 1 shows a quick check of DoubleSpace's compression ratios on some random individual files on my PC. Your mileage will vary depending on the content of your files. These results are meant only to be a general guide.

Note that DoubleSpace didn't achieve 2:1 compression with most file types, and some files didn't compress at all. For a better idea of how much space a DoubleSpace CVF really has to offer, change the default estimated compression ratio using the DBLSPACE /RATIO command. For example, if you know you'll be copying mostly files that usually compress at 1.5:1 to a CVF in your A: drive, enter the command DBL-SPACE /RA=1.5 A: DoubleSpace will unmount, reexamine, then remount the CVF drive. Afterwards, the CHKDSK and DIR commands will provide more accurate estimates of free disk space.

The problem of arbitrary free disk space estimates isn't limited to floppies. As you begin to fill up a hard-diskbased CVF, DoubleSpace's available space estimate can get out of whack because the program doesn't automatically recalculate free space based on the files it has compressed after you first installed the CVF. You can recalibrate to a more accurate estimate by occasionally issuing the command DBLSPACE /RA d: (where d is the compressed drive's letter). Anyway, your real problem is transferring large files via floppy disks, and one of the best solutions is PKZip 2.04G, the latest version of PKWare's archiving program (see "Gigantic Graphics" in last month's Help Line).

By Scott Spanbauer

Scott Spanbauer is a contributing editor for PC World. Help Line welcomes your questions. See page 10 for contact information.

DoubleSpace Compression Ratios

File type	Original size	Compressed size	Compression ratio
EXE (program file)	1.28MB	874K	1.5:1
ZIP (created with PKZIP 1.1)	689K	689K	1:1
DOC (Word for Windows 2.0)	24.9K	14.6K	1.7:1
XLS (Excel 4.0a)	26.4K	11.5K	2.3:1
TXT (ASCII)	26.5K	14.7K	1.8:1
DB (Paradox)	174K	62.1K	2.8:1
PM4 (PageMaker)	907K	698K	1.3:1
PCX (16-color bit map)	94.4K	67.4K	1.4:1
TIF (256-color bit map)	209K	209K	1:1
WAV (Waveform audio)	15.5K	11.9K	1.3:1
Average compression ratio of the above fi	les:		1.7:1

FIGURE 1: THE DOS 6.0 DOUBLESPACE UTILITY achieves various compression ratios for different types of files. These results were obtained using a sampling of the editor's files.



magine PC values so exhilarating they leave you breathless.

Choices that make your life easier.

Whether you're upsizing or downsizing, Digital gives you one of the industry's broadest ranges of PCs — and all the extras that you need. Here's our list: six notebooks; nine value-priced desktops, five microtower desktops, five mini-servers, three servers, and the

Alpha-based DECpc AXP 150, the world's fastest PC.
We also have a full selection of the industry's best printers, network equipment, the latest MS-DOS and

Windows applications and other options. There's even a variety of leasing and payment plans to suit your needs.



i

magine a new power in PCs: performance, price,



Give your users a thrill. Make a big splash with management.

Only Digital — the new power in PCs — can give you the performance that users crave, a price that won't leave you high and dry, and the peace of mind you get with top-quality worldwide support.

You'll always get cutting-edge performance from a Digital PC.

Would you expect any less from the developers of the world's fastest PC -- the amazing 150 MHz DECpc AXP™ 150?

And that's just the latest

in a long line of high-performance PC products that include Pentium and i486 processors, built-in local-bus acceleration, second-level caching, certification for leading PC networks, and lots of other power-user features. Plus room for growth: plenty of option slots, drive bays, ZIF OverDrive sockets, and more to keep you up to speed.

Introducing a *new* family a *new* 3-year warranty

The DECpc™LPv.
Outstanding value in a low-profile package

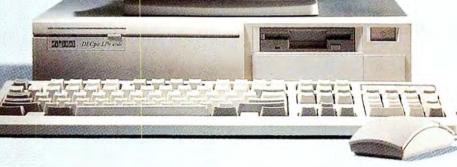
The brand new, valuepriced DECpc LPv personal computer is just what you're looking for in budget-conscious performance. It puts exciting second-generation WindowsTM acceleration into a basic, low-profile package. And like all our PCs, it's backed by Digital's outstanding new 3-year warranty.*

i486[™] processors

 Local bus GUI accelerator with 1 MB video RAM

- 170 MB hard drive
- · 4 MB RAM
- 4 drive bays
- 14" SVGA(i) monitor
- 3 ISA slots
- OverDrive socket
- MS-DOS[®] 6.0 and Windows[™] 3.1









Call 1-800-210-1403



magine a new family of PCs that gives you And unsurpassed peace of mind.

^{* 3-}year limited hardware warranty. Certain restrictions and exclusions apply. Warranty service on DECpc notebooks is return-to-factory. Monitors, batteries and peripherals covered by a 1-year limited warranty.

of value-packed PCs, and on every Digital PC.

The DECpc LPx. Value-priced performance



Please reference BJN when you call, 8:30 a.m. to 8:00 p.m. Mon-Fri ET, I your local Digital dealer or value-added reseller

Or call your local Digital dealer or value-added reseller. PUTTING IMAGINATION TO WORK

The DECpc LPx is an

awesome value.

digital



We promise to keep you on the cutting edge of PC performance.

We promise you will always get outstanding value for your money.

We promise you hassle free buying.

We promise you world-class design and manufacturing quality.

We promise you unsurpassed support, starting with our 3-year warranty.

Call 1-800-210-1403 Please reference BJN when you call.

8:30 a.m. to 8:00 p.m. Mon-Fri ET.
Or call your local Digital dealer or value-added reseller.



A new 3-year warranty smooths out the bumps.



Digital now offers a three-year warranty on all our PCs that's backed by our own factory-trained service experts.

That's how sure we are of the quality and performance of our PCs. And when you need service, we come to your

site, we don't send a third-party vendor. We have over 30,000 service employees, worldwide, whose job is to help make your life easier. And we can custom-tailor a warranty extension or support package for your site.

Quality that makes the others look all wet.

experienced computer builders, and we know just how tough the workplace can be on a PC. Which is why we build little details like metal SIMM clips and card cage reinforcing bars into our PCs. Why we ensure every Digital PC is built to ISO 9000/MRP II Class A quality standards. Test them until we're sure they can measure up to *your* tough standards. And we even give you a 30-day money-back guarantee.

PUTTING IMAGINATION TO WORK

and peace of mind.

digital

Performance, price and peace of mind from the new power in PCs.

PACKAGE INCLUDES: PROCESSOR/PRICE **SL NOTEBOOKS** Modular notebooks that let you upgrade processors, disk drives, screens and more. · 4 MB RAM · 3.5" floppy drive . 25MHz i386SL (mono) \$2,149 64 KB cache Pre-installed MS-DOS 6.0/ . 120 MB removable hard drive 25MHz i386SL Windows 3.1 2 PCMCIA slots (passive matrix color) \$2,699 BitFAX/BitCOM software . 6.5-hour NiMH battery 25MHz i486SL (mono) \$2,499 · 4 MB RAM AC adapter 120 MB removable hard drive 25MHz i486SL (active matrix color) \$3,999 Snap-on trackball 2 PCMCIA slots Lease for as low as \$75/Month LPV SYSTEMS Outstanding value in a low-profile package. 25MHz i4865X \$1,349 Local bus SVGA video · 3.5" floppy drive • 14" SVGA(i) color monitor GUI accelerator 33MHz i4865X \$1,449 4 MB RAM · Microsoft's Ready-To-Run 33MHz i486DX \$1,699 MS-DOS 6.0/Windows 3.1 • 1 MB video RAM 170 MB hard drive Mouse 50MHz i486DX2 \$1,899 · 101-key keyboard · 3 ISA slots 66MHz i486DX2 \$2,099 · 4 drive bays Lease for as low as \$47/Month. LP_x SYSTEMS Value-priced performance and expandability. VESA-VL bus GUI accelerator Pentium™ OverDrive Processor upgrade 4 MB RAM 33MHz i4865X \$1,599 1 MB video RAM · 3.5" floppy drive 33MHz i486DX \$1,849 • 14" SVGA(i) color monitor 170 MB hard drive 50MHz i486DX2 \$2,049 · Microsoft's Ready-To-Run · 6 ISA slots (2 VESA-VL slots) MS-DOS 6.0/Windows 3.1 66MHz i486DX2 \$2,249 5 drive bays Mouse · Lease for as low as \$56/Month OverDrive Processor · 101-key keyboard upgrade MTE SYSTEMS The only desktop PC you can get with both EISA and VESA-VL buses. 6 EISA slots with 1 VESA-VL Pentium OverDrive Local bus SVGA video Processor upgrade • 14" SVGA(i) color monitor GUI accelerator • 33MHz i486DX \$2,924 Video adapter 8 MB RAM 66MHz i486DX2 \$3,324 • 128 KB cache Microsoft's Ready-To-Run 1 MB video RAM MS-DOS 6.0/Windows 3.1 Lease for as low as \$102/Month 245 MB hard drive Mouse 5 drive bays 101-key keyboard · 3.5" floppy drive ST SYSTEMS Now with Pentium Power! Minitower expandability and value. 64-bit Pentium processor* User-upgradeable CPU 60MHz Pentium \$6,989 • 4 or 8* MB RAM • 3.5" floppy drive Up to 256 KB cache Microsoft's Ready-To-Run 66MHz i486DX2 \$4,049 426 MB SCSI hard drive MS-DOS 6.0/Windows 3.1 50MHz i486DX \$3,999 · 6 EISA slots 101-key keyboard · Lease for as low as \$140/Month · 5 drive bays Mouse

Alpha-based DECpc AXP – World's fastest PC – CALL!!

© DIGITAL EQUIPMENT CORPORATION, 1993. The DIGITAL Logo, DECpc and AXP are trademarks of the Digital Equipment Corporation. OverDrive, Pentium, 1486 and the Intel Inside Logo are trademark of Intel Corporation. Windows is a trademark and MS-DOS is a registered trademark of Microsoft Corporation. Digital believes that the information is this advertisement is accurate as of its publication date; such information is subject to change without notice. Digital is not responsible for any errors. Actual monitor may differ from that shown. Not all products available worldwide.

Call 1-800-210-1403
Please reference BJN when you call



SPREADSHEETS Q & A

Fractions on the Half-Shell

I use Excel to summarize data from survey questionnaires. For example, I record the number of affirmative responses to a question in column A, and the number of people who responded to the question in column B. I can calculate the number of affirmatives as a percentage of the number of respondents, but I want to display those values as raw fractions: If there are 12 affirmatives out of 50 respondents, I want to show '12/50'. I've tried all kinds of numeric formats without success. Bonnie Tuttle, Marion, Indiana

FIGURE 1 shows a modification of the worksheet you sent. Column A shows the affirmatives and column B the respondents. While Excel offers a couple of fraction formats and you can create more, all of them reduce the fraction: 12/50 is displayed as 6/25. So I created one set of formulas whose values can be used in calculations and another to display raw, unreduced fractions. Column C contains standard percentage formulas (for example, the formula in C2 is A2/B2) formatted using Format. Number • Percentage • 0.00%. If you don't want to view the percentages, you can hide column C by selecting a cell in it and Format . Column Width . Hide.

The formula in D2, =A2&"/"&B2, displays the raw fraction. Note how it mixes numeric values and text strings in a single formula. When confronted with such conflicting data types, Excel converts the numeric values in A2 and B2 to text strings. 1-2-3 and Quattro Pro require you to use the function @STRING to convert the numerics into strings. In those programs, the formula would be @STRING(A2,0)&"/"& @STRING(B2,0).

Drawing a Blank in 1-2-3

I want to set up a library of graphic images using Wysiwyg in 1-2-3 release 3.1. I use the :Graph • Add • Blank command to draw images such as electrical symbols. How can I reuse

them in a new worksheet without redrawing them? Paul Hemley,

Pennington, New Jersey

A Tricky, Paul, very tricky. But here's the solution. Remember that when you save a worksheet with Wysiwyg formatting, all the Wysiwyg information, including the blank graphs, is stored in

a file that has the same name as your worksheet file, but with FM3 extension (in releases 2.3 and 2.4, it's FMT). To build an image library, set up a series of small FM3 files using :Special • Export. Create one for each image, then import them as needed with the command :Special • Import • Graphs.

Start with a blank worksheet, use :Graph • Add • Blank to create a new graph, and specify a graph range. Then select Edit, move the cell pointer into the area you specified for your graph, and press < Enter>. Now use the drawing tools on the Add menu to create an image. Select Quit to return to the worksheet; select :Special • Export and specify a file name for the FM3 file. Clear the sheet with /Worksheet • Erase • Yes • Yes, and repeat the procedure for each image you want to reuse.

To add an image to a worksheet, select :Special • Import • Graphs, and choose the FM3 file where it's stored. To move and resize the image, use :Graph • Move and :Graph • Settings • Range. To include additional images, repeat the process.

Font Control Hell in Excel

Orve been trying to put a set of Excel charts into a manuscript I've prepared in Word, and it's driving me nuts. I used Chart•Select Chart, then Edit•Copy. I switched to Word, selected Edit•Paste, and the chart appeared in my document. But the fonts were the wrong size. Back in Excel, I made the fonts bigger, selected File•Update, and

-				cel - RAWFRAC
-	<u>File</u> <u>E</u> dit Fo	o <u>r</u> mula Forma	<u>t</u> <u>D</u> ata	Options Macr
1	3 8 8 N	ormal 👤	Σ B I	AA
	D2	=A2&"/"	&B2	
	A	В	C	D
1	Affirmatives	Respondents	Percent	Fraction
2	12	50	24.00%	6 12/50
3	20	30	66.67%	6 20/30
4	3	21	14.29%	6 3/21
5	4	64	6.25%	6 4/64

FIGURE 1: WANT TO DISPLAY A RAW FRACTION that mixes numeric values and text strings in the same formula? Here's how.

switched back to Word. The text was still too small. What's going on? Rita Perreyclear-Scott, Orangeburg, South Carolina

A Welcome to font hell. When you embed a chart, Word tries to duplicate the size of the Excel chart window. Because the margins of your Word document are generally smaller than those of the Excel chart window, Word reduces the chart automatically to the width of your margins, or 6 inches, whichever is larger. The problem is that this scaling process is not equivalent: A 6-inch-wide chart window in Excel does not produce a full-size 6-inch chart in Word.

Now for the tricks: Always use True-Type fonts to compose the charts you will send to Word. To do this, right-click

USER GROUP TIP

Quick Calcs

Not only does the <F9> key recalculate most spreadsheets, it also serves as a quick calculator on the input line. To enter the current result of a formula in a cell, type it in the input line and press <F9>. The spreadsheet substitutes the answer for the formula. <Enter> inputs the answer into the cell.

> Dan Doane National PC User's Group



en a *free* memory manager may not be a bargain—especially if it can't give you all the memory you need.

Introducing QEMM 7 The Memory Manager Worth Paying For

The newest version of the Quarterdeck Expanded Memory Manager (QEMM), version 7, once again is extremely innovative in using the critical area between 640K and 1024K. It finds space for more TSRs and drivers in this area than anyone thought possible. It optimizes this area, taking into account the many drivers that need more memory at start-up than when running; instantly calculating millions of possible memory configurations to find still more memory for your programs to use. And it treats the rest of memory as a giant pool to instantly fulfill the needs of all of your programs—whether they use extended or expanded memory. Whether your PC has 1 megabyte or 16, you can benefit from new QEMM 7.

Instant Riches

What does more memory mean in a practical sense? It means that your DOS and MS Windows programs run faster, smoother and more reliably. It means you can continue to add valuable utilities, drivers, TSRs and new capabilities to your PC. Whether it's workhorse drivers like LAN utilities and fax drivers; productivity-enhancers like disk caches and disk compressors; or fun and exciting capabilities like sound boards, CD ROM drivers, graphics tablets, etc. The better your memory is managed, the more versatility and flexibility your PC has. QEMM 7 lets you have it all without fear of 'out of memory' messages or crashes.

How to Look a Gift Horse in the Mouth



We tested DOS 6 with and without MemMaker and with QEMM 6 and our new QEMM 7 runs away from all of them. See details of test conditions listed below.

DOS 6 Giveth; DOS 6 Taketh Away

The best feature of new DOS 6 is the stable of utilities it includes. Trouble is, they all eat up memory. DoubleSpace file compression needs 43K, Vsafe anti-virus needs 7-45K, Smartdry disk cache needs

28K and even Undelete takes 10-14K as a resident program. Using Microsoft's free memory utility, MemMaker, you could easily end up with a net loss of available 'conventional' memory in DOS 6.

New QEMM 7 takes the best of the new DOS 6 features into account, finding ways to give you more free memory for your program while taking full advantage of DOS 6. One new QEMM 7 feature, DOS-Up, moves the DOS 6 kernel, its data and resources to memory above 640K (this feature also works with DOS 3-5), freeing 7-70K. Another new QEMM 7 feature, Stealth DoubleSpace, frees 40K of the memory addresses used by DoubleSpace and makes them available for other drivers and TSRs. Both features ensure that the all-important memory

below 640K is free for your programs. And QEMM 7's seemingly small feature of supporting multiple configurations gives you the flexibility and ease of setup that you expect. (MemMaker doesn't work well with this important DOS 6 feature.) That's why it makes more sense than ever to put your money on the best memory manager.

Page Frame: the Key to Your Future

There's been a lot of talk about our patent-pending Stealth technology. Jealous talk, mostly. Because nobody else can touch its performance. Our Stealth ROM feature, pioneered in QEMM 6, frees 48-115K of ROM addresses for use by TSRs and drivers. Our Stealth DoubleSpace feature, described above, frees another 40K. And as you might imagine, there's more to come.

The key to Stealth is its use of a 64K reserved area above 640K called the page frame. Besides being used by Stealth, the page frame is used by Lotus 1-2-3 r2.x for larger

spreadsheets and WordPerfect 5.x for larger documents, DESQview for multitasking, Novell Netware, IBM LAN Server and DECnet for reducing the network driver memory footprint, plus games like Wing Commander, Car and Driver, Ultima Underworld II, Wolfenstein and

BEST PC PRODUCTS

WINNER

others for fast action. You sacrifice all this when you turn off the page frame (which

There's lots more to QEMM 7:

- · Tuned for MS Windows
- · New ability to use Vidram inside MS Windows
- DPMI Host
- Pentium Support
- · Laptop suspend/resume support
- · PS/2 micro channel adapters
- Compaq support
- · Fine tuning tools for power users
- · 32-bit architecture for speed
- Enhanced compatibility in response to hardware needs of our millions of users:

Detects adapter RAM and ROM and bus-mastering hard drive

Monitors DMA access into memory

Supports Shadow RAM

other memory managers do to maximize available

Stealth that lets you set up your PC with a mouse,

CD ROM, sound board, a network such as Novell

memory-hungry utilities and still have more than

6's 527K available in the same configuration, after

630K available for your programs. (Compared to DOS

MS Windows performance, use all of DOS 6's

NetWare, reserve 8-24K of extra memory for optimal

memory above 640K). It's this use of the page frame by

using MemMaker). remaining the #1 best-selling memory Easier to use for Novices, More Power for Experts; More Memory for All

> Our seventh-generation thoroughbred QEMM has improved ease-ofuse, with Express Install and Help features. And for power users, Advanced Install and editable parameters and troubleshooting hints.

> And QEMM 7 comes with Manifest, the award-winning memory analyzer—enhanced for more flexibility with Pentium testing, laptop battery reporting, network analysis and editable configuration files.

> The new and ever more exciting capabilities coming to your PC will all compete for memory with your favorite applications, TSRs and drivers. And that makes QEMM 7 the front runner in your efforts to get get the best performance out of your PC today—and tomorrow.



Quarterdeck Office Systems, 150 Pico Boulevard, Santa Monica, CA 90405 (310) 392-9851 Fax (310) 314-4219 Quarterdeck International Ltd., B.I.M. House, Crofton Terrace, Dun Laoghaire Co. Dublin, Ireland Tel. (353) (1) 284-1444 Fax: (353) (1) 284-4380 QEMM Users: upgrades are available from dealers.

Prior versions of QEMM won just about

every competition in sight, as well as

manager 5 years straight.

You can also buy direct from Quarterdeck. Call (800) 354-3222 ext. 1D7 and ask about our special Game Pack offer with your upgrade!

How we got the chart numbers CPU—486/33 ALR Power Possness VESA machine equipped with 16 megs of RAM and running MS-DOS 6. Comparisons were done using the following memory managers: QEMM 7, QEMM 6/IZ, MS-DOS 6 MemMaker. In addition to the drivers for drivers required by each memory manager, the following drivers, DOS insources and programs were loaded for all comparisons in the CONFIGSTS file SETVER DOE, DOS-HICH, FILES—30, BUFFERS—10, STACKS—30, MYSOUNDSYS, SNDBK12SYS, SLCDSYS, DOS SHELL-statement, in the AUTOEXCEBAT file VSAFE, MSCDES, UNDELTED LOOM, NEXOUCOM, IPXOD COM, NEXTO OR ENSIETX, MCUSE COM, SMARTIDRY.COM, PRISCCAP.COM.

COMPARISON OF A CONTROL OF A

Master Class: On Time With Excel

One of the basic tools of project management is the Gantt chart, which lets you see the whole picture: the tasks involved in a project, how long it takes to complete each one, and how they fit together to form the completed project. If you use a project management program like Symantec's Time Line or Microsoft Project, Gantt charts are right in the toolbox; if not, Excel can do the job, as shown in FIGURE 1. This month we'll build this chart, and along the way I'll show off some cool Excel tricks.

In the figure, tasks are listed in column A, and their starting dates and durations (in days) are shown in columns B and C. Most of the starting dates are formulas that encode the relationships between the tasks. For example, plumbing must be completed

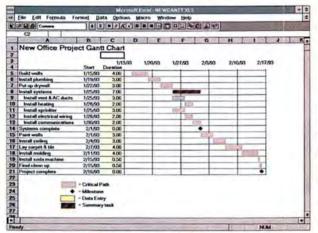


FIGURE 1: EXCEL CAN TURN OUT SOPHISTICATED GANTT CHARTS, one of the staples of project management.

before drywall installation can begin. Because delay in either task will delay the project's overall completion, they both lie on the project's critical path. Notice that 'Install systems' is a summary task that includes the five specific installations listed below it. The rectangular chart object in columns E and F is linked to the values in columns B and C. The milestones are tasks with zero duration and are marked with special symbols on the chart.

To set up the chart, fill in the labels in column A, B4:C4, and B23:B25 (precede each equal sign with an apostrophe). Enter the starting date in B5 and durations in column C. Leave cell C8 blank and for now enter .5 in C14 and C21 instead of zeros. Select Format • Patterns to set the yellow foreground color and the pattern of the data entry cells, and select Format • Number to set the durations' numeric format. In B6, enter =B5+C5, which calculates the starting date of the second, dependent task to begin at the completion of the first. Copy this formula to the other dependent tasks: B7:B8, B10, and B12:21. Because installing vents and sprinklers can begin at the same time, enter the formula =B8 into B9 and B11.

The duration of the summary task is an array formula that seeks out the latest completion date for the subtasks in rows 9:13. Put the active cell indicator on C8, type =MAX(B9:B13+C9:C13)-B8, and

press <Ctri>-<Shift>-<Enter>. That formula adds the starting date and duration of each subtask, picks the maximum of those sums, and subtracts the original starting date to yield the duration in days.

Now build the chart. Select B5:C21, and press < Ctri>C to copy the range. Select File • New • Chart • OK. In the new chart window, select Edit • Paste Special. Click the Columns radio button and make sure both the Series Names in First Row and the Categories (X Labels) in First Column boxes aren't checked. Click OK. You'll see a column chart. Select Gallery • Bar and double-click option 3.

Right-click the vertical axis, select Scale, check the Categories in Reverse Order box, leaving everything else as is, and click OK. Right-click the horizontal axis, now at the top of the graph, and select Scale. Uncheck the Minimum, Maximum, and Major Unit boxes, and enter 4/12/93, 5/17/93, and 7 for each one, respectively. Click OK. Right-click again, choose Gridlines. In the Value (Y) Axis section, check the Major Gridlines box and click OK.

Right-click a red bar and choose *Patterns*. Click the None radio button in the Border and Area sections and click *OK*. Right-click a green bar and select *Patterns*. Set the border color to red in the Color list box, and in the Foreground list box, set the color to gray. Click *OK*. Hold down <Ctrl> and click the fourth bar to select it alone. Right-click it and select *Patterns*. In the Foreground list box, select black, and choose a striped selection in the Pattern list box. Click *OK*. Repeat these steps to put blue borders around noncritical tasks 5 and 6 in rows 9 and 10.

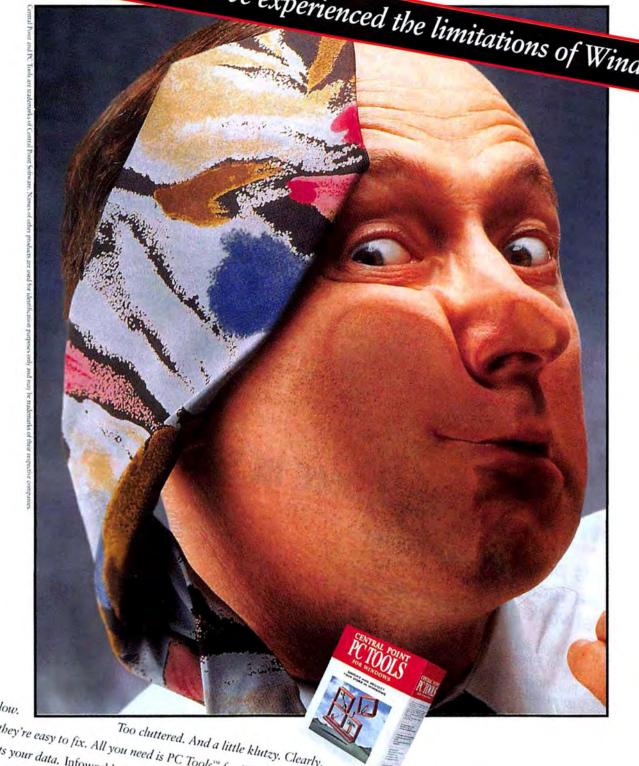
Now <Ctrl>-click task 10, the milestone, right-click it, select Attach Text • OK, type a lowercase u, and press <Enter>. Right-click the bar again and choose Font. In the Font list, choose Wingdings and click OK. Repeat the procedure for task 17. Finally, click the vertical axis and press <Delete> to remove the text.

Now let's put the graph on the worksheet. Select Chart • Select Chart, and press < Ctrl>-C. Press < Ctrl>-<F6> to return to the worksheet, select cell C2, and press < Ctrl>-V. Right-click the chart and select Patterns. Set the Border and Fill radio buttons to None and click OK. Drag the upper left selection handle until the left gridline lies between columns C and D and the horizontal axis lies between rows 4 and 5. Then drag the lower right selection handle until each bar lines up with its task.

Enter zeros in C14 and C21 for the milestone tasks. Select A5:I21 and select Format • Border. Click Bottom until a thin line appears, then click OK. Select A5:C5 and set a border at the top. Select Options • Display, uncheck the Gridlines box, and click OK.

All that's left is the legend. Select Options • Toolbar • Drawing • Show to bring up the draw tool bar. Click its filled rectangle icon; on your worksheet, just to the left of '=Critical Path', drag to create the rectangle shown. Press <Ctrl>-C, select A25, and press <Ctrl>-V. Right-click the first rectangle and select Patterns. Choose red for the border and gray for the foreground. Similarly match the second rectangle to the bar describing task 4. Click A24, type u, and press <Enter>. Select Format • Alignment and click the Right radio button. Finally, select Format • Font • Wingdings • OK, and you're done.

No doubt you've experienced the limitations of Window



Too slow.

Fortunately, they're easy to fix. All you need is PC Tools for Windows software. It makes Windows faster, simpler, more fun while it protects your data. Infoworld concluded, "with the release of PC Tools for Windows, Central Point has in a single stroke Sabbed the top spot as best Windows shell from Norton Desktop." We couldn't have said it better. And at \$99 (from participating dealers) the advantages of PC Tools for Windows are really hard to ignore. To see if you qualify for the

\$49.95 upgrade to PC Tools for Windows, just call 1-800-695-0669.

300-234-0455 ext. 105

Central Point Software

Circle 52 on reader service card

Spreadsheet Toolbox

Talk about evolutionary software! How about an Excel add-in that finds optimal solutions to complicated real-life problems? Like this classic example: You're a salesperson whose route takes you to 20 cities. You want to make the circuit in the fewest possible miles. In what order should you visit your clients? This is a problem that is impractical to solve by checking all the alternatives (there are 2,432,902,008,176,640,000). Or say you want to select records from a personnel database to find the optimal staff for a new project.

Enter Evolver 2.0. A promising spawn of research in artificial life algorithms, Evolver works by randomly creating a population of "organisms" (each of which represents a possible solution). Then it discards the worst half of the solutions and lets the rest "mate," or randomly exchange subsets of their variables to establish a new population. Offspring compete, reproduce, and so on. Evolver seldom arrives at the same solution to the same problem twice. But it sure beats scratching marks on a bone with a flint knife.

Evolver 2.0 \$349; Axcelis; 206/632-0885, 206/632-3681 (fax)

Reader service no. 601

on a text item, then choose *Font*, and select a font with the double-T symbol (indicating TrueType) beside it.

Next, since the size of the chart window in Excel determines the size of the chart object in Word, you'll want to work in a chart window that's just big enough to produce the right size chart, with no reduction. That way the fonts you select in Excel will be the same size as the fonts in Word.

Since there's no metric to tell you how big is big enough, you can create a ruler chart to help you judge: In Excel, select File • New • Chart and click OK. Once the chart appears,

click on the formula bar and type o123456789o123456789o123... and so on, until you've filled up one line in the chart window (the first character you type is a lowercase o, not a zero). Press <Enter>. Right-click on the text box you just created and select Font. In the Font section choose Courier New; in the Size section choose 12 and then click OK. If necessary, stretch the text box and the chart window so the ruler doesn't wrap to two lines. Use File Save to save your ruler chart.

To scale a new chart, put its window on top of your ruler and stretch the chart to the size you want. Typically, an Excel chart embedded into a Word document yields a chart object 80 percent the original size.

Finally, when you paste your chart into Word, use Edit Paste Special Excel Chart Object to ensure that Word stores the chart data in the most Excel-compatible format.

By Richard Scoville

Richard Scoville is a contributing editor for PC World. Spreadsheets welcomes your questions. See page 10 for contact information.

GREAT THINGS COME IN SMALL PACKAGES

This powerful print server can tackle your biggest network printing problems

 Connects any parallel printer directly to your Ethernet LAN

Fully Novell Netware 286 and 386 compatible

Can attach to 8 file servers simultaneously

Fast and easy to install

 Combines high-speed printing and exceptional printer control

 Supports encrypted passwords, forms, notify, cancel, and others

 Full one-year warranty and unlimited free technical support

Made in the U.S.A.



Power jack

Make the Rose Connection

10850 Wilcrest Drive • Houston, Texas 77099 • Phone (713)933-7673 • Fax (713)933-0044



1-800-333-9343

ANNOUNCING THE FIVE BEST PLACES TO WORK IN AMERICA.

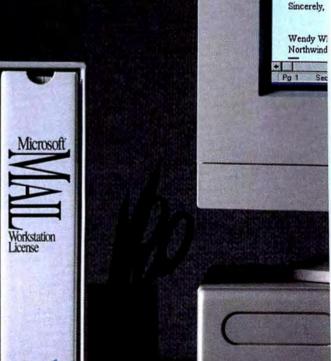
THE MICROSOFT OFFICE PROFESSIONAL.

Microsoft,

Microsoft

Microsoft

Microsoft



Normal

Dear Jone

This letter last year, thank you your need.

Below for Traders: If you hav 555-9342.







The Microsoft Office Professional includes Microsoft Excel, Word, Microsoft Access, PowerPoint and a Mail workstation license.

All the best places to work are now in one place right in front of your eyes. On your computer.

Introducing The Microsoft*
Office Professional for Windows.
It's the essential business software,
everything from word processing
to data management. All designed
to work together.

Does software that works together really make a difference?

For openers, you can easily share text, data and graphics between applications.

Suppose you want to insert a Microsoft Excel pie chart into a report written in Word. Then turn it into a riveting slide show with the PowerPoint® presentation graphics program. No problem.

Want to send out ten thousand customized letters? Just pull the data from your Microsoft Access* database files, print-merge it into Word and relax. Then with Mail; you can speed a memo to desktops all over the office.

Whatever the task, you'll be able to focus on your work. Not on your software.

To learn more, why not visit your reseller now. You could start working in a better place right away.



^{*}The Mail workstation license in The Microsoft Office Professional does not include Mail software and requires a Microsoft Mail server (acquired separately) which contains all Mail software. © 1993 Microsoft Corporation. All rights reserved. For more information in the 50 United States, call (800) 426-9400; customers in Canada, call (800) 563-9048; ourside the U.S. and Canada, call (206) 936-8661. Microsoft Microsoft Access and PowerPoint are registered trademarks and Windows and the Windows logo are trademarks of Microsoft Corp.

WORD PROCESSING Q & A

Dumping Graphics in WordPerfect for Windows

Sometimes after inserting a graphic file into a WordPerfect for Windows document by selecting *Graphics*•

Retrieve, I change my mind and want to delete the picture from the document. What's the fastest way to do this?

Jean Bomser, Oceanside, New York

A Just click once on the graphic image you want to delete and press **Delete**. The image will disappear and the text will realign itself.

Button, Button, Who's Got the WordPerfect Button?

This may sound strange, but I've lost my button bar in WordPerfect 5.1 for Windows. When I pull down the View menu, the button bar menu items are grayed out. I use the buttons regularly to help speed up my formatting, so this is a big loss.

Christie Rindler, Northstar, Ohio

A You're right, the button bar in Word-Perfect for Windows is extremely useful, and you definitely need to get it back. There are only two reasons why the actual menu items could be grayed out, and both involve missing files required for WordPerfect for Windows to display the button bar. Somehow you've accidentally deleted these files, which are normally in your WIN-DOWS\SYSTEM directory.

One is a DLL file used with your display, and the other is a special Windows FON font file. Both of them are installed by WPWin. To get the files and your button bar back, you'll need to reinstall the program completely from the original disks. And, since you're doing that, consider upgrading to version 5.2, which offers a number of worthwhile improvements.

Windows programs such as WordPerfect often scatter their files across several directories. Before deleting any file in your Windows or other directories, be sure you know that file won't be needed by some application.

Getting the Picture in Word for Windows

Nord for Windows 2.0c. The Word-Art application will let me create a buttonlike text object, with text in a circular format. I want to put an image in the center of the circle rather than the repeated text that's there by default. No matter what I do, though, I can't seem to get rid of the horizontal line of text or import a graphic into the WordArt object. Do you have any suggestions?

Helen L. Bennett, California City, California

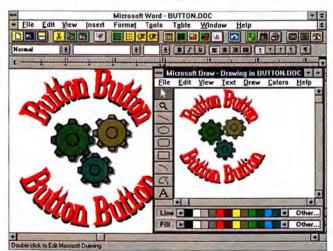
This problem was a A tough nut to crack, but I've come up with a solution. Start with a document open in WinWord, and then select Insert Object. In the resulting dialog box, choose MS WordArt from the Object Type list, and then click OK. (If MS WordArt doesn't appear in your list, install that option using your Word 2.0c disks. If you need to upgrade

to 2.0c, call Microsoft at 800/426-9400.) In the WordArt editor, type the text for your button in the text box at the top left of the screen. Choose a font name from the Font list, leave the Size option set to Best Fit, then choose *Button* from the Style list box. You'll see a preview of your text arched around the top and bottom and repeated horizontally through the center of the circle. Make any other changes you want using the WordArt editor, then click *OK*. The WordArt object will appear in your document. Click the image to select it.

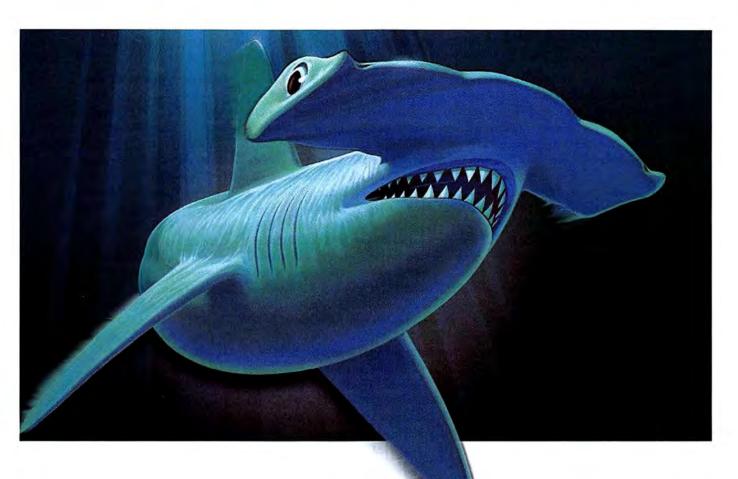
Without pressing any other keys or clicking anywhere else on screen, select Edit • Cut or press < Ctrl>•X to cut the WordArt image to the clipboard. Select Insert • Object again, choose Microsoft Drawing in the Object dialog box, and click OK. When the Microsoft Draw window appears on your screen, select Edit • Paste or press < Ctrl>•V to paste your WordArt object into the drawing module. You'll notice that each character becomes a separate object in the drawing module, surrounded by its own sizing handles.

Now click a blank area in the Microsoft Draw window to deselect all the WordArt objects. To remove the central, horizontal text, hold down the <\$hift>key while you click each character in that text. After you have selected all of the characters, press <Delete> to do away with them.

With the horizontal text cleared, you're ready to import your graphic. You'll have to stick with a WMF file here, such as those that appear in Win-Word's \CLIPART subdirectory. To import the graphic, select File • Import Picture, double-click on \CLIPART, choose a file from the resulting File box, and click OK. The image will appear in the Microsoft Draw editing window, surrounded by sizing handles. Size the picture with these handles, and then drag it into position in the center of your circle of text. At this stage, you can also use any other Microsoft Draw tool to modify your artwork.



TO INSERT IMAGES INTO OBJECTS CREATED IN WORD FOR WINDOWS' WORDART APPLICATION, you'll need a little sleight of hand and the help of Microsoft Draw's OLE tools.



IN THE WILD, IT'S A KILLER. IN BUSINESS, IT'S A LIFESAVER.

Dominant. Powerful. Precise. That's the formidable character of the QMS* 860 Hammerhead Printer. Its singular purpose is to provide you with sharp, clear printouts. Fast, compact and capable of remarkably accurate printing without hesitation, its mere presence in the market has caused excitement everywhere.

This desktop printer is a creature like no other — able to produce high resolution 600x600 dpi output for camera-ready originals or accurate prepress proofs. Up to 11x17/A3 output for more flexible page layout and design.

With QMS Crown[™] technology, the QMS 860 Hammerhead[™] operates in mixed environments of PC, Macintosh* and workstation systems with standard and optional interfaces, supporting protocols that include



EtherTalk™ and NetWare® for ultimate compatibility. It can also accommodate multiple users through its compatibility with a variety of languages including PostScript™ Level 2, HP PCL® and HP-GL® Yet, with all its impressive power, the QMS 860 Hammerhead is surprisingly affordable.

Others see it as a killer. You'll see it as a lifesaver. The QMS 860 Hammerhead. The perfect printing machine.



HAMMERHEAD THE PERFECT PRINTING MACHINE

Get your business "Lifesaver." Call 800 972-6695 or 205 633-4300 for your nearest QMS dealer.

QMS, the QMS logo, and Hammerhead are trademarks or registered trademarks of QMS, Inc. PostScript is a trademark of Adobe Systems Incorporated which may be registered in certain jurisdictions. All other product and company names are trademarks or registered trademarks of their respective companies.

*Developer tested only. Novell makes no warranties with respect to this product.

When you're satisfied, select File•
Update to insert the button into your document, then select File•Exit and Return to Document. Sadly, there's no way to save your newly created button as a separate file, but if you save the document, you can cut and paste the image from one document to another.

Once the completed button is in your document, you can use normal Win-Word tools to resize it or move it into a new position. If you resize the image, both the text and picture will automatically adjust to fit. If you want to move the button image, first click on it, then select *Insert** Frame* to enclose it in a frame and click *Yes*. This will allow you to drag the button anywhere on the page. Since your finished button is an OLE object, you can edit it later in Microsoft Draw by double-clicking on the image itself.

Saving Text Blocks in Ami Pro 3.0

I often work with long documents in Ami Pro 3.0. Sometimes I need to save a single block of text to a new file for use elsewhere. To do this, I highlight the text with the mouse, copy it to the Clipboard, open a blank document, and then use File•Save As to save the block to a file. Is there a faster way to accomplish this?

Allan Bigsby, New Bedford, Massachusetts

A Saving a block of text to a file is a useful operation, and some programs such as WordPerfect offer a built-in command to do it. Ami Pro, however, left that function out. But all is not lost. Ami Pro includes the handy SAV-SHADE.SMM for saving a block of text to a file.

To use the macro, first highlight your text, and then select Tools • Macros • Playback, choose SAVSHADE.SMM from the Macros list, and click OK. (If SAVSHADE.SMM doesn't appear on your list, install the Sample macros option from the Ami Pro disks.) Ami Pro will open a new document, paste in your text, and then display the Save As dialog box. Type in a file name for your new file in the File name box, and then click OK. You will return to your

original document with the block of text still highlighted.

If you use this macro often, and it sounds like you will, you'll save time by assigning it to a keyboard shortcut. To do this, select *Tools • Macros • Edit*. Choose *SAVSHADE.SMM* in the Macros list, and then click inside the Playback shortcut keys box and press your desired keystroke combination. I suggest <**Shift>**-**Ctrl>-S** for easy access. This keystroke combination doesn't conflict with any other Ami Pro command. After assigning the keystroke, select *Save*, and then choose *Close* to make the shortcut permanent.

Borderless Art in WordPerfect for DOS

I frequently import graphics files into my WordPerfect 5.1 for DOS documents. When I do this for a new document, I have to reset the graphics options to remove the border lines that appear by default around the images. I'd like to eliminate borders around graphics in my documents. Do you know of a way to do this?

Alicia Wilson,

Greensboro, North Carolina

There's a quick, easy way to get rid of those pesky lines once and for all, and it'll take only a minute to do. Start by firing up WordPerfect. Then press <shift><F1>IC to bring up the Initial Codes screen. The screen will split, showing your current initial code settings on the bottom half of the screen.

Now press -<F9>F0">F0 to call up the Options: Figure menu screen. Press B to set border styles for figure boxes that will hold your graphics. Press N four times to set all four borders to None. Finish by pressing <a href="Entre-<F7>-<F7> to save your changes and get back to the editing screen.">Entre-<E7>-<F7> to to the editing screen.

Continue working on the document or, if you have no further work to do, exit WordPerfect. From now on, all figure boxes will appear without borders. If you want to set new border styles for other types of WordPerfect boxes, such as text, user, or equation, repeat the process described above for each type of box, substituting the desired box type after the <Alt>--<F9> step.

Unformatting Word for DOS Files

O I'm still working with Microsoft Word for DOS 5.0. Because I have to share documents with others who use Windows word processors, including WordPerfect for Windows and Ami Pro, I sometimes get complaints about my files. I know the Windows word processors can import Word 5.0 files, but I want to avoid font and formatting conflicts and save my colleagues the trouble of making changes. Is there a way to save files in Word 5.0 to minimize the conversion effort?

Andrew Blake, Philadelphia

A If all you need is the unformatted text, there's nothing to it. Just save your file as a pure ASCII file in Word 5.0, with carriage returns only at the ends of paragraphs. To save the current document in this format, press <Esc>TS.

Type a distinctive file name for your ASCII file (TXT is the best extension, since most other programs will immediately recognize the file as ASCII), then press <Tab> to highlight the Text-only option in the format field. Press <Enter> and you're done.

When you forward files saved this way to your co-workers, they'll be able to import them seamlessly into whatever word processor they're using. Their programs will automatically reformat the text in their normal formats and you won't get any complaints.

By George Campbell

George Campbell is a contributing editor for PC World. Word Processing welcomes your questions. See page 10 for contact information.

POWERTIP no. 294

Uppercase in File Manager

You can set Windows' File Manager to display all file names in uppercase by adding the line lowercase=0 to its initialization file, WIN-FILE.INI, which you'll find in the WINDOWS directory.

> Shane Rau Assistant Technical Editor

Introducing Harvard Graphics 2.0 for Windows.

The first presentation software that's about more than moving text and changing charts_



It's about moving people

The Harvard Graphics

vertical bar on the right) puts impact-increasing,

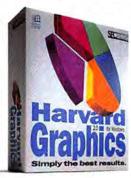
action-inducing presenta-

of your mouse. There's

also a Five Minute Coach

available to speed you

ing better presentations.



Harvard Graphics is about to change the world of presentations. Again. New Harvard Graphics 2.0 for Windows" is the first presentation software focused on what comes after the meeting, not just what comes before.

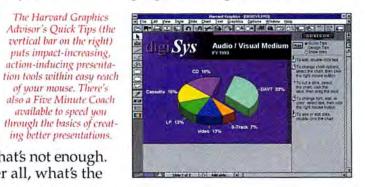
Of course Harvard

Graphics 2.0 for Windows is easy to use. In fact, it's easier to learn, easier to use and has more powerful features than any other presentation product you care to compare it to.

But ease of use, more features—that's not enough. Results are what really count. After all, what's the

point of creating a presentation in 20 minutes if you lose your audience after 20 seconds?

With Harvard Graphics 2.0 for Windows, you'll get the results you want from every meeting, discussion, proposal and presentation.





and changing minds.

ADVISOR

Hide O Quick Tips

O Design Tips

compare the parts of a

whole (percentages)

· Cut a slice away from

labels for each slice

· Show six or fewer sices

into one and show as a

column chart)

the pie to emphasize à

Use a pie chart to

To help you get the best results, we've put a presentation expert inside the program. It's

called The Harvard Graphics Advisor. The Advisor is an on-screen advice system to help make your bullet points more targeted, your pie

The Advisor's Design Tips make it easy to give your presentations that fit-and-finish look, even if you aren't a graphic designer.

charts more tasteful and your bar graphs more impactful. For

more help, you can even call our Advisor hotline, where graphics experts are standing by.

In no time, you'll have output that works harder for you, without having

for you, without having to work harder to get it.

We'll also help you sell your ideas in the meeting, with speaker notes, onscreen highlighting, and stunning special effects. We can even help you conduct meetings over your network, with our exclusive Conferencing feature.

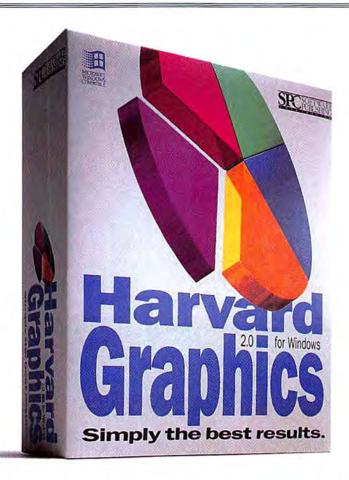
In short, Harvard Graphics 2.0 for

In short, Harvard Graphics 2.0 for Windows represents a new standard in presentation software. One that goes beyond ease of use to something far more important: results.

Start getting results now. See your local reseller. Or call SPC now at **1-800-336-8360**, *Oper.* **962** to order or to ask for a free demonstration disk. Special upgrade price, only \$89.

Harvard Graphics. Simply the best results."





Upgrade your ability to get results for \$89.

With Harvard Graphics 2.0 for Windows, every hour you spend creating presentations will be shorter. And every idea you present will be more compelling.

Simply put, Harvard Graphics 2.0 for Windows represents a new standard in presentations. With more than 100 new enhancements, it's easier to learn, easier to use and has more results-oriented features than any other presentation software you are currently using...even Harvard Graphics.

Here's a sample of what's new in Harvard Graphics 2.0 for Windows.

Harvard Graphics. Simply the best results."

New ease-of-use features.

Advisor Quick Tips-helps you create and enhance your presentations quickly.

Quick Looks-shows options to you graphically, before you implement them.

Customizable Icon Bar-makes your most used features easier to get to.

New results-oriented features.

Advisor Design Tips-expert assistance to help you create high-impact charts.

Harvard F/X*-lets you add attention-getting text and drawing effects to enhance your message.

Conferencing-lets you convene meetings over existing networks for as many as 64 participants.



See your local dealer or call 1-800-336-8360, Oper.962.

'\$89 sayrade offer express 1251093, \$125 themsplor (all prairs in U.S. dellars). Shipping and healting extra. Upgrade eligibility requires you to prove consensing of one of the following. Harmord Graphics! (may consens). Harmord Decay! Letter Freedman, Males Freedman, Males Freedman, All SPC standard larner requirements and restriction upply. Visal when probleted.

