

THE INDEPENDENT GUIDE TO IBM PERSONAL COMPUTERS

PC
NEWS:
IBM'S
SOFTWARE BLITZ



Volume 3 Number 21
\$2.95

October 30, 1984

IBMs in Control: Project Planning With Your PC



STM PC:
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Peter Norton
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Price Waterhouse Report:
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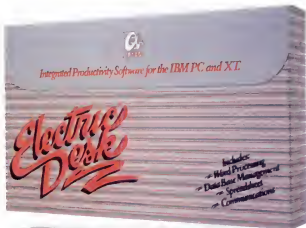
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IBM Personal Computers

VOLUME 3, NUMBER 21
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COVER STORIES

FEATURES

**Project Management with
the PC** 109

Ken Edwards/Presenting the first of our three-part series on project management software, a tool that can play a key role in planning, scheduling, and directing business projects.

CPM/PERT: A Good Introduction 118

**Data*Easy Project Management: No
Frills** 120

**Demi-Plan: Economy Exacts a
Price** 123

**EMPACT: Low Cost and No
Nonsense** 125

**EX-PERT/80: A Program for Smaller
Jobs** 128

**Garland Pathfinder: Simple
Schedules** 131

**Harvard Project Manager: Windows
and a Roadmap** 133



**IntePert: A Well-Documented
Winner** 135

**MicroGANTT: Nice Features, but
Poor Design** 137

**MicroPERT: Project Management
Analysis** 139

MicroTrak: Strong for Small Jobs 142

**Milestone: A Well-Crafted Planning
System** 145



WORD PROCESSING
Word Processing on a Budget ... 160

Marilyn V. Fleming/A review of six inexpensive word processors that are comparable to the more costly programs on today's market.

MagicIndex and WordStar:
Word Magic! 257

Glenn Hart/MagicIndex adds fancy features that can make your WordStar documents shine.

SOFTWARE
**Super Software for Technical
Investors** 173

George Hayes/Winning on Wall Street and The Technical Investor are excellent programs that will help you perform in-depth analyses of Wall Street trends.

HARDWARE
**A Character Set for a More
Readable Screen** 205

Laurence V. Marks/Complete these two soldering projects on your IBM Color/Graphics Adaptor if you would like to make the text on your monitor more readable. One creates a larger font, and the other adds a blank line between rows of text.

**STM Brings Desktop Power to a
Portable—Almost** 226

John Hellivell/The STM PC possesses many good features and an innovative design. But, unfortunately, it has one problem too many.

THE PRICE WATERHOUSE REPORT
Sizing Up the Basic Four 232

The MAI General Accounting series is a PC reincarnation of Basic Four's successful minicomputer software line.



page 232

PRO COLUMNS

SERVICES
A PC Congregation 287
Philip Siddons/A Presbyterian minister from Buffalo discovers the simple pleasures of creating sermons on the PC using *Multimate*.

BUSINESS
IBM PCs All Across America 291
Susan Wolbarsht/Strout Realty, a rapidly expanding, conservative, grass-roots company, is planning to put PCs in every one of its 600 offices within the next two years.

EDUCATION
On-Line College 297
Alfred Glossbrenner/The New York Institute of Technology is the first university to offer full-scale college degree programs—on-line and off-campus.

MEDICINE
Psych Database 303
Thomas Droegdel/BASE III eases the chaos of managing a psychiatric clinic in Durham, North Carolina by putting staff and patient records on-line.

PROGRAMMING
Custom-Made DOS Filters 337
Michael Abrash and Dan Illosky/Presenting some procedures for PC-DOS users on how to modify and reassemble the CR/LF and MARKEOF filters to suit their own needs.

WRITING
PC-FILE-III Puts a Writer In Order 359
Martin Porter/A free-lance writer uses PC-FILE-III to organize his business records, deadlines, assignments, queries, and contacts.

WHAT'S INSIDE 15
PC NEWS 33
 Twelve pages of up-to-the-minute reports, interviews, mini-reviews, and useful tips, as well as tales and fables from the computer community.

FROM THE EDITOR'S SCREEN
Naming the Rose 83
Bill Machrone/The PC AT by any other name would smell as sweet, but how was it named in the first place?

GUEST EDITORIAL
Bringing the PC to Life 89
John J. Walsh/It's time to explore the potential of voice synthesis and videodisk technology in business applications.

LETTERS TO PC 93

THE NORTON CHRONICLES
The Dissection of DOS 3.0 105
Peter Norton/Norton reviews the good, the bad, and the ugly of the new DOS 3.0.



PC ARCADE
Trolls and Snarks 273
Phil Wiswell/Two new adventure games for kids break the frustration barrier for younger players.



page 173

DEPARTMENTS

BOOK REVIEW
Kids and Computers: Advice for Parents 281
Robin Raskin/Computers often present parents with problems, but these three books come to their rescue with some solutions.

NEW ON THE MARKET 307
David Obregón/The latest in hardware, software, accessories, publications, and services for your PC.

CLUB NEWS 319
Jane Mintzer/Listings of dozens of IBM PC user groups.

PC BLUEBOOK 322
 A quick-reference guide for PC owners and soon-to-be owners.

PC: MART 336

USER-TO-USER 344
Paul Somerson/PC owners share their tips and short programs.

PC TUTOR 349
Mark Zachmann/PC answers readers' miscellaneous technical and nontechnical questions.

PRODUCT INDEX 357

INDEX TO ADVERTISERS 369

COMING UP
PCjr. 364
PC Tech Journal 365
PC Disk 366
PC Magazine 371

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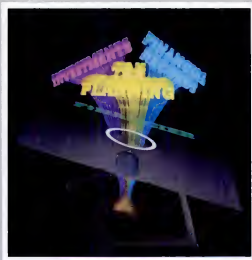
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Here's Sidekick in action. That's Lotus 1-2-3 running underneath. In the Sidekick Notepad you can see data that's been imported from the Lotus screen. On the upper right, that's the Sidekick Calculator.

83: (C2) 408



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What's Inside

An office-wide change in word processing programs creates enough confusion to make this issue's cover package on project management programs seem like a great idea.

One of the great disadvantages of good software is how it can grow on you. A good package becomes as close to you as, say, your favorite pair of Calvins; even after styles have changed and you have found a much more attractive and useful pair, you are still incredibly reluctant to throw out the old.

Well, for the past year or so, the PC editorial staff has been writing its deathless prose using a very well known word processing package. The name of this program isn't particularly important; nor is how it got into our offices to begin with. But it soon became the unofficial PC word processor.

We were very fond of this program and were not at all shy about advertising our romance to friends and colleagues. New staff members were given copies of the software almost before their microcomputers appeared; informal workshops were held over morning coffee on The Best Way To Connect Files, and writers who sent in their manuscripts using other programs were viewed with ill-concealed contempt.

A Word Processor Shakeup

However, in the usual manner of powers that be, a pronouncement came through one day that shook the very foundations of the editorial department.



For certain very good reasons, the official word processing program of *PC Magazine* was going to be changed. Word processor A was almost immediately abandoned, never again to darken our doors. Word processor B was now the order of the day.

A few days later, copies of word processor B were dumped unceremoniously on desks, and memos were distributed explaining politely that staff members were "requested" to learn the new software. In a short time, confusion reigned—at least temporarily.

Formerly blasé editors now spent a great deal of their time running into colleagues' offices asking pitifully, "Why

can't I find half of my file?" Deadline schedules went by the board as writers attempted to shed habits so ingrained that they would have put Pavlov's dog to shame.

In fact, this column was written under those perilous circumstances. The editor who writes this column usually views "What's Inside" as a last-minute, is-it-due-already? task, and so a minimum of time was allotted to its creation. That minimum was badly strained as the unfortunate wordsmith spent hours trying to unravel such mysteries as why the screen blanked out every time she invoked the underline utility.

Project Management

With that problem added to our usual chaos, it was no wonder that we decided to do a cover story on project management software. Those of you who have been reading this column for any length of time will be familiar with the pandemonium that usually surrounds our major product rundowns. While the final result is always something to be proud of, the number of incipient ulcers acquired in the process is alarming.

Project management software is supposed to help with that. These programs are modeled after classic planning strategies used by most corporations to make sure that they allocate funds properly,

WHAT'S INSIDE

use time efficiently, and meet deadlines. Given the appropriate information, these programs will (depending on their level of sophistication) organize data, place

them into charts that illustrate various steps needed before the project is completed, adjust dates and cost estimates according to "what if" scenarios, and

even integrate the schedules of several projects at once.

Since most of the editorial staff was involved in more important things (like learning how to quit their new word processors without losing all their files), we decided to recruit Ken Edwards to head up the project. Edwards, a manager at Touche-Ross, a Big Eight accounting firm, together with assistant Lynne Baron and in liaison with PC associate editor Barbara Krasnoff, planned and put into

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Project management software is supposed to help you allocate funds and meet deadlines.

execution the three-part series that begins in this issue.

Word Processing Redux

And just in case the powers that be change their minds again, we've included Glenn Hart's "Word Processing on a Budget," in which he reviews six programs (*Friendly Writer*, *Personal Editor*, *QUICK-TEXT*, *QUICK-TEXT II*, *The Word Worker*, and *I-EDIT*) that will let you type away happily for under \$100 each. Not satisfied with that, we've also added his overview of *MagicIndex*, which helps add a large variety of bells and whistles to your *WordStar* documents.

Meanwhile, for those who have extra cash to invest, George Hayles examines two investment programs that help Wall Streeters examine trends and make informed financial decisions.

So you can see that, in spite of our resistance to the new word processors, we have once again pulled together an eminently readable issue.

(Now, how do I get this program to save my file? Maybe if I press this function key

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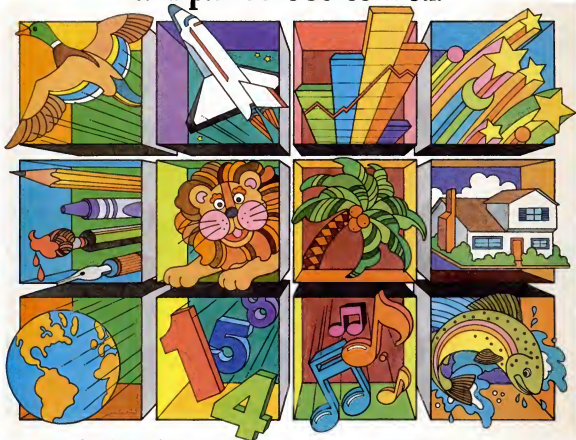
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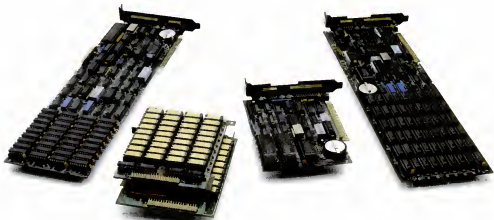


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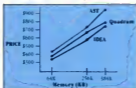
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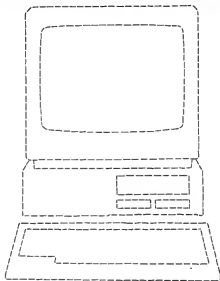
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IBM News

FROM THE EDITORS OF PC

OCTOBER 30, 1984

IBM Floods Market With Low-Cost Software

Low prices, on-disk documentation, dozens of titles shake market—and more is coming!

BY JAMES LANGDELL

BOCA RATON—In a move that has stunned both program developers and computer retailers, IBM has plunged full force into the PC software market. The first round of entries in its new "Personally Developed Software" series contains 36 packages priced as low as \$14.95, and covering a wide range of topics, from games to education to utilities to serious

business applications. And IBM has announced that it plans to introduce a minimum of three bundles of this magnitude each year.

Family Affair

This new software line is devoted to programs created by IBM employees or members of their families—a signal that IBM is ready to change the face

of the PC software market. Until now, most personal computer applications programs with the IBM logo were licensed from third-party publishers; few had been originated by IBM. By introducing a series of employee-created programs and offering more internally developed software, such as the recently announced *TopView* environment, IBM is announcing that it is

ready to enter all levels of the market with software that is "now invented here."

Most of IBM's initial programs offer significant value at low prices that are unprecedented for IBM. With this line, IBM moves into niches staked out by smaller software publishers and brings the software for the PC and PCjr close to the (continued)

Data General Portable Sports Desktop Features

The DG/One takes a strong stance and aims at Compaq's and Kaypro's markets

BY BILL MACHRONE AND CHARLES BERMANT

NEW YORK—Data General's portable computer is a many-faceted machine designed to incorporate the best qualities of existing desktop and transportable units.

The Westboro, Mass. based company acknowledges that the new machine will be immediately compared to Hewlett-Packard's HP 110, but Data General/One, as it is called, is being



positioned to steal Compaq Computer's and Kaypro's share of the market.

"It's a PC, not a portable," says DG spokesperson Michael Klatman of the new One, which is both highly MS-DOS and CP/M compatible. While the machine occupies the better part of an average attache case, it is the first complete, fully functional PC-workalike of its size.

The DG/One weighs from 9 to 12 pounds, depending upon the options you select, and looks more like an upper-end, personal electronic typewriter than a full-strength computer. Perhaps its boldest stroke is the screen, a 12-inch diagonal measurement, 25-by-80 liquid crystal display (LCD) screen that flips up from the closed unit. The DG/One's screen is the first commercial offering of a 25-by-80 LCD. The abbreviated size of their screens has been a limitation to the growth and utility of other machines in this class.

Screen Gem

The screen, though it lacks the resolution and brightness of a CRT, is the same size as that of most PCs. It represents a leap (continued)

IBM's Personally Developed Software

TITLES	PRICE	COMMENTS
● ENTERTAINMENT FAMILY (All require color monitor except where indicated)		
1 <i>Backgammon</i>	\$ 19.95	
2 <i>Blackjack</i>	19.95	
3 <i>Crypto-Mania</i>	19.95	
4 <i>Kaleidoscope</i>	14.95	
5 <i>Roadrunner Rescue</i>	19.95	
6 <i>3-K Trivia</i>	19.95	
7 <i>Word Seeking</i>	19.95	Will run on monochrome monitor
8 <i>Zaran</i>	19.95	
● EDUCATION FAMILY (All require color monitor except where indicated)		
9 <i>Adventures with Decimals</i>	\$ 24.95	
10 <i>Adventures with Fractions</i>	24.95	
11 <i>Adventures with Negative Numbers</i>	24.95	
12 <i>Adventures with Decimals, Fractions, and Negative Numbers</i>	44.95	Combines programs 9, 10, 11
13 <i>Algebra Tutor</i>	29.95	Requires IBM <i>Primate Tutor</i>
14 <i>Beyond basic BASIC</i>	19.95	Requires IBM <i>Primate Tutor</i>
15 <i>Matrix Madness</i>	19.95	
16 <i>Morse Code Drills</i>	14.95	Will run on monochrome monitor
17 <i>These United States</i>	19.95	
● PRODUCTIVITY FAMILY		
18 <i>DOS File Tracker</i>	\$ 19.95	
19 <i>File Facility</i>	19.95	
20 <i>PC Palette</i>	39.95	
21 <i>Personal Computer Picture Graphics</i>	29.95	
22 <i>Phone Directory On-Line</i>	24.95	
23 <i>Print Buffer On-Line</i>	19.95	
24 <i>Phone Directory and Print Buffer On-Line</i>	34.95	Combines programs 22 and 23
25 <i>SciCalc</i>	24.95	
26 <i>Select-A-Font</i>	19.95	
27 <i>The StarProof Bridge</i>	14.95	Runs <i>WordStar</i> files in IBM's <i>Word Proof</i>
28 <i>STATLIB I</i>	149.95	Requires IBM APL
29 <i>STATLIB 2</i>	149.95	Requires IBM APL
30 <i>Utilities I</i>	19.95	File Compress & Expand; DOS Command Retriever
31 <i>Utilities II</i>	19.95	File Locator; Backup & Unmark; DOS Tree Display
● BUSINESS FAMILY		
32 <i>Executive Phone Directory</i>	\$ 34.95	
33 <i>Executive Phone Directory with message feature</i>	39.95	Runs on IBM Cluster
34 <i>Executive Phone Directory build your own</i>	149.95	Can edit lists from other data files
35 <i>Portfolio Management System</i>	99.95	Links to Dow Jones
36 <i>Project Planning and Scheduling</i>	149.95	
● VALUE PACKAGES		
Family Game Package	\$ 59.95	Includes 1, 2, 5, 6, 8
Mish Package	49.95	Includes 12, 13
Scientific Package	194.95	Includes 25, 28, 29
Fun-in-Learning Package	68.95	Includes 3, 7, 14, 15, 16, 17
Utilities Package	56.95	Includes 18, 19, 27, 30, 31
Creativity Package	62.95	Includes 4, 20, 21, 26
Complete Catalog Promotional Package	865.95	Includes all 36 programs

IBM Software (continued)

price level of programs for home machines such as the Commodore 64.

Software by the Carton

The first team of 40 authors achieved few technical breakthroughs in the 36 software packages of IBM's initial release. But the sheer mass and variety of these programs reveals a secret weapon that IBM is finally bringing into the software market—the programming skills of IBM's staff.

Since IBM has more than 10,000 employees in its Entry System Division alone, it has an oceanic talent pool.

All the Personally Developed Software—from backgammon to phone directories to APL-statistical routines—was developed by IBM employees and their families. In the first release, for example, two games were created by an IBM staffer's teenage son. IBM's no-frills packaging for the Personally Developed Software series allows it to publish far more of its employees' programs at low prices ranging from \$14.95 to \$149.95.

IBM doesn't permit its employees to develop software for other companies. To compensate, it established a Software Submissions department that arranges for IBM to publish programs created by IBM employees on their own time, and to pay these authors royalties.

When a program requires extensive documentation, IBM will continue to package it in the familiar rigid, linen-covered box. This past year, whenever a program could be explained in a few pages, IBM has used two other formats: a vinyl folder or thin plastic box (also used for PCjr cartridges) with a booklet enclosed.

Manual-less

The Personally Developed Software format gives IBM the less-expensive option of putting its program disks in generic cardboard folders with no printed manual at all. You must print out all documentation from text files on the program disks, or read the instructions on your screen. However, the

IBM Software (continued)

programs are generally easy to use, and many users will welcome the idea of software sold without any printed documentation whatsoever.

The Personally Developed Software will be available at some IBM Product Centers and from IBM's authorized dealers. But IBM has struck a major blow against its normal distribution channels by emphasizing mail and phone orders. A lush catalog describing the 36 programs (along with photographs of the programmers) does a decent selling job. In the future, IBM promises programs in four additional categories: communications, programming, scientific/engineering, and "lifestyle" software.

For further savings, IBM offers six "value packages," each with three to six related programs at a price about one-third less than if the programs were purchased separately. You can also buy all 36 programs for \$865.95; this 40 percent savings is a bargain if you're a modern Renaissance Man who's ready to learn Morse code, play arcade games, do statistical calculations within APL, and maintain four different directories of telephone numbers.

Curious Procedures

IBM worked with the software authors to simplify operations and make them consistent from one program to another. For example, the methods for starting up programs were reduced to three: loading DOS and then entering the letter G, or inserting the disk and then re-booting, or loading the *Private Tutor* training system (\$50 from IBM) and following its on-screen instructions.

There are problems with this approach, however. Rather than printing a few words of start-up instructions on each disk's label, IBM puts on a circled letter—A, B, or C—and expects the user to hunt up a legend on the cardboard jacket to find what that code means.

One advantage of buying IBM's software is that many of the program disks already contain all files required for operation. This spares you the trouble

of transferring portions of IBM's DOS and BASIC onto your disks—a first step that is sometimes more complicated than using the applications program itself.

However, some programs are too closely tailored to an all-IBM system. For example, the *Matrix Madness* educational package has an embedded start-up process that explicitly calls on IBM's BASICA, so the program can't be run on a compatible computer that uses Microsoft's equivalent GWBASIC.

Each package presents a menu that allows you to read the documentation on screen or to print it out, in full or for particular topics. Beyond the IBM-standardized table of contents, the quality and style of these on-disk manuals varies according to the author's abilities and whims. In *Kaleidoscope*, for example, IBM let stand the programmer's conceit of using this spelling: "symmetrtrices."

In some manuals, the authors use symbols that spruce up the text's appearance on screen; with certain printers, however, these symbols cause unpredictable results. For example, wherever a degree sign (°) appeared as a bullet to set off a topic, an Okidata printer reacted by inserting some carriage returns.

Some on-screen decorative borders turned into strings of numbers when rendered on an IBM/Epson printer without Graftrax. IBM should have edited its on-disk manuals with a greater concern for their hard-copy appearances.

Some Bundle

In spite of these problems, the first set of Personally Developed Software offers many worthwhile programs at bargain prices that are unprecedented—at least from IBM. More details about these 36 programs are published in IBM's first issue of *The Directory*, which is available free by writing to Personally Developed Software, P.O. Box 3280, Wallingford, CT 06494. A subscription to a year's three issues nominally costs \$10, but you can obtain them free by sending IBM a questionnaire bound into the first issue. ■

Data General/One (continued)

forward in LCD quality and manufacturing ability but is dependent on ambient light for proper viewing.

Klatman says that you should be at a 45 degree angle to the screen to see it clearly. Observers outside the viewing angle will see a distorted image or nothing at all.

The narrow keyboard saves

goes on to predict that the smaller disk system will soon become the industry standard.

One reason that the 3½-inch drives were so attractive to DG is their low power consumption. The machine is powered from a Nicad battery pack, designed to last about 7 hours when the disks are accessed 20 percent of the time. One observer quipped, "Just as long as it gets



The DG/One, and peripherals, go for Compaq, Kaypro market

space by placing function and cursor control keys close to the typewriter keys. The auxiliary keys are colored in contrasting shades to help in locating them. The numeric keypad is integrated into the alphabetic keys, as with the Radio Shack Model 100 and generations of IBM key-punch machines. The keys have a distinctive, over-the-center click and a short, crisp travel.

A CMOS 80C88 chip running at 4 MHz does the processing chores. Although a standard PC runs about 15 percent faster, the difference is not noticeable in most operations. Performance is not likely to be a factor to most users, since they will select the machine for its full-feature portability rather than speed.

Power Supply

DG/One stores its data on two internal 3½-inch double-sided Sony disk drives, good for 760K each. Again, this configuration is a first for a product in this class. The machine can also be configured to recognize an outboard 5¼-inch floppy disk assembly as the A: drive. Klatman claims that the DG/One can run any IBM-compatible program in this manner and

me from one coast to another." Klatman replied that the transcontinental business trip was one of the battery-life design criteria.

The system recharges in a matter of hours, or you can slip in a fresh battery pack. An AC adapter supplies the power when the machine is on the desktop.

Other options include a 300-baud internal modem and up to 512K of memory. A 1200-baud modem can be plugged into one of two serial ports hidden behind a cleverly hinged plastic back panel. Company-manufactured peripherals expected in the near future include a small printer and an external hard disk. Curiously, there is no parallel port, a departure from the IBM norm.

The machine was developed and is manufactured by DG's Japanese subsidiary, Nippon Data General, which Klatman says acquired technology unavailable to DG as an American company. While Klatman declines to release the initial production figures, he says that 20,000 square feet have been added to specifically accommodate the machine's manufacture. ■

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PRODUCT REVIEW

A Look into IBM's Box Of Homegrown Software

NEW YORK—Since boxes of IBM's Personally Developed Software were dumped on our desks, the PC News staff has spent tireless hours on the somewhat overwhelming task of evaluating the new programs. Admittedly, it hasn't all been hard work.

What follows is the first wave of observations. Further reviews of entertainment, education, productivity, and business programs will be upcoming in PC News.

To order by mail, write to: Personally Developed Software, P.O. Box 3280, Wallingford, CT 06494. For phone orders call 1-800-426-7279, Monday through Friday, 8 a.m. to 8 p.m.

Word Seeking

by Jim Cyr, Ronald C. Thomas
List Price: \$19.95

Requires: 128K, DOS 1.1 or later, one disk drive (printer is recommended).

Up, down, sideways, or diagonal, anyway you look at it, *Word Seeking* is a time saving way to create your own word search puzzles.

You create new puzzles by entering 20 words that the program jumbles into a 20-line word search puzzle. You solve the puzzle on-screen by moving the cursor to highlight the letters that diagonally, horizontally, or vertically comprise the word you are looking for. Besides solving the puzzle on-screen, you can highlight the solution to hard-to-find words, or choose to print out versions of the puzzle with words, without words, or with the answers fully displayed.

"Customized" options are available so that you can have a musical note play each time a letter is chosen as part of the solution, increase or decrease the puzzle size by from one to two letters, alphabetize the list of words to be found in the puzzle, and even reuse old words in a different puzzle configuration.

Although games like *Word Seeking* seem to promote premature blindness from scanning rows of jumbled letters, they also sharpen your ability to find needles in haystacks. It would make an interesting pastime for

a long car ride if parents pre-
printed a batch of *Word Seeking*
puzzles for the kids.

—Virginia Dudek

J-K Trivia

by Keith Frechette
List Price: \$19.95

Requires: 64K, color display,
one disk drive.

J-K Trivia accomplishes the rare feat of being simultaneously ingenious, addicting, and trendy. It takes its cue from the Yuppie parlor game, *Trivial Pursuit*, filtering it through the short attention span of the computer generation.

Categories are determined through a random spin of slot machine graphics, like "The Joker is Wild" questions increase in value when there are two of a kind (category) or a

joker present. The game has 3,000 questions that rarely repeat, and the player is given the words and spaces of the correct answer. With the timing feature, it more resembles a fast-paced game show than its stodgy, Tony predecessor.

J-K Trivia borrows several questions from *Trivial Pursuit*, but the computer version allows you to add your own questions; none of the 15 questions I added surfaced during 2 hours of additional play.

The game succeeds because it combines equal parts of skill and chance. A person answering an easy "bonus" question can beat an opponent who fielded eight difficult queries. The rules of such games hold true: Your opponent always gets the easiest questions and the computer seems to know to ask about subjects on which you have a mental block.

There are, alas, some mistakes: Rhoda's sister was portrayed by Julie Kavner, not "Kazner," as the game insists, and the Bee Gees originally hail from Manchester, England, not Australia. But these criticisms are, well, trivial.

—Charles Bertman

Blackjack

by Wayne Hammond

List Price: \$19.95

Requires: 128K, DOS 1.1 or later, color display, one disk drive.

Blackjack can handle several players, yet it would be hard to imagine eight people huddled around a computer screen, passing around a keyboard to place their bets. It's fast and lively (especially on the AT), but the sound effects are simplistic and annoying.

The colors, also, are downright nauseating. You can change the cards' hue, but can't tone down the bright green background. Perhaps the gaudiness is meant to reproduce the tackiness of a real casino, complete with real headaches: the clashing colors could cause the program to be sold as a cheap, reusable hallucinogen.

But it's not boring and will be welcomed by anyone who has been hooked by blackjack on the Source. Still, my advice is to play this game alone and with a monochrome monitor.

—Charles Bertman

These United States

by Art Thompson

List Price: \$19.95

Requires: 128K, DOS 1.1 or later, color display, one disk drive.

Some programs can be enjoyed by adults and children alike, but *These United States* is decidedly not one of them. It quizzes players about capitals, largest metropolitan areas and the year a state entered the Union.

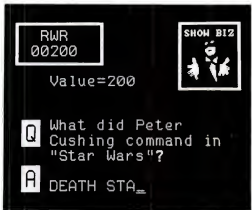
But, if you type "SANTA Fe" instead of "Santa Fe," the game registers a wrong answer—definitely not an example of democracy at work. It would be more worthwhile if it contained multiple information, such as governors and congressmen, or a way to add such facts. As it stands, *These United States* is too out and dried; an atlas is a far better investment.

—Charles Bertman

Crypto-Mania

by Russell P. Holsclaw, Frank D. Dennison, Carl M. Dennison

(continued)



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CIRCLE 391 ON READER SERVICE CARD

Software Look (continued)**List Price:** \$19.95**Requires:** 128K, DOS 1.1 or later, color display, one double-sided disk drive (printer is recommended).

If you have a deep-seated craving to solve cryptograms, IBM's new *Crypto-Mania* will give you a good workout.

Crypto-Mania lets you set up your own messages, quotes, or fact statements and automatically encodes them by substituting code letters for the correct ones. These can be

stored on disk for later use. The program keeps a record of the average length of time needed to solve each puzzle and also provides a clock while the puzzle is being solved.

For the novice or the dumbfounded, *Crypto-Mania*, if requested, gives hints on how to solve the puzzle. A series of cryptograms is on file covering quotes, dates from history, hidden cryptograms that do not show any of the cryptogram letters, facts from United States history, and notes on solving cryptograms. You can solve 40-

column cryptograms or take on a bigger challenge with 80-column cryptograms. All in all, *Crypto-Mania* seems an entertaining game for those able to tackle quotes from Carlyle to Jefferson and ready to create a few of their own.

—Virginia Dudek

**Adventures With Decimals
Adventures With Fractions
Adventures With Negative Numbers**by Scott Harris
List Price: \$24.95 each**Adventures With Decimals,
Fractions, and Negative Numbers****List Price:** \$44.95**Requires:** 128K, color display.

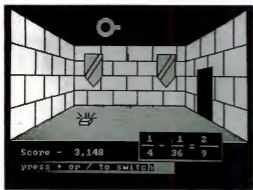
Each of these math adventure programs has a balanced blend of game scenario with a well-graded series of math problems. The screen shows the rooms and corridors of a castle from which you are trying to escape. You can move freely through parts of the castle by pressing cursor keys. To make any real progress, however, by opening doors, collecting treasure, and gathering pieces of a key you need to exit, you must ask to

solve math problems on a specific topic, such as multiplication and division of negative numbers.

The math problems become more difficult as the game goes on, but exiting the castle seemed a more difficult puzzle than the thickest equations. The solution seemed impossible until I tried to walk into a wall and found a secret passageway. Drawing a map of the castle's rooms, doors, and furnishings helped, but this exercise uncovered a bug in the program's graphics: when I stepped out of one room and immediately reentered it, the wall with two banners and the wall with a door were displayed in a mirrored—not rotated—relationship.

The more expensive package lets a player choose math problems on all three topics. It's the best buy since the castle game should be entertaining enough to keep a student playing many times. Unfortunately, the programs are closely tied to IBM's BASIC, which is provided on the disks (a PCjr must have Cartridge BASIC), so they might not run on most compatible computers.

—James Langdell

**IBM's New Soft Touch:
High Quality, Low Price**

New package of aggressively priced programs takes industry by surprise

BY CHARLES BERMANT

BOCA RATON, Fla.—IBM's catalog of bargain-basement programs may very well revolutionize the way software is written and sold. In the process, it could also change the PC's image, making what was once exclusively a work station into a part-time play station.

While some business applications are included in the initial release, the majority of these 36 packages will coax along the PC's slow journey from the office to the rec room. This new generation of homegrown entertainment, education, and personal productivity programs

from IBM is raising lots of eyebrows by offering high quality at a very low price.

Some observers expressed surprise that it took so long for these programs to reach the market, saying that it may be part of a huge development effort by IBM to begin publishing its own applications software.

"For IBM, this is an innovative way to sell some useful programs," says PC software developer Peter Norton. "This is not a particularly aggressive move on its part, just an intelligent way to peddle software

that's worthwhile." Norton also thinks this will encourage more outsiders to submit PC programs to IBM.

But, no matter how successful these new programs are, Big Blue won't match its hardware dominance in the software field.

"IBM is well aware of what it's doing," says Esther Dyson, head of EDventure Holdings in New York. "So far, it hasn't been able to make an impact on the software market, which is a lot more fragmented than the hardware market. There is more to do with software; there is more variety. It won't be dominated by any one publisher."

Small software and games manufacturers have taken notice, but, as Richard Stafford, Technical Director of TCS Software, in Houston, says, "Just because IBM is putting out a lot of inexpensive game programs, it shouldn't mean that anyone else can't compete."

Not only is interest in specific games short-lived, says Stafford, but "the PC market is not the major market for game software—that's more for the Commodore and the Apple. People want to do entertaining things with their PC, but it's not their major motivation."

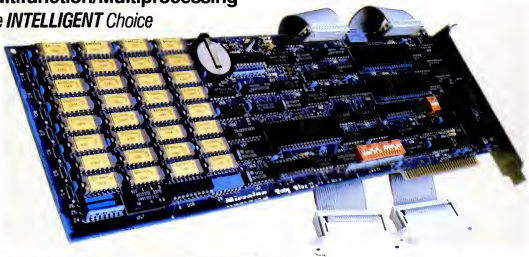
Cathy Carlson of Broderbund Software, of San Rafael, California, agrees, saying they "haven't been terribly aggressive" in going after the PC or the PCjr market.

This bold software stroke has taken the industry by surprise, and most of those contacted by PC News were neither willing nor able to offer a reaction. While it is not expected to drive any successful small companies out of business, it proves that Big Blue now recognizes two salient points: Useful programs need not be expensive, and a PC can be a source of entertainment. *Research coordinator: Virginia Dudek*

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CIRCLE 428 ON READER SERVICE CARD



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CIRCLE 471 ON READER SERVICE CARD

Corona Debuts Multi-user, Multi-terminal Mega PC

'IBM and Corona are attacking the same market from different directions,' says Corona about its eight-workstation system

BY ROBIN WEBSTER

SAN FRANCISCO—At the same time that IBM was unleashing the PC AT and PC network on the world, rival computer maker Corona Data Systems quietly announced its own Mega PC multi-user system.

The Mega PC is an Intel 8088-based machine that uses the MS-DOS operating system and can support up to eight attached workstations. It comes with a standard 256K memory, upgradable to 512K. A two-user system (256K per user) with an internal 10-megabyte disk is priced at \$7,805. Extra workstations cost \$1,495 each, and 20-megabyte and 40-megabyte versions are also available.

However, the Mega PC is not a conventional multi-user computer at all—it is really more of a file-server system.

Instead of having the relatively underpowered 8088 handle all the multi-user activity, Corona equipped the Mega PC with 11 PC-compatible expansion slots. Eight of these slots can be used to support Corona's Application Processor Cards (APCs), which are designed around the much faster 8MHz Intel 8088-2 microprocessor and contain 256K to 512K of RAM and 16K of ROM.

Each multi-user workstation requires an APC board to support it, a scheme Corona chairman Robert Harp describes as "almost like giving users a local area network in one box."

Multi-user Mega

The Mega PC workstations can work either as standalone IBM XT-compatibles, or in multifunction, multiterminal mode. The 14-inch green phosphor screens have super 640-by-400 pixel resolution (where



possible) and 256K to 512K of internal RAM. At the product announcement, the APC/workstation combination appeared to be IBM-compatible—it ran software such as *Microsoft Word*, *Flight Simulator*, *DR Draw*, and *MultiMate*.

In addition to the possible eight APC boards, the Mega PC contains the main file-server board, a hard disk controller card, and a spare slot for video or communications boards. (Any unused APC slot can also take an IBM-compatible add-on board.)

Unfortunately, it is not yet clear which IBM-compatible

boards will work with the Mega PC. "There will have to be the necessary device drivers so that add-on boards can be used. The drivers will be developed by Corona, but they will be user-installable," Mike Toft, Corona director of software engineering, told *PC Magazine*.

And, as to why Corona didn't decide to build the Mega PC around a more powerful chip, such as the Intel 80186, Toft added, "We did try to use faster CPUs than the 8088, but we found that the I/O transfer rates were such a constraint that the extra power didn't make that much of a difference. Anyway,

we couldn't get hold of enough 80186s—the supplies just weren't there."

Copying Concerns

Another problem facing Corona is how to ensure that copy-protected software will work with the Mega PC. "There are some programs that use disk-based copy protection schemes, and these programs may have some problems finding what they want when they want to," said Toft. "Those programs that use the typical interrupt vectors should work just fine."

And, what about IBM's PC AT? "It's the best thing that could happen to us," said George McMurty, vice president of sales. "We felt we had a good idea of what IBM was planning and we were right. IBM and Corona are attacking the same market from different directions. We feel that the Mega PC offers the best performance for the price."

Shipments of the Mega PC are to start in September.

Laser Printer

Corona also introduced an IBM-compatible laser printer built around the print engine developed by Canon.

Although the Corona Laser Printer uses the same basic design as the LaserJet system announced by Hewlett-Packard earlier this year, at \$3,395 the Corona product is about \$100 less than HP's. While the HP LaserJet uses plug-in ROM cartridges to change typesets, the Corona system uses fonts and type size data stored on a PC-resident floppy disk. Currently, four different fonts are available, and these can be output in sizes ranging from 7 to 20 points. Further fonts and sizes will be forthcoming. Corona promised.

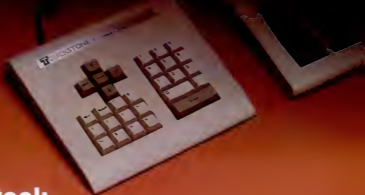
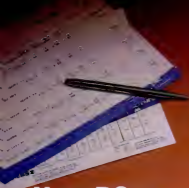
Single-sheet images can be composed of data taken from multiple screens; also, graphics and text can be intermixed easily. Up to eight pages can be printed per minute. Corona claims that any program that sends output to a standard printer device can drive the laser printer. Drivers for some popular programs have yet to be announced, however. ■

Speaking of Computers: Biology Is Destiny

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Adam Osborne, *Hypergrowth: The Rise and Fall of Osborne Computer Corporation*

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Using the standard PC keyboard

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CIRCLE 810 ON READER SERVICE CARD

PC Network Good News for LANs

In an 'Ethernet or Ether-not' world, will all network systems flourish?

BY MARTIN PORTER

NEW YORK—IBM's PC AT announcement stole the limelight from the simultaneous debut of IBM's broadband local area network (LAN) for PCs.

But, for those companies that have pioneered the concept of linking IBM PCs and compatibles to share files and peripherals, the announcement of the Sytek-manufactured LAN was met by a combination of expectation, confusion, and relief.

None of the major LAN manufacturers surveyed are running scared of this network, which will allow as many as 72 IBM PC and PC-compatibles to be linked with coaxial cable. Some call it expensive and only a Band-Aid approach to networking.

But most agree that, although limited, it will help to generate market acceptance of the network strategy, as well as to encourage the much-needed development of LAN software.

"The announcement clearly signals the next era of distributed computing," explains Bill Krause, president of 3Com, manufacturer of an Ethernet-style (fewer channel, baseband) LAN for IBM PCs. Krause continues, "IBM has endorsed the LAN strategy. This should help us all, especially those of us who offer an alternative approach."

Paradoxical Choice

Although both consultants and LAN vendors consistently expressed this sentiment, most were confused about IBM's choice of broadband technology in a traditionally baseband 75-ohm coaxial cable environment. Although the system can accommodate voice and video in addition to data transmission,

most consider it to be slower and more expensive than current market options.

"I'm still a bit puzzled by the selection," explains Dixon Doll of DMW Group, a research and consulting group in Ann Arbor, Michigan. "IBM's decision to introduce a broadband system was somewhat of a paradox," Doll says. "It seems that they wanted to make sure they didn't introduce the Xerox Ethernet protocol they have been fighting against for years. Their system is as close to being Ethernet as possible without being Ethernet." Doll suggests the product may be IBM's defense against AT&T's Information Systems Network (ISN), announced last summer with its PC-compatible computer line.

LAN Alternatives

Other analysts believe that this network is the first of an anticipated series of forthcoming IBM-endorsed LAN protocols. According to Ken Bosomworth of International Resource Development in Norwalk, Connecticut, "I think you will see IBM providing its stamp of approval for seven or eight LAN architectures in the coming months. IBM's interest isn't in LANs. It isn't terribly interested in black boxes or cabling. Its interest is where the money lies—in the workstations themselves."

Although 3Com's Krause maintains that IBM's new LAN divides the market into the "Ethernets" and "Ether-nots," others feel that the price of IBM's LAN leaves plenty of room for competitors, even those with similar products. Bob Davi, director of marketing for Orchid Technology, man-

ufacturer of the PCnet LAN, explains that with all pieces (boards plus translator unit) together, the new IBM PC network will cost nearly \$1,000 per node. This is double the cost of Orchid's baseband PCnet, which also operates in a 75-ohm coaxial environment. As a result, Davi adds, "If IBM did its job well, then this announcement will help the entire LAN marketplace. If it didn't, it will only hurt the concept of LAN."

Even those who read every product introduction for marketing clues have been confused about IBM's announcement of its new LAN. The clues don't add up. This is the third LAN IBM has announced. The market has given its cluster arrangement only lukewarm acceptance. And its token passing scheme, using twisted-pair cable, is still anticipated to take 2 more years in development.

As a result, Charles Hart, president of Nestar, manufacturer of the Plan 4000 token-passing LAN, remarks, "Tech-

nology of the broadband approach is somewhat of a detour. We are staying close to IBM's long-term plan, its announcement of a twisted-pair environment. This announcement seems to be nothing more than a bandaid."

Hart added, however, that Nestar will be introducing a gateway to IBM's broadband network early next year. Krause meanwhile says that 3Com will also announce ways to use its Ethernets of products with the PC AT.

Nevertheless, no one expects IBM's new LAN to generate de facto standards in its marketplace, which is expected to grow to \$3 billion a year by 1988. As John Murphy, analyst with Advanced Office Concepts of Bala Cynwyd, Pennsylvania, observes, "There are those timid users who will only buy a LAN with IBM's logo on it. And there are others who will accept this as IBM's endorsement of the LAN strategy and shop to see what is around." ■

PRODUCT REVIEW

A Wait Watcher's Delight

PC RESET

List Price: \$89.95,
\$99.95 with cable extension.

LOCKIT

List Price: \$129.95
Security Microsystems Consultants
16 Flagg Pl., Suite 102PF+
Staten Island, NY 10304
(212) 667-1019

Do you find it hard to resist snacking while anxiously waiting for your PC to meander through its turn-on memory check? And every time you have to power down and then up again to clear a hanging program, do you curse the idiot who left a simple hardware reset switch out of the PC's design?

