

MAGAZINE

VOLUME 6 NUMBER 1
JANUARY 13, 1987

The AT
Clone
from IBM

Connectivity:
IBM Token-Ring
Report Card

Removable
Hard Disks:
Three
Bernoulli
Challengers



001 ServiceNow's Exhibit No. 100

MAGAZINE

VOLUME 6 NUMBER 1
JANUARY 13, 1987

The AT
Clone
from IBM

Connectivity:
IBM Token-Ring
Report Card

Removable
Hard Disks:
Three
Bernoulli
Challengers

THE
BEST
OF
1986



*****5-DIGIT 95929
304764 MER IACAC90 H410 JUN23
CALIFORNIA ST UNIV CHICD 1987
ACQUISITIONS PERIODICALS01#V5
CHICD 95929
71486 02391 3

Third Annual
Best and Worst:
Editors' Personal Pick

DOCKET
ALARM

Find authenticated court documents without watermarks at docketalarm.com.

Stop cursor run-on.

With all the recent hoopla over performance, it's ironic that two of the PC's ergonomic deficiencies have been overlooked — its slow cursor, and the tendency of the cursor to remain in motion (run-on) after a cursor key has been released. Finally, the solution — Cruise Control™ from Revolution Software.

Cruise Control is a new productivity tool for serious PC users. It boosts cursor speed, typically by 3-5X. It eliminates annoying cursor run-on. And it adds hands-free cursor navigation to any application.

If you use 1-2-3, Symphony, dBASE, Reflex, or Paradox, you need Cruise Control's Anti-Skid Braking. Here's what the leader of one Lotus users group said about Cruise Control:

"Once I used it, I wanted it! Excellent idea. Very practical. One of the best programs ever sent to us for review!"

If you use Word Perfect, MS-Word, Q&A, DisplayWrite, MultiMate, WordStar 2000, Framework, PC-Write, or SideKick, you need Cruise Control's Screen Runner, the high-performance, adjustable-speed cursor.

Cruise Control's namesake feature takes the drudgery out of paging through data base records, long documents, and large spreadsheets. It lets you repeat any key, hands-free — at the speed of your choice.

And there's more. A Chronometer "types" the time or date into your application at the current cursor position. The keyboard-controlled Screen Dimmer protects your privacy. The programmable Auto-Dimmer extends the life of your display screen.

Compatible with thousands of today's popular programs, including Lightning, SuperKey, and Ready!. Uses only 3K RAM. For DOS 2.0 or later. Not copy-protected. No risk, 60-day money-back guarantee.

Cruise Control™

From now until 12/31/86:

Only \$29.95.

Call now to order by credit card (VISA/MC/AX):

201-366-4445

Or, mail \$29.95 plus \$3.50 shipping and handling to:

Revolution Software, Inc.

715 Route 10 East • Randolph, NJ 07869

Dept. 100

WEST COAST EDITOR	Stewart Alsop
SENIOR EDITOR	Gus Venditto
TECHNICAL EDITOR	Craig L. Stark
ASSISTANT MANAGING EDITORS	Greg Pastrick, Paul B. Ross
MANAGER, COPY EDIT	Linda Louk
ASSOCIATE EDITORS	Jennifer de Jong, Cheryl J. Goldberg, Lisa Kleinman
STAFF EDITOR	Paul M. Stafford
PRODUCTION EDITOR	Diane D'Angelo
ASSISTANT EDITORS	Victoria Danoff, Carole Goldstein, Mitt Jones, Jonathan K. Matzkin, Paul Olowacz, Ann Ovodow
SENIOR EDITORIAL ASSISTANT	M. Stephanie Ricks
EDITORIAL ASSISTANTS	Robert Barnett, Peggy Gavan, Christina Okang, Joseph R. Polidoro, Donald Willmott, Jennifer Zaino
BUSINESS MANAGER	Iris Knittel
PROOFREADERS	Michael Cohn, David R. Warren
RECEPTIONIST	Iris Lubar
CONTRIBUTING EDITORS	Richard Arons, Frank J. Derfler, Jr., John Dickinson, John C. Dvorak, G. Hart, Steve Holzner, James Langdell, Stephen Manes, Peter Norton, Ch. Petzold, Winn L. Rosch, Jim Seymour, M. David Stone, Jared Taylor
ASSISTANT TO THE EDITOR	David Baker
ASSISTANT TO THE PUBLISHER	Lois Clifford