Discovering to 1993. Software Publishing Corporation. All regists reserved. Harmord Graphics and the Sectioner Publishing Corporation to get an engiated trademarks and Harmord Graphics All regists reserved. Harmord Harmord Graphics and the Sectioner Publishing Corporation and the registered trademarks of Sectioner Publishing Corporation. Harmord Graphics of the trademarks of sections of the registered trademarks and the rights of the trademarks or would be rights of the trademarks or would be larger to be trademarks or the trademarks of the trademarks of



Macintosh, MS DOS or Windows

Wireless Messaging From Your Desktop!

Don't be tied to your desk in the office, or tied to the phone when you're away. With Notify! software your personal computer can deliver time-sensitive, important information right into your pocket—on the road, in a meeting or at the coffee machine. Working with inexpensive full-text alphanumeric message receivers available from local or nationwide paging service companies, Notify! turns your PC into a complete wireless message center!

Notify! serves as a stand-alone messaging application, allowing you to send instant messages to anyone with a pocket pager, or allowing your office to reach you on your own unit. Notify! also adds remote messaging power to over 150 other applications, including: calendars and schedulers, personal information managers, electronic mail, communications programs, computer network management, spreadsheets, process control and CAD/CAM, project management systems and voicemail. With compatible communications programs, gain immediate access to: stock quotes, sports scores, weather



notify!

- Set up an unlimited number of paging subscribers for messages
- Create an unlimited number of user-defined broadcast groups
- Send messages to an unlimited number of different systems
- Save standard texts for commonly used messages
- Store and recall messages for multiple use and/or archiving
- · Log all message activity
- Add wireless messaging to other applications

Order today! 800-238-4738

Copyright © 1992 by Ex Machina, Inc. New York, NY.
Macintosh is a registered trademark of Apple Computer, Inc. DOS and Windows are registered trademarks of
Microsoft Corporation. Natify! is a trademark of Ex Machina, Inc.

Circle 99 on reader service card

100 COOL CLIPS

...FREE



 Famous military jet and prop driven aircraft



 Business backgrounds for power presentations



 A total of 100 images and audio clips

Only \$24.95 for 12 issues.

Plus you'll receive our exclusive 80 MB of clip art FREE just for trying the Multimedia Edition

Get a FREE CD-ROM with 80 MB of clip art when you subscribe to PC WORLD Multimedia Edition

The "Best of MediaClips" CD-ROM sampler disc

This "Best of MediaClips" features the best images and sounds from **Aris Entertainment**'s royalty free media clips. These stunning images and audio samples of clip art will make creating powerful presentations a breeze.

Each issue of Multimedia World offers:

- · Fast Breaking Multimedia News
- Reviews and Buyers' Guides for the latest Multimedia products and CD-ROM titles
- Articles on Edutainment, Entertainment, Creative Tools, Multimedia Presentations and much more.

If you're a current subscriber to PC WORLD and would like to extend your subscription to include the PC WORLD Multimedia Edition at 12 issues for \$24.95 call our 800 number now and you'll start receiving the Multimedia Edition immediately for the remainder of your current subscription. Call now!

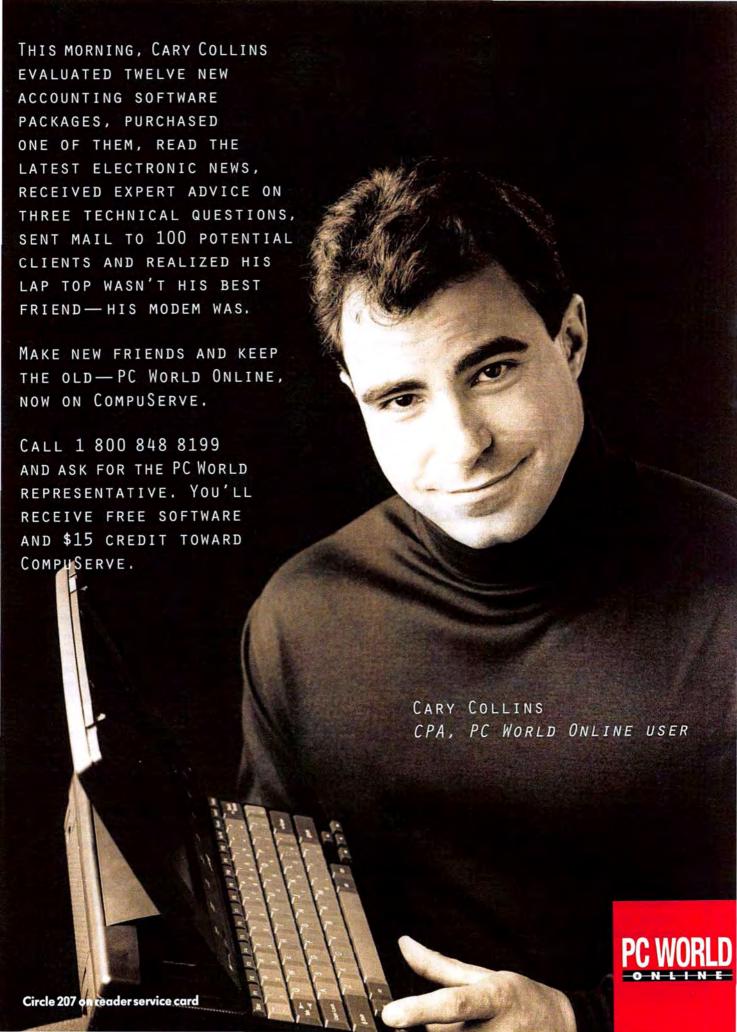


Order now 1-800-825-7595

ext. 501

39AG

Get all 100 pieces of clip art for FREE when you subscribe to the PC World Multimedia Edition featuring the special bi-monthly section Multimedia World.



Here's How

WINDOWS Q & A

Bartering for Virtual Memory

The computer I use at work had only a small (3MB) permanent swap file, so I deleted a lot of junk and defragmented the drive so I could create a bigger one. Although I now have 14MB of disk space free, Windows still recommends a 3MB swap file. Why does it suggest such a puny amount? Roy Hamilton, Rigby, Idaho

A Windows considers many factors when calculating the recommended swap file size, including, apparently, the current phase of the moon and the latest Dow Jones average. Well, maybe it just seems that way.

In truth, Windows bases its recom-

mended value on a number of rules, but there are a couple of basic ones to keep in mind. Rule 1: The swap file can't be more than 4 times the size of available RAM. The more available RAM, the more linear address space Windows has, and the bigger the swap file can be.

Notice I said "available" RAM. That doesn't mean installed memory, but RAM that's free and clear after Windows and some related files are loaded. On a system with 4MB of RAM, you might have 3MB left over, and Windows would probably recommend a 12MB swap file.

Rule 2: Windows won't recommend a swap file that consumes more than 50

> percent of free contiguous disk space.

> So why did Windows still recommend a 3MB swap file? I suspect it hung on to that value because you didn't delete the old swap file, exit Windows, then defrag the disk and reload Windows. If you'd rather not go through this hassle, simply specify a bigger swap file. (Just remember the size limits imposed by Rule 1don't allocate disk space that Windows can't use.)

Double-click the 386 Enhanced icon in Control Panel, and then select Virtual Memory. Change. Type in any number you like, up to the value shown on the Maximum Size line—keeping Rule 1 in mind. Make sure Type is set to Permanent and click OK. A message box warns you that Windows won't use more than the virtual

USER GROUP TIP

Unzipping Extensions

If you need to unzip a file in Windows, there's an easier way than shelling to DOS and running PKUnzip from the command line, Back up your WIN.INI file and open it in your favorite text editor or Windows Sysedit. In the [Extensions] section, add the line ZIP=C:\ UTIL\PKUNZIP.EXE ^.ZIP (where **\UTIL** indicates the directory where you keep PKUNZIP.EXE). Save the file and restart Windows. Now you'll be able to double-click any ZIP file in File or Program Manager, and the file will unzip itself automatically.

> Chris Gregg National PC User's Group

memory specified by the Recommended Size. Call its bluff by clicking *OK*. Then click *Restart Windows*.

When Windows reloads, return to the Virtual Memory dialog box and you will see that the recommended swap file size has greatly increased. You can confirm that Windows is using the swap file by choosing <code>Help • About</code> in Program Manager, File Manager, or any Windows accessory. The free memory number reflects both RAM and the swap file. The moral of this story: Don't believe every dialog box you read.

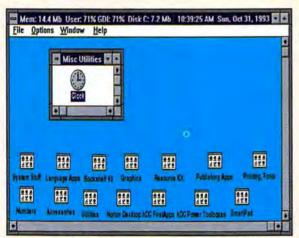
Customizing DOS Windows Globally

Windows 3.1 lets me customize the font size and the window position and size for every DOS program I run in a window. But I have a lot of programs and it's a pain to change them all. Is there some quick way I can change font and window settings without opening each program?

Darren Bixby,

Vancouver, British Columbia, Canada

Windows Toolbox

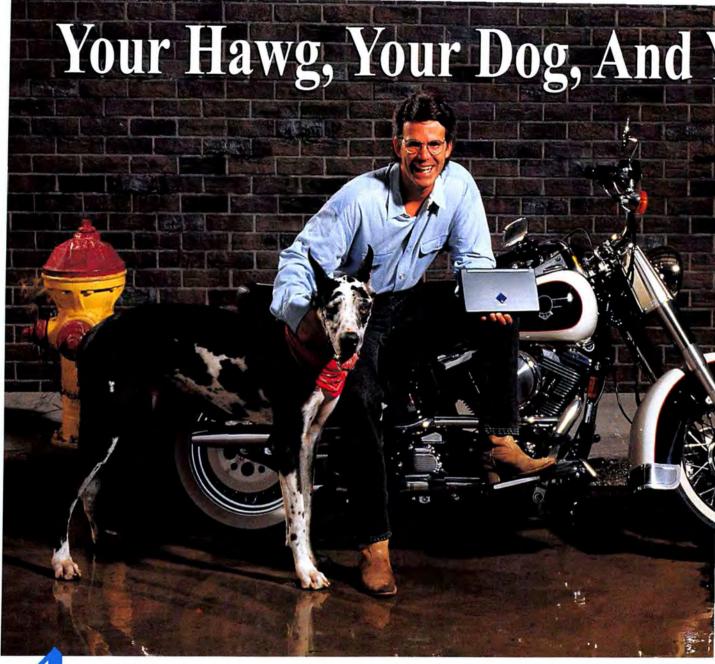


In the world of Windows utilities, there are clocks aplenty. But for my money, none match the unobtrusive functionality of Bar-Clock. BarClock places the time, date, free memory, system resources, and free disk space in the title bar of your active application. You can display selected items and position them to the right or left of the title. Fiddle with BARCLOCK.INI, and it can even play WAV sounds whenever the hour, half hour, or quarter hour strikes. This handy program costs a mere \$5, with volume discounts available. It's available on PC World Online's Featured in October folder (BARCLOCK.ZIP), on other online services, or from Patrick Breen, 3920 Mystic Valley Pkwy. #1119, Medford, MA 02155; 617/396-2673; Internet, breen@world.std.com; CompuServe, 70312,743.

Reader service no. 600



In Life,
Only A Few Things
Inspire Passionate Loyalty.



"You'll have to pry my cold, dead fingers off to get it away from me." That's what an editor told us once about the Gateway 2000™ HandBook we sent him for evaluation.

A journalist covering the conflict in Somalia called to tell us his HandBook was so popular among his colleagues that he could sell dozens of them for us.

Another user wrote, "The HandBook has changed my life in a way that only a few other products ever have. I take it everywhere with me — something I never did with other notebooks."

This is a tiny sampling of the response to the original HandBook. Clearly, the HandBook — the pioneer product in an entirely new category dubbed "subnotebook" computers — inspired the kind of loyalty usually reserved for Harley-Davidson® motorcycles and man's best friend.

Introducing The HandBook 486

Now we are proud to introduce the next generation of the HandBook — the HandBook 486. Since we began marketing the original HandBook a little over a year ago, we've been asking customers to finish this statement: "I'd like my HandBook better if _____." The HandBook 486 includes most everything anybody asked for while retaining all the things people love.

The HandBook 486 still weighs under three pounds and is smaller than the day planners many people carry. The new HandBook still has a great keyboard, excellent battery life, a backlit screen, and that wonderful HandBook suspend/resume feature. But the new HandBook has some important features the original didn't have.

our HandBook®486! Real Intel® 486 Power

People using the original HandBook asked for more power. They asked for a HandBook that would run Windows.™ We gave them both in the HandBook 486. It's the smallest Windows PC in the world — and when using a 486DX2 processor, the HandBook 486 is by far the most powerful PC of its size. New HandBook models include SL Enhanced Intel486® processors and come with 4MB RAM, expandable to 20MB, and large hard drives.

Backlit VGA, Built-In Pointer, PCMCIA

Users asked for VGA. The new HandBook's screen is a blackand-white VGA display, backlit for use in any lighting situation. No need to carry a mouse with your HandBook 486. The built-in pointing device is convenient and easy-to-use. The HandBook 486 also includes one PCMCIA Type II slot, and the card fits entirely within the footprint of the HandBook.

The Bottom Line

HandBook 486 models start at only \$1,495, an extraordinary value even by

Gateway's standards - and we wrote the book on value! We have a reputation for offering the best prices on highquality products with exceptional service from friendly folks in the Midwest. Give us a call. Once you get your hands on a HandBook, you'll wonder how you ever lived without one!



Introducing The HandBook*486!



The HandBook 486 has a handy, integrated pointing device.

FEATURES

Size

SL Enhanced Intel

486 Processor

Backlit VGA Display

PCMCIA Type II Slot

The difference between a 3-pound portable and a 4-pound portable doesn't sound like very much until you lug one around for hours. Then every ounce counts! HandBook users swear by the size of this product. It's big enough to be fully functional, but small enough to take anywhere effortlessly.

Your HandBook 486 includes a genuine 32-bit, 3.3v SL Enhanced Intel 486 processor - not some chip that's almost a 486. Those who crunch numbers will love the high-performance numeric coprocessor in the DX2.

The HandBook's VGA display is easy on your eyes. The screen is backlit for use in all lighting situations so you won't ever be left in the dark.

A PCMCIA slot is a great way to add a modem, network card or any of dozens of available PCMCIA-compatible peripherals.



Even though the HandBook is very small, it has an excellent, touch-type keyboard. You'll also appreciate the sturdy, heavyduty plastics used in the case.

Options: PCMCIA fax/modem cards, PCMCIA VGA card,

PCMCIA network cards, external floppy drive, 4MB or 16MB

RAM upgrades, alkaline battery pack, carrying case and extra

HANDBOOK 486SX-25

- Weight: 2.9 Lbs.
- Dimensions: 9.75" x 5.9" x 1.6"
- 25MHz SL Enhanced Intel 486SX Processor
- 4MB RAM (expandable to 20MB)
- 80MB IDE Hard Drive
- 7.9" Backlit VGA Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- Integrated Pointing Device
- 78-Key Keyboard
- Parallel, Serial & PS/2 Ports
- MS-DOS®6, Windows™ 3.1. Interlink and Serial Download Cable

\$1495

HANDBOOK 486DX2-40

- Weight: 2.9 Lbs.
- Dimensions: 9.75" x 5.9" x 1.6"
- 40MHz SL Enhanced Intel 486DX2 Processor
- 4MB RAM (expandable to 20MB)
- 130MB IDE Hard Drive
- 7.9" Backlit VGA Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- Integrated Pointing Device
- 78-Key Keyboard
- Parallel, Serial & PS/2 Ports
- MS-DOS 6. Windows 3.1. Interlink and Serial Download Cable

\$1995

- Alkaline Battery Pack With PCMCIA 96/24 Fax/Modem

\$379

TRAVELER'S PACK

- Carrying Case
- Extra NiMH Battery

With PCMCIA TelePath™ Fax/Modem

PRESENTER'S PACK

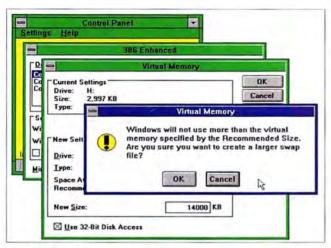
- PCMCIA VGA Adapter
- Asymetrix® Compel
- Carrying Case Call For Details



NiMH batteries. Call for details.



610 Gateway Drive • P.O.Box 2000 • North Sioux City, SD 57049-2000 • Phone 605-232-2000 • TDD 800-846-1778 • Fax 605-232-2023 • FaxBack 605-232-2561 Sales Hours: 7am-10pm Weekdays, 9am-4pm Saturdays (Central Time)



YOU CAN MAKE YOUR SWAP FILE LARGER than recommended, but you'll have to call Windows' bluff and ignore its warnings.

A There is indeed. Instead of running each DOS program in a window and digging through its Font Selection dialog box, simply edit the DOSAPP.INI file found in the Windows directory. To open this file in Notepad, select File • Run in either Program Manager or File Manager, type DOSAPP.INI, and click OK.

In the [DOS Applications] section, you'll see DOS programs or their PIFs listed, followed by an =1 and several numbers. To change the font size, change the two numbers immediately following the =1. These numbers represent the font's width and height in pixels, and you must replace them with one of the pairs listed in the Font Selection dialog box: 4 by 6, 5 by 12, 6 by 8, 7 by 12, 8 by 8, 8 by 12, 10 by 18, 12 by 16, 16 by 8, or 16 by 12. For example, if the Procomm line begins PROCOMM.PIF= 1 8 12 and you want to switch to the 10 by 18 font, change the line to begin with PRO-COMM.PIF=1 10 18. Type with a steady handalthough inserting an extra space won't ball things up, entering a size that's not supported will scramble a DOS window like an eggbeater.

If you want all your DOS programs to use the same font, window size, and window position, simply modify one program and then copy the values to all the others listed in DOSAPP.INI. First, close DOSAPP.INI, then launch any DOS program. Press <alt>-<space> to run it in a window and open its control menu, select Fonts, pick the desired font size, and click OK. Place the window where you want it, size it, and then exit the DOS program.

Now open DOS-APP.INI and locate the line for the DOS program you just ran. Select all the numbers to the right of =1 and copy them by pressing <Ctrl>-<C>. For each unmodified DOS program, highlight all the numbers to the right of the =1 and press <Shift>-<Insert> to paste the new numbers over the old ones. Save DOSAPPINI and

all your windowed DOS apps will now have matching fonts, window size, and position.

If you don't want all your DOS windows stacked on top of one another, you can easily create a cascade effect. Open DOSAPP. INI, locate the second DOS program in the list, and add 20 to the last four numbers at the end of the line. For example, if the line ends in 12 10 666 344, change the numbers to 32 30 686 364. Go to the third DOS program, and add 40 to the last four numbers; for the fourth program, add 60 to the last four numbers, and so on. Save DOSAPP. INI. You'll see the changes the next time you window any of these applications.

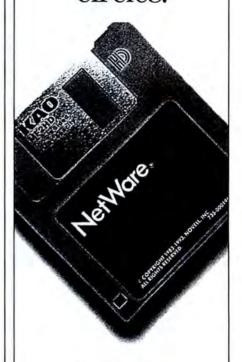
You can experiment with these numbers to get other effects, but note that window size, position, and font size have a relationship that's hard to predict. If you screw things up hopelessly, you can delete the DOSAPP.INI file; Windows will create a new one the next time you run a DOS app.

Inflexible DOS Boxes

Orve set up my DOS prompt to run in a window, but although I can change the position of the window, I can't change its size. When I position my mouse pointer above the border of the window, the mouse pointer changes into a double arrowhead, just as it should. But then it ignores my resizing instructions. What's wrong? Sandy Daley, Palo Alto, California

Nothing, really, When you launch DOS, it comes up maximized—that is, it's as big as it can get for the font it's using (see previous tip). And as with a maximized

Kao diskettes are renowned in business circles.



It must be the networking we do.



Novell* demands the ultimate in diskette quality – it chooses Kao. And we make our diskettes right

here in the USA. at our state-of-the-planet facilities. Count on Kao diskettes, the professional choice. Call us at 1-800-759-2590.





Novell and NetWare are registered trademarks of Novell Inc. KAO is a registered trademark of Kao Corporation © 1993 Kao Infosystems Company

Circle 138 on reader service card

forget the "Experts"



Learn the EASY Way!

ViaGrafix makes it easy to learn the most popular DOSTM and WindowsTM based software packages with custom video training tapes. Learn in the comfort of your own home-at your own pace.

It's as easy as 1, 2, 3!

ing DOS 6.0

Learning Corel
Draw 4.0

Intro to Word for Windows 2.0

Intro to Excel 4.0

ourney Through

Getting Started with OS/2 2.0

Microsoft Access

Windows NT

For product or dealer information, call us at

1-800-324-2150

[512] 338-2150 • Fax: [512] 338-2152

\$10 off of regular price

prices range from \$29% to \$59%

Bring this coupon to your dealer, or call

1-800-324-2150



🔰 🄰 Interlink Corporation 6034 West Courtyard, Ste. 305 Austin, Texas 78730

WINDOWS Q&A

Windows application, you can't change the size until you double-click on the title bar or click the Restore button in the upper righthand corner of the window. That done, you can now use the mouse to drag the borders of your window to any size you choose that's smaller than the maximized size.

Relocating TrueType

I've installed a ton of TrueType fonts and it takes forever to scroll through my bulging \WINDOWS\SYSTEM directory. Can I move the True Type fonts into a different directory?

Stephen Wolfe, St. Paul

Yes and no. A True Type font consists of a A font file (TTF) and a resource file (FOT). You can store TTF files anywhere, but FOT files must remain in the \WIN-DOWS\SYSTEM directory, because they tell Windows where the fonts are kept.

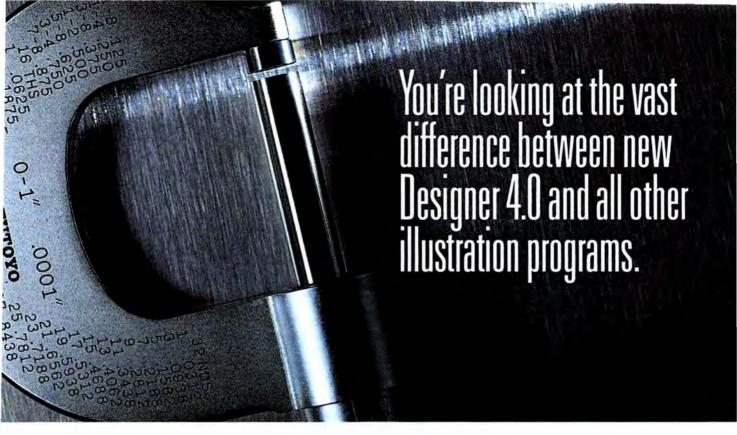
To relocate your TTF files, launch Control Panel and double-click the Fonts icon. In the 'Installed Fonts' scroll box, select the fonts you want to relocate, and click Remove. When Windows asks if you want to remove the selected fonts, make sure you leave the 'Delete Font File From Disk' option unchecked. Click Yes to All.

Now launch File Manager and, if necessary, create the directory where the fonts will reside. Select View Sort by Type and click on the WINDOWS\SYSTEM directory to show its contents. Click the first TTF file and <Shift>-click the last one listed to select all your TTFs; drag them to the new directory.

Return to the Fonts section of Control Panel and click Add. In the Add Fonts dialog box, uncheck the Copy Fonts to Windows Directory option. (You must do this every time you open this box, because it's checked by default.) Select the appropriate directory in the Directories list and the font names should magically appear in the List of Fonts. Select the fonts, click OK, and the fonts are added to Windows, Click Close, Your TTF files now have a new home.

By Scott Dunn

Scott Dunn is a contributing editor for PC World and coauthor of 101 Windows Tips (Peachpit Press, Berkeley, California, 1992). Windows welcomes your questions. See page 10 for contact information.



Introducing new Micrografx Designer 4.0.

With symbol creation and placement to one micron, new Designer 4.0 from Micrograf x is a measurable improve-

Compared to Compar

Designer 4.0's new intuitive interface is easy to learn and use with hint lines and context-sensitive help.

ment in technical illustration. In fact, hair-splitting accuracy is only the start of what will seem like an endless list of new features. And before you furrow a brow, you'll be glad to know that Designer 4.0 is first, last and always easy to use.

You get advanced features including 3-D drawing with rotation, smooth shading, and light source control.

Make adjustments quickly

with object snap, wireframe view

of images, custom dimension units, direct

entry of coordinates and dimensions, and auto dimensioning. And 32,767 layers keep everything organized. The bottom line: you're always in control while creating, editing and manipulating symbols.

Now, while Designer 4.0 is filled with sophisticated features, you'll have it up and running in no

time. A new streamlined interface means you can find everything fast. Hint lines, context-sensitive help, a customizable tool bar, and more keep you close to the tools you use the most. There's even invaluable extras like image editing, advanced

Complete graphic design capabilities range from powerful text management to advanced color separation.

text and layout capabilities, color separation and slide show utilities, plus 1,200 clip art images and 25 photo images on floppy disk, with

13,740 clip art symbols and 200 photo images on CD-ROM, and more. See for yourself how it measures up.

Order your copy today by calling 1-800-488-8310 or see your local dealer



DESIGNER 4.0

The Professionals' Choice For Graphics Illustration.

Micrografs, Inc. 1303 Avapaho, Richardson, TX 75081 (214) 234-1769. Micrografs has offices in Toronto, Paris, London, Munich, Milan, Sydney, Madrid, Copenhagen, and Tokyo Copyright © 1993. Micrografs, Inc.

ProLinea '486

as low \$1099.

(monitor not included)



You can afford today's technology! These '486 ProLineas are available for the same price '386 machines were selling for only a short time ago. And they're much better at delivering the performance required by today's multitasking environments. All feature Local Bus video with 1 MB RAM providing 1024 x 768 non-interlaced resolution. Local Bus means they run at the processor speed-3-5 times faster than traditional video boards.

These ProLineas come with MS-DOS 6.0 and Windows 3.1 ready to run, and we'll install and test any of the "Additional Hardware" shown here or selected software at no extra charge. Order your customized Compag by 10 p.m. and we'll still ship it for next-day delivery. And when comparing prices, always figure in delivery. Our TOTAL SHIPPING CHARGE is only \$5 in the continental U.S.





ProLinea 4/25s

25-MHz 486SX; upgradable processor; 4 MB expandable to 32 MB; 8K cache; 1024 x 768 Local Bus graphics w/1 MB VRAM; 3.5" drive

12166	Model 120/w 120 MB Drive)99
	Model 240/w 240 MB Drive	1299
12168	Model 340/w 340 MB Drive	1449

The following models feature an additional 5.25" drive, PFS: WindowWorks, modem (2400 data, 9600/4800 S/R fax); & Prodigy:

12167	Model 120/w+120 MB Drive \$1199
10889	Model 240/w+ 240 MB Drive 1399
12169	Model 340/w+ 340 MB Drive 1529

6418 Upgrade: Intel Overdrive 486SX/25 449

ProLinea 4/33

33-MHz 486DX; upgradable processor; 4 MB expandable to 32 MB; 8K cache; 1024 x 768 Local Bus graphics w/1 MB VRAM; 3.5" drive

12170 Model 120/w	¢1400
12170 Model 120/W 120 MB Drive	\$1499
12172 Model 240/w 240 MB Drive	
12164 Model 340/w 340 MB Drive	1799

The following models feature an additional 5.25" drive, PFS: WindowWorks, modem (2400 data, 9600/4800 S/R fax); & Prodigy:

	0 /
12171	Model 120/w+120 MB Drive \$1599
11588	Model 240/w+ 240 MB Drive 1759
12175	Model 340/w+ 340 MB Drive 1899
8943	Upgrade: Intel Overdrive

486DX/33569



Need a printer to complete your system?

Keep the costs down and the quality up with the Canon BJ-200 personal desktop bubblejet printer. You get whisper-quiet, high-quality 360-dpi

printing at 248 cps on plain-paper (letter and legal), envelopes, and transparencies. Compatibility with virtually all software is assured thanks to IBM Proprinter X24E and Epson LO-510 emulations. Or, if you want a full-fledged 300-dpi laser printer at a budgetsaving price, check out the reliable 4-ppm Okidata OL400 LED Page Printer. It comes with 17 built-in fonts.

Canon BJ-200 \$315 5093 Okidata OL400...... 599

PC World World Class Award Best Mail Order Company

We're not trying to win any popularity contests. (But we did!)

1990

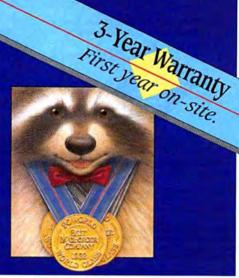
- 1. PC CONNECTION
- 2. CompuAdd
- 3. Dell Computer
- 4. Telemart
- 5. Gateway 2000

1991

- 1. PC CONNECTION
- 2. CompuAdd
- 3. Telemart 4. Gateway 2000
- 5. Dell Computer

1992

- 1. PC CONNECTION
- 2. Gateway 2000
- 3. Dell Computer
- 4. Tiger Software
- 5. Micro Warehouse



ProLinea 4/50

50-MHz 486DX2; 4 MB expandable to 32 MB; 8K cache; 1024 x 768 Local Bus graphics w/ 1MB VRAM; 3.5" drive

100	MOUCI 240/ W	#1000
	240 MB Drive	\$1899
108	Model 240/w+	
	240 MB Drive; additional	5.25" drive,
	PFS: WindowWorks, mod	em
	(2400 data, 9600/4800 S	S/R fax);
	& Prodigy	1999

ProLinea 4/66

66-MHz 486DX2; 4 MB expandable to 32 MB; 8K cache; 1024 x 768 Local Bus graphics w/ 1MB VRAM; 3.5" drive

12176 Model 340/w+

10007 Model 240/m

PFS: WindowWorks, modem (2400 data, 9600/4800

340 MB Drive: additional 5.25" drive.

These ProLineas Also Feature:

- DOS 6.0 & Windows 3.1
- · Three 16-bit ISA expansion slots
- · 101-key keyboard and mouse
- · 145-watt power supply
- · Two serial and one parallel port
- Slimline Case: 15.9"W x 15.1"D x 4.0"H
- · MultiLock security features including power-on password, cable-lock provision, and administrator password.

Compag Monitors:

10699	Compaq VGA 14" Color
	Monitor (.39 DP)\$270
10700	Compaq VGA 14" Color
	Monitor (.31 DP) 309
11899	Compaq SVGA 14" Color
	Monitor (.28 DP) 349
10674	Compaq 1024 14" Color
	Monitor (.28 DP)441
11930	Compaq 151 FS 15" Color
	Monitor (.28 DP) 559

We also carry:

6791	Sony Trinitron 14" VGA
	Monitor (.25 DP)
10844	Samsung Sync Master
	15" Color Monitor (.28 DP)\$499
10063	Mag Innovision MX15
	15" Color Monitor (.28 DP) 599
4249	NEC 4FG 15" Color Monitor (.28 DP) 799

Additional Hardware

Installed and tested at no extra charge

moun	icu una testea at no extra charg	c
4194	Colorado Jumbo 120 Tape Backup	\$149
4354	Colorado Jumbo 250 Tape Backup	. 179
10941	Practical Peripherals 2400 data,	
	9600 S/R internal fax/modem	95
10942	Practical Peripherals 14,400 data,	
	9600 S/R internal fax/modem	. 199
5386	Zoom 14,400 data & fax/modem (int)	. 145
2621	Boca 14,400 data & fax/modem (int.)	. 179
6502	Iomega Bernoulli Insider 90 MB PRO	. 579
6951	Teac 1.2 MB Floppy Drive	55
10744		199
10743		
9312	Tripp Lite BC500	. 219

Note: All Compag hardware options (drives, modems, etc.) are also available from us. Call for more information.

COMPARE THE FINE PRINT!

- NO additional shipping charges. \$5 is the TOTAL per order.
- NO charge to pre-install popular software and hardware (often, the installed price is lower).
- NO charge for support. Toll-free help available from PC Connection and Compag.



Shipping: No bait and switch here!. Your pay just \$5 shipping for overnight delivery, no matter how many systems you buy or what they weigh. Order by 3 a.m. for in-stock systems. For customized systems, order by 10 p.m. ET—we'll install and test the additional hardware listed here or selected software at no extra charge. Continental U.S. only. Includes Saturday delivery in many locations. Remote locations may require an extra day. Warranty: Certain—but very few—restrictions apply.

1990, 1991 and 1992 World Class Awards for Best Mail-Order Company



All software is not copy-protected, unless indicated otherwise by (CP).

The four- or five-digit number next to each product is the product's ITEM NUMBER. Please refer to this number when ordering. Thank you.

We carry only the latest versions of products. Version numbers are current at press time. Products listed here in red are Microsoft Windows Applications.

COMPUTERS

	Compaq Computer 3 years	
12166	ProLinea 4/25S Local Bus, 120 MB, Windows \$1099.	
9549	ProLinea 4/25S Local Bus, 240 MB, Windows 1299.	
12360	ProLinea 4/50 240 MB,	
	Windows while supplies last 1549.	
10893	ProLinea 4/50 Local Bus, 240 MB, Windows 1899.	
10894	ProLinea 4/50 Local Bus, 240 MB, Windows,	
	Modem, PFS Window Works, Prodigy 1999.	
12176	ProLinea 4/66 Local Bus, 340 MB, Windows,	
	Modem, PFS Window Works, Prodigy 2299.	
9552	Contura 3/25 120 MB,	
	Windows while supplies last 1599.	
11420	Contura 4/25 with 209 MB, Windows 2199.	
11417	Contura 4/25C with 209 MB, Windows 2889.	
11646	DESKPRO 4/66M with 510 MB, Windows 3619.	
2016	LTE Lite 4/25 with 120 MB, Windows 2525.	
3019	LTE Lite 4/25E with 120 MB, Windows 3099.	
3029	LTE Lite 4/25E with 209 MB, Windows 3385.	
	Monitors not included.	
	Texas Instruments	
4757	TM 4000 WinDX/25 Notebook with 120 MB 2059.	
6388	TM 4000 WinSX/25 Notebook with 120 MB 1899.	
6441	TM 4000E WinDX2/50 Active Matrix Color	
	Notebook with 200 MB 3799.	
4696	TM 4000E WinSX/25 Advanced Passive Color	
	Notebook with 120 MB 2149.	
	NICHIEGO ARRI IGATIONO	

BUSINESS APPLICATIONS

	Automap
2729	Automap USA for DOS., 55, 8569 Windows., 55,
	Borland International
6788	Quattro Pro 5.0 for Windows (31/2" anly)
10710	Paradox Windows (31/1" only) while supplies last 129.
11915	Borland Office for Windows (3%" only) 395.
11978	Office for Windows Comp. Upgrd. (31/6" only) 299.
	Caere
4277	OmniScan 279.
8933	OmniPage Professional 2.1 629.
	CE Software
3532	CE Power Pak (31/5" only) 79.
	Claris Corporation
6022	ClarisWorks for Windows with Quicken Bundle 119.
5257	FileMaker Pro for Win. 119. 5228 Comp. Upgrd. 95.
	Intuit
2426	Quicken 6.0 45. 5596 2.0 for Windows 45.



Caere

4277 OmniScan—Caere's OmniScan is a handheld scanning solution with integrated OCR (OmniPage Direct), image-editing (Image Assistant) & fax capabilities (FaxMaster) in a convenient package \$279.

	LaserTools
6882	PrintCache 3.1 \$49
	Lotus
2756	1-2-3 4.0 for Windows (2755 5/4")
3428	1-2-3 4.0 for Windows Upgrade (3424 51/4") 99
2546	Ami Pro 3.0 Competitive Upgrade (1847 5%") 99
6657	Improv for Windows 2.1 (31/2" only)
5982	SmartSuite 2.0 (5981 51/2")
	MECA
2798	Managing Your Money 32
	Microsoft
11325	MS-DOS 6.0 Upgrd. (3½") while supplies last 47
7009	Windows 3.1 (7010 5/4")
7841	Word for Windows 2.0C Comp. Upgrd. (3881 5/1) 125
5695	Excel 4.0 Competitive Upgrade (5693 5/4") 99
2931	Access for Windows 1.1 (2932 5/4")
10057	FoxPro 2.5 for Windows (10056 5/4")
8138	Office 3.0 for Windows (8137 51/2)
12848	Office Professional (with Microsoft Access) 589
	Peachtree
12287	Accounting for Windows Release 2 115
	Polaris Software
4395	PackRat 5.0
	Symantec
1625	ACT! for DOS 2.11 259. 7435 Windows 1.03 259
	TIMESLIPS
5698	Timeslips Release 5 1.0 189
	WordPerfect Corporation
3445	Presentations 2.0 for Windows 299. 7582 DOS 279
1501	Presentations for Windows Comp. Upgrade 105
12351	Presentations 2.0 for DOS Comp. Upgrade 105



6441 TravelMate 4000E WinDX2/50 Active Matrix Color Notebook—6.3 pounds, 200 MB, 16 ms IDE Hard Drive, 8.4" Active Matrix Color Display, 4 MB Ram (upgradeable to 20 MB), 1.44 MB Floppy, Trackball... \$3799.

4795	WordPerfect for Windows Ver. Upgrd. (4786-5/4")	
	GRAPHICS & DESIGN	
	Adobe Systems	
10774	Adobe Photoshop 2.5 for Windows (3%" only)	548
6439	Adobe Illustrator 4.0 for Windows (6591 5/4")	429.
5475	Adobe Illustrator & Photoshop Bundle	599.
1085	FreeHand for Windows	395.
11667	PageMaker 5.0 for Windows (315" only)	579.

3795 WordPerfect 6.0 DOS 279. 6274 Ver. Upgrd. 99.



Adobe Systems

5475 Adobe Illustrator & Photoshop Bundle— Two industry standards, bundled! Adobe Illustrator, the design tool for graphics professionals, and Adobe Photoshop, the program for desktop image design and production .. \$599.



Microsoft	
2840 Flight Simulator 5.0-It's never been mor	e
real! Scenery disks available! \$4	2
8491 Golf 1.0-Stunning photorealism! 4	5
6103 Arcade 1.0-Arcade Asteroids, Battlezon	ne,
Centipede, Missile Command, & Tempest 2	7

	Altsys Corporation
8675	Fontographer for Windows 3.5 (31/2" only) 259.
12551	Fontographer & Typestry Bundle
	Application Techniques
1214	Pizazz Plus 4.0 (Windows & DOS included) 79.
	Corel Systems
5508	CoreIDRAWI 3.0 (5506 5'4")
11896	CorelDRAWI 4.0 (11904 51/4")
7923	CorelDRAWI 4.0 Upgrade (7922 5/4") 225.
	DeltaPoint
3435	Graphics Tools! 1.0 for Windows (31/2" only) 99,
	Fractal Design
7822	Sketcher 1.0 for Win. 94. 4356 Painter 2.0 259.
	Inset Systems
3820	HiJaak Pro 2.0 for Win, 82. 7298 HiJaak 2.1 92.
	Lotus
5005	Freelance Graphics 2.0 for Windows (3523 51/4") 349.
	Micrografx
3628	Windows Drawl 3.0 (3627 51/7)
	Microsoft
10051	Font Pack 2 Win 45. 3337 Publisher 2.0 Win. 89.
2840	Flight Simulator 5.0 42. 8491 Golf 1.0
6103	Arcade 1.0
	Pixar Corporation
12552	Typestry & AGFA Discovery Bundle 189.
	Shapeware
5426	Visio 1.0 for Windows (3/4" only)
	Software Publishing
4402	
	CONTRACTOR OF THE PROPERTY OF

SYSTEM UTILITIES & PROGRAMMING

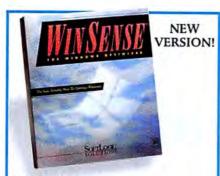
	AddStor	
12029	DoubleTools	65
	Avery Dennison	
6006	Label Pro 1.6 (Laser)	45
	Berkeley Systems	
6642	Disney Collection Screen Saver (31/4" only)	29
9885	After Dark 2,0 for Windows., 29. 3528 DOS	29
12030	More After Dark (M.A.D.) for Windows (31/4" only)	23
6649	Star Trek: The Screen Saver (31/2" only)	34
	Central Point Software	
11393	Safe Six for Windows 1.0 (3%" only)	37
9555	Anti-Virus 2.0 (9751 51/4") or 8114 Backup 8.0 ea.	
5039	PC Tools 8.0 125. 11395 for Windows	



Borland International

6788 Quattro Pro 5.0 for Windows (3½* only)— A revolutionary spreadsheet for Windows. Advanced spreadsheet featuring Spreadsheet Notebooks and Object Inspector to manage your spreadsheets quickly & effectively \$95.

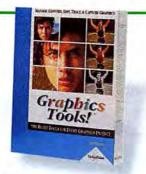




Softlogic Solutions

	Fifth Generation Systems
3950	Fastback Plus 6.0 95. 6431 1.1 for Windows 95.
4187	Fastback Plus for Windows Comp. Upgrade 1.1 65.
	Hewlett-Packard
8731	Dashboard 2.0 for Windows
	Micro Logic Corporation
6787	Info Select DOS 12145 Windows ea. 87.
	Microsoft
10154	Visual Basic 3.0 Windows Std. Ed. (31/2" only) 129.
11444	Visual C++ Standard Edition (3%" only) 125.
	PC-Kwik
8004	PC-Kwik Power Pak 3.1 w/Power Disk (4925 5%") 45.
	Qualitas
12541	386MAX 7.0
	Quarterdeck
3217	QEMM 7.0 (3221 5/7)
	Softlogic Solutions
10868	WinSense 2.0
	Stac Electronics
1409	Stacker 3.1
	Symantec
2360	The Norton Desktop 2.2 for Windows (2359 5/4") 115.
5136	The Norton Utilities 7.0 (3146 51/4") 115.
8535	pcANYWHERE DOS 119. 11303 Windows 129.
	TouchStone Software
11665	Check It Pro: Set (Volumes I & II included) 79.
	XTree
8957	XTree 2.0 for Win. 49. 6161 XTree Gold 3.0 95.

| 3 Com ... lifetime (conditional) | 3453 | EtherLink ||/16..... 159. | 3469 ||/16 TP 169. | | Asanté Technologies ... 5 years | | 2775 | 8 Port Hub..... 249. | 2772 12 Port Hub..... 499. | | EtherPac Ethernet Cards | call | | Artisoft | Lantastic AE-2 EtherNet Starter Kit DOS 5.0... 459. | | 2452 | AE-2 EtherNet Adapter Card | 199. |



DeltaPoint

3435 Graphics Tools! 1.0 Windows (3½" only)— Organize your graphics in a drag and drop

Organize your graphics in a drag and drop thumbnail viewer, convert files, autotrace, image editing, painting, screen capture, 700 pieces of clip art and dozens of photos \$99.

	BOCA Research 5 years
8397	
	Caere
4130	FaxMaster 1.0 69
	CoActive Computing
1174	DOS Connector 149, 1143 Windows Connector 149,
1189	PC/Mac Connector 1.0
	CompuServe
10957	Windows Membership Kit 1.0 (3½* only) 27.
	Data Storm
4798	PROCOMM PLUS 2.01 69. 2006 for Windows 95.
	DCA/Crosstalk
5611	Crosstalk 2.0 for Windows
	Delrina Technology
2446	WinFax PRO 3.0., 79, 5974 DOSFax PRO., 49,
	Hayes 2 years
11397	ACCURA 144 + FAX 144 (int.) 199. 11396 (ext.) 229.
7391	ULTRA 96 Modem., 599, 5024 ULTRA 144, 669,
7395	OPTIMA 144 + FAX 144 389.
	Intel 3 years
2994	EtherExpress 16 or 3021 16 TP ea. 99.
1531	FaxModem 14.4/14.4 (int.) 175. 1536 (ext.) 199.
5994	SatisFAXtion Modem/400 5995 Modem/400e ea. 399.
	Megahertz 5 years
10515	C5144 14.4 Fax/Modem (Compag LTE/Contura) 419.
10517	C524FM Fax/Modem (Compaq LTE/Contura) 215.
11817	XJ124FM 24/96 Fax/Modem (PCMCIA card) 289.
	Microcom
6234	CarbonCopy Plus 6.1 129. 4410 Windows 129.
-33/	Microsoft
5743	Windows for Workgroups (6207 5%")
6172	Windows for Workgroups Add-on (6141 5%*) 59.
-	Norton-Lambert
2754	Close-Up Dual Pack 4.0 (2753 54")
	And the same of the same of Automotion 118.



Hayes ... 2 years

12058

ACCURA 144 + FAX 144—Legendary Hayes quality at an affordable price! Offers speed, versatility. The automated send/receive fax software has superior readability, & confidentiality. 11397 (internal) \$199. 11396 (external) \$229.

	Novell
t	NetWare 4.0 (10 user) 1899. 12056 (25 user) 2799
	We are now Novell authorized. Upgrades also
	available. Please call for details.
	Practical Peripherals lifetime

Practical Peripherals lifetime
PM14400FX (int. modem/fax) 199, 10570 (int.) 215.
PM14400FXPPM Pocket Fax/Modem
NetModert/E for Windows for Workgroups ea. 1479, Supra 5 years
SupraFaxModem V.32bis External for DOS 239.
SupraFaxModem V.32bis Ext. for Windows 239.
Technology Concepts 2 years
Fax Line Manager 203 125.
Traveling Software
LapLink V
U.S. Robotics
Sportster 14.4 FaxModem Int. 185. 11924 Ext. 209.
WorldPort 14.4 Pocket FaxModem 329.
Courier V.32bis FAX Int 359. 11919 Ext. 399.
Zoom Telephonics 7 years
FaxModem AFC 24/96/48 (internal)
FaxModem AFX (2400 baud 96S/48R) 69.

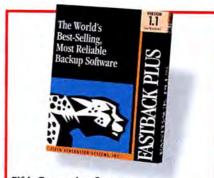
800-800-0003



PC Connection 1093PCW 6 Mill Street

Marlow, NH 03456

SALES 603-446-0003 FAX 603-446-7791



Fifth Generation Systems

6431 Fastback Plus 1.1 for Windows—Versatile and reliable data insurance. It's accurate and easy to use, offers high-speed backups and data compression up to 85%...... \$95. 4187 Fastback Plus 1.1 Win Comp. Upgrd. 65.

FaxModem VFDI (internal 24/96 with voice)	. 99.
FaxModem VFDX (external 24/96 with voice)	115.
FaxModem VFP V.32bis 14,400 baud (internal)	149.
FaxModem VFX V.32bis 14,400 baud (external)	189.
FaxServer 215. 7921 Pocket FaxModem 24/96/48	8 87.
	FaxModem VFDX (external 24/96 with voice) FaxModem VFP V.32bis 14,400 baud (internal) FaxModem VFX V.32bis 14,400 baud (external)

VIDEO & SOUND

	ATI Technologies 5 years
12296	Stereo FX-CD 149. 12720 VGA Wonder GT 175.
3886	Graphics Ultra + 2 MB., 249, 3871 Pro 2 MB., 369,
11022	Graphics Ultra Pro EISA (with 2 MB) 399.
	Boca Research 5 years
12374	VORTEK VRAM Accelerator 2 MB 289.
	Creative Labs 1 year
5770	Sound Blaster 16 ASP 209.
10906	VideoSpigot for Windows 429.
	Diamond Computer 5 years
1696	SpeedStar Pro VLB
1569	Stealth 24 VLB 159. 1585 Viper VLB 415.
	Gold Disk, Inc.
10871	Video Director 1.0 for Windows 119.
	Intel 3 years
11587	Smart Video Recorder
	KOSS Corporation
11323	HD-4 speakers (with equalizer & AC Adapter) 55.
11700	HD-6 speakers (with AC Adapter)79.
	Logitech 2 years
11462	SoundMan 16
	Media Vision 3 years
5637	ProAudio Spectrum 16
12028	ProAudio Studio 219. 11478 ProMovie Spectrum 299.
	NEC 2 years
11949	MultiSync 3FGE Monitor (13")
11948	4FGE Monitor (15") 749. 11950 5FGE (17") 1149.
	Sony 1 year
6803	CDU-31A02 Internal CD-ROM Drive 149.
6802	Interface Kit (OPA-4741) 54.
6790	14CPD-1304S 14" Multiscan Trinitron Display 539.



NEW LOW PRICE!

Sony ... 1 year



Kensington Microware ... 1 year

7899 Expert Mouse 4.0—New Expert Mouse 4.0 is quicker, more comfortable, more precise, & easier to use than ever before! Accommodates both left and right-handed people (Serial) \$99.