If your PC is giving you a developing parity pot and incipient hypertension, Security Microsystems Consultants have a cure. Their PC RESET kit provides the button IBM overlooked and includes a plug-in module, called QUICKON, that bypasses the time-consuming

memory diagnostic routine. It is available for both the PC and the PC-XT (users must specify which) for \$89.95.

The PC RESET kit includes a free chip puller, which simplifies relocating the BIOS ROM in the QUICKON socket. Only a screwdriver and pliers are needed to install the RESET button, which is normally mounted in an unused cutout at the back of the computer. For users desiring a front-mounted reset switch, an extension cable with a Velcro fastener is available for an additional \$10.

Where hard disk security is required, Security Microsystems also manufactures a product called LOCKIT. This \$129.95 package includes the components of the PC RESET kit, plus a programmable password-access-only routine. LOCKIT may be set either to prevent any unauthorized boot-up of the computer at all or to intercept any attempted access to drive C. —Craig L. Stark

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Options:

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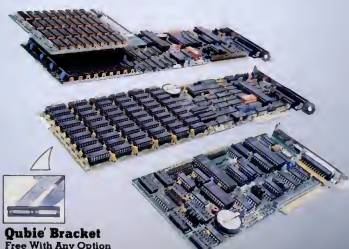
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CIRCLE 160 ON READER SERVICE CARD

Cleese Pitches Compaq And Tosses a PC

BY JAMES LANGDELL

HOUSTON—Compaq found a new way to emulate IBM: it hired a comedian to sell its personal computers. IBM may have Charlie Chaplin, but Compaq's pitchman is John Cleese, the short-fused, tall actor-writer of "Monty Python" and "Fawlty Towers" fame.

Unlike Chaplin's gentle, silent comedy, Cleese's humor has a sharp, verbal edge. You can't possibly ignore him when he speaks. "Cleese's delivery is second to none," says Jim D'Arezzo, Compaq's vice-president of corporate communications. Cleese is an effective hired gun as actor and writer in four of Compaq's television commercials, produced by Ogilvy & Mather. The spots are targeted at Compaq's chief competitors, IBM and Apple.

"We analyzed the marketplace," says D'Arezzo, "and concluded that a computer purchaser's biggest fear is making the wrong decision." In the commercials Cleese portrays someone who made what Compaq believes is the wrong deci-



sion—he bought an IBM or Apple personal computer. In each spot Cleese crumples when confronted by the calm voice of Compaq's off-screen advocate.

In an ad for the Compaq Plus, for example, Cleese has his arms filled with an IBM PC's system unit, keyboard, monitor, and manuals that he's trying to carry home from the office. The

voice tells him the portable Compaq Plus can do more than his unwieldy stack. Cleese asks, "Does it have a handle?" just as the PC slips and crashes to the floor.

Another ad casts Cleese as a stodgy businessman, proud to

have purchased the "well-known computer." After hearing about the Compaq Desktop's advantages, he defends his original, conservative choice by declaring, "This decision was sound. Wrong, but sound."

Compaq's own IBM compatibility seems to have instilled a degree of "IBM civility" that moderates these messages. The

most savage shots occur in a commercial targeted at Apple's Macintosh. Cleese portrays a trendy California executive, dressed in jogging suit and towel. A Macintosh sits on his glass-and-chrome desk. Cleese is so laid back he begins to slither out of his ergonomically designed chair. The Compaq's portability doesn't interest him: "My horoscope advises against travel." And when told that "Compaq can grow as your needs grow," he shares this thought: "But isn't personal growth more important?"

Cleese, educated in law at Oxford, is serious about the crafts of comedy and acting. "The script's words can be flat, but what he does with them is marvelous," raves D'Arezzo. "For example, there's not much in the line 'Does it have a handle?' But the way Cleese delivers it after a long pause gets a belly laugh."

It's not only Compaq's D'Arezzo and die-hard "Monty Python" fans who appreciate Cleese's talents. In recognition of his performances for such clients as Compaq, American Express, and Krænenbourg beer, *Advertising Age* recently declared Cleese the star presenter of the year.

By going with Cleese, Compaq clearly made "the right decision." ■

The Big Fix: IBM PC Service Takes a Step Up

FRANKLIN LAKES, N.J.—It is no longer necessary to reach for the panic button when your IBM PC goes on the blink. As of October 1, IBM inaugurated a new maintenance agreement that is designed to offer more customers convenient access to service and repair. IBM also announced maintenance coverage for the non-IBM products IBM sells in its product centers for use with the PC.

A notice sent to IBM customers in June explained five service offerings now available for IBM equipment: IBM on-site repair, IBM on-site exchange, customer on-site exchange, cus-

tommer carry-in exchange, and customer carry-in repair. "We'll give the customer a price break, depending on what he's willing to do," explains Jack Kessler, service business adviser in IBM's customer service division, about the benefit to customers who transport their own machines, for example. "The more he does, the less he pays for maintenance."

Customers may now choose to either mail or personally deliver machines to any of 100 IBM Service/Exchange Centers. These centers perform minor maintenance, such as exchanging machines or replacing

parts if they're in stock. If major repairs are needed, the machine is delivered to one of seven IBM Repair Centers and, once fixed, it can be picked up by the customer at the Service/Exchange Center or mailed to the customer's home or office. Cost will vary accordingly.

Customers can also request IBM on-site service, IBM on-site exchange, or customer on-site exchange. With on-site maintenance, customers can choose to have IBM perform all maintenance on location or they can assume responsibility for on-site repair once the parts or replacement machine is delivered by IBM.

For non-IBM equipment, IBM maintenance will service two types of printers and seven feature cards. The four types of

service offered for printers are IBM on-site exchange, customer on-site exchange, customer carry-in exchange, and customer carry-in repair. For feature cards, customers can choose IBM on-site repair or customer carry-in repair.

IBM spokesperson Helen Horwitz says that, while IBM will service non-IBM machines, customers should first check to see if the equipment is still covered under the manufacturer's warranty. However, IBM will provide service for any product for customers who request it.

Customers who need service should call the nearest IBM authorized dealer or IBM's national toll-free number, (800) 428-2569. From Hawaii or Alaska, call collect at (312) 986-7451. —Virginia Dudek

ution began.

symbol encountered at 047:0037:..FD00 C008316

REAL TIME SOURCE CODE TRACE DATA

SOURCE or RESULTS
LINE NOTE

```
fake = lower;
while (fake < upper) {
  Compare (fake, Scanlines);
  %c_temp = f_temp - 22;
  %c_temp = %c_temp * 5;
  %c_temp = %c_temp / 9;
}
```

```
0
lines - 17
err - 100
p - 18
```

Sign SP Prio Compare Console Slets Str Sp Echo D/S D/Exec Eval File

0 0 1F 1M1 1N1 1T 1L1 1S 1E 1D 1S 1M 1E 1L 1F 1E 1L 1S 1E 1L 1F

Source Code Debugger Version 28.0 1C Copyright Atron Corp. 1984



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- 3) PERFORMANCE ANALYZER

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CIRCLE 156 ON READER SERVICE CARD

ITT XTRA Bats 1,000, Mets Send XT to Showers

Team pins Series hopes on compatible

BY JAMES LANGDELL

NEW YORK—Will computing become the new national pastime?

On August 31 the New York Mets held Computer Night at Shea Stadium. This baseball team has good reason to celebrate computers: Its manager, Dave Johnson, led the Mets to their best season in over a decade with guidance from his personal computer.

Fans of ballpark giveaways, such as Cap Night, were disappointed that only one Computer Night ticket holder received a free computer—an ITT XTRA, just like Johnson's.

Hold everything! At the time of our spring scouting report ("The PC Goes to Bat," PC, Volume 3 Number 10), Johnson was using an IBM PC-XT. Why did he switch computers in mid-season?

For the answer, we talked to Johnson's computer dealer, Steve Guido, president of ComputerLand of Queens. When he was second baseman for the Orioles, Johnson worked with Guido at Honeywell in Baltimore during the off-seasons.

Last spring, ITT delivered an XTRA to Guido in advance of its official announcement of the computer. Guido had signed a non-disclosure agreement, but he gave Johnson a sneak pre-

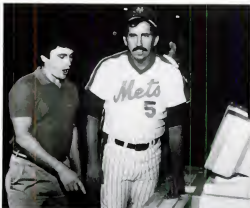
view. The Mets' manager tried running the team's statistical software (designed with *dBASE II*) on the XTRA and found it ran faster than on his PC-XT.

Impressed by the XTRA, Johnson was eager to get one as soon as they became available. He was so eager that when a reporter asked him what moves could improve the Mets, he said, "Trading my XT for an ITT computer and a player to be named later." This may be the only time a computer scoop broke first in the sports pages.

Name Game

Back to Computer Night... The Mets also awarded an XTRA to the winner of a contest to name Johnson's computer. The best name, Abner Doubledata, was coined by Matthew Carlton, of Woodside, New York. Carlton had filled out the last entry form at one of Guido's ComputerLand stores, just as it closed on the contest's final day—proving that baseball is a game of split second decisions.

Carlton is a performer and songwriter; his wife, also a musician, runs a vocal studio. They plan to use the XTRA not to play music, but to maintain business records for her studio and to handle copyright forms for his songs. They already own



Matthew Carlton, Dave Johnson, and "Abner Doubledata" at Mets' Computer Night.

a Commodore 64, but Carlton admitted he was a little intimidated by the more powerful computer.

When Carlton's winning name was announced at Shea Stadium, much of the crowd boomed and groaned at the pun. Abner Doubledata would have gotten more respect if the fans knew some of the other names in its league: Byte Boy, Byte Ball, Perfect Coach, and Byte Fielder.

It's a Miracle

Another one of the Computer Night events was a computer-simulated game between the 1984 Mets and the World Champion "Miracle Mets" of 1969. This time-bending matchup was made possible by *Micro League Baseball*, a computerized baseball game based on the statistics of actual major league players. This software, soon to be available for the PC, is produced by

the Micro League Sports Association, 28 East Cleveland Ave., Newark, DE 19711, (302) 368-9990.

As in real life, Johnson managed the 1984 Mets, while Ed Kranepool, a veteran of 1969, called the shots for his teammates. The game had the makings of a pitcher's duel between 1969's Jerry Koosman and this year's Dwight Gooden. In this Silicon League game, fleshed out with film clips of the players, the 1969 Mets led 4 to 3 after the seventh inning. With two out in the bottom of the ninth, however, the 1984 Mets scored the two runs needed to win the game, 5 to 4.

This dramatic conclusion seemed somewhat calculated. A *New York Post* reporter asked the Mets' manager if his computer had rigged the game. No, replied Johnson, "but if we were losing I would have pulled the plug." ■

Prototype Puck Pointer May Be Future Mouse

BY ROBIN WEBSTER

OAKLAND, California—Mice, light pens, joysticks, and touch screens are all trendy techniques to tell a personal computer what to do.

While such input devices definitely work, they all require that the user move one hand

away from the keyboard and, in some cases, turn their gaze away from the computer screen. To many, the temporary loss of contact with the keyboard is of negligible concern. Others find it a confounded nuisance.

However, a California-based

company called the KA Design Group believes that it has overcome many of the major objections to these alternative input devices. Its hybrid Puck Pointer has no mouse "tail," and it doesn't need to be separately attached to a PC via an RS232 serial port.

The Puck Pointer combines optical mouse and joystick technology and is compact enough to replace the 2-by-2 inch numeric/cursor control key area on the IBM PC's keyboard.

Traditional mice use a ball

bearing on their undersides that, via small sensors, constantly communicates x-y coordinates to a computer system. They can be used on any surface that provides enough friction to cause the ball bearing to rotate as the mouse is moved around.

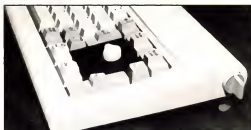
Optical mice use a different method; they note how fast and in what direction they are being moved over a special "pad" that has been etched or printed with a grid pattern. The grid pattern acts as a point of reference from

(continued)

Puck Pointer (continued)
which x-y coordinates are calculated.

The Puck Pointer, according to KA Design's president, Victor Kley, is an "optical, non-contact device that is far less cumbersome and more natural to use. It doesn't put as much strain on the hand, wrist, and arm muscles."

It features a single "handle" that can be moved north/south and east/west. This controls an on-screen cursor, or carries out any other action dictated by software. Pressing down on the "handle" provides a third di-



The Puck Pointer can replace the numeric/cursor control keys on the PC.

mension of movement.

"This third axis of movement can be used to control a number of actions," said Kley. "It might

control the speed at which images are drawn, or it might dictate how fast the cursor will move. You can "ratio" the move-

ment of the Puck Pointer and the cursor on the screen; you might move as little as half-a-pixel and as much as 16 pixels at a time.

"In one mockup we showed how the Puck could be installed on an IBM PC keyboard in place of the numeric/cursor control keys. Although we are not currently producing such a product commercially, I can see us marketing a product for the end-user that comes as an add-on for about \$40. Initially, we will be selling the basic device to OEMs for about \$15 per unit in 10,000 unit quantities".

Calendar of Events

DATE	EVENT	COMMENT	LOCATION	CONTACT
October 11-14	Computer Expo and PC Show	Exhibits, seminars, and workshops.	Cal Expo Sacramento, CA	High Tech Shows, Inc. 2020 Hurley Way, Suite 395 Sacramento, CA 95825 (916) 924-9351
October 25-26	CAD/CAM: A Management Overview	Seminar on philosophy and benefits of an integrated system.	Holiday Inn- International Airport Minneapolis, MN	Institute for Advanced Technology 6003 Executive Blvd. Rockville, MD 20852 (800) 638-6590
October 29- November 1	COMDEX/Europe	Hardware, software, and accessories.	RAI Congress and Exhibition Centre Amsterdam, The Netherlands	The Interface Group 300 First Ave. Needham, MA 02194 (800) 325-3330 (617) 449-6600
November 1-4	Consumer Electronics and Computer Expo	Selling show featuring consumer electronic and computer products.	Nassau Coliseum Uniondale, NY	Expositions Inc. 33 Bell St. W. Babylon, NY 11704 (516) 293-5533
November 2-4	Regional Educational Software Informart	Seminars on educational software developments.	Penta Hotel New York, NY	National Educational Software Informarketing 225 E. 57 St., 17H New York, NY 10022 (212) 688-8904
November 4-7	Eighth Annual Symposium on Computer Applications in Medical Care	Tutorials, demonstrations, and exhibits on computer applications in health care.	Washington Hilton Washington, DC	Office of CME George Washington University Medical Center 2300 K St., N.W. Washington, DC 20037 (202) 676-8928
November 14-18	COMDEX	Hardware, software, and accessories.	Las Vegas Convention Center Las Vegas, NV	The Interface Group See above
December 6-8	Great Southern Business & Computer Shows & Seminars	Hardware, software, accessories, and seminars.	Leon County Civic Center Tallahassee, FL	Great Southern Computer Shows P.O. Box 655 Jacksonville, FL 32201 (904) 356-1044

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PRODUCT REVIEW

Cope 100-106: PC as Electronic Couch

BY HOWARD A. KARTEN

Cope Series#100 *Condition Green* (For Success)#102 *Wings* (Fear of Flying)#103 *Counterweight* (Reduce Overeating)#104 *Center Stage* (Public Speaking)#105 *ZZZZZZ* (Insomnia)#106 *The Big Idea* (Self-Confidence)Cabonics, Inc.
6325 Sheridan Dr., #1
Williamsville, NY 14221
(716) 631-5777**List Price:** *Condition Green*, \$60; others, \$65 each;
Condition Green plus any other program, \$100.**Requires:** 64K RAM.

Psychologists, like other professionals, have lately begun to investigate the potential for delivering their services by computer. One approach that's received considerable attention is behavioral therapy, a specialty within psychology and psychiatry that has had some notable successes in dealing with certain behavioral difficulties. Behavioral therapy places less emphasis on the client's feelings ("How did that make you feel?") and "What were you feeling when you said that?") and focuses on observable and controllable behavior.

Plucky Plunge

The six programs in Cabonics' Cope Series attempt to deliver some of the behavioral therapist's services via what might be called the "electronic couch." The problems they address are difficulties in sleeping, fear of flying, overeating and overeating, stress, self-confidence, and generally feeling good about oneself. The advertising material for this software carefully avoids any mention of words such as "problems," "disorders," "therapy," and so on (no doubt for reasons of professional ethics regarding advertising, lawsuits, and re-

lated concerns).

These programs are a plucky step forward, but unfortunately they seem to be more of a lurch than a sure-footed step. They will require some polish to achieve greater effectiveness.

The authors are two psychiatrists who are diplomats, having passed advanced tests administered by the American Board of Psychiatry and Neurology. They have adapted to PCs a proven approach to dealing with behavioral difficulties. The method used is classical, or Pavlovian, conditioning, in which two events or emotional states are paired. For example, someone with fear of flying gets anxious literally at the thought of air travel. According to the paradigm, reducing the physical anxiety level that accompanies those unsettling thoughts will relax the person's fear about flying. That goal is achieved by placing the sufferer in a very relaxed state and getting him or her to simultaneously imagine all the stimuli of flying—for example, buckling up the seat belt, the roar of the engines, and the plane's takeoff. Getting the sufferer into the relaxed state is accomplished through thoughts and phrases displayed on the CRT. It's an interesting idea, but it receives less-than-elegant execution in this case.

Flying Help

To use these programs, you simply put one of the disks into drive A; and perform a standard boot; the operating system has already been placed on the disks. You are asked to get into a comfortable position in a place free of distractions. The programs then ask you a few basic questions (your name, gender, is it night or day, what season is it), and inform you that the only action necessary to use them is to press the minus key on the numeric keypad to display succeeding screens.

The CRT then displays basic instructions as well as a mixture of different kinds of thoughts and phrases. Some are intended to raise your anxiety level ("You are on a plane. The plane has just begun to take off...you are trapped...maybe the pilot is drunk."). Others are intended to relax you (the feelings of terror "are draining out of your body, soaking into your chair"). The intent is to alternately raise and lower the anxiety level and make the user as relaxed as possible so he or she will be amenable to suggestion.

Unfortunately, the implementation is amateurish and almost guaranteed to conflict with being in a relaxed state. For example, sitting in front of the tube and making a bit of an effort to read the displays seems innately less relaxing than listening to a voice on a tape. Moreover, after you press the minus key on the numeric keypad, the software forces you to wait a few seconds before displaying the next screen (which is never more than 4 lines, at a maximum of 40 characters each).

Disruptive Messages

The phrases come on to the screen one character at a time, which I also found not-relaxing. A better technique, I think, might have been to display the messages a line at a time, starting with a low intensity and slowly turning up the brightness level.

Finally, the message displays between presses of the minus key are not broken up logically into complete thoughts or phrases—they're disjointed, which makes them distracting and difficult to comprehend.

I described these programs to Dr. Larry Stifler, a Boston-area clinical psychologist and director of Boston-based Health Management Resources, a company that helps clients deal with behavioral problems such as

obesity or overeating. Stifler, who's done extensive research as well as behavioral therapy with individual clients, observed, "Generally, I feel there's a great future to self-instructional material delivered via computer. The issue is designing the software so it's effective."

Moreover, he stressed, "The computer is ideally suited to shaping behavior. The advantage of the computer over purely auditory tapes in principle is that the program can ultimately be made interactive, which makes it much more individualized and self-pacing than a traditional auditory tape."

Sense Conflicts

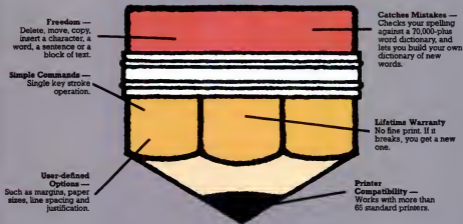
One potential problem Stifler pointed out was the need to keep pressing the minus key, since that effort "is the antithesis of relaxation and could interfere." A better method might be to use the button on a game controller or a joystick, he said. "If some muscles are tense from having to press the button, you're delivering a mixed message to the brain." Stifler feels that this prevents the program from being as effective as it might be if it required less effort on the user's part.

The problem, Stifler explained, is that none of the tasks to be performed should be incompatible with a relaxed body and relaxed muscles. Having to concentrate on the screen and interpret phrases that might not be full sentences is incompatible with a state of relaxation.

For the immediate future, however, I suspect that those who are tempted to deal with their difficulties by plunking down the \$60 or \$65 for these programs would be better advised to spend the money on a cassette tape or a bottle of their favorite mood-altering beverage. Or, at minimum, they should wait for the next release.

The hardware requirements are not stated, but it appears that a minimum of 64K and a monochrome system are needed. The disks already have an operating system written on to them. ■ *Howard Karten is a programmer-turned-writer who has a B.A. in psychology.*

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Elizabeth Ferrarini

This 'infomaniac' pursues modern love with modern romances

BY CHARLES BERMANT

BOSTON—You might know her as Liz the Lusty. Or Baudy Brenda. Or just plain "Baud." Under these aliases, Elizabeth Ferrarini haunts The Source, CompuServe, and other telecommunications services, putting out a computer siren song in search of able-bodied men.

Ferrarini makes telecommunications fit her own needs. She not only turned the tables and broke taboos by advertising her personal needs, but she wrote a book about the experience. And the result, *Confessions of an Infomaniac*, published by SYBEX Inc., in 1984, is far from the typical computer book.

When Ferrarini, 36, first used The Source three years ago, she was a computer novice. She was also at a personal crossroads, having left a middle-management position for Journalism school.

Upon graduating, she was commissioned by Prentice-Hall to write about on-line services, and part of her research of available electronic avenues was an exploration of The Source. She was enthralled with its news, "chat," and all the other services but was most fascinated with the dating bulletin board.

Moreover, she noticed something else: All the advertisers on that board were men. Her own ad received 20 responses the first day.

"I was captivated by what was happening, though I really didn't know what to do with it," she relates.

A Lighter Touch

Once hooked on The Source, her priorities changed. She decided to write a lighter book to reflect what she was experiencing with The Source at the time.

However, her publisher didn't approve and cancelled her contract. *Infomaniac* was not what he had asked for. Later, while seeking a publisher for another book, she mentioned the abortive project to SYBEX editors, who jumped at the chance to



publish the already completed manuscript.

Confessions of an Infomaniac is much like the title suggests. It is a personable, chatty recount of the author's initiation to the electronic age, starring some of the men she met on-line. Most of the book is true, at least from the author's perspective.

But, like the electronic relationships it discusses, the book promises more than it delivers. For instance, it promises to titillate, but, despite flashes of wit, it doesn't even get interesting until it's almost over. It's no fun trying to get on-line for the first time, and it's even less fun reading a detailed description of another user's efforts.

Ferrarini acknowledges the criticism, saying "it's better to get published miserably than not at all." She says she accomplished what she set out to do, adding that people "either love or hate" the finished product.

"You are a moving target when you do this," she explains

about her on-line exploits. "You are communicating your needs, so people will take potshots. One of the frequent questions is 'if you're so attractive, why do you need a computer to meet men?'"

"It's convenient. The odds are in a woman's favor. The response is quick, and, since both people are paying to communicate, it is an equalizer. And as computer users, you have automatically shared some of the same experiences."

Needs Statement

She says she has never landed in an uncomfortable or physically threatening situation. The "screening out process," so far, has worked. In addition to developing some romantic relationships, she has also been able to meet people who will help her in her career—perhaps by bringing *Infomaniac* to the big screen.

She has also turned *Infomania* into a concept, making a legal claim to the term and using it as a title for her next book, *Infomania: A Guide to Essential Electronic Services*, which is slated for publication by Houghton Mifflin next spring. This book is what Ferrarini set out to write before she was sidetracked by electronic lust.

Revamped Book

With her second book, Ferrarini strives to inform users about all the services available to them, advising them about alternatives for getting information, plus giving specific advice. For example, she says many search services previously used by librarians are being pitched to the end user.

"I want to give the reader a sense of the various services

available, an idea of what the database gives you for \$80 an hour," she relates. "Most computer communications books spend a lot of time telling you how to get on-line, but they don't tell you what to do once you get there. I want to tell about all the services without a lot of computer linguist."

"People form opinions about you based upon their electronic facade, which is not necessarily who you really are," she says. "The computer allows me to create any facade I want."

Modem-Packing Mama

Ferrarini's own facade—that of a bawdy, tough-talking broad—belies her slight physical presence. When a Source bulletin board user accused her of being a gay man rather than a heterosexual woman, she let loose with a string of descriptive epithets for about 15 minutes, at which time it was deleted by Source censors.

"On The Source, people are paying to communicate and self-publish," she insists. "No one has a right to say what is offensive. There should be no censorship."

She didn't clean up her act and was recently kicked off The Source for harassing a West Coast user who had criticized her for using a *Parti* conference on electronic love to plug her book. The user called her a slut, and Ferrarini responded with disparaging comments about that user's race, weight, and dentures.

"That kind of comment brings the street person in me out," she says. "If someone says something nasty to me, then I'll come back."

Electronic Backlash

The upcoming *Infomania* directory could develop into a yearbook or a newsletter, and Ferrarini is keeping as many modems in the fire as possible.

She has not, however, acknowledged any of the brutally pornographic electronic mail she has received on The Source.

"It's like I don't want to be a player in my own game," she confides laughing. "I'd rather watch other people." ■

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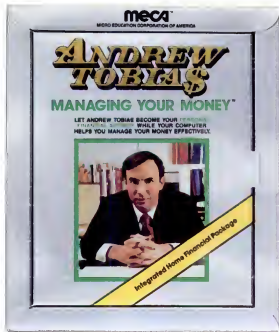
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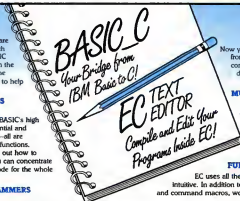
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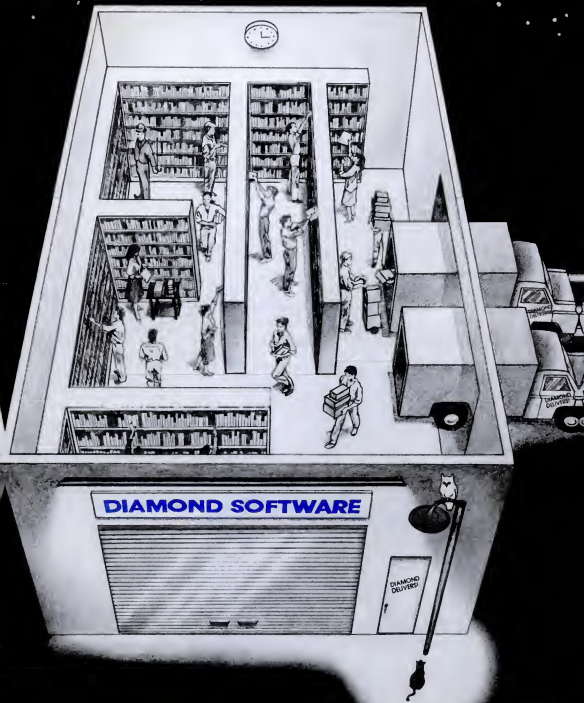
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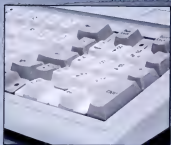
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Naming the Rose

The PC AT by any other name would smell as sweet, but how it was named in the first place is a strange and apocryphal tale. The little tramp, it seems, was not man enough for the new machine.

PC AT. We all know what "PC" means, but "AT"? You might think it stands for "Advanced Technology." Or maybe "Absolutely Terrific." There are even some who feel that it is a sly IBM riposte to AT&T's double entendre "Watson, watch us now" pitch.

Well, forget it. IBM simply abbreviated the name of a famous former world leader, entrepreneur, politician, and marketer. The folks at IBM knew they had something special in this new machine when it was still on the test bench, and they wanted credit where credit was due. They knew the machine would come to dominate the personal computing market, as surely as the original PC already has. The new PC's name had to reflect its destiny.

PC HH?

Our spies tell us of the many names IBM and its admen tried on and of the numerous failed attempts at devising a proper marketing scheme for the new machine. Only now can the tale be told. Forget all that Popcorn jazz; that was just a treacly Clark Kent cover-up to use while they tried out names like Dominator, Conqueror, and Vanquisher. "Too Detroit," said the admen. "People will want to know how much is the Corinthian leather upholstery."

"Well," the IBMers rejoindered, "how about a good, forceful name like Viking?"

"Viking? VIKING?" The admen were incredulous. "You're gonna let



Bill Machrone

that wimp tramp peddle a Viking?"

The IBMers allowed as to how maybe the tramp had run his race. Time to come up with a new image, they said.

"Yeah," said the admen. "We could do a knockout campaign based on Hagar the Horrible." One of them jumped up in a fit of enthusiasm. "Great! Let's run it up the flagpole and see who salutes!"

There was dead silence in the room. All eyes turned to him, and, after a long pause, the top adman said, "Why don't you get your feeble brain out of 1959 and

call Dik Browne's agent?"

Once he had left, though, enthusiasm mounted for the idea.

"I can see it all now," said one. "Hagar and Lucky Eddie sitting around the breakfast table, having an eye-opening cup of mead. Helga walks in and asks, 'So what are you going to do today?'

"Hagar says, 'Well, now that I've conquered the U.S. market and beaten the Common Market countries into submission, I think I'll go for total world domination.'

"That's nice, dear," says Helga. "Don't forget to take out the garbage."

As the admen picked themselves up off the floor, they noticed that the IBMers were tight-lipped.

"No cartoon characters," said one. "This is serious business."

PC CB?

"Okay, already," said the admen. "You want serious, we'll give you serious. Hmmm. Lemme see. I got it! Conan the Barbarian! You're strong, he's strong. We can get Schwarzenegger to do the ad spots. I can see him now, holding a Compaq Deskpro in one hand and an AT&T micro in the other and bashing them together in slo-mo. The camera comes in tight on the crazy gleam of triumph in his eyes as a million tiny pieces swirl to the ground."

(continued)

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CIRCLE 101 ON READER SERVICE CARD

EDITOR'S SCREEN

"Impolitic," said one IBMer. "Too macho, too chauvinistic. What do you take us for?" The rest nodded their heads. The admen just sighed.

PC GK?

"Okay, okay, you want somebody real, not mythical," said the top adman. "Great strength. Personal charisma.

Memorable name. Left his mark on the world."

He saw the IBMers nodding in agreement.

"Genghis Khan," he said.

"No," they said.

"Aw, come on, you guys! He's perfect. We could get Toshiro Mifune or . . ." He stopped when he saw an IBMer twisting a piece of paper as though it were a pale, fragile neck.

"Look," the IBMer said evenly. "We have an image to support. Our concepts are simple. We're big, powerful, international, paternalistic, marketing-driven, and not afraid of a good fight. There are enough people in our industry already who are nervous about the Far East taking over the industry. Besides, Mifune is Japanese."

PC AT

All this time, one of the admen, the psychological consultant, had remained silent. He took a long pull on his pipe and worried his beard with the stem.

"So, you want a father figure," he began. "A strong presence that doesn't insult you with its obviousness. Something that whispers a subliminal suggestion of power. Someone of mythic proportions, one that transcends mere reality." He watched the IBMers exchange glances.

"There have been many great and powerful men who have sprung from or ruled over Central Europe. From Albert Einstein to Count Dracula, they have left an indelible impression on our collective subconscious minds." The IBMers winced at the mention of Dracula, but the consultant went on.

"Even the earliest rulers are still in our hearts and minds today. So, the name should be 'PC AT,' which will carry a strongly resonant, psychohistorical frame of reference. So strong, in fact, that you won't need a huckster like the tramp. Just the first two letters of his name."

"And just who is this perfect paradigm for us?" asked the IBMer.

"Attila the Hun," he answered. ■

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CIRCLE 146 ON READER SERVICE CARD

A BUREAUCRAT'S GUIDE TO WORD PROCESSING

Now, if it were you or I and we wanted a word processing program for our IBM-type PC, we'd probably stop off at our local computer store and simply diddle with a few.

You and I, however, are not the U.S. Department of Agriculture.

(Nor any of its permutations of subsystems like the Economic Research Service, National Resources Economics Division, Data Services Center, etc., etc.)

So when the USDA told ERS to tell NRED and DSC to look into a truckload of w.p. programs for all their PCs, the last thing they wanted was simple diddling. Their dedicated Wangs and Lextrons were far too few to handle their

needs, their IBM® PCs weren't compatible with them anyway, and nobody really, quantifiably, knew from word processing with a personal computer.

Definitely not a diddling-mode condition.

As they put it in The Exchange, an internally distributed publication of the Department of Agriculture: "A needs assessment showed that, in the long-term, a word processing system is needed that can increase word processing capability and also be compatible with ERS' Long Range Information Management goals."

Well, "Needs assessment" led swiftly to "procurement action," which galloped into an "objective review" of the eight top-rated PC programs on the market (as compiled by The Ratings Book published by Software Digest), along with Wordstar® and Display Write 2, because they had some around.

Thus armed with the names, the final evaluators (a team of secretaries from NRED who would be the primary users of the PC software) became armed with each of the programs, along with checklists to record such things as ease of use, advanced features, and similarity to their existing dedicated equipment.

The first to be eliminated from the prospect list were Office Writer™

and Samna,™ since they're copy-protected and couldn't be transferred to hard disks.

Next, IBM's Display Write 2: because it's "not compatible with other software used in ERS (like Lotus 1-2-3,™ dBASE II® etc.); and it's "full of confusing menu options and cryptic error messages." Au revoir IBM.

Then, three more, for a variety of reasons.

Which left the following:

Volkswriter® Deluxe™

MultiMate™


Leading Edge™

Volkswriter Deluxe? "Too complicated and confusing." Not "easy to learn or use."

MultiMate? Not bad. It actually tied the winner in a few categories.

The winner being the one that won 82% of the votes in the Ease of Use/Ease of Learning categories. The one about which they said, "The ability to store deleted text and automatic document backup features were both highly desirable." The one they thought they'd quickly "be able to use... for their day-to-day word processing tasks."

The whole process took some three months of work by people in DSC to support the NRED in its work with the ERS and DSC to make the world a better place for the USDA.

But the results were well worth the wait. Because at last they've solved their word-processing problems...  "With Leading Edge!"

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CIRCLE 280 ON READER SERVICE CARD

Bringing the PC to Life

Voice synthesis and videodisk technology can broaden business applications of the PC while also providing a compelling learning alternative for managers.

Many managers trying to integrate PCs into their offices are echoing the question of the year: "Where's the beef?" They want to know how they can make use of the PC other than for word processing and spreadsheet functions, for which they generally have only a limited need.

To these managers, I present the case for two PC applications: the use of video and of voice in conjunction with traditional data processing, graphics, and text-based software. Since managers spend about 85 percent of their day engaged in visual- and audio-based learning activities, such as reading and attending meetings, I urge them to explore the possibility of using voice synthesis and optical videodisks to enhance these activities.

Voice synthesis can help managers cope with and use the enormous amount of information available to them through the over 5,000 external informational databases now in existence. I've found that managers who are exposed to relevant information from one of these systems will immediately find a cost justification for using the database, but I've also discovered that these managers will not read through more than three or four screenfuls of information at a time. With a voice synthesizer, the information from the external database can be output in

voice mode, and the manager can listen to it while continuing to perform his work and then store the output on a cassette for further access, either at home or in the office.



John J. Walsh

Of course, managers can absorb only so much information at one time and are often faced with information overload. When this occurs, they need to focus on one particular area. Personal computer-based interactive video, which is currently being used to deliver education in publishing, manufacturing, and marketing, may be the answer for the manager who doesn't have the time or money for traditional learning methods such as classes and texts.

Videodisk technology—a combina-

tion of computing, optical disk storage, communications, graphics, and lasers—can provide a self-paced learning environment. Managers can control the rate at which they learn because videodisk systems have forward, reverse, and interactive controls that provide special functions, such as random access to information and the ability to speed up or slow down, to freeze frames with extremely high resolution, and to zoom in.

Most importantly, PC-based videodisk technology offers a prototype learning environment for diverse fields. It simulates reality in ways that are flexible and paced to the individual learner. For example, when videodisk systems have been introduced into large corporate environments, users frequently come forward and suggest other learning applications for the system.

It's time to stop concentrating our efforts on devising text, graphics, and data applications and aggressively begin to explore the possibilities of voice synthesis and videodisk technology in our evolving PC environments. ■

John J. Walsh is a principal of the Visual Technology Group, Inc., a New York City-based company specializing in office automation and the use of interactive videodisk technology. He was formerly director of MIS at Avon.

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Letters to PC

Synthesis with a PC

Robin Raskin's excellent article "PCs, Peptides, and Process Control" (*PC*, Volume 3 Number 16) on the use of an IBM PC for chemical synthesis was most interesting.



As our colleagues at Rockefeller University do, we choose the PC, but rather than retrofitting it to an existing instrument, we designed a new, highly sophisticated, automated synthesizer that we call Syn-Thor 2000. Our choice was influenced by the number of compatible programs it runs, the quality of the color monitors, the numerous add-on I/O boards, and by the many researchers who either have or want an IBM PC in their labs.

Arno F. Spatola, Ph.D.
Louisville, Kentucky

Missing Floppies

I am a very satisfied subscriber to *PC Magazine* whose needs for software reviews, hardware reviews, and relevant information of all sorts have been very well filled by *PC*. I'd like to point out a gap that exists both in the realm of human knowledge and in your coverage of important issues.

This most basic and fundamental body of knowledge that is missing from our collective consciousness focuses on one thing—the floppy disk. Why have we not

seen a comprehensive review of this most important cornerstone of the personal computing field?

The world needs and cries out for an in-depth analysis of floppy disk materials, including the longevity, quality, and readability of the major brands of diskettes. I hope that *PC* can fill this need.

Richard Goldstein
Rochester, New York

We have examined the effects of environmental conditions on floppy disks ("Stress Tests for Floppies," PC, Volume 3 Number 13). As for a comprehensive review, we're thinking about it.—Ed.

More on Electric Desk

I would like to clarify some of the points I made in my review of *Electric Desk* in *PC News* ("Electric Desk: Organized, But Several Small Mars," *PC*, Volume 3 Number 18, page 60).

I said that *Electric Desk* will not gracefully support two different kinds of printers. However, if your file uses no special functions, such as underlining, superscripting, or boldfacing, you can safely switch from one printer to another without re-customization. If your file does contain these special functions you must make some special preparations. For example, if you customize *Electric Desk* for an Epson printer, then wish to switch to a NEC 3550 formed character printer, it is necessary to remove the write-protect tab from the disk.

This is not inherently risky; however, there is the chance that if the command is entered incorrectly, or if you forget to replace the write-protect tab, the disk could be inadvertently clobbered with files that you did not intend to have written onto the system disk.

Also, I said that "any attempt to write

to a write-protected disk will throw the user back into DOS mode." This is an overstatement and will not happen in every instance.

I hope this clarifies my point.

Howard Karten
Randolph, Massachusetts

We're Glad You're Clean

May we have permission to reprint your article "We're Clean" (*PC*, Volume 3 Number 16)? We'd like to distribute copies to our customers.

Your statement is clear, concise, and cogent; your policy could not be stated better.

S.J. Mesh
IBM Corp.
White Plains, New York

This letter is typical of the many favorable responses we have received from readers regarding software copying. As for permission to reprint the article, we'd love to say yes, but we can't. The person to contact is Jean Lamensdorf, Ziff-Davis Publishing Company, One Park Ave., New York, NY 10016. She's from Australia, she's really nice, and she'll probably let you do it.—Ed.

Manufacturer's Responsibility

I was delighted with Barbara Krasnoff's article "Consumer Guinea Pigs" (*PC*, Volume 3 Number 17). As a consultant and sometime beta tester, I think she hit the nail on the head about consumer guinea pigs. Even when beta testers are used, manufacturers invariably send us incomplete products with little or no usable documentation. I've noticed that even before we can finish a very short analysis of the program, *PC Magazine* is out with an advanced report of the software, usually with warnings that the program was an

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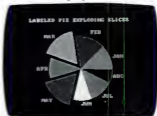
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LETTERS TO PC

early release with several shortcomings that the manufacturers have assured will be corrected in the final version. By that time, it is on the market, and hundreds of copies have been snapped up by the unwary public. Worse than that, many people have committed money and then find out that the product can't be shipped for many months.

I am glad that *PC*, unlike other computer magazines, does not publish product reviews that are written by the manufacturers of the same product. No matter how hard you try to point out to readers that these articles may not be objective, some will misunderstand.

I hope that *PC* will stay objective and continue to move fast. You could put consultants out of business.

Henry G. Moseley
Grafton, Vermont

Not a Bug at All

I'd like to respond to the article "Wising Up with KnowledgeMan" (*PC*, Volume 3 Number 4) and Ralph Freshour's letter ("Some Buggy Problems," *PC*, Volume 3 Number 13, page 95) regarding a serious bug that they say Micro Data Base Systems (MDBS) should have corrected. The bug referred to is "the one that adds an extra record when appending data."

We've been using *KMan* since shortly after the Las Vegas COMDEX last fall and find that the bug referred to is really a nice feature when understood properly. When you have added your last record and the cursor returns to the top adjacent to the record number, you merely press the Esc key to eliminate the extra record. The nice part about the feature is that when adding records that have the same fields (which happens frequently, such as the date or any other field that is the same as the last record), the information is already there and you just leave it there with CR. When the field is different, you merely type the new field. When starting to type in a field, the previous field is immediately deleted.

If this feature isn't wanted, all that needs to be done is set E.LMOD-FALSE.

Our experience with *KMan* puts it in a class all by itself. In my opinion, it is far superior to other Micro Data Base programs, as well as the big seller from Ashton-Tate.

M. Lee Osborne
Orange, California

Project: Success

I had been shopping around for a relational database program for 4 months before I came across "Project: Database" in *PC Magazine* (Volume 3 Numbers 11-17). I had heard so many conflicting stories



about databases that I didn't know where to turn to until I read your articles. I made a decision last week to purchase *R:BASE SERIES 4000* solely on the information you offered. I am extremely pleased with my purchase, and your description and review were right on target. I knew exactly what to expect, and the program delivers and performs as described with no surprises.