SENIOR ART DIRECTOR	Mary Zisk
TECHNICAL ART DIRECTOR	Gerard Kunkel
ASSOCIATE ART DIRECTOR	Tracey J. Grant
ART EDITOR	Mariano Nicieza
GRAPHIC DESIGNER	Laurie Wance
ASSISTANT ART DIRECTOR	Denise Platin
LAYOUT ARTISTS	Natalie Chu, Susan McGuire
ADMINISTRATIVE ASSISTANT	Frieda T. Smallwood

DIRECTOR, PC LABS	William G. Wong
TECHNICAL SUPPORT SPECIALIST	Charles Rodriguez
LAB SERVICES MANAGER	Colleen O'Brien
PROJECT LEADERS	Joe Desposito, Bill O'Brien, Phil Rose
INVENTORY CONTROL TECHNICIAN	Leon Newman
RECEPTIONIST	David Rivera

MARKETING DIRECTOR	Ronni Sonnenberg
--------------------	------------------

PUBLIC RELATIONS MANAGER	Jessica Kersey
PUBLIC RELATIONS ASSISTANT	Kimberly Humphries

SINGLE COPY SALES DIRECTOR	Bob Woltersdorf
RETAIL SALES & MARKETING MANAGER	Carol Benedetto
CIRCULATION MANAGER	Charles Mast
CIRCULATION COORDINATOR	Robert Smahl

SENIOR AD. PRODUCTION MANAGER	Susan DePierro
AD. PRODUCTION MANAGER	Wendy Goldstein
AD. PRODUCTION ASSISTANTS	Susan Livoti, Lisa Salatino
EDITORIAL PRODUCTION COORDINATORS	Eve Hinderer, Barbara Ross
PRODUCTION SYSTEMS	Melvin Foster-Poetsch, Linda Harms, Peggy Pennella

ADVERTISING OFFICE	One Park Avenue, New York, NY 10016, (212) 503-5100
--------------------	---

ZIFF-DAVIS PUBLISHING COMPANY

PRESIDENT	Kenneth H. Koppel
SENIOR VICE PRESIDENT, MARKETING	Paul Chook
VICE PRESIDENT, OPERATIONS	Baird Davis
VICE PRESIDENT, CONTROLLER	John Vlachos
VICE PRESIDENT, CREATIVE SERVICES	Herbert Stern
VICE PRESIDENT, CIRCULATION	Alicia Marie Ivans
VICE PRESIDENT, CIRCULATION SERVICES	James Ramaley
VICE PRESIDENT, MARKETING SERVICES	Ann Pollak Adelman
VICE PRESIDENT, DEVELOPMENT	Seth Alpert
VICE PRESIDENT	Hugh Tietjen
BUSINESS MANAGER	Gary A. Gustafson
PRODUCTION DIRECTOR	Walter J. Terlecki

ZIFF COMMUNICATIONS COMPANY

Chairman Philip B. Korsant President Kenneth H. Koppel Senior Vice President Philip Sine Vice Presidents Laurence Usdin, William J. Lips, J. Malcolm Morris, Steven C. Feinman Treasurer Selwyn I. Taubman Secretary Bertram A. Abrams

PC Magazine: The Independent Guide to IBM-Standard Personal Computing ISSN (#0745-2500) is published bi-weekly except in July and August for \$34.97 for one year (22 issues), \$64.97 for two years, and \$81.97 for three years. Additional postage \$15.00 for Canada and all other foreign countries. Ziff-Davis Publishing Co., a division of Ziff Communications Co., One Park Avenue, New York, NY 10016. Second Class postage paid at New York, NY 10016 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine, P.O. Box 2445, Boulder, CO 80322. Editorial and Business Office: One Park Ave., New York, NY 10016. Editorial (212) 503-5255. Advertising (212) 503-5100. For subscription inquiries and service, write to PC Magazine, P.O. Box 2445, Boulder, CO 80322, (303) 447-9330. PC Magazine is an independent journal, not affiliated in any way with International Business Machines Corporation. IBM is a registered trademark of International Business Machines Corp. Entire contents Copyright © 1986 Ziff-Davis Publishing Co., a division of Ziff Communications Co. All rights reserved; reproduction in whole or part without permission is prohibited. The following are trademarks of Ziff Communications Co., PC, PC: The Independent Guide to IBM-Standard Personal Computing, PC Magazine, PC Lab, PC Laboratory, PC Lab, PC Labs, PC-Communications, Project PC, PC Tutor, PC BlueBook, User-to-User, Power User, Spreadsheet Clinic, The PC Utilities, PC Lab Notes, PC Advisor, Looks. Permissions: Material in this publication may not be reproduced in any form without permission. Requests for permission should be directed to Jean Larned, Ziff-Davis Publishing Company, One Park Ave., New York, NY 10016. Editorial Communications may be addressed to MCI Mail 157-9301. PC Information Reader Service: (212) 696-0360 (Postage: \$2.00).