INPUT/OUTPUT

	Canon 1 year
7893	BJ10EX BubbleJet Printer (white) 255.
7809	BJ-200 BubbleJet Printer 315, 12547 BJ-230 419. CoStar 1 year
1814	LabelWriter II Plus
1014	Epson 2 years
5555	AP-3250 (80 col., 200 cps, 24 pin)
11800	LQ570+ (80 col., 269 cps)
10784	Action Laser 1500 (1 MB)
11495	Stylus 800., 369. 10784 ActionLaser 1500., 789.
11433	Hewlett-Packard 1 year
12212	LaserJet 4L (with toner)
7620	DeskJet 550C 669. 7621 DeskJet Portable 439.
6442	LaserJet 4 (with toner)
7970	LaserJet 4 Toner 109. 11884 (3 pack) 319.
	Kensington Microware 1 year
7899	Expert Mouse 4.0 (Serial) 99. 7900 (Bus) 115.
	Key Tronic 3 years
4518	101 Plus Keyboard
	Logitech limited lifetime
3996	Trackman2 (combo) 79. 2343 Portable 99.
3295	Mouseman (combo), 69, 9766 (cordless) 89.
7975	ScanMan256 179. 2468 w/OminiPage Direct 225.
	Microsoft lifetime
7597	Microsoft Serial Mouse 69, 1896 Ballpoint Mouse 115.
2898	Mouse with Windows 3.1 (serial)
2000	MicroSpeed 1 year
6007	PC-TRAC Trackball 59. 11222 KB101 Keyboard 40.
0001	Microtek 1 year
5187	ScanMaker II 879. 5175 ScanMaker IIxe 1099.
11859	ScanMaker II with Transparency
11000	Mouse Systems lifetime
7878	PC Mouse III (serial) 69. 5427 NewMouse 62.
	Mustek 1 year
8452	Gray Artist for Windows (256 GS hand scanner) 165.
6-104	Okidata 1 year
5093	OL400 Laser Printer 599. 9590 OL810 Laser 969.
11901	OL830 Plus 1149. 11893 OL850 1279.
	Pacific Data 60 day MBG
5729	ProTracer (personal CAD printer) (1 yr.) 1099.
0123	Seiko 1 year
1069	
1506	Smart Label Printer Pro (Windows or DOS) 145.
1300	Oman Label Filliter Fro (Williams of DOS) 229.



Logitech ... 2 years

11462 SoundMan 16-16-bit stereo playback & recording. Sampling/playback rate from 2 KHz to 44 KHz. Yamaha OPL-3 stereo synthesis chip w/4 operators generating 20 voices. Input/output jacks for speakers and microphone. \$139.

ACCESSORIES

UPS 400 \$179.
-UPS 600 439.
84.
DX 85.
Security Sys. 39.
lemote 105.
29.
Cool 300. 159.
mputer Case 69.
rranty) 43.
rranty) 49.
2 BC500 219.
֡

DRIVES

	Colorado Memory Systems 1 year	
4354	Jumbo 250 Tape Backup	179.
1073	Trakker 250 Tape Backup (parallel)	349.
	Conner Peripherals 1 year	
2339	CP30104H 120 MB IDE HD (19 ms)	199.
1337	CP30204 210 MB IDE HD (16 ms)	256.
	IOMEGA 1 year	
6499	Transportable 90 PRO	659.
10452	Transportable MultiDisk 150	849.
6344	PC Powered 90 PRO 599. 10537 PC Power. 150	799.
2530	90 MB Cartridge 129. 2467 Tripak	379.
8480	Tape250 Insider Tape Backup	199.
8481	Tape250 Insider Half-Height Tape Backup	209.
10702	Tape250 Parallel Port Tape Backup	429.

\$50 REBATE COUPON IN BOX FROM EPSON! (LIMITED TIME)



Epson ... 2 years

11495 Stylus 800—Seven built in typefaces. 100-sheet paper tray, crisp 360 dpi printing, prints 150 characters per second \$369. 10784 ActionLaser 1500-27 internal fonts, 6ppm, and 1 MB memory...... 789.

	NEC 2 years	
6582	CDR74-1 CD-ROM Drive	597
6581	CDR84 Internal CD-ROM (regs. interface)	449
	Quantum 2 years	
4735		249
4714	Hardcard EZ 240 MB IDE (16 ms)	399
	TEAC 1 year	
6951	1.2 MB Drive for AT 55. 7371 1.44 MB Drive	45
4414	3.5"/5.25" Dual Floppy Drive	145
	MEMORY	
	6581 4735 4714 6951	6581 CDR84 Internal CD-ROM (reqs. interface) Quantum 2 years 4735 Hardcard EZ 127 MB IDE (17 ms) Hardcard EZ 240 MB IDE (16 ms) TEAC 1 year 6951 1.2 MB Drive for AT 55. 7371 1.44 MB Drive 4414 3.5*/5.25* Dual Floppy Drive

MEMORY

1411	1 MB x 9 SIMMs (70 nanosecond)	call
3702	4 MB x 9 SIMMs (60 ns) 2497 4 MB x 9 (80 ns)	call
5746	1 MB Chips (80 nanosecond, set of 9)	call
	Pacific Data lifetime/60 day MBG	
7959	4 MB Upgrd. for LaserJet 4 or 7960 8MB Upgrd.	call
	DIOMOMEDIA	

DISKS/MEDIA

	Fuji lifetime	
11790	3.5" HD Disks (10) 13. 2241 (50)	58
4863	3.5" HD Disks (20) with storage case	24
5692	3.5" HD Preformatted Disks (20) w/storage case	25
	Kao	
11870	3.5" HD Disks (10) 12. 11869 (30)	35
11867	3.5" HD Disks (50)	50
	Sony 1 year	
3298	3.5" HD Disks (10) 13. 6375 (30)	37
6495	3.5" HD Disks (50) 50. 11871 (100)	
1603	DG60M (2 yr.) 15. 2520 DG90M (2 yr.)	19
8185	QD2040 (2 yr.) 14. 1895 QD2120 (2 yr.)	19
	3M lifetime	
1581	DC2120 Tape Cartridge	22
11013	DC2120 Tape Cartridge (3 pack)	60



Zoom Telephonics ... 7 years

5915 FaxModem VFDI (internal 24/96 w/voice)-Voice storage/playback in a full-featured 24/96 FaxModem with V.42bis. Includes file sharing. DOS & Windows software for voice mail \$99. 5914 FaxModem VFDX (ext. 24/96 w/voice) 115.

- OUR POLICY

 We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax, except Ohio residents (please add applicable tax).
- All U.S. shipments insured; no additional charge
- APO/FPO orders shipped 1st Class Mail.
- International orders: U.S. \$100 minimum, add 2% surcharge and \$2 insurance. Manufacturer support and upgrade eligibility may be limited outside the U.S.A. Some products not available for export, call or fax information.
- Upon receipt and approval, personal and company checks clear the same day for immediate shipment of your order. Corporate P.O.s accepted subject to approval.
- . COD max. \$1000. Cash or cashier's check. COD orders require an additional \$4.50 charge. COD orders ship via UPS and may require additional UPS charges.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability. Prices and promotions subject to change without notice (e.g. SIMMs).
- Order lines opened continuously from 8 a.m. Monday until 5 p.m. Sunday ET. Business offices at 603-446-3383 Monday through Friday 9 a.m. to 5:30 p.m. ET.

SHIPPING

Continental U.S.: The total freight charge on any order placed with PC Connection is only \$5. Barring events beyond our control, all credit card orders (no COD orders) phoned in week days by 3 a.m. ET will ship Airborne Express for delivery the next business day. Which means same day delivery for orders placed between midnight and 3 a.m. ET. (Some orders may ship by UPS Ground for next day delivery). Saturday delivery available to many areas upon request at no additional charge. Order all day Saturday through noon on Sunday for Monday

delivery. (Some areas require an additional day delivery).

Hawali, Alaska, Canada, Puerto Rico and the

U.S. Virgin Islands: Shipping to these areas may require additional time and charges. Call 800-800-0003 for information. All other areas: Please call 603-446-0003 or FAX 603-446-7791 for information.



V.FAST **UPGRADE**

U.S. Robotics

11919 Courier V.32bis FAX External-Protect your investment with a Courier 14,400 V.32bis FaxModem now, and receive a free 28,800 V.Fast upgrade when available \$399. 11918 Courier V.32bis FAX Internal 359.





Just \$5 TOTAL no matter what!

Everything Overnight*. We ship every credit-approved order overnight* for just \$5. No matter how many products you order or what they weigh. So when comparing prices make sure you check the total <u>DELIVERED</u> price.

Order by 3:00 a.m. That's right. You can actually phone in an order by 3:00 a.m. and it will go out that night via Airborne Express.*

Weekend Shipping. No additional charge. Friday orders (until 3:00 a.m. Saturday) are delivered Saturday. Orders placed all day Saturday through noon Sunday arrive Monday.* The total charge is still only \$5.

One-Minute Mail Order™. Once you're a customer, we use Caller ID to access previous ordering information so you can place your order in record time! (We can block this at your request.)

Hold the foam! We pack our orders with a recycled packing paper made in New Hampshire from used 4-color magazines and catalogs. No foam peanuts here!

PCTV.* Our weekly half-hour show is the fast and efficient way to keep up with the latest PC products and industry news. Call 800-800-6914 to find out where to see it in your area.

Toll-Free Tech Support. If you ever have a question about anything you buy from us, please call toll free.

PC World World Class Award Best Mail Order Company 1990, 1991, 1992

*Airborne's overnight service is available *almost* everywhere in the continental U.S.



DATA MANAGEMENT Q&A

Creating a Tickler With dBASE

I use dBASE IV 1.5, and my marketing contact data file has a date field where I write the date on which I need to contact each person. Can I make dBASE prompt me when a contact date becomes current?

Cynthia L. Anderson, Phoenix

If a data file has a date field, it's an asy matter to pull out records by their relationship to the current date. For instance, for a list of records dated today, simply go to the dot prompt and enter DISPLAY fields to view FOR DateField = DATE(), where fields to view are the fields you wish to see, separated with commas, and DateField is the name of the field holding your contact dates. Changing '= DATE()' to > DATE() will list upcoming contact dates, and = DATE() + 7 will find those dated a week from today. To edit or report on the records rather than simply list them, substitute CHANGE or REPORT FORM reportname for 'DIS-PLAY', using the name of your report format for reportname.

You can get much better control of your selections, however, by adding a field to indicate whether a contact has been completed or not. Then, by setting conditions for selecting records on both the follow-up date field and the completion field, you can get a variety of useful lists or reports. To do this, add a logical field called **Complete** to your table. When an action is completed, enter a **Y** in Complete. Then you can tell dBASE to show only records with incomplete actions, or those that you've completed, within a certain date range.

FIGURE 1 shows FOLLOWUP.PRG (available on PC World Online), a simple dBASE program you can use to display three types of follow-up lists: all actions with today's date, all incomplete actions due today or before, and the next week's actions. It assumes that the contact file is called CONTACTS, that the action date field is called Followup, that you've set up a Complete field like the one described in the last paragraph, and that the fields you want to display are Fname, Lname, and Phone.

FOLLOWUP.PRG is an ASCII text file, and you can create it in any text editor. To use the one in dBASE, enter MODIFY COMMAND Followup at the dot prompt. You'll probably want to change the program not only to match your file

and field names but also to use criteria that you need. For example, to see only today's incomplete actions, use FOR Followup = DATE() .AND. .NOT. Complete; to get a list of everything you've done during the last week, use FOR Followup < DATE() .AND. Followup > DATE() - 8 .AND. Complete. You can also use the REPORT FORM command if you want to print or display a formatted report. Run the program by entering Do Followup at the dot prompt.

Although the specifics described above are geared toward dBASE, the concept behind this solution will work with most any database. The basic idea is to have a date type field to hold the target completion dates for the actions you want to track, and another field to mark when an action is completed. This second field could be an alphanumeric field, but if you use a date field, you can see how close you come to completing things on time. With these two fields as part of your data file, you can query for records that are blank in the "completed" field to find upcoming tasks.

Avoiding Split Memos in Paradox

I created a tabular report in Paradox 4.0 that contains a memo field, which I've set to word wrap. Because the memo field's length changes, the printed records vary in height, averaging about 1 inch per record. Everything looks fine until the bottom of the page, where records often get split across pages. Is there a way I can keep Paradox from printing a record on a page where the entire memo field won't fit? Brenda D. Jackson, Des Moines

A I'm afraid not. But if your memos are all fairly short (which I'm assuming is the case if the average height is an inch), you might want to design your report so each record takes a set number of lines. If a record won't fit on one page, Paradox will print it on the next.

You can use this approach with your existing report, whether you have a tabular or free-form design. Use Report • Change to open your report for redesign. Once you have the report on screen, go to the end of the line that contains your memo field, press <Insert>, and press <Enter> six times to add six blank lines to the bottom of your table or form band. Press <F2> to save your report.

This method will work as long as your memo field is no longer than seven lines. If Paradox comes to a record with a longer memo at the end of a page, it will still split the record across pages, but this will occur less frequently. You can add more blank lines to decrease the chance of this happening, but these

```
USE Contacts
CLEAR
@ 10,30 SAY "T - Today's Actions"
@ 12,30 SAY "I - All Incomplete Actions"
@ 14,30 SAY "N - Actions for Next Week"
@ 20,1
WAIT "Select one" TO rpttype
rpttype = UPPER(rpttype)
DO CASE
CASE rpttype = "T"
  DISPLAY Fname, Lname, Phone FOR Followup = DATE()
 CASE rpttype = "I"
  DISPLAY Fname, Lname, Phone FOR Followup <= DATE();
  .AND. .NOT. Complete
CASE rpttype = "N"
  DISPLAY Fname, Lname, Phone FOR Followup > DATE();
  .AND. Followup <= DATE()+7
ENDCASE
```

FIGURE 1: SHOW YOUR CHOICE of data selections using FOLLOW-UP.PRG, a wonderfully simple dBASE program.



Only an Intel SatisFAXtion® Modem comes bundled with all this.



Intel's line of SatisFAXtion® Modems gives you the foremost in faxmodem technology—and the accolades of eight of the biggest industry publications—in every box.

In fact, the SatisFAXtion Modem/400 series has won more awards than any other faxmodem.

And for good reason. The

SatisFAXtion Modem offers:

- An exclusive smart buffering feature, so all your data gets to you.
- Smart Line Sharing, a feature that distinguishes between voice, data and fax calls, so you only need one phone line.

 | Find 1-8 | 1-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
 |-8 |
-8
- A separate microprocessor that lets you work in other applications while you fax—it's like having two computers.
- Free fax and data software for Windows* and DOS.



Now get Quicken* bundled free.

Call 1-800-538-3373, ext. 283 for your nearest dealer. Or for information via fax, call 1-800-525-3019, ext. 9792.

Then take home a SatisFAXtion Modem. And all the honors will go to you.



@1993 Intel Corporation. *All products are trademarks of their respective companies.

DATA MANAGEMENT 0 & A

lines will be added to every record. Experiment a bit with the number of blank lines to get the result you want.

Centering Variables in Paradox Report Titles

I'm using Paradox 4.0 and have three lines in a report heading. The first two lines are fixed and the third line is a variable. How can I place the third line so that it's centered under the previous two lines? Dean Ferra, Jersey City

To center the third line, all you have to do is put the FORMAT function in your variable expression. In Report mode, use Field • Place • Calculated to create a new field or Field • CalcEdit to edit an existing one. Then enter an expression such as FORMAT("Wn,AC",variable), where n is the maximum possible length of the variable (it won't do any harm if your estimate is too high), and variable is the variable name or calculation. When your report runs, it will

show the value of the variable centered within the field mask.

Locked Records in Paradox for Windows

Q I use Paradox for Windows, and Γm in the habit of keeping several windows open at once for editing. However, once in a while I get a message that the record Γm trying to use has already been locked in the current session. Why is Paradox giving me this message? Γm not on a network, so no one else could possibly be using the file. Lynne Smith, San Mateo, California

A You probably have more than one window open for the same table or form. You can check to see which windows are open by selecting *Window* and reading the list of numbered windows at the bottom of the menu. To fix your problem, just close any duplicate windows and resume working.

Centering With Access

How do you center text in an Access table? I can't find anything in the manual that refers to this. Also, I can't bring up the alignment tool bar buttons when designing a database table.

Ed Woodworth, Cortland, New York

A You don't see the alignment tool bar buttons in table design or view mode because you cannot align text there. Data in Access tables is always left-justified and there is nothing you can do about that. However, you can center a field in a form that looks like a table.

Use the Form Wizard to create a tabular form for your table, and for the last option, select *Design*. This step will bring you into design mode, where you will find the alignment tool bar buttons.

Select the field you want to center and then click on the Center alignment button. The resulting form will look just like a table—and maybe even a little nicer—but the columns will be centered, as you want them to be.

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World and the author of The Paradox 4.0 Handbook (Bantam Computer Books, New York, 1992). Data Management welcomes your questions (see page 10 for contact information).



Printer Port Connections Are The New Tools Of The Trade.

nce you discover just how easy it is to install a backpack CD-ROM drive to your computer, you'll never be inconvenienced by conventional installation methods again. Just plug backpack into your computer and you're ready to go. No interface cards, hardware conflicts or expansion slots required. Because of its unique printer port interface, backpack fits all IBM PC compatibles and portables regardless of CPU speed. In addition, a built-in audio circuit with both headphone and line output jacks allows for connection of sound cards or Hi-Fi. You can run thousands of your

favorite multimedia programs and view Kodak™ Photo CDs too, with CD-ROM backpack. Compact and versatile, you can expect backpack to go wherever you go, bringing with you the wealth of information CD-ROM storage makes possible. Printer pass-through is included. Tape drive, hard drive and diskette backpack drives are also

available. Call today for ordering information and a dealer nearest you,

backpack

CD-ROM Drive

MicroSolutions

132 W. Lincoln Hwy. DeKalb, Illinois 60115 Telephone 815.756,3411 Fax 815.756.2928 Call Toll Free 800.294.1214



Circle 200 on reader service card



A SLICK DEMONSTRATION OF HOW TO INSTALL OUR NEW BOARDLESS SCANNER.

New ScanMan® EasyTouch plugs
directly into your parallel port, with no
boards or drivers. It's easy to install,
and passes from PC to portable and back
again faster than a congressional pay raise.
EasyTouch includes OmniPage® Direct™ AnyFont™
OCR for Logitech, FotoTouch™ image editing
software, Logitech's AutoStitch™ (for scanning
large or odd-sized documents), and can add

™/® Trademarks belong to their registered owners.

ScanMan[®]

EasyTouch

professional quality grayscale scans to all your favorite Windows™

applications. And at about a third of the price of a flatbed scanner, you'll have no

trouble keeping your budget balanced. Pick up ScanMan EasyTouch at your local dealer, or call **1-800-732-2909.**



The Senseware™ Company

PUBLISHING & PRESENTATIONS Q & A

Speedy PageMaker Graphics Using OLE

I want to insert multiple copies of a Windows Draw 3.0 graphic on different pages of a PageMaker 5.0 document and then edit each copy of the graphic so it changes slightly-in color and fill, for example-from page to page. What's an easy way to alter graphics like this for a monthly newsletter? Laura Huberman, Absecon, New Jersey

This is a perfect opportunity to use Windows' object linking and embedding capabilities, assuming the programs you're using are OLE-aware. The new version of PageMaker is, as well as the current version of Micrografx's draw program (Windows Draw 3.0 Plus OLE). If you have the older, non-OLE-ready version of Windows Draw 3.0, however, consider upgrading (\$34.95 for registered users; 214/234-1769) or trying another OLE drawing package. In a pinch, you could paste your Draw image, via the Clipboard, into Paintbrush-a crude OLE draw program that comes with Windowsand proceed from there.

Before you begin, some explanation is in order. You'll want to paste your Draw graphic into PageMaker as an OLE object so you can edit it-within Windows Draw-by double-clicking on it. OLE objects can be linked or embedded:

The key difference is, changes made to a linked object also change the original file, whereas changes made to an embedded object change that object only. For this job, embedding is the way to go, since you want to change each copy of the Draw graphic separately. The following steps, though specific to Windows Draw and PageMaker 5.0, will work with only a few slight modifications in other OLE-aware applications as well.

1. Open Windows Draw and open (or create) the graphic you want to paste into PageMaker. Using Draw's Pointer tool, select the graphic and choose Edit Copy. Save the file if you want, select File • Exit to close Draw, and click Yes when Draw asks if you want to leave the data in the Clipboard.

2. Launch PageMaker and open your document. Go to a page where you want to paste a copy of the Draw graphic and choose Edit • Paste special. In the Paste special dialog box, select Windows Draw Drawing from the list box and then click Paste to place a copy on

3. Go to each additional page where you want the Draw graphic and repeat the Edit Paste special procedure. To verify that you've embedded the graphics on the proper pages, select File. Links; PageMaker will list each embed-

> ded drawing and its corresponding page. Click OK when you want to return to your document.

4. To edit an embedded Draw graphic, use PageMaker's Selector tool to double-click it. Windows Draw opens in a foreground window, and its title bar displays the name of the PageMaker document. You can edit the graphic using any of Windows Draw's tools. When you're finished, just select File Update PageMaker | and then

File • Exit and Return to PageMaker5.

Windows will update the embedded object you modified, and you can continue changing the other Draw graphics as you wish.

Sharp Headlines With Publisher

I use Microsoft Publisher 1.0 to produce a newsletter and I want to add wide spaces between the letters in a centered, all-capitals headline. But after I insert the extra space (using Publisher's Spacing Between Characters and Move Letters Apart commands), the headline comes out slightly left of center. What's wrong?

Mike Bonk, Detroit

You've stumbled upon a quirk in Publisher 1.0. Instead of adding space between selected characters, as you might expect, Publisher adds space after each character. This extra space after the last character in your headline is the reason the text centers incorrectly. Fortunately, the problem has been fixed in Publisher 2.0, which should be available by the time you read this. But for now, here's an easy work-around for version 1.0.

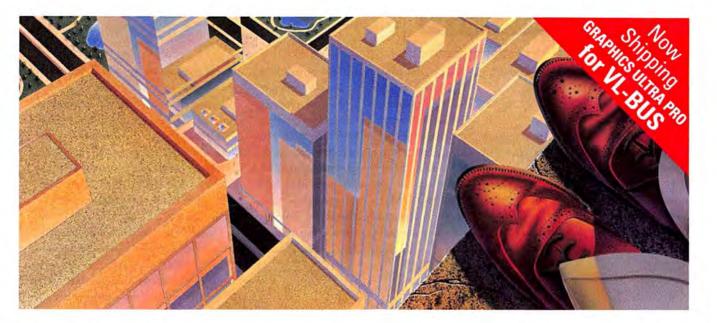
1. With your Publisher document open, locate the headline you want to format with wide letterspacing. If the headline isn't already centered, use the Selection tool to select the text, select Format • Indents and Spacing, in the dialog box select Genter; and click OK.

2. Use the Selection tool to select the headline and highlight all the characters you want to spread except the last character in the text. For example, in the headline "NEWS BRIEF" wouldn't select the F.

3. Select Format Spacing Between Characters. In the dialog box, choose Move Letters Apart, and Publisher automatically provides a default measurement in the By This Amount box. You can accept the suggested amount or type a new measurement (up to 22 points), depending on the width you want the headline to span. Click OK.



THE MAGIC OF OLE: Double-click an embedded object, such as the Windows Draw graphic, and you can edit it in its original application.



Don't Jump to a Graphic Conclusion

If you're about to take the plunge on a new graphics accelerator, get one that won't limit your future. ATI's GRAPHICS ULTRA+ and GRAPHICS ULTRA PRO give you no-regrets performance with all of today's applications. And they're perfectly poised for the leap forward into 32-bit operating systems and multimedia applications.

See Us At COMDEH/Fall'93 Get the Jump on Booth # L1114 the Latest Technology

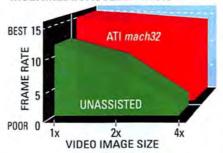
Don't let inadequate technology give you or your PC a nervous breakdown. Our mach32 Accelerator Chip and 2.0MB of standard memory accelerate graphics to heights that others can't

match. And ATI's newest accelerators



are multimedia-ready, with hardware-assisted scaling of motion video images under Windows for full screen playback.

MULTIMEDIA ACCELERATION



Software Safety Net

Software driver support shouldn't have to be a giant leap of faith... but without it, an accelerator is just an expensive VGA card. ATI gives you the best driver selection with the full security of 8514/A-compatible acceleration, plus up-to-the-minute ATI drivers for all major applications, including 32-bit environments, like OS/2 2.1 and Windows NT.1

Don't Fall Behind

ATI helps you stay on the leading edge, without going over the brink financially. Our new upgrade plan2 lets you move up to the latest hardware... at a fraction of the regular price.

GRAPHICS ULTRA+

- ► True color at 800x600 and 65,000 colors at 1024x768
- ► Non-interlaced 1280x1024 in 256 colors
- ► Flicker-free Windows, up to 76Hz refresh rate



- ► Fast DOS and graphics performance
- ▶ Enhances and accelerates Video for Windows

\$299.00³

GRAPHICS ULTRA PRO adds

- ▶ VRAM for better performance at higher refresh and greater colors
- ► Non-interlaced 1280x1024 graphics at 74Hz refresh
- ► ISA4, or VL-BUS \$499.00°

► EISA or Micro Channel \$549.00°

So look before you leap. Drop in to your local ATI dealer and let our counselors help you avoid a graphic mistake.

PCW INFO HOTLINE: INSTANT FAX BACK 1-800-234-0455 ext. 125





GRAPHICS ACCELERATORS • MULTIMEDIA • COMMUNICATIONS













Copyright © ATI Technologies Inc., 1993. ATI, GRAPHICS ULTRA+, GRAPHICS ULTRA PRO and mach32 are registered trademarks of ATI Technologies Inc. All other company and/or product names are trademarks and/or registered trademarks of their respective manufacturers. Features and specifications are subject to change without notice. Products may not be exactly as shown. '32-bit OS/2 2.1 drivers will be available in September 1993; 16-bit OS/2 2.1 drivers currently included. ATI drivers included in Windows NT package. "Tradeup plan to latest ATI products; call or fax for further information. Suggested US retail prices, dealers may sell for less. 'Mouse included with ISA versions only.

PUBLISHING & PRESENTATIONS Q & A

That's the trick—the text should now be centered correctly in the text frame.

Speeding Up Ventura

Publisher 4.1 for Windows, and I'm wondering if there's anything I can do to make it start faster. Even when I don't have any other Windows programs running, Ventura still starts slow.

Debbe O'Brien, Richmond, California

A The common culprit for Ventura's long loading is the time it takes to generate font information each time the program starts. This somewhat complicated procedure involves compiling data about the height and width of each character for all the fonts installed on your system, and then saving the data in a width table file called ENVIRON.WID. The amount of time Ventura takes to generate this file depends on your computer's speed and the number

of fonts installed for the default printer on your system.

When Ventura starts, it also loads the style sheet used at the end of your last session, and each style sheet, in turn, tells Ventura which width table to load—and therein lies the rub. Whenever a style sheet tells Ventura to use ENVIRON, WID, Ventura rebuilds the entire file from scratch—a lengthy process.

To bypass the problem, you will need to save a width table with a name other than ENVIRON.WID and apply it to your style sheets. From then on, Ventura won't waste any time rebuilding the width table each time it starts.

Here is how to save a width table under a new name—we will use CUSTOM.WID, but you can use any name you choose—and apply it to a sample style sheet we will call CUSTOM.STY.

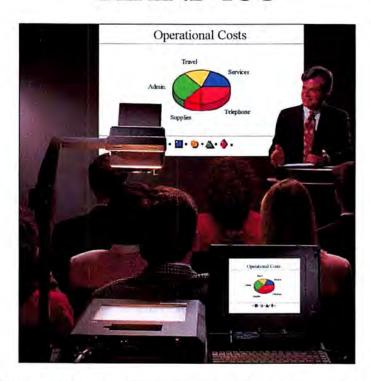
- 1. Open Ventura.
- 2. If you want to generate a custom width table for a printer other than the current default printer, select File Print Setup, choose the specific printer you want in the Print Setup dialog box, and click OK. Ventura may delay for a moment while it generates the font information it needs.
- 3. Select File Manage Width Table and click the Save As New Width Table button. In the File Name box, select a directory where you want the new table to reside, and enter CUSTOM.WID for the width table file name. Click OK twice.
- Select File Save Style As, select a directory and type CUSTOM.STY in the File Name list box, and click OK.

Now you have a custom width table. If you exit Ventura at this time and then restart it, the program should start faster since Ventura will be loading CUSTOM. STY and CUSTOM.WID instead of generating the ENVIRON.WID file. As long as you continue to apply a custom width table to the last style sheet you use at the end of each Ventura session, Ventura should continue to load faster.

By Richard Jantz

Contributing Editor Richard Jantz is an electronic publishing and presentations consultant in Berkeley, California. Publishing & Presentations welcomes your questions and make-over candidates. See page 10 for contact information.

STAND UP WITH THE INDUSTRY LEADER BEHIND YOU



If you want to have impact, your ideas have to be big. Slides and overhead film just won't do. Large images, brilliant color, crisp data, beautiful video.

Display your presentation – directly from nearly any computer or video source – with the nVIEW

Lotus Freelance
Graphics
FREE
with every ViewFrame
Spectra C panel.

projection product that is right for you.

Award-winning presentation solutions which are easy to use and completely portable.

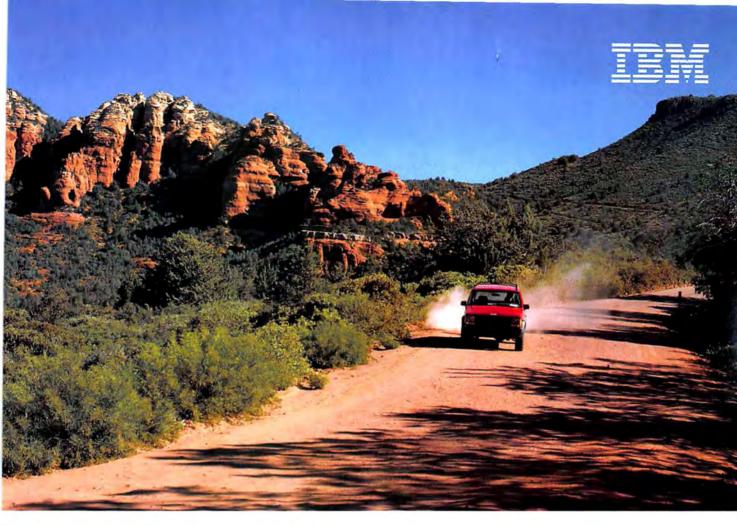
*n*VIEW. The leader in

high-performance projection displays. For more information call 1-800-736-8439 or 804-873-1354.

*n*View

VISIONARY DISPLAY TECHNOLOGIES

Circle 176 on reader service card



There was a time you couldn't expect onsite service if your site was as remote as this.

Jay Pancost IBM Customer Engineer To IBM Customer Engineer Jay Pancost, going the extra mile often means

exactly that. His service calls
take him to homes and offices
from the Grand Canyon to
the Hopi and Navajo reservations. "When you buy a PC,"
he says, "the company that
made it should be there for you
when you need them. I like the idea

of a job where people are always glad to

see me, even if they're sometimes surprised I would go so far off the beaten path." Wherever you may be, there are more than 10,000 IBM service representatives like Jay Pancost, in over 1,600 locations nationwide, at your service. Right where you want them.

If you've ever bought computers "direct," we want you to know one important thing.

IBM PC Direct

We're putting the personal in personal computing.

This time, it can be different.



L-R: Alice Robinson, Gregg McGhee, Jeff Herman and Beverly Whitman, Custom Build Technicians. IBM Personal Computer Company



ValuePoint Si

- Newest entry-level member of the ValuePoint family
- Compact size: 14.2" W x 4.8" H x 16.6 " D
- VESA Local Bus Video
- 3 slots and 3 bays
- Choice of IBM Keyboard (Basic^{††} or Enhanced)
- A great, low-cost network client
- IBM HelpWare service and support

ValuePoint SpaceSaver

- Compact size: 14.2"W x 4.8"H x 16.5"D
- 3 slots (includes 1 VESA Local Bus slot) and 3 bays
- Also available in medialess (no drives) configuration to function as an economical LAN client workstation

425SX/S

ValuePoint Desktop

- Plenty of room to grow: 5 slots (includes 1 VESA Local Bus slot), 5 bays
- A super combination of speed, power, upgradability and expandability

ValuePoint Mini-Tower

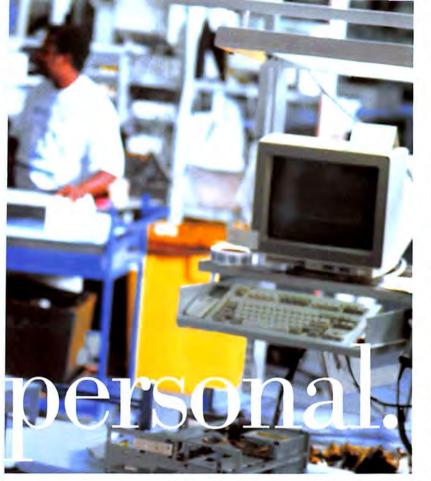
- Convenient, compact Mini-Tower processor case measures 9.5 "W x 16.8"11 x 16.9 "D
- Enormous room for growth: 8 slots (includes 1 VESA Local Bus slot), 6 bays
- Perfect format for high-powered computing (CAD/CAM, graphics, multimedia, etc.) or as a low-cost network server



466DX2/T

IBM PC Direct

We're putting the personal in personal computing.



IBM

If you don't see it here, call us. We'll custom build a system just for you.

It's a personal commitment from Alice, Gregg, Jeff, Beverly and their associates at the IBM Personal Computer Company. Thousands of IBM people — many working around the clock — to keep you personally delighted with everything we do for you.

It starts — but doesn't end — with our hot-selling IBM ValuePoint™ PCs. Take a closer look at the systems shown here. Super PCs. Super prices. But if you don't see the system you want, call us. We'll build your PCs to your specifications — and your budget.

Remember, Value Point is backed by IBM HelpWare[®], including our 30-day moneyback guarantee. No qualms. No quibbles. No questions asked. And for one year with free around-the-clock telephone assistance and fast onsite service (even in the most remote locations!) from more than 10.000 IBM service representatives in over 1,600 locations nationwide.

Call us today. And discover how we're putting the personal in personal computing.

All ValuePoint SpaceSaver, Desktop and Mini-Tower systems listed below feature: **



- Intel® i486™ processors
- SVGA VESA Local Bus Video
- Upgradability via Intel OverDriveTM technology all the way up to Pentium^{TM 3}
- 101-key IBM Enhanced Keyboard and IBM Mouse
- Zero Insertion Force (ZIF) socket for fast, easy processor upgrades
- A 32-bit VESA Local Bus slot for local bus speed on SCSI drives and other peripherals
- IBM HelpWare

	ValuePoint Si – NEW!	ValuePoint SpaceSaver	ValuePoint Desktop	ValuePoint Mini-Tower
Features	425SX/Si	425SX/S	425\$X/D	433DX/T
Processor	i486SX/25MHz	i486SX/25 MHz	i486SX/25 MHz	i486DX/33 MHz
Hard Drive/Memory	120MB/4MB	120MB/4MB	120MB/4MB	340MB/4MB
Diskette	3.5*	3.5*	3.5*	3.5*
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	6318 14" SVGA NI
Operating System	IBM DOS & WINDOWS™	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS
Price*/ IBM Credit Lease**	\$1,539 / \$56 per month	\$1,649 / \$60 per month	\$1,709 / \$62 per month	\$2,459 / \$89 per month
Features	425SX/Si	433SX/S	433DX/D	466DX2/T
Processor	i486SX/25 MHz	i486SX/33 MHz	i486DX/33 MHz	i486DX2/66 MHz
Hard Drive/Memory	212MB/4MB	120MB/4MB	120MB/4MB	527MB/4MB
Diskette	3.5*	3.5*	3.5*	3.5*
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	6319 15" SVGA FS NI
Operating System	IBM DOS & WINDOWS			
Price*/ IBM Credit Lease**	\$1,699 / \$62 per month	\$1,789 / \$65 per month	\$2,059 / \$74 per month	\$3,319 / \$120 per month
Features	433DX/Si	433DX/S	466DX2/D	466DX2/T
Processor	i486DX/33 MHz	i486DX/33 MHz	i486DX2/66 MHz	i486DX2/66 MHz
Hard Drive/Memory	212MB/4MB	245MB/8MB	245MB/4MB	527MB/8MB
Diskette	3.5*	3.5*	3.5*	3.5*
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 15V 15" SVGA FS NI	IBM 15V 15" SVGA FS NI
Operating System	IBM DOS & WINDOWS	0S/2*	IBM DOS & WINDOWS	OS/2
Price*/ IBM Credit Lease**	\$2,049 / \$74 per month	\$2,359 / \$85 per month	\$2,729 / \$98 per month	\$3,589 / \$129 per month

[&]quot;ValuePoint Si systems do not include all features listed above chart. Please refer to product details listed at left, or call for more information. ValuePoint Si prices listed reflect IBM Basic Keyboard only. The Enhanced Keyboard is available at additional cost.

Call 1 800 IBM-2YOU

refer to: EBA 1 800 426-2968 8am-midnight M-F, EDT



8am-7pm Sat., EDT
Purchase order is available for qualifying customers





It's as simple as calling Angela Hardy, or any one of our other PC consultants. ValuePoint PCs, ThinkPad® notebooks, peripherals, printers, monitors, add-ons, the most popular software and more (IBM and non-IBM) are all yours - at prices you'll find personally pleasing - when you call 1 800 IBM-2YOU. You'll speak to a PC consultant who'll either answer any question you have, or get you in touch fast with an expert who can. If you don't see it here, it's in our free catalog. And if it's not in the catalog, we can probably get it for you anyway. Either way...call!

This time you can have it all.

Save space inside your multimedia PC!

The Mwave™ WindSurfer™ Communications Adapter is a V.32 Data Modem, 9600 bps Fax/Modem and CD-quality sound system. Mwave MIDI synthesizer with instruments and MIDI port...all in one! Mwave WindSurfer Communications Adapter (92F4057).....

Eliminate LAN processing bottlenecks!

The IBM LAN Streamer MC 32 Adapter can help you increase your network's capacity and set new standards for speed and performance! No new hardware or costly facility rewiring.

Streams frames directly between system memory and Token-Ring without storing them directly in adapter. LAN Streamer MC 32 Adapter



Give your PC gigantic storage capacity!

This 3.5" Rewritable Optical Drive lets you put all your large-project files on one 127MB optical disk. You can store this disk in your desk. and free up precious hard drive space! Update data when you want. use the disk over and over.

IBM Enhanced 3.5" Rewritable Optical Drive	
(6451295)	 \$1,499
SCSI External Enclosure (35100V0)	 \$219

The easy, affordable way to go to a speedy CD-ROM.

The ISA Internal CD-ROM has a fast 300KB/SEC maximum data transfer rate - double the speed of most CD-ROM drives! You can load your operating system and applications software from a typical 600MB CD-ROM disk. You save precious hard drive space and load onto your ISA system faster. It's priced to move fast too!

IBM ISA Internal CD-ROM Drive

Upgrade to 256KB L2 Write Back Cache Memory.

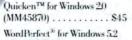
Here's a super way to boost system performance without buying a new system. This 256KB L2 Write Back Cache Memory Kit gives you an easy, standardized growth path for your ValuePoint systems.

256KB L2 Write Back Cache Memory Kit	
(60C 1626)	\$249
Cache Memory Kit 256KB (60G 1625)	\$229
Cache Memory Kit 128KB (60G1624)	\$119
IBM Video Memory Upgrade Kit (60G 1623)	\$89

Super prices on popular software!

IBM PC Direct has the popular software you want, at prices you'll love. Remember, if you don't see it here, or in our catalogs, call us. Chances are we can get it for you fast!

WinFax™ Pro (MM 13632)..... \$79 STACKER* (MM29205) . . \$95 Quicken™ for Windows 20





The IBM PC Direct™ Source Book. ValuePoint, ThinkPad, peripherals, add-ons, popular software ...it's all here and it's all yours for the asking. Call 1 800 IBM-2YOU today!



IBM prices only. The offerings, prices and products are sub-ject to change or withdrawal without prior notice. Products you acquire may not be counted under any existing Volume Purchase Agreement. The same offerings and products may be available through IBM Authorized Remarketers. Remarkete prices may vary. Shipping and handling charges are extra.

**IBM Credit Lease prices are quoted for 36-month terms.

Lease rates quoted are good through 10/31/93 after which time rates are subject to change without notice. Lease available to qualified commercial customers only. (6312 monitor depicted in photograph is currently sold out. Prices listed reflect the new IBM 14V monitor (see details in chart on previous page). I Copies of warranty and 30-day moneyback guarantee information available through IBM and IBM Authorized Dealers. Please call 1 800 426-2968 for details regarding IBM's moneyback guarantee and limited warranty, 2 Åt no additional charge during warranty period. Onsite service available Monday-Friday 8am-5pm in your time zone, APPLIES TO IBM DIRECT SALES ONLY. 3 Upgradable with Intel's future

OverDrive processor based on Pentium technology, IBM, HelpWare, ThinkPad and OS/2 are registered trademarks and ValuePoint, Mwave and WindSurfer are trademarks of International Business Machines Corporation, Intel and Intel Inside logo are registered trademarks and i486, Pentium and OverDrive are trademarks of Intel Corporation. Windows is a trademark of Microsoft Corporation. PC Direct is a trademark of Ziff Communications Company and is used by IBM under license, STACKER is a registered trademark of STAC Electronics, Inc. WordPerfect is a registered trademark of WordPerfeet Corporation. Quicken is a trademark of Intuit Corporation. WinFax is a trademark of Delrina Technology, Inc. ©1993 International Business Machines Corporation.

Call 1 800 IBM-2YOU refer to: EBA

1 800 426-2968 8am-midnight M-F, EDT 8am-7pm Sat., EDT



IBM PC Direct

We're putting the personal in personal computing.

COMMUNICATIONS Q & A

The Many Faces of Kermit

I always thought that Kermit was just an error-checking protocol, but I heard it's also a complete communications software package. Is that true? Also, when is the best time to use it as an error-checking protocol? Susan Weistman, Long Island City, New York

Like the "Sesame Street" frog, Columbia University's Kermit is a creature of many talents. It is indeed a full-fledged communications program with versions available for DOS, UNIX, VMS, OS/2, and many other operating systems. At \$34.95, Kermit is also one of the cheapest communications programs around. You don't hear much about it because its user interface is ungainly and it's not advertised the way commercial software is.

Kermit is a big favorite at universities and corporations because it's easily adaptable to complex networking environments. It's rocket fast-true Kermit is faster at transferring files than XMO-DEM, YMODEM, and ZMODEM, plus it's less susceptible to line noise and error. It also offers excellent terminal emulations, is a whiz in 7-bit mainframe environments, can be customized, and even offers a built-in TCP/IP connection. Other virtues include foreign character sets, including Hebrew, features to accommodate physical handicaps, and support for speech synthesis and Braille devices.

And what about the Kermit listed on the file transfer protocol menu in programs like Procomm and Telix? Unfortunately, it may have little relation to Kermit the communications program. The protocol is still useful, however, because it can transfer data files in 7-bit environments, including X.25-based networks, ones with IBM mainframes, ones with TCP/IP connections, and those that are sensitive to certain control characters or that employ Xon/Xoff to regulate data flow. Even if the only computers you call are BBS's, try Ker-

mit when file transfers with X, Y, or ZMODEM fail. Sometimes it's the only protocol that works on bad phone lines.

A copy of MS-DOS Kermit, the communications software, together with Christine M. Gianone's excellent book Using MS-DOS Kermit, is \$34.95 from Digital Equipment Corporation at 800/ 344-4825 or Columbia University at 212/854-3703, 212/663-8202 (fax).

Online Privacy: Should You Worry?

I recently received a Prodigy membership kit with a modem I bought. I read some government bulletins warning people away from Prodigy because it reads information from the user's computer, and when I looked at the Prodigy documentation, I spotted the

following: "The First Time You Sign Onthere may be a slight delay while your computer and the PRODI-GY service computers exchange some initial

information." What information does Prodigy take from my computer? Do other services also take information? Chuck Dodd, Tahoe City, California

There was a scare several years ago A following a rumor that Prodigy software was reading discarded file fragments on members' hard disks and transmitting them to Prodigy along with sign-up information. Steve Hein, program manager for The Prodigy Service, maintains this was never the case. "We don't upload to Prodigy any information except what Prodigy members provide us, and we never have," he says.

When you delete a file from your hard disk, fragments of it remain until the disk overwrites them with new data. According to Hein, the discarded file fragments that some Prodigy users spotted with their disk utilities were not actually part of the Prodigy configuration file, they merely occupied disk space reserved for that file. Since then Prodigy has amended its software so that it overwrites with zeros any discarded file fragments on disk sectors that Prodigy uses for configuration files.

When you first log on to Prodigy, its software collects and transmits your name, address, and password. During subsequent log-ons, the software notifies Prodigy of the menus on the service that you frequent, then downloads the menus to speed up your online time.

But could an online service with supersmart software like Prodigy's pick up confidential information from your disk? You bet. For it to be able to do so, it must be able to perform behind-thescenes communications between your PC and the service. Keep this danger in mind as the rest of the online world begins producing its own specialized

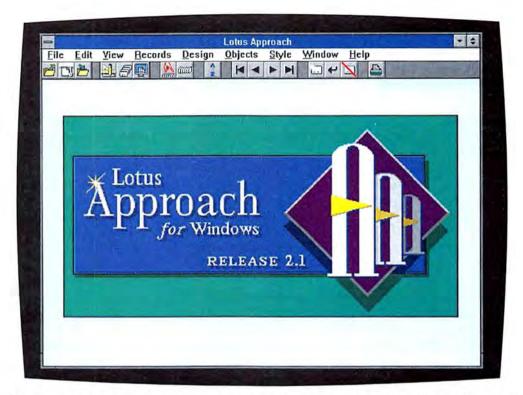
Could an online service with supersmart software like Prodigy's pick up confidential information from your disk? You bet.

graphical software. If you run a basic terminal emulation program like Procomm Plus, however, you have nothing to fear, you can see all communications between your PC and the service.

A final note: A package called The Wire, which is used for automating MCI Mail use, telecommunicates your name and your MCI Mail password to its vendor, SWFTE International, upon registration of the software. Why? SWFTE spokesperson Christy Thiele says that access to users' passwords is part of SWFTE's contract with MCI Mail. But frankly, the company doesn't appear to have any legitimate reason for obtaining this private information. If you object, avoid this package.

By Judy Heim

Judy Heim is a contributing editor for PC World and the editor of Online Investor, a newsletter about using online services to track and manage investments. Communications welcomes your questions. See page 10 for contact information.



AT 9 A.M. HE DIDN'T KNOW HOW

When Don Glor came to work on the morning of September 15.* he'd never used a database before. Two hours later he'd developed his first application - it looks like a fire truck:

actually it's a customized inventory and billing management system for the South County Fire Department, San Mateo County, CA.

Don was using Lotus^a Approach™-the only database designed for fire fighters. And lawyers and doctors and business people. And anyone who isn't necessarily a computer expert.

world is no good if you can't use it Approach is expressly designed to be easy. There's no programming to learn. No endless documen-

tation to study. And according to independent





Approach lets you get to work right away in familiar, easy to understand desktop items. You can generate reports, forms or form letters - you can even print mailing labels to match any specification.

INTRODUCING APPROACH 2.1. THE RELATIONAL DATABASE ANYONE CAN RELATE TO.

All the power and functionality in the

research. The average Approach user produces real results with their database in 2 hours."

This will surprise anyone who has tried to work with databases like Paradox* or Access* According to Don, 1 tried Access and shelved

it. It was just too difficult to get a handle on." That's not surprising considering the 543 page supplemental language reference for programmers Don would've had to pore

> through. Which looks like light reading next to Paradox's 1300 pages of programming instruction.

The difference is that their products were not designed for general business users.

With Approach you have database power that

really is accessible, and you work in one of four familiar, desktop items - reports, forms, mailing labels or form letters - that look and work just like you expect them to to help you be productive right out of the box.















AT 11 A.M. HE WASN'T SURE HOW HE'D EVER WORKED WITHOUT ONE.

NOTHING THIS EASY HAS EVER BEEN THIS POWERFUL.

Just because Approach is easy to use doesn't mean it's not powerful. This is a fully relational client/server database that received a perfect 5.0 score from PC Week Labs in both 'ease of use' and 'performance.'**

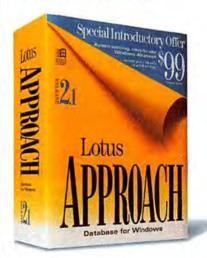
And with Approach access to existing databases is only a mouse click away. Our PowerKeyTM technology lets you work with dBASE* Paradox FoxPro.* Oracle* SOL SOL Server and DB2*** data in its native format. With no filters and no imports involved.

Letting you transparently share data across multiple databases and all popular networks with unsurpassed speed and flexibility.

NOTHING THIS POWERFUL HAS EVER BEEN THIS AFFORDABLE – JUST \$99.

For just \$99*** you can experience the database that *PC/Computing* called 'the most usable Windows™ relational database ever.'™ But this great introductory price for new Approach 2.1 won't last forever. Call I-800-TRADEUP, ext. 9073 today or visit your Lotus Authorized Reseller to take advantage

of this limited time offer. And discover the powerful relational database expressly designed for end users. Like Don Glor. And you.