I do have one question. What does the term *procedural language* mean?

Ed King
Belleplain, New Jersey

A procedure-oriented language is a computer language designed to facilitate the accurate expression of procedures, algorithms, or routines belonging to a set of procedures. COBOL, FORTRAN, PL/I, and BASIC are all procedure-oriented languages.—Ed.

Your review of databases in "Project: Database" was great for those of us who are getting swamped by the multitude of software on the market. Please continue to do these general reviews—they are life-savers.

James P. Siepmann
Rochester, Minnesota

Congratulations on your extensive and comprehensive "Project: Database" series. I am not in the market for one now, but the series will be super for reference use, and for when I decide that I need something more than *PC-File*.

I would like to see *PC Magazine* extend this idea of in-depth analysis to other areas, such as financial software.

Lucius M. Lamar
Memphis, Tennessee

Look again! We've run many articles on financial software including the various Price Waterhouse Reports, "From Wall Street to Your Street," (PC, Volume 3 Number 13), "How to Be Your Own Best Financial Advisor" (Volume 3 Number 17), and many others.—Ed.

Good Language Support

I enjoyed your series of reviews of UNIX-like operating systems for the IBM PC (see *PC*, Volume 3 Numbers 10 and 11). As your articles noted, UNIX was originally an operating system designed by hackers for hackers. Imagine my surprise when I read through the tables and discovered that, besides C, almost no other language was listed. On larger computers, UNIX comes with BASIC, FORTRAN-77, LISP, Pascal, RATFOR, SNOBOL, and more. One of the nice features of AT&T's UNIX is that the code generator for the C compiler is used by both the FORTRAN-77 and Pascal parsers. So for just the cost of extra parsers, AT&T provides additional compilers. Only Co-Idris followed AT&T's example by providing a Pascal front end to the C compiler. PC/IX should be commended for providing BASIC and SNOBOL interpreters and a

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LETTERS TO PC

FORTRAN-77 set for release soon.

There are large markets that have made a significant investment already in languages other than C. Artificial intelligence has chosen LISP, engineering and scientific computation have chosen FORTRAN, and many students use Pascal. Many commercial products exist that are written in these languages. Yet on an IBM PC, MS-DOS is the only operating system that supports most of these languages. Here is a ready market just waiting for a viable multitasking operating system to come along with good language support.

Craig C. Douglas
New Haven, Connecticut

The Poetry of Software

Never before have I been so embarrassed while reading a magazine article. Not embarrassed for myself, mind you, but embarrassed for a history of feelings expressed through literature by poets such as John Donne. Yes, they are dead and the times they lived in are gone, but the nature of emotions and humanism that they expounded still continues. After reading Bill Machrone's article "New Product Love" (PC, Volume 3 Number 15), however, I have serious doubts whether this is still true.

My outrage stems not from the fact that he uses a poem as a basis for practical prose. Poetry is a precise way to express an idea, and analysis of the same is a good way to get a point across. But the simple fact is that Donne's "Lecture Upon The Shadow" never has, never will have, and never should have anything to do with software development and publishing in a serious sense. I first thought the article was going to be a humorous parallel by what can only be called a hokey and weak attempt to draw conclusions about software development from a poem of love and life. The fact that this article appears at all makes me wonder about the technological mindset of today. Is something beautiful from the past only worthwhile in terms of how it can be related (or misre-

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LETTERS TO PC

lated) to today? Is love really a software package?

Next thing you know, computer science classes will be given roses to dissect with each petal relating to the stem like chips in a motherboard.

Rob Southall
Prairie Village, Kansas

Finally! An editor who seems to have read something other than the technical reference manual. There is still hope for the world. Keep up the good work.

William Burt
Union, New Jersey

True Tests

I thoroughly enjoyed Howard Karten's article "Stress Test for Floppies" (PC, Volume 3 Number 13). I was disappointed, however, that Karten did not report the results of the test shown in the picture—the data compression test (the hammer test)—or the menu technique (the lasagna test).

James E. Manley
Baltimore, Maryland

We were disappointed too, so we decided to duplicate the tests. The results for the hammer test were smashing. The force of a hammer swung from a 90° angle (wrist straight up) destroys a diskette 98.3% of the time (98.8% for health club members).



The menu technique yielded one sure principle: lasagna is not improved by using a diskette as a spatula. Our food and wine editor remarked, "Now that's not Italian."—Ed.

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LETTERS TO PC

Love It and Learn

I read Alan Hoenig's review of Microsoft's *Word 1.1* in PC News (PC, Volume 3 Number 16, page 60). I would like to add a few comments to his.

I have found *Word* to be very difficult to learn, but it is very powerful once you have learned to use it. I still am unable to use many of the commands, and I expect that it will take me about another 6 months to learn all the features.

I would suggest that prospective buyers take the time to try out the package thoroughly. Although I had to struggle to learn and apply *Word*, I believe that someday, somehow, I will master it. Then, I will have a really powerful tool.

Robert J. Hobbs
Upland, California

Corrections:

In line 40 of the second program listing in PC Tutor ("PEEKING at Ports," PC, Volume 3 Number 17, page 394), the final equal sign should be a plus sign. This is the corrected line:

40 STATUSA% = &h80 AND INP
(1+PORT%)

"The Hidden Character Set on IBM's Color Card" (blurb on cover of Volume 3 Number 19) was hidden, all right, more so than we intended. As you may already have noticed, the article actually appears as "A Character Set for a More Readable Screen" in this issue. Sorry.

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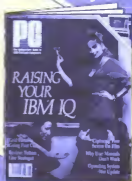
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The Dissection of DOS 3.0

DOS 3.0 is 50 percent larger than its predecessors and eats up 20K more memory than DOS 2.1. It also lacks "dot comments," which made batch files prettier and more efficient.

With DOS 3.0 out, it's time for another edition of "The DOS Report." Thanks to my article "The Dark Side of PC-DOS 2.0" (*PC*, Volume 2 Number 2), some readers expect me to trash all new releases. Honest, folks, that's neither my style nor my purpose. My goal is to point out some of the lesser-known characteristics of each version of DOS—both the bad and the good ones. With this purpose in mind, let's look at the latest DOS.

DOS 3.0 is 50 percent larger than its predecessors. The resident part of DOS—that is, two hidden files on the DOS disk named *IBMBIO.COM* and *IBMDOS.COM*—is 15K, or 70 percent bigger; when I add in the command interpreter, *COMMAND.COM*, I get another 5K increase, for a total of 20K, which is a 50 percent increase over the three program files that make up the core of DOS 3.0. Thus DOS 3.0 eats up 20K more memory than DOS 2.1. If your PC is loaded with memory, that's small potatoes, but if you don't have at least 128K RAM, then DOS 3.0 is not for you.

Now, let me mention two resident programs, *PRINT* and *SHARE*, that you can install into DOS. *PRINT* came with the introduction of DOS 2.0, while *SHARE* is new to DOS 3.0. To install them, you simply invoke them, but unlike most programs, these two load into memory and

then stay there to do their work while you perform other tasks with the computer. Each program occupies 5K RAM when loaded, so keep that in mind when you are determining how much memory you



Peter Norton

need for your operating system.

How much memory can be eaten up with the operating system and its extensions? Let's look at my system as an example. Giving DOS 3.0 32 disk buffers (with *CONFIG.SYS*), running it with *SHARE* (without *PRINT* or *VDISK*), and using two popular resident programs—*ProKey* (default size) and *SideKick* (without the notepad)—I've eaten up a cool 100K RAM.

In the past, everything in DOS had a version number to match the OS. No

more. For example, the *LINK* program has a version number of 2.2, but it was introduced with Version 2 of the IBM Pascal compiler. *DEBUG* and *EXE2BIN* are each marked as Version 2.4, but I think that 4 is just a Microsoft reference rather than IBM's official version number. Other stuff, such as *BASIC*, has the 3.0 version number, just as expected.

No More Dots

A wonderful, undocumented feature of batch files that has evolved into widespread use is "dot comments." Of course, *REM* is the officially approved way of putting comments in a batch file, but, as I learned from Andy Fluegelman, the use of a period, instead of the keyword *REM*, worked as a better type of batch-file comment. First, the dots are nicer and less obtrusive on screen than the *REMs*. And more importantly, DOS doesn't insert blank lines between successive dot comments as it does for *REMs*, making possible neatly formatted comments on the screen.

Although undocumented and unannounced, dot comments have been a feature of DOS Versions 1.0 through 2.1. Now, they are gone. All those who use dot comments will now find that DOS objects to the dots with the remark "Bad command or file name."

Another feature of DOS 2.0 that has



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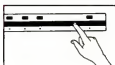
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disappeared in DOS 3.0 is SWITCHAR control. As you know, DOS uses the slash character (/) for "switches" or program options and the reverse slash (\) for specifying directories in file paths. However, the UNIX operating system—which DOS is evolving toward—uses a hyphen (-) to identify switches and the slash (/) for directories. A little-known feature of DOS 2.0 allows you to change the standard character for switches from a reverse slash (\) to any other character by redefining it with SWITCHAR in your CONFIG.SYS file.

DOS will report what the switch character is to any program that asks because it's the program's job, not DOS's, to make sense out of the command line that follows a program name—and that includes making the distinction between program parameters and program switches. Some programs do things right: They ask DOS what the switch character is and act accordingly. Others always assume it's a slash, which is the DOS convention; and a few, such as the Mark Williams C compiler, assume that it's a hyphen, the UNIX convention.

Anyway, you could control the switch character in DOS 2.0, but you can't in DOS 3.0. Maybe it's a good change. After all, switch characters ought to be standard, and, by taking away the option, DOS is enforcing its own standard.

Gains and Losses

In DOS 2.0, the switch character was controlled in a parameter of the CONFIG.SYS file. By looking into what DOS 2.0 and DOS 3.0 will check for in the CONFIG.SYS file, I've discovered several additions and deletions in the transition from DOS 2.1 to 3.0. Lost are SWITCHAR, which I've already mentioned, and AVAILDEV. Gained are STRING, FCBS, LASTDRIVE, and COUNTRY. Like BUFFERS and FILES, FCBS and LASTDRIVE let you control how much memory DOS eats up for some tables. For most of us, that's inconsequential, but it does help if you are

fine-tuning your memory use. COUNTRY, of course, controls the country-dependent items, such as date format, number punctuation, and currency symbol. If you want details, see the SELECT command or DOS function call 38.

Two New Commands

Two new commands are LABEL and ATTRIB, both of which make obsolete small parts of my *Norton Utilities*. It's good news when DOS eliminates the usefulness of some of my programs, instead of creating the need for more.

Now for the good news and the bad news about LABEL and ATTRIB. The good news on LABEL is that it works on any disk, including hard disks. The bad news is that LABEL will claim that some disks can't accommodate a volume ID label when they actually can. The good news on ATTRIB is that it lets you control the read-only attribute, which protects files against being changed or deleted. We've needed this ability from the first introduction of the read-only attribute with DOS 2.0. The bad news is that ATTRIB won't let you change the archive attribute. Archive is used to tell the BACKUP program which files have been changed since the last backup copy. This archive attribute is a key to the successful support of a hard disk. The concept is to cut the time-consuming task of continually making complete copies of your hard disk. Now, you make a complete copy only every so often, and in between, you make incremental backups of the files that have been changed.

DOS Misses the Ball

Whenever you create or change a file, DOS sets the archive bit, letting BACKUP know that the file has been changed when you ask for an incremental backup. That's all very good, but you need to have some manual control over the archive attribute so you can control things to force a backup of files when you want it (even if they haven't been changed) or avoid a backup of files that don't matter.

Therefore, the ATTRIB program ought to let us control the archive attribute as well as the read-only attribute. Unfortunately, it doesn't. However, *The Norton Utilities* let you control the archive

The system I'm
writing this on
has three drives.
But DOS 3.0
claims I have five.

attribute on floppy disks, and the next edition will support it for any disk. Whenever DOS misses the ball, I try to run with it.

There are a number of other idiosyncrasies that I've found in DOS. One is that when a program starts up, DOS reports a number of important things to it, such as how much memory can be used, placing the information in a program header known as the PSP. Surprise: DOS 3.0 reports it differently than DOS 2.0. As near as I can tell, DOS 3.0 does it right and DOS 2.0 does it wrong—in a way that could cause a program's stack to be clobbered and crash. Any program that relied on DOS 2.0's way of reporting this could be in for trouble.

Another area of interest is the DOS service that reports on the number of disk drives. Smart programs use this information to learn what's what. Unfortunately, DOS 3.0 reports the wrong number. For example, the system I'm writing this on has three drives, A: through C:. But DOS 3.0 claims I have five drives, A: through E:. I can't use the spurious drives, of course, but DOS claims I have them. If you're using *Framework* with DOS 3.0, you'll see frames for drives A: through E.; anything that appears after your last true drive is just DOS nonsense.

There is more to tell of the oddities of DOS 3.0, but what you've seen so far will give you a taste of what's there. ■

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One way to cover your tail: On a hard disk system, you could set up a menu item to format diskettes on drive A; and require an authorization code so that the format menu item could not be altered without credentials. You could also require a password in order to execute that format menu item. You could then lock the format program so that it could not be used directly with DOS; users would have to go through SysteMate to format diskettes. With that implementation, it would be virtually impossible to format your hard disk, unless you unlock the format program. Other similar errors or problems can be prevented by using these SysteMate techniques and methodologies.

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PROJECT MANAGEMENT WITH THE PC

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Anyone who has watched a NASA space launch has observed the intricate scheduling of tasks, built-in checkpoints, and coordination that is necessary for an effort of that magnitude. To accomplish such a massive undertaking requires not only great technological skill but also great management skill. In fact, most of the techniques used by project managers today had their ori-







gins in military and space programs.

Formerly, project managers who sought computerized assistance for scheduling and carrying out their tasks had no option other than to use mainframes and minicomputers. Now, however, project management software is becoming widely available for the PC. To help you determine whether you should use a formal automated tool to manage your projects, we have prepared a checklist of questions you can answer quickly (see sidebar, "Do You Need Project Management Software?"). If you check more than two boxes you should consider using a project management system; if you check five or more, you probably need this software. Almost everyone at some time has managed a project and has had to plan, schedule, and then direct or control the work of others so that they achieved specific objectives. If you're one of those people, you probably already realize how important a project management tool can be.

PLANNING YOUR WORK

Most of us have heard the old adage "plan your work and work your plan," but exactly how do you plan your work?

Do you make a "to do" list? Do you draw up a list for each person with target dates for the completion of each task? Do you draw a Gantt chart (see sidebar, "A Project Management Glossary") of tasks against time to show task schedules and project milestones? Do you use PERT charts, and, if so, how often do you update them and how long does it take you? You're probably beginning to get the idea: A computer can perform many of the mechanics of looking up calendar dates, drawing charts, summing up budget amounts, and determining a critical path.

Until recently, project management was either a time-consuming manual task or the domain of those with access to mainframe computers that supported comprehensive (and often complex) software products. When the personal computer arrived, it wasn't too long before elements of project management appeared. While you were mastering a spreadsheet program, a word processor, and maybe a database program, project management on a personal computer was still in its infancy. Software designed for this purpose lacked sophistication, and many critics

rejected them outright as trivial attempts at creating complicated software.

But recently project management software has matured to a point that could cause a market explosion. The next NASA launch may not be managed on an IBM PC, but the sophistication of these products should give you an incentive to try your hand at improving the management of what you do.

Before you jump at the opportunity, however, you should reflect on your needs and your personality. Most people find that either they're terrible planners and organizers or they're much better than average. The tendency of super planners is to outline projects in excruciating detail. The less energetic planner tends to gloss over the details and then sum them together as macro tasks. In either case, you need to accommodate your style to have a successful undertaking with this software.

What next? The casual observer might go into his or her local computer store, ask about project management software, and perhaps find a couple of representative products for the PC. But how many products are there competing in this marketplace, and which ones will best suit your needs?

The survey we completed for this article turned up 35 DOS-compatible project management software packages. You may be surprised by this number, thinking as we did that there were only about 10 to 15 products in this category. To evaluate so many products was a major undertaking that required many independent reviewers. Our role at Touche Ross was to classify the products according to level, set up the test methodology used by the reviewers, and construct the table of results. We did inspect the software and its documentation, but we did not evaluate any of the



Illustration: Jeffrey Smith



products ourselves, nor did we edit the opinions expressed by the reviewers.

Before setting up the evaluation criteria we set some ground rules and screened the packages. All of the products are commercially available in the form that they were submitted to us. (We did accept versions with draft documentation, as long as the product itself was in final form.) Second, all of the products run on the IBM PC or PC-XT under DOS 2.1. While many users run their machines under other operating systems, most people have DOS available for their IBMs and compatible computers. We used Version 2.1 because this is the only version that IBM currently distributes.

We then categorized the products into three levels: project planning software, project planning and control software, and full-featured project management software. To understand the distinctions and why they may be important to you requires some explanation.

WORKING YOUR PLAN

Project management is a discipline that allows management of a nonrepetitive, goal-oriented environment. Its three major elements are planning, scheduling, and controlling. After a job (project) is requested, the project manager's first duty is to plan, that is, to identify the work necessary to complete the request and the types and quantity of resources that will be required.

To make a realistic plan, real-world constraints on staffing, budget, and resources must be imposed. This is the first area in which many software products are lacking. The simpler products do not allow any constraints to be placed on the project plan—they assume unlimited resources and time. With these products, the

DO YOU NEED PROJECT MANAGEMENT SOFTWARE?

If five or more of these conditions apply to the projects you manage, you probably do.

LONG PROJECTS:

- Number of tasks greater than 25
- Number of work days greater than 75
- Number of elapsed days greater than 60
- Budget greater than \$25,000
- 3 or more workers
- 2 or more resource types (people, machinery, and the like)

COMPLEX PROJECTS:

- Complex task-dependency structure
- Work depends on delivery of equipment or other resources
- Many milestones that need to be reported on
- Two or more project locations
- Two or more organizations participating
- Multiple related projects with interdependencies on tasks/resources
- Need to optimize projects—for example, resource leveling

SPECIAL ANALYSIS NEEDED:

- Reports sequenced in various ways—for example, by date, by resource, by responsibility
- Graphics—for example, Gantt, PERT, histograms, manpower loading charts
- Special reports—cash flow projections, network analyses, project master plans, assignment work plans, and so on
- Need to understand critical path and who has assignments on critical path
- "What if" calculations to determine exposures and balance resources between two or more projects and to determine the effect of adding or deleting personnel on the project

FREQUENT UPDATES/STATUS NEEDED:

- Weekly updates
- Status reports/redrawn PERT or Gantt charts
- Spontaneous questions on status of any task, milestone, resource
- Desire more control over scheduling and cost control



A PROJECT MANAGEMENT GLOSSARY

So you've put activities from the assignment work plan into a Gantt chart, only to discover that there's too much float. But what does it all mean?

Activity: One of the subunits of work that comprise a task. For example, staking out and digging are two activities in the larger task of laying a house's foundation.

Assignment work plan: Represents the work assignment of an individual and provides an understanding of the person's responsibilities and role in fulfilling an activity or task.

Critical path: That series of tasks or activities that, if delayed, will be the first to cause the delay of the project; the path that leads to the project end task with a minimum of accumulated slack time.

Critical path method (CPM): A project scheduling method based on the assessment of time required to complete activities on the critical path.

Dependent task: A task that cannot begin until one or more previous tasks are complete; for example, the walls of a house must be erected before the roof is put on.

Dummy activity: An activity used to account for nonwork/nonbillable portions of a project; for example, waiting time for materials to be delivered.

Early finish date: The earliest possible date a task or activity can be completed without interfering with the completion of any preceding activities.

Early start date: The earliest possible date a task or activity can begin; it often gives rise to slack time at the end of the previous activity.

Event: Also called "node" or "milestone," an event has no time frame associated with it, but typically serves to mark the start or end of activities and to relate activities to each other.

Float: The amount of time following the completion of a task or activity but prior to the start of the next dependent task or activity (or project end if there are no dependent tasks/activities).

Gantt chart: Named after its developer, Henry Gantt, a time-based bar, line, or arrow chart depicting start and end points of activities or tasks; the interrelationships/dependencies of activities are *not* shown.

Manpower loading chart: A histogram showing the allocation of labor by time period.

Milestone: See *Event*.

Network: The structure of relationships among a project's activities, tasks, and events.

Network analysis: A listing of the components of a project network, with their start/end dates, float, and dependencies.

PERT (Project Evaluation and Review Technique): A planning and control tool that identifies the interdependencies of project elements and attempts to determine the time needed to complete each in terms of pessimistic, optimistic, and best-guess estimates.

PERT chart: A diagram representing the interdependencies of work elements

against time, typically shown graphically as circles and connecting lines.

Progress reporting: Input of actual time, resource utilization, and task/activity completions; similar to time and expense reporting.

Project: An undertaking, having a definite objective and specific start and completion points, that is the composite of tasks and activities set up in a logical order to achieve the objective; for example, building a house.

Project control: The third phase of the project management cycle; it compares actual performance with the planned schedule and implements corrective measures to avoid project completion delays.

Project library: A database of projects, tasks, and activities that can be modified and applied when planning new projects.

Project plan: The first phase of the project management cycle, involving development and organization of the work plan.

Project schedule: The second phase of the project management cycle, detailing start and completion times for each task and activity.

Resource: Includes manpower, materials, equipment, and any other costed item utilized in completing a project.

Resource allocation: The assignment of resources needed to complete each task or activity.



Resource leveling: The scheduling of activities with float time to optimize the use of resources, thereby avoiding large fluctuations in resource requirements; see *S-curve*.

S-curve: A curve plotting manpower versus time, which is used to smooth out resource allocation—the goal is to develop a gradual build-up and subsequent cutback of manpower by rearranging resources utilized for activities with slack time.

Scheduling unit: The particular time period(s) in which a project is planned—hours, days, weeks, quarters, years, and so on.

Slack time: See *Float*.

Status report: An analysis of actual project costs and time expended against the plan, with variances calculated and displayed.

Subcontract: See *Assignment work plan*.

Task: A discrete element of a project, consisting of activities; for example, laying the foundation and landscaping are two separate tasks in the project of building a house.

Work breakdown structure (WBS): A comprehensive, hierarchical listing of the work elements and dependencies required to complete a given project; a useful tool for the project planner, serving as a predefinition to speed up the planning process.

Work package: See *Assignment work plan*.

planner is often forced to redo the plan many times until it fits the reality of the situation.

More sophisticated products not only allow resource and time constraints, but they also aim to build up staffing gradually at the beginning of the project and reduce staffing gradually at the end. This smoothing process tries to achieve what is called an *S-curve* and makes the project much easier to staff and manage. Such products often allow staffing and task dependencies across several projects as well as constraints on a single resource pool serving an organization.

Additional help is given when the product scans the task network for large accumulations of slack time in the hope that a reorganization of the network can alleviate having to bring staff off and then back on to the project. Once staff are removed from a project, it is often risky to assume that you can get them back as soon as you need them. Second, the reorientation necessary is seldom planned and invariably causes schedule and budget slippages.

The project manager's answer to the requestor generally consists of two parts—budget and schedule—justified by a listing of the tasks and resources required. This answer, sometimes called a *project master plan*, forms the basis for a work contract or project authorization. Every project management package lists the tasks and resources that are required to complete the project, but the most helpful ones present this information in a format that can be given directly to the requestor. The ability to draw project diagrams such as Gantt charts, PERT diagrams, manpower loading charts, and funding charts also helps the project manager and the requestor to understand the magnitude and complexity of the work effort.

The planning process doesn't stop there, however. Once authorization is given to go ahead with the project (this may take several iterations of the first pass of planning), the planner begins the difficult task of preparing work assignments for the project team members assigned to the first phase. This is best accomplished when the team members themselves work with the original planner using a similar planning methodology. The reason for involving team members in the planning process is twofold. First, you can gain their commitment on work estimates by involving them in the estimating process. Second, and just as important, it is an excellent way to make sure they understand the job they are about to tackle.

Next, the combined effect of the individual work plans must be contrasted with the original project master plan. Updating the project master plan must continue until the planner, the requestor, and the assigned workers agree on a work definition, schedule, and budget. Project management software varies in its ability to help accomplish this step. Most products can't freeze the original agreement between the planner and requestor and won't take it into account in subsequent reports. This is especially true of microcomputer software.

The products that we have included in Level 1 (project planning software) offer some or all of the planning facilities just described. All of them are useful in taking a first look at the requirements for a project and in sizing up the work effort needed to come up with a project master plan. The more-sophisticated products in this group allow individual work assignments to be planned as well. The 12 reviews that appear in this issue and the 12 that will appear in the next issue cover the 24 prod-



THE LEMON PROJECT

In this series of reviews, the authors' mission was to manage the development and introduction of the Lemon I personal computer.

The project management software reviews in this series are based on a hypothetical project that the authors "managed" with the software they reviewed. It began:

"As president of the newly formed Lemon Computer Company, you have decided to plan the introduction of your first product, the Lemon I, with a project management software package. The product will be a truly innovative portable personal computer, 100 percent compatible with the IBM Personal Computer. It will feature two full-page (66-line) flat-panel displays; a monochrome display for text and a color display for either graphics, a second page of text, or a horizontal continuation of the left screen for a total of 160 columns. All of these components will be integrated in a luxurious leather attaché case, with the displays mounted in the lid. With the lift-out, full-featured keyboard, 1 megabyte bubble memory, and a side-mounted, high-den-

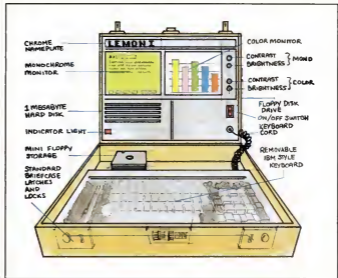
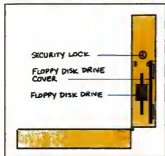
sity minifloppy, your product should be a hit.

The team members involved in your project will include the following ten individuals, code named A, B, D, E, F, G, L, M, N and Q."

Each author received a list of 84 tasks that covered all phases of the project and a PERT chart showing task dependencies. The list of tasks included such

assignments as building a model for the Lemon I, estimating costs, selecting advertising copy, ordering raw materials for manufacturing, shipping the product to distributors, and introducing the product. For each task, the list also included the start date, the number of work days needed to complete the task, and which team member was responsible for accomplishing it. —K.H.

We challenged project management software by applying it to a case study: the production of a hypothetical, if ridiculous, Lemon I computer. The machine never materialized, but how did each program bear up?





ucts that fall into Level I.

The next step in project management is to control the work effort and to report the progress made to management, to the requestor, and to the project team. Work estimates for assignments have been agreed upon, and a way of recording time must be adopted to make progress reports on the assignment work plans. Most importantly, forecasts of the time remaining for each active task must be relayed by the team member so that accurate status information can be generated.

All of the Level II (project planning and control) software packages can do some kind of progress reporting against the work plan and can generate status reports showing plan versus actual results. We were able to obtain nine packages in this class; reviews of them will appear in the third article in this series.

An invaluable tool to a project manager is the ability to monitor the status of a project with a series of project control reports that compare actual performance with the planned schedule. Very often this task is performed manually and consequently is error-prone and consumes a great deal of time. This is especially true if you need to redraw complex charts or prepare a series of reports. The reports should include an updated network analysis for the project manager, status reports for the team members and manager, and project summary reports for the department manager and the requestor.

When many projects compete for the same resources, a higher level of support is needed for successful management.

Level III (project management) software allows for the coordination of several projects that share resources. This type of software is generally beyond the needs of the single user, but it may in fact be

required in complex multiproject situations. We found two products that address the requirements of a project environment. One product works in conjunction with a mainframe-based package while the other uses the subproject concept.

Level III software not only addresses the needs of a multiproject environment but typically also provides an increased level of support for individual projects. One example of this is the archiving of a series of work breakdown structures (WBS). A work breakdown structure is a multilevel or hierarchical listing of tasks to accomplish a specific goal—new product development, for example. In its most complete implementation it also includes dependencies between work elements as well as guidelines for estimating them. When a WBS library is tied to interactive project planning software, the planner is prompted through the plan and is therefore freed from typing descriptions of all the common tasks. The WBS becomes the plan's foundation and the driving force behind the planning mode. An analogy to this capability is the spreadsheet template, many of which are marketed for common worksheet use—for predefined financial statements, for example.

Another example of support for individual projects is the project library. Using the analogy of the electronic worksheet, this would be like having a library of completed spreadsheets as opposed to generic worksheet templates. This is useful to the planner who is tackling several similar projects or emulating a project previously planned.

Another area where more sophisticated software can achieve payback is in progress reporting to the project control module. The typical time and expense form could be an output for our signature

**AN INVALUABLE TOOL
TO A PROJECT
MANAGER IS THE ABILITY
TO MONITOR A
PROJECT WITH A SERIES
OF PROJECT CONTROL
REPORTS THAT COMPARE
ACTUAL PERFORMANCE
WITH THE PLANNED
SCHEDULE.**

rather than a redundant input that needs to be reconciled with our project progress reporting. Sophisticated project management software can also capture individual forecasts by project team members and calculate updated networks with these forecasts. This is the real-time project control that a manager needs in order to manage a project in progress rather than playing Monday morning quarterback after the results are in.

Software evaluations are very difficult to do. When considering which product is most likely to satisfy your needs at a cost you are willing to pay, take a look at the chart accompanying this article. Bear in mind the fact that this article will appear in three parts and that you should consider all of the Level I, II, and III packages before you make a decision on which product you are willing to try. ■

Ken Edwards, CMC, is a manager with the Executive Office of Touche Ross & Co. He has 15 years of consulting experience and is currently in charge of the firm's microcomputer support center.



CPM/PERT: A GOOD INTRODUCTION



CPM/PERT, Version 2.0

Elite Software Development, Inc.

P.O. Box 1194

Bryan, TX 77806

(409) 775-1782

List Price: \$249

Requires: 128K RAM, one disk drive.

CIRCLE 752 ON READER SERVICE CARD

The *Critical Path Method and Job Scheduling Program*, or *CPM/PERT*, from Elite Software Development, Inc., of Bryan, Texas, is a simple and easy-to-use project management tool. Although it lacks some of the advanced project planning techniques and reports available on more costly products, it's well suited to introducing beginners to the intricacies of project management.

To install *CPM/PERT*, the user must include IBM's ANSISYS driver in the CONFIG.SYS file, which requires DOS 2.x. The program provides an appropriate CONFIG.SYS and ANSI driver, but the documentation does not discuss including the ANSI driver in an existing CONFIG.SYS. This common problem could confuse naive users with hard disk drivers or other necessary hardware drivers installed on their systems. Once the CONFIG.SYS is set, however, you merely copy the distribution disk onto your hard or floppy disk. The program is not copy protected and installation time is essentially nil.

DOCUMENTATION

The documentation covers all versions of *CPM/PERT* and includes instructions for CP/M and TRS-80 computers, as well as for the PC. The program comes without a disk tutorial, but the manual offers sam-

ples of typical interactions, and the disk provides a short sample data file. This proved straightforward, and I ran through it in less than half an hour.

I examined preliminary documentation, which was missing some example reports and screens. The manual I saw consisted of word processor output photocopied onto full-size pages. It appears that the manual's final form will be something similar. Like the program, the manual seemed well-written, clear, and easy to understand. Its explanation of the concepts behind CPM and PERT will give even newcomers to project planning enough insight into the process to quickly start creating usable planning output. Even though the manual skips around a bit, a good table of contents and index make it easy to find the information you're looking for.

OPERATION

Program operation is straightforward. When first invoked, *CPM/PERT* determines available memory and advises the user how many variables can be handled. On a PC with at least 128K RAM, *CPM/PERT* can manage 600 variables, enough for even sizable projects. Unfortunately, the program checks with the user to make sure the clear-screen code is correctly installed. While this is necessary on a CP/M system, which may use a wide variety of terminals, it's redundant on a PC. The program also prompts for the date as a character string (for example, October 30, 1984), but it's easier to just pull the system date from the computer.

A simple master menu controls program operation. Option 1 allows setting the title of the project, the project coordinator's name, and other general data relevant to the overall project. The next step involves defining a holiday schedule (Op-



the other offending activities, the program moved on.

REPORT OPTIONS

Menu Option 4 displays or prints a report summarizing the input data. The report is the same whether CPM or PERT has been chosen; the CPM output merely shows the same time duration for Optimum, Likely, and Pessimistic forecasts. Option 5 generates the various available reports, including a Critical Path Report, Holiday and Calendar Reports, and an Activity Cost Report. These reports are legible, detailed, and easy to understand.

CPM/PERT produces Gantt charts on any standard printer, but graphics and plotting are not supported. A submenu allows the user to specify the character symbols for the critical path, slack time, date breaks, and so on. Much like spreadsheet programs, *CPM/PERT* segments large charts onto multiple pages that you can paste together to create one, long, unified exhibit. The program's Gantt charts are well done, although I find plotter output superior for elegance and readability. The sorting and calculations required by *PC's* model took *CPM/PERT* 2 minutes and 9 seconds to perform. The system must do these calculations each time it produces a chart, since it cannot store the results of its calculations.

SUMMING UP

CPM/PERT operates smoothly and easily within its limitations. Obviously a converted CP/M program, it lacks "polish" in the PC environment and fails to use any of the PC's hardware capabilities. It simply does not speak the PC's language like a native. Nonetheless, what it does do, it does well. —Glenn Hart

DATA*EASY PROJECT MANAGEMENT: NO FRILLS



*Data*Easy Project Management, Version 1.2*

Data Consulting Group
12 Skylark Dr., #18
Larkspur, CA 94939
(415) 927-0990

List Price: \$50

Requires: 64K RAM, 80-column
printer.

CIRCLE 749 ON READER SERVICE CARD

The *Data*Easy Project Management* program is a chopstick trying to masquerade as a baseball bat. It claims to be a full-function project manager, but it just doesn't make it in the big leagues.

*Data*Easy* is a bare-bones, no-frills program that can handle a project of up to seven tasks and up to 99 weeks long. Only 10 weeks of the project can be graphed on-screen in a Gantt chart, however, and if you want a chart showing more than seven tasks, you must assemble it by screen-dumping several graphs onto a dot matrix printer and then pasting the hard copies together.

Unfortunately, *Data*Easy* has other graphics-related limitations. For example, it can't calculate or show pictorially what tasks relate to or depend on other tasks. Nor can it so indicate holidays or financial limitations. The limitations make it questionable whether *Data*Easy* is a useful program for anyone except managers of the simplest projects—in which case, they might find a felt-tip pen and a stack of graph paper adequate.

Installation is straightforward, although it may appear complicated since the 16-page introduction/installation sec-

tion of the manual is a generic document for all 24 programs in the Data*Easy family. The process, in fact, should take about 5 minutes, but PC-XT users may need 10 to 15 minutes because of the confusing instructions. I suggest that anywhere the instructions and your common sense head in opposite directions, you should probably trust your instincts. For instance, the instructions say XT users should copy the original disk from the A: drive to the B: drive. Your instincts would tell you that it should be to the C: drive. The AUTOEXEC.BAT file should be modified to include ASSIGN A=C to redirect the program's tendency to look for everything on the A: drive.

To install Data*Easy, you have to format a blank disk, add DOS, BASICA (or GWBASIC), and MODE.COM, then copy everything from the original diskette onto the working diskette. PC users running GWBASIC must also substitute a special AUTOEXEC.BAT file. A cryptic message advises DOS 2.0/2.1 users to set the CONFIG.SYS file to FILES=13 to allow that many files to be open at once.

Moreover, there is no tutorial or sample data. For such a simple program, a tutorial might be overkill, but a sample project included on disk and referred to in the manual would ease the get-acquainted period.

Data*Easy comes in a peach-colored IBM-size binder, which is common to the Data*Easy family. Inside there are the 16

● The Data*Easy Gantt chart allows the user to input proposed as well as previously planned tasks. It illustrates comparisons and shows the person responsible for a particular task in the project.

introductory pages, 1 page of information about the current version, and then 10 pages of operating instructions run off on a dot matrix printer. There is no index. Only the introduction has a table of contents. Even by the decidedly mediocre standards of microcomputer documentation, this manual suffers from lapses in grammar and punctuation.

CASE STUDY

Learning to use Data*Easy is a process of trial and error. It took me 3 hours to analyze and duplicate the case study of the mythical Lemon 1 project. And all I had to show for my work were two printouts listing the 84 tasks and their status (sorted in no useful order) and a bunch of Gantt chart segments. That's the extent of Data*Easy's capabilities.

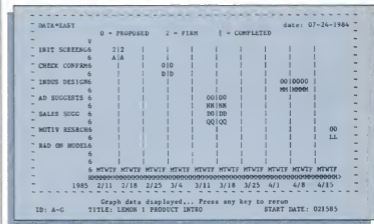
The program offers 12 options on its main menu. Options 1 through 5 are mostly housekeeping. Option 1 sets the time and date. Options 2 and 3 initialize the BASIC files that will hold the framework

of your information (the definitions file) and the actual data (the data file). Option 4 deletes a set of data. Option 5 edits the "control file," which contains the system

GRAPHICS-RELATED LIMITATIONS MAKE IT QUESTIONABLE WHETHER DATA*EASY IS A USEFUL PROGRAM FOR ANYONE EXCEPT MANAGERS OF THE SIMPLEST PROJECT.

date and the user's name.

Options 6 and 7 are for data entry. Ideally, the two steps should be one. Option 6 establishes the outlines of projects, giving each a cryptic five-character ID, which you must remember when you get to Option 7; a 32-character project title, which appears on the reports; and a project start date, which is a six-digit number



FOR SUCH A SIMPLE PROGRAM, A TUTORIAL MIGHT BE OVERKILL, BUT A SAMPLE PROJECT IN THE MANUAL WOULD EASE THE GET-ACQUAINTED PERIOD.

without slashes separating days, months, and years. The date is window dressing; no calculations are performed with it. Each project can have seven tasks, identified by 12-character labels.

If your project has dozens of tasks like the Lemon I project, it has to be broken into seven-task segments. Once the projects and tasks have been named, the user goes to Option 7 to enter information about the project. Each project is recalled from disk by its five-character title; each of the seven tasks associated with each project is identified as 1, 2, 3, 4, 5, 6, or 7. The user can give each task start and end points (in weeks and days) over a 99-week span, define it as preliminary, firm, or complete, and add a one-character code, which could be used to identify the person responsible for the project or to indicate the project's priority. You can't enter specific dates, only weeks and days from the first full week of the year. For example, Monday, January 14, 1985, is entered as week 2, day 1 of year 85.

Because it may be hard to remember the cryptic project IDs and which tasks go with which projects, Options 8 through 10 allow printouts of the control file, the project definitions, and the data file. The lists are supposedly rerouted to the screen if no printer is connected, but that didn't happen during my test. After 30 seconds

of "nothingness," the program resumed.

Options 10 and 11 graph the projects on-screen, using the PC's monochrome graphics set, and show 10 Monday through Friday weeks or 7 Monday through Sunday weeks. The user selects a project to graph by entering the project ID, the starting and ending weeks, and the year.

The screen displays a Gantt chart—the only type of chart the program has—for one project and its seven tasks. To the left of each row is the 12-character task name. At the bottom of the screen is the mm/dd date of each Monday in the chart, the project name, and the project start date. Proposed, firm, and completed tasks are represented by light, medium, or solid bars. Under each bar is the single-character code the user enters to represent the person responsible or the task's priority. Graphs take only a few seconds to display, since there's no sorting or rearranging done. The chart is printed by pressing the Shift-PrtSc keys.

*Data*Easy* had trouble charting projects that spilled over from late one year to early the next, even though it claims a 99-week project cycle for any year from 1980 to 1999. Occasionally it stopped running altogether, but without locking up the system. By typing RUN, I was often able to get things back on track.

Deleting a task doesn't shift other tasks; it just leaves a blank in the chart. And, what's worse, adding a last-minute task requires deleting another one or starting a new project file.

SPECIAL FEATURES

*Data*Easy* has only two special features worthy of note: it runs on a hard disk

with no hitches (after you reassign drive A: to drive C:), and it does a nice job of generating graphics on the PC's monochrome screen using the extended PC character set. There's no need to buy a color monitor and graphics board. Even with a color monitor, everything comes out black and white.

The program stands alone; it can't take data from another program or output it to a third program.

Data Consulting Group specializes in low-cost programs written in BASIC and assembly language. The company says *Data*Easy* is aimed at the first-time project management software user who has fairly simple needs and isn't interested in charting the financial aspects of the project. It has no intention of competing with sophisticated project managers, a spokesman says.

The software does work, but it is cumbersome and limited. Furthermore, the documentation is skimpy, though, admittedly, there's not much to document. For \$50, *Data*Easy* does a passable job of generating little Gantt charts.

Will *Data*Easy* make you a better manager, help you understand the project better, or get the project done faster or more efficiently? Not likely—especially if you're playing in the big leagues.

—William K. Howard

THE SOFTWARE WORKS,
BUT IT IS CUMBERSOME
AND LIMITED. THE
DOCUMENTATION IS
SKIMPY, BUT THEN
THERE'S NOT MUCH TO
DOCUMENT.



DEMI-PLAN: ECONOMY EXACTS A PRICE

PC SOFTWARE

Demi-Plan, Version 3.1

Demi-Software
62 Nursery Rd.
Ridgefield, CT 06877
(203) 431-0864
List Price: \$49.95

Requires: 128K RAM, one disk drive.

CIRCLE 792 ON READER SERVICE CARD

D*emi-Plan* could be regarded as a budget-priced door opener to electronics project management. The system determines critical paths, computes slack times, and prints Gantt charts—all for the incredible price of only \$49.95.

On the other hand, if you're spending over \$3,000 on PC hardware to schedule long, complex projects, do you really think a \$50 management tool will cut the mustard? In the case of *Demi-Plan*, the unequivocal answer is no.