003

ServiceNow's Exhibit No. 1006



COVER STORY

The Best of 1986 (And Some of the Worst)

An entire year's worth of PC products and developments gets summed up in this sharp-eyed, personal glance backward by the editors and writers of *PC Magazine* ... 115

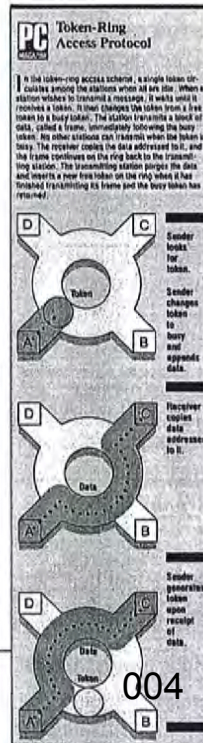
Abort, Retry, Ignore

Bill Howard/ An industry that slavishly reproduces bugs in the name of compatibility richly deserves its own set of error messages. *PC Magazine* provides some fitting rejoinders to the year's flubs and foibles 152

IBM's \$3,995 PC-XT Model 286, page 155



IBM's token-ring protocol, page 227



COMPUTERS

The AT Clone from IBM
Winn L. Roschl/ The IBM PC-XT Model 286 is a hardworking but costly addition to Big Blue's product line. Is there a market segment that will find the 286's assets equal to its price tag? 155

CONNECTIVITY

Making Connections: The IBM Token-Ring Network
Frank J. Derfler, Jr./ The IBM Token-Ring Network should be able to lay claim to being the new industry standard. A critical shortcoming stands in its way 227

HARDWARE

Stretching the Standard: Seven New EGA Boards
Charles Petzold/ The more-adventurous manufacturers in the EGA market—Video-7, Quadram, Tseng Laboratories, Paradise Systems, and IDEAssociates—are forging ahead with boards that both mimic and improve on the IBM original, with higher-resolution video modes and some unique software features 165

Drawing a Bead on Bernoulli
Winn L. Roschl/ Fast data access speeds, more hard disk storage space, greater data security, and improved performance are the hallmarks of today's cartridge-based hard disk systems. Amcodyne's PhD, Sysgen's DuraPak, and IDEAssociates' Diskit 2 Plus are challenging the Bernoulli Box as the premier solution to combined storage and backup needs 217

SOFTWARE

Multidimensional Spreadsheets: Giving Data to Your Data
Marvin Bryan/ The sophisticated nature of today's business environment demands more than a traditional two-dimensional spreadsheet to provide 175

Electronic Thesauri: Four Ways to Find the Perfect Word

Robin Raskin/ If your copy of *Roget's Thesaurus* is getting more dog-eared (tattered, worn) by the day, then it may be time for you to check out (look into, investigate) its various (many, sundry) electronic incarnations. ...



GRAPHICS

CAD at Any Price
Glenn Hart/ Does the dramatic price spread (\$80 to \$8,000) among the four packages reviewed—*AutoSketch*, *EasyCAD*, *CADWrite*, and *MicroCadam*—parallel a comparable spread in performance? 170

SERVICES

MSR: A New Approach to Software Support
Barbara Krasnoff/ With Microsoft's Support Resource's AnswerLine, help with standard applications software is a phone call away.

ServiceNow's Exhibit No. 1006

its: Giving Dep
ta
an/ The
d nature of today
vironment deman
traditional two-
l spreadsheet can
.....
Thesauri: Four
nd the Perfect

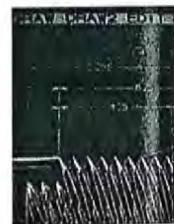
CPD-1302 Multiscan
Trimitrom monitor;
WordTech's *Quicksilver*;
Multisoft's *PC SuperKwik*;
MathSoft's *MathCAD*; the
Tops PC-to-Mac network;
Lifetree's *Words & Figures*;
Broderbund's *For-Comment*;
R&R Relational Report Writer
for dBASE; in Quick Looks,
Hotshot and *ColorMagic*...33

in/ If your copy e
:saurus is getting
ared (tattered,
e day, then it ma
you to check out
investigate) its
ny, sundry)
ncarnations....