Here's How

HARDWARE Q&A

Cache Bonus

The 33-MHz 486 system I recently bought lets you add up to 256K of secondary cache memory. I bought it with no cache memory at all, but now I'm told if I install some, I can get better performance. Is this true?

Doug Forester, Lexington, Kentucky

A Your system already has cache memory on the 486 chip, but some quantity of secondary (or external) cache memory is always better than none. Why? Think of secondary cache as a high-speed interchange between processor and main memory. When the 486 chip can't find the data or instructions it needs in its own very fast 8K memory cache, it tries to find it in the secondary cache, which is nearly as fast. Things get bogged down, though, when the 486 accesses main memory. The system adds wait states—processor cycles dur-

ing which the 486 spins its wheels waiting for main memory to register processor reads and writes properly.

You're lucky to have a scalable cache system so you can install as much cache memory as you need, usually 64K at a time. (Most systems either have a fixed amount of cache memory or none, and don't allow you to add more.) PC World recently tested a scalable cache system with popular desktop applications to determine the optimum secondary cache size for a 486. Our results show that installing just 64K provides a big speed boost-as much as 20 percent in one test. Beyond 128K, which further improved things by a couple of points, additional cache memory made little difference. (These benchmarks apply only to desktop PCs; servers or other systems that handle multiple simultaneous processing tasks could benefit from larger caches.)

Systems with scalable caches typically have sockets on the motherboard into which you plug fast static RAM chips or modules-the ordinary dynamic RAM used for main memory won't do. Some systems require modules from the machine's manufacturer-always more expensive than commodity static RAM from an electronics supply store. If your system accepts standard static RAM chips, check its technical documentation or call the manufacturer to find out the exact specifications. A 33-MHz machine will probably require static RAM rated at 15 nanoseconds (ns), with a choice of 1-bit, 4-bit, and 8-bit varieties. At this writing, 64K of 15ns 8-bit static RAM chips should cost \$25 to \$30.

Beyond VGA

One reason I bought a new PC was to get a sharper monitor. The one that came with my PC is supposed to

have a resolution of 1024 by 768, but I can't tell the difference between its screen image and that of my old VGA monitor. What's wrong?

Kelvin Jackson, New York

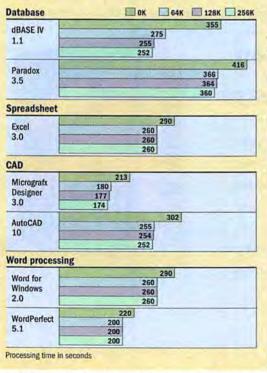
Actually, monitors don't control resolution, video boards do—and you would definitely see the difference if the video board was driving your new monitor at 1024 by 768. With most applications, you'd see 2½ times the work area (that much more of your document, spreadsheet, or whatever). Also, unless your new monitor was much larger than the old one, the text in most apps would be considerably smaller.

Assuming your monitor really can operate at 1024 by 768, why is your video board driving the monitor at VGA (640 by 480) rather than maximum resolution? Because you have to set up the board using special software drivers, which should be on a utility disk accompanying your new system's documentation. Each driver lets the board and monitor run at a higher resolution with a specific application or environment—Windows, AutoCAD, OS/2, 1-2-3 for DOS, WordPerfect for DOS, and GEM are among the most common.

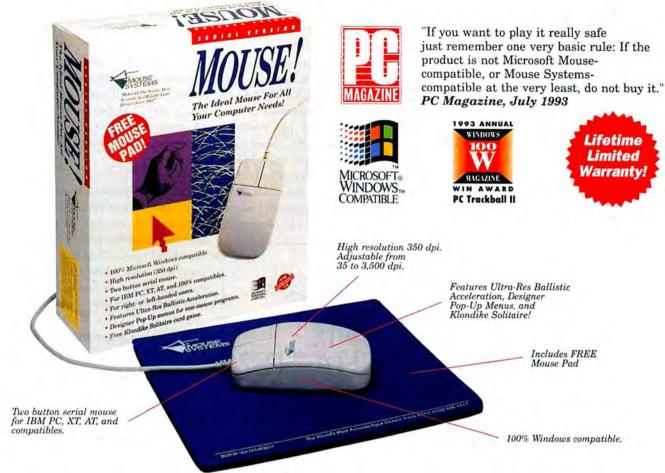
There's some good news and some bad news. The bad news is, if you don't use any of the applications or environments for which your board has drivers, you can't go beyond VGA resolution. The good news is, if you install a Windows, OS/2, or GEM driver, you can run both the environment and any application written for it at high resolution without having to change drivers.

Video boards typically come with separate drivers for 800 by 600, 1024 by 768, and sometimes 1280 by 1024 resolutions in specific color densities (Windows at 800 by 600 with 256 colors, Windows at 1024 by 768 with 16 colors, and so forth). The number of colors is limited by the amount of RAM your video board has. For example, with 1MB of RAM, your video board will top out at 1024 by 768 resolution in 256

Secondary Cache Benefits



INCREASE 486 PERFORMANCE SIGNIFICANTLY by adding a small amount of secondary cache memory.



Introducing The Ideal "MOUSE!" For All Your Computer Needs.

PERFORMANCE The "Mouse!" is a high-resolution, two-button

mouse that gives you pin-point accuracy!

QUALITY Featuring

Mouse: lets you re-assign the buttons for right-or left-handed use! a sleek ergonomic design, the "Mouse!" has been engineered to the most

exacting standards. Quality so good, we back it with a lifetime limited warranty!

COMPATIBILITY The "Mouse!" is 100% Microsoft

Windows compatible and works with all IBM PC, XT, AT,

and compatible computers!

"Mouse!

VALUE Only \$24.95 (MSRP)

Fax Back Product Information (800) RU-MOUSE

For A Dealer Near You Call

(800) 886-MICE



Copyright 1993, Mouse Systems Corporation. All registered and unregistered trademarks belong to their respective companies

HARDWARE Q&A

colors; with 512K you'd be limited to 16 colors at that resolution.

Most video driver sets come with a menudriven installation routine that copies the drivers for the applications or environments you specify from the driver floppy disk to your hard disk. Once copied, the drivers appear in the setup routine on the list of display options. Just run the setup routine, select the new driver, reboot your system, and you've got a sharper image. Here's how it works with Windows: First, either run the driver software's installation routine or copy the drivers into Windows' \SYSTEM directory. Then go into the Main group in Program Manager and click the Windows Setup icon or select File•Run, and type SETUP to run Windows' setup utility. Select Options • Change System Settings and in the Change System Settings dialog box, click on the down arrow at the right hand side of the Display list box to get a list of alternate

drivers. Select the 1024 by 768 driver you want and click *OK*. When prompted, select *Current* to use the driver you copied earlier to your \SYSTEM directory. Windows then asks if you want to restart Windows; when you do, the new driver will take effect.

Tape Misbehavin'

I recently bought an Irwin tape drive and DOS backup software from a friend who kept all the old documentation. I followed the installation procedure religiously, but when I run the backup program, my system hangs. It worked in my friend's machine; why won't it work in mine? Rhea Mandel, San Diego

Tape backup programs are notorious for conflicting with other software—device drivers, RAM-resident utilities, memory managers, any software that hangs around in memory while you try to run your backup program. If you use a RAM-resident utility that you load from the DOS prompt, and you think it might have been resident when you tried running the backup software, simply reboot your machine and try executing the backup program again. If that doesn't work, or you don't have such a utility, the conflict probably derives from a device driver or other software automatically loaded at start-up by your CONFIG.SYS or AUTOEXEC.BAT files.

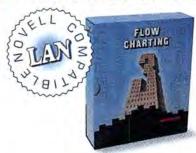
If you use DOS 6.0, you can bypass CONFIG.SYS and AUTOEXEC.BAT at start-up by pressing <F5> when the message 'Starting MS DOS' appears. (If you have an earlier DOS version, grab a boot disk, put it in drive A:, and reboot from it.) The only problem with this method is that your tape drive may require a CONFIG.SYS DE-VICE statement to work. If so, and you use DOS 6.0, press <F8> when 'Starting MS DOS' appears and you'll be prompted to confirm or bypass each CONFIG.SYS statement. Bypass any INSTALL statements and all DEVICE statements except the one for the tape drive. If you're running earlier DOS versions, create a CONFIG.SYS file on the boot disk that includes only the tape drive's DEVICE statement.

By Eric Knorr

Eric Knorr is a contributing editor for PC World. Hardware Q&A welcomes your questions. See page 10 for contact information.

ARE YOU SPENDING TOO MUCH TIME DRAWING FLOWCHARTS?

YOU NEED FLOW CHARTING™3.



Every day, professionals worldwide save time and money using Flow Charting 3. It's fast, efficient, easy to use, and always produces presentation-perfect charts and diagrams.

With Flow Charting 3's built-in flexibility, you can create customized charts using a variety of shapes, lines, and text—placed where you want them.

Plus, Flow Charting 3 is now available in a LAN version. Making it easy to share files and set up work groups for specific projects.

And it's backed with free technical support and a 90-day no-risk guarantee. So if you're spending too much time drawing charts, call for a free demo and see for yourself what makes Flow Charting 3 the best-selling flowcharting software.

See your dealer today! Or for a free interactive demo disk,call 1-800-525-0082, ext. 252

International: 408-778-6557, ext. 252

Novell is a registered trademark of Novell, Inc.



Excellence in charting the flow of ideas!

Patton & Patton Software Corp. 485 Cochrane Circle, Morgan Hill, CA 95037

Circle 233 on reader service card

This Time is Better!

TurboModem Plus. Slow and steady isn't always the best solution. In today's business world you need the fastest Fax/Modem available to stay ahead of your competition.

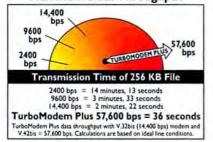
Unsurpassed Speed.

TurboModem Plus is designed for speed. At over 24 times faster than a 2400 bps modem, the TurboModem Plus trans-

with V.42bis, data throughput is accelerated up to 57,600 bps. So file transfers and screen refreshes are

mits at 14,400 bps without data compression. Coupled faster than ever before.

Maximum Data Throughput



Exceptional Performance. TurboModem Plus is fully Hayes-compatible. Be sure of error free transmissions every time with V.42 and MNP 2-4 error

> correction on the job. TurboModem Plus also includes a 14,400 bps Group III fax modem so you can send and receive faxes at your PC. The TurboModem internal card installs

quickly into your PC — or, connect the light-weight external version to your serial port in a snap. So don't be a tortoise — get the speed of a winner. From the company that continues to bring you high quality products at great prices.



Copyright © 1993, The Complete PC, Inc. The Complete PC and TurboModern Plus are trademarks of The Complete PC, Inc. Other product names or company names mentioned are trademarks or registered trademarks of their respective companies.

STAR-DOT-STAR TIPS

Time After Time

For years I tried to find a quick, easy, and aesthetically pleasing way to display the time from the DOS prompt. In your May 1993 column, you demonstrated how to ECHO a period to DOS's TIME command to get the time. But there's a better way: the PROMPT command. I've created a batch file [FIGURE 1] that uses PROMPT

```
@echo off
set | find "PROMPT=" > OLDPROMP.BAT
prompt Current time: St$h$h$h$_
echo on

@echo off
call OLDPROMP.BAT
del OLDPROMP.BAT
```

FIGURE 1: DISPLAY THE TIME from the DOS prompt using this batch file. The secret is in the blank line.

```
{CHAR}Key- {;}Menu·choices-
  {^]}1{^\}.·é··
  {^]}2{^\}..è..
  {^]}3{^\}..é..
  {^]}4{^\}..ē..
  {^1}-
{CASE}{VARIABLE}Key--
  1-Choice1-
  2-Choice2-
  3-Choice3-
  4-Choice4--
{QUIT}
{LABEL}Choice1-
  {QUIT}
{LABEL}Choice2~
  {QUIT}
{LABEL}Choice3-
  {QUIT}
{LABEL}Choice4~
  {QUIT}
```

FIGURE 2: CREATE A MINIMENU of foreign-language characters with this WordPerfect macro.

to display the time. Its blank line causes DOS to display the prompt, and its last line resets the prompt.

Gary S. Best, Somerville, Massachusetts

Editor's note: This is one of those marvelously simple techniques that's hard to discover but is so obvious after you understand it. As Best mentions, the blank line (which causes DOS to display the prompt) is the key: It lets you display any string that can be generated by DOS's PROMPT command exactly once. You can also use this technique to display the current drive and directory (\$P) or the current date (\$D). You can also display the < (\$L), > (\$G), and | (\$B) characters (which you can't put in an ECHO statement easily).

Best's original batch file always set the prompt to \$P\$G when it was finished. Because many users prefer different prompts, I incorporated commands that save and restore the old prompt instead.

Finally, one more note. The May 1993 tip that inspired Best ("Logging Log-ins") didn't actually echo a dot to DOS's TIME command. Rather, it took advantage of the fact that the command ECHO. (with no space between the word ECHO and the period) cehoes only a carriage return. The command presented in our May issue, ECHO. | TIME | FIND "Cur" >> BOOT.TXT, passes a carriage return to the TIME command, causing it to maintain the current time. But as many of our readers found out the hard way (and wrote to tell us), adding a space before the period does echo a dot to the TIME command. This resets the computer's clock to midnight. The moral: Be careful when adding spaces to "clarify" an example from a magazine, since it may change the meaning of a command.

Parlez-Vous WordPerfect?

I frequently write papers and letters in French using WordPerfect. I have trouble remembering the numeric codes for é, è, ê, ë, and other special accented characters. Assigning each character to a separate macro was also awkward; the

letter "e" can have one of four accents, so I couldn't just use <Alt>-E. And when I assigned each character to a different key, I found it difficult to remember the assignments.

I solved the problem with macros [FIG-URE 2] that allow the user to choose from a menu. For example, the macro assigned to <Alt>-E brings up the menu '1. é 2. è 3. ê 4. ë'.

Pressing the highlighted number puts that character in my document. I copied this macro to <Alt>-A, <Alt>-C, <Alt>-I, <Alt>-O, and <Alt>-U and modified it for those characters (for example, to insert the ç character). Now getting an accented character is mnemonically easy and takes only two keystrokes.

Little menus such as this one can serve other purposes. For example, I have assigned PRINT_PAGE and PRINT_FULL_DOCUMENT to <ALT>-P. In this case the menu is 'Print 1. Full Document 2. Page'.

Nathan Cummings,

Durham, North Carolina

Editor's note: In the past few issues, we've extensively covered ways of getting special characters in Word for Windows; now it's WordPerfect for DOS's turn. Note that this macro must be created using the WordPerfect macro editor, invoked by <Ctrl>-<F10>. WordPerfeet's macro editor requires you to enter different types of commands in different ways. To insert a command shown here in boldface, press <Ctrl>-<Page Up>, select the command from the pop-up list in the upper-right corner of the screen, and press <Enter>. Control characters, such as [^] and [^\], are shown in curly braces in the listing but can be typed in directly (in this case, as <Ctrl>-] and <Ctrl>-\, respectively). Each of the four accented "e" characters-é, è, ê, and ë-can be typed by holding down the <Alt> key and entering its ASCII code (130, 138, 136, and 137, respectively) on your numeric keypad. (If you want upper-case accented characters, you'll have to add them to your menu macro.) Finally, type plainly printed

Earn good money full-time, part-time, on the job, or in a new career as a PC Troubleshooter!

There's no doubt about it: Businesses spend billions of dollars on personal computers each year, even more on PC service and support. That's why Department of Labor Statistics show skyrocketing employment opportunities for PC troubleshooters — people with the hands-on skill to diagnose system failures, replace damaged chips, retrieve lost data, or troubleshoot faulty disk drives and circuit boards.

Now with NRI, you can be the one "in-the-know" when it comes to keeping today's PC systems running at peak performance. Only NRI gives you the computer, the software, and the PC troubleshooting skills to make a name for yourself in your present job, even start a moneymaking new career.

Your training includes a powerful AT-compatible computer system complete with 40 meg IDE hard drive

NRI training gives you a practical understanding of today's PCs...how they work, what can go wrong, and why. Best of all, you master state-of-the-art troubleshooting skills through hands-on training with a

powerful AT-compatible computer, 40 meg IDE hard drive, and professional diagnostic hardware and software — PC Tools, R.A.C.E.R., and Quicktech — all yours to keep!

As you work with your computer and software, you learn how to localize PC problems, identify faulty components, recommend system configurations, and replace the damaged parts that cause PC system failures. Plus you

get hands-on experience with the diagnostic tools used by the pros to keep systems up and running in today's PC-driven business world.

No previous experience necessary — only NRI gives you everything you need to succeed

NRI's step-by-step lessons and unique hands-on Discovery Learning projects prepare you completely for the real-world challenges of PC troubleshooting. Backed by the full support of your personal NRI instructor, you begin by covering important computer fundamentals — hardware and software essentials, system configurations, plus methods and procedures that show you how to localize PC problems to specific circuit boards or replaceable parts.

Then you move on to master vital PC system commands, using the MS-DOS software included in your course. You learn to resolve user error messages that commonly occur when working with spreadsheets, databases, word processors, and other PC applications. Then you take your skills further, discovering how to use DEBUG and assembly language programming to troubleshoot problems in PC operating systems and hardware. But that's not all...

Train with and keep today's top diagnostic and utilities software PC Tools

With NRI training you get first-hand experience with professional diagnostic software that makes troubleshooting PCs easy and profitable. Using PC Tools — today's top utilities software package — you

66I've located the problem. Your data has been completely recovered. ?? master skills that put you in command when it comes to retrieving lost data, handling disk drive failures, even correcting installation problems.

Quickly, you see how to use this state-ofthe-art software for everything from hard disk backup to data recovery, disk and file management, even virus and memory loss protection. But that's still not all...

Get hands-on troubleshooting experience with in-demand diagnostic hardware and software from

Ultra-X

With NRI, as with no other school, you get even more professional troubleshooting

experience as you work with the Ultra-X R.A.C.E.R. plug-in

diagnostic card and QuickTech menudriven software. Through hands-on training with these state-of-the-art diagnostic tools, you actually discover for yourself how to test the system RAM

and resolve problems that can occur with PC motherboards, parallel ports, video adapters, floppy disk drives, and more.

> By the time you complete your course, you have every basic skill you need to diagnose PC system problems fast, efficiently, and

economically. Plus you have the computer, the software, and the hands-on experience you need to start making money immediately as an NRI-trained PC troubleshooter.

Send for your FREE NRI catalog today

If the coupon is missing, write to NRI Schools, McGraw-Hill Continuing Education Center, 4401 Connecticut Avenue, NW, Washington, DC 20008.

NA.	SCHOOLS McGraw-Hill 4401 Connec	Continuing Education Center ticut Avenue, NW, Washington, DC 2000s
□ PC T □ Progr Wind □ PC A	roubleshooter ramming in C++ with	☐ Desktop Publishing & Design ☐ Word Processing Home Business ☐ Bookkeeping & Accounting
Name	(please print)	Age
Address		

Save Disk Space



PKZIP version 2.0

PC WORLD



PKWARE introduces the next generation of its award winning compression utility, giving even greater performance levels than achieved with previous releases of the software. PKZIP compresses and archives files, saving disk space and reducing file transfer time.

AWARD

WORLD CLASS Software developers, you can significantly reduce product duplication costs by decreasing the number of disks required to distribute your applications. Call for Distribution License information.

Put Your Executables on

Software Developers, save disk space and media costs with smaller executables. You can distribute your software in a compressed form with PKLITE Professional." PKLITE Professional also gives you the ability to compress files so that they cannot be expanded by PKLITE, hindering reverse engineering of your programs.



PKLITE increases your valuable disk space by compressing executable (.EXE and .COM) files by an average of 45%. The operation of PKLITE is transparent, all you will notice is more available disk space!

Compression for YOUR Application



The PKWARE Data Compression Library allows you to incorporate data compression technology into your software applications. application program controls all the input and output of data, allowing data to be compressed or extracted to or from any device or area of memory.

All Purpose Data Compression Algorithm compresses ASCII or Binary data quickly. An adjustable dictionary size allows software to be fine tuned for maximum compression or speed. The routines can be used with most popular languages, such as C, C++, Pascal, Assembly, Basic and Clipper.

9025 N. Deerwood Drive Brown Deer, WI 53223 (414) 354-8699 Fax (414) 354-8559

Internet: pkware.inc@mixcom.com

PKZIP \$47.00 PKLITE \$46.00 PKLITE Professional \$146.00 Please add \$5.50 S&H per package in the US & Canada, \$5.00 overseas Wisconsin residents add 5% state sales tax & applicable county sales tax. Visa and Mastercard accepted, no COD orders.

See us at PC Expo Booth #430

PCW10/93

USER GROUP TIP

Relief for Large Monitors

If you use a large-screen monitor with Windows, you might find your Program Manager icon labels hard to read. If so, add the line lconTitleSize=x (where x is the point size) to the [Desktop] section of your WIN.INI file. The default is 8 points, so try 10 or 12 instead. Remember, you'll need to restart Windows for the change to take effect. If you find that the labels overlap, increase the number in Icon-Spacing= and restart Windows again.

> **Lois Moore National PC User's Group**

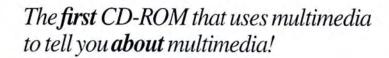
text as it appears in FIGURE 2. Note that spaces after the periods in lines 2 through 5 are represented by a small dot in the middle of the character cell (.). The macro can be found in PC World Online's Featured in October folder as ALTE, WPM.

Outsmarting FoxPro

FoxPro for Windows' query builder utility lets you construct complex queries easily without having to know SQL, but it can slow you down (and therefore hurt your productivity) if you use it many times for the same (or similar) queries. Luckily, there's a way to avoid that overhead: Save the query builder's SQL output and use it instead of the utility from then on.

Here's an example of this technique. One of my organization's FoxPro programs prompts the user for a part number, then uses that number to create a query and generate a report. The program looks like the list on the left side of FIGURE 3.

This program took approximately 12 minutes to run. Once the query was built, however, pressing the See SQL button brought up a window with the SQL commands that were actually used for the query. My colleagues and I discovered that you can copy and reuse these commands by taking the following steps. First, press the See SQL button to reveal the query. Then, select all of the SQL code in the window, and choose



The Guided Tour of Multimedia





Over 20 hours of fact-packed interactive multimedia information for beginners and professionals!



VIDEO Capture/Playback video



SUUNU Add music and voice-over



ANIMATION Makes your work fly

The Guided Tour of Multimedia

You'll experience the exciting world of multimedia first hand. The power, the potential, and the easy, step-by-step ways you can harness this useful tool for business, education... or just plain fun! Experience the wonder of multimedia yourself! It's easy to order!

Call 1-800-942-4000 Just \$39<u>95</u>

(plus applicable taxes and \$3.50 for shipping and handling)
Please have your VISA or MasterCard ready when you call.
Or send your check or money order to:
The Guided Tour of Multimedia, 914 S. Hoover St, Los Angeles, CA 90006.





Circle 259 on reader service card

Here's what you need to run The Guided Tour of Multimedia

- PC 386SX or better
- Windows 3.1 or 3.0 with Extensions
- 4MB RAM recommended
- 30MB hard disk
- VGA display, 256 colors
 CD-ROM drive

8-bit sound board



STAR-DOT-STAR TIPS

- * Part number retrieved from user
- * is in the variable search part;
- * e.g. search_part = '1234578'
- .
- * Build Bill of Materials report
- * using form bom.frx

open &searchfile repo form bom.frx for catpartno=search_part to printer noconsole

- * Part number retrieved from user
- * is in the variable search_part;
- * e.g. search_part = '1234578'
- * Build Bill of Materials report
- * using form bom.frx

select *:

from &searchfile; where catpartno in (search_part); into cursor query report form bom.frx to printer

FIGURE 3: REPLACING FOXPRO FOR WINDOWS' query code with its SQL equivalent speeds up searches dramatically. This procedure also cuts down on programming and debugging time.

Edit • Copy from the menu to copy the text to the clipboard. Next, edit your program and choose Edit • Paste to replace the original code with the SQL. The result looks like the list on the right side of Figure 3.

The report now takes 3 minutes to generate instead of 12. We've also found that this procedure cuts down on our programming and debugging time; we're able to see how our queries translate to SQL, and improve their efficiency, before incorporating them into our programs.

Larry Carnes, Columbia, South Carolina

Editor's note: Any program that translates queries from one form to another needs some time to do the work, and avoiding reuse of FoxPro's query builder is one good way to save time. Don't bother using this technique for extremely simple queries; but when your queries get complex, this may be essential for fast report generation.

DOS 6.0 Double Trouble

I use the Mirror undelete/unformat utility in Central Point's PC Tools on a drive compressed with DOS 6.0's DoubleSpace, and was unable to resize the compressed volume until I discovered the following secret.

If you try to resize the DoubleSpace drive while using Mirror, you'll get the error message, 'Drive C: is too fragmented to resize', followed by a recommendation to first run CHKDSK /F C: and DEFRAG /O /H C:.

Yet no matter how many times you issue the prescribed commands, you won't be able to resize your drive. Here's why: When you run the Mirror program, it creates a file called MIRORSAV.FIL in the root directory. The file has the attributes "read-only," "system," and "hidden," and is located at the very end of the DoubleSpace com-

pressed volume file. In order to change the size of the volume, the file must be moved away from the end. However, while DEFRAG will move hidden files if you specify the /H switch, it simply refuses to move read-only or system files for fear of disrupting a copy protection scheme.

To get around this problem, from the root directory of the DoubleSpace drive, run the command ATTRIB +I -S MIRORSAV.FIL to remove the hidden and system attributes (ATTRIB won't remove the system attribute of a hidden file). Defragment the drive with DEFRAG /Q /H C: then issue the DBLSPACE /SIZE command, which now will work. To complete the process, add back the hidden and system attribute using the command ATTRIB +H +S MIRORSAV.FIL. By the way, DOS 6.0's README.TXT file offers a similar solution, but mistakenly omits the critical -H switch from the ATTRIB command.

Jeffrey T. Rusch, Baraboo, Wisconsin

Editor's note: This letter came just in time to answer questions I'd received from many readers who were having problems with DoubleSpace. PC Tools' MIRROR (and the equivalent MIRROR program that shipped with DOS 5.0) aren't the only tools that leave hidden, system, and read-only files on the disk; so do Norton's IMAGE utility and several others. Until Microsoft installs an option to allow DEFRAG to move any file (and the company has not announced any such plans), Rusch's approach is the best way to resize your disk.

Edited by Brett Glass

Brett Glass is a contributing editor for PC World. Star-Dot-Star welcomes your macros, batch files, short programs, or tips. See page 10 for contact information.

PC WORLD GIVES YOU A WINNING HAND!



Tired of flipping through user manuals?

Can't find the user manual? Need lightning-quick access to key commands and features?

Need a software reference you can take anywhere?

PC WORLD'S NEW INSTANT REFERENCE CARD IS YOUR BEST BET.

This monthly pullout card gives you a full house of tips on using essential applications. One side provides basic commands that get you started; side two raises the stakes, with advanced pointers to help experienced users squeeze every bit of productivity out of their software and hardware investment.

LOOK FOR THESE INSTANT REFERENCE CARDS:

WordPerfect
Microsoft Word
Windows 3.0
Procomm Plus
Ventura Publisher
Paradox
Excel
PageMaker
1-2-3
DOS
CompuServe
...and more!

PC WORLD

Instant Reference Card #41

For use with PC World Instant Reference Card Portfolio

WORDPERFECT 6.0 FOR DOS

You can display WordPerfect 6.0 in text, graphics, or page mode and optionally display its menu bar, Ribbon (to change text), and Outline Bar. Graphics and page modes can display the Button Bar. < Alt>-< Equal> or right-clicking activates/deactivates the menu bar, visible or not. To open a menu, click its name; or hold <Alt> or activate the menu bar, then press its underlined or highlighted letter.

Note: Keys to press are shown here in boldface. Keys to press simultaneously are joined by a hyphen. A bullet (*) links menu, option, button, check box, and dropdown list box names in a series.

USING THE BUTTON BAR

You must use a mouse to select Button Bar buttons. Use 👗 , 🔻 , 🤜 , or to see more buttons. You can display or hide the Button Bar, change its location display another prepared button set, create your own sets, or edit any set.

Button	Task	Keyboard or mouse		
File Mgr	Open File Manager dialog box when no block selected	<f5> or File • File Manager</f5>		
Elle is	Save file or block into other file, directory, or format	<f10> or File • Save As</f10>		
福	Print or fax page(s), document, or blocked text	<shift>-<f7> or File • Print/Fax</f7></shift>		
Provide	Preview printout of page(s), document, or blocked text	<shift>-<f7>7 or File • Print Preview</f7></shift>		

CUSTOMIZING THE DISPLAY (continued)

Display/hide code window <al><Alt><F3> or View • Reveal Codes

Tile/cascade document Window . Tile/Cascade

windows

Click Ribbon's Mary , double-click choice; Magnify/shrink view

or View . Zoom, select size

MOVING THE CURSOR AND BLOCKING TEXT

To move the cursor, click a location or use the cursor keys or commands below. To block text, click and drag the mouse pointer over the text, or turn Block on and move the cursor using the keyboard, or use multiple mouse clicks.

<Ctrl><Home> or Edit • Go to (if Block is off). Go to next occurrence of character/<Enter> character /hard return

Go to last cursor position <Ctrl>-<Home> or Edit • Go to, <Ctrl>-<Home>

<Ctrl>-<Left>/<Ctrl>-<Right> Go left/right one word <Home>, <Left>/<Right> Go to screen's left/right side

<Home><Home>, <Left>/<Right> Go to start/end of line

<Home><Home>, <Left>/<Right> Go to start/end of line. including codes

<Ctrl>-<Up>/<Ctrl>-<Down> Go to beginning of previous/

next paragraph

Go to top/bottom of screen

<Home>, <Up>/<Down>; or <Gray Minus>/<Gray

Minus>/<Shift>-<Gray Plus> with Num Lock on

Plus> with Num Lock off or <Shift>-<Gray

Fold

<Ctrl>-<F8> or Font • Font Set font size etc of subsequently typed or blocked text <Ctrl>-<F3>3 or Switch to graphics mode View · Graphics Mode <Ctrl>-<F3>2 or Switch to text mode View . Text Mode <Alt>-<F12> or <Shift>-<F8>37 Label envelope or Layout . Envelope Check spelling of document, <Ctrl>-<F2> or <Alt>-<F1>1 page, or blocked text

<Alt>-<F1>3 or Tools • Writing Check grammar of document, Tools • Grammatik page, or blocked text <F5><F4> Search QuickFinder indexes

<Alt>-<F11> or <Alt>-<F7> Edit table when no block 22 or Layout . Tables . Edit selected <F2> or <Shift>-<F2> Search document for word

or formatting code View . Button Bar Setup . Select different Button Bar Select

View . Button Bar Setup . Change Button Bar's position or style Option

CUSTOMIZING THE DISPLAY

GrphMode/TextMode button; <Ctrl>-<F3>, 3/2; Display in graphics/text or View · Graphics Mode/Text Mode mode <Ctrl>-<F3>4 or View • Page Mode Display in page mode

View • Pull-Down Menus/Ribbon/Outline Bar/ Display/hide menu bar/Ribbon/Outline Bar/Button Bar **Button Bar**

BBar Opt button or View . Button Bar Setup . Choose display style of **Button Bar buttons** Options, Picture and Text/Picture Only/Text Only BBar Opt button or View . Button Bar Setup . Choose Button Bar's screen

Options • Top/Bottom/Left Side/Right Side position View · Horizontal Scroll Bar/Vertical Scroll Bar Display/hide scroll bars

<Ctrl><Home> or Edit • Go to, <Up>/<Down> Go to beginning of first/last line of page or column Go to beginning of first line <Page Up>/<Page Down> of previous/next page Go to beginning/end of <Home><Home>, <Up>/<Down> document <Home><Home>, <Up>/<Down> Go to beginning/end of document, including codes <F12>, <Alt>-<F4>, Edit • Block, or select block Turn Block on (indicator appears at window's bottom) Double-click word Block word Triple-click sentence or Edit • Select • Sentence Block sentence Quadruple-click paragraph or Edit • Select •

Edit · Select · Page Block page <Esc>, <F12>, <Alt-<F4>, edit block, or click Turn Block off

Paragraph

EDITING TEXT

Block paragraph

<Ctrl>-X or Edit • Cut Cut block to clipboard <Ctrl>-C or Edit • Copy Copy block to clipboard <Ctrl>-V or Edit • Paste Paste from clipboard Drag to location; or <Ctrl>-<Delete> or Edit • Cut Move block

and Paste, go to location, <Enter>

<Ctrl>-drag to location; or <Ctrl>-<Insert> or Copy block Edit • Copy and Paste, go to location. < Enter> <Delete>/<Backspace> Delete block or current/pre-

vious character if Block off <Ctrl>-<Backspace> or <Ctrl>-<Delete> Delete word if Block off <Ctrl>-<End>/<Ctrl>-<Page Down> Delete to end of line/page

PC WORLD

Instant Reference Card #41

For use with PC World Instant Reference Card Portfolio

WORDPERFECT 6.0 FOR DOS

FORMATTING

Justify blocked paragraphs or current and subsequent paragraphs if Block off

Indent paragraph's first line

Indent paragraph's left side

Indent both sides

Set hanging indent

Bold block

Italicize block Underline block

Set font/point size for block or

text up to next font/point-size code if Block off

Set point size of block proportionally larger or smaller

Set block to superscript/

subscript

text if Block off

Fold

Click Ribbon's Left I, double-click choice; or Layout . Justification . Left/Center/ Right/Full

Go to start of paragraph, <Tab>

<F4> or Layout • Alignment • Indent

<Shift>-<F4> or Layout • Alignment • Indent

<F4><Shift>-<Tab> or Layout • Alignment •

Hanging Indent

<F6> or <Ctrl>-B or Font • Bold

<Ctrl>-I or Font • Italics

<F8> or <Ctrl>-U or Font • Underline

Use Ribbon's Courter 10cpt F / 12pt : or <Ctrl>-<F8> or Font • Font, 1/2 or Font/Size, select font/size, OK

<Ctrl>-<F8>4 or Font • Font • Relative Size. select size, OK; or Font . Size/Position. select size

<Ctrl><F8>5, 2/3, OK; or Font • Size/Position or Font . Font . Position, Superscript/

Subscript

Set color of block or subsequent <Ctrl>-<F8> or Font • Font, Color, select

WORKING WITH TABLES

Create table -<F7>21 or Layout • Tables • Create; select number">Create; select number

of columns and rows. OK

-<F7>21, 1/2, Close; or Layout • Tables • Create • Convert text

Tabular Text or Parallel Columns • Close to table

Edit table Tbl Edit button or <Alt><F11> or Layout • Tables • Edit Set row height -<F7>2233">Alt>-<F7>2233 or Layout • Tables • Edit • Row • Fixed, type

height, OK

Set column width <Alt>-<F7>2228 or Layout • Tables • Edit • Column • Width.

type width, OK

Insert column(s)/ <Alt><F11> or Layout • Tables • Edit, Ins. 1/2 or Columns/ Rows, 3 or How Many?, number, 4/5 or Before Cursor row(s) before/after

cursor Position/After Cursor Position, OK

Delete column(s)/ -<F11"><F11> or Layout • Tables • Edit. Del, 1/2 or Columns/

Rows, 4 or How Many?, number, OK row(s)

WORKING WITH TOOLS

Check spelling

Speller button or <Alt>-<F1>1 or Tools • Writing Tools •

Speller, choose type if Block off, OK

Replace word with <Alt>-<F1>2 or Tools • Writing Tools • Thesaurus

synonym

WORKING WITH OUTLINES AND STYLES

You can have up to eight levels in your outline. Level text is outline text; other text is body text. An outline family consists of the line containing the cursor, its subordinate lines, and following body text. Buttons shown here are on the Outline Bar.

Begin new outline

<Ctrl>-<F5>1; or Options or Tools • Outline, Begin New Outline. Double-click style

Edit current outline

<Ctrl>-O or Tools • Outline Options • Edit Change body text to outline text/ III; or <Ctrl>-T; or <Ctrl>-O, #/T; or

outline text to body text

Tools . Outline . Change to Outline Level/ Change to Body Text

Hide/show all sublevels of outline family

| or <Ctrl>-0. <Gray Minus>/<Gray Plus>

Collapse or expand outline

Show or <Ctrl>-OS, select level

Hide/show body text

Hide Body / Show Body ; or <Ctrl>-OB or <Ctrl>-0, <Tab> or <Ctrl>-Promote/demote outline family

<Left>/<Shift>-<Tab> or <Ctrl>-<Right> <Ctrl>-0, <Ctrl>-<Up>/<Ctrl>-<Down>

Move family up/down outline Change outline's style

Style | Paragraph | or <Ctrl>-OY or Tools . Outline . Outline Style: double-click style

Exit outline edit mode

End outline

Tools . Outline . End Outline or <Ctrl><F5>5

<F7> or <Esc> or <Ctrl>-0

WORKING WITH MACROS

<Ctrl>-<F10> or Tools • Macro • Record, name, <Enter>, enter macro text/commands, <Ctrl>-<F10> or Tools • Macro • Stop

Display macro button bar

Record macro

BBar Sel button or View . Button Bar Setup . Select. Double-click MACROS; or select MACROS, 1 or Select

Create macro button

View . Button Bar Setup . Edit . Add Macro. Select name, Select: or double-click macro name. OK

Run macro

<Alt>-<F10> or Tools • Macro • Play, Name, <Enter>

Check grammar

Gramatik button or < Alt> < F1>3 or Tools • Writing Tools •

Grammatik, Q when done

Print file, page(s), or blocked text Print preview

Print button; or <Shlft>-<F7> or File • Print/Fax, select options, Print Preview button or <Shift>-<F7>7 or File • Print Preview

Search button or <F2> or Edit • Search Search for text

Search and replace <Alt>-<F2> or Edit • Replace

WORKING WITH FILES

File · New Create new file

File . Open or <Shift>-<F10>. Type name, OK; or Open existing file

use File Manager

<F5> or File • File Manager

Open File Manager

<Shift><F1>57 or File • Setup • Location of Files • Set default directory

for documents

Documents, type path or use Directory Tree, OK <Ctrl>-<F12> or File • Save

Save open file

Save open file into other file, directory, or format

Save As button or <F10> or File • Save As, type/ select path/name/format. OK

Assign/remove password for file

<F10><F8>, type password, <Enter>, retype password, <Enter>, <F6> to remove

Merge file into current file

<Shift>-<F10><Shift>-<F10> or File • Retrieve. Type path/name, <Enter>

Turn Undo on/off

<Shift>-<F1>34 or File • Setup • Environment •

Allow Undo, OK

Undo last change if Undo on <Ctrl>-Z or Edit • Undo

Set file's margins <Shift>-<F8>2 or Layout • Margins, set document margins, OK

Set default font/font size or Font/Size, select font/size, OK

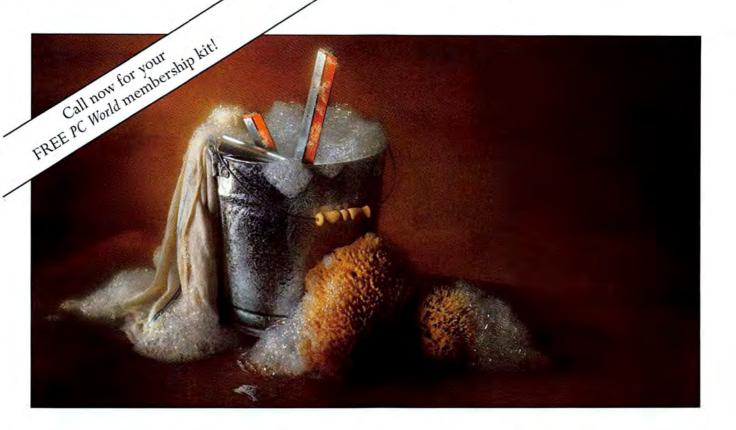
<Shift>-<F8>13 or Layout • Line • Line Spacing; Set default line spacing

<Ctrl>-<F8><Shift>-<F1>1 or Font • Font, 1/2

type spacing or use buttons, OK

Layout . Tab Set, set tabs, OK Set tabs

For use with PC World Instant Reference Card Portfolio



CompuServe does Windows.

Introducing a whole new way to look at CompuServe: CompuServe Information Manager for Windows (WinCIM"). It's a fully integrated Windows application, and lets you

take advantage of Windows when you're on CompuServe. It'll make your session faster, more efficient, easier, and a lot more fun.

With the help of icons and pull-down menus, you'll

find your CompuServe time is almost effortless. Cruise the forums, browse through your messages, download files — it's all about as simple as clicking a mouse button.

And with WinCIM you can do more offline, too. That means everything from writing letters to reading the answers to your hardware and software questions can be done

much more economically.

PC World is now available on CompuServe, too, with a special introductory offer: order now, and get a free membership kit (new members only, please),

including a \$15 usage credit. Just call 1 800 848-8199 and ask for the

PC World representative. Outside the United States and Canada, call 1 614 457-0802.





Help end the class struggle.

Here's your chance to train the next generation of knowledge workers before they show up for work.

Donate your unused computers, software, and peripherals directly to your local school.

Or contact Computers for Classrooms at one of the numbers below, and we'll direct your donations for you.

Either way, your generosity will pay off in gigabytes. Because instead of tossing your equipment out, or selling it for a few cents on the dollar, you'll be providing our classrooms with the most powerful teaching aid since teachers.

And getting a tax deduction in the bargain.

So donate the best—and most—equipment you can afford. When you do, you'll be helping a whole new class of people to succeed.



COMPUTERS FOI CLASSROOMS

With Prices This Low, By The Time You Read This, It May Be Too Late.

As recently as September of 1993, these Texas Instruments printers were winning major awards. Today, we're selling them at incredibly low prices*. And tomorrow, we just may be sold out.

















microLaser™ Plus Entry Level Windows Solution

9 PPM HP LaserJet® II Emulation 68000/TI ASIC

14 HP fonts Prints TrueType fonts

NOW \$669

microLaser PS17 Affordable PostScript® Solutions

9 PPM HP LaserJet II/PostScript Emulation 68000/TIASIC

17 scalable fonts Prints TrueType fonts

OW \$765

microLaser PS35 Affordable PostScript Solutions

9 PPM

HP LaserJetII/PostScript Emulation 68000/TLASIC 35 scalable fonts

Prints TrueType fonts

microLaser Turbo PostScript for the Power User

9 PPM

HP LaserJet II/PostScript II Emulation

RISC/8220

35 scalable fonts Prints TrueType fonts

All printers come with a 1 year limited warranty. AppleTalk® kits available for Mac users for an additional \$50.00.

Current microLaser Owners: TURBO UPGRADE KIT

Was \$1250 NOW \$399!!

Call for immediate delivery before it's too late.

TI EXPRESS 1-800-847-2787 Ext. 200

PCs COMPLEAT 1-800-669-4727

CDW 1-800-884-4CDW

USA FLEX 1-800-888-2702

INSIGHT 1-800-859-5615

THIRD WAVE 1-800-880-7555

MacUser MacUser MacUser



*Dealer prices may vary. *Limited warranty, see dealer for details, AppleTalk and TrueType are registered trademarks of Apple Computer, Inc. HP LaserJet is a registered trademark of Hewlett-Packard, Inc. microLaser is a trademark of Texas Instruments. @1993 T1

FIVE YEARS IN THE MAKING

THE MIS PROMIS

 ${f F}$ ive years!? How do you guys do it? How do you manage to be successful with all the big boys dropping their prices?" At MIS, not a day passes without being asked those questions. The answer is simple. MIS builds a better computer. We have steadfastly believed that our customers realized how much a computer actually costs when, after a six week wait, it shows up in your office with a defect or, a malfunction occurs in 1 out of 3 systems within the first year of use. We know that you want a well built and reliable computer that satisfies your company's requirements and you want it now.

if you're looking for an all-around solid performer at a good price, the M466 should make your short list

- PC World

what emerges is the kind of quiet, unassuming machine that will sit in your office, do everything you need done, never give you a day's trouble and become an old friend about five minutes after you open the box. And it will run faster than is allowed in some states."

- InfoWorld Direct



Celebrating five years of quality products



PROMIS MT

486SX/25 through 486DX2/66 Local Bus or EISA, Pentium socket in a Mid-Tower case. Starting at \$1,795

PROMIS MAT

486SX/25 through 486DX2/66 Local Bus or ISA, in a mini AT case and easy upgrades. ZIF! Starting at \$1,495

PROMIS SL

486SX/25 through 486DX2/66 Local Bus or ISA. Slimline case for the work station. Starting at \$1,495

PROMIS AT

486SX/25 through 486DX2/66 Local Bus or EISA, Pentium upgrade and a full size AT case. Starting at \$2,195



MADE IN THE U.S.A.

To order or for more informations, please call toll free

1-800-733-9188







Prices and terms are subject to change without notice. 30 days money back does not include shipping charge. CA residents add appropriate sales tax. No surcharge on credit card purchases. Personal and company checks require 2 wks clearance. The Intel Inside Logo is a trademark of Intel Corporation. All other names and logos used here are registered trademarks of their respective companies.

Video Training for Windows Applications

Mark Wright is your personal Windows 3.1 software expert. His corporate training experience will dramatically increase your understanding of Windows in these videos. Train your entire staff for one low price.



Learning Microsoft® Windows 3.1

Beginning Video \$49.95 Advanced Video \$49.95 Special Both videos \$89.95

DOS & Windows Basics Video \$49.95



Over 3-1/7 boars of architection per set

James Meyer is a seasoned expert at programming databases. He currently teaches database management, writes course texts, and designs coursewere as an associate faculty member of Arizona State University.



Learning Microsofte Access**

Beginning Videe \$49.99 Intermediate Video \$49.99 Advanced Video \$49.99

Special All three videos \$134.95



Terri Clark teaches Excel by using common spreadsheet functions as examples. Her teaching approach to Excel gives you the ability to utilize this powerful program within your personal working environment.



Learning Microsoft® Excel 4.0

Beginning Video \$49.95 Advanced Video \$49.95 Macros, DDE, OLE, Name Ranges \$49.95 Special All three videos \$129.95



Over 31/2 hours of instruction per set

Charlie Bass is a public speaker, professional trainer and Microsoft expert. He has a passion for creating professional business presentations and knows Microsoft PowerPoint inside and out.



Learning Microsoft® PowerPoint™ 3.0

Beginning Video \$49.95 Advanced Video \$49.95 Special Both videos \$89.95



Kurt Hills makes learning Word a snap, taking you step-by-step through the functions and features in minutes. KeyStone videos quickly increase employee productivity and are perfect for new hires.



Learning Microsoft® Word 2.0

Beginning Video \$49.95 Advanced Video \$49.95 Special Both videos \$89.95



Over 31/2 hours of instruction per set

Dave Bellamy is a graduate of the Colorado School of Mines with 17 years experience as a project manager. He currently consults with large and small companies as a project management trainer and specialist.



Learning Microsoft® Project 3.0

Level I Video \$99.95
Level II Video \$99.95
Level III Video \$99.95
Level IV Video \$99.95
Special All four videos \$359.95





MS FoxPro 2.5 (2 videos)	\$99.95
Windows for Workgroups	
MS Mail	
MS Schedule+	

Special Video Combinations

Windows for Workgroup Set	\$144.95
Microsoft® Office	\$299.95
Microsoft@ Office Pro	\$429.95
Microsoft® Office Plus	\$549.95



We Promise You Will Learn with a 30-Day Money Back Guarantee.