DIME-STORE QUALITY

Demi-Plan delivers economy, but it's the type most users will prefer to forgo. Using it is like substituting a dime-store telescope for a navigational sextant. Although you might eventually reach your destination, the grief and aggravation expended offset the initial savings.

Demi-Plan's problems begin with installation. The user's manual instructs you to copy one file from the distribution disk to a blank, formatted disk. Then you invoke the program by typing DEMI-PLAN. As simple as this procedure is, it's wrong because there are two files that must be copied. While experienced PC users may resolve the oversight quickly, novices will be stymied.

For documentation, the vendor sup-

plies nine scant pages describing the program's seven menu functions. The function descriptions range from several paragraphs to two sentences, excluding the terminate function, which is left out completely.

From one perspective, the documentation could be construed as adequate because of the banal simplicity of the program; there are no function keys to learn or fancy editing of keyboard entries. If you make a mistake while entering one of the six fields composing a task description, the program imposes a simple solution—re-enter all six fields.

A SNAIL'S PACE

Demi-Plan's annoying get-it-all-right-or-do-it-over mode of data entry slows input time to a snail's pace. I spent 2 hours

USING DEMI-PLAN IS
LIKE SUBSTITUTING A
DIME-STORE TELESCOPE
FOR A NAVIGATIONAL
SEXTANT. ALTHOUGH
YOU MIGHT EVENTUALLY
REACH YOUR
DESTINATION, THE
AGGRAVATION OFFSETS
THE INITIAL SAVINGS.

entering the 84 tasks for the case study, about twice as long as a system with a screen-oriented editor.

The method of handling dates also retards the input process. The program uses no dates per se. Start times are expressed as numbers of days relative to the project's commencement. If the project begins on February 15, 1985, then

PROJECT-START-DATE 07/30/84	APR 19 85	MAY 3 85	MAY 17 85	MAY 31 85	JUN 14 85	JUN 28 85
SCALE=DAY	190	200	210	220	230	240
**** T A S K ****						
initial screening						
check prot conform						
industrial design						
motivation res.						
research & dev.						
advertising sugg.						
sales sugg.						
build crude model						
estimate manuf.					CCCCCCCCCC	
executive reactions						
estimate market						
estimate comp. beh.						
estimate mark. pot.					CCCCC	
price vs demand c.						
review manufacturing						CC
estimate distrib.						CC
estimate advert.						CC
preliminary financ.						
preliminary price						
full scale test						
consumer reactions						
check prot non v.						
complete prod. des.						
equipment for man.						
engineering lab test						
manufacture models						
buy raw materials						
sampling techniques						
preliminary adver.						
preliminary sales						
determine financial						
financial forecast						
net-up samples						
get interviewers						
market test fors]						
preliminary media						
market tests						
investigate distr.						
train-interviewers						
code & tabulate test						
evaluate test res.						
improve product						
investigate names						
establish quality						
investigate patent						
plan manufacturing						
management go-ahead						
patent application						
determine seasonal						
set advertising bud.						
evaluate media						
select name						
select sales man.						

DEMI-PLAN'S GET-IT-ALL-RIGHT-OR-DO-IT-OVER MODE OF DATA ENTRY SLOWS INPUT TIME TO A SNAIL'S PACE.

tasks beginning on February 20, 1985, and March 28, 1985, must be entered as start-days 5 and 41.

To enter tasks, you select the menu option Add, Change, or Delete Task followed by the Add suboption. The program then prompts for task data, such as a four-digit task number; 20-character task description; task duration in days; resource or responsibility code; predecessor task number (if any); and start day. Following each entry, you're catapulted back to the main menu where you must again select the Add option and suboption and start the process again. The system lacks an add continuous mode.

USER BEWARE

The program's response to a misstroke in the entry of the task number further demonstrates the system's inflexibility. The user-assigned task number is the key to accessing a task. If you mistakenly try to add a task number that has been previously added, the program notifies you accordingly and prompts for another number. There's no way to back out or abort. Once task addition mode has been selected, you're forced to add a task. Task modification and deletion follow the same unyielding pattern—changing your mind is a no-no.

● Critical tasks along the project path ("C") are identified by this Gantt chart.



During task number entry, you should beware of accidentally pressing a non-numeric key. Such a slip of the finger causes the program to issue the very informative "Redo from start" message that discloses *Demi-Plan's* programming language origins, but this information is of little value to users who are unfamiliar with BASIC.

Once you've entered the project tasks, the system offers two report formats: Gantt charts and task/resource listings. The Gantt charts can be printed on a scale of days or weeks with 4-, 5-, 6-, or 7-day workweeks. The reports can only be routed to the printer, which should be on-line before you start to print or *Demi-Plan* will turn your PC into a municipal air-raid siren. The siren can be disabled only by a Ctrl-Alt-Del reset from the keyboard or by the activation of the printer.

COUP DE GRACE

Perhaps the coup de grace of *Demi-Plan's* operational deficiencies is the menu command for saving data. First of all, *Demi-Plan* has no save command—it's a save and end command. Every time you want to save your project file on disk, you must end the program and reload it to continue. However, ending doesn't mean returning to DOS, which would be forgivable. The program inexplicably quits or dies. Your PC can be revived only through a keyboard reset.

NO FREE LUNCH

Overall, *Demi-Plan* might barely rate a passing grade in Programming 101, but as a professional tool for project management, it fails. Conventional wisdom says there is no free lunch. Don't count on *Demi-Plan* to set a precedent.

—Edward Joyce

EMPACT: LOW COST AND NO NONSENSE

PC FAME FILE

EMPACT, Version 1.0

Applied MicroSystems, Inc.

P.O. Box 832

Roswell, GA 30077

(404) 475-0832

List Price: \$149.95

Requires: 256K RAM, one disk drive.

CIRCLE 791 ON READER SERVICE CARD

EMPACT is to Gantt charts what a screen editor is to text. A Gantt chart displays the start time and the completion time for individual tasks in a complex project. *EMPACT* allows you to enter and modify these task descriptions and schedules, and though it's far from perfect, for \$149.95 it opens the door to computer-aided project management.

A simple, 5-minute installation procedure sets the stage for project scheduling with *EMPACT* (Electronic Manager of Projects, Action items, and Tasks). You copy the three files on the single distribution disk to a hard disk or to one or two floppy disks depending on your hardware configuration. The program can execute from a single disk, which is an advantage over programs requiring multiple disks that treat the disk drives like revolving doors.

Following the user manual verbatim and proceeding directly to the system tutorial leads, unfortunately, to a dead end because the program can't find its help file. A little trial-and-error exercise solves the dilemma. After all, it's hard to completely misplace a file in a system consisting of only three files. Even so, this problem does convey the flavor of the abridged documentation. Though the 30-page manual adequately explains the software (the 16 screen illustrations make a major con-

RESPONSIBILITY ORDER

DESCR.	MARCH '70					APRIL '70				
	1	2	3	4	5	1	2	3	4	5
Initial screen										
Check profit										
Executive rec										
Estimate work										
Estimate comp										
Estimate work										
Estimate dist										
Price vs dema										
Preliminary p										
Preliminary f										
Full scale te										
Determine fin										
Financial for										
Preliminary n										
Investigate d										
Market tests										
Evaluate test										
Investigate p-I										
Investigate n										
Management go										
Select name										
Patent applic										
Determine sea										
Set advertis										
Develop me										
Select sales										
Select distri										
Establish pri										
Establish pri										
Establish dist										
Determine ser										
Financial fun										
Select adver										
Select media										
Select promot										
Introduce new										
b										
Research & dev										
Improve prod										
d										
Check profit										
Review manuf										
Equipment for										
Manufacture n										
Establish qua										
Plan manufact										
e										
Hire workers										
Set up equip										
Receive raw m										
Train workers										
Full scale m										

(Chart continues)

tribution in this regard), it could stand some polishing.

DATA ENTRY

Of course, given the simplicity of the system, an inch-thick reference manual would be overkill. And the program's on-line, context-specific help screens put many operational questions to rest. After spending just 30 minutes with the user manual tutorial and a demonstration file supplied on the distribution disk, I felt confident enough to strike out on my own. I created a fresh file and entered the 84 tasks listed in the standard case-study project. That took an hour, and a more intelligent data-entry system could have considerably shortened the process.

For example, the raw case-study tasks include start dates and work days. Even though EMPACT's input template prompts you for start dates and end dates, it won't calculate end dates, requiring you to mentally add the work days to the start date to arrive at the end date.

After performing these calculations 84 times while making allowances for 28-, 30-, and 31-day months—not to mention leap years—I felt as if the Gregorian calendar had become etched on my brain. Your gray matter must also take responsibility for verifying the dates as you enter them. According to the user's manual, the program regards dates conflicting with the MM/DD/YY format as "invalid," but I found it accepted any string of characters.

My other major data entry and modification complaint involves the procedure for updating the file on disk. EMPACT

● The Gantt chart in this example has the added capability of portraying scheduled tasks versus actual tasks in relation to time.

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ON MY BRAIN.

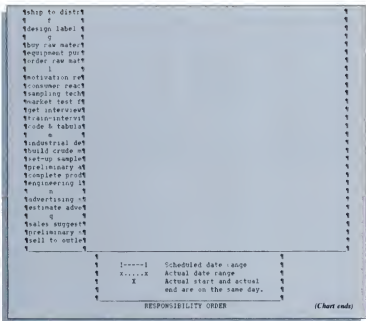
a project plan. Called, appropriately, Analysis, it shows the number and percentage of tasks completed, as well as the earliest and latest scheduled start and end dates of the entire project.

EMPACT generates reports within a few seconds, reflecting the speed of RAM buffering. You have the option of directing the report output to disk, printer, or screen. Gantt charts show up with graphics symbols both on the screen and on dot matrix or letter quality printouts.

A window that can open on any part of the report handles screen output. The arrow keys move the window horizontally and vertically. The PrtSc key prints out a screenful of data, including graphics symbols. According to the documentation, EMPACT employs an "intelligent screen-dump routine" to process the graphics symbols.

EMPACT also uses windows judiciously in its file-maintenance function. The screen can be split into three parts: data for project tasks, a calendar for a given month and year, and a menu. The project window holds up to 13 tasks; viewing others is a matter of pressing the PC's Home, End, PgUp, PgDn, or arrow keys.

The calendar is posted for reference to



buffers project/task descriptions in RAM. The program applies all additions and modifications to this RAM image of the file. The file is updated onto the disk only when you exit the program or select another project for editing. The program needs a *WordStar*-type save-and-resume command or a *Multiplan*-style transfer/save command. Exiting the program or project file to preserve your data is like developing the film in a camera after every shot to save the photo.

Worst of all, the procedure results in updating a project plan file regardless of whether you made any changes. Essentially, the system lacks a browse mode. Once you invoke the program, the project plan

is written back to disk unless you kill the program with a keyboard reset.

OPERATION

After data entry, the program produced reports without a hitch. The report menu offers seven selections, mostly variations on a boiler plate format that shows, for each activity, the description, responsibility code, schedule start and end dates, and actual start and end dates. The project plan can also be reported on Gantt charts complete with graphics symbols. The charts can be arranged according to the person responsible for them in chronological sequence.

Of these reports, only one can analyze



assist you in scheduling. You can select any month/year combination, and *EM-PACT* will instantly display that calendar. It automatically determines and highlights holidays—with the exception of Veterans Day, which the program doesn't seem to celebrate.

WISH LIST

EMPACT comes close to being a good buy. With three improvements, there'd be no question about its value. First, I'd like to see the dates handled with more finesse. I want the ability to edit them for valid characters to ensure that the start date precedes or equals the end date, and to calculate an end date given a starting date along with a specified number of days.

Second, there should be an overt command for saving a project plan on disk. The implicit save made while exiting masks the consequences of failing to save regularly. As it stands, novice computer users may be lulled into thinking that the 3 hours worth of task data they entered is safe because it's "in the computer." They'll learn otherwise after a few abrupt power interruptions.

Third, *EMPACT* needs an elegant way of browsing and exiting an update session without recording the file on disk. Since the program already seems to buffer everything in RAM, this enhancement should be a simple matter of adding an abort command to the menu.

Applied MicroSystems started distributing *EMPACT* in July, so I suspect that the company will incorporate these and other improvements before long. In the meantime, if you're searching for an easy-to-use tool, take a look at *EMPACT*. It may contain the reporting functions you need to streamline your project control and scheduling. —Edward Joyce

EX-PERT/80: A PROGRAM FOR SMALLER JOBS



EX-PERT/80, Version 4.2

Decision Support Software, Inc.

1300 Vincent Pl.
McLean, VA 22101
(703) 442-7900

List Price: \$115

Requires: 64K RAM, one disk drive,
80-column printer.

CIRCLE 750 ON READER SERVICE CARD

How sophisticated must a project management program be? The answer depends, of course, on just what you want to do with it. A tractor-trailer rig can haul lots of heavy material from place to place, but not everyone needs the capacity or the power of an 18-wheeler.

EX-PERT/80 does not have all the complex features that some programs have, but then again, at \$115, it costs one-half to one-third as much as most of its competitors. When comparing this program to others, you must keep in mind how much power you need and how much you want to pay to get it.

INSTALLATION

Originally created on a mainframe, *EX-PERT/80* was later rewritten to run on a Radio Shack TRS-80 Model I. Needless to say, this first microcomputer version ported only the bare essentials from the mainframe version. Since that humble start, other versions have been written for the TRS-80 Model III, the Apple II and IIc, and now the IBM PC.

Despite its crossbreed parentage, the IBM PC version is a plain vanilla, interpreted BASIC program. And since *EX-PERT/80* has few frills, it is fairly easy to work with. It does not require any installation procedure; just put the disk in the

drive and go. The disk I received for this review already had DOS 1.1 and BASIC on it; since the documentation made no mention of installing them, I assume that the program is published with them. It even came with an AUTOEXEC.BAT file that loaded an initial menu, making start-up that much easier.

TUTORIAL AND DOCUMENTATION

EX-PERT/80's tutorial is its documentation. It is 31 pages of typeset text printed on 8½-by-11-inch paper and stapled in the corner. After a table of contents and introduction, it steps you through a simple tutorial that illustrates every aspect of working with *EX-PERT/80*. The manual states that the tutorial should take 30 minutes. I spent somewhat less time than that, even with added time for taking notes and poking around in the program.

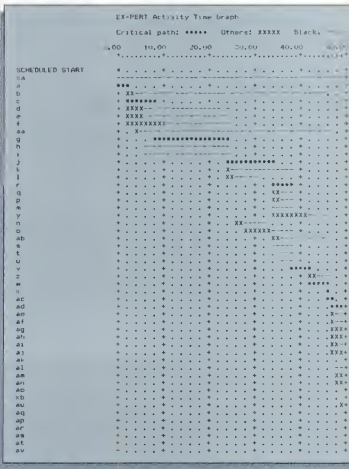
The manual/tutorial is well written, and the instructions are clear and readable. Sample reports and screen prints appear on almost every page, so it is easy to make sure that you are doing everything correctly as you go along.

Unfortunately, the manual has quite a few rough edges. Many of these apparently result from the program's many versions for different computers; the one manual serves all versions, so some features do not work as advertised. For example, the manual states that whenever you see the prompt, "Press Enter to Continue*," you may press the letter P instead to trigger a screen print. This command does not work on the IBM PC. (The manual does not mention the Shift-PrtSc key combination, which does work.)

● This time graph is a hybrid of a Gantt chart and a critical path schedule.

When I began entering data for the PC case study of the Lemon Computer Company project, some of *EX-PERT/80's* more significant limitations appeared. It would only accept a task's name, its start and end nodes, and its duration. There was

no way to specify a task's description, start date, or resource category. Since the package has no calendar function, I was unable to allow for holidays and weekends. On the other hand, *EX-PERT/80* accepts optimistic and pessimistic task



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duration estimates and quantities of a single resource required for a task.

EX-PERT/80's data-entry procedure shows the package's age and its BASIC background. You enter the task name on one line. The program then prompts you for a string of comma-separated values: start node, end node, optimistic duration, likely duration, pessimistic duration, resources required. If you miss one of these six items, you are told to "Redo from start." If you enter wrong data, you must leave the add tasks mode, go to the fix tasks mode, and then make the corrections. Also, in the fix tasks mode you are told that you may press Enter to keep the old value, which is displayed in parentheses. Following this advice resets the values to zero.

The data entry system, while not particularly easy to use, was at least quick. It took me only about 30 minutes to enter the case study's 85 tasks. I encountered no appreciable lag when entering tasks, aside from brief pauses on one or two records. After saving the list of tasks on the disk, I selected the Solve Problem option. In 54.4 seconds, the solution was complete, although I received the warning that there was an "inconsistency in the network" of tasks.

When I went to print the list of tasks with their early and late starts, duration, and slack time, I found that some had impossibly large values. I also discovered that the only way to get a printout of this list was to use the PC's PrtSc key. In order to time the listing, I had to toggle the Ctrl-PrtSc key combination to direct screen output to the printer as it was displayed on the screen. In fact, only the Gantt chart is designed as a printed report, and it is not available on the screen.

When I tried to print the Gantt chart, the program crashed with an ominous message, "INTERNAL ERROR NUMBER 4 DETECTED IN LINE 166." After I carefully checked each item in the test data, a second attempt produced exactly the same results.

I called Decision Support Software (which has no toll free number) and was immediately connected with someone who seemed to understand what I was talking about. He told me that he would check with the programmer and would get back to me with some information. It was late in the day, and he called back early the next morning to say that the problem was probably nodes that were unconnected in one direction or the other. Furthermore, he said that if I were unable or unwilling to find the problem in the data, I could send a copy of the disk to him and he would check it over for me.

A thorough examination of the case study network chart revealed nine "dangling" nodes. I created dummy tasks to link these to the first or last node in the network (to eliminate the possibility that these dummy tasks might affect the critical path) and tried again. This time *EX-PERT/80* took just over 1 minute to solve for the 94 tasks (85 original and 9 dummy tasks). The task list took 2 minutes to print, and

the Gantt chart took 6½ minutes (and six sheets of paper).

It was a simple matter to remove the required task from the list and solve the problem (1 minute and 14 seconds), and then replace the task and solve again (1 minute and 14 seconds). The critical path and project completion times were the same at the start and finish of the operation, and both changed when the task was removed.

In all, it took me 3 hours to work through the entire case study. Keep in mind that nearly half of the time was consumed by the search for the dangling node problem, and that data entry went especially quickly, since so much of the case study information could not be entered.

SOME UNIQUE FEATURES

As you can see in the comparison chart, although *EX-PERT/80* lacks many features found in other programs, it does have some interesting features of its own. Since it accepts pessimistic and optimistic task duration estimates, it can produce probabilities for a range of project completion

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IT WAS WRITTEN IN
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dates. It can print a graph showing the quantities of a single resource required on each day of the project. You can request an event calendar that shows the day, the



task, and whether the task must (or may) begin or end on that day. You can even obtain a list of all tasks that must (or may) be active within a range of days or on a single day.

The program's "dynamic dimensioning" feature takes full advantage of all available memory. While *EX-PERT/80* will run in as little as 64K RAM, any additional memory permits you to add more tasks to a project. With 192K on my machine, I had the capability of adding up to 999 tasks. While this feature was not explained in the manual, it is still nice to know that the program will use all the extra memory I bought.

Decision Support Software plans to add new features about once a year. Next on their official wish list is a resource "smoothing" function that will adjust slack time assignments so that the total resource draw on any given day does not exceed a limit that you specify. The company is also considering adding some simple calendar functions.

CONCLUSION

EX-PERT/80 is an older program with a long lineage. It looks like it was written in BASIC, which in fact, it was. It does not have many fancy features, and some parts of it are downright difficult to work. On the other hand, it doesn't cost nearly as much as some programs that have big names in the business, and it gets the job done for many users. In spite of its quirks, it is extremely easy to set up and to learn; you hardly need the manual at all. The manufacturer's support is friendly and responsive. *EX-PERT/80* seems to be an excellent value. If a big rig is too much for your task management application, this little pickup might be just what you need.

—Alfred Poor

GARLAND PATHFINDER: SIMPLE SCHEDULES



Garland Pathfinder
Garland Publishing, Inc.
136 Madison Ave.
New York, NY 10016
(212) 686-7492
List Price: \$299

Requires: 128K RAM, two disk drives,
132-column printer (or 80-column
printer with compressed print).

CIRCLE 746 ON READER SERVICE CARD

Pathfinder, from Garland Publishing, Inc., is a simple system for project planning and scheduling. Although it can't produce PERT charts or dependency reports, it does generate useful schedule reports and Gantt charts. The system is easy to use.

To install *Pathfinder*, you simply copy the files with the DOS COPY command. The source diskette is not copy-protected, and there are no installation programs to run. (*Pathfinder* cannot be tailored to your particular equipment.) Installing the system took me about 4 minutes.

In lieu of a tutorial, the system disk includes a sample project file, which is documented in the manual. Reading the manual and using this file gives you a good understanding of the system's information requirements and its capabilities.

The small, 61-page manual is typeset, fairly easy to read, and well organized. However, it does not have an index, and it fails to include some important information, such as a license agreement or contract and a telephone number.

The case study took me 6 hours to complete, including an hour spent diagnosing and fixing several problems involving the calendar file. I also chose to use the max-

imum number of sort options in my first group of reports, which probably were not required and which added an extra half hour.

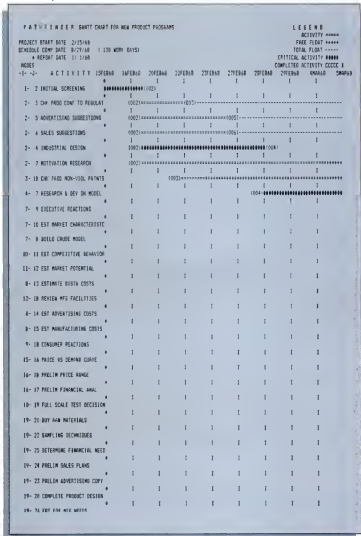
Of the reports called for in the case study, *Pathfinder* could produce only the task list, Gantt chart, and funding schedule. It could not produce a PERT chart, resource list, manpower loading chart, or holiday calendar. However, in addition to the task list, *Pathfinder* also produces a schedule report showing the start times it computed for each of the tasks. For any single report, you can request up to four schedule reports, each with a different sort sequence.

Adding, deleting, and inserting tasks can be done quickly and efficiently. It took me only 5 minutes to enter the changes and another 15 minutes to regenerate the schedule and print the schedule report.

The case study data were almost immediately usable. I didn't have to rearrange or recode anything except the assignment codes. These were given as alphabetic characters in the case study, and *Pathfinder* only accepts numeric entries for this code. However, the package couldn't handle a task duration of a fraction of a manday, so I had to code the half-day tasks as one day each.

Pathfinder consists of four processing programs and a very simple help facility. Each of these programs is executed separately; there is no menu. The first program provides a question-and-answer dialogue for entering task information and report options. The second program uses the resulting project file to calculate the schedule and produce most of the reports. The

● The inclusion of free-float and total-float time complicates the presentation of this Gantt chart.





view indi-
screen. The
Gantt chart,
the printer.
caused prob-
lems with a cal-
endar with 3
years 1975 to
cter format, with

represented by a single
indicating that the day is a
work day, a Saturday, a Sunday, a
ward holiday, or a special holiday. To
change the calendar, you must use a text
editor. If you want to use this predefined
calendar file, you specify SYSTEM for
the calendar file in the project definition. If
you want to use a different file, you enter
the filename instead.

In my first try, I missed the place in the
manual that said to use SYSTEM and used
the filename of the predefined calendar
file, PFCAL. When I tried to run the
schedule calculation program, I got a disk
error message. Looking at the sample
data, I saw my mistake and changed the
calendar filename to SYSTEM. When I
tried the schedule program again, I got a
FORTRAN run-timeabend. This time the
problem was that the calendar file did not
include the 1968 time frame required by
the case study. So I used a text editor to
build a new calendar. Although it was dif-
ficult to put the file together, when I was
finally finished the schedule program ran
without a hitch.

I'm sure that most people will use the
calendar file provided with *Pathfinder* and
will not encounter these problems. Noneth-
theless, the program's response to the mis-
takes I made was totally inappropriate.

Pathfinder requires an IBM PC with
MS-DOS, at least 128K RAM, two dou-
ble-sided disk drives, and a 132-column
printer. An 80-column printer will work

just fine if you put it in compressed print-
ing mode before you get into *Pathfinder*.
The program stores the project file on the
same disk as the *Pathfinder* system and
uses the other disk for temporary work
files. It cannot take advantage of a color
monitor or a plotter, nor can it interface
with another software package.

Pathfinder is, for the most part, an
automatic Gantt chart drawing tool. It's
easy to use (as long as you don't have to
create your own calendar file). The major
weakness is that there is no system output
that conveys the dependency relationships
among tasks. At a price of \$299, *Pathfind-
er* is no bargain. —Lestle K. Brown

HARVARD PROJECT MANAGER: WINDOWS AND A ROADMAP



Harvard Project Manager, Version 1.12

Harvard Software, Inc.
521 Great Rd.
Littleton, MA 01460
(617) 486-8431
List Price: \$395

Requires: 128K RAM, two disk drives.
CIRCLE 748 ON READER SERVICE CARD

Harvard Project Manager is a pro-
gram that makes project planning
accessible to everyone. It allows
you to plan a project visually by graphi-
cally showing the relationships of various
project tasks and events. Moreover, the
program effectively uses cursor position-
ing to let you create a system of lines and
rectangles such as a PERT diagram, called
the "roadmap" to your project. The *Har-
vard Project Manager* is a combination of
logical and graphic relationships that fac-
ilitates creativity—an important ability in
today's software market.

GETTING STARTED

Two short programs must be executed
to get the system up and running. The
installation program simply copies DOS
onto the program disk. Printer installation
requires entry of the command "printer"

followed by the printer name. The program may be used with a hard disk system, but the hard disk will only hold project data; the program must be run off the program disk in the A: drive.

The program is copy protected, so the disk cannot be copied. However, Harvard Software, Inc., sends you a backup copy of the program disk when it receives your software registration card.

Harvard Project Manager comes with a fantastic tutorial that makes mastering the program in under 2 hours easy and almost fun. The tutorial consists of seven workshops—each instructing you to read sections from the manual, run demonstration programs in which all the keystrokes are entered for you, and then return to the manual to finish the demonstration on your own.

The documentation includes a reference card and a well-designed reference manual with attractive graphics and two-color printing. However, in spite of all its gloss and structural correctness, the manual is the program's Achilles' heel. It is brief to a fault; 90 percent of its explanation of how the program works is contained in the demonstration tutorials—not a good format for easy reference.

THE CASE STUDY

It took almost 2 hours—longer than for other packages—to enter the case study. Remember, however, that much of the preparation work had already been done before we began entering the case study data. If you were entering a new project from scratch with *Harvard Project Manager*, you should be able to spend less time in forethought and jump right in, letting the package help you actively plan the project as you go along. *Harvard Project Manager* requires that you enter activities and milestones on the roadmap, or PERT diagram. It has the most interactive entry system we've seen.

The program allows easy insertion or deletion of tasks and automatically adjusts the project plan accordingly; it redraws the roadmap to accommodate new activities. Milestones are represented by a box; activities are depicted by a box in reverse video. To delete a task, you simply place the cursor on the task box, and then with two keystrokes, it's gone.

Harvard Project Manager produces a variety of reports. The roadmap and the Gantt chart can be printed either normally or sideways. The sideways mode is unreasonably slow, but the reports are attractive

in the normal mode and a piece together without the ture.

In addition to creating a Gantt chart for each project, *Project Manager* also produces a report and a status report. The details lists all the information the program has about your project, including each activity and milestone followed by all the information you've entered plus the information it has calculated, such as early finish dates. The status report lists information about selected activities and milestones. Using the sort function key you can specify which item of information you want the order of the report to be based on. You can extract lists based on the responsibility, slack time, or code field.

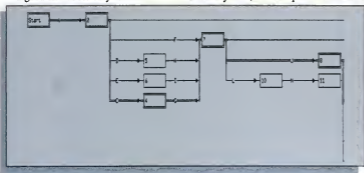
You can also print out the calendar for the project. Projects can be printed to disk in a DIF format to be used by spreadsheet programs.

FEATURES

Harvard Project Manager does not deal as thoroughly with the planning of resources and their related costs as some other project planners. With this package, only fixed costs may be assigned to each activity—you cannot enter individual rates per resource. This limitation is unfortunate, and it will undoubtedly discourage from using the program those who rely heavily on flexible resource cost projections.

With the exception of inadequate resource scheduling, this product has many outstanding features. In addition to the graphic entry of project data we men-

● This is a typical critical path method diagram, which identifies each task in the entire path.





tioned earlier, the program allows up to four "windows" to be displayed on the screen at one time. For example, while you are looking at the PERT chart, the bottom window may contain the "node description," allowing you to see the data for each activity and milestone as you scroll along the roadmap. Or, you could display the roadmap and the Gantt chart simultaneously; even the project calendar may be viewed. This window feature comes in very handy—you can, for example, keep the node description window active while studying the PERT diagram.

Furthermore, *Harvard Project Manager* allows the entry of subprojects into the main project roadmap. A subproject is simply a sequence of activities stored as a project in a file of its own, then referenced in a larger project's plan by one activity box. This is an important feature because it lets you easily build a library of subtasks that will be used repeatedly. It also means that the number of activities you may have in a single project is limited only by disk space.

You can track the progress of your project in two different ways. One way is to enter the actual start dates and actual completion dates of each activity; the program then adjusts the project plan to reflect the impact of actual completion times on the remainder of the project. Progress can also be tracked by entering the percentage of completion of each activity.

SUMMARY

Of all the project planning software available for the PC, *Harvard Project Manager* has probably attracted the most attention. Its use of windows and a graphic interface makes it stand out from the herd

of logically correct, boring-to-use packages currently available. It is not a perfect package, but it is easier to use than most other products. With the exception of resource cost management, it performs all

the essential aspects of detailed project planning. It's a good value for the money, so we expect it to remain among the leading packages for quite a while.

—Diane Burns and S. Venit

INTEPERT: A WELL- DOCUMENTED WINNER

PC MAGAZINE

IntePert, Version 1.1

Schuchardt Software Systems

515 Northgate Dr.

San Rafael, CA 94903

(415) 492-9330

List Price: \$195

Requires: 128K RAM, one disk drive,
80-column printer.

CIRCLE 751 ON READER SERVICE CARD

IntePert belongs to the InteSoft family of integrated software from Schuchardt Software Systems. You can purchase *IntePert* as a standalone product or as part of the Professional Series III, which also includes *InteCalc* and *IntePlan*. *IntePert* offers critical path analysis and generates PERT, Gantt, task, and time charts for each project. Combining it with the other two packages in the Professional Series, especially *IntePlan*, adds detailed resource-management capabilities. All the InteSoft programs share similar commands.

GETTING STARTED

Installation of the product is straightforward. The program disk is not copy protected, and it requires no special initialization to run on the IBM PC. I was able to get the program up and running in minutes. The documentation includes step-by-step instructions on the basic DOS

commands required to make a backup of the program disk, so even computer novices will find start-up painless.

The program supplies several sample projects, and the reference manual contains a thorough tutorial that demonstrates all the program's important features. Although its read-then-type-in-what-you-read format is not as much fun as tutorials that enter the keystrokes for you, it does ensure quick and thorough mastery of the program. The tutorial runs for seven chapters (almost half the manual) and requires at least 2 hours to complete. I found it well written, clear, and correct. It even included a good deal of background information

● *Shown here is an example of a task versus completion-time schedule.*

on the basics of project planning. The skillfully presented material won't bore old pros or intimidate newcomers.

The rest of *IntePert's* documentation is also outstanding. The typeset reference manual is printed on high-quality paper in two colors, with index tabs separating the major sections. The manual is well organized and liberally sprinkled with examples of screens and exact keystroke sequences printed in a second color that allows them to stand out clearly. This design reflects careful thought, and other software documentation authors should take note of it.

In addition to the tutorial chapters, the manual has a reference section, appendixes, a glossary, and a detailed index. The appendixes include information on error messages and a detailed explanation of

how to transfer information from *IntePert* to other programs in the *InteSoft* series.

THE CASE STUDY

PC Magazine's case study required just over an hour to enter. Once you define the project, each task is entered separately. The program prompts you for the task name, description, start date, end date, duration, predecessor and successor tasks, and a resource code. Once you define the start date of the whole project, you don't have to enter any more dates or predecessor or successor activities on every task for the program to perform its calculations.

You can't enter tasks with zero duration: when I entered the "dummy" activities suggested by the case study, the program refused to calculate a schedule or critical path. I deleted these tasks and the

NEW PROD		CASE STUDY	
02/15/85-02/16/85	02/17/85-02/22/85	02/23/85-03/10/85	03/11/85-03/20/85
--INITIAL SCREEN1--	++INDUSTRIAL DES1	---RESEARCH & DEVE---	++BUILD CRUDE MOD
Slack: 0 Days	: Slack: 0 Days	Slack: 0 Days	: Slack: 0 Days
:	:	:	:
	02/17/85-02/20/85		
	++SALES SUGGEST10		
	: Slack: 40 Days		
	:		
	02/17/85-02/20/85		
	++AD SUGGESTIONS		
	: Slack: 40 Days		
	:		
	02/17/85-02/25/85		03/11/85-03/12/85
	++MULTIPLICATION RESE		++ESTIMATE MAND EI
	: Slack: 13 Days		: Slack: 9 Days
	:		:
	02/17/85-02/18/85	02/19/85-02/19/85	
	++CHECK CONFORMAN	---CHECK PRD NUN---	
	Slack: 40 Days	Slack: 40 Days	
	:	:	
			03/11/85-03/11/85
			++EXECUTIVE REHAET
			Slack: 12 Days



program performed the calculations flawlessly. When you insert or delete a task, *IntePert* automatically adjusts the rest of the project. Tasks are written to disk as you enter them. Other packages do this slowly, but *IntePert* writes the data without unreasonable delays.

FEATURES

IntePert uses spreadsheet-like slash commands, which are displayed at the bottom of the screen. Many of the legions of spreadsheet users would love to add project planning to their software libraries; *IntePert* can help ease the transition.

Once you enter the project data, *IntePert* generates a number of useful reports. Simply pressing a function key transforms your data into a PERT chart showing the critical path tasks across the top of the page. Another function key changes the screen display to a Gantt chart. Both kinds of charts can be printed with a single slash command. The charts don't use graphics characters, so they print quickly and don't require a special graphics printer. Although not particularly attractive, the reports are easy to read.

IntePert also generates a detail report, which lists the tasks and all the data available on each task. The resource chart generates a report for the schedule of each resource individually. The schedule report, which lists the activities by date, looks similar to the PERT chart but diagrams the information somewhat differently. Every task that begins on the 15th, for example, would be drawn across the page on the same row. The next row would contain tasks scheduled to begin on the 16th, and so on—a very useful way to view a project. Finally, the program prints a task chart, which lists the tasks by start date.

IntePert allows up to 64 hierarchical

levels, which means you can divide each task into a series of subtasks. This ability makes it a good program for dealing with relatively large, complex projects.

SUMMARY

At under \$200, *IntePert* is a good value. If it is representative of the *InteSort* series, I'd say that Schuchardt Systems has come up with a strong contender in the

integrated software race. I did not evaluate the portability of *IntePert* data into *IntePlan* or *InteCalc*, but the documentation suggests that data transfer should be simple and effective. (The program does not interface with any other brand-name spreadsheet or database software.) *IntePert* is a solid program that may be just the project management package to fit your needs. —Sharyn Venit

MICROGANTT: NICE FEATURES, BUT POOR DESIGN



MicroGANTT, Version 1.94A

Earth Data Corp.
P.O. Box 13168
Richmond, VA 23225
(804) 231-0300
List Price: \$395

Requires: 128K RAM, one disk drive.

CIRCLE 747 ON READER SERVICE CARD

Since project management on the microcomputer is a relatively new concept, many software packages, such as *MicroGANTT*, do only part of the job. *MicroGANTT* does Gantt charts and project budgeting but not PERT charts. The package has some good design features and will undoubtedly improve the management effectiveness of projects previously planned with pencil and paper.

FAST AND EASY

MicroGANTT is not copy protected so installation is fast and easy. No initialization of the program disk is necessary to run it. And since the program doesn't use graphics, its reports can be printed easily on any type of printer.

The manual supplies adequate information to get the program up and running but omits any type of detailed explanations.

No tutorial is provided. Several example projects are included on the program disk, and there are report printouts from the sample project files, but no explanations are given on any of them.

● *Very close to a classical Gantt chart, this presentation has the added capability of identifying critical tasks and illustrating priorities.*

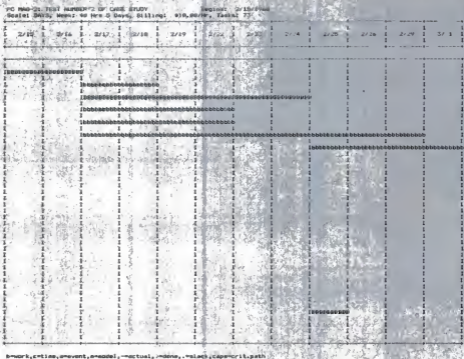
THE CASE STUDY

The case study was more time-consuming to enter than some of the other packages I reviewed because the PC data was set up to be entered into a network analysis format, which *MicroGANTT* does not accommodate. I had to spend more time preparing the data than with other packages. Once I had the project set up, it took me almost an hour to enter the data.

MicroGANTT writes each task to disk

as you enter it. While it saves time, it means you have to wait for that data to be saved after the entry of every task. And as the project lengthens, the time you have to wait after *each* entry increases. My final task entry in the case study took a full 10 seconds to save.

The case study did not take advantage of one of the strong points of *MicroGANTT*—budgeting. *MicroGANTT* allows you to assign a default hourly billing





rate to the entire project, plus it lets you override the default for each task necessary. The program also lets you assign fixed costs to each task.

MicroGANTT took 40 minutes to print the Gantt chart for the case study. Since it doesn't use any graphics, this seems like an inordinately long time. The program will also generate a detailed time/cost summary and a task summary.

Regarding the reports themselves—to use a line from the movie *The Wiz*, they "put the UGH in ugly." I found them hard to read. The lines on the border of the chart are made up of capital *I*'s. Each activity is represented by a letter of the alphabet instead of boxes; uppercase letters designate critical activities. While the letter system is a logical programmer's dream, it is totally unimaginative in terms of simplifying the presentation of complex data.

A FEW GOOD WORDS

MicroGANTT has a poor overall design, but it also has a few exceptionally well-thought-out features. The program is command driven. Commands are displayed on the screen at all times. It has two main programs on the disk, which are linked through their respective command menus—one program allows entry and modification of project data and the other outputs the various reports.

MicroGANTT not only allows for careful, detailed budgeting, but it also lets you include realistic work-loading in its project calculations through several important prompts in the project data entry. First, you are prompted for the time unit, such as day, week, and month, for each task and then for the expected duration of the task. These fairly standard entries are followed by a prompt for the number of

workers you will assign to that task and the percentage of their work allocation. For example, if you have a team of five people working on a task and you know they will be spending only 50 percent of their time on that particular activity, you can define accurate resource allocation.

Another good feature is that *MicroGANTT* allows the entry of a "composite task" or any project file on your disk. In other words, you can create Gantt charts for small segments of work that you do repeatedly for different projects and insert these into the appropriate points in a current project. It also extends the power to handle large projects effectively.

MicroGANTT stores its Gantt chart in BASIC format. These files may be used with any program with a BASIC interface. For instance, cost information may be read into Lotus's 1-2-3 for further analysis.

SUMMARY

While *MicroGANTT* has some good concepts, it offers no serious competition to the growing number of strong products in the project planning market. I think it is overpriced at \$395. To be competitive, the price should be slashed or the entire program should be redesigned, salvaging its few good features and scrapping the rest. —Diane Burns

MICROPERT 0: PROJECT NETWORK ANALYSIS



MicroPERT 0, Version 3.2

Sheppard Software Co.
4750 Clough Creek Rd.
Reading, CA 96002
(916) 222-1553

List Price: \$350

Requires: 192K RAM, one disk drive.

CIRCLE 745 ON READER SERVICE CARD

MicroPERT 0 (MP0) is a powerful tool for project network analysis. Originally designed for use on the Tektronix 4050 graphics computer in 1978, MP0 for the IBM PC was released in January 1983. The program requires a system with 192K RAM; two disk drives are recommended, but it will run with only one.

For what it does, the program performs well, but there are some important aspects of project planning that are neglected. You

can create a PERT chart by responding to a series of simple prompts about tasks and time. And then, with a few additional keystrokes, you can generate a Gantt chart, an activity list, and a resource list. *MPO* does not have the ability to include costs, and the entry of resources is awkward without the assistance of prompts. In addition, the program runs slowly, even on a hard disk system with 512K RAM.

QUICK START

MPO's installation is straightforward so I had the system up and running in a few minutes. However, I found it awkward

● *This is a network diagram: it displays a time-scaled relationship between the tasks of a project.*

that every time you start the program you have to respond to a minimum of four entries just to see the opening system menu. Moreover, hard disk users, like myself, must perform six separate entries because the program never remembers what disk drive you want to use.

A tutorial is included and takes about an hour to follow, including entry of all project data. The tutorial sample project is easy to understand and gives you a basic idea of the program's capabilities. Furthermore, the accompanying explanations in the manual are presented well.

DOCUMENTATION

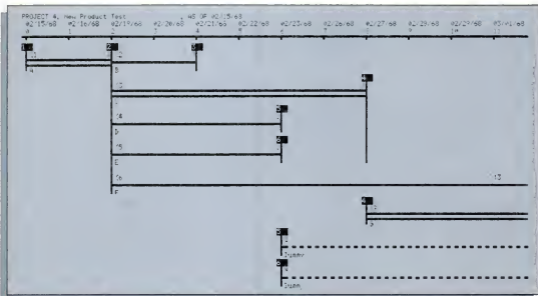
Every aspect of *MPO*, including error messages, is explained in a step-by-step manner. The 210-page manual is indexed,

and the table of contents is complete. A good introductory section is also included for users who are reluctant to take the project planning plunge.