VIEWPOINTS

LETTERS TO
PC MAGAZINE.....15

PC ADVISOR
Bus Venditto/Help in adding
RAM beyond 640K to a
Compaq and in sharing word
processing files between IBM
PC and Wang systems.....27



CS
ay Price
t/ Does the drama
d (\$80 to \$8,000)
four packages un
utoSketch,
CADWrite, and
m—parallel a
e spread in
ce?.....

CS
few Approach to
Support
rasnoff/With Mic
source's
ne, help with
pplications softw
call away.....

FROM THE EDITOR'S
SCREEN
Bill Machrone/Small-System
Snobbery.....61

JOHN C. DVORAK
Mainframes—Here to
stay67
Inside Track69

PETER NORTON
The Software Revolution,
Part 175

IM SEYMOUR
Desktop Publishing: Myths
and Realities.....85

STEPHEN MANES
Whatever Happened to
Ergonomics?91

TEWART ALSOP
The Power Desk107

QuickBASIC
Ethan Winer/Explore the speed
and power of Version 2.0 . 285

**PROGRAMMING/
UTILITIES**
Files Fly with DIREX
Steve Holzner/Remove the
drudgery of file directory
management; add protection to
selected files 295

SPREADSHEET CLINIC
Jared Taylor/Add a notepad to
reference cells, write BASIC
programs with 1-2-3, and make
decorative borders 309

TURBO POWER USER
Neil J. Rubenking/Convert
variables into strings and
modify Turbo to beep at
compilation errors 313

USER-TO-USER
Paul Somerson/A utility to
check available RAM and a
program that write protects
your hard disk 319

PC TUTOR
Charles Petzold/Set colors in
1-2-3, Release 2, and program
in BASIC with PC
compatibles..... 325

DIRECT MARKETING
CONNECTION 330
READER SERVICE
CARD 337
MARKETPLACE 348
PRODUCT INDEX 366
INDEX TO
ADVERTISERS 368
COMING UP 369
Cover Photograph:
Raeanne Giovanni



PC Labs Benchmark Tests 4.0

dent that traditions, if not standards, abound.

In this third annual best-of-the-year issue, the editors of *PC Magazine* get personal about the products and trends of 1986. We spend most of the year objectively evaluating products. This is our traditional chance to add a healthy subjectivity to the magazine. Turn to page 115 for a no-holds-barred look at the best and worst of 1986.

Another tradition at *PC Magazine* is ensuring that our benchmark tests are absolutely current with the rapid pace of technology. For years, users everywhere have relied on the tests to provide quantitative, comparative, and repeatable measurements. In this issue, we are introducing Release 4.0 of our benchmark tests, which contains some familiar benchmark tests and new tests: BIOS Disk Seek, and DOS Disk Access tests.

The new BIOS Disk Seek test supersedes the popular Disk Access benchmark test from Core International. Both tests report disk random seek time, the most common hard disk performance measurement. But our new DOS Disk Access test avoids situations and uses DOS calls to access disk sectors directly. It differs from the BIOS Disk Seek test in that it will work with all hard disks. This lets us compare a wider variety of devices, from hard disks to write-once, read-mostly (WORM) laser disks.

It's difficult to switch tests because users want to compare results with the old. With this in mind we're now retesting all our industry-standard products, particularly the IBM PC, XT, and AT, to provide a consistent set of base-level comparisons.

We used the new benchmark tests to evaluate IBM's new XT Model 286 and removable hard disks for two articles in this issue: "The AT Clone from IBM" on page 155 and "Dr. Doom: A Bead on Bernoulli" on page 217.

And in the *PC Magazine* tradition of giving readers the hands-on evaluations of hot new products, we review the CPD-1302 Multiscan monitor and Tandy's \$799 1000EX computer.

We encourage all readers to obtain a copy of the PC Magazine Benchmark Test Series, Release 4.0. You can download the tests from the PC Magazine Interactive Reader Service by calling 696-0360 (300 or 1,200 bps, no parity, 8 data bits, 1 stop bit). For more information, contact PC Labs at One Park Avenue, New York, NY 10017.

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.