Shipping: \$5,00 for the first two video tapes; plus \$1,50 for each additional video tape

3 Easy Ways to Order:

Call 1-800-748-4838

Fax 1-801-373-6872

Mail 125 East 300 South, Suite 205 Provo, UT 84606 **IBM PS/2 SIMM MODULES**

WE ACCEPT PO'S FROM QUALIFIED FIRMS

NO SURCHARGE FOR MC, VISA AE & DISCOVER

CACHE MEMORY	CPU UPGRAD 386 DX, SX
--------------	--------------------------

	15NS	20NS	25NS	
5Kx8	8.00	7.00	6.50	
32Kx8	9.50	8.00	7.50	
64Kx1	14.00	8.00	7.00	
64Kx4	12.00	10.00	8.00	
16Kx4	9.00	7.00	5.00	
128Kx8	-	54.00	39.00	

Individual

Boost your speed by 56 Comes with Cache so Change existing CPU C	oftware
Cyrix 486 DLC 40MHZ	199.00
33MHZ	179.00
25MHZ	118.00
Cyrix 486 SLC 33MHZ	159.00

INTEL

D-RAM Chips					Math Ch	ips
MI IMegx1 1Megx4 1Megx4 (Zip Pack) 256 x 4 Video Zip) 256 x 1 256 x 1 256 x 15(S)	525 24.00 25.00 - 4.75 3.20	70NS 4.75 20.00 21.00 4.50 2.80	8 APPL 80NS 4.50 18.00 19.00 15.95 2.60 29.50	12.95 2.40	8087-2 8087-2 8087-1 80287-XL 80287-XL 80387-20 DX 80387-20 DX 80387-20 DX 80387-20 DX 80387-20 DX 80387-20 DX 80387-20 DX 80387-20 DX	49.00 69.00 89.00 74.00 54.00 59.00 89.00 89.00
54x4 54x1	2	2	3.00	2.00	Intal 16SX Intal 20SX	54.00

SIMM MODULES (Add \$5.00 for SIPP)

1Meg x 9 4Meg x 9 16Meg x 9 (9 chip) 16Meg x 9 (36 chip) 256 x 9	40NS 59.00	53NS 54.00	60NS 45.00 179.00	70NS 41.00 150.00 990.00	80NS 40.00 144.00	100NS 37.00
16Meg x 9 (9 chip)	-	-	-	990 00	-	-
16Meg x 9 (36 chip)		-	-	819.00		-
256 x 9	+	+	20.00	19.00	18.00	17.00

72 PIN SIMMS (EISA)					
80	-	-	-	50.00	-
eo	-	-	89.00 165.00 329.00	84.00	-
		179.00	165.00	160 00 319 00	-
		333 00	329.00	319.00	-
0	-	719.00	649.00	639.00	
ā		-	1899.00	639.00 1899.00	-
ea		-	5000.00		-

CYRIX FASMATH PROCESSOR

Programs executed	up to 3X faster • Plug & object	t code compat. w/Intel
83D87-40MHz - 99.00	83087-33MHz - 84.00	83S87-25SX Ver 79,00
83S87-33SX - 99.00	PC Week*	rated #1 over all math chips
5 Year	Warranty . "All Downward Co	impatible"

AST MEMORY MODULES					
ge 12-386 86/25, 33	AMT. UPGRADED 4Meg Kit 2Meg Kit 6Meg Kit 4Meg 8Meg Kit	AST PART 6 500510-004 500780-005 500780-001 500987-002 500987-003	PRICE 179 00 120 00 298 00 165 00 330 00		

DIAVU 400/23, 33	Zwieg Nit	300/00-003		120.00
Bravo 486	4Meg	500780-001		298.00 165.00
w	8Meg Kit 16Meg	500987-003 500987-004		330 00 655 00
Premium 386/25, 16 SX Premium 386/33	1Meg	500718-001 500718-002		55.00 56.00
Premium II 386SX20, 486-25, 25E, 33	1Meg	500780-003 500780-004	WPB	160.00
Premium Tower, 386/331E, 486/25TE, 486/33TE	8Meg	500780-001	WPB	320,00
Cupid Memory Board	0-32Meg	500818-001		149.00
The second second	-	THE PERSON NAMED IN		

ZENI	TH MEMORY	MODULES	5
E 00 010	AMT. UPGRADED	AST PART	PR

MODEL AMT. UPGRADED AS	A3800ME	50.0
386/33, 25, 20, 33E 1Meg 2386/33, 25, 20, 33E, 486/25E 4Meg 2	A3800MK	160.0
386SX 2Meg	Z-605-1 modules	99.0

MAGNAVOX

286/386SX-	16. 386SX-20, 486SX	-20 & 386-33 all are	72PIN SIMM:
1MEG - 50.00	4MEG - 149.00	8MEG - 309.00	16MEG - 669.00

MEMORY BOARDS

BOCA AT PLUS

16 BIT MEMORY BD. FOR 286, 386 AT - OK-SMog Bd. 4.0 LIM Compat. - New Yr, Warr. Convent. Exped. 8 Edited Memory - Supports DDS, DS2. LIMEMS & EMBA - VERSIBLE SOM Memory Addressing - Operatives in CPU Secretic to 33 Mitr. Supports Desayver, Mutilitatis expensions - 8d, made by Boca Research, AT plat OK. - 580, DO 286g - 1519, DO 486g - 2529, D0 686g - 3529.

BOCA XT 8 BIT BUS

ory for XT • Lim 4.0 compat. 0-2Meg • Uses 256x1-100 00 1Meg \$179.00 2Meg - \$219.00

8 BIT OR 16 BIT MEMORY BD.

0-K - \$144,00

32 BIT MEMORY BD. FOR EISA BUS

0-128Meg Uses 1,2.4,8,16,32Meg 72 Pin Simms

O-K - \$239.00 PS/2 MODEL 50, 60 EXP. MEMORY BD.

0-32Meg Uses IBM or Industry Standard 72 Pin Simms 0-K - \$179.00

IBM P/S2 32BIT EXPANSION BD.

0-32Meg. Ext.-Exped. Memory Bd. for P/S2 70, 80, 90, Lim 4.0 2Meg. 4Meg. 8Meg. 16Meg. 32Meg. OMeg 2Meg 4Meg 6Meg 15Meg 32Meg 5179.00 \$258.00 \$328.00 \$477.00 \$799.00 \$1,499.00

PS/2 MCA 0-8MEG EXPANSION BD.

0-8Meg Extended and/or Expanded Memory for all IBM P/S2 Models 50, 502, 60, 55SX, 65SX, 16 Bit, 4.0 LIM Compat, CK - 119.00 2Meg - 189.00 4Meg - 259.00 EMeg - 399.00

6450608 (2Meg)

IBM PART NO.

78X8955 (128K) 34F2933 (4Meg) 87F9977 (4Meg) 1057035 (512K) 92F9935 (2Meg) 92F9694 (4Meg)

6450128 (4Meg) 79F0999 (2Meg) 79F1000 (4Meg) 79F1001 (8Meg) 07G1826 (2Meg) 07G1827 (4Meg) 07G1828 (8Meg) 07G1420 (4Meg) 07G1421 (8Meg) 92F8804 (2Meg)

WORKS WITH MODEL NO. 30.00 79.00 109.00 339.00 30-286, 25-286, 50 MTHR BD. 86.00 Value Point 325T 25
35SX, 40SX, 55SX, 65LS, 65LS, 65LS, 55SX, 56LS, 65SX, 56LS, 67.5TSX, 90.55, 77.5TSX, 90.5TSX, 90.5TX, 90.5TSX, 90.5TX, 90.5TX, 90.5TX, 90.5TX, 35 00 159 00 159 00 40 00 92 00 144 00 89 00 165 00 319.00 319.00 89.00 169.00 319.00 99.00 179.00 319.00 189.00 319.00 99.00 NST (all)
NST (a

COMPAQ MEMORY MODULES

MODEL	AMI, UPGRADED	CMPU PART	PRICE
DeskPro 386/33, 386/33L,	2Meg Module	115144-001	89.00
486/25, 486/33L.	8Meg Module	116561-001	339.00
486/50L. System Pro	32Meg Modula.	116568-001	1500.00
DeskPrp 386/33L, 486/33L	(Exp Bd)	116569-001	289.00
DeskPro 386/25, 386/20	1Meg Module	153131-001	79.00
DESIG 10 300 25, 000 20	AMeg Madule	113132-001	174.00
DeskPro 386S-16MHz	1 Meg Exp Bd	113633-001	110.00
DESKY TO SOUGH TO MAKE	4Meg Exp Bd	113634-001	239.00
200	1Meg Module	113646-001	75.00
	4Meg Module	112534-001	174.00
DeskPro 386/20E	1Meg Exp Bd	113644-001	119.00
DeskPro 386/25E	4Meg Exp Bd	113645-001	239.00
DESKPTO 300/25E	1Meg Module	113131-001	75.00
		113132-001	174.00
Devides 200H 200H	4Meg Module		50.00
DeskPro 286N, 386N,	1Meg Module	118688-001	
386SX/20, 386/25M, 486/3	3M, 2Meg Module	118689-001	85.00
486S/25M, 486S/16M	4Meg Module	118690-001	149.00
Port 486C	8Meg Module	128877-001	309.00
M Series Exp Bd	0-64Meg	129160-001	279.00
DeskPro 386/16	1Meg Kit	108071-001	99.00
	4Meg Kit	108072-001	269.00
10	1-2Meg Exp Bd	108069-001	239.00
	4-8Meg Exp Bd	108070-001	399.00
DeskPro 286	512K Kit	113012-001	\$9.00
Prolinea 386 3/25S, 3/252S	E 2Meg	141738-001	99.00
1	8Meg	141742-001	299.00
Prolinea 486 4/25S, 4/33	1Meg	141682-001	55.00
4/50, 4/66, CDS	2Meg S	141683-001	98.00
	4Meg	141684-001	159.00
	BMeg	141685-001	319.00
Prosignia PC Server, 486/3:	3. BMeg	141685-001	349.00
486 DSX/66	16Meg	149320-001	679.00
	32Meg	149147-001	1949.00

COMPAQ LAPTOPS & NOTEBOOKS

LTE/286	2Meg Bd	117081-002	99.00
LTE/286	4Meg Bd 4Meg Module	117081-003	179.00
LTE/386S/20 LTE LITE/20, 25, 250	4Meg Module	121125-002 129769-002	199.00
LTE LITE/20, 25, 25C	SMeg Module	129769-003	319.00
LTE LITE/20, 25, 25C	16Meg Module	129769-004	699.00
LTE LITE 4/25C	4Meg Module	142337-002	199.00
LTE LITE 4/25C	8Meg Module	142337-003	299.00
LTE LITE 4/25C	16Meg Module	142337-004	749.00
SLT/286	1Meg Module	110235-001	79.00
SL1/286	4Meg Module	110237-001	209.00
SLT/386	1Meg Module	118303-001	79.00
SLT/386	2Meg Module	118304-001	99.00
SLT/386	4Meg Module	118305-001	159.00
Contura 320, 325	2Meg	139497-001	99.00
	4Meg	139498-001	169.00
and the tree the	5Mag	139499-001	299.00
Contura 4/25, 4/25C, 4/25C	X 4Meg	146520-001	189.00
	BMeg.	146521-001	369.00
	15Meg	146531-001	939.00

PCMCIA VERSIC (for Palmtop &

	-	Subnoteboo	
MODEL S-RAM Cards 1MEG S-RAM Cards 2MEG	159.00	MODEL 14,400/14,400 Data/Fax	PRICE
Card Pro (made by Data I/O) Transfers data from PCMCIA card to desktop PC, connects	239.00	9600/9600 Data/Fax Moderns 2400/9600 Data/Fax Moderns Lan Ethernet (10 Base T)	189 00 Call
to a parallel port	393.00	Visual Media (CD Rom, Tape	Call

region (et al. control, et al. ceffer section). Come del reduction e hands) with access frequent (et al. control can't deserve section). Commerce se en hands) with access 5 OKT V the control (et al. control can't deserve section) et al. control control, et al. control control (et al. control control

All products Brand new & guaranteed • We buy excess inventory



22825 Lockness Avenue • Torrance, CA 90501

	MODEL	AMT, UPGRADED		PRICE
	T1000SE/XE/LE	2Me		84.00
	T2000/T2000SX	2Me	PC18-PA8317U	84.00
	T2000SX/T1000LE	4Me	PC-PAB314U	159.00
	T2000SX/T1000LE	BMe	PC14-PA8315U	279.00
	T2000SXE/2200SX/T1800, 1856	C 2Me	PC-PA2000U	84.00
ij	T2000SXE/2200SX/T1800.1850	C 4Me	PC-PA2001U	159.00
	T2000SXE/2200SX/T1800, 185	3, C 8Me	PC-PA2002U	279.00
	T4400SX; SXC T6400	-4Mé	PC-PA2004U	164.00
	T4400SX, SXC T6400	8Me	PC-PA2005U	299.00
	T4400SX SXC T6400	200 16Me	PC-PA2010U	599.00
	T4400SX, 5XC, T6400	32Me	g N/A	2599.00
	T4500, T4500C, T4600, T1900, T19	000C (3.3 v) 4Me	PC-PA2012U	239.00
	T4500, T4500C, T4600, T1900, T19		PC-PA2013U	419.00
	T4500, T4500C, T4600, T1900, T19			1299.00
	T4500, T4500C, T4600, T1900, T19			3299 00
	T3300SL	4Me		169.00
	13300SL	6Me		229.00
	T3300SL	BMe		369.00
	T3300SL	16Me		
	T1200XE	2Me		85.00
	T1600	2Me	PCS PA8302U	85.00
	T3100	2Me	PC3-PA7135E	129.00
li z	T3100s	-2Me	PC9-PA8340U	85.00
	13100SX	2Me		
	T3100SX	4Me	PC15-PA8310U	164.00
	13200	3Me		
	T3200SX	2Me		
þ	13200SX	4Me	PC12-PA8909	164.00
•	T3200SXC	2Me	PC19-PA8318U	84.00
	T3200SXC	4Me	p PC19-PA8319U	164.00
	T5100	2Me	PC7-PA8301U	89.00
	T5200/T8500	2Me	PC10-PA8304U	
	T5200/T8500	8Me	PC10-PA8313U	299.00

TOSHIBA LAPTOP MEMORY

	NOTEROO			ORY
	ALR Venture AST Notebook Prem Exec 386SX/20/25/25L	AT. UPGRADED 4Meg 4Meg	MANU, PART # 12407950 500814-003	PRICE 229.00 149.00
200	AST Power Exec 3/25C, 425EL AST Power Exec 4/25SL AST Power Exec 4/25SL ATAT Safari NSX/20 Bondwell 8/310, Plus Bandwell 8/310, SX Bondwell 8/310V, SX Bondwell 8/310V, SX Bondwell 8/310V, SX Execution 16/3	4Meg 4Meg 10Meg 4Meg 1Meg 1Meg 4Meg 4Meg	PEC 37551 23050-09100 A808511	109.00 109.00 219.00 179.00
	Epson NB/SL 20.25,25C	2Meg 4Meg 8Meg	A808771 A808781	129.00 219.00 479.00
	Everex Tempo LX, LX20 Everex Tempo Carrier Goldstar GS520 386SX/16 Leading Edge D/LT 386SX	2Meg 2Meg 4Meg 1Meg	PWA 0884-A-J000 \$386-4M	119.00 239.00 109.00
	Magnavox Metalis NCR 3170 NCR 3170	1Meg. 4Meg 4Meg 8Meg	286, 386SX 3123-K104-V001	99.00,189.00 239.00 519.00
,	NCR 3170 NEC Prospeec 286, 386SX-16 NEC Prospeec 286, 386SX-16 NEC Prospeec 386 NEC Prospeec 386	1Meg 4Meg 2Meg	3123-K116-V001 PC21-21 PC21-22 PC31-21	105.00 179.00 129.00
	NEC Prospeed 286, 3865X-16 NEC Prospeed 286, 3865X-16 NEC Prospeed 386 NEC Prospeed 386 NEC Prospeed 3865X-20 NEC Utraite IIVSZ-20 NEC Utraite IIVSZ-20P, 22C NEC Utraite IIVSZ-20P, 22C NEC Utraite IIVSZ-20P, 22C NEC Utraite IIVSZ-20P, 20P	TMeg 4Meg 2Meg 4Meg 6Meg	PC43-22 PC47-21	199 00 119 00 219 00
1	NEC Litraite SUZO, 20P NEC Litraite III/25C	5Meg	PC47-23	349.00
	Packard Bell 386SX, 286 Pagasonic CE170, CE270, CE370	1Meg, 4Meg 1Meg, 4Meg 1Meg 2Meg	286, 386SX CF-BA165	229/429/1389 89 00,189.00 54.00 89.00
	Saryo 17/18 NB Sharp 6781, 6881, 6785 Sharp PC-6220 Tandon, PC Brand, Dataworld TI Trayelmate 2000	2Meg/4Meg 1Meg 2Meg, 8Meg 1Meg	NB386SX-20	109 00/199 00 85 00 89.00, 499 00 85 00
	TI Travelmate 3000 TI 4000 Twinhead, Altima, Compudine	4Meg. 16Meg	2566996-1	79.00 199.00, 1599.00
	Tandy 4860, 486SX, DX Zeos 386SX, Notebook. Zenith Master Sport 386SX Zenith Master Sport SL, SLE Zenith Super Sport 286, 286E	4Meg/16Meg 2Meg 2Meg 2Meg 1Meg	ZA-300-1 ZA-4-4 ZA-180-66	89.00
	286E, SX SX Alpha SX Beta Zenith Z-Note 325L, LC	2Meg 2Meg 2Meg 2Meg/8Meg	ZA-180-64 ZA-180-86 ZA-180-87 ZA3250-4/-5	109.00 109.00 109.00 129.00/369.00

LASER PRINTER MEMORY UPGRADES

AMOUNT UPGRADED OK BE	256k	1	2	3	3.5	4	5	6	. 8	15	32
Canon LBP4, 4Lite, 4plus -	-	119	169	-	-		-	-	-	-	_
Canon LBP-4SX -	-	89	249	-	-	-	-	-	-	-	-
Compag Pagemarg -	-	69	99	-		169	-	-	299	-	-
Epson 6000, Action Laser -	-	-	115	-	-	179		-	-	-	-
Epson Action Laser II -	-	99	-	169	-	-	249	-	-	-	-
Epson 8000 -	-	99		169	-		249	-	- 10	-	-
Epson 1000	-		72	-	-	144	-	216	-	-	-
HP 2, 2D, 3, 3D, 3P, 2P 2P+-	-	-	99	-	-	159	-		-	-	-
HP 4 4M 4SI 4SIMX -	-	-	08		-	149	-	-	309	-	-
HP 4L	-	69		-	-	0.2	-	_		-	-
HP 3SI	-	49	-	-	-	139	-	-	309	-	-
HP 4SI	-	-	80	-	-	149	-	-	309		
HP Deskjet 500, 500C, 550 -	55	-	- 5	-	-	-	-	-	07	-	-
HP Deskiet 1200C 1200C/P	-		129	-	-	209	-	-	399	-	-
HP Paintiet XL300 109	-	-	-	-	-	268	-	-	-	745	-
IBM Laser 4019, 4019E -	-	-	-	-	144	-	-	-	-	-	-
IBM Laser 4029 -	-	-	-	-	-	139	-	-	-	-	
IBM Laser 4039 -	-	-		-	-	169	-	-	319	-	
NEC 90, 290 -	-	-	109	-	-	-	-	-	-	-	-
NEC 95 -		-	99	-	-	-	-	-	-	-	-
Oki 400 -	-	-	94	-	-		-	_	-	-	-
Oki 830, 840 -	-	-	109	-	-	-	-	-	-	-	-
Packard Bell PB 9500 -			115	-	-	179	-	-	-	-	-
Panasonic 4420/44501 -	-	-	119	-	-	189	-	-	-	h 1-0	-
Panasonic 4410/4430 -	-		109	-	-	169	-	-	-	-	-
Panasonic 4450 -	-	99	-		-		-	-	-	-	-
Star LS04	-	109	159		-	249	-	-	-	-	-
TLXL/PS17/PS35 -	-	49		-	-	-	-	-	- /-	-	-

H.P. COMPATIBLE FONT CARTRIDGE

This COMPATIBLE FORT CARTE	IDGE
BAR CODES Ear Code Reader Fonts	99.00
DESKJET SOLUTION for DkJt 500 & Plus, 92 Fonts, 4.5 pt-30 pt	99.00
IBM 4019, 4019E, FONT CARTRIDGE 209 Fonts, Turbo Card	105.00
TURBO 25 Comparable to Pacific Data's 25 CARTRIDGES IN ONE M. Fonts (compat. with Epson Action Laser II and all HP Printers except	
TURBOSCRIPT* 47 Scalable Fonts in Any Point Size (HP 2, 20 - 159).	149.00
TURBOSCRIPT™ 109, 109 Scalable Forts to Any Point Size (HP 2, 2D -	
TAX & FINANCE FOR IBM 4019, 4019E, 4029	139.00
TAX & FINANCE CARTRIDGE	
OKI 400 B00 41 foots 11 typestyles	169.00

310-539-0019 FAX: 310-539-5844

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

CALL TOLL FREE

1-800-433-3726 (US and Canada)

1985

Mon-Fri, 8:00 a.m. to 5:00 p.m. PST Sat. 10:00 a.m. to 12:00 noon



• 6 PPM • 1MB • 14 resident fonts
• 2-YR Warranty

\$63995

Panasonic KX-P2124



\$28995

With Color \$329.95

Panasonic KX-P4410 0 5 PPM • 300 X 300 dp . 1-YR Warrants

\$52995

Other PANASONIC Printers

KX-P4410 Laser . \$529.95 KX-P4430 Laser .\$619.95 KX-P4440 Laser \$1059.95 KX-P4451 Laser \$1299.95

KX-P4455 Laser \$1639.95

OKIDATA 400E LED

. 4 PPM with

44 fonts • 300 X 300 dpi Serial standard

5-YR printhead warranty

Other OKIDATA Printers

400E LED.....\$479.95 810 LED \$859.95* 830 + LED \$1029.95* 850 LED\$1139.95*

*Qaunities Limited

Laser Printers

IBM Laser Printers IBM laser 4029/6\$994.95 IBM laser 4039/12R\$1789.95

Full line of accessories available

IBM laser 4039/12L \$2539.95

DANACONIC

	PANASUN	10
1150		\$124.95
3123		\$279.95
3123	Color	.\$319.95
3124		.\$334.95
3124	Color	.\$369.95
3624		.\$389.95
2180	*********	.\$149.95
	Color	\$185.95
2023		
2123	Color	\$259.95
2124	military executi	
	Color	\$329.95
2624		
1624		\$319.95
1654		.\$509.95

CITIZEN GSX-190 GSX-190 Color \$199.95

GSX-230 Color	.\$265.95
GSX-240	.\$289.95
GSX-240 Color	.\$329.95
GSX-145	.\$349.95
200GX-15	.\$319.95
*Quanities Lim	ited
STAR	
NX-1001	.\$129.95
NX-1040 Color	

	STA	R	
NX-1001	con.		\$129,95
NX-1040	Color		\$155.95
NX-2420	Color		\$274.95
NX-2430	Track.		\$217.95
XR-1020			\$369.95
XR-1520	****		\$399.95
XB-2420			\$469.95
XB-2425		10	\$589.95

EPSON AP-3250\$179.95 FX-870\$279.95 LQ-570 + \$238 95 LQ-1070+ \$369.95 FX-1170 ... LQ-870 \$449.95 LQ-1170 LQ-2550 \$615.95 Stylus 800 Inkjet . . \$324.95



Dot Matrix Printers

OKIDATA 184 | Turbo\$210.95 380 . \$204.95 520/521\$359.95/479.95 3201\$279.95 321 \$415.95 395 +\$945.95

395 C	\$999.95
3410	\$1179.95
590 Post-Net/	
Bar Code	\$415.95
591 Post-Net/	
Par Code	eccc oc

Mannessmann Tally

M1151/9 parallel	
9-pin	\$495.95
MT150/24 parallel	
24-pin	\$589.95
MT151/24 parallel	
24-pin	
MT350/24 par./ser	
24-pin	\$1649.95
MT360 par./ser.	
24-pin	\$1939.95
MT645 line printer	
MT690 line printer	

MT691 line printer\$6999.95

SEAGATE Hard Drives

MODEL	SIZE	SPEED	TYPE	PRICE
3%" 1 Inch	High:			
ST-351AX	42 Meg	28MSEC	IDE/AT	\$98.95
ST-3144A	130 Meg	16MSEC	IDE/AT	\$159.95
ST-3290A	260 Meg	16MSEC	IDE/AT	\$219.95
ST-339DA	341 Meg	12MSEC	IDE/AT	\$299.95
31/2" Half H	rights:			
11200N	1050 Meg	10.5MSEC	Fast SCSI-2	\$899.95
5%" Full He	rights:			
ST-42100N	1900 Meg	12.9MSEC	Fast SCSI-2	\$1375.95

Mandor Hard Drives

MODEL	SIZE	SPEED	TYPE	PRICE
3 4" 1 Inch	High:			
7213A	213MB	15MS	IDE/AT	\$215.95
7245A	245MB	15MS	IDE/AT	\$224.95
7345A	345MB	14MS	IDE/AT	\$299.95
540SL	540MB	8.5MS	SCSI-2	\$729.95
5 " Full He	ights:			
1240S	1240M8	8.5MS	SCSI-2	\$1099.95

Hard Drives



345 MB IDE/AT \$29995

HOURS

Sales: Mon. - Fri. 9 - 9 EST. Sat. 10 - 6 EST. 800-233-8760 or 717-494-1030 Fax: 717-494-1441 **Customer Service:** Mon. - Fri. 9 -5 EST. 717-494-1670

	COLORADO			
Jumbo 120	COLORADO	\$145.95		
Jumbo 250		\$159.95		
Trakker 120		\$285.95		
Trakker 250		\$319.95		
External kit for 120 &	250	SCALL		
	artridges			
PT-25 2 Gigabyte		\$939.95		
CONNER				

C250MQ\$159.95

Tape Back-Ups

COLORADO Jumbo 250 Tape Back-Up



250 MB \$15995

IBM Computers

Occupation & Saftey & Health Administration Regulations for LABOR

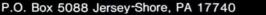
PS/Value Point VESA Systems

486 SX/25 120MB DOS/WIND VESA \$1269.95 486 SX/25 245MB DOS/WIND VESA \$1399.95 486 SX/33 120MB DOS/WIND VESA \$1399.95 486 SX/33 340MB DOS/WIND VESA \$1699.95 486 DX/33 120MB DOS/WIND VESA \$1599.95 486 DX/33 340MB DOS/WIND VESA \$1899.95 486 DX2/66 245MB DOS/WIND VESA ... \$2125.95 486 DX2/66 340MB DOS/WIND VESA ... \$2269.95 *OS2 Versions Available - SCALL

*Space Saver and Tower Versions Available - SCALL

Why shop at Lyco Computer VLyco Computer off quality name brand computer products at prices 3 to 50% below retail, if you do not see the product yant advertised, call Lyco Marketing joil free. How staff receives continuous tormal training by manufacturers. Though our strict guarantee on priding only new merchandse prohibits free it periods and a guarantee on compatibility, a wealth of the staff receives continuous tormal training by manufacturers. Though our strict guarantee on priding only new merchandse prohibits free it periods and a guarantee on compatibility, a wealth of the staff of the sta POLICY





(717)-494-1030 Fax: (717)-494-1441



BARN FROM BYPERIS

Windows 3.1

om Sheldon guides you through the basics of Windows operation, as well as demonstrating how to use the many powerful applications and accessories such as Notepad, Paintbrush, Write, and more.

Beginning Windows 3.1 \$49.95

Created specifically for new users, Tom Sheldon guides you through the basics of Windows operation.

Windows 3.1 Applications \$49.95
Picking up where Beginning Windows left off, Tom demonstrates how to use the many powerful applications of 3.1.

Windows 3.1 Adv. Tips & Tricks *49.95 Learn about creating macros, changing PIF files, object linking and embedding, and much more.

Optimizing Windows 3.1 \$49.95
This tape will help you improve Windows operation on you

This tape will help you improve Windows operation on your system. Learn about Windows memory requirements and how to evaluate your computer's performance.

Combination Special

\$15995



earning WordPerfect couldn't be easier! Karen Acerson, Carolyn Dillon, and Daniel Will-Harris are the expert instructors on this powerful software.

Beginning WP 6.x

849.95

You will learn to create, edit, save and print basic business documents, as well as streamline your word processing.

Intermediate WP 6.x
Learn how to search and replace, justify, create footnotes,

special characters, macros and more.

Advanced WP 6.x part 1 \$49.95

You'll learn the process behind creating columns, tables, graphs, styles and more.

Advanced WP C v port 2 SAP RE

Advanced WP 6.x part 2 \$49.95 Learn about merge, customizing button bars, sorting, outlining, faxing, bookmark, indexing and other techniques.



Combination Special

\$159⁹⁸

Other WordPerfect Videos

WordPerfect Macro Magic, Perfecting the Office, WordPerfect/Windows Update 5.2,

WordPerfect for Windows Series.

Coming Soon:

WP 6.x Desktop Publishing

Exce

Basic instruction of Beginning, Intermediate, & Advanced tapes are taught by Dr. Robert Voss, a senior trainer & contribut-

ced bert but-

ing author. Reed Jacobson, a certified Microsoft "Partner", teaches the more advanced features of Excel.

Beginning Excel/Windows \$49.95
This tape will help the user understand the basic operation of this fabulous spreadsheet/database program.

Intermediate Excel/Windows \$49.95
Learn about creating and changing charts, adding & formatting text, adding a legend, database analysis, and more.

Advanced Excel/Windows \$49.95
This tape teaches about using macros, linking worksheets, consolidation, and much more.

Names, Arrays, & References
Learn about readable formulas with names, controlling names using arrays, using references to control range names, notation and relative references, and more.

Processing Data Files \$49.95 Learn about importing files delimited by commas, importing files with fixed length fields, data parse command, dealing

with implied decimal points, and more.

Combination Special

\$195⁹⁵

Word

In this series of videos, Tom Badgett (Windows) and Jim Turley (DOS) will help you understand the many features & functions of Word. From beginning, to intermediate, to advanced, these tapes are a must if you are using Word.

Beginning Word \$49.95 Learn about menus, tool bar, defaults, and other basics to

help you create letters, memos, and other documents.

Intermediate Word \$49.95

This tape will show you how to search for, find & replace text, format paragraphs, use tables & columns, & more.

Advanced Word \$49.95 Learn about linking and embedding, outlining, using macros, creating lists, using frames, importing graphics, & more.

Combination Special

\$12**9**95

Call, Write, or FAX for a FREE Catalog!

Voted #1 WordPerfect Videos

Order your training videos today! 1-800-937-3279 ext 10





Karen Acerson author of WordPerfect The



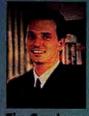
Tom Sheldon author of Windows 3 Mad Easy and NetWare 4: The VordPerfect: From 5.0 to 5.1. Complete Reference.



Judd Robbins author of over 21 technical



Daniel Will-Harris author of WordPerfect: Desktop Publishing in Sty



Certified NetWare Level II instructor has taught hun-dreds of professionals.

hese nationally recognized instructors and best selfing authors will help you learn WordPerlect, Lotus, Windows, and other popular software in a few short hours. Just watch ${\sf TV}$ — no complicated manuals, no expensive and inconvenient classes, and your entire office learns for one low price. Over 500,000 business, government, and educational professionals have used LearnKey's "Teach Me How" videos to help them master their computer. LearnKey offers the best computer training by featuring the absolute best teachers. SATISFACTION GUARANTEED!

DOS 6.x

f your using DOS 6 on your computer and want to maximize your efficiency, don't miss this extremely thorough introduction to the biggest DOS upgrade ever. Taught by scientist, author, & lecturer Judd Robbins.

Beginning DOS 6.x

Learn about the DOS shell, managing screen display, directory structure, on screen help, and much more.

Intermediate DOS 6.x

This tape covers full-screen editor, restoring files, doubling

hard disk space, virus protection, and much more.

\$49.95

Advanced DOS 6.x Learn about DOS batch files, macros, QBasic, managing files, diagnosing system problems, and working with laptops.

Combination Special

Other DOS tapes available

Optimizing DOS 6.x, DOS 6.x for Windows Users, DOS & Your PC, Upgrading to DOS 6.x, Controlling

the DOS 6.x Startup, Mastering Batch Files, Mastering QBasic, Using DOS 5, Discover DOS (version 3.3 & up).

EASY WAYS O ORDER

Major Credit Cards Accepted: For your convenience we accept Visa, MosterCard, or American Express, call 1-800-937-3279. Please have card available.

Purchase Order: FAX or mail an authorized PO. Your order will be processed immediately.

Check or Money Order: Business Checks and Money

Orders are processed immediately. Personal Checks please ow 2 weeks to clear.

When ordering please include: Video titles and quanti-ties desired, shipping and billing address, phone #, version needed & computer diskette size.

Shipping: USA shipping charges: UPS Ground SS.00, UPS Blue \$10.00, Overnight \$20.00, Regular U.S. Mail or Canada \$8.00. Additional charges for International ship-ping. Utah residents add 6.25% sales tax.

FAX or mail orders to: LearnKey, Inc.

93 S. MountainWay Dr. Rm. 10 Orem, UT 84058

Phone 801-224-8210 FAX 801-224-8211



VetWare

om Sheldon, Certified NetWare Engineer, and author to the book NetWare 4: The Complete Reference, guides you through the powerful features and important changes of version 4.0.

Users Guide to NetWare 4.x

Leads the inexperienced user through a simple overview of networking to help remove the mystery of the network. 60 minutes

NetWare 4.x Concepts
An introduction for administrators, managers, supervisors and other users.

Learn about the new NetWare Directory Services for global naming, object management features, security & access rights, and more. 2 hours

OFFER! Buy both 4.x tapes and get Tom Sheldons book NetWare 4: The Complete Reference from Osborne McGraw-Hill absolutely FREE!

im Gendreau, certified NetWare Level II instructor and contributing author to the book Inside Novell NetWare, guides you on a step-by-step video tour of Novell

NetWare 3.x Basics 70 min. \$125.00 NetWare 3.x Security 67 min.

Menu & File Server Utilities 1 \$125.00

Menu & File Server Utilities 2 \$125.00

\$125.00 NetWare 3.x Printing 83 min. \$125.00 Login Scripts 74 min. Custom Menus 33 min. \$125.00

Combination Soecial

NetWare 3.X Installation 69 min. \$125.00 Installing WordPerfect 5.1

\$125.00 on a Novell Network 101 min.

Lotus 123

est-selling author, Judd Robbins addresses this powerful new upgrade on every Dievel of version 2.4. Both DOS and Windows versions available.

Beginning Lotus 123 v 2.4 Learn about updating and enhancing spreadsheets, using cell ranges, perform sophisticated calculations, and more.

Intermediate Lotus 123 v 2.4 \$49.95 This tape teaches about add-in programs, WYSIWYG, BSOLVER, AUDITOR, MACROMGR, VIEWER, and more.

Advanced Lotus 123 v 2.4 Learn about presentation quality graphs, file linking, macros, database management, and much more.

mhination

Windows Primer Series for the Technically Impaired Networking with LANtastic **Harvard Graphics** with Mike McClure DOS 3.0/Windows

WordPerfect Presentations **WordPerfect Legal Series**

Desktop Publishing Videos with Daniel Will-Harris

CoreIDRAW 3.0 Special Effects & **Publication Design & Production**

AmiPro DTP Word for Windows DTP

SPECIAL \$29.95 Supercharging DOS Applications under Windows

Scientist, lecturer, & writer, Judd Robbins will help you streamline your DOS applications while running under WINDOWS Windows. This tape will teach you the most efficient use of Windows facilities.

Circle 206 on reader service card

Arlington Computer Products... Great Prices and Service Since 1984!

- PC Magazine: "—Arlington offers worry-free mail order purchasing!"
- · PC Sources: "-You can be confident that what you order will work!"
- . PC Computing Review: "5 Star Pricing!"
- PC Computing: "Courteous service and terrific technical support!"

HEWLETT-PACKARD

Laserjet IV w/Toner \$1369
Laserjet IIIP w/Toner \$879
Laserjet IV L w/Toner \$675
Laserjet IV SI w/Toner \$2989
Laserjet IV M \$1929
2MG Upgrade \$99
4MG Upgrade \$159
8MG Upgrade \$289
Deskjet 500/500C \$309/409
Deskjet 550C \$575
Deskjet 1200C \$1379
Pacific Page/XL \$259/\$699

Panasonic

11241 .	\$249	1654 \$519
2023	\$199	2624 \$349
2123	\$229	4410 \$569
2124	\$295	4430 \$649
2180	\$169	44501 . \$949
1624	\$329	4455 . \$1659
4410/4	4501 2	MG\$125
	-	

Canon

Noteiet 486/with Built-In Printer CALL

Canon

						. \$239
						. \$289
					,	. \$395
						. \$325
a	rt					\$19
						. \$489
					×	\$1449
						\$1579
						. \$669
						. \$979
		art	art.	art	art	art



. A PPM • 360 dpi

Action 3250 .. \$169 Action 1000 .. \$599 Action 1500 .. \$649

EPSON PRINTERS

LX810 \$169	LQ570+ \$232	LQ1170 \$589	DFX5000\$1299
FX870 \$259	LQ870 \$425	LQ2550 \$859	DFX8000 \$2139
FX1170 \$345	LQ1070 \$339	EPL8000 \$819	Stylus 800 \$319*

NO SURCHARGE FOR CHARGE CARDS!

*Ask about Mfg. rebate.

OKIDATA

ML320 \$295	ML395 \$959
ML321 \$415	3410 \$1199
ML380 \$209	OL400 \$509
ML520 \$369	OL810 \$899
ML590 \$415	OL830.\$1089
ML591 \$569	OL850.\$1199
OL400 2M	IB\$129

TEXAS INST. 49

TM 4000/WIN	15	S	X		1	2	0		\$1849
TM4000/WIN									\$2389
TM4000/WIN									\$2539
TM4000/WIN	D)	(2	25	5()		\$2959
LASER PS17									\$1029
LASER PS23									. \$869
LASER PS65									\$1099

NETWORKING

Netware 3.11 5 User \$555
Netware 3.11 10 User \$1249
Netware 0.11 10 Oser \$1249
Netware 3.11 20 User \$1539
Netware 3.11 50 User \$2239
Lantastic Starter 4.0 \$445
E143 Ethernet \$185
NE2000 \$129
SMC Hub T/P \$325
SMC Hub Coax \$225
Ethercard +/+16 \$89/\$115
3 Com EtherLink II \$179
Intel Ether 16 \$95
Intel Ether 16-5 Pak \$429
Intel Ether 16-20 Pak \$1639
Intel Token Express \$479
Irma Board 3\$399

SCAN. & DIGIT.

Epson 600C \$779
Epson 800C \$1069
Logitech ScanMan \$135
Logitech ScanMan 256 . \$229
Mustek Color Artist \$289
Summasketch 12×12 \$255
Summasketch 12×18 \$499

NEC

P3200/3300 \$225/\$325
P6200/6300 \$399/\$599
P9300\$825
Model 95 Pscrpt Laser \$889
Model 95FX Laser \$1119

MONITORS

				1	١	E		C							
3 FGE															. \$579
4 FGE															. \$679
5 FG															\$1245
5 FGE									ì						\$1049
6 FG															\$2249
- 3	1	и	ı	T	3	SI	U	Е	31	5	31	4	ı		

FOA MIT						***
EGA						
Diamond Pr						
HL6955 20"						\$1759

	P	ANASONI	C	
1381	VGA	1024×768		. \$319
1395	VGA	1024×768		. \$429
1991	VGA	1280×102	4	\$1539

VIDEO BOARDS

ATI Graph Ultra + 2MG.	
ATI Graph Prof 1 MG	
ATI Graph Prof 2 MG	\$339
Diamond Stealth Pro	\$239
1024 VGA 16 Bit 1 MG	. \$79

CHIPS

01111
256K/1 MG Chips each \$3/\$5
256K/1MB Simms \$15/\$49
4MB Simms \$159
Epson Action 2 MG \$99
HP 2MG Upgrade \$99
OKI Laser 2MB \$129

intal.

80387 SX-16/20/25	\$75
80387-16/20/25/33.	\$85
Overdrive SX20/25	\$309/\$409
Overdrive SX33	\$529
Overdrive DX25/33	\$409/\$529

MODEMS

intal.

Int. 14.4/14.4 Fax .			i	\$165
Ext. 14.4/14.4 Fax				\$195



SatisFAXtion MODEMS

100 2400/9600 Fax	. 599
200 2400 V.42/9600 Fax .	\$269
300 14.4/9600 Fax	
400 14.4/14.4 Fax	\$365
400 Ext 14.4/9600 Fax	\$365

Hayes' Haves Accurs 06/Eav

ridyes Accura 30/rax	9213
Hayes Accura 14.4/Fax .	\$245
Hayes Optima 96	\$309
Hayes Optima 14.4/Fax .	\$369
Hayes Ultra 96	\$539
Hayes Ultra 96 14.4	\$589
The state of the s	

\$210

Practical	Per.	2400	Int	. \$69
Practical	Per.	9600	Int	\$169
Practical	Per.	9600	Ext	\$179
Practical	Per.	14.4	Int	\$185
Practical	Per.	14.4	Ext	\$195
Practical	Per.	14.4	Pocket	\$325
Practical	Per.	FaxN	ле	\$169

Mylohotice'

GI. MODES OF CELLO	
16.8 HST Ext	\$459
14.4 Dual Std. 16.8	\$659
Sportster 14.4 Int	\$155
Sportster 14.4 Ext	\$175
	\$175
	\$195
Worldport 14 4	\$325

SOFTWARE

Aldus Pagemaker \$	489
Corel Draw S	369
Lotus 123 2.4/3.1 \$325/\$	389
Microsoft Windows 3.1	
Microsoft DOS 6.0 Upg	\$59
	219
	279
Word Perfect Windows . \$	279

DRIVES & TAPES Toshiba 3½" 1.44 \$69

lomega 250	\$199
Irwin 120/250 \$169/	
Irwin Parallel 250	\$399
COLORADO	
Colorado Jumbo 120	\$145

AMERICAN UPS					
Colorado 2GB Ext \$1069					
Colorado Trakker 250 \$319					
Colorado Trakker 120 \$275					
Colorado Jumbo 250 \$169					
00101400 0d11100 120 \$140					

			ч	n	IERIC	AN UPS	
250					\$109	600	\$259
00					\$159	900	\$369
50					\$189	1250	\$729
CI)	R	()	M OP	TICAL DIS	KS

Intel Video Recorder ... \$459 Media Fusion CD-16.... \$485 Media Vision Pro 16 \$679 Sony CDU 535 Int. \$279 Sony 7205N Ext. \$455 SEAGATE HARD DISKS

40 MB for AT (ST251-1) \$229 80 MB for AT (4096) \$279 106 MG 3120A ... \$169 120 MG 3144A ... \$179 245 MG 3283 ... \$279 260 MG 3290A ... \$249 452 MG 3550A ... \$449

PLUS HARD CARD 85 MB/127 MB\$229/\$249 240 MB \$395

CONNOR	HARL	DRIVES
120 MB/174	MB	\$179/199
209 MR/540	MB	\$289/\$879

Prices and availability subject to change without notice. Purchase orders accepted from Qualified Customers. **Arlington**

Product: inc. HOURS C.S.T.
7:30 - 7:30 pm - Mon.-Frl.
9:00 - 5:00 pm - Saturday
1970 CARBOY
MT. PROSPECT, IL 60056

FOR ORDERS & QUOTES: 800-548-5105

CUSTOMER SERVICE AND IN ILLINOIS 708-228-6333 SHIPPING 708-228-9748 TECHNICAL ASSISTANCE 708-228-1470 We Export! FAX 708-228-0516

Circle 8 on reader service card

"BRILLIANT DEALS FROM MEDIA VISION!"



THUNDER BOARD

- Great 8-bit sound card for beginners
- AdLib[™] & Sound Blaster compatible
- Joystick port
- 11-voice FM synthesizer



MR. RESOURCE

Fusion CD16E

- An ideal multimedia starter kit
- Award-winning 16-bit PC sound card
- High quality external CD-ROM drive
- Amplified speakers
- 5 exciting software packages



Pro 16 Multimedia System

- The ultimate multimedia upgrade kit
- Award-winning 16-bit sound card
 Double-speed NEC CD-ROM Drive
- Exciting software collection, including Compton's Multimedia Encyclopedia & Carmen Sandiego

\$599

Pro AudioSpectrum Plus Sound Card (SCSI or Sony interfaces)



- 8-bit sampling & stereo playback via 20-voice synthesizer
- Highly compatible: Windows 3.1. MPC.™Windows/Multimedia,

Thunder Board, AdLib. Sound Blaster

Easy installation

Thunder & Lightning Audio/Video Adapter

- 1MB sound & videocard with Yamaha synthesizer, joystick port
- Thunder Board, AdLib, Sound Blaster compatible
- 16.8 million colors supported in high resolution
- 24-Bit SuperVGA

AudioPort PC Audio Device

- High-performance portable module for PCs and notebooks
- Plugs into parallel port of any IBM PC/AT, PS/2 or notebook
- Transport Sound™ technology & built-in speakers
- Headphone & external speaker inputs

Call 1-800-684-6699

Monday thru Friday 7:00 am to 6 pm PST

D 1993 Media Vision, Inc. 3185 Laurelview Court, Fremont, CA 94538. (510) 770 8600. Thunder Board, Fusion CD 16E, Pro 16 Multimedia System, AudioPort, Thurder & Lightning and Pro Audio Spectrum Plus are all trademarks of Media Vision, Inc. Any other trademarks and registered trademarks are owned by their respective holders

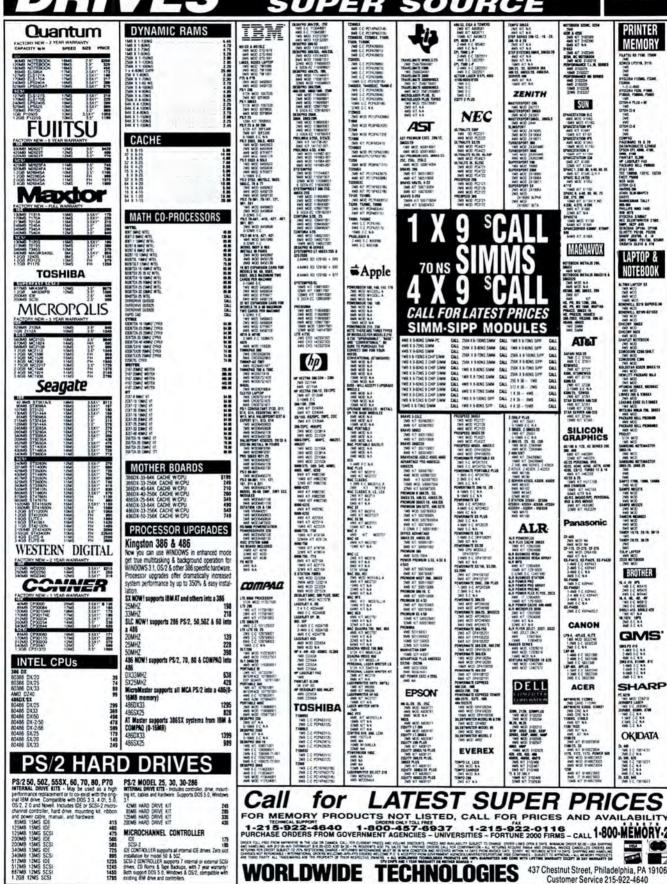






SUP SOURC

LIFETIME* WARRANTY 100% GUARANTEED



FOR MEMORY PRODUCTS NOT LISTED, CALL FOR PRICES AND AVAILABILIT 1-215-922-4640 1-800-457-8937 1-215-922-0116
PURCHASE ORDERS FROM GOVERNMENT AGENCIES - UNIVERSITIES - FORTUNE 2000 FIRMS - CALL 1-800-MEMORY-2

TECHNOLOGIES 437 Chestnut Street, Philadelphia, PA 19106 WORLDWIDE

MICROCHANNEL CONTROLLER

CE 278 CE

COMPUTER DISCOUNT WAREHOUSE™





CDW® FACT-BENEFIT FILE

FACT: CDW® Now Offers a "Lease Option" for the Purchase of the Latest Name Brand Computer Products.

BENEFIT: You Can Receive Immediate Benefit From Your New Products While Making Low Monthly Payments.