Technical support is available by phone, but the number is not toll-free. Updated versions of the software are sent to registered users for a nominal charge. A new version of the program is being written in the more efficient C language; it will replace the current compiled BASIC version and should reduce some of the response-time problems.

THE CASE STUDY

The case study was extremely easy to enter, taking approximately 30 minutes. Of course, the necessary preparation work, such as determining task relation-



ships, was already done. When initially setting up a project, you will always have to do preliminary work before you can begin to enter the data. For example, you must determine the predecessor and successor of each task on paper first if the entry operation is to be efficient. *MPO* provides three worksheets to help you in this

**ONE OF THE STRONG
FEATURES OF MPO IS A
POWERFUL, RESPONSIVE
EDITOR, WHICH ALLOWS
FOR THE DELETION,
INSERTION, OR
UPDATING OF ACTIVITIES
AND EVENTS.**

process: an event list worksheet, an activity list worksheet, and a project layout worksheet.

One of the strong features of *MPO* is a powerful, responsive editor, which allows for the deletion, insertion, or updating of activities and events. Experimental situations may be tested by modifying data for individual tasks.

If an event is deleted, all activities that use the event must be updated to use a different predecessor or successor event. All subsequent events are automatically renumbered. When activities are deleted, no additional steps are required, but all activity relationships are recalculated and renumbered.

MPO produces a PERT chart, a Gantt chart, an activity list, and a resource list from the project data. There are a variety of print options available, including presentation or draft-quality printing, normal or compressed characters, and normal or sideways printing. Printing time in the

presentation mode is extremely slow; draft-quality printing is much faster and occurs at an acceptable speed.

FEATURES

MPO's system menu consists of 15 different selections, including Enter Project Data, Edit Project Data, Network Diagram, Gantt Chart, Utilities, and Help. Project data is quickly and easily entered. The first step is to enter the project size in terms of the number of events and the number of activities (tasks).

Next, the time period is established by entering the time unit and a multiplier. Standard time units are available (day, week, month, quarter, and year), and the multiplier gives the additional capability of increasing a time period to several units, such as 3 days or 2 quarters. Weeks may be defined by the number of days and by what day the workweek begins. The final time-related prompt asks for the date the project is to begin and the date of the report. There is no holiday calendar, so they must be entered as dummy activities.

Events are numbered automatically and may be given a description as well, if desired. Activities are also numbered automatically, and you enter them by inputting the predecessor event number, the successor event number, and then the duration of the activity. Several activities can use the same preceding event. Parallel finish times are established using a common successor event number.

Each activity description begins with a two-letter code, which you designate to identify a person or department. The program will then produce separate Gantt charts or schedule reports for each code.

PERT charts generated by this program use various symbols to indicate whether an

activity has started yet or whether it has been completed. The critical path is indicated on the screen and printouts by a double line, which appears in red on a color monitor. The Gantt chart indicates both the earliest and latest possible schedules, as well as the percent complete for each activity.

The program does not automatically save previous versions of the project. Comparisons with the original project plan may be obtained by either copying the project before revising it or by keeping a printout of the original.

MPO is an effective package for network analysis and Gantt charting. The documentation as well as the overall design is well thought-out and thorough.

If you are not responsible for budgeting costs, *MPO* may be for you. However, make sure you have plenty of time to print in the presentation mode—unless, of course, you have a spooling program; there is no print spooling feature included

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in *MPO*. *MPO* is a reasonable value for the price, but it needs some improvements to edge it further into this fast-growing, competitive project software market.

—Sharyn Vent



MICROTRAK: STRONG FOR SMALLER JOBS



MicroTrak, Version 1.4C

SofTrak Systems
P.O. Box 22156 AMF
Salt Lake City, UT 84122
(801) 531-8550

List Price: \$595

Requires: 128K RAM, one disk drive,
two recommended.

CIRCLE 744 ON READER SERVICE CARD

MicroTrak is a no-frills software package that does on-screen and printed critical path analyses of small- to medium-size projects—constructing a half-mile sewer line, for example, as opposed to building a sewage treatment plant.

MicroTrak really only handles the back end of the planning task. Before you even approach the computer, you must manually break down the entire project into subsets of tasks and define task dependencies. However, once this is done, MicroTrak will help you develop a critical path for the project and keep track of expenses. MicroTrak also handles updates and schedule revisions automatically.

Getting started with MicroTrak is simple. You simply use the DISKCOPY command to create working backups or the COPY command to move MicroTrak files onto a bootable disk. To its credit, MicroTrak's publisher does not bog down the program with fumbling copy-protection schemes, but rather devotes 10 pages of documentation to explaining the dire consequences of illegal copying.

The system I received for review was already configured for the PC screen and keyboard as well as for the Epson MX—or IBM—printers, so I had to spend only 5 minutes on installation.

While MicroTrak does not come with

an on-line tutorial, the documentation does include an 11-page introduction to the basics of critical path method precedence scheduling. Since each scheduling software product tends to use slightly different terminology, reading this section of the documentation is a must before you start to use MicroTrak.

To the extent that this section of the documentation is a "tutorial," it is relatively easy to read and can be digested in 10 minutes. It does seem to assume, however, that you have some experience with scheduling theory.

The "basics" section is the best part of the documentation I read. The rest is skimpy and does not do justice to the product. It consists of 55 pages of text plus a series of plates showing MicroTrak's menus. Since 11 of these pages are devoted to planning basics and 12 pages are devoted to the user license, little seems to be left to help you use the program other than a cursory description of how to enter activities and other planning elements into the system.

MicroTrak's charts and their symbology, for example, are not discussed at all in the manual. This omission is a major defect in the documentation, since the network chart itself is so complex that its components cannot be fully understood without study. An interpretation of this chart's layout and symbology would be a significant addition to the manual.

THE CASE

The PC Magazine Lemon Computer Company case study required about 3 hours on MicroTrak. The system was able to handle a full component of holidays and all ten of the labor resources specified in the PC case.

Each task could also be preceded by up to ten other tasks, so there was plenty of

power to handle the PC test.

Entering the 83 activities in the PC task consumed most of the 3 hours. *MicroTrak* updates itself as activities are entered (much in the way a spreadsheet recalculates as entries are made). You can disable

**TO ITS CREDIT,
MICROTRAK'S PUBLISHER
DOES NOT BOG DOWN
THE PROGRAM WITH
FUMBLING COPY-
PROTECTION SCHEMES,
BUT SPENDS 10 PAGES
OF DOCUMENTATION
EXPLAINING THE DIRE
CONSEQUENCES OF
ILLEGAL COPYING.**

the recalculation feature, cutting your input time in half, but since the screen then goes blank so you cannot see what is going on, you would have to be absolutely sure that your entries were correct before you would want to do this.

MicroTrak allows three relationships between adjacent activities—finish to start, finish to finish, and start to start.

A finish-to-start relationship is one in which a preceding task must be finished before a following task can be started (a wall must be built before painting can begin).

A finish-to-finish relationship requires that one job be completed before another

● This project schedule in tabular form identifies critical and non-critical activities as well as lead and lag times.

SCHEDULE: Lenon Computer		MICROTRAK		BASE DATE = 15FEB85			
RUN DATE = 29JUL84 Rev 1				DATA DATE =			
NETWORK REPORT by TOTAL FLOWT				CUT OFF DATE =			
PREDECESSOR NO. AND DESCRIPTION	REL LEAD	LAG DAYS	DATES		TOTAL		
ACTIVITY NO. AND DESCRIPTION	TYPE	TIME	TIME LEFT	START	FINISH		
SUCCESSOR NO. AND DESCRIPTION							
1740	Ship to distributors	0	0		26JAN87	0	
1710	Introduce new product	0	0	0	27JAN87	26JAN87	0
1690	Sell to outlets	0	3		23JAN87	0	
1700	Ship to distributors	1	26JAN87	26JAN87	0	0	
1710	Introduce new product	0	0	27JAN87	0	0	
1660	Full scale manufacturing	0	0		19JAN87	0	
1670	Establish distributors	0	129		15JUL86	129	
1690	Sell to outlets	4	20JAN87	23JAN87	0	0	
1700	Ship to distributors	0	0	26JAN87	0	0	
1620	Set up equipment	0	3		08JAN87	3	
1630	Receive raw materials	0	1		12JAN87	1	
1640	Train workers	0	0		13JAN87	0	
1660	Full scale manufacturing	4	14JAN87	19JAN87	0	0	
1690	Sell to outlets	0	0	20JAN87	0	0	
1610	Hire workers	0	0		07JAN87	0	
1640	Train workers	4	08JAN87	13JAN87	0	0	
1660	Full scale manufacturing	0	0	14JAN87	0	0	
1190	Chk. prod. for pat violat	0	200		21FEB85	200	
1170	Consumer reactions	0	163		16APR85	151	
1200	Review manf. facilities	0	169		08APR85	169	
1180	Preliminary price range	0	0		06DEC85	0	
1201	Null	0	30		23OCT85	30	
1202	null	0	09DEC85	06DEC85	0	0	
1570	Design Label & Trademark	0	0		31DEC86	0	
1580	Financial funds flow	0	4		24DEC86	4	
1610	Hire workers	4	02JAN87	07JAN87	0	0	
1640	Train workers	0	0	08JAN87	0	0	
1540	Establish prices	0	0		22DEC86	0	
1550	Select promotional aids	2	23DEC86	24DEC86	0	0	

(Chart continues)

continued

1520	Establish prices	#	#	220EC86	#
1530	Select advertising copy			1 230EC86	230EC86 #
1520	Establish prices	#	#	220EC86	#
1560	Select media			1 230EC86	230EC86 #
1470	Determine seasonal demand	#	#	180EC86	#
1540	Establish prices			2 190EC86	220EC86 #
1580	Financial funds flow	#	#	230EC86	4
1550	Select promotional aids	#	#	230EC86	#
1470	Determine seasonal demand	#	#	180EC86	#
1520	Establish prices			2 190EC86	220EC86 #
1560	Select media	#	#	230EC86	#
1530	Select advertising copy	#	#	230EC86	#

(Chart ends)

is finished. (A work crew could begin filling up a trench while pipe is being laid, but the last of pipe must be laid before it is closed.)

In a start-to-start relationship the preceding task must be started before the following task can be started. (Using the analogy above, a start-to-start relationship exists between the digging of the trench and the laying of the pipe.) The system often enables you to add lead or lag time to an activity or to specify starts "not earlier than . . ." and finishes "not later than . . ." a particular date. Although all of these features are important in real-life planning, none were required by *PC Magazine's* test case.

To delete a task, you have only to press a delete key and supply the activity number. *MicroTrak* deletes the task, removes all dependencies on it, and recalculates the network. When I deleted a task from the *PC* case, it took about 5 seconds to get a new screen.

MicroTrak can handle over 300 tasks

on a double-sided, double-density data disk; however, as the documentation warns, you should frequently check the space you have left. If you try to add a task that won't fit, you cause an unrecoverable error. *MicroTrak* comes with a zap utility to close files after such an error, but data could be lost.

A program of *MicroTrak's* sophistication should really tell you at the outset how many tasks can be added and continually show you how much disk space you have left.

MicroTrak can be used on a hard disk, but it does not support directory paths. It passes up all opportunities to make special use of color or of input devices other than the keyboard.

A strong feature in the *MicroTrak* package is its smorgasbord of seven reports. It includes a schedule report, network report, time scale report, milestone report, update report, activity-within-resource report, and resource-within-activity report.

MICROTRAK CAN HANDLE OVER 300 TASKS ON A DOUBLE-SIDED, DOUBLE-DENSITY DATA DISK. HOWEVER, YOU SHOULD FREQUENTLY CHECK THE SPACE YOU HAVE LEFT. IF YOU TRY TO ADD A TASK THAT WON'T FIT, YOU CAUSE AN UNRECOVERABLE ERROR.

These reports can be generated singly or in a group by a single request from the main menu.

Since it is designed for medium-scale projects, its most significant constraint is its ten-resource limit. Most medium-scale projects should be able to live with the 300-activity limit.

While this program does the job, its I/O—particularly the keyboard and screen routines—seems relatively unsophisticated compared with most current-generation software.

Its prompting is good, and errors are for the most part handled with a suggestion for correct input.

The documentation is definitely too sketchy, but *SoftTrak* promises new documentation soon. (To prove it, they showed me galleys of the new manual's table of contents.)

MicroTrak has many fine features and quite a bit of flexibility for its size, but I would recommend you see a demo before buying to be sure its talents and limits match the scope of your project.

—Richard Aarons



MILESTONE: A WELL-CRAFTED PLANNING SYSTEM

PC

Milestone

Digital Marketing Corporation
2363 Boulevard Circle
Walnut Creek, CA 94595
(415) 947-1000

List Price: \$250

Requires: 128K RAM, one disk drive.

CIRCLE 743 ON READER SERVICE CARD

Milestone from Digital Marketing presents a good basic planning system for small and medium-size projects. It is written in USCD Pascal and will run on most 8- and 16-bit machines. Installation on 8-bit machines involves the typical setup of keyboard and screen functions; however, since the IBM PC version is preconfigured, it doesn't require any preparation other than making working backups.

TWO TUTORIALS

Milestone has two on-line tutorials. One is generic and acquaints the user with Digital Marketing's prompting system, which is used on most of its business products. The other includes an on-line sample construction project accompanied by an explanation in the manual.

The generic tutorial on Milestone's input system takes about 5 minutes. Basically, this screen-oriented input system requires the user to tab from menu item to menu item and edit the value shown. When the value is correct, it is accepted by tabbing or hitting the A key for "accept." The input scheme feels quite natural to me and, in my opinion, reduces input time and errors by anticipating appropriate responses and adding them to the prompt line.

Milestone's other tutorial takes about

20 minutes for you to go through the sample problem and try all of Milestone's bells and whistles. This tutorial is easy to understand and covers all of the product's features.

Milestone's manual is excellent. It is readable, well coordinated, easy to use, and comprehensive. Furthermore, examples and discussions of all of Milestone's reports are keyed to the sample problem in its tutorial.

THE CASE STUDY

Preparation for the case study required only 10 minutes, but it took about 2 hours to enter the project activities and their dependency factors and relationships, which are necessary so a critical path can be established for you to follow. Milestone allows only finish-to-start relationships, which are all the case study requires; however, some systems also support start-to-start and finish-to-finish relationships. A

MILESTONE IS A WELL-CRAFTED AND STURDY PRODUCT THAT IS IDEALLY SUITED FOR SMALL- TO MEDIUM-SIZE TASKS—THAT IS, FOR BUILDING A GARAGE AS OPPOSED TO BUILDING AN APARTMENT BUILDING.

finish-to-start relationship requires that you finish one phase of a project before you can start another phase.

The number of activities that can be handled by Milestone is dependent on memory capacity. In the CP/M system,

Lemon Computer, Revision 3, 2/15/84
 Prepared by Dick Aarons

Job Description	Feb								
	15	16	17	20	21	23	24	27	28
	0	1	2	3	4	5	6	7	8
1 Initial Screening	0----->
2 Check prod conformance
5 Sales suggestions	----->	.	.	.
8 Null1	X
4 Advertising suggestions	----->	.	.	.
3 Industrial Design	----->	.	.
7 Research and Development	----->
6 Motivation research	----->	.	.
9 Null2
12 Estimate markets
14 Estimate comp behavior
15 Estimate market potential
19 Null4
10 Build crude model
13 Null3
16 Estimate distribution
20 Null5
17 Estimate add costs
21 Null6
18 Estimate mfr costs
11 Executive reactions
22 Price vs. demand curve
23 Prelim. financial analysis
24 Null7
26 Prelim price range
28 Review mfr facilities
25 Consumer reactions
27 Check prod for non violation
29 Full scale test desc.
34 Prelim sales plan
30 Complete prod design
27 Engineering lab test
31 Buy raw materials
30 Null
32 Sampling techniques
36 Equip for mfr needs
37 Set up mkt samples
42 Null
40 Mkt test forms prepared
33 Prelim ad copy
43 Manufacture models
45 Null

(Chart continues)

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NAME	HARDWARE REQUIREMENTS			DOCUMENTATION	
	MEMORY	NUMBER OF DISK DRIVES REQUIRED	FIXED DISK REQUIRED	HAS TUTORIAL	GIVES SAMPLE DATA
CPM/PERT	128K	1	NO	NO	YES
DATA'EASY PROJECT MANAGEMENT	128K	1	NO	NO	NO
DEMI-PLAN	128K	1	NO	YES	NO
EMPACT	192K	1	NO	YES	YES
EX-PERT/80	64K	1	NO	Yes, combined with reference manual	YES
GARLAND PATHFINDER	128K	2	NO	NO	NO
HARVARD PROJECT MANAGER	128K	2	NO	YES	YES
INTEPERT	128K	1	NO	YES	YES
MICROGANTT	128K	1	NO	NO	YES
MICROPERT 0	192K	1, but 2 recommended	NO	YES	YES
MICROTRAK	128K	1, but 2 recommended	NO	YES	NO
MILESTONE	128K	1	NO	YES	YES

SYSTEM CAPACITIES

NUMBER OF RELATED PROJECTS	TASKS PER PROJECT	LEVELS OF HIERARCHY	RESOURCE CATEGORIES	SCHEDULING UNITS	MAXIMUM \$ AMOUNT	TASKS DISPLAYED SIMULTANEOUSLY
1	600	1	None	Days	14 digits	18
1	7	1	None	Days	Not applicable	7
1	100	1	1	Days; can scale in weeks	Not applicable	1
1	250	1	Unlimited	Days	No costing done	13
1	999	1	1	Numbered	Not applicable	18
1	2,000	1	30 per project, 1 per task	Days	No maximum	1
Can relate unlimited number as subprojects	200 per subproject	Limited by disk capacity	None	Variable from seconds to years	\$999,999.99	9-12
Can relate 1,200-1,900 as subtasks	Can relate 1,200-1,900 as subtasks	64	26	Days, weeks, months, years	Not applicable	20
Can relate unlimited number as subprojects	100	Limited by disk capacity	Unlimited	Hours, days, weeks, months, quarters, years	\$99,999,999	11
1	220	1	Not applicable	Days, weeks, months, quarters, years, or numbered	Not applicable	28
1	300	1	10	Input: days, Output: days, weeks, or months	\$9,999 per resource per day	18
1	250	1	9	Hours, days, months, quarters, federal fiscal quarters	\$9,999,000	16



NAME	FEATURES				
	COPY PROTECTED	MIXED PLANNING UNITS	CHANGES PLANNING UNITS	ON-LINE HELP	CRITICAL PATH HIGHLIGHTED
CPM/PERT	NO	NO	NO	Yes, with split-screen	Yes, by special symbol
DATA*EASY PROJECT MANAGEMENT	NO	NO	NO	NO	Yes, by graphic density or user-defined code
DEMI-PLAN	NO	NO	NO	NO	Yes, printed on Gantt chart with character "C"
EMPACT	NO	NO	NO	Yes, context-sensitive	NO
EX-PERT/80	NO	NO	NO	NO	Yes, by asterisks
GARLAND PATHFINDER	NO	NO	NO	NO	Yes, by "CRT"
HARVARD PROJECT MANAGER	YES	YES	YES	Yes, context-sensitive	Yes, by a double line
INTEPERT	NO	YES	YES	Yes, context-sensitive	Yes, across top of network diagram
MICROGANTT	NO	YES	YES	Yes, with split-screen	Yes, by upper case
MICROPERT 0	YES	NO	YES	YES	Yes, by double line or color
MICROTRAK	NO	NO	NO	NO	Yes, by double line on screen, by boldface on printer
MILESTONE	NO	NO	NO	NO	Yes, by double line

INPUTS

CHARACTERS ALLOWED IN TASK DESCRIPTION	ALLOWS TASK ESTIMATES	DEFINES TASK DEPENDENCY		INSERTS TASKS	READJUSTS DEPENDENCIES	MULTIPLE BILLING RATES
		AS PERCENTAGE OF TASKS COMPLETED	AS NUMBER OF TASKS COMPLETED			
20	YES	NO	NO	YES	YES	NO
12	NO	NO	NO	NO	NO	NO
20	NO	NO	NO	YES	YES	NO
24	NO	NO	NO	YES	NO	NO
No task description	YES	NO	NO	YES	YES	NO
24	NO	NO	NO	YES	YES	NO
255	NO	NO	NO	YES	YES	NO
60	NO	NO	NO	YES	YES	NO
40	NO	YES	1-4 per event	YES	YES	NO
30	NO	NO	NO	YES	YES	NO
28	NO	Yes, in time units	10	YES	YES	NO
32	NO	NO	NO	YES	YES	NO



NAME	OUTPUTS				
	PROJECT PLAN/TASK LIST	NETWORK ANALYSIS	GANTT CHART	PERT CHART	RESOURCE LIST
CPM/PERT	Yes, on screen and printer	NO	Yes, on screen, printer, and plotter	NO	NO
DATA'EASY PROJECT MANAGEMENT	Yes, on screen and printer	NO	Yes, on screen and printer	NO	NO
DEMI-PLAN	Yes, on screen and printer	NO	Yes, on printer	NO	Yes, on screen and printer
EMPACT	Yes, on screen and printer	NO	Yes, on screen and printer	NO	NO
EX-PERT/80	Yes, on screen	Yes, on screen	Yes, on printer	NO	NO
GARLAND PATHFINDER	Yes, on printer	NO	Yes, on printer	NO	NO
HARVARD PROJECT MANAGER	Yes, on printer	NO	Yes, on screen and printer	Yes, on screen and printer	NO
INTEPERT	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer
MICROGANNT	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen, printer, and plotter	NO	Yes, on screen and printer
MICROPERT 0	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer
MICROTRAK	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer	NO	Yes, on screen and printer
MILESTONE	Yes, on screen and printer	NO	Yes, on screen and printer	NO	Yes, on screen and printer

						VENDOR SUPPORT
FUNDING SCHEDULE	MANPOWER LOADING	HOLIDAY CALENDAR	SUB-CONTRACTS	UPDATED PROJECT PLAN	UPDATED NETWORK ANALYSIS	HOT-LINE TECHNICAL SUPPORT
NO	NO	Yes, on screen and printer	NO	NO	NO	YES
NO	NO	NO	NO	NO	NO	YES
NO	Yes, on printer	NO	NO	NO	NO	YES
NO	NO	Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer	NO	YES
NO	Yes, on printer	NO	NO	NO	NO	YES
Yes, on printer	NO	NO	NO	NO	NO	NO
NO	NO	Yes, on screen and printer	NO	NO	NO	YES
NO	Yes, on screen and printer	NO	NO	NO	NO	YES
Yes, on screen, printer, and plotter	Yes, on screen, printer, and plotter	NO	Yes, on screen and printer	NO	NO	YES
NO	NO	NO	Yes, on screen	NO	NO	YES
Yes, on screen and printer	Yes, on screen and printer	Yes, on screen	NO	Yes, on screen and printer	Yes, on screen and printer	YES
Yes, on screen and printer	Yes, on screen and printer	Yes, on screen and printer	NO	NO	NO	YES

NAME	INTERFACING		BUYING INFORMATION		
	WITH OTHER FAMILY SOFTWARE	WITH OTHER TYPES OF SOFTWARE	LIST PRICE	DEMO VERSION AVAILABLE	AVAILABLE OUTSIDE OF U.S.
CPM/PERT	NO	NO	\$249	YES	YES
DATA*EASY PROJECT MANAGEMENT	NO	NO	\$50 plus \$2 shipping	Yes, to dealers	NO
DEMI-PLAN	NO	NO	\$49.95	NO	YES
EMPACT	NO	NO	\$149.95	YES	Yes, except in Australia and Japan
EX-PERT/80	NO	NO	\$115	NO	YES
GARLAND PATHFINDER	NO	NO	\$299	YES	YES
HARVARD PROJECT MANAGER	NO	Yes, DIF format output	\$395	YES	YES
INTEPERT	Yes, with <i>IntoGraph</i> , <i>IntoPlan</i> , <i>IntoCalc</i> , and <i>IntoMate</i>	NO	\$195	NO	Brazil, Europe, Australia, South Africa
MICROGANTT	NO	Yes, has BASIC interface	\$395	YES	YES
MICROPERT 0	NO	NO	\$350	YES	YES
MICROTRAK	NO	Yes, dBASE	\$595	Yes, for \$50	YES
MILESTONE	NO	NO	\$250	Yes, to dealers	YES

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The six word processing programs reviewed here give budget-conscious PC users something to cheer about. Each costs less than \$100, runs on a single disk drive, and requires 128K RAM or less.

WORD PROCESSING ON A BUDGET

Word processing wizards may swear by *WordStar* or other sophisticated word processing software, but if your needs are basic and your wallet is thin, you may be interested in programs that won't cost hundreds of dollars. *Friendly Writer*, *Personal Editor*, *QUICK-TEXT*, *QUICK-TEXT II*, *The Word Worker*, and *I-EDIT* are six such packages. Each costs \$100 or less and runs on a single disk drive. None requires more than 128K RAM, and, with the exception of *Personal Editor* and *The Word Worker*, each is easy to use.

WORD PROCESSING
MARILYN V. FLEMING

I compiled a list of common features and gave some thought to what functions were particularly useful or important, such as being able to transport files between applications and computers and having screen-editing capability. *Personal Editor* and *I-EDIT* are ASCII files, which makes transporting files no problem; *QUICK-TEXT*, *QUICK-TEXT II*, and *Friendly Writer* offer the option of working with document or nondocument files, and *QUICK-TEXT*

(both versions) provides a special interface for *WordStar* and *EasyWriter* files. *The Word Worker* does not allow any but its own files to be used. Most of the packages have a screen-editing capability, except for *The Word Worker*, which is the only package to offer just a line editor. The screen editor offered by *Personal Editor* is superb.

Generally, I was impressed with the quality of these six programs. Knowing that many word processing packages sell for over \$300, I was surprised to find that these six selling for less than \$100 compared so favorably. A brief review of each package follows.

Friendly Writer

Although it can be used for general-purpose word processing, *Friendly Writer* is designed for the writing, filing, and accessing of letters. Users are given little flexibility in defining text area because pages and margins are defined by a choice of three sizes—8½ by 11, 8½ by 14, and 5

WORD PROCESSING

by 7—rather than by column position for the left and right margins. There may be no more than 78 characters per line, and the document size is limited by available memory. There is no provision for chaining files for printing. The status line on the screen lets you know what line, page, and character position you are on and how many lines are still available before memory is exhausted.

The tab, search, and special print features are limited. Tabs cannot be set; striking the Tab key inserts five blank spaces in the text. To move more than five spaces, you must press the Tab key again; to move less, you must delete the extra spaces. The search function finds the defined string and offers you the opportunity to replace each occurrence, but it does not let you define the replacement string for automatic replacement. Ranges of text can be identified for underlining, but other special print features, such as boldface and double strike, are defined at print time and apply to the entire document. The document attributes—spacing, margins, and so forth—are conveniently saved and automatically reloaded with the document. Reformatting is as simple as changing the document format settings.

The spelling checker, *Friendly Speller*, is one of the best I have seen. Documents are quickly and accurately checked for spelling errors. The option for a display of alternative spellings helps find the correct spelling for words misspelled in text. To correct words, you simply select the correct alternative or enter the correct spelling in the text yourself. Moreover, if the word is one that you will be using repeatedly, you can immediately add it to the auxiliary dictionary. You can also import "foreign" files for spelling correction or for editing as a *Friendly Writer* document. When I tried this with a *WordStar* document, the only casualty was the loss of all paragraph indentations.

Friendly Writer supports 49 printers; FriendlySoft urges you to call if yours is not on its list. The company says it will "add printers to the list frequently, and an

update that supports your printer may be available."

FriendlySoft offers a "No Fine Print" guarantee, which states that the company will replace your master disk at no cost if it fails during normal use; if it is damaged because of abnormal use, it will replace it

FriendlySoft offers a
"No Fine Print"
guarantee, which
states that the
company will replace
your master disk at
no cost if it fails
during normal use.

at no charge in return for a blank, unformatted disk. In either case, you must return the original, damaged disk. And if you have problems using the software, there is a 24-hour hotline.

Personal Editor

Personal Editor is a screen editor with comprehensive editing functions. There may be up to 255 characters per line, and the size of any document or file is limited by available memory and disk space. If *Personal Editor* runs out of memory space, it will create a "spill file," which may contain up to 128K.

I didn't find the *Personal Editor* to be well adapted to word processing. The package can be tailored to meet most document and text-handling requirements, but you must be willing and able to modify it. I think the program has been ingeniously designed to make the tailoring a fairly simple procedure—one of the appendixes even provides the command file and key definitions that the author used to set up the word processor when he was writing the reference manual. However, the novice PC user may be intimidated by the

reprogramming requirement.

Noteworthy features of the *Personal Editor* include its ability to edit up to 20 files simultaneously, to move or copy blocks of text between files, and to undo a mistaken deletion; the automatic saving of the last five changes on a user-accessible file; and the MACRO and DEFINE commands. The *Personal Editor* comes with certain functions assigned to various control keys. The DEFINE command allows you to assign new or different functions to various control keys, and the MACRO command lets you set up files of commands that can be saved and executed when accessed. Thus, you can set up a macro containing the commands needed to turn the *Personal Editor* into a word processor.

While there are no defined functions for page eject and underlined or emphasized printing, there is a function allowing you to embed printer commands in the text and thereby take advantage of all the special printer functions that are available on your machine, such as italics, compressed and enlarged print, and optional character sets.

Personal Editor is a powerful, flexible, and comprehensive text-editing program that can be made into a satisfactory word processor, but in order to use it effectively, you must be fairly comfortable with your PC.

QUICK-TEXT

QUICK-TEXT is a general-purpose word processing package that provides most word processing functions. The maximum line size is 80 characters, and, while the size of each file is limited by available memory, there is a print-chaining function that allows you to link several files for printing.

I didn't like the fact that you can't tell what page you are on while writing the document. However, an especially helpful feature is the command that enables you to automatically reverse the order of the two characters immediately to the left of the cursor—a tremendous aid to users who

WORD PROCESSING

Comparative Analysis of Six Inexpensive Word Processors

	Friendly Writer \$89.95	Personal Editor \$100.00	QUICK- TEXT \$55.00	QUICK- TEXT II \$70.00	Word Worker \$49.95	I-EDIT \$30.00
COST						
DOCUMENT ENTRY FEATURES						
Maximum line length	78	255	80	253	130	80
Automatic word wrap	yes	yes	yes	yes	yes	yes
Set margins	page size	yes	yes	yes	yes	yes
Tab set	5 spaces	yes	yes	yes	yes	yes
Set line spacing	yes	no	yes	yes	yes	yes
Right-margin justification	yes	no	yes	yes	no	yes
Center text	yes	yes	yes	yes	yes	yes
Reformat text	yes	yes	yes	yes	yes	yes
Ruler line	no	no	yes	yes	no	no
Status display (column, line, and page)	yes	col/ line	col/ line	col/ line	no	line
DOCUMENT EDITING						
Character						
● Insert	yes	yes	yes	yes	yes	yes
● Delete	yes	yes	yes	yes	yes	yes
Delete word (single command)	yes	no	no	no	no	yes
Line and block						
● Delete	yes	yes	yes	yes	yes	yes
● Copy	yes	yes	yes	yes	yes	yes
● Move	yes	yes	yes	yes	yes	yes
Find string	yes	yes	yes	yes	yes	yes
Replace string with defined string	no	yes	yes	yes	yes	global
Scrolling	yes	yes	yes	yes	no	yes
Save recent changes	no	yes	no	no	yes	yes
FILE HANDLING						
Retain document attributes when saved	yes	no	yes	yes	yes	no
Save selected blocks	no	yes	yes	yes	yes	no
Copy other files into document	no	yes	yes	yes	WW files	yes
Change document name	yes	yes	no	no	yes	yes
Automatic backup	no	no	no	no	no	yes
List of available files	yes	yes	yes	yes	WW files	yes
DOS interface						
● ERASE	FW files	yes	yes	yes	yes	no
● RENAME	no	yes	yes	yes	no	no
● COPY	FW files	yes	yes	yes	no	no
DOCUMENT PREVIEW ON SCREEN (on screen as on printer)						
	no	no	no	no	no	yes
SPELLING CHECKER INCLUDED						
	yes	no	yes	yes	no	yes

(continued)

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WORD PROCESSING

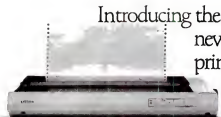
Comparative Analysis of Six Inexpensive Word Processors

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Maximum line length	78	255	80	253	130	80
Automatic word wrap	yes	yes	yes	yes	yes	yes
Set margins	page size	yes	yes	yes	yes	yes
Tab set	5 spaces	yes	yes	yes	yes	yes
Set line spacing	yes	no	yes	yes	yes	yes
Right-margin justification	yes	no	yes	yes	no	yes
Center text	yes	yes	yes	yes	yes	yes
Reformat text	yes	yes	yes	yes	yes	yes
Ruler line	no	no	yes	yes	no	no
Status display (column, line, and page)	yes	col/ line	col/ line	col/ line	no	line
DOCUMENT EDITING						
Character						
● Insert	yes	yes	yes	yes	yes	yes
● Delete	yes	yes	yes	yes	yes	yes
Delete word (single command)	yes	no	no	no	no	yes
Line and block						
● Delete	yes	yes	yes	yes	yes	yes
● Copy	yes	yes	yes	yes	yes	yes
● Move	yes	yes	yes	yes	yes	yes
Find string	yes	yes	yes	yes	yes	yes
Replace string with defined string	no	yes	yes	yes	yes	global
Scrolling	yes	yes	yes	yes	no	yes
Save recent changes	no	yes	no	no	yes	yes
FILE HANDLING						
Retain document attributes when saved	yes	no	yes	yes	yes	no
Save selected blocks	no	yes	yes	yes	yes	no
Copy other files into document	no	yes	yes	yes	WW files	yes
Change document name	yes	yes	no	no	yes	yes
Automatic backup	no	no	no	no	no	yes
List of available files	yes	yes	yes	yes	WW files	yes
DOS interface						
● ERASE	FW files	yes	yes	yes	yes	no
● RENAME	no	yes	yes	yes	no	no
● COPY	FW files	yes	yes	yes	no	no
DOCUMENT PREVIEW ON SCREEN (on screen as on printer)						
	no	no	no	no	no	yes
SPELLING CHECKER INCLUDED						
	yes	no	yes	yes	no	yes

(continued)

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CIRCLE 113 ON READER SERVICE CARD

WORD PROCESSING

constantly transpose characters.

The spelling checker that comes with the package is better than no spelling checker, but not by much. The dictionary has the articles *the* and *a* but it leaves out the pronoun *he* and the conjunction *and*. The checker is evoked during document entry; it will check only one word at a time and will not provide a display of alternative spellings. If you want to add words, you must make a note of them and run the dictionary update program once you have finished with your document.

Several features have been included to make *QUICK-TEXT* compatible with other packages, including the ability to easily create nondocument files and a special interface to directly read *WordStar* and *EasyWriter* Version 1.1 document files through recognition of a WS or EWF filename extension.

The package also has some nice form-handling features. You can number pages, define headings or footnotes to automatically print on selected pages, chain other documents to be printed sequentially, and

set the printer margin (used in addition to the document margin) to start a new page where appropriate.

QUICK-TEXT II

QUICK-TEXT II has all the features of *QUICK-TEXT* plus the following important additions: the maximum line size is increased to 253 characters; DOS 2.0 sub-directory support has been included; and you can use up to four printers. For example, you can have both a dot matrix and letter quality printer attached and you can direct your document to be printed by either one. In addition, *QUICK-TEXT II* has the capability to print from the editor without first having to save the document.

In addition, three other new features more than justify the \$15 price increase. The text merge feature allows you to create form letters or other form documents. Then, with the variable input feature, you can create a data file that has, for example, the names and addresses of agents to whom you wish to send a book proposal.

You can then construct your proposal to accept the names and addresses from the variable input file and insert them in the document when they belong. Now, you can type one form proposal that can access a file of 25 prospects and print 25 personalized proposals. The envelope feature lets you create an envelope to be associated with your document file that you can edit and print as appropriate.

In short, while *QUICK-TEXT II* requires more memory than other packages reviewed here, it does provide all the fundamental word processing functions along with some sophisticated ones.

The Word Worker

The Word Worker's 500-page manual explains the steps for selecting a computer and a printer and shows you how to write a word processing application for it. The application is, of course, *The Word Worker* programs that come with the manual, including a fundamental word processing routine that provides rudimentary writing, editing, and printing capability; an en-

(Comparative Analysis Chart continued)

	Friendly Writer	Personal Editor	QUICK- TEXT	QUICK- TEXT II	Word Worker	I-EDIT
DOCUMENT PRINTING						
Print selected pages	no	no	yes	yes	yes	no
Page numbering	no	no	yes	yes	yes	yes
Multiple copies	no	no	yes	yes	no	yes
Print before save	yes	yes	no	yes	yes	yes
Interface with various printers	yes	yes	yes	yes	yes	yes
Underline	yes	no*	yes	yes	yes	line*
Bold or double	document	no*	yes	yes	no*	line*
Superscript/subscript	no	no*	no	no	no*	no*
Footnotes and headers	no	no	yes	yes	yes	no
Top of form control	no	no*	yes	yes	yes	yes
Embedded printer control commands	no	yes	no	no	yes	yes
Text-merge and variable input	no	no	no	yes	no	no
Envelope utility	no	no	no	yes	yes	no
ON-SCREEN HELP						
Menu of available commands	yes	no	yes	yes	yes	yes
Accessible help file	yes	yes	yes	yes	yes	yes

*These features can be implemented by inserting the proper printer escape sequences.

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Plantronics Color Plus (Symphony Compatible)	590.00	389.00
Printers -- Epson, Oki, Diablo, NEC, Toshiba, Brother, Others		\$CALLS
Princeton Graphics		
Max-12 Amber Monitor ...	249.00	189.00
HX-12 Hi-res RGB Monitor ..	895.00	524.00
SR-12 Super Hi-res RGB Monitor w/Scan Doubler ..	1048.00	643.00
PTI Datasheet Power Supply ..	359.00	329.00
Diskettes -- 3M, Dysan, Others		\$CALLS

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Ashton-Tate dBase III	\$ 895.00	\$ 449.00
FRAMEWORK	895.00	489.00
8PI Systems Accounting® ea.	595.00	398.00
CYMA Shoebox Acctg Pkg	395.00	315.00
Human Edge Sales Edge	250.00	189.00
Microrim inc. R-base 4000 ...	495.00	315.00
Microsoft® Multiplan™	195.00	139.00
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WORD PROCESSING

hanced writing program; an enhanced editing program; and an enhanced printing program. You are provided the BASIC source for these routines and are told how to modify them to suit your particular requirements. The manual is an excellent reference, and the programs provide an extremely powerful document-handling capability. However, unless you are quite comfortable with your computer and fairly adept with BASIC—or willing to become so—you are not going to be comfortable with this package. And, even if you are a computer whiz and know BASIC inside out, you will probably find the editing program frustrating—it is a line editor that allows only one editing function at a time, and the only way to copy or move blocks of text is to delete them and rewrite them from the delete "holding area."

The program has been well designed for writing manuscripts and reports. The lines may be up to 130 characters long, and, while individual files are limited by available memory, the program will automatically store pages onto disk for long documents. It also offers a chaining function so these files can be automatically chained for editing and printing. There is a wide flexibility in page numbering and titling format, and there are utilities for handling footnotes and other special manuscript formatting requirements. You can also insert nonprinting notes to yourself to show where figures or tables should be inserted in the text. Moreover, you can insert special printer control sequences in the document as it is being created, so you can take full advantage of any special printing features your printer has.

I-EDIT, Version 2.11

I-EDIT processes and creates ASCII files so the documents created contain no special *I-EDIT* command sequences. Lines may be up to 80 characters wide, and, although document length is limited by available memory, a print-chaining function has been provided.

The application has been designed to serve as both a word processor, for the

creation and printing of documents, and as a screen editor, for the creation and editing of program files. I did not like the fact that the page number was not displayed on the screen during document entry and found it inconvenient that most scrolling functions were limited to the text displayed on the

screen. For example, the page up and page down function moves you from screen to screen. The capability to have the file printed to the screen for preview seemed a real asset until I discovered it scrolled by too fast to read. Because the document files are ASCII, printer control commands

Bargain Hunters Take Note

The following six low-cost word processors compare favorably to many more-expensive models.

Friendly Writer

FriendlySoft Inc.
3638 W. Pioneer Parkway
Arlington, TX 76013
(817) 277-9378
List Price: \$89.95

Requires: 64K RAM with DOS 1.x,
128K RAM with DOS 2.x, one disk
drive, 80-character monochrome or
graphics monitor.

CIRCLE 797 ON READER SERVICE CARD

Personal Editor

IBM Corporation
590 Madison Ave.
New York, NY 10022
(212) 407-3500
List Price: \$100

Requires: 64K RAM, one disk drive.

CIRCLE 798 ON READER SERVICE CARD

I-EDIT, Version 2.11

Innovative Technology Inc.
2387 Blackstone Crescent
Ottawa, Ontario
Canada K1B 4H3
(613) 521-8391
List Price: \$30 for executable copy,
\$120 for source.

Requires: 64K RAM, one disk drive,
80-character monochrome or graphics
display.

CIRCLE 799 ON READER SERVICE CARD

QUICK-TEXT

Distributed Software Systems, Inc.
950 Knollwood Dr.
Buffalo Grove, IL 60090
(312) 634-1511
List Price: \$55

Requires: 64K RAM, one disk drive.

CIRCLE 794 ON READER SERVICE CARD

QUICK-TEXT II

Distributed Software Systems, Inc.
950 Knollwood Dr.
Buffalo Grove, IL 60090
(312) 634-1511
List Price: \$70

Requires: 128K RAM, one disk
drive.