SOFTWARE **FOR LESS!** WHY PAY RETAIL? CDW® SELLS



WordPerfect For DOS Upgrade ONLY 99.17 29431



MICROSOFT WindowsNT ONLY



Lotus 1-2-3 Release 4 Upgrade ONLY \$93.44

29308



Boland Office Upgrade ONLY

287.92

29106

5TH GENERATION DISKLOCK V2.0 5TH GENERATION SUITCASE V2.1 52.52 5TH GENERATION DIRECT ACCESS 58.12 5TH GENERATION FASTBACK PLUS V3.1, 92.51 97.02 5TH GENERATION FASTBACK WIN ADOBE ACROBAT EXCHANGE 1 USER ___116.88 ADORE PHOTOSHOP V2 5 WIN 109 23 ADOBE TYPE MGR WIN V2 01. 61,90 ALDUS PAGEMAKER V5.0... 523.91 AUTOMAP ROAD ATLAS 56.92 APPROACH WIN COMP UPG ... 96.00 ARTISOFT ARTICOM MODEM SHARING., 251,09 AUTODESK 3D CONCEPTS V1.0.. 137.87 AUTODESK AUTOSKETCH WIN 163.86 AUTOSKETCH V3.0 85.53 BANNER BLUE ORG ADV V6.0 ... BERKELEY AFTER DARK WIN. 32.11 BITSTREAM FACELIFT WORDPERFECT 59.39 BLOC PUBL FORMTOOL GOLD. 56.90 BORLAND PASCAL OBJECTS V7.0 321.15 BORLAND TURBO PASCAL V7.0 99.36 BORLAND C++ APP FRAMEWORK V3.1. 483.70 BORLAND C++ V3.1 WIN/DOS 316.79 BORLAND TURBO C++ V3.0 66.24 BORLAND BRIEF V3.1 87.70 BORLAND PARADOX 4.0 UPG 171.51 BORLAND PARADOX V4.0 506.87 BORLAND PARADOX 4.0 NODE .. 255.62 QUATTRO PRO 4.0 WIN COMP UPG 01.36 BORLAND OFFICE WIN 1.0 UPG .. 289.49 BORLAND TURBO C++ VISUAL ED WIN 77.18 BORLAND DBASE COMPILER VI.O. 319.57 BORLAND DBASE IV 2.0 NODE ... 275.74 BORLAND DBASE IV 2.0 UPG 93,59 BRODERBUND PRINT SHOP DELUXE V1.246.61 BORDERBUND WIN PRINTSHOP DELUXE .47.05 CAERE OMNIPAGE PROFESSIONAL V2.1 577.17 CENTRAL POINT PC TOOLS VADA 116.80 CENTRAL POINT ANTIVIRUS V1.4 87.94 CENTRAL POINT PC TOOLS V8.0 108.70 CENTRAL POINT PC TOOLS WIN ... 117.90 CALERA WORDSCAN PLUS 386.71 SYMANTEC ACT WINDOWS 226.83 SYMANTEC ACT V2 1 219.66 CA CLIPPER COMP UPG. 136.77

COREL SCSI SOFTWARE CLARIS WORKS FOR WINDOWS V1.0.... 93,49 CLARIS FILEMAKER PRO WINDOWS116.50 DAC EASY ACCOUNTING V4.3..... 89.23 WINSLEUTH GOLD PLUS 57.53 DCA CROSSTALK 16 V3.8 109.24 DCA CROSSTALK V2.0 WIN. 109.34 **DELRINA DOSFAX PRO** 49.25 DELRINA WINFAX PRO COMMMUNICATION P135.54 ECLIPSE FAX WITH OCR 81.53 XTREE FOR WINDOWS V1.5. 63.28 XTREE GOLD V2.55 86.80 GENERIC CADD V6.1. 278.57 GRYPHON MORPH FOR WINDOWS 97.48 HEWLETT PACKARD DASHBOARD WIN 47,35 HAYES SMARTCOM WIN ... 39.57 IBM OS/2 V2.1.. 144.20 IBM DOS V6.1 UPGRADE INTUIT QUICKPAY V2.0 DOS/WIN 38.34 INTUIT QUICKEN V2.0 WIN 41.55 84 40 INTUIT QUICKBOOK. INTUIT QUICKBOOKS & QUICKPAY 101.59 INTUIT QUICKEN V6.0. 44.54 KODAK PHOTO CD ACCESS DOS 31.36 KODAK PHOTO CD ACCESS WINDOWS 31.99 LOTUS 123 V2 4 NODE 296.59 LOTUS 123 V2 0 OS/2 326.09 LOTUS CC:MAIL 10 USER PACK ... 218.48 LOTUS CC:MAIL 25 USER PACK .. 529.90 LOT AMI PRO V3.01 234.28 LOTUS SMARTEXT BUILDER V2.0 .. 331.18 LOTUS SMARTEXT READER V2.0 .. 69.24 LOTUS V3.4A UPG 98.22 LOTUS AMIPRO V3.01 COMP UPG 93.08 LOTUS AMI PRO 3.01 VERSION UPG 59.90 LOTUS 123 RELEASE 4 WIN COMP UPG 98.22 LOTUS 123 V2.4 322 26 LOTUS 123 V2.4 SERVER 393 26 LOTUS 123 V2.4 UPG KIT 97.08 LOTUS AMI PRO V3.0 VER UPG. 59.02 LOTUS IMPROV 20 98.22 LOTUS ORGANIZER V1.0. 95,24 LOTUS WORKS V3.0 94.80 MECA MANAGING YOUR MONEY V9.0 ... MICROCOM CARBON COPY PLUS V6.1 125.63 MICROCOM CARBON COPY WIN. DATASTORM PROCOMM PLUS V2.01 69.67 DATASTORM PROCOMM PLUS WIN 93.65 MICROGRAFX ABC FLOWCHARTER V2.0.302.21

MICROSOFT V6.1 MACRO ASSEMBLER ... 123.96 MICROSOFT OFFICE UPG. MICROSOFT FLIGHT SIMULATOR V5.041.17 MICROSOFT WORD V6.0 VERSION UPG ...95.51 MICROSOFT WORD V6.0 DOS MICROSOFT VISUAL BASIC V3 0 DOS117.98 MICROSOFT C COMPILER V7.0 297,13 MICROSOFT VISUAL C++ COMP UPG. 179.60 MICROSOFT VISUAL C++ PRO UPG. 129 BB MICROSOFT VISUAL C++ PRO. 299.24 MICROSOFT WINDOWS V3.1 UPG 44.53 MICROSOFT WORD V2.0 WIN .. 292.00 MICROSOFT SCHEDULE+ WINDOWS 121,47 MICROSOFT EXCEL V4.0 292.00 MICROSOFT EXCEL V4.0 COMP UPG 115.79 MICROSOFT EXCEL 4.0 WIN LIC. 252.35 MICROSOFT MAIL 5 NODE LIC PACK 237.60 MICROSOFT WORKS DOS. 91.93 MICROSOFT DOS UPG V6.0 47.75 MICROSOFT DOS V6.0 UPG 3 PACK MICROSOFT TEST TOOLS WIN V2.0 299.20 MICROSOFT PUBLISHER V2.0 WINDOWS .. 87.50 MICROSOFT VISUAL BASIC COMP UPG...179.50 MICROSOFT V3.0 VISUAL BASIC WIN UPG137.50 MICROSOFT VISUAL BASIC V3.0 ... 737.67 MICROSOFT WORKGROUP ADD STARTER254.01 MICROSOFT WORKGROUP ADD-ON USER131.09 MICROSOFT WORKGROUP ADD-ON62.50 MSOFT WORKGROUP ADD-ON 5 PACK....239.13 MICROSOFT WIN PRINTING SYSTEM 125.00 MSOFT FOXPRO WIN V2.5 COMP UPG.....118.48 MICROSOFT FOXPRO WIND V2.5 UPG 93.41 MSOFT FOXPRO V2.5 WIN COMP UPG ________119.74 MICROSOFT FOXPRO DOS V2.5 UPG MICROSOFT FOXPRO WIN DIST KIT ... 299.41 MICROSOFT FOXPRO WINDOWS V2.4 LIC255.72 MICROSOFT VIDEO WINDOWS. 119.74 MICROSOFT MULTIMEDIA VIEWER V2 0 297.84 MICROSOFT PROFIT V1.0 WIN ... 119.74 MICROSOFT WINDOWS NT V3.1 UPG277.17 MICROSOFT DINOSAURS MULTIMEDIA CD53.31 MICROSOFT VISUAL C++ V1.0. MICROSOFT VISUAL CONTROL PACK ... MICROSOFT VISUAL TOOLS SUITE V1.0, 248.54 MICROSOFT EFORMS DESIGNER WIN 247.98 MICROSOFT OFFICE V3.0 WIN ... 443.51 MICROSOFT OFFICE LICENSE .. 376.09 MICROSOFT POWERPOINT WIN 292.00 MICROSOFT TRUE TYPE FONT PACK ... MICROSOFT WORD V2.0 UPG ...

MICROSOFT WINDOWS SOUND SYSTEM 173.89 MICROSOFT WINDOWS V3.1 ... 91.93 MICROSOFT WORKS WIN ... MOON VALLEY ICONDOIT WINDOWS 13.85 NORTON LAMBERT CUST & SUPPORT 113.61 ONTRACK DRIVE ROCKET V1.0 DOS/WIN .26.15 FLOW CHARTING 3 V2 10 129.77 PIXAR TYPESTRY WINDOWS ... 155.43 POLARIS PACKRAT V5.0... 226,13 POWERUP CALENDAR CREATOR PLUS45.11 POWERUP CALENDAR CREATOR+ WIN.... 45.29 QUALITAS 386 MAX V7.0. QUARTERDECK QEMM V7.0.1 59.30 QUARTERDECK DESOVIEW/X 155.12 QUARTERDECK DESQVIEW 386 V2.4 119.15 HARVARD GRAPHICS V3.06 359.49 HARVARD GRAPHICS V1.03 WIN. 341.36 HARVARD GRAPHICS V1.03 UPG. 107.57 SPINNAKER PFS:PRO WRITE V22 SABER LAN WORKSTATION V1.0. 67.15 SABER LAN WORKSTATION NODE 29.00 SHAPEWARE VISIO V1.0 WIN 189.33 SPINNAKER PES:WINDOW WORKS 42.17 STACKER V3.1 WINDOW/DOS 93.52 SYMANTEC PC ANYWHERE .. 108.03 SYMANTEC NORTON COMMANDER V4.0 .64.38 PC ANYWHERE V4.5LAN HOST & REMOTE111.50 SYMANTEC NORTON ANTI VIRUS V2.1 ... SYMANTEC NORTON DESKTOP WIN V2.2109.08 SYMANTEC NORTON UTILITIES V7.0 109 34 SYMANTEC PC ANYWHERE WIN 122.78 SYMANTEC O&A 4.0 . 238.04 SYMANTEC O&A V4.0 3 USER LAN PACK 297.67 TOUCHSTONE CHECK IT PRO 57.52 WORDPERFECT OFFICE 3.1 LIC WORDPERFECT V6.0 LICENSE. 169.14 WORD PERFECT OFFICE V4.0 LIC 55.63 WORDPERFECT OFFICE V4.0 LIC 20 PACK868.46 WORDPERFECT V5.2 WIN NODE W/DOC .193.24 WORDPERFECT V5 1 DOS 281.84 WPERECT PRESENTATIONS V2.0 DOS 276.38 WORDPERFECT WINDOWS VER 5.2... 276.36 WORDPERFECT LETTER PERFECT. 86.42 WORDPERFECT OFFICE V3.1 86,36 WORDPERFECT NODE W/O MANUAL 168.01 WORDPERFECT V5.2 COMP UPG 101.21 WORDPERFECT PRESENTATION V2.0 UPG79.38 WORDPERFECT VAID DOS LIPS 99.71 WORDPERFECT V5.2 WIN UPG. 77.59 WORDPERFECT UPG KIT V5.1 TO V5.243.37

CA CLIPPER V5.2

COREL DRAW V3.0 WITH CD

CORFL DRAW V4.0 WITH CD

COREL SCSI PRO V2.0



457.72

124.53

377.79

313.76

WE SELL NAME BRAND ITEMS FOR LESS! NASDAO

(708) FAX (708) 291-1737

CDW is a NASDAQ traded company D & B Rated 3A1 Duns 10-762-7952





COMPUTER DISCOUNT WAREHOUSE



ROM Drives



✓ 240 ms Average Access Speed
✓ 335KB Data Transfer Rate
✓ MPC Level 2
✓ Photo CD Multisession Compatible
✓ SCSI-2 Compliant, 64KB Buffe

\$369.45 CDW 31234 DM-3028 Internal DM-3028 Int w/ Interface \$439.90 CDW 31236 \$449.45 CDW 31232 DM-5028 External DM-5028 Ext w/ Interface. \$519.90 CDW 31235

WHY PAY RETAIL?

CDW[®] Sells For Less

Canon BJ-200 BubbleJe **Personal Printer**

PC Magazine says, "...many users will be hard-pressed to see any difference between this and laser printed pages without resorting to a magnifying glass." December 22, 1992

✓ Multi-Purpose Feeder Holds 100 Sheets Letter/Legal Paper and Feeds

Them Automatically ✓ 49KB RAM ✓ 8KB Cache ✓ Parallel Interface / Operates at 42 dbA or Less / Canon Native. Epson® LQ and IBM X24E Emulations ✓ Weighs 6.6 lbs ✓ 2 Year Limited Warranty





\$298.12 CDW 2484

Canon

HARDWARE, SOFTWARE & PERIPHERALS AT DISCO

TWORKING PRODUC

MNOVELL Netwere V4.01

		100 User CD	
10 User CD.	1988.00	250 User CD	9997.0
25 User CD.	2994.00	500 User CD	16833.0
50 User CD.	3999.00	1000 User CD	30607.0
	Netwa	re V3.11	
5 User 3.5"	552.17	50 User 3.5	2466.17
10 User 3.5".	1252,17	100 User 3	5'.3499.9
20 User 3.5".	1752.17		
	SFTI	II V3.11	
5 User	1564.33	50 User	4631.66
10 User	2408.34	100 User	6328.63
20 User	3193.20	250 User_	11454.2
	Netwo	are V2.2	
5-User 3.5"			469.50
10 User 3.5°			1265.73
Lita Win or D	08		E0.00
Like Cinetes V	4-		09.00
Lite Starter K	/15		345.7
Life Add-On F	Kit		199.65
EAGLE ETH	ERNET NE10	000	97.4
EAGLE ETH	ERNET NE20	000 Plus	108.89
EAGLE ETH	ERNET NE32	200	679.5
		^	3,000

THOMAS CONRAD

TC5143T 10BT Ethernet	95.2
5055 8 Port 10BT Concentrator	349.5
4 Port Passive Hub	
4035 4MBPS Toke Ring Adapter	
6242TP+ 8Bit TP Archet	
6245 16-Bit Arcnet, Coax, TP, TP+	
6242 Arcnet 8-Bit	
6246 PS/2 Board Archet	
6151-11 16 Port Smart Hub	709.0
6151 16 Port Arcnet Smart Hub	
4045 16/4 Token Ring XT/AT	359.2
8Port Twisted Pair Active Hub.	349.5
100 MBPS TCNS Smart Hub 8 Coax	1153.4
100 MBPS TCNS 16 Brt Coax	434.5
100 MBPS TCNS 16 Bit Twisted Pair	
ARTISOFT.	

AE1/T 10 Base T Adapter, 8-Bit ARS-	190 127.5
AE2 Ethernet Remote Boot ROM	46.8
AE2 Ethernet Adapter	184.7
AE3 Ethernet Adapter	219.2
Etherbasket AE3 12pk	2189.5
Noderunner 2000/A	217.0
Noderunner 2000/T	179.1
Noderunner 2000/T 6pk	948.1
Noderunner 2000/T 12pk	
Noderunner 2000/M/TC	249.4
LANtastic Al Soltware V5.0	76.6
LANtastic Al 12 User	621.0
LANtastic AE2 Ethernet Starter Kit.	443.3
T-Runner 8 Port NEW	287.1
T-Runner 12 Port NEW	489.8

SMC

3402 TransceiverAUI/BNC	105.6 134.6 138.7
	138.7
Archel 310 Board	
Archel 4 Port Passive Hub	69.8
Archet & Port Active Hub	229.8
Ethernet 16 Bit Combo 6 Pack	788.8
Ethercard Plus Elife 16E 6 Pack	689.0
10BT EISA BusMaster 2 Channel	609.5
3512 TP 12 Node Concentrator	599,11
Active Hup 8 Port Twisted Par	345.6
3008 Coax 8-Bit Ethernet	87.82
3008 TP 10 BaseT 8-Bit Ethernet	99.5
PC 600FS Coax Archet File Server 16-Bit	199.00
PC 650WS TP Archet Workstation 16-84	119.8
	199.2
Ultra Ethernet Coax.	104.9
Ultra Ethernet 10Base-T	104.93
Ultra Ethernet Combo	123.4

PC 600WS Coax Arcnet Workstation 16-8	Bit 119.88
PC130 8-Bit Arcnet Coax	68.50
PC130E 8-Bit Arcnet Coax	99.00
8-Bit 10 Base T Ethernet Elite	
16-Bit Ethernet Plus Coax Elite	119.50
8-Bit Ethernet Plus Coax Elite	
Combo Ethernet TP. Coax. AUI Elife	
10 Pack Elite PS/2	205.10
SMC Token Card Elite 16/4	339.65

3Com

3C507 Ethernet Card	279.6
3C509 Etherlink III 10BASE-T	133.2
3C509 Etherlink III Coax	129.7
3C509 Etherlink III Combo	140.4
3C619 Tokenlink III 4/16 10pk	3999.4

Xircom

PCMCIA Ethernet 10 BT	274.52
Ext. Ethernet LAN Adapter-RJ45AUI/BNC	393.92
PE210BX LAN Ethernet II/Thick	285.98
PE310BC Pocket Ethernet Coax/TP	309.16
PE310B2 Pocket Ethernet Coax	275.56
PT216B3 16/4 Token Ring DB9	527.03
Arcnet Pocket Adaptor Coax/RJ45239	0.50/234.77
Ethernet Pocket Adaptor Thin Coox/10BT299	
Ethernet Pocket Print Server.	242.50
Parallel Port Multi	72.00
PT216BT Token Ring Pocket Adaptor	539.23

TAPE, REMOVABLE & FLOPPY DRIVES

COLORADO

COLORADO 2GB SCSI Power Tape	.1129.09
COLORADO 4GB SCSI Power Tape	1529.10
COLORADO Jumbo 120	148.37
COLORADO Jumbo 250	179.32
Trakker 120MB Parallel Portable Back-up	288.00
Trakker 250MB Portable Portable Back-up	349.21
Call For Accessories And Interface	ces

[·MEGA

21 MB Roptical Insider Diskette Drive.	349.00
21 MB Floptical Ext Dissettle Drive	389.10
Tape 250, 250MB Tape Back-up	196.10
Bernoulli PC Powered 90/Pro	489.25/ 645.57
Bemouli Transportable 90 Pro	639.81
Bernoulli Transportable 150 Pro	859.25
Bernoulli Insider 90 Pro	549.47
PC Powered Multidisk 150	795.15
•	

SUMMIT.

SUMMIT 250MB Internal 4 MB/ min	174.34
SUMMIT 305MB, Internal IDE 10MB/min.	239.90
MICROSOLUTIONS	
Externa 100MB Portable HD	497.06
External 200MB Portable HD	582.95
Backpack External Floppy 3.5" or 5.25"	189.41

PRO NOTE 42MB	519.50
PUMA 105MB	636.36
88MB Ext / w 8 Bit Adapter	529.27
V24	

250MB Internal Backup	199,5
304MB Internal IDE Backup	439.5
2.0 Gigabyte External Filesale	1976.4
4.0 Gigabyte, Int. 4mm DAT	1797.0
Sidecar 305MB Portable Tape Backup	515.2
Call Eng DCD Deliver Controllers	Assessation

	THE PERSON NAMED IN COLUMN	transfer months
120 MB External	EZ Port	319.2
250 MB External	EZ Port	339.2
A120PC-120 MB	Internal	175.1
A250PC-250 MB	Internal	199.6
Call For Contr	ollers Accessory	Kits and Tane

	IBM	TOKEN RING	
	4 PS/2 MCA		609.1
IBM 16/	4 XT/AT		498.27
IBM 16/4	4 Multi Access U	Init MAU	432.26
	INTEL	NETWORKING	

INTEL TokenExpress EISA 16/4	599.8
INTEL EtherExpress 16-Bit Coax	99.3
INTEL EtherExpress 16-Bit TP	99.3
INTEL TokenExpress XT/AT 16/4	399.2
INTEL EtherExpress EISA 32-Bit	397.30
INTEL EtnerExpress 16-84 TP 5 pk	499.4
INTEL ElherExpress 16 Combo.	114.7
INTEL EtherExpress FlashC Coax	131.8
INTEL NetPort Com	357.2
INTEL MatDest 100 LCC T	202.2

WYSE TERMINALS	
WYSE 50 Amber or Green	349.15
WYSE 60 Amber, Green or White	279.93
WYSE 160/30 Amber or Green	8/274.89
WYSE 185 VT320 Amber, Green or White	327.6
WYSE 150 Amber, Green or White	265.45
WYSE 325 Color/ 325ES Low Emission 519.40	/ 549.39
MULTIMEDIA, SOUND, C	D

Advanced Digital Systems PC PrimeTime 389.14

289.50

109.46 39.49

489.26 129.18 179.25 419.29 388 33

79.93

123.18

258.81

219.28

449.82 485.82

309.46

338 29

619.09

898 08

179.83

119.20

109.43 729.16

779.46

89.26

548.63 636.70 792.22

915.76

668.15

519.24

457,A2

589.36

.529.91 2199,91

Advanced Digital Systems Video Clipper
ALTEC ASC300 Speakers w/ Sub Woof
ALTEC ASC150 Powered Sub Woofer
ALTEC Speakers ACS100
ARISTASOFT, Wired for Sound
ATI Multimedia Upgrade Kit
CD-ROM Software 5 CD Bundle, Call For Tr
COREL SYSTEMS Artiflow
COREL SYSTEMS Draw CD 3.0
CREATIVE LABS Int. CD-ROM Upg Kit.
CREATIVE LARC Count Blacker Deburn

CREATIVE LABS Sound Blaster Deluxe 16

MediaVision DoubleFusion CD 16 Bit.

MICROSOFT Bookshelf For Windows D. 49.50 MICROSOFT Bookshelf For Windows D. 19.20 MICROSOFT Molymer Developed The Windows D. 309.40

CD-ROM & OPTICAL DRIVES

MediaVision Pro 16 System II Bundle

MICROSOFT Works For Windows CD

ORCHID Sound Producer ... Procom MM Station Internal Procom MM Station Externa

SIRIUS Publishing PC KARAOKE

TEXEL Consumer Bundle External .
TEXEL Multimedia Bundle Internal .
TEXEL Multimedia Bundle Internal .
TEXEL Multimedia Bundle External

TURTLE BEACH 16 Bit Multibundle

HITACHI 1700SA Externa

TEXEL Consumer Bundle Intern

Advanced Digital Sy

CREATIVE LABS Sound Blaster Pro MC CREATIVE LABS Sound Blaster 16 Bit ... CREATIVE LABS Sound Blaster 16 ASP CREATIVE LABS MultiMedia Starter Kit CREATIVE LABS Video Blaster CREATIVE LABS Video Blaster Windows

SVDES

RO NOTE 42MB	519.50
JMA 105MB JMB Ext / w 8 Bit Adapter	636.36 529.27

Mountain.

	ape Backup	199.5
250MB Internal	Backup	474,4
304MB internal	DE Backup	439.5
2.0 Gigabyte Ex	ternal Filesale	1976.4
4.0 Gigabyte, In	4mm DAT	1797.0
Sidecar 305MB	Portable Tape Bac	Skup515.2
Call For PS/	Drives Controll	ers Accessories

IRWIN

25 25 19 89

NASDAO

BUY WITH CONFIDENCE CDW® IS A NASDAQ TRADED COMPANY

D & B Rated 3A1

No Surcharge For Credit Cards



SONY COU-31A Internal 550MS, MPC	211.00
SONY CDU-535 Internal 340MS	251.00
SONY CDU-541 Internal 380MS, SCSI, MPC	381.00
SONY CDU-6211 External 380MS, SCSI MPC	488.00
SONY CDU-7205N External 340MS	410.00
SONY CDU-7211 External 380MS, SCSI MPC	489.00
TEXEL CD ROM Irit 240 ms/ Complete Kit	439.90
TEXEL CO ROM Ext 240 ms/ Complete Kit	519.90

PLOTTERS, DIGITIZERS & SCANNERS

ROHIH						
KURTA	12	×	12	XGT pressure sensitive	399.12	
KURTA	12	×	12	XLP/12 x 18 XLP199.50/	399.29	
KURTA	12	×	17		538.27	

CalComp

CALCOMP 12 x 12 w/16 But	275.92	
CALCOMP 12 x 18 w/16 But	559.77	
CALCOMP 2024/2036 Pacesetter	CALL	
CALCOMP Classic 4036	CALL	
CALCOMP Design Mate 3024	CALL	

Summaglaphics-						
Summagraphics Summa III 12 Summagraphics Summa III 12						
Summa Grid III 18 x 24	1083.33					

I'M INSTRUMENT

HOUSTON	INSTRUM	ENTS	DMP.	61	2075.00
HOUSTON	INSTRUM	ENTS	7100	A-D	CALL
HOUSTON	INSTRUM	ENTS	7200	A-F	CALL
The same of the sa					

The HEWLETT

PALMAN	The state of the s
HP7475A/HP7550B	1309.25 / 3009.70
DESIGNJET 600 A-D/ 600 A-E	
DRAFT PRO PLUS A-E SIZM A-D	
SCANJET IIP W/ INT	.724.10/2529.36
SCANJET II C Color XT/AT w/ INT	1299.10
EPSON ES600C Color SCSI Scan	ner837.99
EPSON ES800C Color SCSI Scan	ner1088.40

5
365.91
399.90
279.00
109.50
749.58
1164.00
555.26
959.50
2398.12
1109.39
2089.19
699.15
0/689.43
/2298.57
389.55

NEC SVGA 14", 1024 x 768 .28mm... PANASONIC C1381i, 1024 x 768, 14" PHILIPS 1436, 14", 1024 x 768 PHILIPS 1557.15", 1024 x 768, .28 SEIKO CM1760CR VGA & SUPER VGA DISPLAY CARDS

ACTIX Graphics Engine 32 VL 2 MB	199.07
ACTIX Graphics Engine Ultra	.299.31
ATI GRAPHICS ULTRA 1MB	209.23
ATI GRAPHICS ULTRA Pro EISA 2 MB	
ATI GRAPHICS ULTRA +2 MB	
ATI GRAPHICS ULTRA Pro 2 MB	
ATI GRAPHICS ULTRA Pro MCA 2 MB	394.92
ATLGRAPHICS VANTAGE IMB	179.41
ATI GRAPHICS VANTAGE IMB ATI VGAWonder XL24 1 MB	119.32
ATI VGAWonder GT	163.73
DIAMOND Speedstar Pro / Local But 136,64/	142.28
	339.61
DIAMOND Smallh VESA Local	159.99
DIAMONO Viper wi2MB	414.21
HERCULES Graphite	219.26
HERCULES Dynamite VL	
ORCHID Prodesigner IIS 1 MB	145.45
ORCHID Farenheit 1280 Plus, 1MB	
ORCHID Farenheil VA 1MB 1280 x 1024	199.32
ORCHID Farenheit VA VLB 1MB	

IF YOU FIND A BETTER PRICE CALL CDW[®] BEFORE YOU BUY (800) 359-4CDW





CDW* HOURS

es7:30-7:30 CDT Mon-Frt. 9:00-5:00 CDT Sat. Tech Support for Custon

MOST ORDERS SHIP THE SAME DAY

COMPUTER DISCOUNT WAREHO

COMPUTER DISCOUNT WAREHOUSE

xternal **liniTower**

14400 BPS Data Transmission, 400 BPS Send/Receive Fax Hardware Controlled V.42 Error

tection and Control; V.42bis Data mpression / Quick Link II^a Data/Fax Software Included Hayes® Compatible ✓ Features Rockwell® Technology 7 Day-A-Week User Support Backed by a Lifetime

PRACTICAL PERIPHERALS



WHY SETTLE FOR LESS?

CDW® **SERVICES YOU BETTER**

Intel EtherExpress 16, 16TP &16C LAN Adaptors

✓ SoftSet[®] Autoconfiguration ✓ Installs and Configures in Less than 5 Minutes / On-board, On-Network, and Responder Diagonstics / Supports Twisted-Pair and Coax Ethernet Cabling

✓ Two Data Transfer Modes—Shared Memory or I/O Data Transfer

COAX 10BASE-TONLY

99.33 CDW 20754 9.33 CDW 20752 \$114.77 CDW 27605



CDW CARRIES OVER 15,000 PRODUCTS. IF YOU DON'

		HIBA		
T1900/80 T1900/120 T1900C/120 T1900C/200 T1900C/200 T4500/80 T4500C/120 T4500C/120	1586.93 1709.85 2336.44 1959.68 2586.27 1793.62 1989.98 3189.32	T4500/200	2289.44 3074.10 2749.83 2999.99 3918.73 4168.57 4584.96 6657.17 7175.30	
Bravo 4/33D 12 Bravo LC 4/25	OHD 4MB	ST	1255.50	

ASI	
Bravo 4/33D 120HD 4MB	1255.50
Bravo LC 4/25 120HD	1016.29
	1196.63
Bravo LC 4/33D 120/210HD	1286.52/1529.21
Bravo LC 4/50D 120/210HD	1556.18/1798.88
Bravo LC 466D 120/210HD	1825.84/2068.54
Bravo MT 4/33D 170/340HD	1512.22/1956.67
Bravo MT 4/66D 170/340HD	2045.56/2490.00
Bravo NB 4/25 120HD MONO/COLOR	1782.22/2448.89
Bravo NB 4/25 170HD MONO/COLOR	1893.33/2560.00
POWEREXEC 200MB Special Edition	
POWEREXEC 200MB Special Edition	
Premmia 4/33SX/4/33DX 170HD	1909.29/2139.41
Premmia 4/50D/4/66D 340HD	
SE 4/30 EISA Server 8MB	2215.30
SE 4/66 EISA Surver 18MB.	3362.84
Canon	

Canon

lotejet 4/25 180 HD Notebook w/ built in ptr. 2749.65 lotejet 4/25, 135HD Notebook w/ built in ptr. 2529.59 lotejet 4/25, 85HD Notebook w/ built in ptr. 2309.21

DTK Grafika

EMB, VGA, 2 Fep 200+0 1194.23 / 1592.41 1, VGA, 2 Fep 200+0 1165.68 / 1557.95 HD, BMB, 2 Flop, DOS, Win 2346.59

NEC

Ready ES 4/25S 17CHD

leady ES 4/33D 210HD	1227.66
Ready ES 4/66D 250HD	
owermate ES 4/25SX/433DX 170HD	.1043.34/1165.50
owermate ES 4/66DX2 170HD	1687.22
nage II 4/33D, 170/340HD	.1743.48/1978.26
mage II 4/66D, 170/340HD	.2092.39/2326.09
Versia 4/25SL 120HD MONO/COLOR	.2649.89/3698.84
ersa 4/25SL 180HD MONO/COLOR	2869.22/3928.22
ersa 4/33SL 180HD MONO/COLOR	.3195.82/4259.56
ersa 4/33SL 250HD MONO/COLOR	.3993.28/5323.59

TEXAS INSTRUMENTS

TM4000 4/255X 120HD	1895.48
TM4000 4/25DX 120HD	2095.13
TM4000 4/25DX2 120/200HD	2648.17/2988.76
TM4000E 4/25SX 120HD Enhanced Col	or NEW. 2088.49
TM4000 4/40DX2 200MB Passive Color	3574.12
TM400E 4/50DX2 200HD Active Color	4248.20

OKIDATA

ML184 Turbo	215.33	ML590	419.20
ML320	299.12	ML591	569,52
ML321	417.08	OLB10	909.15
ML380		OLB30	999.96
ML395	966.97	OL840	1009.12
ML395 + Color	1019.74	OL850	1239.66
Mi-520	369.11	OL400E	519.51

Canon

BJ230 Bubble Jet Wide Carriage	399.96
BJ10EX Bubble Jet FREE SHEET FEEDER	
BJ200 Bubble Jet	298.12

EPSON LQ870 437.15

Steritwitter II 95F B85.33	P6200 24-pin	399.93
Silentwriter II 97 1059.29 23200 24-pin219.88	P6300	599.5
3300 24-pin322.58	Jetrate 1000 NEW	

DOT MATRIX & LASER PRINTERS

1150 N	EW133.49	3123	NEW	289.59
1624	337.93	3124	NEW	349.90
1654	534.86	3624	NEW	408.44
20231	198.97	4410	BBB	598.00
2123	236.09	4430	Book	658.95
2124	309.95	44401	2205	NEW .1217.85
2180	158.92	4450	Lagor	958.12
2624	365.48			

TEXAS INSTRUMENTS

TI microWriter Basic 5PPM	629.35
TI microWriter PS23 /PS65869.19	/ 1099.57
TI microLaser TurboPlus PS 9PPM RISC	1378.55
TI microMarc Ink Jet	316.92

Deskjet 550C 609.11 Laser 4SI 2988.7 Deskjet 1200C 1419.12 Paintlet 577.0	LONG BUT TO THE ROLL OF	
	Deskjet 500C 410.39 Deskjet 550C 609.11	LaserJet 4L 689.10 Laser 4SI 2988.78

318.40 / 229.22 209.28 / 229.22 245.00 84.15

DRIVES & CONTRO

Macdor

7120A 130MB IDE 15M3		200.70
7213A, 213MB, 15MS, 3	.5", HH, IDE	229.95
7213S 212MB, 15MS, 3	5" HH, SCSI	297,40
7345A 340MB, 13MS, 3		496,55
LXT535S 535MB, 13MS	3.5° HH SCSI	969.06
PO-12S1029MB.13MS.	S' FH. SCCI-2	1229.84
P1-17S1503MB, 13MS, 3		
1240S 1240MB, 8.5MS,	50.00	1694.40
inter interior around,		

MICROPOLIS

MCP1528-1	5.1345M	B-SCSI		999.42
MCP2105 5	560MB, 10	MS 3.5" I	HH. SCSI	1089.93
MCP1624 6	668MB, 16	MS 5.25"	FH. SCSI	729.64
MCP2112 1	000MB, 1	OMS 3.5"	HH, SCSI-2	.1037.22
MCP2112A	1000MB	10MS 3.5	5" HH. IDE	1569.59
MCP1548 2	206MB, 14	MS 5.25°	FH. SCSI	1966.94
MCD1004 5	2070880 1	414C 5 25	FH CCCLO	2410 88

CONNER

CP3000 40 MB, 28MS, 3.5° HH, IDE	149.34
CP30064H 64MB, 19MS, 3.5" HH, IDE	179.82
CP30104H 120 MB, 19MS, 3.5" HH, IDE	179.17
CP30084E 84 MB. 19MS, 3.5" HH. IDE	189.76
CP301074E 174MB, 17MS, 3.5* HH, IDE	222.58
CP30204 212 MB 12MS, 3.5" HH, IDE	339,63
CP30254 251MB, 14MS, 3.5" 1", IDE	376.88
CP3364 360MB, 12MS, 3.5" HH, IDE	789.83
CP30544 540MB, 10MS, IDE	897.14
CP30540 540MB, 10MS, 3.5" HH, Fast SCSI	
CP31370 1371MB 10MS 3.5° HH SCSI-2	1892.00

Quantum

PLUS Hardcard IIXL 105MB	259.20
PLUS Hardcard EZ 240MB /127MB	. 539.45/319.14
PRO DRIVE 240MB IDE	299.73
PRO DRIVE 1GB SCSI-2	1289.15
PRO DRIVE 525MB IDE 10MS 3.5°	749.14

ATP Seagate

ST351/AX 42MB, 28 MS 1", IDE	129.82
ST3120A 106MB, 19MS, 3.5" HH, IDE	
ST3144A 130MB, IDE, 16MS	219.51
ST2511 40 MB, 28 MS, 5.25" MFM	259.41
ST3243A 200MB, IDE, 12MS, 3.5" HH, IDE	366.40
ST1239A 211MB, IDE, 3.5" HH	439.94
ST1480A 426 MB IDE, 3.5" HH.	819.37
ST2383A 338MB, 16MS, 525° HH, IDE	869.27
ST3290A 216MB, IDE, 35"	
ST3385A 340MB, IDE, 3.5"	387.48
ST3600A 525MB, IDE, 3.5"	859.05
ST4766E 766MB, 16MS, 5.25" HH, ESDI	1059.80
ST41200N 1050MB	1074.29

CONTROLLERS

Acculogic IDE 3 Plus 16 BIT	39.90
Acculogic IDE 3 16 BIT Controller	23,10
Acculogic IDE 4 14/15/16 Controller	29.87
Adapted 1542C Kit	257.43
Adapted 1522K Kit 16 Bit SCSI Host Adaptor	145,45
Adaptec 1742K Kit 32 Bit EISA Kit	439.61
Ultrastor 34F Local Bus SCSI Controller	298.24
Utrastor 12F ESDI/Floppy Controller	166.86
Ultrastor 24F FISA SCSI Controller	399.85

MODEMS & COMMUNICATIONS

UFRODOTICS	
14.4 Sportster Ext. 179.50 9600 Spi	ortster Ext.155.53
14.4 Sportster Fax. 197.28 9600 Spo	ortster Fax169.90
14.4 Sportster Int 157.48 9600 Spo	ortster Int. 147.50
14.4 Sportster Fax. 179.50 9600 Spo	ortster Fax164.81
16.8 & 14 4 Courset Out Std. Ext/ Fax	673.91/688.44
16.8 HST Courier External/ Fax	464.49' CALL
14.4 Courser External Fax	359.10/388.31
14.4 Courier Internal	328.00
Worldport 9696 Portable/w/Fax	263.87/278.73
Worldport 14:4 Portable/ Fax	303.11/339.48
LAN Modern V.32 BIS Ethernet	1096.57

Hayes

ACCURA 144FAX, 219.46	
ACCURA 1448FAX 197.88	
ACCURA 96FAX 189.88	
ACCURA 968FAX, 177,12	
ACCURA 2400B 59.10	
ACCURA2400 69.25	
OPTIMA 14.4 363.56	2
OPTIMA 14.4 Fax 368.49	

PRACTICAL

14.4 V.32 BIS, Snd/Rcv FAX Internal	188.52
14.4 Fax Mini Tower	197,28
14.4 Fax Pocket	338.98
9600 Fax Mini Tower	183.21
Fax Me Roy Fax cartridge for HP Laser III	111168.92
And the second s	

		-	
SatisFAXtion 100	95.50	14.4 Fax Int.	169.81
SatisFAXtion 300	228.09	14.4 Fax Ext.	199.28
SatisFAXtion 350	299.65	96 Fax Int.	156.07
SatisFAXtion 400	368.95	96 Fax Ext	167.89
SatisFAXtion 400E.	374.95		

MULTI-TECH MULTI-TECH 224BA 2400 EXT MULTI-TECH 932BA 9600 EXT

MULTI-TECH 1432BA 14.4 EXT w/F, MULTI-TECH 1432BL 14.4 EXT	AX436.11 489.41
MATH COPROCES	SSORS
INTEL 387DX 16/20/25/33	78.99
INITE! 207CV 10/20/20 / 207CV 22	74 DE / 90 CO

INTEL 3875X 16/20/25 / 3875X 3374.95	78.99 78.68 75.00
INTEL Rapid CAD For All 386 DX's	239.10
BATTERY BACKUP AND	UPS

mur

BC-250	97.30	OMNI 450 LAN	256.17
BC-400			299.90
BC-500	179.55	OMNI 900 LAN	475.50
BC-500 LAN	189.77	OMNI 1250 LAN	593.26
BC-600 LAN	248.13	Isotel Ultra 6	57.13
BC-900 LAN	339.51	Isobar 6	49.38
BC-1250 LAN	469.27	Isobar Ultra 6	48.75
Isobar 4	38.95	Command Console	58.45
Isobar Ultra 4	42.75	LapPwr DC/AC	55.50

AMERICAN POWER

BACK	UPS 250 98.25	Surge Arrest 7	Tel 49.88
	UPS 400 157,25		
BACK	UPS 450 182.68	Smart 600	355.00
	UPS 600 258.84	Smart 900	558.75
BACK	UPS 900 367.88	Smart1250	698.75
BACK	UPS 1250 489.68	Smart 2000.	1167.5
Surge	Arrest 7 19.42	Line-R 600	119.09
Surge	Arrest Plus 7 34.97	Line-R 1250	157.58

LOGITECH Folomen Plus	539.30
LOGITECH Mouseman Cordiess. NEW	89.33
LOGITECH ScanMan 32/Scanman 256 99.55	/169.25
LOGITECH Sena/Trackmanil/Portable 74.9	9/95.50
MEMOREX 3 Button Mouse Plus	29.50
MICROSOFT Mouse V2.0 Bus No Software	86.80
MICROSOFT Ball Point Mouse	109.50
MICROSOFT Serial Mouse, V2.0 No Software.	79.80
POINTEX MOUSE w/ HP Dashboard NEW	45.40

KINGSTON MEMORY	
AT&T CRECIT CARD 4MB	CALL
EPSON ACTION LASER 2-8MB	CALL
AST BRAVO 486LC 2MB AST PREMIUM II 1MB CUPID SIMM AST POWEREXEC 486 4MB	CALL
AST PREMIUM II 1MB CUPID SIMM	CALL
AST POWEREXEC 486 4MB	CALL
AST PHEMIUM 386SX 2MB	CALL
AST PREMIUM 4MB	CALL
AST PREMIUM EXEC 4MBAST PREMMIA 16MBAST PREMMIA 8MB UPG	CALL
AST PREMMIA 16MB	CALL
AST PREMMIA 8MB UPG	CALL
AST PREMIUM 486/33 8MB	CALL
AST BRAVO 386SX 8MB	CALL
COMPAQ PROSIGNIA 16MBCOMPAQ DP386/33 2MB	CALL
COMPAQ DP386/33 2MB	CALL
	CALL
COMPAQ LITE 4/25C 4MB/8MB	CALL
COMPAO DP 386/33L 32MB	CALL
COMPAO PROSIGNIA 32MB	CALL
COMPAO DP 386/16 4MB	CALL
COMPAO DP286N-386N 4MB	CALL
COMPAQ USEN ZMB COMPAQ UTE 4/25C 4MB/8MB COMPAQ DP 386/33L 32MB COMPAQ DP 386/33L 32MB COMPAQ DP 386/16 4MB COMPAQ DP 386/16 4MB COMPAQ DP 386/16 4MB COMPAQ DP 386/16 4MB COMPAQ DP 386/26E425E 4MB COMPAQ DP 386/26E425E 4MB	CALL
COMPAQ DP386SX/16 4MB	CALL
COMPAQ DP 386/20E 4MB	CALL
COMPAQ DP386SX/16 4MB	CALL
COMPAN CONTURA 486 16MB	CALL
COMPAQ CONTURA 486 16MBCOMPAQ CONTURA 486 8MB	CALL
COMPAQ CONTORA 486 8MB	CALL
COMPAC PURIABLE III 2MB	CALL
COMPAQ 8MB DP 486/33M COMPAQ 8 SOCKET EXP W/8MB	CALL
COMPAC CONTURA AND	CALL
COMPAQ CONTURA 4MB	CALL
COMPAQ CONTURA 3/20 8MB	CALL
COMPAQ LITE 4MB CREDIT CARD	CALL
COMPAO PROLINEA 486/33 4MB	CALL
COMPAO PROLINEA 486/33 8MB	CALL
COMPACIFICATION AND STATE OF THE COMPACIFICATION OF THE COMPACIFICAT	CALL
HP LASERJET 2P/III 1MB	CALL
COMPAO PROLINEA 3/25S 2MB	CALL
HP LASERJET ZP/III ZMB	CALL
HP VECTRA 486 4MB	CALL
HP LASERJET II & IID 4MB HP LASER 4L 1MB MEM UPG	CALL
HP LASER 4L 1MB MEM UPG	CALL
HP VECTRA 386/25 8MB	CALL
HP DESKJET 500 & 500C 256KB	CALL
HP LASERJET 3SI 4MB	CALL
HP LASERJET 4 2MB/4MB/8MB	CALL
HP PAINTJET XL300 4MB	CALL
HP PAINTJET XL300 BMB	CALL
II MICHOLASER IMB	CALL
TI TM 3000 2MB/4MB	CALL
TI MICROLASER 4MB	CALL
TI WINSLC/25 2MB IBM PS/2 70 4MB	CALL
IBM PS/2 70 4MB	CALL
IBM PS/2 90 4MB	CALL
IBM PS/2 90/95 8MB	CALL
IBM MOD30 2MB	CALL
IBM PS/2 70-061 2MB	CALL
IBM PS/2 70-A21 2MB	CALL
IBM PS/2 55SX 4MB	CALL
IBM PS/2 50 2MB	CALL
IBM 55SX 4-16MB	CALL
	CALL
IBM PS/1 2MB NEC VERSA 4MB/8MB NEC SILENTWRITER 95 2MB NEC SILENTWRITER 95 2MB	CALL
NEC VERSA AMBIRMR	CALL
NEC SILENTWRITER OF SMR	CALL
OKII ASER 400 2MB	CALL
OKILASER 400 2MBOKILASER 800 2MB/4MB	CALL
PANASON C 4410 4430 2-4MB	CALL
PANASON C 4410, 4430 2-4MB PANASON C P4450I 2MB TOSHIBA T1200XE 2MB	CALL
TOSHIBA T1200XF 2MB	CALL
TOSHIBA 1800, 1850, 2000SX/E, 2200SX 2MB	CALL
TOSHIBA 1800 1850 2000SX/E 2200SX 4MB	CALL
TOSHIBA 1900, 1850, 2000SX/E, 2200SX 2MB TOSHIBA 1800, 1850, 2000SX/E, 2200SX 4MB TOSHIBA T1800, 1850, 2000SX/E, 2200SX 8MB	CALL
	CALL
TOSHIBA T3200SX 2MB	CALL
TOSHIBA T3200SX 4MB	CALL
	CALL
TOSHIBA 4400, 4400SX/C 4MB	CALL
TOSHIBA 4400, 4400SX/C 4MB	CALL
TOSHIBA 5200 2MB	CALL
Due to an Industry-Wide Memory Shortage	

Due to an Industry-Wide Memory Shortage, Please Call CDW for the Best, Most Current PRICES ARE RISING-PLEASE CALL TODAY!

ACCELERATOR/OVERDRIVE

INTEL Overdrive 486/25DX / 486/33DX .439.66 /	549.55
INTEL Overdrive 486/SX25MHz /20 MHz . 429.20 /	319.44
INTEL Overdrive 486/33SX	549.49
KINGSTON SX Now, 25 MHz, IBM 50, 60, 50Z	169.20
KINGSTON 486SX Now, 25 MHz.	346.72
KINGSTON 486DX Now, 33 MHz.	539.89

REE TECHNICAL SUPPORT FOR CDW® CUSTOMERS. (708) 291-7575

CDW® Sells for Less and Services You Better!

FAX (708) 291-1737

CALL FOR FREE CDW® CATALOG

COMPAQ, Toshiba, AST, NEC, Leading Edge.

uper direct buying offers the brand name choices of a superstore with the value and convenience of direct marketing. You receive custom configured "plug and play" systems, overnight delivery, lifetime technical support, and flexible payment plans.



Lowest Price

You always get the lowest available price on PCs Compleat systems. We guarantee it for 30 days after your purchase



Money Back Guarantee

We guarantee 100% satisfaction with a prompt replacement or refund. It's your choice within 30 days of purchase



2nd Day Delivery

Place your standard order by 4 P.M. and receive it in two business days for only \$19,95 per package. Guaranteed.



Lifetime Toll-Free Support

Free technical support is available as long as you own your PCs Compleat system.



Custom Configuration

Fliminate installation hassles by letting PCs Compleat install software, extra memory, a modem, tape, or disk drive. Configuration is FREE!



LEADING EDGE

WinPro 486 E

- 4MB expandable to 32MB
- 8KB cache expandable to 256KB
- Windows Accelerator
- · MS-DOS, Windows 3.1, MS-Works MS-Productivity, Quicken

Processor	Drive	Price
486SX/25	120MB	\$979*
486SX/33	170MB	\$1099
486DX/33	170MB	\$1239
486DX/33	260MB	\$1349
486DX2/66	260MB	\$1599
Color VGA n	nonitors start a	\$229.99
Leas	e for \$50/mo	





- **Bravo Desktops**
- 4MB expandable to 64MB . 120MB or 210MB hard drive
- Local bus video 1024x768
- · OverDrive and P24T upgradable

Model	123/W	213/W	Price
4/25s	120MB	-	\$1029*
4/33	120MB	_	\$1299
4/33	_	210MB	\$1539
4/66d	-	210MB	\$2099

Lease for \$50/mo.



COMPAQ

ProLinea Desktops

- 4MB RAM expandable to 32MB
- · 3.5" floppy drive
- Local Bus graphics
 MS-DOS 6.0, Windows 3.1, Mouse

Model	Hard drive	Price
486SX25	120MB	\$1099*
486SX25	240MB	\$1299
486DX33	120MB	\$1389
486DX33	240MB	\$1469
486DX2/50	240MB	\$1899
D	aller also available	

COMPAQ SVGA monitors \$349.99 Lease for \$50/mo.



COMPAQ

Contura

- 4MB RAM
- · Trackball, MS-DOS, Windows
- · 3-year warranty

Processor Display		Hard drivePrice	
386SL25	Monochrome	120MB	\$1599
486SL25	Monochrome	209MB	\$2199
486SL25	Dual scan color	120MB	\$2699
486SL25	Dual scan color	209MB	\$2879
486SL25	Active color	209MB	\$3479

Lease for \$58.68/mo.

Z-NOTE+ • 486SL/25 processor • 4MB RAM, expandable to 28MB

- 200MB hard drive
- NOTEPOINT trackball
- · Built-in Ethernet
- MS-DOS 6.0, Windows 3.1, MS-Windows for Workgroups

Sceen	Price
Monochrome	\$2469*
Dual scan color	\$3129
Active matrix color	\$3699

Lease for \$90.61/mo.



TOSHIBA

T4600

- 33MHz 486SL processor 4 MB, expandable to 20MB
- 2 PCMCIA slots
- 9.5" diagonal display

Display	Hard Drive	Price
Mono	120MB	\$2879*
Mono	200MB	\$3139
Active matrix color	120MB	\$4099
Active matrix color	200MB	\$4359
Active matrix color	340MB	\$4799

Lease for \$105.65/mo.

PCs COMPLEAT



Sales Hours: Monday-Friday 9 A.M. to 12 A. M. Saturday 10 A.M. to 8 P.M. Sunday 12 P. M. to 8 P.M.

THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

TOLL-FREE SALES 1-800-398-4727

© PCs Compleat. All prices subject to change and do not include shipping. Monitors are sold separately, Lease prices reflect 36 month operating lease to approved business customers. All products or brand names are trademarks of their respective companies. Not responsible for typographical errors. PCs Compleat, 34 St. Martin Drive, Marlhorough, MA 01752.

Texas Instruments

Whether it's portable computing...

More power, more choices, more value...with TI's TravelMate notebooks!



March 30, 1993 TravelMate 4000 WinDX2/50





TravelMate 4000 Color

- 4 or 8MB RAM expandable to 20MB
 120 or 200MB hard disk drive
- 640x480 VGA color display (9.4")
- · Local bus video (SX/25 only)
- MS-BallPoint/QuickPort connection
- MS DOS 6.0. Windows 3.1

Processor RAM Hard Drive Price 120MB 486DX2/40 8MB 200MB \$3299

Lease for \$80.70





TravelMate 4000 WinDX2/50

- or 8MB RAM expandable to 20MB
- . 120 or 200MB hard disk drive
- 640x480 VGA display (10")
- 64 gray scales
- · MS-BallPoint/QuickPort connection
- MS-DOS 6.0, Windows 3.1 RAM Price

Hard drive \$2659 120MB 200MB \$2999

Lease for \$97.59

MATRIX

COLOR!



TravelMate 4000E

- 486DX2/50 processor
- 4MB RAM expandable to 20MB
- · 200MB hard disk drive
- · 8.4" active matrix color display
- · 256 colors, local bus video
- · MS-BallPoint/QuickPort connection MS DOS 6.0, Windows 3.1

Lease for \$143.09

exas Instruments' microWriter and microLaser printers have been expertly designed to keep costs down while offering the highest level of performance. Each model features laser-quality, high resolution printing, re-

liable LED technology,

a small footprint for true

desktop use, an out-

standing warranty, and

with you. Choose the

model that best suits

your needs.

upgradability so it grows

or affordable printing, we have what you need.





microWriter

Affordable laser quality printing

- · Laser-quality, high resolution (300dpi) printing
- 5 pages per minute
- HP LaserJet II emulation
- 512K memory, expandable to 4.5MB





microWriter PS23

Postscript printing for under \$1000

- 5 pages per minute
- Adobe Postscript support
 HP LaserJet II emulation
- · 23 scalable built-in fonts
- 2MB memory expandable to 4MB
- · Automatic emulation switching \$899.

microWriter PS65

65 scalable built-in fonts



PCs Compleat is the proud recipient of PC/Computing magazine's highest Five Star rating for service and overall performance in its listing of the nation's leading direct sellers





microLaser Turbo High performance

- 9 pages per minute
 Adobe PostScript Level 2
- · HP LaserJet II emulation
- Automatic emulation switching
 35 built-in Adobe scalable fonts
- Weitek 8220 RISC-based 16MHz
- 2.5MB memory expandable to 6MB

1-800-398-4727

PCW-10/93

...THE BEST NAMES IN THE BUSINESS FOR LESS!

HEWLETT PACKARD NEW AT SUSA FLEX! Authorized Dealer



drop-on-demand thermal

*S75 Rebate	HP MA
when purchased	YOUR
with accessory.	AFTER!
Ask for details.	IN REB

FPSON LASER

PRINTERS

inkjet printing	
FLEX PRICE	\$324
HP MAIL-IN REBATE	-75*
YOUR COST AFTER MAIL	\$249

	_	_	_
EF	S	0	N

	1659
ACTION LASER 1500	-II ⁵ 719
EPL-8000	\$819

EPSON DOT MATRIX PRINTERS LX-810 169 LQ-870 AP 3250 174 LQ-860 Cir. \$454 \$574 NEW LQ-570+1239 LQ-1170 \$624

FX-870 \$274	LQ-2550 Clr.	1919	
FX-1170 1359	DFX-5000	\$1359	
LQ-1070+ \$359	DFX-8000	\$2279	
Stylus 800 Ink Jet Printer \$289*			
*Includes \$50 Rebate from Epson			

Panasonic

LASER PRINTERS			
KX-P4410	1549	KX-P4455	\$1679
KX-P4430	\$659	KX-P5410	CALL
KX-P4440	\$1144		

DC	T MAT	RIX PRINTER	S
KX-P1150	\$139	KX-P1624	1329
KX-P2180	\$159	KX-P1695	1344
KX-P2023	\$194	KX-P2624	1359
KX-P2123	\$229	KX-P1654	1524
KX-P2124	\$200		

CD-ROM SPECIALS

MultiMedia for only... CD/ROM Upgrade Kit

Mitsumi Internal CD-ROM

Sound Galaxy

Nx PRO MA Sound card w/16-bit I/F Connects directly to CD/ROM drive. 20 FM systhesized channels. Stereo MIC input.
Manual and S/W Volume Control. Includes applications S/W, Does not require a CD ROM caddy, Includes 2 stereo speakers.

-Software Bundles!~

5 Educational Titles or 5 Entertainment Titles Your Choice Only \$139

When puchased with CD-ROM Upgrade Kit

MEC	NEW
ER PRINTERS	LOWER

LASER PRINTERS	PRICESI
SILENTWRITER Model	95f 1889
SILENTWRITER Model	95fx 1099
SILENTWRITER Model	97 \$1079
SILENTWRITER Model	97fx \$1299
NEC Jetmate 1000	\$329

TEXAS	NEW AT
INSTRUMENTS	JUSA FLEXI
microWriter Basic	
microWriter PS23 microWriter PS65	
microMarc TM	\$279

Canon

BL	BBLE JE	T PRINTERS	6
BJ-5	\$199	BJ-800C	\$149
BJ-10ex	\$239	BJ-820C	1162
BJ-200	\$289		
BJ-230	\$399		

\$399 LASER BEAM PRINTERS LBP-4SX 5669 LBP-8SX \$1299

MONITORS



NE	C
14" 3D 14" SVGA 14" 2A	\$359 \$329 \$279

15" 3FGe	\$599	_
15" 4FGe	\$699	
17" 5FGe	\$1069	1
17" 5FG	1249	17
21" 6FG	\$2279	

00	
99	NEC "OEM"
20	
19	17" 5FG* \$1099
19	11 Jru 1033

SAMSUNG

ELECTRONICS	
14" CVL4955 \$239	
14" SyncMaster 2. \$269	
14" SyncMaster 3	
14" SyncMaster 3n	\$309
15" SyncMaster 15C	\$449
17" SyncMaster 4 Plus	5649
17" SyncMaster 5C	

FLEXVISION

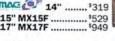
14"	1024X768 \$289	
	1280X1024 \$429	q

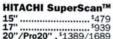


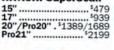
CIA	
4" 5439-As	219
4" 5468/NI \$259/	279
4" CPS 1461LR 5	
5" CPS1561	379
5" CPS 15601 P 5	419

14"	5468/NI \$259/279	(a
14"	5468/NI \$259/279 CPS 1461LR \$309	ALC:
	CPS1561 379	-
15"	CPS 1560LR 5419	
17"	CPS 1760 Proscan	\$769

MAG (14"	 . \$319
15" MX15 17" MX17	F	 . \$529
17" MX17	F	 \$949





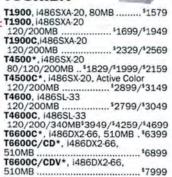






TOSHIBA LAPTOPS

TOSHIBA



*AC power only

TI TravelMate™ Notebook Computers

TEXAS INSTRUMENTS

IIIO I I CONTENTO
TravelMate WinSLC™ 25MHz -
80MB HD, 4MB RAM1489
TravelMate 4000 WinSX/25 -
120MB HD, 4MB RAM31879
TravelMate 4000 WinDX/25 -
120MB HD, 4MB RAM \$2049
200MB HD, 4MB RAM ³ 2219
TravelMate 4000 WinDX2/50 -
120MB HD, 4MB RAM ⁵ 2639
200MB HD, 8MB RAM ⁵ 2979
TravelMate 4000E WinSX/25
Advanced Passive Color -
120MB HD, 4MB RAM52129
TravelMate 4000 WinDX2/40 Passive
Color - 200MB HD, 8MB RAM \$3229
TravelMate 4000E WinDX2/50 Active
Color - 200MB HD, 4MB RAM \$3829

TAPE BACK-UP

Ask about special

JUMBO 120 120MB storage capacity INT. SYSTEM 149 . EXT. SYSTEM 1233 JUMBO 250 250MB storage capacity INT. SYSTEM 179 EXT. SYSTEM 269 JUMBO TRAKKER 120MB \$289 JUMBO TRAKKER 250MB \$349 POWERTAPE¹

DATA CARTRIDGES

M DATA CARTRIDGES

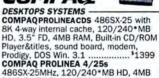
DC2000 40/80MB	°15.95 ea.
DC2060 Thetamat (QIC-40)	\$29.95 ea.
DC2080 80/160MB	\$19.95 ea.
DC2080 Rhomat (Ir-80)	
DC2120 120/250MB	\$21.95 ea.
DC2120 Ximat (QIC-80)	\$26.95 ea.
DC6150 250/500MB	\$21.49 ea.
DC2060 Kappmat (Ir-60)	\$25.95 ea.
DC6250 250/500MB	
DC6525350/700MB	532.95 ea.

H-P FAX MACHINES

HEWLETT PACKARD

and and relationship				
HP FAX-200	Plain	paper	fax	\$89
HP FAX-310				
III LAV-2TO	LIGHT	hahei	Idy	771

COMPAQ



NOTEBOOK PORTABLES

PRINTERS -COMPAQ PAGEMARQ 15 15 ppm

Res., PS Level 253749 MONITOR -COMPAQ VIDEO GRAPHICS COLOR 14" Flat picture tube, 640 x 480 @ 60Hz max. graphics res. 31mm dp \$199

* The two numbers refers to the HD

with/without DOS Data Compression

VIDEO CARDS

0	SPEEDST
~	ISA/VLB
IAMOND	STEALTH

TAR PRO 1MB 3 \$119/\$129 TH PRO VLB

| STEAL1H PRO VLB | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 1949 | 194

GRAPHICS ULTRA+ 1MB/2MB .. \$219/\$249 GRAPHICS ULTRATH PRO 2MB ISA/VLB/EISA .. \$359/\$359/\$399



ProDesigner II/s 1MB ⁵149 Fahrenheit 1280+ 1MB ISA/VLB ⁵159/⁵179 7

Celsius VLB 1MB 1249

MODEMS

	Int./Ext.
ACCURA 2400	\$65/\$75
ACCURA 96+FAX96	. \$189/\$209
ACCURA 144+FAX144	
POCKET EDITION™ 2400 .	119

Robotics

Int./Ext. Sportster 9600 FAX \$159/\$169 Sportster 14.4 FAX \$179/\$199

FLEX *altimate* 14,400/14,400 V.32 MODEM

Communication S/W and FaxWorks Fax S/W both for DOS and Windows. Int. 5149 Ext. \$169

TO ORDER CALL...



° 1-800-876-5606













471 Brighton Drive, Bloomingdale, IL 60103 **CODE # WD1003**

PC WORLD

Shop The PC World Catalog For Fast Solutions To Your PC Needs

The PC World Catalog is the most cost efficient way to bring your product message to managers proficient with PCs, the group identified by study after study as today's key buyers of computers and related equipment.

Your message can reach buyers in a variety of ways. The "Business Class" section brings your ad to our 901,000 readers with four-color impact. *PC World's* "Computer Showplace" section highlights your ad in black and white, with a choice of display or text/only formats (standard red can be added as a second color).

For complete information on Catalog advertising, please call toll-free 800-262-9885 or 203/838-1425 Fax. PC World Catalog, c/o RAM, 50 Washington Street, South Norwalk, CT 06854.

Advertising Sales Staff

Pat Fales

Catalog Manager 203-857-5100

Deborah Cocchia

Catalog Coordinator 203-857-5111

Janet Sawyer

Western Account Manager 203-857-5102

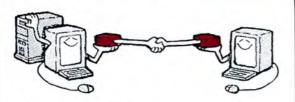
Chris Kimball

Eastern Account Manager 203-857-5101

HARDWARE Communications Computer Systems Memory Cards Peripherals Security Storage/Backup Devices SOFTWARE	330 330 331 331 331	334 334 334
Computer Systems Memory Cards Peripherals Security Storage/Backup Devices	330 331 331 331	334
Memory Cards Peripherals Security Storage/Backup Devices	331 331 331	
Peripherals Security Storage/Backup Devices	331 331	334
Security Storage/Backup Devices	331	334
Storage/Backup Devices		
	000	
SOFTWARE	332	
Accounting		336
Business Applications	333	336
CD Rom	333	
Church Applications		336
Data Entry		336
Educational		337
Financial		337
Flow Charting		337
Inventory Control		337
Mall Order		337
Malling Programs		337
Maintenance Management		337
Mapping		337

Product Category	Business Class	Computer Showplace
Medical		337
Music		337
On-Line Service	MAN STANSTO	337
Public Domain/Shareware		338
Real Estate		338
Restaurant Point of Sales		338
Statistics		338
Surveys		338
Utilities	333	338
Windows	333	
MISCELLANEOUS		
Accessories	332	334
Bar Coding		334-335
Computer Insurance		335
Data/Disk Conversion		335
Data Recovery		335
Disk Copy Service		335
Disks		335
On-line Services	332	
Supplies		336

HARDWARE/Communications - Computer Systems PC-COMPANION



Add a second Keyboard, Monitor and Mouse up to 250 feet from your PC!

- PC/AT, PS/2 and 100% Compatibles
- Supports VGA up to 1024 x 768
- · Use either PS/2 or Serial Mice
- Combine monochrome and color VGA



Made in USA

Dealer Program Available



4912 Research Drive • Huntsville, AL 35805 U.S.A.

(205) 430-4000 · FAX (205) 430-4030

CIRCLE 516 ON READER SERVICE CARD



COMMANDER

CONTROL UP TO 96 PC FILE SERVERS WITH 1 KEYBOARD MONITOR, AND MOUSE

- Select via Keyboard
- Dual access to 150 feet away (optional)
- "AutoBootTM" Feature boots attached computers without operator intervention
- Use either PS/2 or Microsoft serial mouse with available cables
- Each unit accommodates from 2 to 8 PCs; cascade up to 12 units







4912 Research Drive · Huntsville, AL 35805 U.S.A.

(205) 430-4000 · FAX (205) 430-4030

CIRCLE 517 ON READER SERVICE CARD

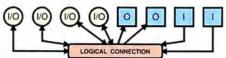
You CAN Afford **Four-Color Impact**

In fact, you can't afford not to advertise in color. Industry studies and years of ad tracking show that color ads typically outsell black and white ads by over 40%. PC World's Business Class section brings your four-color ad to over 620,000 of North America's most influential PC buyers at very economical rates.

Call now for more information 800/262-9885

PRINTER SHARING & MEMORY

() = serial = parallel



800-238-9415

LCX-1000 (1Mb) \$495 8 ports; 4 serial I/O; 57,600 bps 2 parallel in, 2 parallel out LC-256 (256Kb) \$375 LC-512 (512Kb) \$425 8 ports; 4 serial I/O; 19,200 bps 2 parallel in, 2 parallel out LXFR-ETC

DOS, Windows & OS/2 File Transfer 4 user license, for LC or LCX

PB-42PP-256Kb \$199 PB-42PP-1Mb \$279 PB-42PP-4Mb \$429 6 parallel ports; 4 in / 2 out Upgradable to 4Mb; 25,000 cps

LC Jr.-256 (256Kb) \$199 LC Jr.-512 (512Kb) \$249 5 ports; 4 serial in, 1 parallel out Up to 115,200 bps

LC-41PAS \$69 5 parallel ports; 4 in / 1 out Smart-switch; 25,000 cps \$49

9600 bps to 115,200 bps Serial / Parallel Converter PB-11PP-1Mb

\$199 2 parallel ports; 1 in / 1 out Upgradable to 16Mb; 25,000 cps



PC SIMMs MAC SIMMS POWERBOOK **PCMCIA TOSHIBA**

NEW SOFTWARE

TicklerFile™ Planner that posts notes MicroPaint™ 256 color image processing AmazinGames™ DOS & Windows Block dropping and mazes

LOGICAL CONNECTION 4660 Portland Road NE #108 Salem, OR 97305-1658

Tech.: (503) 390-9375 FAX: (503) 390-9372

CIRCLE 420 ON READER SERVICE CARD

9-Track for PCs Mainframe to PC data interchange

Rock solid solutions, rock bottom prices. Direct from the manufacturer. 1600 & 6250 bpi. Subsystems include drives and software.

800-729-8725 OVERLAND DATA.

Since 1980

480 Now With IDRC!

Ask about 3480 tape drives too

Tel: 619-571-5555 · FAX: 619-571-0982

Europe: Tel: (+49) 6172-35027 - FAX: (+49) 6172-35028

CIRCLE 430 ON READER SERVICE CARD

HIGH-PERFORMANCE PARALLEL-TO-SCSI CONNECTIONS!

-Jerry Pournelle, Byte Magazine 3/93 This product ... is darned near perfect." even more elegant than its predecessor and almost twice as fast." -Jim Seymour, PC Magazine 12/92



nect up to 7 SCSI devices to your parallel port and still use your printer! Buy the MiniSCSI" Plus adapter to run CD-ROMs, tape, SyQuest, Bernoulli or other SCSI devices.

▲ 100% Printer Passthrough ▲ Just 7.2 Oz.

▲ Only \$219.00 ▲ EPP Version Available ▲ See Your Dealer or Call: 1-800-TRANTOR

Fax: (510) 770-9910 Adaptec Interactive Fax: (408) 957-7150 Trantor

5415 Randall Place • Fremont, CA 94538



Would you leave \$2500 in cash on your desk and go to lunch?

Then why leave your computer?

Secure your equipment with the . . .

Kāblit^{IM} Security System

Kablit products are known for their quality and reliability. Our customers can testify to the security effectiveness of our products and they still have their computers to prove it.

· Master LockTM included with each security system. · Lifetime warranty on all parts.

Security packages for all types of office equipment:

- · COMPUTERS

Secure-It

- · PRINTERS

18 Maple Court

- · SCANNERS · HARD DRIVES
- · LASER PRINTERS
- · FAX MACHINES
- ·MONITORS OTHERS Call for your free catalog:

413-525-7039 800-451-7592

East Longmeadow, MA 01028 CIRCLE 433 ON READER SERVICE CARD

Explore the Internet - FREE!

DELPHI, a leading international online service, now offers full access to the Internet. You can explore this incredible electronic network with no risk. You get 5 hours of evening/weekend access to try it out for free!

Use electronic mail to exchange messages with over 10 million people

throughout the world. Download programs and files using "FTP," connect in real-time to other networks using "Telnet," and participate in "Usenet Newsgroups" the world's largest bulletin board with over 3500 topics. If you're not familiar with these terms, don't worry; DELPHI has expert online assistants and a large collection of help files, books, and other resources to help you get started.

After the free trial you can choose from two low-cost membership plans. With rates as low as \$1 per hour, no other online service offers so much for so little.

5-Hour Free Trial!

Dial by modern, 1-800-365-4636* Press Return once or twice At Username, enter **JOINDELPHI** At Password, enter **PCW39** DELPHI

Cuestions? Call 1-800-695-4005 (voice) Send e-mail to INFO@delphi.com

Current internet users can Teinet to delphi com instead. Complete details provided during the toll-free registration

Polaroid has the Answer to the Glaring Problem



Turn Your Monitor into a High Quality Display with Polaroid Circular Polarizer Filters!

The problem of computer glare has been well documented. Bright light from windows or overhead lamps reflects off computer displays causing operators to strain in order to read data. This results in sore eyes, blurred vision, headaches, fatigue and loss of productivity.

Polaroid Circular Polarizer Filters suppress up to 99% of reflected light and are more effective than any other kind of filter for improving contrast, so you see clearly with less effort. Also, most CP-Filter models have a transparent electrically conductive coating which reduces up to 98% of electric field radiation, and allows

for static control grounding of the filter. All models now utilize convenient and attractive universal mounting systems for easy compatibility, quick attachment, and a great fit.

Polaroid offers a full range of Circular Polarizer Filters which allows you to select the one that best meets your needs. The CP-90 for 10" to 15" monitors and the CP-Workstation for 16" to 21" monitors – durable top quality glass filters with conductive coating. The CP-60SC and CP-60 for 9" to 15" monitors – low cost, high quality alternatives to our glass filters, with and without conductive coating.

Polaroid

Polarizer Division 1 Upland Road/N2, Norwood, MA 02062 1-800-225-2770

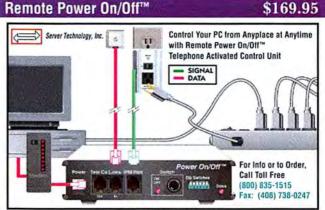


CIRCLE 425 ON READER SERVICE CARD

BUY LOW. SELL HIGH.

PC WORLD'S Business Class section offers four-color selling power at super low prices. What, you didn't know color ads outsell black and white by over 40%? But get this: your quarter page ad (on a typical, twelve time rate) will run for only \$4560 per issue! Can you afford NOT to advertise in Business Class?

Call the PC WORLD Classified Department NOW for details. 800/262-9885



CIRCLE 410 ON READER SERVICE CARD



CIRCLE 431 ON READER SERVICE CARD

BUY LOW. SELL HIGH.

PC WORLD'S Business Class section offers fourcolor selling power at super low prices. What, you didn't know color ads outsell black and white by over 40%?

But get this: your quarter page ad (on a typical, twelve time rate) will run for only \$4560 per issue! Can you afford NOT to advertise in Business Class?

Call the PC WORLD Classified Department NOW for details. 800/262-9885

MANAGERS ONLY READ PC WORLD

Well, 684,000 of them only read PC World. You can't reach them through any other magazine. No kidding. Your four-color ad in Business Class hits them right between the eyes. For only \$4560 an issue! (On a typical 12 time rate for a quarter page ad.)

Call 1-800-262-9885 or 203-838-1425 for details



CIRCLE 408 ON READER SERVICE CARD



ontains a copy of CICA, CDROM the internet's largest \$24.95° Windows archive. Hundreds of megabytes of MS Windows programs on your desktop save you time and money. Our friendly shell makes accessing all these files easy. Includes hundreds of utilities, screen savers, backup/restore programs, diagnostics, data conversion programs, games, demos for many commercial Windows programs, fonts, icons and bitmaps. There are programming tools for C, C++, Toolbook, Turbo Pascal, and Visual Basic. This disc is configured educational for Opus, RBBS, Peboard, Wildcat, and Spittire in July 1993.

ENTREPRENEUR

BBS's, Made in EMAIL April 1993.

CALL, SEND EMAIL 1-800-786 CALL, SEND ENT. 1-800-786-9907 OR FAX +1-510-674-0821

\$5 S&H per order (USA, Canada, Mexico)
\$10 overseas +1-510-674-0783 AMEX/VISA/MC/COD Concord, CA 94520

Packed full of the world's highest quality MSDOS shareware from the internet - every DOS user should own this disk! With 8,818 files, Simtel contains something for everyone. Includes our friendly shell program to help you find whatever you need, whether it be utilities, communications programs, BBS's, editors, documentation, databases. BBS index files. Made in May 1993.
Giga Games CDROM \$39.5 An amazing collection of games, from classic arcade to the latest windows simulations to

DMACS SOFTWARE

Risk-free 60 day money back guarantee

educational games for all ages. BBS ready, Made *Shareware programs require separate payment to authors if found useful.

Full money-back guarantee

CIRCLE 416 ON READER SERVICE CARD



Even if you have reviewed your homeowners insurance, you are not as prepared for disaster as you may think! You could lose thousands of dollars on a homeowners claim because you don't have full knowledge of your possessions.

Now ValueVision makes the inventory of your home's contents easy, by utilizing over 500 colorful icons and the powerful Windows™ format. You can drag and drop items in each room of your own floorplan... right on the screen!

Windows is a trademark of MicroSoft® Corp. ValueVision is a trademark of Fusion Software. System requirements: Windows 3.0 or later, VGA monitor, 3 MB free hard drive space, 1.44 MB 3.5' or 1.2 MB 5.25" floppy disk, 2 button

mouse or other pointing device.

Provides a complete record and valuation of your home's contents through an easy question-and-answer process

Produces the necessary claim forms automatically for you to send to your insurance company, leaving little chance of coming up short during settlement .

Expedites settlement of your

Easy to use. You needn't be a computer whiz to benefit from this important protection, which is as fun as it is functional

Free technical support is available by telephone Monday through Friday, 8 a.m. to 5 p.m.

ORDER NOW SEC Add \$5.95 for shipping & handling TX Residents add 8.25% sales ax

1-800-856-8566 Houston (713) 465-9721 • Fax: (713) 465-9749 Or mail to: Fusion Schware 11748 Cawdor Way, Houston, TX 77024-2618

Hardware

Miscellaneous

COMMUNICATIONS/MODEMS

FAX-ON-DEMAND + VOICE PROCESSING

dVOICE's™ features include:

- · One call fax mode
- Fax back mode
- Voice mail
- Text to speech
- · High level programming language Inbound and outbound capabilities
- · Automated receptionist
- Built-in database capabilities

MULTIVERSE • 212-580-0541

"beep beep BEEP. Deep beep BEEP beep" ABCvoice® lets callers touch-tone their way to extensions, mailboxes, & recorded information - on up to 24 lines in 1 PC! Nothing beats the value, flexibility, & power of ABCvoice! Jenu-driven screens.

•Menu-driven screens •Delivers messages & dials pagers
•Supervises call transfers •Offer Fax-on-Demand with ABClax® tool

We do custom programming! Toolkits also available for developing your own applications

Versicom Corp • 316 Regency • Dayton, OH 45459 • 513-438-3700 fax:513-435-1629

CIRCLE 438 ON READER SERVICE CARD

ACCESSORIES

204 page guide to computer furniture supplies and accessories Dial Toll-Free

1-800-8-GLOBAL

ŒGLOBAL COMPUTER SUPPLIES

Harbor Park Dr., Dept 91 PCW Port Washington, NY 11050

CIRCLE 508 ON READER SERVICE CARD

BAR CODING

wariant microsystems ...Where Quality Counts

BAR CODE AND MAGNETIC CARD ACCEPTED SIMULTANEOUSLY For XT/AT PS/2 286/386/486 PCs

RS-232/Scancode terminals DOS/UNIX/PC-MOS compatible 10 year warranty on readers

30 day moneyback guarantee (in USA) CCD with Decoder & Bar Code Printing Software - \$485



COMPUTER SYSTEMS

USED COMPUTERS

IBM, COMPAQ & MAJOR BRANDS Also IBM PCjr & Convertible Accessories, & Service. Computers from \$99 Monitors from \$49 New CGA Color Monitors \$129 IBM 5140 Laptops \$349 Software, Keyboards, Parts Hard to find parts FREE CATALOG Computer Reset Call (214) 276-8072 PO. Box 461782 Garland TX 75046-1782

FAX & BBS (214) 272-7920

Reports:

PC WORLD's ad sales jumped 23.3% during last year's "recession".

Why? Because products sell when advertising in these in good vears and bad, PC

today: 800/262-9885

Advertising Age

pages. Every issue, every day, WORLD works

Contact Catalog sales

PERIPHERALS



Super Support, & SCSI Too!



PERIPHERALS

The Only Professional Choice

CIRCLE 513 ON READER SERVICE CARD

Save BIG \$\$\$ on printing costs!!!

MacInker'

Better than new cartridges for less than 5¢



Over 200,000 sold. Beautiful printing and longer printhead life. Call for complete information.

Epson MacInker	48.00
Universal Cartridge	Model79.45
MultiColor Adapter	40.00

Jet-Master

Re-usable jet-printer recharge kit. Just buy ink later as needed.



- Simple, trouble-free operation.
- Average recharge cost is \$1-\$2 · Most Jet-printers supported, single and multicolor.
- · Brilliant, bold color inks available for HP cartridges.

HP Deskjet	24.95
HP 4-color	49.95
HP QuietJet	26.95

C≞mputerFriends, Inc.

14250 NW Science Park Drive Portland, OR 97229 To Order 1-800-547-3303 Tel. (503) 626-2291

CIRCLE 483 ON READER SERVICE CARD

BAR CODING



800-526-5920

Call Toll-Free U.S. & Canada

FAX: 415-856-3843

Money-Back Guarantee VISA

All TPS products carry 30-Day





4047 Transport Street, Palo Alto, CA 94303 Phone: 415-856-6833

Bar Code Reader for IBM and MACINTOSH

- Reads all popular bar codes
- Rugged aluminum housing
- No software/hardware modifications
- Includes removable all metal wand
- Lifetime warranty (see factory for details)
- Works with any program or operating system
- Withstands 6ft. drop to concrete
- Also available: Barcode printing software, portable readers, magnetic stripe readers and encoders

CIRCLE 434 ON READER SERVICE CARD



JORTHINGTON

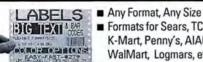
BAR CODE HEADQUARTERS

DATA SOLUTIONS

OFFICES IN USA AND EUROPE

Labeling Software

For PC with Dot Matrix or LaserJet



- Formats for Sears, TCIF, K-Mart, Penny's, AIAG, WalMart, Logmars, etc. ■ WYSIWYG Design
- Bar Codes: UCC-128, UPC/EAN, 2of5, MSI, 11, UPC/EAN, 2of5, 128, Code 39, etc.
- Big Text and PCX Graphics too!
- Powerful, Versatile, Easy to Use
- Imports ASCII data files from dBase, etc.
- Above Label Printed by LabelRIGHTTM-\$279

Thermal Transfer Printer with Labeling Software



- Fargo's Allegro Printer
- Up to 4"label width
- Small size, only 20 lbs.
- Prints UPC/EAN, 2of5, 128, 39
- Scalable text & PCX graphics
- Packaged with LabelRIGHT thermal™ software, serial cable, ribbon & labels
- Complete package, ready to use \$ 1895

Bar Code Readers

for PC, XT, AT, PS/2, Macintosh and RS-232 Terminals

- Attaches as 2nd Keyboard
- UPC/EAN, Code 128, 2of5, MSI, Code 39
- Wand, Magstripe, CCD Slot Badge or Laser Scanner
- Top Rated by Independent Review
- Complete with Steel Wand \$399
- Complete MagStripe Units from \$219

Portable Bar Code Readers

for PC,XT,AT,PS/2,Macintosh, and Serial Interface Computers

- Battery Operated Reader 3 AA Cells
- 64K or 256K memory
- Keyboard or Serial upload
- XMODEM upload
- Download Tables
- 2 built-in inventory programs
- UPC/EAN, 128, 2of5, Code 39
- Complete 64K Reader with Laser - \$1734
- Complete 64K Reader with wand \$799



Ordering is Easy!

- Same Day Shipping USA Made
- Free UPS Blue in USA
- Qualified P.O.'s Accepted
- Free "800" Support
- 30 Day Money Back Guarantee

Call 408-458-9938 or Call Toll Free

In Europe call information for Toll Free numbers to our Swiss Office or call 71 87 51 15 in Schweiz.

Advertising Age Reports:

PC WORLD's ad sales jumped 23.3% during last year's "recession".

Why? Because products sell when advertising in these pages. Every issue, every day, in good years and bad, PC WORLD works.

Contact Catalog sales today: 800/262-9885

COMPATIBLE READER SYSTEMS

CALL TOLL FREE 800-217-4307

- No software changes required
- 1, 2 or 3 input devices per reader Portable DOS unit Wand, swipe, ccd, laser, magnetic User configurable
- Access control readers

Leaders in creative technology

- RS-232 readers
- · Portable DOS units
- Starting at \$179

Orders & Information Box 353 Maynard, MA 01754

CIRCLE 404 ON READER SERVICE CARD

DISK COPY SERVICE

FORMATTED DISKETTES BASF, VERBATIM, SONY

WITH	QTY 250	WITHOUT
FORMAT	MIX & MATCH	FORMAT
\$.38	5.25" DS/DD	\$.33
\$.52	5.25" DS/HD	\$.42
\$.59	3.50° DS/DD	5.49
\$.89	3.50" DS/HD	5.79

- FREE FORMATTING on First Order TYVEC SLEEVES Included (5.25°) COLORED MEDIA Please Add \$ 05 VOLUME DISCOUNTS Available SAME DAY Shipping MONEY BACK GUARANTEE

800-255-3142

Diversified Systems Group, Inc. PO Box 1114, Issaquah WA 98027

CIRCLE 422 ON READER SERVICE CARD

- Full packaging services
- Duplication, all formats
- EVERLOCK copy protection
- Label and sleeve printing
- 48 hour turn around
- Fulfillment and drop shipment
- Consultation and guidance

Star-Byte, Inc. 2880 Bergey Rd., Hattield, PA 19440

800-243-1515 CIRCLE 477 ON READER SERVICE CARD

COMPUTER INSURANCE

SAFEWARE

Insures your computer. Full replacement of hardware, media & purchased software. As low as \$49 yearly. Covers fire, power surge, and accidental damage Now available in Ontario. Call for immediate coverage or informa-

1-800-800-1492

SAFEWARE

The Insurance Agency Inc 2929 N. High St., PO Box 02211 Columbus, OH 43202 Local (614) 262-0559

DATA RECOVERY

Hard Drive Crash?!

We have rescued data from drives that won't spin, bad track0, bad FAT tables, flood/fire damage and other catastrophic failures. Used by IBM, Faralon, Amoco, Mobil and others. Consideration given to dealers and consultants, Small evaluation fee. fast turnaround and reasonable recovery rates.

Computer Shoppe The Data Recovery Experts 1318 Reese Street, Ridgecrest, CA 93555 619/384-4500 • 619/384-4005 Fax

DATA/DISK CONVERSION



CIRCLE 515 ON READER SERVICE CARD

DISKS

DUPLICATION FROM \$.49 HIGHEST QUALITY MEDIA

MSDOS duplication from \$.49 (5.25" and \$.80 (3.5"). Prices go even lower as you continue to order!

- Duplication + 100% Verification
- Custom Labels/Sleeves/Mailers Custom Packaging & Assembly Colored Media Available
- Special Rates For Demo Software & Site Licensing Educational Discounts Available
- 24 Hour Turn-Around Guaranteed Products

800-255-3142

Diversified Systems Group, Inc. PO Box 1114, Issaquah WA 98027

CIRCLE 448 ON READER SERVICE CARD

Remanufactured cartridges for HP, Apple, etc. Exchange Price

VISA 800-777-8444 MC, COD

CIRCLE 429 ON READER SERVICE CARD

Low Cost - High Quality - Free Delivery

COMPLETE LINE OF SUPPLIES

RECYCLED TONER COMPLETE LINE OF DATA FORMS CARTRIDGES

Save Your \$ - Save Your Environment

Connecticut Computer Supplies 65 Post Road • Fairfield, CT 06430 • 1-800-334-1800

CIRCLE 439 ON PEADER SERVICE CARD

PC WORLD DELIVERS THE BUYERS YOU NEED TO REACH!

Study after study has proven that managers proficient with PCs now control the business PC buying process. Make sure your advertising gets maximum exposure in your best target market.

Software

ACCOUNTING

DATASMITH Payroll

Is your payroll UPSIDE-DOWN-SIZED? DATASMITH can help! Modular, sensible, affordable, easyto-use. 15 years field-proven producing 6 to 6000 checks/period. Muti-company/multi-state, magfiling, user-maintainable tax tables. Option Direct Depsit. Import/Export, MICR encoding. Order today!

LPI Information Systems 10020 Fontana Overland Park, KS 66207 913/381-9118

BUSINESS APPLICATIONS

UPS Shipping Software

Direct interface to Macola, DacEasy, RealWorld, Great Plains and Platinum. Used as TSR can work with almost any software. Also works great stand-alone. Computes zone & charges. Prints Manifests, COD tags, shipping labels, etc. Optional 100WT, GSV, RPS, USPS, FedEx, scale intf. Only \$249, network \$449. Gtd UPS acceptance, 60-Day money back. Free trial offer.

V-Technologies PO. Box 6261 Wolcott, CT 06716 (203) 879-6960 · Fax (203) 879-6962

BUSINESS APPLICATIONS

The Software Exchange

will buy your unwanted software. PC or Macintosh compatable. All applications including games. Call about pricing for both selling and buying used software. Note The seller must surrender all original software, literature and licensing for the product being sold.

The Software Exchange 3575 28th street suite 202 Boulder, CO 80301 800 440-8908/(303) 440-8908 TimeWise for DOS Computers A time, billing and productivity management system designed for organizations which account for their time. Time Wise helps track every detail of job management from prospecting through scheduling, time and material costing, billing & analysis, 60 Day Trial version for \$49.00 plus S&H 1-800-795-9074 (US and Canada)

Dynamic Software Solutions Inc. 177 Telegraph Road, Unit #447 Bellingham, WA 98226 Product of David Berman Developments

BUSINESS APPLICATIONS

Print Checks on Blank Forms!

New Version 2.0 Now only \$149.95

BlankCheck prints MICR-encoded checks on blank forms using an HP laser printer and your accounting software. Peachtree, DacEasy, Quicken, Accpac Plus, BPI and others.

1-800-628-6427 P.O. Box 1703, Mt. Airy, NC 27030 MAGNETIC S-O-F-T-W-A-R-E

CIRCLE 427 ON READER SERVICE CARD

CHURCH APPLICATIONS



Church Management Systems

Expect the best!

- Outstanding Reporting
- ·Superior Support
- •Integrated Modules
- Over 1500 Users
- •Free Preview Disk

1-800-247-8044

TSL - 3300 Bass Lake Road, -#304 Brooklyn Center, MN 55429 FAX 612-566-2250

CIRCLE 415 ON READER SERVICE CARD

Church Partner

Written by Computer professionals involved in church management. Skilled users love its power, depth and flexibility. Novices love its ease of use. 13 optional modules with support and upgrade, For IBM compatible and LANs, Object oriented graphic user interface, pop-up menus, windows mouse compatibility and more.

Software by Summit Systems Inc. Suite 121, 16 Berry Hill Road Columbia, SC 29210 USA 803/798-9749, 800/228-5857 Fax: 803/731-0349

CHURCH *SOFTWARE*

Discover for yourself why more churches are choosing Power Church Plus.® Try out the leading membership and accounting package. Call today for your FREE full-working DEMO.

F1 SOFTWARE, 208 Ridgefield Drive, Asheville, NC 28806 800/486-1800

CIRCLE 482 ON READER SERVICE CARD

DATA ENTRY

mile

Full featured, heads-down entry, with two-pass verification, batch control, output record reformat, operator stats, edit language, customizable menus, help text. Free technical support.

PC from \$395 Also for LAN's IBM AS/400", IBM \$/36

व्यव्या विद्या 206/776-6443 800/356-0203



Computer Keyes 21929 Makan Rd. Woodway, WA 98020

Replace dedicated data input systems Front-end mainframe applications

KeyEntry III

- ☐ LAN or stand-alone environments ☐ ScreenPainter and MenuManager
- □ ScreenPainter and Menumanager included
 □ Batch Control System and Reformat utility
 □ Spanish, German, and French versions
 □ Cutstanding customer support
 □ Thousands of users worldwide
- OS/2 version

800-533-6879



AVAILABLE TO QUALIFIED COMPANIES! SCS SOUTHERN COMPUTER SYSTEMS, INC. (205) 251-2985 FAX (205) 322-4851 In UK: SCS Europe, Ltd 0753-36550/ FAX 0753 36765

Viking Data Entry

Professional Quality Software

- · Used by U. S. Census
- · Advanced Validation
- · Sequential/ISAM files
- · MS/DOS, UNIX, XENIX, VMS, AIX
- · Technical Support
- · Re-key verify

Viking Software Services 4808 E. 67th St. Ste. 100 Tulsa OK 74136 918/491-6144 FAX: 918/494-2701 800/324-0595

FACT:

ADD RED AS A SECOND COLOR. NCREASE RESPONSE By 41%.

EDUCATION

In Computer Sciences

- ALL COURSES BY CORRESPONDENCE.
- · Increase your earning power.
- Join students from leading computer companies.
- · Most courses fully interactive.

AMERICAN INSTITUTE COMPUTER SCIENCES

For free information write 2101-WO Magnolia Ave. Suite 200 B'ham, AL 35205 USA or call 1-800-767-2427

Be a computer repair expert!

Professional-level hom study. Learn PC repairs, troubleshooting, upgrad-ing, servicing, installation. Become a more valuable employee or open your own business. Send or call for free career literature.



6065 Roswell Road Dept. KL684, Atlanta, Georgia 30328

CIRCLE 451 ON READER SERVICE CARD

FINANCIAL

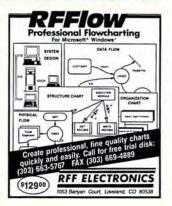
Loan-Amortization

EXEC-AMORT. Replace Desktop Financial Calculators, Avoid Inaccuracies, Quit Using Your Spreadsheet, Store Loans to Disk, Solve for PV, FV, I, PMT, N. Easy to read amortization reports, fixed & ARM's, APR's per Reg Z, Points & Fees, Balloons, irregular & skipped payments. \$149.95 US + \$5 s/h. Int'l add \$25

ELECTROSONICS

36380 Garfield, Suite 1 Fraser, MI 48026 USA 800-858-8448, 313-791-3010 fax Int'l phone: 313-791-0770

FLOW CHARTING



INVENTORY CONTROL

RETAIL POINT OF SALE INVENTORY

Need Inventory Control??
The POS has invoicing, reordering on line stock search and browse, inventory updating, PO's.
Supports cash drawer, tape Supports cash drawer, tape receipt printer, barcode scanners Accounts Receivables, Mailing List, Barcode Printing, General Ledger, Accounts Payables Wholesale, Dental, Apparel stores, Office Supply, Auto Parts, Tire Dealers inventory programs

Prices \$289 - \$489

Network versions available Freeman Software Garland, Texas 800-426-6598 214-270-0625

CIRCLE 518 ON READER SERVICE CARD

MAIL ORDER

Mail Order Manager (M.O.M.)™

America's most popular, complete, and affordable solution for the mail order business - order entry/review, credit card processing with draft capture, UPS manifesting, profit analysis, accounting, telemarketing, list management. Clipper compiled, dBase III + files. Single and Multiuser versions. Find out why more people buy MOM after comparing! Call for demo kit.

Dydacomp Development Corporation 150 River Road, Suite N1, Dept. PCW Montville, NJ 07045

(800)858-DMOM (201) 335-1256

MAILING PROGRAMS

The Mail Order Wizard

Complete management system for a catalog, inbound telemarketing, or mail order company. Order processing, inventory mgt, ad forecasting, sales/banking, list mgt, modem charge approval, EDC, UPS manifest w/scale interface. Single and Multi User Systems. Inbound/Outbound Editor's choice.

Haven Corporation 1227 Dodge Ave., Dept. W93 Evanston, IL 60202 800/676-0098, 708/869-3434

MAINTENANCE MANAGEMENT

Maintenance & Inspection

An integrated maintenance management system, including parts inventory, with clients in Fortune 500 companies, utilities, hospitals, schools, manufacturing & service industries, etc. The online system provides operational, planning & analytical reports, such as work orders, schedules, skill & inventory requirements, budget reports & reports that summarize history of work performed. Penguin Computer Consultants

PO Box 20485 San Jose, CA 95160 408/997-7703, FAX: 408/927-0570 800/521-0545

Geo Whiz Desktop Mapping

\$129.95 gives you US maps. Pinpoint your data base on base on vector map.

- Featurees •360K of Hwys
- Variable zoom
 Point to point milage
 Print maps

- Applications
 Find Lat/long
- Locate customers
- Closest dealer
- · Route assistance
- · Territory management Detailed country maps. Address Lat/

Long matching Kositzky & Associates, Inc. 1601 Greenbriar Place, Ste J

Oklahoma City, OK 73159 PH 405/692-1683 Fax 405/693-1698

MUSIC

SongWright V

MUSIC PROCESSOR prints professional sheet music, songs, scores with text, chords, dynamics. Compose, edit, record, play, transcribe, copy, transpose, extract import, publish - all in standard notation. Symbol editor/librarian. PC, MIDI/AdLib, or SMF entry & playback, Matrix/laser/Deskjet printers. \$119.95+\$5 s/h. Free sample output.

SongWright Software 7 Loudoun Street, S.E. Ste 5B Leesburg, VA 22075 1-800-877-8070, 703-777-7232j2

MEDICAL

Medical Systems with ECS

PPM offers a complt, line of med SW from simple ins. claims proc. to

PC CLAIMS PLUS- claims proc. w/ECS to 100+ major ins. carriers -30 day MB guar

THRESHHOLD-complete A/R, Pt. Bill, Comprh. practice mgt stats. CLAIM NET- Nationwide eletrne claims clearinghse transmits to 100+ ins. carriers. SW starts at \$649. Dealer inquiries welcome Physicians Practice Management 350 E. New York

Indianapolis, IN 46204 800/428-3515, 317/634-8080

Medical Billing Made Easy Medsoft can handle your office NOW. and GROW with your practice. Over 1500 installations and 10 years experi-

ence means we are the experts. Medsoft's FoxPro Sierra Line offers: · Custom versions: MEDICAL, DENTAL,

- ANESTHESIA, CLINICAL Flexible - Used by All specialties
 Automatically Generates Insurance
- Electronic Claims COMPETITIVELY PRICED

FREE Demo Disk. Dealers Welcome! Source code available. Pacific Medsoft, Inc

P.O. Box 7049 (925 N. Lake Blvd, Suite B-301) Tahoe City, CA 96145-7049 800/343-5653, 916/583-2994, Fax 916/583-1532

ON-LINE SERVICE

Hot Modem Fun!



Join The Thousands Of Ladies And Gents Around World Who Have Discovered America's Leader In Online Adult Entertainment Where YOU Create The Fun! And It's Only On Odyssey!

For Modern Info, Signup Or A Local 818 358-6968 Number From Over 850 Cities Call:

CIRCLE 411 ON READER SERVICE CARD

Files in the U



■ 200 new Shareware programs every day ■ Music Graphics Business/Finance Windows Adult ■ INTERNET E-Mail and 2500+ Newsgroups ■ No obligation Special FREE downloads Area

8-N-1 617-354-3230 2400 and v.32/v.32 bis

CIRCLE 424 ON READER SERVICE CARD

Got a great business idea?

Turn it into reality. Get your high-tech product or service ready to go and advertise it inexpensively in PC World's "Computer Showplace". It's America's "most likely to succeed" testing ground for new ideas.

Call today: 800/262-9885 or fax, 203/838-1425

PUBLIC DOMAIN/ SHAREWARE



CIRCLE 402 ON READER SERVICE CARD



FREE CATALOG

OVER 600 PROGRAMS
NO Minimums, NO Gimmicks, NO Clubs
Business, Windows, Games, Education
24-Hour, Toll Free Ordering

SHAREWARE EXPLOSION CD-ROM – 549

Over 5,000 Programs — Menu Driven We Carry a Full Line of Graphics CD-ROMS S Software, 2880 Bergey Rd., Dept 600BQ Hatfield, PA 19440 • (215) 997-2470

CIRCLE 405 ON READER SERVICE CARD

STATISTICS

NCSS 5.x Series - S125

Easy-to-use menus & spread sheet. Multiple regression. T-tests. ANOVA (up to 10 factors, rep. measures, covariance). Foreasting, Factor, cluster, & discriminant analysis. Nonparametrics. Cross Tabulation. Graphics: histograms, box, scatter, etc. Reads ASCII/LOTUS. Many new add-on modules.

NCSS 329 North 1000 East Kaysville, UT 84037 Phone: 801-546-0445 Fax: 801-546-3907 FACT: 23%
of PC WORLD's
subscribers
purchased
PC software
from mailorder
companies
last year.

SURVEYS

REAL ESTATE

Property Management

Rental-Ease. Tracks tenants, income and expense, repairs and maintenance and much more. Guaranteed to be the easiest and fastest property management program available at any price. Others claim ease of use, see our demo and decide for yourself.

Versions for owners, professionals, networks. \$395 to \$1295. Free brochure, demo \$10 Strategic Office Systems 688 North 500 West #61 Mt. Pleasant, UT 84647 800/942-6784 or 801/462-2130

Property Management

Comprehensive software for managing residential, commercial, condos & more. Three versions: Basic PM for owner/manager-\$495, Deluxe PM for professional management-\$1,195, Multi-User with Novell network compatibility-\$2,395. Includes check writing, recurring expenses, G/L, management reporting.