CIRCLE 796 ON READER SERVICE CARD

The Word Worker

Design Enterprises of S.F.
P.O. Box 14695
San Francisco, CA 94114
(415) 282-8813
List Price: \$49.95

Requires: Microsoft BASIC, 64K or
128K RAM, one disk drive.

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WORD PROCESSING

are entered as specially formatted lines of text or with the printer control escape sequences that *I-EDIT* allows you to insert in the text. While these features offer flexibility, they tend to make the printing of specially formatted documents a bit awkward.

I-EDIT offers some noteworthy editing features. You can transpose letters or words with a single command and sort several lines based on the value in a user-

You can add to the *I-EDIT* dictionary and even build your own dictionary files.

defined key field. You can also assign new definitions to the numeric and alphabet keys. Thus, if you wanted, you could have *personal computer* inserted in your text every time you pressed the Alt-P key combination. The new definitions assigned to these keys can be saved, along with document attributes, on a special file to be loaded with your document. In this way, you do not have to redefine them each time you reload the document.

The program includes a spelling checker, which will highlight all words on the screen not in the dictionary. You can add to the dictionary and build your own dictionary files.

I-EDIT was designed so that both document and program files could be created, and, because it handles only ASCII, it can interface freely with other applications.

If you're without a basic word processing capability, given the prices and selection, you won't go far wrong choosing from this low-budget list. ■

Marilyn V. Fleming is a computer specialist with the U.S. Army Corps of Engineers.

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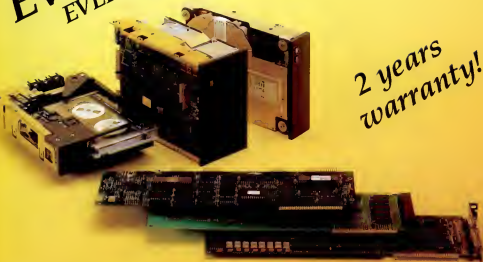
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If you are an individual investor who wants to keep track of fairly substantial investments, the first question you might ask about a package before even considering price or ease of use, is, "What can it show me that I need to know?" This is the first aspect of these packages we will be looking at.



The Technical Investor

Savant Software Corporation

P.O. Box 440278

Houston, TX 77244

(713) 556-8363

List Price: \$395

Requires: 128K RAM, two disk drives, modem, graphics-capable printer, and color/graphics adapter.

CIRCLE 734 ON READER SERVICE CARD



The Technical Investor

The Technical Investor is a dream to operate. Its setup batch file and installation program automatically take care of the preliminary housekeeping chores and minimize the headache of configuring the program to your computer. *The Technical Investor* is a quality product.

The package's tutorial gives you a flavor of the program's capabilities and its power without overwhelming you with too many details. The tutorial is clearly written and includes an excellent reference section if you need more information on a given charting or analysis technique.

My initial impressions of *The Technical Investor* were quite favorable. The manual is well written and keeps your time and interests in mind. It is typeset and printed on high-quality paper, includes a table of contents and an index, and is generally attractive to the eye. *The Technical Investor* comes with versions for both DOS 1.1 and DOS 2.0, but Savant recommends using 2.0. You also receive sample data so you can test the analysis and charting techniques without having to manually enter data or download data from an information utility.

Miniscreens

When you start *The Technical Investor* you are presented with a graphic display of the various menu choices (see Figure 1). This menu is actually the main menu for the entire Savant Investor Series, which

FACT FILE

Winning On Wall Street

Summa Software Corporation
P.O. Box 2046
Beaverton, OR 97075
(503) 644-3212

List Price: *Trader's Data Manager*, \$200, *Trader's Forecaster*, \$250, *Trader's Accountant*, \$350.

Requires: 192K memory, two disk drives, graphics printer, color/graphics card.

CIRCLE 735 ON READER SERVICE CARD

The Volkswagen Alternative

DSF Software's Stock Trader is a low-priced technical investment program for those investors who don't require a lot of fancy features.

The New York Times says *The Technical Investor* is the "Cadillac of the technical investment software world." If so, then *Winning On Wall Street* would be a Mercedes.

You may not be looking for luxury, however, and may find a Volkswagen—and Volkswagen pricing—more attractive. If you are price-conscious, your charting needs are minimal, and you don't need to use all those fancy technical analysis techniques to help you decide when to buy and sell, then DSF Software's *The Stock Trader*, at \$79.95, may be for you.

This program, despite its low price, is not just another toy. It is a serious investment analysis tool that can help you with your stock trading decisions just as *Winning On Wall Street* and *The Technical Investor* do. Of course, it cannot come close to providing all the analysis tools that the more costly programs do, but it does have the basics down.

It displays charts to your screen or printer and computes moving averages. And DSF Software provides telephone technical support. If you have a modem, the company will supplement the stock data provided on the program disk by

downloading an initial amount of data free of charge.

If you have been considering using your computer to assist you with stock market decision making, this is an excellent package to consider. DSF Software also sells a demonstration disk for \$6.95 that lets you use the full capabilities of *The Stock Trader* for 15 trading days and includes 30 days of data for eight stocks and the Dow Jones Industrial Average.

The program comes with no documentation. It has a four-page cardboard instruction booklet that also serves as a protection cover for the program disk. The two inside pages contain instructions on how to get started with *The Stock Trader*. The large majority of the information about using the program is in on-line help messages that you access with the F1 key.

The information you get this way leaves a bit to be desired. Figure A shows the information that comes to the screen when you request help interpreting the chart shown in Figure B. I hope you get a bit more information if you call

PC

The Stock Trader

DSF Software
P.O. Box 19624
Portland, OR 97219
(503) 244-4800
List Price: \$79.95

Requires: 64K RAM, one disk drive, color monitor, and dot matrix printer capable of producing boldface and italics.

CIRCLE 736 ON READER SERVICE CARD



DSF's support line. (The same screen is more helpful on a color monitor, however, than on the black-and-white printout in Figure A.)

Graphs

The buy/sell/hold signals generated by *The Stock Trader* are based on three technical indicators. When you first start the program you supply parameters that affect these three indicators and hence affect the buy/sell/hold signals. You must develop your market knowledge through experimentation before deciding what parameter values to use for a particular stock you are trading. Advice concerning general ground rules on how to select these input parameters is available by telephone.

The Stock Trader produces a rather interesting report for each stock or index in the database. The report contains information about the technical indicators you are generating under various input parameters. It also makes excellent use of the printer by using boldface, italics, and regular print to highlight certain changes in a stock's prices. Figure C shows a sample of this report for AT&T stock.

To collect data for trading the stocks you are interested in, you must get the data from the daily newspaper and input it manually.

This program doesn't approach the sophistication of *Winning On Wall Street* and *The Technical Investor*, but it should be interesting to see what *The Stock Trader* has to offer. And for \$6.95 for the demo disk, you really don't have much to lose. —G.H.



The Dow Dot will also carry the Buy, Sell and Hold signals on the DOW averages.

The two wavy lines across the chart are magenta, for the short term average, and white, for the long term average.

The magenta boxes at the bottom of the graph are the relative sales volumes.

When the stock switches from buy to hold, it may be wise to place a stop sell with your broker.

HIT F2 TO RESUME PROGRAM

Figure A: Help message from *The Stock Trader* explaining buy/sell/hold information produced on the graph in Figure B.

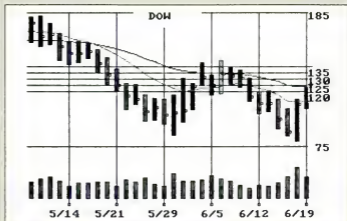


Figure B: Epson MX-80 printout of a *Stock Trader* graph. The actual graph is designed to be displayed on a color monitor, which depicts the buy/sell/hold signals in color.

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dProgrammer..... \$199

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5/11/84	16.00	15.13	15.88	12130	15.93	15.94	-0.01
5/14/84	15.88	15.63	15.75	10284	15.90	15.93	-0.03
5/15/84	15.88	15.63	15.88	10732	15.88	15.93	-0.05
5/16/84	16.00	15.75	15.88	10833	15.88	15.93	-0.05
5/17/84	15.88	15.63	15.75	7851	15.88	15.92	-0.04
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The columns depicting the close, short average, and long average are set up to reflect value changes.

Boldface : Value increase (**BOLDFACE**)
 Italics : Value decrease (*ITALICS*)
 Straight Type : No changes (**STRAIGHT**)

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(Sidebar ends)

Figure C: Report produced by The Stock Trader showing volume and value of the technical indicators used by the program to generate buy/sell/hold signals.

will eventually include modules for fundamental analysis and portfolio management.

You can now access *The Technical Investor's* main programs, and that of the communications module included with the package, by using the PC's cursor keys. Paul Langston, manager of marketing for Savant, says the fundamental analysis module will be available by late fall of 1984 and the portfolio module by the first quarter of 1985.

The Technical Investor's communications software supports the Dow Jones News/Retrieval service and the Warner Computer System service. It will download stock price and volume information by stock symbol onto a data disk. Once you have the information you need, you can enter the charting program. You are then presented with two horizontally split screens (called miniscreens by Savant) and are prompted at the bottom of the screen to enter a stock ticker symbol. When you enter a stock symbol from the data disk, you are shown a high/low/close price chart in the top miniscreen and a volume chart for the selected stock in the lower miniscreen (see Figure 2).

One unique feature of *The Technical Investor* is its ability to split the screen into

The Technical Investor can split the screen into four miniscreens.

up to four miniscreens at any time during a charting and analysis session. Since the program is command-driven, you create new charts by issuing commands through a "command line" at the bottom of the screen rather than by selecting items from a menu. At any point, you can issue an NS (for Number of Screens) followed by the number of miniscreens you would like to use. Figure 3 shows a screen divided into

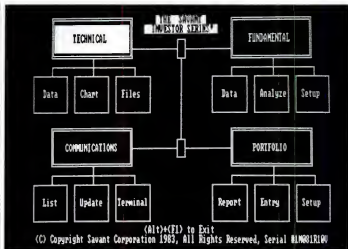


Figure 1: Main menu screen for *The Technical Investor* by Savant Software.

four miniscreens. You can move charts from one screen to the other or change the number of screens displayed at any time.

Automatic User Procedures

Like other sophisticated packages, *The Technical Investor* supports "command files" that contain multiple command sequences. *The Technical Investor* calls this command file feature "automatic user procedures." To create a user procedure, you issue the DP command, followed by the letter of the alphabet and the sequence of commands you want to execute when you call the procedure.

For example, suppose you had Figure 2 on the screen and you wanted to define a procedure to set the number of miniscreens to four, select miniscreen 3 (SS), clear it (CS), and plot (on miniscreen 3) a high/low/close price bar chart (PB), a 12-day exponential average (EA) of the closing-price time series, and a 50-day exponential average of closing price. Then you planned to select miniscreen 4, clear it, and plot a volume bar chart (VB) and a negative volume indicator (NV) on miniscreen 4.

You would define the automatic user procedure (which we shall call user procedure A) that accomplishes all of these tasks with the following command:

```
DP:A;NS:4;SS:3;CS:PB;EA:
12;EA:50;SS:4;CS:VB;NV
```

You then invoke the procedure using only four keystrokes: XP:A (execute procedure A). Figure 3 shows the results of using this procedure on the screen that is shown in Figure 2.

As you look at Figure 3 and the commands used to create it, you can begin to see how powerful *The Technical Investor's* analysis and charting capabilities are. It is also easy to use. All the commands are defined on a reference card; the manual's reference section describes each command and how it is issued and discusses its results. You can quickly learn how to make effective use of the commands and combinations of commands you want to implement.

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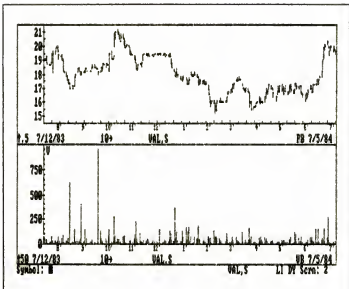


Figure 2: A high/low/close price chart and a volume chart for Valspar Corporation produced by Savant Software's Technical Investor.

matically executed when you boot up *The Technical Investor*, and the autoplot procedure is automatically executed when you enter a stock symbol and press AN (autoplot on). Pressing AF (autoplot off) turns the feature off.

The autoplot procedure is set to plot a price bar in miniscreen 1 and a volume bar in miniscreen 2 as soon as you enter a symbol. To get another price and volume plot, you merely enter another symbol.

Analysis Capabilities

The Technical Investor is obviously written with the serious technical investor in mind. Some of the more sophisticated analysis routines built into *The Technical Investor* allow you to plot exponential averages (EA), linear regressions (LR), moving averages (MA), negative volume indicators (NV), on-balance volume indicators (OB), oscillator functions (OS), point and figure charts (PF), price volume trend indicators (PT), positive volume indicators (PV), relative strength charts

(RS), trading bands on exponential, moving, or weighted moving averages (TE/TM/TW), and weighted moving averages (WA); you can also draw speed resistance lines (RL).

The Technical Investor has all the power even the most technically competent investor could want and more.

Winning On Wall Street

Whether or not *Winning On Wall Street* will make you a success in the stock market, the package itself is a winner, in my opinion, one of the best technical analysis packages on the market today.

Winning On Wall Street offers you more analysis techniques than you could possibly make effective use of in a week. And if you discover a new technique it doesn't include, you can probably use *Winning On Wall Street's* "user-defined procedures" to implement it. (Summa might also be willing to add your latest analysis tool to the next version released.)

First Impressions

My first impressions of *Winning On Wall Street* were good. The documentation is well written, provides enough detail to allow you to get a good understanding of the package's technical analysis tools, and is typeset on high-quality paper. The program has a good user interface program to allow you to configure the software to your particular computer. The communications parameters are easily set from a configuration menu. It accepts your information utility's password and automatically configures your Hayes Smartmodem so that you can easily download data automatically from the Dow Jones News/Retrieval service or from Remote Computing Corporation's Dial/Data service.

Winning On Wall Street is actually three separate programs each of which is able to access the same data on a single data disk: *Trader's Data Manager*, *Trader's Forecaster*, and *Trader's Accountant*.

The Data Manager allows you to create and maintain a database of daily, weekly, or monthly statistics for any stock or security you select. It is designed as a standalone package to display graphs and tabular data about the securities in your personal *Winning On Wall Street* database. However, if you want to analyze the data you must have the *Trader's Forecaster* module.

The Forecaster includes the technical analysis tools used by analysts, brokers, and prof institutional investors. How *Forecaster* cannot be open will need to purchase a first.

The third program, *Accountant*, is an add-on to *Data Manager's* securities transactions records, stock market trends, and sur 1984. This requires

Trader's Data Manager

The *Data Manager* program will retrieve data automatically from Dow Jones or from Dial/Data. You can also enter it manually. It creates charts, prints reports, maintains the data in your database, configures the software to your computer system, and will list the files on the data disk.

Automatic Data Retrieval

The automatic data retrieval feature makes downloading data effortless and efficient. *Winning On Wall Street* will configure your modem properly for data downloading from the utility. All you do is instruct it to retrieve data automatically and sit back and watch the software, computer, and modem do the work for you.

I was particularly impressed with the Express Update option for automatically downloading data to your database. For instance, when you are retrieving daily data for all stocks in your database, this option will cause *Winning On Wall Street* to look at the last date entered for each stock and automatically add any data you are missing up through the current date. You can have, for example, three stocks with daily data through 12/31/83 and two stocks with data through 4/30/84. The Express Update feature will note how much data each stock has and add the daily data only for those days needed to bring each stock up to date.

This feature can save you a lot of headaches when you haven't updated your database for a while or you are adding new stocks to your portfolio. It will also save you some money in updating costs because it only retrieves just the data each stock needs rather than downloading, for instance, a year's worth of daily prices for each stock.

Charting

Winning On Wall Street's charts are crisp and professional-looking (see Figures 4, 5, 6, 7 and 8). As you can see from Figure 4 (the standard display when selecting a high/low/close versus a volume

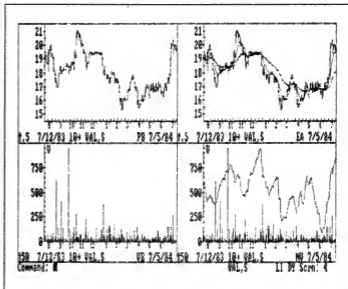


Figure 3: A four-way miniscreen display produced by The Technical Investor.

chart), *Winning On Wall Street* displays the price data at the top of the screen and the volume data at the bottom.

Since the *Data Manager* loads up to ten stocks for charting into memory at once, charting is also very fast. When you

Using *Winning On Wall Street's* update feature can save you a lot of headaches.

request a chart, the data is read from memory rather than from disk. A high/low/close price and a volume chart for 190 days of daily data is produced on the screen in less than 4 seconds. It takes about 75 seconds to load a year's worth of data for ten stocks from disk to memory. I find it worthwhile to spend a little time loading data from disk into memory for several stocks at a time in order to get fast-

er displays of the graphs when I call for them.

This feature does have its shortcomings, however. Since the point is to group stocks for comparison, you have to be careful to put stocks you want to compare in the same "group." Otherwise you will end up losing time swapping from one group of stocks to another.

When you select the Draw Charts option from the main menu, you can choose up to nine groups of stocks for charting. You might designate one group for each of several portfolios you are tracking or a new group of stocks you are currently considering. You might even group stocks by industry segment.

You can have up to ten stocks in each group, one for each of the PC's ten function keys. You select stocks within groups by pressing the function key that you have associated with the stock. You can quickly compare one chart with another in its group merely by pressing the function keys for each stock. Industry averages such as the Dow Jones Industrial Average

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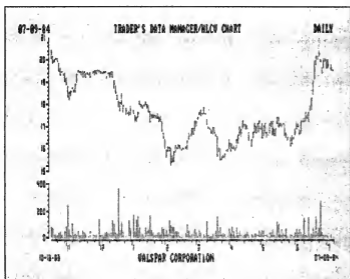


Figure 4: Winning On Wall Street's "standard" high/low/close/volume chart.

can also be assigned to a function key within a group.

You can compare an industry average with a stock by pressing the two function keys. You cannot, however, display high/low/close and volume charts for multiple stocks or industry averages on the same screen. You can compare multiple close prices for two stocks or for an industry average and a stock (see Figure 5).

Trader's Forecaster

The *Trader's Forecaster* program is a collection of sophisticated graphics and technical analysis tools. You use this portion of *Winning On Wall Street* to identify patterns by mathematically analyzing price and volume data for a stock or index.

This particular module includes five classic trending techniques: moving averages, weighted moving averages, exponential smoothing, adaptive filtering, and least square fit.

It also includes several tools for technical analysis: mid-channel support/resistance lines, $1/2$ - $3/8$ speed resistance lines,

trading bands, volume indicators, oscillator charts, and point and figure charts.

Dozens of trending and technical analysis procedures can be applied to a stock or index to help you interpret whether the stock is at a good sell or buy point. And using these techniques on the index can also help you interpret moves in the overall market.

The *Winning On Wall Street* manual adequately describes each technique. It gives you a minicourse in using technical analysis to buy and sell stocks.

Other Charts

In addition to the "standard" high/low/close and volume charts (see Figure 6 for examples), *Winning On Wall Street* includes some useful relative strength and normalized comparison charts.

A relative-strength chart allows you to compare performance of two stocks or a stock and an index over some period of time. Figure 7 compares the performance of Electronic Data Systems (EDS) and Valspar Corporation (VAL) with the Dow Jones Industrial Average. The base stock

(in this example, the Dow Jones Industrial Average) is represented as a straight line graph across the chart. All stocks are normalized to zero on the first day. After that, the base stock remains at a constant or norm while the lines representing the comparison stocks move above and below the baseline depending on that stock's relative performance against the base.

A normalized comparison chart is similar in concept to a relative performance chart, but the baseline represents \$100 worth of a security, purchased on the first day of the chart, instead of an index. Percent changes from the baseline are computed for each stock and graphed over time. Figure 8 shows that EDS has varied from 38 percent below to about 10 percent above its price on October 19, 1983. It shows that VAL did not drop in value as much as EDS did over the period charted but is currently valued about the same as it was on October 19, 1983.

Other interesting *Trader's Forecaster* features are: price/volume relationship charting, (which graphs the relationship between a given stock's price and the volume of trading), point and figure charting, a proprietary matrix projection formula, and an "autorun" feature.

The matrix projection formula is based on a mathematical model invented by Summa Corporation. This projection formula is an objective-setting tool. It seeks to detect the next peak and valley of a securities price. Unlike other analysis tools in the package, this model uses previous highs and lows (rather than charts) to predict the next significant high and the next significant low price. It is discussed in the *Trader's Forecaster* user manual.

The autorun feature is very convenient if you want to track your stocks often and run the same analyses each time you evaluate your holdings. Once you set up this autorun procedure, it will automatically calculate results and chart them on your display or printer. It is used with high/low/close/volume charting, point and figure charting, and matrix projection formula analyses.

Trader's Accountant

One of the major advantages that *Winning On Wall Street* has over *The Technical Investor* is its extensive accounting system. (*The Technical Investor's* accounting module is under development now but will not be ready until the first quarter of 1985.)

I cannot really do justice to the *Trader's Accountant* module in the space I have left. Its data entry, organization, and reporting capabilities are extensive. To use this program, you merely enter data about your stock transactions as they occur. It can handle margin and cash accounts, short sells, sell or buy to cover transactions, or long trades. You can manage up to 999 portfolio accounts, thousands of transactions, all types of securities, special liquid fund accounts, short and long positions, dividends and interest, stock split adjustments, brokers' fees, and margins.

It will automatically calculate realized and unrealized profit and loss, short- and long-term capital gains, brokers' commissions, cash on hand, and more. You can produce the following reports one at a time or through a batch facility that runs while you do something else:

- security transactions detail
- liquid fund transactions
- unrealized profit and loss detail
- realized profit and loss detail
- unrealized profit and loss summary
- realized profit and loss summary
- cash account transactions
- margin account transactions
- tax data/security transactions
- portfolio/liquid fund/security directories.

Samples of all of the reports are given in the manual.

You can also update price information from the *Trader's Data Manager*, either manually or from an information utility.

Simulation Mode

One feature of the *Trader's Accountant* module that merits special attention is something Summa calls "simulation

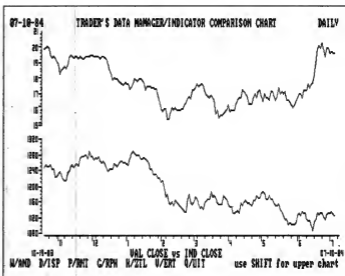


Figure 5: Example of *Winning on Wall Street's* indicator comparison chart. It shows the daily closing price for Valspar Corporation versus the daily closing price for the Dow Jones Industrial Average.

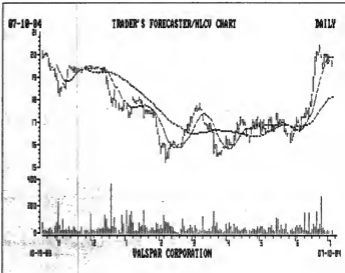


Figure 6: *Winning On Wall Street's* "standard" charts showing Valspar Corporation's daily price and volume data along with a 10- and 30-day moving average of the daily closing price.

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mode." In this mode, you can do "what if" analysis on all types of buy/sell transactions. You can use it to generate all the reports produced by this program based on hypothetical transactions and hypothetical price updates.

This feature allows you to test your buy/sell decisions and evaluate the effect they will have on the profitability of your portfolio. You can repeat the process more than once to compare a variety of decisions you are considering. And once you have finished with your simulated decisions, you can produce all the resulting reports in a batch. All this analysis and reporting won't affect the status of your real portfolio.

Head to Head

The Technical Investor and *Winning On Wall Street* are both first-class technical analysis investment packages. They are among the best the microcomputer software industry has to offer. It's difficult to recommend one over the other, but here is a point-by-point comparison.

Price

The *Trader's Data Manager* and *Trader's Forecaster* modules of *Winning On Wall Street* are roughly equivalent to the technical analysis and communications features of *The Technical Investor*. But together, the *Trader's Data Manager* and *Trader's Forecaster* modules cost about \$50 more. Both programs have good documentation and include good reference and tutorial material on interpreting and using the results of their analyses.

Both sets of documentation guide you through the package without overwhelming you with detail. I found *The Technical Investor's* tutorial slightly better.

Completeness

As of this writing, *The Technical Investor* does not have a portfolio management and reporting module, whereas *Winning On Wall Street* has an excellent one. Neither package has a fundamental analysis module, although both publishers plan to

A Practical Example

Winning on Wall Street and *The Technical Investor* helped the author of this review decide to sell two of his stock holdings—at a profit.

I was able to put *The Technical Investor* and *Winning On Wall Street* to practical use while reviewing them. Based on the analysis and charting results produced by both of these packages, I decided to sell two of my stock holdings at a considerable profit.

I was particularly intrigued with the package's point and figure charts and its moving average charts of my two closing prices, which helped me decide to sell my shares of Valspar Corporation (VAL) and Electronic Data Systems (EDS).

I executed these trades on July 6, 1984, based on the historical and current price and volume data I had downloaded from the Dow Jones News/Retrieval Service to both *The Technical Investor* and the *Winning On Wall Street* packages using their built-in communications interfaces.

The figures illustrating the main article were the charts I used to assist me in my decision. As you can see in Figures 3 and 6 of the main article and Figure D here, both stocks had peaked out. They were beginning to fall below their 10-day

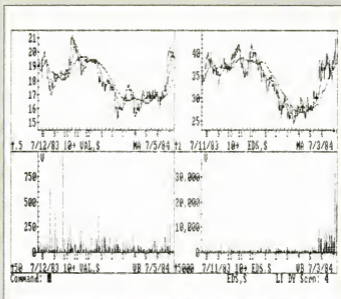


Figure D: Charts produced by *The Technical Investor* of the 10- and 30-day moving average and volume charts for Electronic Data Systems and Valspar Corporation.

moving averages, but were still well above their 30-day moving averages. The point and figure charts in Figures E and F show some strong "up trends" in effect. (In every point and figure chart there is a fairly significant "stack" of X's in the last column).

Sell, Sell, Sell

EDS and VAL were both exhibiting very "bullish" point and figure trends when they were sold on July 6.

Based on the strong sell signals I was getting from the moving average and the point and figure charts, it was a fairly easy decision to sell these two stocks.

The information I used to make my decisions would have taken many hours of effort had I constructed my charts and analyses manually.

The information I used to make these decisions would have taken many hours of effort had I tried to construct these charts and analyses manually unaided by the software.

Charts other than the point and figure and moving average charts were also helpful in making these decisions, all of which were produced with only minimal effort on my part. —G.H.

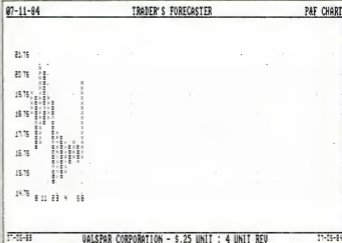


Figure E: Point and figure charts for Valspar Corporation from The Technical Investor (top) and Winning On Wall Street. (Sidebar continues)

(A Practical Example continued)

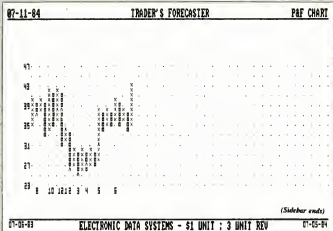
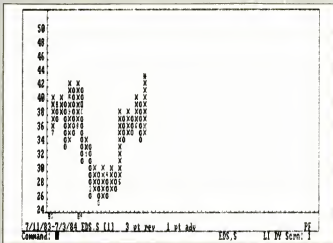


Figure F: Point and figure charts for Electronic Data Systems from The Technical Investor (top) and Winning On Wall Street.

offer one in the near future.

Despite the extra cost, having the transaction entry and reporting features of *Winning On Wall Street's* *Trader's Accountant* is worthwhile.

The *Technical Investor* will soon have a *Spreadsheet Databridge* program that transfers data to and from *The Technical Investor* to Lotus's 1-2-3. I have seen a beta-test version that works well.

Unique Features

Each package offers some unique analysis tools and features. *The Technical Investor* offers a built-in logarithmic mode in addition to a linear mode, commands rather than menus, user-defined macros, a startup file similar to that of DOS's AUTOEXEC.BAT, and function-key-invoked procedures.

Also, *The Technical Investor* handles stock splits more elegantly; when updating stock prices for the split, you can see a chronological list of daily prices for that stock on the screen, so mistakes in entering the date of the split are minimized. *The Technical Investor* can display up to four charts on a screen simultaneously. The most *Winning On Wall Street* can display on one screen is two charts.

Winning On Wall Street offers an adaptive filtering analysis, more extensive comparison analyses, a proprietary matrix projection model for high and low points, an autorun facility, normalized comparison charts, and extensive user-defined formulas.

I find *Winning On Wall Street's* charts more appealing to the eye. It also can convert daily data to weekly data.

Winning On Wall Street loads ten stocks' worth of data from disk into memory at once, so it's very fast in displaying charts to the screen, although batch loading of data from disk to memory is not without its problems.

Also, *Winning On Wall Street* needs a menu at the bottom of the screen that identifies the function keys associated with each stock. You can get a printout of the function keys for a given group of stocks,

but having it available on screen would be a nice feature.

Winning On Wall Street allows you to maintain indicators as well as high/low/close/volume data. For example, you could maintain daily price/equity ratios for each of your stocks and chart this series against others.

Winning On Wall Street is menu-driven rather than command-driven. It is annoying that you must sometimes use the Ctrl key and the Enter key together to enter the data from a screen, and other times just the Enter key. The reason for this inconsistency is not readily apparent.

Winning On Wall Street has a nice feature that allows you to display the high/low/close/volume data for a given day in chart form. You can also easily get a tabular printout for any day.

Communications

Both *The Technical Investor* and *Winning On Wall Street* have superb communications interface setup and downloading capabilities. Automatic data retrieval from information utilities is a breeze with either package. If you have a Hayes Smartmodem, both programs will automatically handle switch settings and the like for the modem interface.

The communications modules in both programs are equally speedy. It took 9 minutes, 17 seconds for *The Technical Investor* and 10 minutes, 24 seconds for *Winning On Wall Street* to sign on, download, and sign off the Dow Jones News/Retrieval service while extracting and writing to disk 1 year's worth of daily data for two stocks.

I would say the programs are equally matched in this area. However, the "express update" feature in *Winning On Wall Street* should save you some initial update time, especially if you often add new stocks to your portfolio.

Package Integration

The Technical Investor is a completely integrated program. It accesses the data through its various modules without your

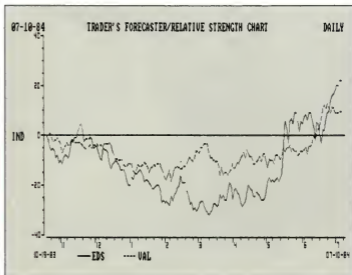


Figure 7: A relative strength chart produced by *Winning On Wall Street*. It compares the daily performance of Electronic Data Systems (EDS) and Valspar Corporation (VAL) with the Dow Jones Industrial Average.

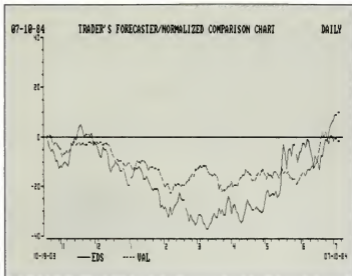


Figure 8: *Winning On Wall Street*'s normalized comparison chart showing the percent increase or decrease in the value of EDS and VAL relative to its price on the starting date of the chart, 10/19/83.



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having to exit from one module, load another disk, and start another part of the program. Although the fundamental analysis module and the portfolio accounting modules are not available yet, Savant claims that they, too, will be fully integrated. *The Spreadsheet Databridge* will help "integrate" *The Technical Investor* with *I-2-3* as well.

To go from one program to another in *Winning On Wall Street*, you must exit one and start another. This process is easier if you have a hard disk and don't have to worry about swapping disks.

You are, however, able to leave a single data disk in the disk drive. All three of the *Winning On Wall Street* modules use the data disk directly without converting or transferring the data to a new database. However, moving from one program to another is not so easy. For instance, to get

from the *Trader's Data Manager* to the *Trader's Forecaster* you have to escape from several menus back to the *Trader's Data Manager* master menu before you

Winning On Wall Street has a slight edge.

are able to load and execute the *Trader's Forecaster*. Then you may have to go through several other *Forecaster* menus to get to the menu item you need.

Conclusions

Both these packages are superior technical investment analysis tools. You could hardly cram any more analysis tools into

either one. You should be able to find the analysis tools you need in either package, no matter what your trading style.

If you need portfolio accounting integrated into your technical analysis product and you can't wait for Savant to develop *The Technical Investor's* accounting module, then *Winning On Wall Street* is the product for you. If transferring data to *I-2-3* is a priority, then you may want to choose *The Technical Investor* when the *Spreadsheet Databridge* comes out.

My decision between the two is close to a toss-up, but I think *Winning On Wall Street* has a slight edge. Its extra analysis tools, portfolio accounting, "express updating," and attractive charts are real pluses. But you may find *The Technical Investor's* lower price, closer integration, command-driven system, and link to *I-2-3* more attractive. ■

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By Hyres Veson

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The first step was to put all the CPU essentials onto the base-

board, leaving more open expansion slots and greater provision to meet users' changing needs. The standard 5160 system includes all these essential features on the baseboard: 8088 CPU and optional 8087 coprocessor; 128K memory (expandable to 640K); calendar/real-time clock with battery backup; two RS-232C ports; parallel printer port; floppy disk controller and SASI interface.

So for an office system that truly offers room to grow, choose ISI International's 5160 office system.

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Both the 5160 and the 6160 offer MS-DOS® and GW-Basic;® in addition, the 6160 factory system offers VRTX†, a multitasking kernel that permits you to run real-time, interrupt-driven control applications.

For operation in a more office-like setting, the 6160 can be dressed up in its own "office" style cabinet, just like the 5160. But underneath, it will still be the most versatile, expandable, functional computer available to run factory control applications.

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▶▶ A Character Set for a More Readable Screen

Make text on your color monitor easier to read by completing these two soldering projects with your adapter. One turns on a larger font, the other adds a blank line between text rows.

Any personal computer display can sometimes be difficult to read. The characters are too small for the visually impaired or the beginning reader, and the density of the lines can be fatiguing for anyone who spends a lot of time at the keyboard. The design of IBM's Color/Graphics Adaptor allows you to make two slight modifications that will generate a larger font or create an extra scan line between the rows of text. To make these changes you

must have some soldering skills. If you don't, or if you have never worked on a card with pins spaced as closely as this one ($\frac{1}{16}$ -inch apart), you may want to enlist the aid of a skilled friend. You will be inserting wires from the pin side of the card into the card's plated-through holes alongside the integrated circuit leads already in those holes. The pin side is the one without any components; the other side of the card is called the component side. You should use solid, insulated wire, Number 26 or smaller.

Most integrated circuits are designed to withstand 7 seconds of soldering temperatures. If you can't get the wire to enter the

hole alongside the lead after a few seconds, let it cool and try again. A few of the instructions tell you to connect two wires to the same point. If you can't get both wires to enter the plated-through hole, connect the second one to the first in a T-shape. (Just be sure they don't contact anything else when they're pressed flat against the back of the card.) It may be helpful to first use solder wick or a solder removal tool at all connection points.

References to integrated circuits in the connection list are by circuit number and pin number. The circuit numbers are silk-

screened next to the modules on the component side. They begin with a capital *U*. When viewed from the component side, integrated circuit pins are numbered counterclockwise starting from the lower left. On both sides of the card, you can identify pin 1 of each module by the dimple in the plastic and by the square pattern around the plated hole. This works for any size module (see Figure 1).

In addition to the hardware modifications, you will have to make some software changes. For both of these projects, I have included a parts list, connection instructions, and source code for the needed programs.

Both of these projects conform to the I/O address map in Section 2 of the *IBM PC Technical Reference* manual (page 2-23 in the July 1982 edition). The new connections will not conflict with any other conforming adapters. Both projects are deactivated when power is initially turned on, so they do not interfere with the PC's use for all applications. Other users need not be aware of the special features you have installed.

Neither modification will place an additional load on the I/O channel. They are designed to minimize the additional load on the power supply and heat dissipation equipment.

A Third, Larger Color Font

The *IBM PC Technical Reference* manual states that the IBM Color/Graphics Adaptor's ROM character generator includes three fonts. Why three fonts? Why not two or four? A little study of the ROM schematic diagrams in the *Technical Reference* manual yields the answer. A 7×7 double- and a 5×7 single-dot font each fill one-fourth of the ROM; the remaining font uses the other half.

The $8K \times 8$ ROM has 13 address bits. In the PC, bit 11, the second-most significant bit, can be switched to select double- or single-dot fonts. (For instructions, see "Single Dots or Double," *PC*, Volume 3 Number 11). Bit 12, the most significant bit, is permanently connected to the +5

volt power supply on the color/graphics card, which means it always applies a logical value of 1.

In fact, the third font is at the lowest addresses in the ROM; the single-dot font is next, and the double-dot font is at the highest addresses. These addresses are illustrated in Figure 2.

As you might expect, a font that takes up twice as much space as the normal fonts must be something special. It certainly is: it's the font used in the IBM Monochrome Adaptor. The characters are 9 dots high by 7 wide, and the ROM also includes blank scan lines that ensure that the descenders on characters such as *g*, *j*, *p*, *q*, and *y* do not make contact with the tops of capital letters on the next line. This third font is much more readable and attractive than the 7×7 dot double-dot font. (These character heights are for the normal capital letters; they do not include descenders.) It's ideal for beginning readers or the visually impaired. In fact, for the visually impaired programmer, use of this font and 40-column mode on a conventional television or monitor is better than any alternative short of a special monitor. Figure 3 shows both the large font and the usual font on the color/graphics adapter. Figure 4 is a BASIC program that simulates the large font. If you're not sure you want to make these hardware changes, you can run this program to see what the large font looks like.

You do, of course, pay a price for everything. Because the color/graphics card and monitors or televisions can display only 200 or so scan lines, when the character height is changed to 13 scan lines from 8, the maximum number of displayable lines is reduced from 25 to 16. Obviously, with only 16 visible lines, any program that assumes 25 visible lines will be writing off the screen a lot. This problem won't damage the hardware, but it is hard to use a program when the only way you can see what you've typed is to issue several carriage returns. The worst environments for the large font are those that place a lot of information on the screen

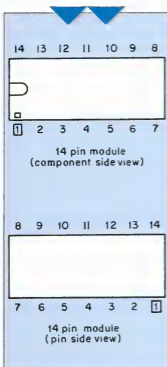


Figure 1: To identify module pins, note the round dimple above pin 1 and the square pattern around the plated hole for pin 1.

and those that scroll the output in typewriter fashion, such as spreadsheets, word processors, and processors like DOS.

The best environments for the large font are those that put only a little information on the screen at a time: database programs like *PC-File*, children's tutorials, or programs you can modify because you have the source code. The very best environment is BASIC. The BASIC supplied with the IBM PC is designed for a variety of displays. You need merely tell it that your display has only 16 lines, and it will cooperatively scroll the screen as soon as the 16 lines are full. To redefine the ending line for BASIC, you merely type:

```
DEF SEG : POKE 92, 16.
```

You must do this coding whether you have loaded the MC6845 registers from BASIC or by changing the parameter tables.

The large font is ideal for the visually impaired individual because it is installed on the hardware. The only other alternative to a special monitor involves graphics mode and mapping of characters to the undefined graphics extension. As long as things are normal, this method is fine, but when an error occurs, you are faced with a standard-size, perhaps unreadable error message from BASIC. When the large characters come from the hardware without software translation, errors will not produce unreadable messages. If you are not visually impaired, the best way to use this font is to enable it only when you wish and to keep the normal 7×7 font as the default when you turn on the power.

This project conforms to the I/O address map in the *Technical Reference* manual; that is, it uses only addresses between 3D0 and 3DF hexadecimal, which are reserved for the color/graphics card. Therefore, it will not interfere with other cards or PC accessories as long as they also obey the rules. Additional power dissipation is less than $\frac{29}{1000}$ of a watt.

I/O addresses are similar to memory addresses, except that the address space is usually used to attach peripheral hard-

ware. Unlike memory, the map is usually not contiguous, in that a device is not necessarily attached at each location.

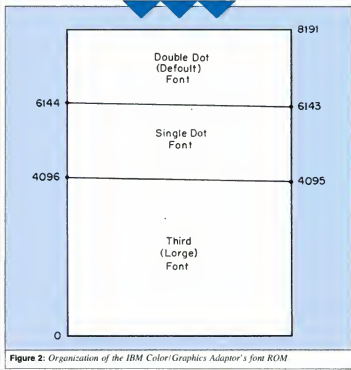
On the color/graphics card, for example, the MC6845 CRT controller responds to addresses 3D0 and 3D1 (hex). The Mode Control register (used to set text or graphics, 40 or 80 columns, and color or black-and-white) is at 3D8 (hex) and the Color Select register is at 3D9 (hex). The Light Pen Status register may be read at 3DA (hex), and the Light Pen Trigger register may be reset or preset by accesses to 3DB and 3DC (hex), respectively. Nothing is defined for addresses 3D2-3D7 or 3DD-3DF.

The memory map for the 8088 is 1,024K long. It takes 20 bits or five hexadecimal digits to express a number this large. The I/O map is only 64K long. You

can express addresses in 16 bits or four hexadecimal digits. In the IBM PC, the I/O map is further restricted in that only the lowest 10 address bits are used. A maximum of 512 unique addresses is available in the I/O map.

To access the I/O map, you use special instructions. In BASIC, the OUT and INP instructions transfer data to and from the I/O map, the way POKE and PEEK do for the memory map. In assembly language, you use the OUT and IN instructions instead of the all-purpose MOV.

To minimize the amount of added circuitry needed for this project, I have used address-activated selection like that of the Light Pen Trigger. Any access, either an OUT with any data value or an IN, will activate the added latches. Both latches are reset by an access to address 3DD



READABLE SCREEN

(hex). An access to address 3DE (hex) enables the single-dot font. To enable the third font you must access both 3DE and 3DF (hex).

You also need to change the parameters programmed into the MC6845 CRT controller. The MC6845 consists of a number of programmable hardware counters (bi-

cursor bounds, and adjustment values are counts of scan lines.

You can't expect a CRT controller programmed for characters 8 dots high to display a font 13 dots high. You must do a little programming and make some additional hardware connections.

The MC6845 has 18 internal registers

requiring modified values are:

Register Number	Register Name	New Hex Value	New Dec Value
4	Vertical Total	13	19
5	Vertical Total Adjust	02	02
6	Vertical Displayed	10	16
7	Vertical Sync Position	12	18
9	Max Scan Line Address	0C	12
10	Cursor Start Register	0B	11
11	Cursor End Register	0C	12

The Vertical Total register (register 4) and the Vertical Total Adjust register (register 5) together determine the vertical sweep frequency. This must be kept constant for most televisions and monitors in order to get an exact 60-hertz vertical refresh rate, which minimizes the annoying ripple that sometimes travels up or down the screen. The integer number of the character line times -1 is programmed into the 7-bit Vertical Total register. The fraction is programmed into the 5-bit Vertical Total Adjust register. For the large font, 20 rows of 13 scan lines each plus 2 scan lines adjustment equals 262 scan lines, the same result as the PC's usual 32 rows of 8 scan lines plus 6 scan lines of adjustment.

The Vertical Displayed register (register 6) is a 7-bit register that contains the number of rows to be displayed. Not all the rows can be displayed; some time must be reserved for sweeping the beam back to the top of the screen and sending sync information. By starting the top row close to the top of the screen, 16 lines can be accommodated. Optional parameters for 17 rows are shown in the listings. If you elect to display 17 rows, you will have to set the Horizontal Sync Position register (register 2) carefully to center the display and to make sure neither end of the top or bottom line is cut off by a CRT corner.

The Vertical Sync Position register (register 7) is programmed in character

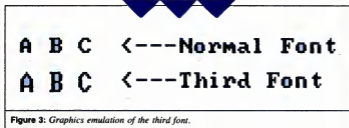
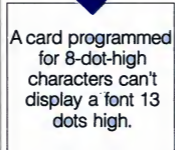


Figure 3: Graphics emulation of the third font.

nary hardware registers that show an increment each time they receive an electronic pulse) and registers with comparison values. In the horizontal direction, for example, as a line is swept across the screen, the controller compares the total line length, the displayed line length, the point at which to add a horizontal sync pulse to the signal, and the cursor location. Each of these values is expressed as a count of characters, and the MC6845 continually compares the values stored in its internal registers to its horizontal counter. When it detects any match, it activates the appropriate hardware.

The vertical direction is trickier. The MC6845 must compare not only total height, displayed height, and vertical sync pulse generation, but also the number of times each character must be reslected as each row of its dots is displayed, the starting and ending lines for the cursor, and an adjustment value that minimizes annoying ripple on the CRT screen caused by interference with the 60-hertz power line. Some of the vertical parameters are expressed in character row counts and some in scan line counts. The total and displayed heights and the sync position, for example, are counts of character rows, while the number of character rescans,

for comparison with the horizontal and vertical counters. They are identified in the *Technical Reference* manual and defined in Motorola's *MC6845 Data Sheets*. The MC6845 has only two addresses in the I/O map. To write to a register, you must first select the register by writing its number to address 3D0 in



the I/O map. You then write the data for that register to address 3D1. For example, to change the Vertical Sync Position register in BASIC, you would type:

```
OUT &H3D0, 7 : OUT &H3D1, 18.
```

Another example of this access appears in the BASIC manual, under the description of the OUT command. The registers

rows to produce synchronization information for the monitor or television. Modifying the value in this 7-bit register changes the distance on the display screen from the top to the first row of characters.

You may be more familiar with its horizontal counterpart, register 2, which is frequently modified to move the display to the left or right. The default for register 2 is 45 in 40-column mode and 90 in 80-column mode. For most televisions, these settings cause the first character or two to appear off the left edge of the screen, so if you use a television with the color/graphics card, you are probably used to issuing the command sequence:

```
OUT 980,2 : OUT 981, 44.
```

The Max Scan Line Address register (register 9) is the key to this project. This

5-bit register determines the number of scan lines per character row, including spacing. The programmed value is a maximum address and is one less than the number of scan lines. Conceptually, the MC6845 compares this register to the scan line counter at the end of each scan line. When the maximum value is reached, it resets the scan line counter and increases the row count by one.

The Cursor Start register and Cursor Stop register (registers 10 and 11) define the starting and ending rows for the cursor. The lowest 5 bits of these registers define, respectively, the starting and stopping scan lines for the cursor. These are the registers modified by BASIC when you use the LOCATE statement with the fourth and fifth arguments.

All of these values must be inserted into

the MC6845 registers when you select the third font. They will be changed by the BIOS whenever the display mode is changed. For example, in BASIC, the command sequence

```
SCREEN 1 : SCREEN 0
```

will cause the BIOS to reload the default parameters into the MC6845.

There are two ways to attack this problem. You can load the MC6845 after each mode change, a technique appropriate within, say, a BASIC program. Figure 5 is an example of a BASIC program that switches between modes. Each time it is run, it switches to the default font and parameters, and then to the large font. Note that it uses the LOCATE statement to modify the cursor definition. You can also use the BIOS-provided facilities to replace

```
10 'Program Chars-Generate Images of Large Font characters
20 'Copyright (C) 1984 Laurence V. Marks
30 '
40 SCREEN 1,0: WIDTH 40:KEY OFF:COLOR 7,0
50 CLEAR ,&HB000 ' save 32K bytes at end of BASIC for array data
60 DEF SEG = 0 'Set vector to high character table
70 POKE &H7C,0: POKE &H7D,&H80 ' Offset to character data =32K
80 POKE &H7E, PEEK(&H510):POKE &H7F,PEEK(&H511) ' Segment of character data,
  same as BASIC's segment
90 DEF SEG ' Set segment back to BASIC's
100 FOR I=0 TO 46:READ A$: POKE &HB000 + I, VAL("&H"+A$):NEXT I 'Read char data
110 DATA 10,38,6C,C6,C6,C6,FE,C6 'Top of A (See Technical Reference pages)
120 DATA FC,66,66,66,66,7C,66,66,66 'Top of B (A-75 and A-76 for examples )
130 DATA 38,6C,C6,C0,C0,C0,C6,6C 'Top of C
140 DATA C6,00,00,00,00,00,00,00 'Bottom of A
150 DATA FC,00,00,00,00,00,00,00 'Bottom of B
160 DATA 38,00,00,00,00,00,00,00 'Top of C
170 CLS:LOCATE 12,18
180 PRINT "A B C <---Normal Font"
190 LOCATE 14,18
200 PRINT CHR$(128); " ";CHR$(129); " ";CHR$(130); " <---Third Font"
205 LOCATE 15,18
210 PRINT CHR$(131); " ";CHR$(132); " ";CHR$(133)
220 'FIGURE 3. Sample BASIC program to display large font characters
230 PRINT:PRINT
240 PRINT" FIGURE 2. Graphics Emulation"
250 PRINT
260 PRINT" of the Third Font"
270 A$=INPUT$(1)
280 '
```

Figure 4: A sample BASIC program to display large font characters.

READABLE SCREEN

the default parameters. The BIOS checks memory location 0:74 (hex, corresponding to interrupt vector 1D hex) for a pointer to the parameter tables for the MC6845. You have to replace all four tables even though only two are changed, but the changes then persist through the mode switching. This technique would be appropriate for developing BASIC programs with lots of alternate graphic and text screens. Quitting the graphic mode would automatically restore normal text. Figure 6 is an example of an assembly language program that "installs" a set of new parameter tables at the lowest avail-

able memory address, changes the BIOS pointer to identify the new tables, instructs DOS to reserve memory used by the table (64 bytes), and then returns to DOS. Incidentally, as long as new parameters are being defined, this is the perfect opportunity to change that pesky horizontal sync. Just change the value in the two tables for 40- and 80-column text modes shown in Figure 6. Usually a value one or two less than the defaults in 40-column mode, and two to four less in 80-column mode, is satisfactory.

Naturally, hardware designed to display characters in an 8-dot-high box isn't

exactly ready to display characters in a box 13 dots high. Fortunately, not much modification is needed. The double-dot and single-dot fonts in the MK36000 font ROM are coded so that the three least-significant bits are used to select which of the eight rows in a character to scan. The MC6845 puts out Row Addresses 0 to 2 from its scan line counter that connect to these ROM inputs to select the proper character row. The next 8 bits contain the ASCII character value to be displayed. The next bit, bit 11, selects double- or single-dot codes as long as bit 12 is on (its normal state). Bit 12, the most significant,

```
10 'FONT3.BAS--Program to modify parameters in BASIC and for the Color/Graphics
  Card.
20 'Copyright (C) 1984 Laurence V. Marks
30 DEF SEG=0 'Switch to the Color/Graphics monitor if both installed
40 POKE 1040,(PEEK(1040) AND &HCF) OR &H20
50 SCREEN 1 'This sequence, SCREEN 1:SCREEN 0 causes the standard parameters
60 SCREEN 0 ' to be loaded into the MC6845
70 OUT &H3DD,0 'Reset the double-dots and FONT3 latches
80 LOCATE ,,1,6,7 ' Normal cursor height and position
90 INPUT " Width? (40 or 80)",W:WIDTH W
100 FOR I=1 TO 4:READ A$:PRINT A$;PRINT A$;NEXT I
110 PRINT "Strike any key when ready . . ."
120 A$ = INPUT$(1) 'Get a key
130 '-----
140 'The FONT3 setup starts here
150 '-----
160 OUT &H3DE,0 'Set double-dots latch
170 OUT &H3DF,0 'Set FONT3 latch
180 OUT 98,4:OUT 98,19 'Vertical Total
190 OUT 98,5:OUT 98,2 'Vertical Total Adjust
200 OUT 98,6:OUT 98,16 'Vertical Displayed #
210 OUT 98,7:OUT 98,18 'Vertical Sync Position
220 OUT 98,9:OUT 98,12 'Max Scan Line Address
222 ' # Change the 16 to 17 in lines 200 and 270 to display 17 lines
230 '-----
240 'The FONT3 setup ends here
250 '-----
260 DEF SEG 'Addressability to BASIC
270 POKE 92,16 ' Tell BASIC the screen has only 16 lines #
280 LOCATE ,,1,11,12 'Cursor to scan lines 11-12. Could use 6845 regs 10 & 11.
290 DATA The quick brown fox jumped over the lazy
300 DATA DOGS. THE QUICK BROWN FOX JUMPED OVER T
310 DATA DESCENDERS-gjapygjqpygjqpygjqpygjqpygjqp
320 DATA CAPS-ABCDEFGHIJKLMNPOQRSTUVWXYZABCDEFghi
```

Figure 5: A BASIC program to reload the MC6845 registers.


```

TITLE  Install Video Params and Set Pointer at
Int 10H
      ; Copyright (C) 1984 Laurence V. Marks
      PAGE      60,96
      NAME      Font3
0000  ONESEG     SEGMENT
      ASSUME CS:ONESEG
0100  ORG      100H
0100  HERE    PROC  FAR
0100  EB 40   JMP      SHORT  START
;=====;
;  CONSTANTS AREA
;=====;
0102  INT_RET LABEL  BYTE
= 0025  DOS_FUNCT EQU  25H
= 001D  INT_VECTOR EQU  1DH
= 0074  INT_OFFSET EQU  INT_VECTOR * 4
= 0076  INT_SEGMENT EQU  (INT_VECTOR * 4) + 2
= 03DE  SNGL_DOTS  EQU  3DEH
= 0410  EQUIP_FLAG EQU  410H
= 0000  SET_MODE   EQU  00H
= 00DF  CRT_TYPE   EQU  0DFH ; 80 Column monitor
= 0000  MODE_SELECT EQU  00H ; 40 x 25 black and white
; Could substitute  1H  40 x 25 color
; or                2H  80 x 25 black and white
; or                3H  80 x 25 color
;=====;
;  VIDEO PARAMS TABLE
;=====;
0102  VIDEO_PARAMS LABEL BYTE
0102  3B 2B  DB  3BH,2BH ; MODIFIED TABLE FOR 40 x 25 DISPLAY
0104  2D   DB  2DH      ; Horizontal Sync Position
                       ; Could be 2C or 2B to shift display
                       ; slightly to the right. See the text.
0105  0A   DB  0AH      ;
0106  13   DB  13H      ; Vertical Total (19 rows of chars)+1
0107  02   DB  02H      ; Vertical Total Adjust (2 scan lines)
0108  10   DB  10H      ; Vertical Displayed (16 rows of chars)
                       ; You could use 11 (17 rows of chars)
0109  12   DB  12H      ; Vertical Sync Pos (18 rows of chars)
010A  02   DB  02H      ;
010B  0C   DB  0CH      ; Max Scan Line Adr(12 lines per char)+1
010C  0B   DB  0BH      ; Cursor Start (Line 11)
010D  0C   DB  0CH      ; Cursor Start (Line 12)
010E  00 00 00 00  DB  0.0.0.0
0112  71 50  DB  71H,50H ; MODIFIED TABLE FOR 80 x 25 DISPLAY
0114  5A   DB  5AH      ; Horizontal Sync Position
                       ; Could be 56 - 59 to shift display
                       ; slightly to the right. See the text.
0115  0A   DB  0AH      ;
0116  13   DB  13H      ; Vertical Total (19 rows of chars)+1
0117  02   DB  02H      ; Vertical Total Adjust (2 scan lines)
0118  10   DB  10H      ; Vertical Displayed (16 rows of chars)
                       ; You could use 11 (17 rows of chars)

```

(continued)

Figure 6: An IBM Macro Assembler program to replace the default MC6845 parameters.

READABLE SCREEN

selects the third font. If bit 12 is off, the large font is selected and bit 11 is used as the fourth count bit to select scan lines beyond the eighth line. To display the third font properly, bit 11 must be connected to the MC6845 Row Address 3, which is currently unused. Therefore, to switch modes selectively, you must be able to switch ROM address 12 on or off and switch ROM address 11 among three positions: on, off, or connected to Row Address 3.

(I have assumed, in describing this project, that you have made the modifications to the color/graphics card described in "Single Dots or Double," *PC*, Volume 3 Number 11. If you have not done so, the connection list for that project is also included here.)

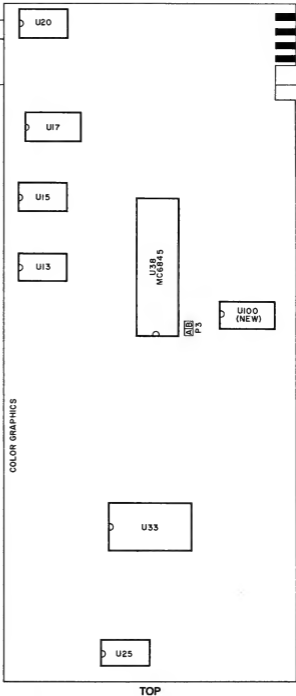
There aren't quite enough unused circuit portions on the unmodified color/graphics card to complete this project, but there is room to add one module. Fortunately that's just enough. You will need an SN74LS00 integrated circuit. This 14-pin circuit contains four NAND portions and should cost less than 50 cents. It's available at any electronics parts store.

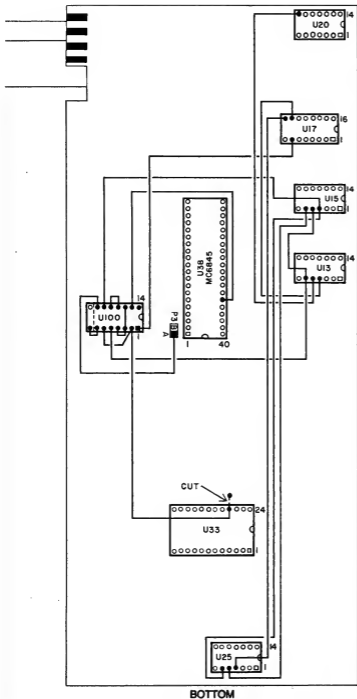
Connection Instructions

Wiring additions in the steps below should be made to the underside (pin side) of the color adapter card. I have provided the Component Side Layout and the Pin Side Layout to keep you from losing your way among the myriad integrated circuit connections on the board. If you have previously completed the double-dot/single-dot project, remove the wire from U15, pin 6 to point P3A (the jumper point near pin 1 of the MC6845).

If you have not previously completed the double-dot/single-dot project, then do the following:

This top (component) side layout of the color adapter board shows the integrated circuits affected by the third font wiring changes. The bottom (pin) side layout of the affected portion of the board shows the new third font wiring.





1. Connect U17, pin 9 to U25, pin 4.
2. Connect U25, pin 6 to U15, pin 4. (Another wire will be attached to U15, pin 4.)
3. Connect U15, pin 6 to U25, pin 5.
4. Connect U13, pin 6 to U15, pin 5. (Another wire will be attached to U13, pin 6.)
5. Connect U17, pin 10 to U13, pin 4.
6. Connect U20, pin 8 to U13, pin 5. (If there is a wire here, don't remove it. Just add the new wire.)

In either case:

1. Cut the trace that connects the +5 volt power supply to U33, pin 21. This is address 12 for the font ROM. The trace is about 1/4-inch long and 1/8-inch wide, much wider than most of the traces. It runs horizontally from U33, pin 21 toward the black metal card-mounting tab on the pin side of the card. Carefully cut between the two plated holes on it to open the circuit. Use a single-edge razor blade or a craft knife. Make several scores to open a good gap.
2. The SN74LS00 will be mounted at the previously unused socket space at U100. Clean the 16 plated-through holes with a solder removal tool, toothpick, solder wick, or by the heat-and-blow-and-tap method.
3. Insert the module at U100, or insert a 14-pin socket if you elect to use one. The module should be placed closest to the top of the card, leaving the two holes closest to the bottom of the card empty. (U100 was designed to accommodate a 16-pin integrated circuit.) You should orient it the same way as the other modules on the card; that is, pin 1 should be closest to the top of the card. Solder pin 14 to hold the module in place. This is the +5 volt supply connection.
4. Connect U100, pin 7 to the empty hole next to it. Pin 8 would be there if U100 were a 16-pin module.
5. Connect U17, pin 7 to U100, pin 1.
6. Connect U13, pin 6 to U100, pin 5.

READABLE SCREEN

(Figure 6 continued)

```

0119 12          DB 12H      ; Vertical Sync Pos (18 rows of chars)
011A 02          DB 02H
011B 0C          DB 0CH      ; Max Scan Line Adr(12 lines per char)+1
011C 0B          DB 0BH      ; Cursor Start (Line 11)
011D 0C          DB 0CH      ; Cursor Start (Line 12)
011E 00 00 00 00 DB 0.0.0.0
                                ; UNMODIFIED GRAPHICS TABLE
0122 38 28 2D 0A 7F 06 DB 38H.28H.2DH.0AH.7FH.6.64H.70H.2.1.6.7
    64 70 02 01 06 07
012E 00 00 00 00 DB 0.0.0.0
                                ; UNMODIFIED 80 x 25 TABLE
0132 61 50 52 0F 19 06 DB 61H.50H.52H.0FH.19H.6.19H.19H.2.0DH.0BH.0CH
    19 19 02 0D 0B 0C
013E 00 00 00 00 DB 0.0.0.0
= 0040
TABLE_LENGTH EQU 6-VIDEO_PARMS
;=====
; Everthing after here is not kept resident in memory ;
;=====
                                ASSUME CS:ONESEC,DS:ONESEC,SS:ONESEC
0142          START:
                                ;=====
                                ; Set up for return to DOS ;
                                ;=====
0142 1E          PUSH DS
0143 33 C0       XOR AX,AX
0145 50          PUSH AX
                                ;=====
                                ; Relocate the Video Params Table into the PSP. ;
                                ; That is, copy it over, 256 bytes earlier in memory. ;
                                ; This will avoid reservins 256 bytes of wasted memory ;
                                ; ahead of the table. ;
                                ;=====
0146 FC          CLD
0147 B9 0040     MOV CX,TABLE_LENGTH
014A BC C0       MOV AX,ES
014C 2D 0100     SUB AX,100H
014F BE C0       MOV ES,AX
0151 33 FF       XOR DI,DI
0153 BE 0102 R   MOV SI,OFFSET VIDEO_PARMS
0156 F3/ A4     REP MOVSB
                                ;=====
                                ; New Interrupt ;
                                ;=====
0158 06          PUSH ES
0159 1F          POP DS
015A 33 D2       XOR DX,DX
015C B8 251D     MOV AX,DOS_FUNCT * 256 + INT_VECTOR
015F CD 21       INT 21H
                                ;=====
                                ; Set the latches on the Color/Graphics Card ;
                                ;=====
0161 BA 03DE     MOV DX,SNGL_DOTS ; Set latch at 3DDH
0164 EE         OUT DX,AL
0165 42         INC DX ; Set latch at 3DEH
0166 EE         OUT DX,AL

```

(continues)

(There is a wire at U13, pin 6 already.)

7. Connect U100, pin 3 to both U100, pin 4 and U100, pin 12.
8. Connect U100, pin 2 to both U100, pin 6 and U33, pin 21.
9. Then connect U38, pin 35 to U100, pin 13.
10. Next connect U100, pin 11 to U100, pin 10.
11. Connect U100, pin 9 to U15, pin 4. (There is a wire here already.)
12. Connect U100, pin 8 to point P3A. (This is one of the pair of points labeled P3. It is the one farthest from the metal card-mounting tab and near U38, pin 1.)

Figure 7 shows the completed circuit.

An Extra Blank Line

If you use applications with a lot of upper- and lower-case letters, you may have noticed that there is no room on the display between rows. The characters theoretically are 7×7 characters in an 8×8 box. However, this 7×7 figure does not include the character descender. Lower-

case characters with tails, such as *g, j, p, q,* and *y* use the otherwise-blank eighth row. If one of these characters appears above a full-height character, such as *f, h,*

The hardware change needs no initialization and is invisible until the MC6845 CRT controller parameters are changed.

or any uppercase character, the two characters contact, making the screen difficult to read.

Any personal computer designed for use with a television as its display must squeeze a maximum amount of informa-

tion into a television's 200 or so usable raster scan lines. The IBM Color/Graphics Adaptor needs to be able to display 25 rows of characters to be compatible with the monochrome adapter and display. Its dense display is a result of these requirements.

This project will add one scan line between the rows to display the 7×7 characters in a 9×8 box instead of an 8×8 box. Figure 8 shows both types.

This project is compatible with the one described in "Single Dots or Double" (PC, Volume 3 Number 11), and the third font project in the first half of this article; neither of those needs to be installed on your PC in order to change to a 9×8 character box. The hardware change needs no initialization and is invisible until the MC6845 CRT controller parameters are changed.

The MC6845 CRT controller must be reprogrammed to display 9 scan lines before advancing to the next character row. Unfortunately, the total number of displayed lines must be modified as well. The color/graphics card can display about 200 scan lines on a monitor or TV. This

(Figure 6 continued)

```

0167 33 C0
0169 BE C0
016B 26: 80 0E 0410 30
0171 26: 80 26 0410 DF
0177 BB 0000
017A CD 10

017C BA 0040
017F CD 27
0181 CB
0182
0182

; =====
; Set Color Mode and...
; Do a Video Interrupt to assure the parms are read
; =====
XDR AX,AX
MOV ES,AX
OR BYTE PTR ES:EQUIP_FLAG,030H ; Both bits on
AND BYTE PTR ES:EQUIP_FLAG,CRT_TYPE ; Turn one off
MOV AX,SET_MODE + 256 + MODE_SELECT
INT 10H ; Video Interrupt
; =====
; Other one time code could go here
; =====
; Terminate back to DOS but remain resident
; =====
MOV DX,TABLE_LENGTH
INT 27H
RET
HERE ENDP
ONESEG ENDS
END HERE
```

(Figure 6 ends)

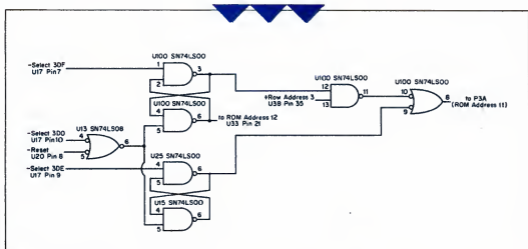


Figure 7: A schematic diagram of the added circuitry.

corresponds to 25 rows of 8 scan lines, for example. When 9 scan lines are used, there is easily room for 22 rows. The screen can accommodate 24 rows if you take care to center the displayed lines on the CRT so nothing gets cut off at the corners. The 24-line solution is desirable. Almost every BASIC program will run without modification if only 24 lines are displayed, because the 25th line is usually reserved for key definitions. To display character rows with an extra scan line, only a software change is needed to mod-

ify these registers in the MC6845:

Register Number	Register Name	New Hex Value	New Dec Value
4	Vertical Total	1C	28
5	Vertical Total Adjust	01	01
6	Vertical Displayed	18	24
7	Vertical Sync Position	1A	26
9	Max Scan Line Address	08	08

The values in the table will display 24 rows of 9 scan lines; Figures 9 and 10 also show the values you can use if you want to display 22 rows. To load the MC6845, you can use either of the two techniques employed in the previous project. You can load the MC6845 registers directly from a program, or you can create a new parameter table for the BIOS to use. The first method is a little easier to introduce into a program, but the second is more persistent. Switching in and out of graphics mode with a new parameter table will not cause reversion to the eight-line character box. Figure 9 shows how you might reload the MC6845 as part of a BASIC program; Figure 10 shows how you might "install" a parameter table of values for the text modes.

If the MC6845 is reprogrammed without the accompanying hardware modification, nine lines will be displayed for each character. However, the ninth line is not blank: it's the first line, line 0, again. Try it—just enter the program in Figure 9 and run it.

You need to make sure that nothing is displayed during the ninth line interval. There are two parts to this problem: detect-

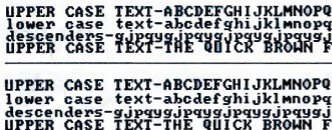


Figure 8: Characters in an 8 x 8 and a 9 x 9 box.

ing when the ninth scan line is occurring, and inhibiting character display at that time.

Several MC6845 outputs, Row Addresses 0 to 4, indicate which scan line of a character row is currently displayed. Since the color/graphics card usually displays only eight lines, only Row Addresses 0 to 2 are used; they take on all binary values between 000 and 111. Row Addresses 3 and 4 are not connected to anything and are always valued at 0. That's why the ninth scan line looks like the first: the value 1000 appears as 0000 when only the three lowest bits are observed. Therefore, Row Address 3 may be used to detect when the ninth scan line is occurring.

The second part, inhibiting character

display, is easy, too. An unused input to the logic circuitry makes the screen dots at U22, pin 9. It is connected to the +5 volt power supply, which serves as a logical 1. If it is connected to 0 volts, no dots will be drawn.

The only problem is that Row Address 3 is true (+5 volts) when we want it to be false (0 volts) to inhibit the display, and vice versa. Fortunately, circuits that invert logic signals can solve this problem. An unused NOR on the color/graphics card can be used in this way.

Connections

If you have not made the third-foot modification to the color/graphics card described in the previous project, making

this change is easy:

1. Cut the printed-circuit card trace connecting U22, pin 9 to the +5 volt power supply. The trace is about a 1/4-inch long and 1/8-inch wide, much wider than most of the traces. It runs horizontally on the component side of the card from U22, pin 9 toward the black metal card-mounting tab. Carefully cut between the two plated-through holes on it to open the circuit. Use a single-edge razor blade or a craft knife. Make several scores to open a good gap. Be sure not to damage the thin traces on either side of the wide trace.
2. Connect U38, pin 35 (+RA3) to U65, pins 11 and 12 (inputs to spare

```
10 '24ROWS.BAS--Program to modify paramaters in BASIC and for the Color/Graphics
Card
20 'Copyright (C) 1984 Laurence V. Marks
30 DEF SEG=0 ' Switch to Color/Graphics adapter if both installed
40 POKE 1040,(PEEK(1040) AND &HCF ) OR &H20
50 SCREEN 1 ' The sequence SCREEN 1 : SCREEN 0 causes the standard paramaters
60 SCREEN 0 ' to be loaded into the MC6845
70 INPUT"Width (40 or 80)? ",W:WIDTH W
80 LOCATE ,,1,6,7 ' Standard cursor for Color/Graphics display
90 FOR I=1 TO 4:READ A$:PRINT A$:PRINT A$:NEXT I
100 PRINT "Strike any key when ready . . ."
110 A$=INPUT$(1)
120 "=====
130 ' The 9 x 8 box setup starts here
140 "=====
150 OUT 980,4:OUT 981,28 ' Vertical Total
160 OUT 980,5:OUT 981,1 ' Vertical Total Adjust
170 OUT 980,6:OUT 981,24 ' Vertical Displayed (22)*
180 OUT 980,7:OUT 981,26 ' Vertical Sync Position (25)*
190 OUT 980,9:OUT 981,8 ' Max Scan Line Address
200 "=====
210 ' The 9 x 8 box setup ends here
220 "=====
230 DEF SEG
240 POKE 92,24 ' Tell BASIC there are 24 lines (default condition) (22)*
250 ' For a 22 line display, substitute the values in braces ( )
260 RESTORE
270 DATA The quick brown fox jumped over the lazy
290 DATA DOGS. THE QUICK BROWN FOX JUMPED OVER T
310 DATA DESCENDERS-gjpyvgjqpygjqpygjqpygjqpygjqpygjq
330 DATA CAPS-ABCDEFGHIJKLMNPQRSTUVWXYZABCDEFGHI
340 '
350 '
```

Figure 9: A BASIC program to reload the MC6845 registers for adding a blank line.

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READABLE SCREEN

```

;
TITLE  Install Video Params and Set Pointer at
Int 1DH
; Copyright (C) 1984 Laurence V. Marks
PAGE  60,96
NAME  Ninehi
ONESEG SEGMENT
ASSUME CS:ONESEG
ORG 100H
HERE PROC FAR
JMP SHORT START
;=====
;          CONSTANTS AREA
;=====
INT_RET LABEL BYTE
DOS_FUNC EQU 25H
INT_VECTOR EQU 1DH
INT_OFFSET EQU INT_VECTOR * 4
INT_SEGMENT EQU (INT_VECTOR * 4) + 2
EQUIP_FLAG EQU 410H
SET_MODE EQU 0H
CRT_TYPE EQU 0DFH ; 80 Column monitor
MODE_SELECT EQU 0H ; 40 x 25 black and white
; Could substitute 1H 40 x 25 color
; or 2H 80 x 25 black and white
; or 3H 80 x 25 color
;=====
;          VIDEO PARAMS TABLE
;=====
VIDEO_PARAMS LABEL BYTE
0102 DB 38H,28H ; MODIFIED TABLE FOR 40 x 25 DISPLAY
0104 2D ; Horizontal Sync Position
; Could be 2C or 2B to shift display
; slightly to the right. See the text.
0105 0AH DB 0AH ; Vertical Total (28 rows of chars)+1
0106 1C DB 1CH ; Vertical Total Adjust (1 scan line)
0107 01H DB 01H ; Vertical Displayed (24 rows of chars)
0108 18H DB 18H ; Use 16H for 22 row option
0109 1AH DB 1AH ; Vertical Sync Pos (26 rows of chars)
; Use 19H for 22 row option
010A 02H DB 02H ; Max Scan Line ADR(8 lines per char)+1
010B 08H DB 08H ; Cursor Start (Line 11)
010C 06H DB 06H ; Cursor Start (Line 12)
010D 07H DB 07H
010E 00 00 00 00 DB 0,0,0,0
0112 71 50H DB 71H,50H ; MODIFIED TABLE FOR 80 x 25 DISPLAY
0114 5AH DB 5AH ; Horizontal Sync Position
; Could be 56 - 59 to shift display
; slightly to the right. See the text.
0115 0AH DB 0AH ; Vertical Total (28 rows of chars)+1
0116 1C DB 1CH ; Vertical Total Adjust (1 scan line)
0117 01H DB 01H ; Vertical Displayed (24 rows of chars)
0118 18H DB 18H ; Use 16H for 22 row option

```

Figure 10: IBM Macro Assembler program to replace the default MC6845 parameters to add a blank line.

```

0119 1A          DB      1AH          ; Vertical Sync Pos (26 rows of chars)
                                ; Use 19H for 22 row option
011A 02          DB      02H
011B 08          DB      08H          ; Max Scan Line Adr(8 lines per char)*1
011C 04          DB      04H          ; Cursor Start (Line 11)
011D 07          DB      07H          ; Cursor Start (Line 12)
011E 00 00 00 00 DB      0,0,0,0
                                ; UNMODIFIED GRAPHICS TABLE
0122 38 28 2D 0A 7F 06 DB      38H,28H,2DH,0AH,7FH,6,64H,70H,2,1,6,7
                                ; UNMODIFIED 80 x 25 TABLE
012E 00 00 00 00 DB      0,0,0,0
                                ; UNMODIFIED 80 x 25 TABLE
0132 41 50 52 0F 19 04 DB      41H,50H,52H,0FH,19H,6,19H,19H,2,0DH,0BH,0CH
                                ; UNMODIFIED 80 x 25 TABLE
013E 00 00 00 00 DB      0,0,0,0
= 0040          TABLE_LENGTH EQU    $-VIDEO_PARAMS
;=====
; Everything after here is not kept resident in memory ;
;=====
                                ASSUME CS:ONESEG,DS:ONESEG,SS:ONESEG
0142          START:
;=====
; Set up for return to DOS ;
;=====
0142 1E          PUSH    DS
0143 33 C0       XOR     AX,AX
0145 50          PUSH    AX
;=====
; Relocate the Video Params Table into the PSP. ;
; That is, copy it over, 256 bytes earlier in memory. ;
; This will avoid reserving 256 bytes of wasted memory ;
; ahead of the table. ;
;=====
0146 FC          CLD
0147 D9 0040     MOV     CX,TABLE_LENGTH
014A BC C0       MOV     AX,ES
014C 2D 0100     SUB     AX,100H
014F 8E C0       MOV     ES,AX
0151 33 FF       XOR     DI,D1
0153 BE 0102 R   MOV     SI,OFFSET VIDEO_PARAMS
0156 F3/ A4     REP     MOVSB
;=====
; New Interrupt ;
;=====
0158 04          PUSH    ES
0159 1F          POP     DS
015A 33 D2       XOR     DX,DX
015C 9B 251D     MOV     AX,DOS_FUNCN * 256 + INT_VECTOR
015F CD 21       INT     21H
;=====
; Set Color Mode and... ;
; Do a Video Interrupt to assure the Params are read ;
;=====
0161 33 C0       XOR     AX,AX
0163 8E C0       MOV     ES,AX

```

(Figure 10 continues)

```

(Figure 10 continued)
0145 24 80 0E 0410 30      OR      BYTE PTR ES:EQUIP_FLAG,030H      ; Both bits on
0146 24 80 26 0410 DF      AND      BYTE PTR ES:EQUIP_FLAG,CRT_TYPE ; Turn one off
0171 80 0000              MOV      AX,SET_MODE $ 254 + MODE_SELECT
0174 CD 10                INT      10H                          ; Video Interrupt
; =====
; Other one time code could go here
; =====
; Terminate back to DOS but remain resident
; =====
0176 8A 0040              MOV      DX,TABLE_LENGTH
0179 CD 27                INT      27H
017B CB                  RET
017C                     HERE      ENDP
017C                     DNESEC   ENDS
; =====
END                      HERE

```

(Figure 10 ends)

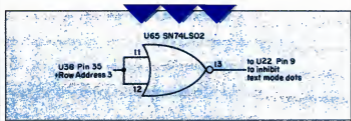


Figure 11: A circuit to inhibit display of the ninth scan line for cards without the third-font modification.

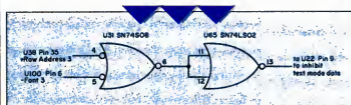


Figure 12: A circuit to inhibit the display of the ninth scan line for cards with the third-font modification.

AND circuit to inhibit dots if Row Address 3 is active and the third font is not selected. After completing Step 1 of the connection instructions, continue as follows:

2. Connect U38, pin 35 (+RA3) to U31, pin 4 (input to spare AND).
- 2A. Connect U100, pin 6 (—third font) to U31, pin 5 (input to spare AND).
- 2B. Connect U31, pin 6 (output of AND) to U65, pins 11 and 12 (input to NOR).

Then continue with Step 3 as above. Because the added circuitry works only when the scan line count is greater than 7, and it never does exceed 7 under normal operation, you need not take any special care. To make it active, merely run the code in Figure 10 or insert the code in Figure 9 into any BASIC program in which you desire this feature.

As with the large-font project, this modification is better suited to certain applications than others. Screen-oriented programs that don't scroll the display, such as *PC-File* or *PC-Talk* ought to work just fine. Nearly every BASIC program should run without modification if the 24-line option is selected.

Most editors and word processors that use the 25th row for prompting or key information can be used without modification, if you are aware of the missing prompting information. ■

- NOR).
3. Connect U65, pin 13 (—RA3, output of NOR) to U22, pin 9 (inhibits dots). This change works on an unmodified card, or one that has the double-dot/single-dot modification. The circuit is shown in Figure 11.
- If you have installed the third-font

modification, you must work slightly harder. You can't simply turn the dots off whenever the scan line count is greater than 7, because the large font displays 13 lines; you must turn it off only if the large font is not selected. There are enough spare integrated circuit sections to do this. The circuit shown in Figure 12 uses an

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The STM PC is based on an Intel 80186 processor and two quadruple-density disk drives. The processor is considerably faster than the one on the IBM PC, and the disk drives are twice as capacious as the PC's. It has a built-in modem, a thermal printer, and the first LCD screen on the market with a full 25 lines by 80 characters. A nice touch is a hands-free telephone with directory and dialing software, which you can use even as you compute. STM is promoting its Personal Computer as an office-in-a-box that fulfills all your needs; the STM PC certainly comes closer to this ideal than any of the machines that are briefcase-size, even than the very expensive Grid Compass.

The machine weighs 17 pounds naked. But in its nylon carrying case, accompanied by two manuals and a roll of thermal paper, the STM PC weighed 26 pounds. It

fits easily under an airline seat, although it's not so light that you'd want to carry it around without good reason.

All in all, it's a machine whose specifications and design promise a lot: I wish it delivered on all its promises.

A Quick Look

STM's design is quite creative. The STM PC is a single unit about the size and shape of a small attache case (20 inches wide, 11 inches deep, 4 inches high). On the right are two half-height floppy disk drives. On the left is a sloped LCD screen. The keyboard fits into a plastic shell that you flip upside down and snap over the screen for transporting. The built-in printer is apparent only as two thin slots, one in the back and one in the top of the computer, through which roll paper passes. When closed up, and with its roll of printer paper and its power cord removed, the STM PC is a clean, rectangular box. Packing it up is easy, although fitting the coiled keyboard cord back into its little compartment is as difficult as refolding a roadmap.

At the back of the machine are a multitude of connectors: two RS-232 serial ports, a telephone miniplug socket, a socket through which an acoustical coupler can be attached to the built-in modem, a parallel printer port, a standard video jack, a color monitor jack, a connector for an expansion chassis (any IBM chassis, apparently, will do, as will IBM-standard cards), and an SCSI (small computer systems interface) connector to which several makes of hard disk can be attached.

Under its hood the STM is tightly packed. It has a couple of small fans, which appeared to operate adequately. The machine is not meant to be probed by the user, a reasonable design principle since it has no internal space for board expansions, except for a slot holding an extra 256K of memory. (Early versions of the STM PC can be upgraded only by replacing their 64K chips with 256K chips.) Expansion boards can be added in an expansion chassis that is connected

through the I/O expansion socket on the back. The STM has no slot for an 80187 coprocessor. Additional detail was difficult to come by, since STM has not yet released a technical manual.

The STM PC portable model sells for \$3,449. A desktop model with only one serial port and without an LCD screen, modem, printer, or telephone costs \$2,499. Both models include STM's version of MS-DOS, and *NewWord*, a word processing program that imitates the popular *WordStar*. (*NewWord* was favorably reviewed in *PC*, Volume 3 Number 15.) BASIC is not included.

Feature by Feature

The 80x25 LCD screen, made by Epson, can display just about everything an IBM PC screen can, although only in regular and reverse video; it has no equivalent to the bright and dim characters available on most CRT screens. The LCD will display standard IBM graphics as well as text (640 by 200 pixels), but because it is proportionately much wider and shorter than a standard screen, your pie charts will come out as egg charts. A knob labeled Contrast lets you adjust the screen for viewing angle, and a backlight makes the screen glow a light-blue color.

The screen's display area is 3¼ by 9¼ inches—large enough for use from a normal working position at a standard desk. However, its smooth, glass front panel seems to find some glare to reflect no matter what angle you view it from. I found that I could read the LCD screen comfortably only by using the backlight in a somewhat darkened room.

Fortunately, either a color or monochrome monitor can be connected easily to the STM PC. Most buyers will probably invest in a simple, standard monitor for the machine's most common resting place and use the LCD screen only when on the road. Of course, a monitor is necessary for any color work.

The keyboard has the same 83 keys as the IBM PC. Their arrangement is more compact, and a few are repositioned. The



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Enter key is considerably larger than the one on the IBM PC. The ten function keys are across the top of the keyboard, probably a better place for them than the IBM location; however, the placement is an irritating distraction for anyone who must move back and forth between an STM and an IBM PC or any other machine with the PC's layout. The keyboard feel is less crisp but quite satisfactory.

STM has equipped its PC with Canon quadruple-density disk drives, which, in some of its advertising, it claims have a capacity of 2 megabytes. In the fine print, the company acknowledges it is quoting an unformatted capacity, a practice akin to describing a refrigerator in terms of its outside dimensions. The meaningful figure, for floppies as for refrigerators, is inside capacity. STM's formatted, usable capacity is 712K per disk.