Yardi Systems, Inc. 819 Reddick Street Santa Barbara, CA 93103 805/966-3666

The Survey System

Analyzes: marketing, public opinion, customer satisfaction, employee attitude surveys. Handles mail, personal, phone, scanner, disk-by-mail or computer interviews. Records verbatim text and actual voice answers. Graphics, network version, user friendly. Free support.

Creative Research Systems 140 Vista View - Ste 101 Petaluma, CA 94952-4728 Ph (707)765-1001 Fax (707)765-1068

NEW StatPac Gold IV

Professional's choice for survey & marketing research. Covers questionnaire design, sampling, CRT & telephone interviewing, basic analyses & presentation quality graphics. Includes frequencies, tabs, banners, descriptives, t-tests, verbatim coding, etc. Advanced statistics available. Free brochure.

StatPac Inc. 4532 France Ave. South Minneapolis, MN 55410 TEL: (612) 925-0159 FAX: (612) 925-0851

RESTAURANT/POINT OF SALE



RoundTable RMS Restaurant POS

Controls Food and Labor Costs, Security, Point Of Sale, Timeclock, Network Option. Supports Cash Drawer, Receipt & Kitchen Printers. Full Reporting. IBM Compatible (800)324-2388 (713)622-9841



\$495 Easy Restaurant Software \$495

CIRCLE 435 ON READER SERVICE CARD

PC WORLD DELIVERS THE BUYERS YOU NEED TO REACH!

Study after study has proven that managers proficient with PCs now control the business PC buying process. Make sure your advertising gets maximum exposure in your best target market.

Advertising Age Reports:

PC WORLD's ad sales jumped 23.3% during last year's "recession" .Why?

Because products sell when advertised in these pages. Every issue, every day, in good years and bad, PC WORLD works.

Contact Catalog sales today: 800/262-9885

UTILITIES

REMOVE HARDWARE LOCKS

Protect your investment!

Don't wait for your lock to get lost, stolen or fail and render your program useless costing you \$\$\$\$

Our SAFEKEY'S are guaranteed to unlock the following programs:

MaxRoute Pads 2000 3D-Studio
MasterCam CadKey Topas
MicroStation Rio & others

VISA (609) 390-2799 Fax: (609) 390-3750



IMAGINE THAT

From \$399 plus S&H

One Evergreen, Seaville, NJ 08230

T

MATH ACCELERATOR

- 387/487 emulation for 386 and 486SXPC's
- Up to 400% faster graphics, CAD, etc. for PC's w/o a math chip.
- · Run all CAD, Graphics, FEA,
- games, etc. without a math chip.
 DOS, Windows, DOS Extender, and EMM compatible.
- · Uses no DOS memory.
- · Only \$25
- Call for a FREE working demo of Q387

Quick Ware PO Box 684652, Austin, TX 78768 Voice 24hrs (512)-280-6707 BBS (512) 292-1212 (8N1) Also on CIS, at IBMHW, AOL, etc.

FACT: 56% of PC WORLD subscribers reported making purchases "immediately" or "very soon" after seeing an ad in the magazine.

PC WORI

PUBLISHER Richard J. Marino Assistant to the Publisher Colette Cornish

ADVERTISING SALES

Vice President, Director of Advertising leff Edman

Assistants to the Director of Advertising Kate Comfort Harr, Patricia Owen

FAST

Eastern Advertising Director Bob Ostrow (508/820-0440)

Administrative Assistant/Office Manager Ellen Sanderson

Mid-Atlantic/Manhattan

John Grogan, Senior Account Manager (201/587-0090) New England/Ohio/Michigan/

Eastern Canada Michael Welsh Carroll, Account Manager (508/820-0440)

Southeast/Pennsylvania Judy Sutter, Senior Account Manager (404/394-0758)

MIDWEST

Midwest Advertising Director Mark Taussig (708/827-4477)

Administrative Assistant Tammy Torp

Midwest/Texas

Harvey Diamond, Senior Account Manager, National Direct Account Manager (21-1/233-3492)

Midwest

Duane Hampson, Account Representative (415/243-0500)

NORTHWEST

Northwestern Advertising Director Bob Carrigan (415/243-0500)

Northern California Corinne Cox. Account Manager (415/243-0500)

San Jose, California Susan Simmons, Senior Account Manager, Director of Strategic Markets (415/243-0500)

SOUTHWEST

Southwestern Advertising Director Greg Mason (415/243-0500)

Administrative Assistant Casady Rutter

Southern California, (San Diego) Colorado/Idaho/Nevada/Utah/ New Mexico/Arizona

Lisa Crutchfield, Account Manager (714/250-8081)

Sales Assistant Linda E. Celis Southern California (Los Angeles County/

Orange County) Bill Hanck, Account Manager (310/312-8008)

Sandie Wade, Account Representative (415/243-0500)

LOTUS EDITION ADVERTISING SALES

Kevin Normandeau, Account Representative (508/820-8113)

PC WORLD CATALOG

(800/262-9885) Catalog Manager Pat Fales Eastern Account Manager Chris Kimball Western Account Manager Janet Sawyer

Coordinator Sally Naylor PC WORLD ACTION CARDS

Account Representatives Kevin Normandeau (508/820-8113) Leslie Piper (415/243-0500)

CIRCULATION, MARKETING, RESEARCH

Senior Vice President Heather Martin Maier Subscription Director David Ball

Senior Promotion Manager Francesca Davies

Circulation Business Manager Noël White Promotion Manager Ellen DiMatteo

Promotion Coordinator Jane Kratochvil

Renewal and Billing Coordinator David Cobb

Circulation Assistant Katherine McCarthy

Single Copy Sales Kemco Publishers Services (603/924-0224)

Director of Marketing Alan Abrams Public Relations Manager Lee Dovle Reprints Coordinator Leslie Piper

Marketing Events Manager Sandy Wong Administrative Assistant Krista Alvarez

Research Director Cheryl Curbow Research Manager Thomas Gewecke

PRODUCTION

Vice President, Manufacturing Linda Manes Goodwin

Senior Production Manager Nadia Maudsley

Advertising Information Manager Kevin Octavio

Assistant Production Manager Kathy Badertscher

Advertising Production Coordinator Francis Aviani

Production Coordinator Nancy Jonathans

Advertising Information Assistant Erin Wayman

HUMAN RESOURCES

Director, Human Resources Richard Willoughby

Administrator, Human Resources Thalia Ohara

Human Resources Assistant Maria Chico

ADMINISTRATION

Director of Finance Vicki Peilen **Director of Information Services** Walter J. Clegg

Corporate Business Manager Christina Spence

Accounting/Operations Manager Pat Murphy

Accounting/Facilities Manager Michelle Reyes

Senior Financial Analyst Madeleine Buckingham

Special Assistants to the President Pete Deemer, Thomas Hsieh, Jr., Scott Laughlin, Melissa Riofrio Assistant to the President Kelly Milan

Advertiser Index A-Z

Get more information-circle the appropriate number on the reader service card.

Servi Numi	co Page Number
6	Acma Comuters Inc
9	Advanced Logic Research9
-	America on Line
45	American Power Conversion 93
-	Anthro Corp
-	Apple Computers 69-76
27	Arabesque Software
8	Arlington Computer Products
4	AST Research
5	ATT Technologies, Inc 291
36	Attitude, Inc
10	Austin Computer Systems 219
12	Austin Computer Systems
32	Austin Computer Systems 62
38	Bay Technical Association
63	Borland International 41
34	Brother International
21	Caere Corp
52	Central Point Software 257
91	Citizen America Corp 239
18	Coactive Computing Corp 46-47
-	Co-op Advertising L31
47	Compaq
83	Compaq Computer Corp , 12-13
19	Compudyne192-193
14	Compudyne 190-191
33	Compuserve, Inc311
39	Computer Associates
42	Computer Associates 161
78	Computer Associates
68	Computer Discount Warehouse
-	Curtis Manufacturing 96, 125
59	Cyrix Corp

PC World is a publication of International Data Group, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. International Data Group publishes over 190 computer publications in 62 countries. Forty million people read one or more International Data Group publications each month, International Data Group's publications include: ARGENTINA's Computerworld Argentina, Infoworld Argentina; ASIA's Computerworld Hong Kong, Computerworld Malaysia. Computerworld Southeast Asia, PC World Hong Kong, PC World Malaysia. PC World Singapore: AUSTRALIA's Australian Macworld, Australian PC World, Computerworld Australia, IDG Sources, Network World, Reseller: AUSTRIA's Computerwelt Destereich, PC Test; BRAZIL's Computerworld, Mundo IBM, Mundo IBM, Mundo Ibnix, PC World, Publish; BULGARIA's Computerworld Bulgaria; Ediworld, PC & Mac World Bulgaria; CANADA's Direct Access, Graduate Computerworld, InfoCanada, Network World Canada; CHILE's Computerworld, InfoCanada, Network World Canada; CHILE's Computerworld, InfoCanada, CHILE's CH World, Computerworld Danmark, Lotus World, Macintosh Produktkatalog, Macworld Danmark, PC World Danmark, PC World Produktguide, Windows World; ECUADOR's PC World; EGYPT's Computer World (CW) Middle East, PC World Middle East, FINLAND's MikroPC, Tietoverkko, Tietoverkko, Tietoverkko, Tietoverkko, Tietoverkko, Tietoverkko, Tietoverkko, Tietoverkko, Tietoverko, Tie Extra, Computerwoche Focus, Computerwoche Karriere, Information Management, Microett, Netzwelt, PC Worke, Publish, Unit: HUNGARY's Alapiap, Computerwoche Karriere, Information Management, Microett, Netzwelt, PC Worke, Publish, Unit: HUNGARY's Alapiap, Computerwoche Karriere, Information Management, Microett, Netzwelt, PC Worke, Publish, Unit: HUNGARY's Alapiap, Computerwoche Karriere, Information Management, Microett, Netzwelt, PC Worke, Publish, Unit: HUNGARY's Alapiap, Computerwoche Focus, Computerwoche Karriere, Information Management, Microett, Netzwelt, PC Worke, Publish, Unit: HUNGARY's Alapiap, Computerwoche Karriere, Information Management, Microett, Netzwelt, PC Worke, PC Worke, Publish, Unit: HUNGARY's Alapiap, Computerwoche Focus, Computerwoche puterworld Israel, PC World Israel: ITALY's Computerworld Italia, Lotus Magazine, Macworld Italia, Letus Magazine, Macworld Italia, Lotus Magazine, Macworld Italia, Magazine, Mag News; KOREA's Computerworld Korea, Macworld Korea, PC World Korea; MEXICO's Compu Edicion, Compu Hanufactura, Computacion/Punto de Venta, Computerworld Mexico, MacWorld, Mundo Unix, PC World, Windows: THE NETHERLANDS' Computer/ Totaal, LAN Magazine, MacWorld: NEW ZEALAND's Computer Listings, Computer Vealand, New Zealand PC World: NIGERIA's PC World Africa: NORWAY's Computerworld Norie, C/World, IDG Direct Response, Lotusworld Norie Macworld Norge, Networld, PC World Ekspress, PC World's Product Guide, Publish World, Student Data, Unix World, Windowsworld; PANAMA's PC World; PEOPLE'S REPUBLIC OF CHINA's China Computerworld, China Hetwork Words, Electromics International, PC World China; IDG HIGH TECH BEIJING's New Product World; IDG SHENZHEN's Computer News Digest; PERU's Computerworld Peru, PC World; PHILIPPINES' Computerworld, PC World; POLAND's Computerworld Poland, PC World/Komputer; PORTUGAL's Cerebro/PC World, Correso Informatico/Computerworld, MacIn; ROMANIA's PC World; RUSSIA's Computerworld Moscow, Mir-PC, Sety; SLOVENIA's Monitor Magazine; SOUTH AFRICA's Computing S.A.:
SPAIN's Amiga World, Computerworld España, Computerworld España, NeXTworld, PC World España, Publish, Surworld; SWEDEN's Attack, Computerworld España, Computing, Dataingenjoren, Lokala Natverk/LAN, Lotus World,

10 Poly Computerworld España, Computerworld España, Poly Computerworld E MAC&PC, Macworld, Maxi Data, Mikrodatom, PC World, Publishing & Design (CAP), Windows World; SWITZERLAND's Computerworld Schweiz, Macworld Schweiz, PC & Workstation; TAIWAN's Computerworld Taiwan, Global Computer Express, PC World Taiwan; THAILAND's That Computerworld; TURKEr's Computerworld Monitor. Macworld Turkiye, PC World Turkiye; UKRAINE's Computer World; UNITED KINGDOM's Lotus Magazine, Macworld, Sunworld; UNITED STATES' AmigaWorld, Cable in the Classroom, CD Review, Clo, Computerworld, Desktop Video World, DOS Resource Guide, Electronic News, Federal Computer Week, Federal Integrator, GamePro, IDG Books, Infoworld, Infoworld, Infoworld, Multimedia World, Network World, NeXTworld, PC Games, PC Letter, PC World, Publish, Sumeria, SunWorld, SWATPro, Video Event; VENEZUELA's Computerworld Venezuela, MicroComputerworld Venezuela; VIETNAM's PC World Vietnam

Index

Reade Service Numb	e Page	Reade Service Numb	e Page	Read Service Numb	ce Page	Read Service Numb	e Page
70	Dae Easy117	233	Patton & Patton Software 302	59	Cyrix Corp 102-103	-	Gateway 2000 137-140
77	Datawatch	-	PC Connection	106	Intel End Users Division 128-129	-	Gateway 2000 273-276
-	Dell Computers 149-155	12	PC World Fax Back95	191	Sigma Designs20	197	MEI Micro Center 86-87
_	Digital Equipment Corp 245-252	÷	PCWorld On-Line271		Communications	-	NEC Information
-	Epson America Inc 118-119	232	PCs Compleat Inc	105	Hayes Microcomputer107		Systems173-176
101	Ergodyne	-	PC World On-Line 347	115	Intel Corp	244	Texas Instruments 232-233
99	Ex Machina 269	211	Phoenix Tech Ltd 43	113	A contract	228	Toshiba America Inc 21
235	Fifth Generation Systems 16	212	PK Ware		Computers	251	Zeos International
-	Gateway 200049-61	231	Portrait Display Labs8	6	Acma Comuters Inc		Monitors/Displays
-	Gateway 2000 137-140	256	Power Soft65	9	Advanced Logic Research9	169	Mag Innovision64
-	Gateway 2000	184	QMS Inc	-	AST Research	194	Nanao USA Corp
79	Haventree Software 141	202	QMS Inc	12	Austin Computer Systems . 228-229	201	NEC Electronics
105	Hayes Microcomputer107	189	Quarterdeck Office	32	Austin Computer Systems 62	176	NView Corp292
-	IBM 180-184		Systems254-255	47	Compaq Computer Corp 236	231	Portrait Display Labs
-	IBM204-205	4	Radio Shack	83	Compaq Computer Corp 14	255	Sampo Corporation of
162	IBM211	239	Rose Electronics	19	Compudyne 192-193		America121
-	IBM214-215	255	Sampo Corporation of America121	14	Compudyne190-191		Multimedia
-	IBM217	225	Serif, Inc	85	Comshare	4	Apple Computers 69-76
~	IBM293-296	191	Sigma Designs20	-	Dell Computer Corp 149-155	10	Austin Computer
115	Intel Corp	84	Smart Print		Digital Equipment Corp 245-252		Systems219
106	Intel End Users Division 128-129	_	Software Publishing 265-268	-	Gateway 2000 137-140	145	Media Vision
137	Interlink	213	Sumeria Inc	-	Gateway	200	Microsolutions288
138	Kao Corp277	124	Tektronix, Inc	-	IBM.,	-	IBM293-296
120	Keystone Learning Systems315	-	Texas Instruments	-	IBM204-205	-	IBM204-205
118	Kinesis Corporation 148	244	Texas Instruments 232-233	-	IBM293-296		Other
-	LA Trade	74	The Complete PC	-	IBM217	27	Arabesque Software
206	Learnkey, Inc	37	The Complete PC	- 3	IBM214-215	74	The Complete PC36
122	Logitech, Inc	208	3M195	106	Intel End Users Division, 128-129	37	The Complete PC
-	Lotus298-299, 25-35	228	Toshiba America Inc	-	Lotus298-299	172	MIS Computer Systems 314
-	Lotus Development	243	Traveling Software	187	NEC Information Systems		Peripheral/Sharing Devices
	Corp 162-163	148	USAFlex328		NCR		얼마 없이 얼마나를 살아보다 하나는 없다.
126	Lyco Computers317	12	WordPerfect Corp 122-123		Radio Shack	38	Bay Technical Association
169	Mag Innovision	_	WordPerfect Corp 188-189	148	USA Flex	-	Gateway 2000
145	Media Vision94		WordPerfect Corp	164	Wise Guides	115	Intel Corp
167	Media Vision Direct	238	Worldwide Technologies322	219	Zeos International 6-7	239	Rose Electronics
197	MEI Micro86-87	-	Xerox 109-112	210		84	Smart Print
217	Merritt Computer Programs 64	219	Zeos International 6-7		Desktop Publishing		Printers/Plotters
183	Micrografx	251	Zeos International	194	Nanao USA Corp		
-	Microsoft259-260	259	Zone Publishing		Input Devices	45	American Power Conversion 93
200	Microsolutions		A STATE OF THE STA	118	Kinesis Corporation	34	Brother International
172	MIS Computer Systems 314			159	Mouse Systems301	91	Citizen America Corp 239
159	Mouse Systems	Λdu	articar Inday by	-	Microsoft259-260	-	Curtis Manufacturing96
194	Nanao USA Corp		ertiser Index by		Local Area Networks	-	Curtis Manufacturing
	NEC	Pro	duct Category	38	Bay Technical	202	Epson America Inc
201	NEC Electronics C2-1		nore information-circle the appropri-	30	Association 126-127	202 184	QMS Inc
187	NEC Information	ate n	umber on the reader service card.	18	Coactive Computing Corp, 46-47	124	Tektronix, Inc
201	Systems			239	Rose Electronics	244	Texas Instruments 232-233
177	New Vision Technologies , 101		HARDWARE		Laptop/Notebook	244	Texas Instruments
-	NRI Schools305			32	Austin Computer Systems 62		Xerox
176	NView Corp		Boards/Cards/Chips	14	Compudyne 190-191	_	109-114
		5	ATT Technologies, Inc 291	2.4			

Index

Read Servi Numb	ce Page	Servi Numi	ce Page	Serv Num	ice	Page Number	Read Servi Numi	ce	Pag Numbe
	Scanners/Digitizers		Database Management		Word Processing/Aid	s	640	DeskTop Confe	erencing,
122	Logitech, Inc	39	Computer Associates	-	WordPerfect Corp	. 122-123		A STATE OF THE PARTY OF THE PAR	120
200	Microsolutions288		Fontware	-	WordPerfect Corp	235	639	Personal Video S	System Model 70,
	Storage/Backup Devices	36	Attitude, Inc	-	NCR	197-200	635	PFS:Resume &	
	Apple Computers69-76	30		-	NEC	. 173-176	-	for Windows, Sp	innaker
	Apple computers Tittle 2 - 10		Graphics		Add-On Board				
	MISCELLANEOUS	183	Micrografx	676	Actix Graphics Engine 32p	lus.	634	Resume for Mic SWFTE	rosoft Word, 113
		-	Software Publishing 265-268	1.522	Actix			Communicati	one
	Computer Accessories		Integrated Software	677	AMI Fast View VLB, Ame		707	CommWorks fo	
-	Anthro Corp	-	Lotus25-35	670	Megatrends	220	101		are
101	Ergodyne		Multimedia	010	CardExpert Cardex W32, CardExpert Technology	220	642		
217	Merritt Computer Programs 64	12	Austin Computer	679	Cardinal VideoSpectrum 2			Enable Software	124
208	3M195		Systems228-229		Cardinal			Compression	
	Mail Order	213	Sumeria Inc	680	Diamond Stealth Pro, Diamond Stealth Pro VLB; Diamond		694		
-	Arlington Computer Products		Optical Character		Computer Systems			Intex Solutions	
68	Computer Discount		Recognition					Computer Sys	stem
	Warehouse	21	Caere Corp	Pro	ducts Featured		659		ro 66M, Compaq Compaq 178
-	LA Trade316		Other		Editorial		656	AcerFormula 44	
126	Lyco Computers	-	Datawatch		more information—circle the	oneroed.	000		
167	Media Vision Direct	79	Haventree Software 141		number on the reader service		657		/66d Model 343W,
172	MIS Computer Systems314	138	Kao Corp						
-	NCR197-200	225	Serif, Inc	626	Diamond Viper PCI, Diam	ond	658	Carrera Worksta Carrera	tion 4,
-	PG Connection 280-285		Presentation Graphics		Computer Systems		704		o, Compaq 80
232	PCs Compleat, Inc 326-327	177	New Vision Technologies 101	681	Diamond Viper VLB,	220	620	CompuAdd Cer	ntura Line,
148	USA Flex		Project Management	651	Diamond Computer Syste Digital Sound Pro 16,	ms 220			mputer 97
238	Worldwide Technologies 322	78	Computer Associates	031	Cardinal Technologies	132	660		0, DEC 178
	On line Services	233	Patton & Patton Software302	682	Genoa WindowsVGA24 N		661	Deskstation Tec	olution rPC/44, hnology 178
33	Compuserve, Inc				8500, Genoa Systems		672		ght67
-	PGWorld On-Line	4.2	Protection	683	Hercules Graphite ISA, He Graphite VL; Hercules Co		662	HP Vectra 486/6	6XM, HP
-	America On-Line	235	Fifth Generation Systems 16		Technology	221		NetServer LM5	i/60; d178
	Books/Periodicals/		Schedule Software	684	Metheus Premier 928, Metheus	221	663	NCR 3350, NCI	
	Subscriptions	27	Arabesque Software	685	Number Nine #9GXE,				178
-	PC World Faxback95		Operating Systems	000	Number Nine Computer	221	664	NEC Image 466	NEC 178
259	Zone Publishing	-	IBM180-184	686		hid	625	Netpower RISC	
	Training		Spreadsheets/Templates/		Fahrenheit VA-VLB; Orchid Technology	221	621	New Dell Lines	
137	Interlink Corporation		Forms	627	Pegasus PCI, STB System	s 100	021		97
120	Keystone Learning Systems, 315	_	Lotus Development	648	Picture Perfect, In-Motion	127	665		Magnum 4400/70,
206	Learnkey, Inc		Corp 162-163	628	SmartCache III, DPT	104			' Magnum 4400/75;
-	NRI Schools305		Utilities	687	STB Horizon VL,	221	666		4, Tangent 178
	SOFTWARE	52	Central Point Software257		STB Systems		622	TravelMate 4000	E WinDX2/50,
	JULITARE	212	PK Ware	000	Vid Tech Microsystems Gra LB, Vid Tech Microsystem				nts
	Accounting/Financial	189	Quarterdeck Office Systems254-255	689	Volante Warp10 LB, Volant	e221	667		0i Model 760MP.
42	Computer Associates 161		100 M		Business Application				
70	DacEasy, Inc		Windows	618	BizPlanBuilder 4.1, Jian	348	***	Database Ma	
	Communications	63	Borland International 41	617	Business Plan Software, Na		602	Approach for Wi Lotus Developm	ndows 2.0, nent 243
99	Ex Machina, Inc	-	Microsoft		Business Association		652	Claris FileMake	Pro 2.1 for
211	Phoenix Tech Ltd 43	-	Software Publishing 265-268 WordPerfect Corp	693	Crystal Ball, Decisioneering	. 136-1-3			
243	Traveling Software	-	WordPerfect Corp 188-189		- samusang ra crarri	no to	603	FileMaker Profe Claris	or Windows 2,0,



GET FAST DELIVERY OUTSIDE THE U.S.

Have PC WORLD delivered to your door—on time every month—at a very reasonable price. You won't miss a thing—even when your favorite newsstand runs out of copies. Just complete this order form today!

Fax It Today! 415-882-0936

Please fax a photocopy of this form.

Or Send Your Payment To: PC WORLD Subscription Department P.O. Box 55029, Boulder, CO 80322-5029

PC WORLD

YES! Please enter my subscription for the rate indicated below.

NAME				
STREET ADDRESS				
CITY, POSTAL CODE				
COUNTRY				
Method of Payment:	enclosed	☐ Visa	☐ MasterCa	ard
CARD #			EXPIRA	TION DATE
SIGNATURE	Now cub	scription	Rene	wal
PC WORLD	11501575	ABA1		
PC WORLD—Lotus Edition		2AB8	□ 5F	
PC WORLD—Multimedia Edition	7.5	9AA5	□ 6F	7.7
Renewal Account #				
Check box with rate that applies	:		Airmail postage	Total U.S. \$
Basic subscription rate	D	Mexico	\$20.00/vr.	1.00
\$29.90/year (12 issues)		Canada	\$20.00/yr.	\$53.39/yr
Checks should be made out to PC WORLD (U.S. or Canadian	_	Juniou	& 7% GST \$3.49	400.00/j1
funds only, please).		Other countries	\$46.00/yr.	\$75.90/yr
Subscriptions havin with the part available	innin Di	sana alla C	O maste las dal	luan, of cour

first copy. Canadian GST Registration #R124669680.

Reade Servic Numb	e Page	Reade Service Numb	e Page
604	Instant Database 2.0, Asymetrix	619	CompuServe Information Manager for Windows, CompuServe348
605	MediaDesk 1.0, Lotus Development	695	CompuServe, CompuServe 227
647	Microsoft Access 1.1,	696	GEnie, GEnie227
	Microsoft	697	Prodigy, Prodigy Services 227
607	Paradox for Windows, Borland		Operating System/ Environment
608	Superbase 2.0 for Windows, Software Publishing	705	Novell DOS7, Novell
609	VideoBase 1.0, Videomail 243		Personal Information Manager
	Disk Drive	637	Commence 2.0, Jensen-Jones. , . 116
629	Maxtor 7000 Series Hard Drives, Maxtor		Presentation Graphics
	Display	630	Harvard Graphics 2.0 for Windows, Software Publishing 106
673	FlexScan, Nanao67		Printer
	E-mail	701	Silentwriter SuperScript 610,
641	BeyondMail 2.0 for MHS, Beyond		NEC88
		646	SJ-144 Printer, Star Micronics 126
	Entertainment/Game		Project Management
615 616	El-Fish, Maxis	632	ManagePro 2.0, Avantos Performance Systems108
	Dynamix		Scanner
	Graphics 108	624	Caere OmniScan, Caere 98
631 645	Altsys Virtuoso 2.0, Altsys 108 ClickArt Studio Series, T/Maker	623	Logitech ScanMan EasyTouch, Logitech
	24.57.77		Scheduling Software
	LAN Package	636	Schedule/DOS, Powercore 113
649	Moses Computers		Spreadsheet
	Mail Order	706	Quattro Pro 5.0 for Windows, Workgroup Edition; Borland 84
660	DECpc AXP 150, DEC		Spreadsheet Utility
664	NEC Image 466, NEC 178	601	Evolver 2.0, Axcelis
	Miscellaneous		User Group
611	MD Computing, Springer-Verlag New York	614	
610	Medical Software, Medical Software Products244		Utility
674	MonitorMiser, Technology Marketing Partners67	650	Access-EZ 3.1, Auratek Int'l 130
644		600 700	BarClock, Patrick Breen 272 Dashboard for Windows 2.0,
612	Physicians and Computers,		Hewlett-Packard84
675	Moorhead Publications 244 Smartbar, Sequence	638	QEMM 7.0, Quarterdeck Office Systems116
	Electronics	653	Quick Restart for Windows and DOS, PowerPro Software 132
643	And the second second		Word Processing
043	Cardinal Technologies126	699	Word 6.0 for Windows 6.0, Microsoft82
	Online Service		
698	America Online, America Online		

Pets and Sweaty Sports on Your Computer Screen

ver wonder what happened to Alexey Pajitnov, the guy who invented Tetris, after his game became an international hit? He went fishing! Pajitnov and his team of Russian computer aces joined forces with Maxis (of SimLife and Sim-City fame) to create El-Fish, an electronic aquarium that lets you catch, breed, and display an amazing variety of electronic fish on your PC screen. Maxis is probably the leading source of artificial life simulations and "software toys," a growing branch of software that differs from games in that there's no score, no competition, and no losers.

El-Fish's animation is incredible. Fish swim in perfect 3-D perspective, turning and floating and approaching the front of the tank. They look amazingly like the real thing.

To create your own underwater world, start by choosing a tank, then add plants, rocks, miniature castles, deep-sea divers, and coral. You control the size, shape, and placement of every element. When you've got the stage set, you'll want to introduce some denizens of the deep. You can start with a built-in library of tropical fishies or drop a hook in the ocean and wait to see if anything bites. Once you catch a fish you can crossbreed it, or even let it evolve to see what it turns into.

When you have a fish you like, you can animate it and turn it loose in your tank. But there is a downside to El-Fish's hyperrealism: It takes a *long* time to animate a fish. We're talking about hours to create as many as 256 frames for each fish. Maxis suggests you let the computer do its animation overnight, while you sleep. If that doesn't work for you, the manual includes a full page of cute suggestions for things to do to amuse yourself while fish animation is taking place: Compute pi to the last digit, design a car out of your emotions,

By Michael Goodwin

ponder rutabagas, and so on.

Or you could (gasp!) read the manual, which is admirably literate and includes almost every fish pun known to humanity. ("Tanks a lot" is only the beginning.)

The best thing about El-Fish is you never need to clean the electronic tank, you never run out of food, and even if you have to have unexpected surgery, the fish won't die. Barring a hard disk erash, of course.

More Than Brute Force

If you think pro football is

merely a matter of beer and brute force, take a look at Front Page Sports: Football from Dynamix. This incredibly detailed, stupendously realistic gridiron game is the most impressive PC sports simulation I've ever encountered.

Picture the best computerized football game you can imagine—you'll still come up short of what you get with Front Page. In fact, to come even close you need to think about real-life pro ball. "If you want more realism," says Los Angeles Raider Bob Golic, quoted on the box, "you'll have to suit up on Sunday afternoon." For once, the software lives up to the hype.

You can play the game at many levels: Join in the sweaty play-by-play action on the field. Sit back, trade players, and set overall team strategy. Coach. Or try doing it all. Front Page Sports: Football lets you run one-player, two-player, or computer-controlled games. More than 200 stock plays are included, and you can customize, reinvent, or replace them. League-play mode features up to 28 teams, each of which includes 47 players plus an injured reserve.

The problem with all this power is that it takes a while to learn the game. There's a QuickStart mode, but if you haven't read the manual first you may



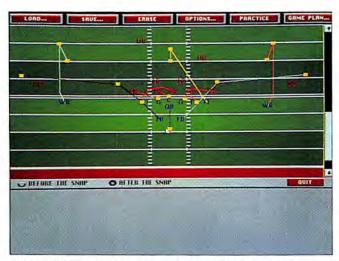
quickly find yourself out of your depth—with the clock running and penalties adding up. You'll need to know how to call plays, when and how to snap the ball, how to load a game plan, when to take control over individual players, what effect the weather is having on your team—and a lot more. A solid knowledge of football is essential.

The best part of Front Page is the capability to design, polish, and test plays on the field before

using them in official league games. Working with an on-screen play diagram, you use your mouse to set starting positions for every player, draw movement paths, and create logic assignments that determine what each man will do once the ball is snapped.

Want the quarterback to check three possible receivers before making a pass? No problem: Simply list them in the order you choose. Want a blocker to key on an opposing player and push him right? Left? Or release the block after a specified number of seconds and run to

EL-FISH EAT, BREED,
SWIM IN SCHOOLS,
and stare stupidly at
you—all in three
dimensions. Just
don't plan to do
anything else with
your computer
overnight while it
animates images.



FRONT PAGE SPORTS: FOOTBALL'S PLAY EDITOR lets you diagram plays and then test them out, with and without opposition.

catch a pass? Just do it! Once the play is diagrammed, you can run it on the field, without defense, to make sure it's right—and then try it against defense to make final adjustments. Once it's working well, try it out in a real game.

The play-by-play visuals are gorgeous,

and the thrill of watching the action is intense. You'll find only one problem: frustrating stop-and-start animation. The PC needs to do a huge amount of calculation to figure how each block, pass, and interception will work out-and how it should render the play realistically on screen. One should, I suppose, be impressed that it can do the

job at all. But when the action is under way you expect the plays to proceed with the smoothness you see on TV. What you get is animation that freezes unexpectedly while the computer figures out what happens next. I ran the game on a 25-MHz 486SX with multiple megabytes of memory, and

the on-screen delays drove me crazy. I wouldn't recommend running it on anything less powerful. As long as you're laying in hardware, a sound board will let you enjoy digitized speech and sound effects for a more realistic on-field feel.

Front Page Sports: Football is best played with a joystick, but it can be played with a mouse, cursor, and keyboard. The only problem is that the mouse doesn't work on every screen. It's annoying to click the mouse on a menu only to discover that you need to use the cursor keys instead. It's especially maddening to make this discovery while the clock is running—those 5-yard overtime penalties can add up! Hike!

- El-Fish \$59.95; Maxis; 800/336-2947, 510/254-9700
 - Reader service no. 615
- Front Page Sports: Football \$69.95;
 Dynamix; 800/326-6654, 209/683-4468
 Reader service no. 616

Michael Goodwin is a contributing editor for PC World. He can be reached on PC World Online (see page 10 for contact information).

COMING UP

Should You Buy a No-Name 486 Clone?

Our special section helps you figure out which buying path suits you best—local stores, superstores, or big-name vendors. We give you tips on picking the right components, report on our experiences with 25 local clone dealers, and review 24 local bus 486DX2-66s from local assemblers and national vendors.

Windows Communications Packages Come to Life

High-speed modems have made accessing online services and downloading files much more efficient and cost-effective. But you also need a communications package to make the connection. Our review of eight Windows programs, including Procomm Plus and Crosstalk, tells you which work best.

Plus:

- Test Drives of Word 6.0 and Excel 5.0
- How to Survive When Your PC "Expert"
 Disappears and Leaves a Mess
- Tips on boosting your 386's horsepower, researching information via the Internet, and adding pizzazz to your company newsletter.



The More Windows You Open, The Cooler It Gets.







PC WORLD Online



Expert Computing Advice



Internet E-Mail Gateway



Windows Advice & Support

Fast, Easy Downloading

More Than 30,000 Software Files

Try PC WORLD on America Online FREE Sign On and Enter to Win a Pocket Modem!

There's only one way to appreciate America Online's capabilities – you have to try the service. So we're willing to send you our software and give you time online to explore our service, absolutely free.

America Online offers *PC WORLD Online*, where you can send opinions and questions directly to *PC WORLD* editors, and receive answers. Download software they recommend. Study Buyers' Guide reports. Read equipment reviews. Check out past *PC WORLD* issues. Plus, America Online offers you news and entertainment, computing support, thousands of programs to download, and much more – all on the most "clickable" service there is.

Sign on this month and use keyword PCWORLD to enter the drawing to win a pocket modem. Just fill out and mail the attached postage-paid reply card, or call 1-800-827-6364, Ext. 7831.

Come to PC WORLD Online to sign up and win this high-speed pocket modem!



Practical Peripherals PM14400FX PKT Pocket Modem — a miniature powerhouse with 14,400 bps data transfer, 14,400 send/receive fax capability, and all the benefits of a sophisticated V.32bis modem!

Big Help for Small Businesses

ave you had the start-yourown-business daydream yet?
Maybe you'd like a homebased consulting practice or a
PR firm? You're not alone.
The Small Business Administration
(SBA) says that about 874,000 Americans started businesses in 1992. In fact,
a straw poll taken at a Pasadena IBM
Users Group meeting revealed that
about half the group were ready to take
the plunge, and a quarter had already
started part-time small businesses.

Insane work hours aside, starting a business is not as hard as you might think. Assistance is just a phone call away—and in some cases, the call's even free. Plus, there are some snazzy PC applications that'll help you get your business off the ground without costing you an arm and a leg.

This Is Not Your Father's SBA

If you're looking for assistance in forming a small business, the best place to start is the SBA, a federally funded organization whose mission is to provide financing, planning, and management assistance to privately owned businesses with fewer than 500 employees. Although these basic services are still the core of the SBA's offerings, the organization has grown with the times.

To boost small-business productivity and competitiveness, the agency now provides new businesses with top-notch high-tech help. Through its new Business Information Centers (BICs), the SBA offers access to fast computers, CD ROM technology, online data services, and technical information. That means you can tap into CD ROM-based market research databases and the vast federal electronic network.

While the software that's available varies by location, all BICs offer the Microsoft Solution series, which includes Microsoft Works, Microsoft Pub-

By Steve Bass

lisher, and Microsoft Money. Some sites have high-end programs like PageMaker.

The downside is that there are BICs in only five cities (Atlanta, Houston, Los Angeles, St. Louis, and Seattle), although it's likely the list will grow. To take advantage of the SBA's many other services, available in most major cities, contact its Answer Desk to find the office closest to you (800/827-5722). Can't wait? If you have a modem, dial into its toll-free (yes, *free*) BBS at 800/859-4636 (2400 bps) or 800/697-4636 (9600 bps). And if

that's not enough, pick up a copy of GOVT.ZIP, a list of more than 40 government BBS's, including those for the Department of Defense, the Department of Energy, the Environmental Protection Agency, and others. The file is available on PC World Online.

Devising a Plan

Your start-up needs a business plan—especially if you're thinking of applying for a loan—and there's software that can help. For an orientation to the SBA loan process and help in determining your chances of getting a loan, pick up a free copy of First Step Review, a DOS business loan review program from the National Business Association. Then, for \$5 each, pick up the group's Profit and Loss Statement, Cash Flow Analysis, and Business Plan programs to round out your bag of tools. • National Business Association; 800/456-0440, 214/991-5381. Reader service no. 617

If you need an industrial-strength package, take a look at BizPlanBuilder 4.1, which includes sample business plans and financial statements. For \$129 list, BizPlanBuilder also includes worksheets for budgeting, cash flow, income statements, balance sheets, and breakeven analysis that you can call up from your favorite spreadsheet. • BizPlan-



Builder 4.1 \$129; Jian, Inc.; 800/346-5426, 415/941-9191, 415/941-9272 (fax). Reader service no. 618

Getting your share of the market means finding out who your potential customers are and where they're hiding. If you're armed with a modem-and a CompuServe account-it's a piece of cake. You can choose from dozens of databases, including Business Database Plus to search business and trade journals; Commerce Business Daily for federal contracts and requests for proposals; IQuest for access to more than 800 publications, databases, and indexes; and TRW Business Credit Profiles for credit and business information about more than 13 million organizations. Prices range from 25 cents per minute to as much as \$9 per search. Yeah, I know, it's pretty steep, but listen: In many cases, tapping into these databases can enable you to really play with the big guyswithout paying a bundle for market research. · CompuServe Information Manager for Windows \$25; CompuServe; 800/848-8199, 614/457-8650. Reader service no. 619

Contributing Editor Steve Bass is the president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 10 for contact information).

FINAL PCS A LY, DICAT **O YC**



THEY WORK SHORTER AND ACTUALL

INTRODUCING DELL
OPTIPLEX. PCs DESIGNED
FOR BUSINESS-CRITICAL
APPLICATIONS.

(For systems and configurations, see back cover.)



DESIGNED AND CONFIGURED TO WORK HARDER AND FASTER.

This is much more than just another new line of PCs. These are role models for everyone in your office.

Dell's new OptiPlex PCs are serious, hard-working, hard-core business machines, designed to perform in the workplace.

Our accelerated local bus video kicks all your standard workday applications into high gear. Our systems are up to 16% faster than our major competitors'

PCs.' As anyone who's ever worked on a spreadsheet will tell you, that adds up fast.

Every OptiPlex system also features advanced Dell optimized Windows display drivers. We also give you the ever popular burst mode memory transfer and block mode IDE transfer.

(Translation: things go faster.)

And to spare you the usual set-up hassles, we'll have your PCs ready to run, right out of the box. You can have your choice of six

network interface cards factory-installed. We'll also be more than happy to install your choice from over 100 of the most

popular business software applications. All you pay is a flat \$15 installation fee.



Good-looking, hard-working, dedicated, flexible. See back

page for resume and financial

requirements.

We give you up to 16% faster overall application performance than our leading competitors!

*Guarantees available in USA only for registered owners of Dell Performance Series systems purperformed by National Software Testing Lahs on 8/10/93. Independent performance measurement by N recommendation or endorsement of any products. BAPCo-prepared tests executed by NSTL in accordan proprietary interest in the marks and names of others. \$1993 Dell Computer Corporation. All rights reser



EASIER TO MAINTAIN, SO YOU GET BACK TO WORK FASTER.

Nothing's more important in business than the ability to quickly bounce back from adversity. So we've made our OptiPlex PCs extraordinarily easy to service. Our unique OptiFrame chassis can essentially be snapped apart after turning a couple of thumbscrews. Most of the important component assemblies can then be removed simply by loosening one screw per assembly. And the card cage lifts out in one piece for easy access to the system board. No cards to remove or cables to disconnect. If you want them to work

even harder, no problem. In fact, you'll find our whole company is easy All systems are upgradeable to use. Dell offers a unique service plan — our to Pentium Overdrive. SelectCare™ program. You can pick and choose from a comprehensive menu of service options that includes everything from an optional five-year parts and labor warranty to a highly economical plan for those who would prefer to maintain their PCs themselves. The bottom line is, you pay only for services you want or

need. And not a cent for those you don't. It's this kind of service and support that has made Dell the winner of virtually every major customer satisfaction survey in the past five years. It's also earned us a place in over two-thirds of the companies in the FORTUNE 500".

And having picked up over \$2 billion in worldwide sales, we think we'll keep it up for a little while longer.



With our embedded diagnostics you don't have to push hard to get at the root of a problem.



READY TO GROW AS YOUR BUSINESS GROWS.

There's one more thing we built into these PCs that is indispensable to any successful business. Foresight.

> With an OptiPlex L system you can easily upgrade from three to five slots, and from three to five drive bays. The chassis upgrade usually takes but a few painless minutes.

OptiPlex systems also feature an easy BIOS upgrade — by way of flash RAM so there are no chips to remove. With the system's embedded diagnostics located in the BIOS as well, that too is

an easy upgrade. What's more, you can add up to 128KB of cache for memory-intensive applications. All systems

can also be upgraded to Intel's mighty Pentium Overdrive processor.

We suggest you call us soon. With hard-working business machines like these out there, if you don't bring them

We offer guaranteed five-minute response to calls, 24 hours a day." See, someone does work longer hours than you.

on board, you can be sure your competitors will.



TO ORDER, CALL

IN CANADA, CALL 800-668-3021, IN MEXICO CITY, 228-7811. #11DBT

d after 7/1/02. For a complete copy, please call our TechFax line at 1-800-950-1329 or write Dell USA L.P., 9505 Arboretum Blvd., Austin TX 78759-7299. Attention Guarantees. Henchmarking orning BAPCo SYSmask92 on comparable ISA systems configured substantially identical to the Dell OptiPlex, each with equivalent or maximum allowable external cache. SISTL is not affiliated with Dell and makes no h Dell parameters. Results from other tests may vary. The Intel Insule logo is a registered trademark of Intel Componation. FORTUNE 500 is a registered trademark of The Time Inc. Magazine Company, Dell disclaims

SYSTEMS DESIGNED TO MAKE YOUR BUSINESS WORK HARDER. NOT YOUR BUDGET.



FEATURES COMMON TO ALL OPTIPLEX SYSTEMS

- i486th PROCESSOR UPGRADEABLE TO PENTIUMth OVERDRIVEth
- UNIQUE OPTIFRAME™ CHASSIS EASY SERVICE AND MAINTENANCE
- UPGRADEABLE OPTIFRAME L CHASSIS
 HAS 3 16-BIT ISA SLOTS AND 3 STORAGE
 BAYS (EASILY FIELD UPGRADEABLE TO THE
 OPTIFRAME MX CHASSIS)
- MIDSIZE OPTIFRAME MX CHASSIS HAS 5
 16-BIT ISA SLOTS AND 5 STORAGE BAYS
- OPTIONAL 128KB CACHE
- . OPTIONAL VESA" LOCAL BUS SLOT(S)
- BURST MODE MEMORY TRANSFER
- BLOCK MODE IDE DISK TRANSFER
- FLASH RAM BIOS
- . 4MB RAM EXPANDABLE TO 64MB
- ACCELERATED LOCAL BUS VIDEO WITH DELL OPTIMIZED WINDOWS DRIVERS
- 512KB VIDEO RAM EXPANDABLE TO 1MB
- ONE DISKETTE DRIVE (3.5" OR 5.25")
- · QUIETKEY" 101 KEYBOARD
- EMBEDDED DIAGNOSTICS
- MS-DOS® 6.0/MICROSOFT® WINDOWS™ 3.1/MOUSE
- GUARANTEED* NEXT-BUSINESS-DAY ON-SITE SERVICE*
- GUARANTEED* 5-MIN. RESPONSE TIME SUPPORT – 24 HOURS/DAY



DELL* OPTIPLEX** 425s/L \$1,499 | BUSINESS (EASE) | \$55/MO.

- i486 SX 25MHz
- . OPTIFRAME L CHASSIS
- . 120MB IDE HARD DRIVE
- SVGA 1024I MONITOR (14", 1024 x 768, .28mm)

\$1,799 BUSINESS LEASE \$67/MO.

- i486 SX 33MHz
- OPTIFRAME L CHASSIS
- . 170MB IDE HARD DRIVE
- ULTRASCAN™ 14C MONITOR (14", 1024 x 768, .28mm, NI)

\$1,999 BUSINESS LEASE \$74/MO.

- i486 DX 33MHz
- OPTIFRAME L CHASSIS
- . 170MB IDE HARD DRIVE
- ULTRASCAN 14C MONITOR (14", 1024 x 768, .28mm, NI)

\$2,249 S83/MO.

- i486 DX 33MHz
- . OPTIFRAME L CHASSIS
- . 230MB IDE HARD DRIVE
- . 1MB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)

\$2,449 S91/MO.

- i486 DX2 50MHz
- . OPTIFRAME L CHASSIS
- 230MB IDE HARD DRIVE
- . IMB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)

\$2,999 \$111/MO.

- i486 DX2 66MHz
- . OPTIFRAME L CHASSIS
- . UPGRADED TO 8MB RAM
- . 340MB IDE HARD DRIVE
- . IMB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)



\$2,749 SUSINESS LEASE \$102/MO.

- i486 DX 33MHz
- . OPTIFRAME MX CHASSIS
- UPGRADED TO 8MB RAM
- 340MB IDE HARD DRIVE
- . IMB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)

\$3,249 BUSINESS LEASE \$120/MO.

- i486 DX2 66MHz
- OPTIFRAME MX CHASSIS
- UPGRADED TO 8MB RAM
- . 450MB IDE HARD DRIVE
- IMB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)



ALSO AVAILABLE: DELL 466/ME

\$3,649 | BUSINESS LEASE \$131/MO. (NOT PICTURED ABOVE)

- i486 DX2 66MHz
- 4 EISA AND 2 ISA EXPANSION SLOTS AVAILABLE
- . 5 STORAGE BAYS
- BURST MODE MEMORY TRANSFER
- . BLOCK MODE IDE TRANSFER
- . FLASH RAM BIOS
- . 8MB RAM EXPANDABLE TO 64MB
- 450MB IDE HARD DRIVE
- . IMB VIDEO RAM

- ACCELERATED LOCAL BUS VIDEO WITH DELL OPTIMIZED WINDOWS DRIVERS
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)
- ONE DISKETTE DRIVE (3.5" OR 5.25")
- QUIETKEY 101 KEYBOARD
- MS-DOS 6.0/MICROSOFT WINDOWS 3.1/MOUSE
- EMBEDDED DIAGNOSTICS
- GUARANTEED NEXT-BUSINESS-DAY ON-SITE SERVICE
- GUARANTEED 5-MINUTE RESPONSE TIME SUPPORT - 24 HOURS/DAY

*Guarantees available in USA only for registered owners of Dell Performance Series systems purchased after 7/1/92. For a complete copy, please call our TechFace** line at 1-800-950-1329 or write Dell USA L.P., 9505 Arboretum Bled., Austin TX 78759-7299. Attention Guarantees.

*Prices valid in the U.8 only. Some products and promotions not available in Canada or Mexico. *Leasing arranged by Leasing Group, Inc. For histiness use only. Prices hased on 36-month, open-end lease, 10% purchase option. *On-site service provided by BaneTec Service Conformation. On-site service may not be available in certain remote locations. MS-DOS and Microsoft are registered trademarks and Windows is a trademark of Microsoft Corporation. The Intel Inside logs is a registered trademark and 1486. Pentinan and Overdrive are trademarks of Intel Corporation. VESA is a registered trademark of Video Electronics. Standards Association. Dell disclaims proprietary interest in the marks and names of others, ©1993 Dell Computer Corporation. All rights reserved.



800-727-1410

HOURS MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT IN CANADA* CALL 800-668-3021. IN MEXICO CITY.* 228-7811. #11DK3