The disks are "sort of" IBM-compatible. The STM PC can read IBM disks, so you can copy data from IBM to STM disks. You can load programs into the STM from IBM disks. But the STM cannot write information onto IBM disks, nor can the PC read STM disks. So disk compatibility between the two machines is a one-way street, from IBM to STM. The only way to get information out of an STM PC and into an IBM PC is through a wired communications connection. Because this incompatibility causes it some problems in the marketplace, STM also sells a version with 360K disk capacity.

STM has equipped its PC with an 80186 processor, an advanced version of the 8088 used by the IBM PC. The advantages of the 80186 include greater speed, more circuits on the main chip (which means fewer are needed in the rest of the computer), and a true, full-fledged 16-bit address bus. The disadvantage is that the different chip makes true PC-compatible

ty more difficult to achieve.

Whether the processor's speed will be of use to you or not depends on the task you are performing. If the task involves manipulation of data in memory, the STM will perform considerably faster than an IBM PC. However, it doesn't move data from or to disks any faster, so tasks involving heavy disk traffic won't be as significantly speeded up. For example, loading 1-2-3 from disk took each machine 9 seconds; loading a 48K spreadsheet took 23 seconds. But a spreadsheet recalculation that took the IBM PC 6 seconds was done in 3 by the STM PC.

In a long *WordStar* document, proces-

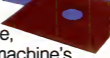
compatible in one brochure, an exaggeration its sober-minded Canadian marketing manager attributes to an overexuberant California ad agency.

In truth, like the disks, the computer itself is "sort of" IBM-compatible. It will run 1-2-3 directly from an IBM disk. It is reported to run Microsoft's *Flight Simulator*. *WordStar* and *dBASE II* also runs fine.

I had trouble with two different communications programs (*Crosstalk* and *PFS:ACCESS*), neither of which could find the serial port. STM thinks my experience was an anomaly, since the company uses the same program itself without problems.

IBM BASIC won't run on the STM PC. STM was still working on its version of BASIC as of this writing, so it couldn't be tested.

Copy-protected programs cause some problems, depending on the copy-protection scheme. I tested



Most buyers will probably invest in a simple, standard monitor for the machine's most common resting place and use the LCD screen only when on the road.

three programs on the STM that use variations of the you-have-to-leave-the-original-disk-in-the-A:-drive scheme. One of them (*PFS:ACCESS*) loaded with no trouble; two of them (*Concentric Information Processor* and *The Spreadsheet Auditor*) refused to load. *Concentric* raises another problem: while the program is running, it writes some configuration files onto its uncopyable program disk. Consequently, *Concentric* couldn't be run on an STM (the double-density version, at least) because the computer can't write to IBM-format diskettes.

Accompanying the fast processor is a standard 256K of RAM, expandable to 512K for \$500. The 256K is not quite as usable as 256K on an IBM PC because 38K is occupied by special STM device drivers and other housekeepers, leaving 218K of usable memory.

STM claims its PC is IBM-compatible—it goes as far as to say "totally"

three programs on the STM that use variations of the you-have-to-leave-the-original-disk-in-the-A:-drive scheme. One of them (*PFS:ACCESS*) loaded with no trouble; two of them (*Concentric Information Processor* and *The Spreadsheet Auditor*) refused to load. *Concentric* raises another problem: while the program is running, it writes some configuration files onto its uncopyable program disk. Consequently, *Concentric* couldn't be run on an STM (the double-density version, at least) because the computer can't write to IBM-format diskettes.

STM admits that copy-protected software is a problem, especially since the variety of schemes is great and growing. The company says it will make the necessary modifications to its operating system as the problems are drawn to its attention, a generous and ambitious promise, but not a completely satisfactory answer to the

customer who wants to run a particular program right away.

These problems aside, STM has engineered a system that runs an impressive array of IBM software even though it uses a different processor. And besides standard computer features, STM has thrown in a number of interesting and useful extras. Unfortunately, none of them quite lives up to its promise.

A thermal printer is handy while away from home. It prints on a 4-inch-wide roll of that nasty, tacky paper that discolors in your files, but for a quick printout, you'd think it should be fine. However, the printer can only be driven by the DOS PRINT command or by the PrtSc key. You cannot use it as an ordinary printer driven in the normal way from a program. For a program such as *WordStar*, which lacks a proper print-to-disk feature, using the STM built-in printer is a real problem.

In principle, the DOS PRINT program should be able to run in the background; you should be able to load another program and use it while the printing is going on. In fact, STM's DOS allows you to load the other program, but doing so brings printing to a halt; the printer resumes when you exit back to DOS.

Unfortunately, the printer is so slow that background printing is essential. A page-long file took nearly 5 minutes to print.

The printer normally prints a 40-character line. It can print 80-character material as well, but only sideways, in 24-line chunks. Happy gluing! Sideways printing completely freezes the computer and takes even longer than 40-character printing—more than 10 minutes for a one-page file and 3 minutes for a screen dump. STM could have made its thermal printer more useful by buffering it, allowing the printer to proceed in the background while the computer moved on.

STM has built in a modem, which some of its advertising calls a 300/1200-baud modem. But the modems on early machines (including our test machine) operated with the rarely used Bell 202

communications standard for 1200 baud. To be useful, a 1200-baud modem must use the Bell 212A standard, so for all practical purposes, the early versions had only a 300-baud modem. These early modems could only use STM's own communications program, a modest offering.

However, STM promises that, by the time this article is published, its machines will have a Hayes-compatible, honest-to-goodness 300/1200-baud modem that will work with the popular communications program. If you buy, be sure your dealer doesn't have old stock.

A built-in, hands-free telephone is a terrific idea. You can make or answer a call any time while using the computer. After you hit a couple of control keys, your computing is frozen and your person-

STM could have made its thermal printer more useful by buffering it.

al phone dialing directory appears. Select a name and the computer dials for you. You can speak to a colleague without picking up your phone, then hang up and return to your computing exactly where you left off. Unlike other telephone-dialing programs, this one does not require you to put away your work to dial the phone, so it could be truly useful.

I have two caveats. First, STM's hands-free phone is even worse, acoustically, than many others of that odious species. You might get away with using it to automatically dial and then get the receptionist to your colleague, but don't plan to use it to actually converse with anyone whose continued esteem you value. Second, the controlling software is imperfect. I found that if I activated the phone software while the program was performing a disk operation (loading a file into *WordStar* or 1-2-3, say, or formatting a disk),

the computer completely stalled when I returned from the telephoning software and required a system reset.

Unfortunately, the instability of software associated with STM's version of MS-DOS is not limited to the telephone controlling program. Frequently, on the test machine I had, the booting process would stall before completion and would not respond to the Ctrl-Alt-Del reboot command; the machine had to be turned off and on, or reset. A number of similar problems seemed to be associated with the printer and serial ports.

STM's PC is the direct descendent of its first product, an 8-bit computer called (for no obvious reason) the Pied Piper. The Pied Piper was the same shape as the STM PC, which made it interesting and innovative. It had a 720K disk drive, an even more unusual feature a year ago than it is today. It had a built-in modem. It was even more portable, in that it had a carrying handle. It looked good. But when you thought about it for a while, you got to wondering—maybe its drive held 720K, but STM only gave you one of them. It was portable, but it had no screen; you had to hook it up to a television (which the software didn't support very well) or to a monitor. The keyboard wasn't detachable; it was on the main unit, where the new machine's screen is.

When STM's PC came along, you could tell at a glance that STM had learned a lot from the Pied Piper. The new machine has two drives, a detachable keyboard, the biggest LCD screen on the block, and a raft of interesting features—and IBM-compatibility to boot.

Now that I've worked with it, though, I feel a bit sad. Such great potential, a really classy design—and just enough flaws that I don't believe I can recommend it at this point. If you think the machine sounds interesting, however, keep an eye on it. By the time this article is published, some of the faults should have been corrected. The difference between the Pied Piper and the STM PC does show the company is capable of learning from its mistakes. ■



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CIRCLE 172 ON READER SERVICE CARD





Sizing Up The BASIC FOUR

The MAI General Accounting series, a PC reincarnation of Basic Four's successful minicomputer software, is a powerful set of no-nonsense applications. Here we review the first four of the series.

MAI/Basic Four Business Products Corporation, long known for its Basic Four minicomputer hardware and software line, recently introduced a family of accounting applications for the IBM PC and XT. When the MAI General Accounting Series is complete, it will comprise 11 integrated applications. Four of them—*General Ledger*, *Accounts Payable*, *Accounts Receivable*, and *Inventory*—make up the core of the series and were released earlier this year. The complete portfolio will also include applications for order entry, payroll, purchase orders, sales analysis, financial statements, fixed assets, and a report writer. These packages are, in effect, a scaled-down and made-more-friendly version of Basic Four's successful minicomputer accounting software. They benefit from their minicomputer legacy—their clarity, thoughtful approach, and feature set are truly impressive.

Although MAI's series focuses on the needs of a wholesale distribution business, some of the individual programs are not so specialized and could satisfy the accounting requirements of a variety of businesses. We reviewed the four core systems of the series—the *General Ledger*, *Accounts Payable*, *Accounts Receivable*, and *Inventory* systems.



MAI General Accounting Software
MAI/Basic Four Business Products Corporation
601 San Pedro, N.E.
Albuquerque, NM 87108
(505) 266-5811

List Price: *General Ledger*, *Accounts Receivable*, *Accounts Payable*, and *Inventory* packages, \$695 each.
Requires: 128K RAM, DOS 2.0 or 2.1, 80-column display, 132-column printer (or 80-column printer with compressed print), two 360K disk drives.

CIRCLE 790 ON READER SERVICE CARD

The General Ledger

You can learn a great deal about a financial reporting system by examining the size and structure of its chart of accounts. MAI's *General Ledger* has a very flexible account-coding structure—you can choose a format with as many as nine characters in up to four distinct segments. For example, the following represent possible account codes:

```
1001      Cash
1001-001-110 Cash-Division
              1-Dept 110
400-HDWR  Sales-Hardware
```

For each segment, you must specify whether or not alphabetic characters are permissible, and you can supply an account description of up to 35 characters. This scheme makes for a very versatile financial reporting system.

MAI has also chosen an unusual approach to packaging its software. The company plans to market *Financial Statements* (which was released too late for this review) as a separate package that will allow you to tap the versatility inherent in the *General Ledger*. Without *Financial Statements*, you have to live with the limited set of standard reports that arrives with the *General Ledger*, which includes a chart of accounts listing, listings of your journal entries (with special listings of the recurring and allocation journals you've established), a daily and monthly summary of postings to the general ledger, a trial balance, and a balance sheet and income statement. A working trial balance (a listing of each account with its current balance) is also included. It is formatted so that you can use it as a handy means of "working up" any necessary period-end adjustments. The income statement lists the monthly and year-to-date amounts, with percentages of each line item calculated with total revenue (100 percent) as a basis.

According to MAI, the *Financial Statements* package offers substantial power for creating custom reports from *General Ledger* data (actuals, budgets,

and last year's actuals, basically). The flexibility you'll have will, of course, depend heavily upon how you structure your chart of accounts coding scheme, so you should think this through carefully before setting up your records.

One special feature of MAI's *General Ledger* is the allocating journal entries function. As illustrated in Figure 1, this function lets you establish a series of standard journal entries that will be booked each time you run the end-of-period processing functions. This is different than a recurring or standard journal entry, which is also accommodated by the *General Ledger*. In setting up allocation entries, you establish source and destination accounts. The source account will be cleared (made zero). You determine (by entering percentages) how much of the amount cleared from the source account is to be allocated to each destination account, though you need not allocate the entire balance. This can be very handy if you need to do a number of allocations each period.

You can establish your own accounting calendar with the accounting period maintenance function. For each period (1 through 12), you simply enter the period-ending date. Then, as accounting transactions are processed, the *General Ledger* will record transactions in the appropriate period.

Accounts Payable

The MAI *Accounts Payable* system can operate as a standalone subledger package or can interface with MAI's *General Ledger* and/or *Purchase Order* systems. Like the other MAI packages, the functions are neatly divided into three groupings: Definition, Operations, and Maintenance.

"Definition" includes those routines that allow you to customize your implementation of the package. "Operation" covers day-to-day use of the system, and "Maintenance" provides housekeeping routines that allow you to maintain diskette labels and back up your files.

In defining the system, you can specify

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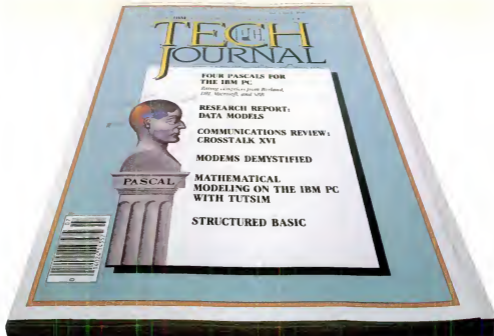
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TRANSPORTER™

CIRCLE 326 ON READER SERVICE CARD

MAI/BASIC FOUR

WORLDWIDE ENTERPRISES		ALLOCATING JOURNAL ENTRIES		DATE: 06/10/83	
REFERENCE:	AJE1				
DESCRIPTION:	RENT - WAREHOUSE & SALES				
TRANS CODE:	JE				
ALLOC S/L ACCT:	520	Rent Expense			
DIST S/L NO	DESCRIPTION	PERCENTAGE	BALANCE:	.00%	
521	Rent - Warehouse	85.00			
522	Rent - Sales and Administratio	15.00			
IS THE S/L DISTRIBUTION CORRECT? (Y-N-DELETE)					

Figure 1: This screen is used to establish allocating journal entries.

that a "retention field" be available while recording invoices. This lets you retain a portion of each vendor's payment until a decision is made to pay it. So, for instance, you can withhold a portion of a payment until certain conditions, such as the completion of a given task or delivery of a piece of equipment, are met. This is a very common practice in the construction industry.

If you use the cash basis method of accounting, you can still make use of MAI's *Accounts Payable* system for check printing and general ledger distribution. The system will hold all invoices in a temporary file until payment is made. No posting to the general ledger occurs until each payment is made in full.

The *Accounts Payable* system supports the use of up to 24 bank accounts. Bank accounts are assigned alphabetic codes, which are used to mark the checks you write and to assign them to the correct bank and general ledger accounts. When you perform check reconciliations each month (as described below), your checks will be sorted by bank based on these codes.

You can establish a variety of "terms" codes for recording payment terms when entering invoices. Each terms arrangement (for example, 2% 10, net 30) is given

**With MAI's
Accounts Payable
system, you can
withhold a portion
of a payment until
certain conditions
are met.**

en a unique two-character code. Using these codes, you can specify the number of days until an invoice is due, the number of days in the discount period, and the discount percentage allowed.

Operation of the *Accounts Payable* system begins with vendor master-file maintenance. You assign a code of up to six alphanumeric characters to each vendor. If you choose to segregate the reporting of

accounts payable transactions by division, the first two characters must be used to designate the division. Although this may increase the number of vendors' accounts you have to maintain, it will allow you to report payables and expenditure amounts separately for different divisions. An eight-character sort key is available, which defaults to the first eight characters in the vendor's name. Further, in setting up each vendor, you can specify a two-digit pay cycle number. The pay cycle—a number between 1 and 31—can then be used to determine on which day disbursements are made to each vendor.

Processing invoices and checks that have been written manually is straightforward. The update process automatically posts entries to the general ledger. Before updating, invoice information can be edited freely; after updating, you must make changes by adjusting entries. Updating must occur before checks can be written against invoices. Registers for both invoices and manual checks entered can be printed to verify accuracy before updating takes place.

The automatic payment selection facil-

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Windows no longer needed may be closed. Any background area overlaid earlier (which could be corners of

several windows) will pop back to the screen. Think for a moment what a programming job that technique represents.

To your program, the entered window is the *entire* screen — all row and column references are relative to the window no matter its absolute position in the screen. All scrolling occurs only within the active window. The cursor will not leave its boundaries until your program says so. Any screen window may be entered for display, data entry, whatever. Any virtual screen — displayed or not — may be read from or written to by your program.

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PMate is a full screen editor with ten auxiliary buffers for squirreling away pieces of text until needed. It uses single key commands to move the cursor, or text, or insert or delete, or rescue several thousand characters of deleted text.

It has a format mode for tab setting or wraparound and shaping when it's time to write documentation. PMate lets you assign chains of commands or strings of text to single keys: one keystroke could set up the entire shell of a new C function, for example.

PMate has variables, if-then statements, loops. It calculates, and converts decimal to hex to binary and back. You can write compact programs (called "macros") to delete comments, for example, or check syntax, or process long sequences of commands. Macros can alphabetize lists, do row and column math, perform a series of operations on multiple files, even summon other macros.

Put another way, PMate is a text editor with its own built-in interpretive language. A language you can use to completely customize this text editor to your fancy. Possibly the most artificial, ingenious program you have ever seen.

Product Code: S0600

Our Price:

Suggested Retail: \$225.00

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Halo™ will astound you. It provides a complete library of graphic functions which can be linked with your Lattice programs to create full-color charts, graphs, simulations, even animation.

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It's a long list of capabilities which make for an extraordinarily powerful product. In fact, Halo is so good that manufacturers of graphics boards and systems are adopting it as a standard graphics language. So it can bridge your application to other systems. CAD-CAM developers, especially, have embraced its device-independent approach for maximal portability.

Halo is a dazzling demonstration of why C has become the language of choice among programming professionals: its function library architecture means you can tremendously enhance your firepower by acquiring libraries of software like Halo with dramatic economy of time and money.

Requires IBM monochrome or color graphics card or equivalents.

Product Code: S0300

Our Price:

Suggested Price: \$200.00

\$125.00

PLINK86

Overlay Linkage to Expand

Software is becoming ever more sophisticated, which means more complex programs requiring large chunks of memory. But if you use extra memory, if you count on users to have expanded RAM, you will forego sales to those who do not.

PLink86 is the answer. It takes on the job of shoe-horning large programs into small memory. First, PLink86 acts as an alternative to DOS Link. For a language like C which encourages design of separately compiled object modules in the Microsoft relocatable format, PLink86 pulls modules together into single compiled programs. But PLink86's overlay power is what has gained it a reputation as a miracle worker. It binds into the compiled program its overlay manager which knows how to swap modules of your large linked program between disk and memory, so that each can temporarily occupy the same memory space.

Unlike other linkers, the overlay manager acts on its own, needing no calls from the source program. Instead, PLink86's straightforward overlay description language allows you to describe your overlay structure in one place in your program — a structure

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Panel routines are powerful. Unlike so many programs which make error correction difficult once a field is departed, Panel gives the user full field-

All products operate on the IBM PC or PC/XT under PC-DOS and require no more than 64K of RAM unless indicated.

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MAI/BASIC FOUR

ity allows you to select invoices by pay cycle, due date, or discount due date. There is also a manual payment feature that allows you to select individual invoices. If the printer jams while you're printing checks, you can start over for a selected group of checks, or print all the checks by invoking the restart function.

The reports you'll use on a day-to-day basis include listings (registers) of invoices entered, manual checks entered, and checks produced by the system: an open-invoice report; a cash requirements report (to help you plan your disbursements); and, of course, your checks. You must use one of only two predefined check formats. A listing of all vendors is available, as are mailing labels and a cross-reference listing, which is a listing of all vendor names and numeric codes sorted side-by-side in both numeric and alphabetical order.

Period-end processing automatically generates two audit trail reports—an aged open-invoice report and a period-to-date disbursement register. Additionally, at period end, a check reconciliation function is available. You can enter information

At period end, the system can print out a neatly formatted report showing the reconciliation of checks to the book cash balance.

such as bank statement balances, deposits in transit, outstanding checks, and adjustments; the system will print out a neatly formatted report showing the reconciliation to the book cash balance.

Accounts Receivable

MAI's *Accounts Receivable* package closely mirrors the *Accounts Payable* system in its Definition, Operation, and Maintenance functions. The system can operate as a standalone subledger or can interface with the *General Ledger* pack-

age. According to MAI, the *Order Entry* and *Sales Analysis* packages (released too late for this review) also interface with *Accounts Receivable*.

In defining your system, you must choose either the balance-forward or open-item method of accounting for your receivables. With the balance-forward method, invoice detail will be retained only until period-end processing, at which point the detail is summarized. Payments are always applied to the oldest open invoice. With the open-item method, invoices are retained in your data files until they are paid. You apply payments to specific open invoices when entering cash receipts.

MAI's *Accounts Receivable* system contains one feature that is unique and a real benefit to those of you who use the cash method of accounting but need to keep track of customer receivables. You can set up the system to report income to the general ledger only when cash receipts are recorded (not when invoices are recorded). However, you will be able to apply full payments only to invoices recorded within the customer ledger, not

WORLDWIDE ENTERPRISES
CUSTOMER MASTERFILE MAINTENANCE DATE: 07/05/84

CUSTOMER CODE: 0060

LAST VIEWED: NONE

NAME: Open Road Constr. Co.
ADDRESS: 5075 Plains Blvd.
Laramie, WY 82070

SORT KEY: Open Roa
LOCATION: 82070
PHONE: 307-545-8231

CUSTOMER STATUS:

CREDIT CODE: cc LIMIT: 2500.00

DATE ACCT OPENED: 05/01/83
DATE LAST ORDER: 06/09/83
DATE LAST PAYMENT: 06/06/83
TYPE CUST: cc
STATEMENTS? (Y-N): Y
LATE CHARGE? (Y-N): Y

TAX CODE:

IS THE DATA CORRECT? (Y-N) Y

Figure 2: MAI's *Accounts Receivable* system maintains this basic information for each customer. You can also bring up a customer aging summary and open-invoice display from this screen.

DATE: 07/16/84

WORLDWIDE ENTERPRISES
CUSTOMER CROSS-REFERENCE

PAGE: 1

CUSTOMER CODE SEQUENCE

0001	Foraast Lumber Co.
0010	Government Purch. Agent
0020	Sunahina Soccer League
0030	Waterways Freight Inc.
0040	Railways Limited
0050	Central School Systems
0060	Open Road Constr. Co.

ALPHABETICAL SEQUENCE

Central School Systems	0050
Foraast Lumber Co.	0001
Government Purch. Agent	0010
Open Road Constr. Co.	0060
Railways Limited	0040
Sunshine Soccer League	0020
Waterways Freight Inc.	0030

Figure 3: Cross-referenced by customer code and alphabetical sequence, this listing for the customer master file in MAI's Accounts Receivable package lets you quickly key in on a given customer name or number.

to partial payments or prepayments.

The system can be directed to perform finance charge computations based on a fixed rate, a variable rate, or a specific amount for each customer. You can choose the option of booking these finance charges to the general ledger or merely having them show up as a memo on customer statements. Furthermore, when calculating finance charges, you can choose whether or not to include previously outstanding finance charges in the calculation.

The sales tax code maintenance function permits you to establish and maintain a two-character alphanumeric code for each distinct sales tax computation percentage. A facility for dealing with whether or not freight charges are taxable is also included, since the related laws vary from state to state.

Figure 2 illustrates the type of information maintained for each customer. A three- to seven-character alphanumeric code is used to identify each customer, and the first two characters of the customer code can be used to designate divisions, so you can segregate the reporting of your receivables by division. This can be quite handy for a company that keeps separate receivables records for many divisions or locations.

A sort key is available and defaults to the first eight characters of the customer's name. Three optional fields are available

to further identify customers: customer type (two characters), credit code (two characters), and location (five characters). Unfortunately, none of the report programs permits you to create a report sorted

The system can be directed to perform finance charge computations based on a fixed rate, a variable rate, or a specific amount.

by any of these three identifiers. The customer master-file maintenance function allows you to produce a customer cross-reference listing such as the one shown in Figure 3. You can also print customer mailing labels in a single-vertical-column (one-up) format in customer-code order or in alphabetical order.

Invoice processing is accomplished in one of two ways. The invoice data entry facility is used when you are setting up the MAI Accounts Receivable system and you do not need to print an invoice for an entry. The detail invoice data entry function is used during day-to-day processing

and printing of invoices. Invoice dollar amounts must be distributed to the general ledger during this process. Invoices are held on file and can be edited freely before they are posted during the updating process. A register of all open invoices can be printed to allow you to check your entries for accuracy.

The invoice processing function automatically extends the quantity and price information and also computes applicable sales taxes; discount information can also be entered at this point. Invoices can be printed in only one predefined format. After entering and printing your invoices, a detailed sales journal can be printed.

Cash receipts processing is a straightforward operation that affords you significant flexibility in the cash "application" process. If you are maintaining your records using the balance-forward method, you simply apply the cash to the customer's account. If, on the other hand, you're maintaining open-item records, you can apply the cash either to a single invoice or to multiple invoices on an oldest-invoice-first basis. Additionally, you can assign the cash directly to a general ledger account. This last option is appropriate for those cases when you need to record cash that is not in payment of an outstanding receivable (such as the return of an employee advance). The system also allows prepayments to be processed. A cash receipts journal is available for audit

1.2.3

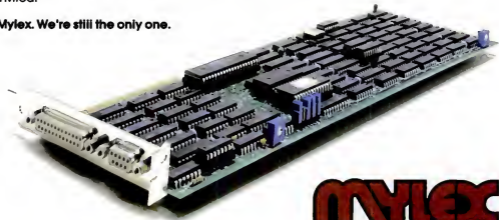
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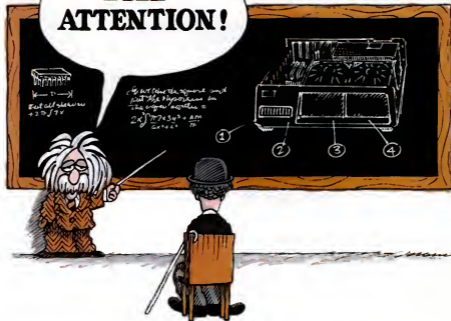


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trail purposes.

The system lets you write off uncollectible accounts and produces on-demand customer statements at any time. Period-end processing computes and posts finance charges, produces period-end reports (including a summary of sales taxes and an aged open-receivables listing), and prints customer statements. Other period-end reports include a sales tax report and an aged open-invoice report.

Inventory

Like many similar product offerings, MAI's *Inventory* system is focused upon the record-keeping needs of a wholesale distribution business. However, it could be used in many other situations as well—keeping track of a manufacturer's raw materials or finished goods inventory, for instance.

In defining your system, you must specify the costing method: LIFO, FIFO, or moving average cost.

In setting up your inventory system, you are faced with several decisions, the first of which relates to the length and format of your inventory item numbers. MAI affords you a great deal of flexibility in this regard. The item code can have from one to three distinct segments, and each segment can be of any length as long as the entire code does not exceed 20 characters. This is by far the longest item code we've yet encountered in a PC-based inventory system.

You specify each segment's length, description, type (alphanumeric or numeric), and whether or not your inventory reports should include subtotals for all but the last segment. If you segment your inventory items properly, you can better

analyze your inventory reports by class (or type) of product.

In defining your system, you must specify the costing method: LIFO (last in/first out), FIFO (first in/first out), or moving average cost. If you choose LIFO or FIFO, the system will maintain up to eight levels of costs for each item. If you choose the average cost method, you are asked whether or not the system should allow item quantities to fall below zero—a real-world circumstance in businesses with rapid movement of inventory.

The system definition routines include a unique feature that lets you specify the precision (number of decimal places) for tracking units and costs. You can specify zero to four decimal places for units and two to four units for costs. This would be helpful if you price some of your inventory items at, say, .7525 cents.

MAI's *Inventory* package takes a unique approach to interfacing inventory transactions to the *General Ledger*. To automatically supply accounting information to MAI's *General Ledger*, you must establish and maintain one or more distribution codes. For each distribution code, you establish a table as follows:

General Ledger Account	
Debit	Credit
Receipt: 1015-001	2001-001
Issue: 5050-001	1015-001
Adjustment: 1015-002	5120-002
Physical count: 1015-003	5120-002
Sale:	4050-001

The link to the *General Ledger* program is established when, as you set up your inventory items, you assign one of the distribution codes to each item. Then, as the transactions are processed, the system will know which financial accounts will be affected.

This scheme offers a lot of flexibility in reporting the financial impact of your inventory transactions. This could be an important asset if you want to segregate financial reporting of various products or product lines.

The system provides several useful

functions to address your physical inventory requirements. You can print out inventory count sheets that list, for each item, an item number and description, a location, and a unit of measure. You can use the count sheets to record the physical inventory counts and then enter these quantities with a special physical count

You can restrict access to many of the system functions.

data entry function. This information is used to produce the physical count summary report, which lists, for each item, the on-hand (book) count and value, the physical count and value, and the variance between the two. After the *Inventory* system produces this report, it asks if you want to update automatically the inventory records to reflect the adjustments from book to physical. An affirmative response will direct the system to update your inventory records and produce the necessary general ledger transactions.

One unfortunate drawback to this set of routines is the fact that if you do *not* enter a physical count for an item, the system assumes the count to be zero! This precludes you from using the system to do anything but a complete physical inventory. With a few enhancements, the routines could be used for cycle (partial) counts as well.

Seven basic inventory reports are available. These include a master-file listing, a valued inventory report, a reorder report (listing those items for which the on-hand quantity is less than the reorder quantity you've established), a discontinued items list, and a price list. At period end, you can get a movement report, which summarizes receipts, issues, and adjustments for each item. You can also generate a transaction audit list.

MAI's *Inventory* system does lack fea-

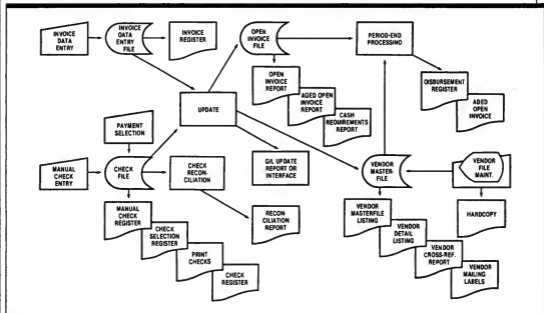


Figure 4: A system flowchart is provided with each MAI package. This one gives an overview of the Accounts Payable system.

tures found in a number of similar systems for the PC. For example, you cannot establish custom or user-defined data fields in your master file; inventory counts are kept for only a single location; you cannot establish a picking list sequence to make your picking/packing operations more efficient; there are no special reports of slow-moving items; and the system has only a single price level within the inventory file. Nonetheless, the features that MAI's package does have can provide an inventory accounting solution for a great number of businesses.

Functions at Your Fingertips

A noteworthy feature in the MAI accounting series is the effective use made of the PC's function keys. When you buy the software, you are supplied with a solid plastic template that fits neatly around the function keys (much like the one supplied with Lotus's 1-2-3). The function keys make it easier to review accounting

records and respond to certain prompts. The key assignments are as follows:

Next	Prior
First	Last
Date	List
Delete	End
Yes	No

MAI's spiral-bound manual gives clear and concise instructions for software installation—a pretty straightforward process. Handy flowcharts (see Figure 4) give you a quick overview for each package. The manual makes good use of typefaces, which vary in size and boldness. Two colors are used, and the text is well illustrated. Each manual has a glossary of accounting terms as well as a seven-page primer on double-entry bookkeeping. The documentation includes an easel and diskette labels for your convenience.

Storage and Security

The file sizing/resizing facility, found in the Definition section of each system, is an unusual feature that lets you define the sizes of various system files. Figure 5 shows the screen used to size your *Accounts Payable* files. You would begin by entering the number of vendors with whom you expect to be doing business, or accept *Accounts Payable's* default value of 10. After you complete all 11 specifications, the information is translated into file sizes appropriate for your installation. Figure 6 shows the file sizes that were computed based on the information shown in Figure 5. Most importantly, the screen indicates the total disk storage required for your files. You can then use this information to manage your disk storage requirements.

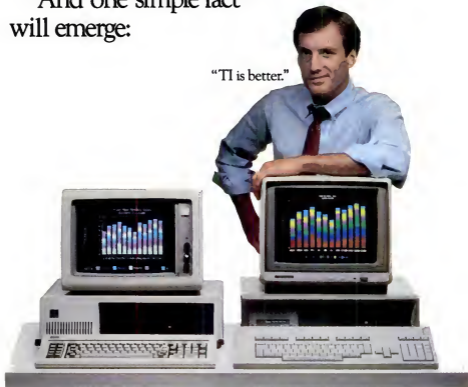
The Definition section of each system also contains a password maintenance function that lets you restrict access to many of the system functions by setting up

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passwords for certain menu selections. To control this whole process, you must password-protect the Definition section to restrict access to the password maintenance menu.

Prior to sending its software out into the micro world, MAI developed an advanced version of its Business BASIC interpreter known as Business BASIC/Micro or BB/M. Although we did not have the chance

to review it, the language is worth mentioning because all of MAI's microcomputer accounting packages are written in BB/M.

BB/M is designed to speed program

WORLDWIDE ENTERPRISES FILE SIZING/RESIZING

FILE SIZE SPECIFICATIONS:

1.	NUMBER OF VENDORS:	10
2.	ONE TIME ONLY VENDORS:	7
3.	INVOICES ENTERED AT ONE TIME:	10
4.	INVOICES OPEN AT ONE TIME:	50
5.	AVERAGE G/L DISTRIBUTIONS PER INV:	1.5
6.	CHECKS PRINTED AT ONE TIME:	10
7.	AVERAGE INVOICES PER CHECK:	2.5
8.	CHECKS WRITTEN PER PERIOD:	25
9.	MANUAL CHECKS WRITTEN AT ONE TIME:	5
10.	NUMBER OF CHECKING ACCOUNTS:	5
11.	NUMBER OF TERMS:	10

IS THE DATA CORRECT? (CR-N-END-LIST)

Figure 5: The file-size specification screen for the Accounts Payable module. The program will automatically size the files for your system and compute file requirements as shown below.

ACCOUNTS PAYABLE FILE REQUIREMENTS

FILE DESCRIPTION	FILE TYPE	FILE NAME	KEY SIZ	NO. RECS	8BYTES /REC	TOTAL SECS	RECS SIZED	RECS USED
VENDOR MASTERFILE (1)	DIR	VMF01	12	10	230	8	10	10*
VENDOR MASTERFILE SORT (1)	SRT	VMF02	19	10	0	3	10	9*
NOT ON FILE VENDORS (2)	DIR	VMF05	15	7	116	5	5	0
CHECKWRITING (6)	DIR	APC01	19	11	84	5	11	1
CHECKWRITING DETAIL (6,7)	DIR	APC02	19	25	92	9	25	0
DISBURSEMENTS HEADER (8)	DIR	APC03	11	25	92	8	25	10
DISBURSEMENTS DETAIL (7,8)	DIR	APC04	21	62	64	14	62	15
OPEN INVOICE MASTER (4)	DIR	API01	19	50	108	16	50	17
INVOICE DATA ENTRY (3,5)	DIR	API02	21	26	108	10	26	1
OPEN INVOICE DISTRIBUTION (4,5)	DIR	API03	21	1	48	4	1	0
MANUAL CHECK DATA ENTRY (9,7,5)	DIR	APM01	23	22	96	9	22	1
TERMS CODE MASTERFILE (11)	DIR	APT01	5	10	64	5	10	3
BANK ACCOUNT ID MASTERFILE (10)	DIR	APF00	4	5	64	4	5	2
CHECK RECONCILIATION (8)	DIR	CKR01	11	35	72	9	35	8
TOTAL BYTES REQUIRED FOR FILES:						55808		

DO YOU WANT TO SIZE/RESIZE FILES? (Y-N)

Figure 6: The Accounts Payable file requirements computed from the information shown in Figure 5. The numbers in parentheses next to the file descriptions refer to the specification numbers (see Figure 5) that are used to arrive at the file-size computation.

development, and MAI claims that it is one of the easiest, fastest, and most complete business-oriented development environments available on a microcomputer. The language is specifically designed for the transaction-based procedures that dominate accounting applications.

As part of its marketing strategy, MAI is making BB/M available to software developers. The company's aim is to make it easy for the developer or sophisticated user to customize vertical applications to integrate with MAI's accounting

Buying the fanciest system makes no sense if all the extra features just get in the way.

software or modify the source code of MAI's software for special customer needs.

Also, because BB/M uses MS-DOS-compatible file structures, programs can be written to access data created by other MS-DOS applications.

Conclusion

MAI's accounting software benefits from its minicomputer heritage. While the packages lack some of the wide-ranging features of competitive products, they are straightforward, easy to set up, and easy on the user. "Extras" are not helpful to you if your business won't use them. On the contrary, they may be more trouble than they're worth. Selecting the right system for your business is simply a matter of determining which software package meets the majority of your accounting and management reporting needs, present and near term. Buying the fanciest system makes no sense if all the extra features just get in the way. Examine your needs and MAI's features carefully. It could be a perfect match.—G. William Dauphinais and Michael A. Yesko

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110) January February March April

	January	February	March	April
120) Seattle	1,789.82	1,993.83	3,772.99	2,118.44
130) Portland	521.99	854.77	864.82	409.11
140) Salem	319.22	590.10	646.44	221.88
150) San Francisco	4,555.10	6,556.83	7,945.10	8,994.54
160) Santa Barbara	521.44	980.23	883.92	754.99
170) Hollywood	281.99	462.88	519.99	892.11
180) Los Angeles	10,992.81	13,447.88	12,954.21	15,292.88
190) San Diego	1,321.81	1,980.21	2,445.92	2,981.88
200) -----				
210) West Coast	26,652.88	29,805.81	32,284.44	35,142.21
220) -----				
Total	114,212.88	128,945.81	142,874.44	158,942.21

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One of the most popular and widespread uses of PCs is for word processing. Since the appearance of the IBM Personal Computer, dozens of word processing programs have appeared to satisfy a wide range of text manipulation needs. Some are carryovers from earlier 8-bit CP/M machines, while others are new programs designed to take advantage of the hardware advances of the 16-bit environment.

The unquestioned champion of 8-bit word processors, however, is MicroPro's *WordStar*. Products like *MultiMate* and *WordPerfect* have eroded *WordStar*'s market share to some degree, but even

with all the competition, the MicroPro program has remained dominant.

Early PC versions of *WordStar* were direct conversions of the 8-bit program, which took little or no advantage of the PC's hardware. While the current releases of *WordStar* do use the extra memory, direct screen display, and function key features of the PC, the basic operation of the program is unchanged. As a veteran contender, *WordStar* offers users the benefits of consistency and familiarity, but many newer products simply offer more features. Some of the most obvious deficiencies in *WordStar* are its lack of automatic footnotes, automatic indexing, auto-

matic generation of tables of contents, and true proportional spacing.

Proportional Spacing

Almost all daisywheel and thimble letter-quality printers, and even some dot matrix printers, are capable of moving their printheads in very small horizontal steps, usually $1/120$ of an inch. Simple word processing programs don't use this ability at all; they justify right margins by adding entire space characters between words. This can be distracting and visually unappealing. Somewhat more sophisticated programs use the micro-spacing abilities that some printers have to add small

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MAGICINDEX

spaces between words (or, occasionally, within words) to line up margins. This technique works with normal printwheels and fonts and looks quite a bit better than space insertion. *WordStar* falls into this latter camp of programs using the micro-spacing technique.

Normal printwheels attempt to keep all characters more or less the same width so that the typing and word processing output will look reasonably balanced. The special proportionally spaced wheels, however, make characters like *M* and *W* wider than the others to more closely imitate true typesetting fonts. If such wheels are used with standard word processing software, the wide characters will overlap in a word like "command." The software must make a special provision for such wheels—the printhead must be moved in exact increments based upon the actual width of the character to be printed. For example, the printhead would be moved much further for a capital *M* than for a lower-case *i*.

This type of printing is called *true* proportional printing to distinguish it from the micro-spacing technique, which is often erroneously called proportional spacing. True proportional output is far superior visually and can sometimes approach typeset copy for eye appeal.

Many of the serious word processing programs for the PC include true proportional spacing, but *WordStar* does not. There is an unsupported and unofficial way to patch *WordStar* to come close to true proportional printing, but the method is clumsy and doesn't work terribly well.



MagicIndex

Computer Editype Systems
509 Cathedral Parkway
New York, NY 10025
(212) 222-8148

List Price: \$295

Requires: 90K RAM, one disk drive,
letter quality printer.

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The lack of proportional printing and many other deficiencies of *WordStar* are addressed by a program called *MagicIndex*, from Computer Editype Systems of

New York City. *MagicIndex* includes true proportional printing and other fancy formatting routines, a replacement for Micro-Pro's *MailMerge* utility, and completely

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MAGICINDEX

automatic creation of indexes and tables of contents. It works with files produced by several word processors and text editors—there is a version specifically for *Word-*

Star—and it can team up with both Diabolo and NEC printers. The syntax for the *WordStar* version is slightly different from the version for other editors; we'll use the

WordStar syntax here.

To use *MagicIndex*, text files are prepared with *WordStar* as usual except for the special *MagicIndex* commands embedded in the text. The *MagicIndex* commands are like *WordStar's* dot commands, except that two periods precede the command rather than one. *WordStar* treats lines beginning with two periods as a comment and ignores them, so text entry and editing can proceed normally. The standard *WordStar* commands for boldface, underscoring, and other "special effects" are recognized by *MagicIndex* and handled normally. *MagicIndex* adds a few wrinkles to the special effects options (see Figure 1), such as the concept of "transient" commands, which are cleared by the end of a paragraph. This eliminates the possibility of printing an entire document in boldface, for example, if the closing control character is omitted.

MagicIndex's dot commands are listed in Figure 2. Most of the commands work similarly to equivalent commands in

The centering and flush right commands produce very attractive headings.

WordStar, and the meaning of the others should be reasonably self-explanatory to experienced *WordStar* users. Two special commands, * and #, are used to define headers and footers. *WordStar* offers only single-line headers and footers, but multiple lines can be defined with *MagicIndex*. Using the centering and flush right commands can produce some very flexible and attractive headings.

MagicIndex also includes automatic footnoting capabilities. The text of a footnote is surrounded by Ctrl-E characters, and the program places the footnote at the bottom of the page, separated from the main text by a short line. If a footnote is

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