

The vast Lotus aftermarket provides software to make the spreadsheet you have do just about anything you want. This overview covers 21 add-ins that make *1-2-3*, Release 2.2, a sharper tool for crunching numbers.

LOTUS 1-2-3 ADD-INS:

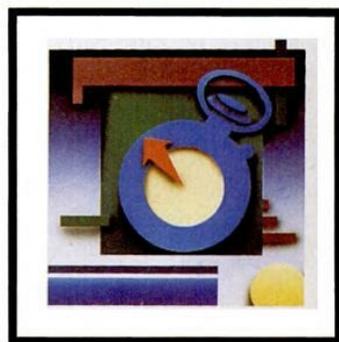
Building The Perfect Spreadsheet

by Craig Stinson

If features tables were reliable predictors of market success, *Lotus 1-2-3*, Release 2.2, would be a product in deep trouble these days. Borland's *Quattro Pro* and *Microsoft Excel*, to name only two of *1-2-3*'s strongest competitors, offer more-versatile file linking, vastly superior graphics, better publishing features, a richer environment in which to develop macro-driven applications, the ability to access and manipulate external data tables, and tools for annotating and auditing worksheet logic.

In addition, *Excel* holds out the increasingly credible prospect of smooth integration with myriad applications by way of the *Microsoft Windows* Dynamic Data Exchange (DDE) protocol.

In measurements of spreadsheet prowess, the world's most popular application lags behind. Yet in one particularly critical measurement



it shines: *1-2-3*, Release 2.2, continues to outsell its competitors by more than two to one.

A major factor in *1-2-3*'s leadership is the gigantic Lotus aftermarket of software that enhances *1-2-3*'s performance. This evaluation covers 21 financial, forecasting, optimizing, and utility add-ins that run within *1-2-3* and make it a better spreadsheet.

GRAVITATIONAL FORCES

Inertia is certainly part of the reason for *1-2-3*'s enduring preeminence. Upgrades and product switches are extremely disruptive and costly. When you have years of training and a metric ton of worksheets, templates, graphs, and macros invested in a product, it takes a compelling argument to make you want to move. So far, no one—not even Lotus itself with *Symphony*, *1-2-3*, Release 3, or *1-2-3/G*—has made that argument convincing.

Enter add-ins. By enhancing *1-2-3* exclusively and specifically, add-ins allow you to build on the investment you've already made. Aftermarket services naturally accrete to the strongest gravitational force and thereby increase its attractive power. The 1991 edition of the Lotus Enhancement Products Directory (available in May from Lotus Development Corp., Cambridge, Mass.; 800-343-5414) lists nearly 500 third-party support products for *1-2-3*, plus several hundred consulting services, training firms, and books.

Introduced by Lotus in 1987, the add-in concept has been widely imitated. So far only *1-2-3*, Version 2.01 (along with its file-compatible successor, Release 2.2) has had enough gravitational pull to create a market of third-party products. Borland's *Quattro* and *Quattro Pro* were designed to accommodate add-ins, but a toolkit with which to develop them never materialized. To date, the only add-ins to appear have been Borland's own *Transcript* (a backup facility) and *Menu Builder* (a utility for customizing the menu tree). The recently shipped *Excel* 3.0 includes add-in capability and comes bundled with a raft of Microsoft accessories (including an optimizer that's functionally identical to Frontline Systems' *What-If Solver*). It remains to be seen, however, if a third-party add-in market will develop for *Excel*.

THE ADD-IN ADVANTAGE

A major segment of the aftermarket is made up of add-ins that cover a wide

spectrum—from generic services such as word processing and worksheet annotation, to highly specific vertical-market applications such as electrical estimating for the construction industry. What they all have in common is that they augment the power of *1-2-3* in specific, focused ways, allowing users to upgrade selectively and as needed.

Suppose you covet the formatting power of *Excel* but don't want to move to *Microsoft Windows*. No problem: Simply attach Funk Software's *Always* or PC Publishing's *Impress* to *1-2-3*. Neither add-in makes boardroom beauty quite as accessible as *Excel* 3.0, but both come close enough. Do you want your spreadsheet to perform nonlinear optimization, but feel reluctant to switch operating systems and adopt *1-2-3/G*? Check out Frontline Systems' *What-If Solver*. While its reporting capability is less extensive than that of *1-2-3/G*'s built-in Solver, it handles

the same kind of problems—right inside your Release 2.2 worksheet. You say background printing would let you get more work done, but you're not willing to take on Release 3 just for that? Take a look at *P.D.Queue*. This add-in from Funk Software is less adept than Release 3 at reporting printer errors, but it can manage a background queue of 99 print jobs.

Not only do add-ins save you the trouble of switching spreadsheet programs (and possibly spreadsheet vendors), but in most cases they'll also spare you the expense of upgrading your hardware. *Excel*, *1-2-3/G*, and *1-2-3*, Release 3.1, all require significant amounts of extended memory in addition to 640K of conventional memory and an 80286 or more-advanced processor. Most add-ins do just fine in 640K. The amount of memory they use (in many cases 100K or less) reduces the memory available for your worksheets, but if your favorite add-in leaves your larger worksheets gasping for RAM, you can simply detach it. With an add-in, you get an enhanced version of *1-2-3* when the memory cost is affordable; when it isn't, you can go back to unadorned Release 2.

Lotus has tried vigorously to promote add-in development for its advanced DOS spreadsheet, *1-2-3*, Release 3.1. In an effort to build bridges between all its advanced applications, present and future, Lotus created a new high-level programming language in parallel with its development of Release 3. The Lotus Programming Language (LPL), unveiled in the *Lotus Add-in Toolkit* for Release 3, is explained in the sidebar "A Tour of the Lotus Add-In Toolkit."

Unfortunately, the first release of the *Toolkit* required the use of LPL, while virtually all Release 2 add-ins are written in C or assembly language. This meant that developers had to recode their products from scratch to make them available to Release 3. With market acceptance of Release 3 in some doubt to begin with, developers were in no rush to commit time and talent. A recent upgrade of the Release 3 toolkit that permits the use of C and assembler routines may stimulate the river to flow, but to date only a handful of Release 3 add-ins exist.

LIVING WITH LOTUS TODAY

Meanwhile, the market for Release 2 add-ins continues to flourish, but its character has changed considerably since the last *PC Magazine* review devoted to this topic ("Living with Lotus," January 26, 1988).

OUR REVIEWERS

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Thomas White is president of Systems Advisory Services, a California-based consulting firm specializing in financial and manufacturing systems. ■

That article evaluated three word processing add-ins, one spell-checker, and five database management utilities.

These horizontal add-ins—products aimed at a wide spectrum of users in many

different industries and occupations—had been published on the assumption that a huge population of 1-2-3 users spend the

entire day sitting in front of spreadsheet grids. These Lotus-bound users, according to theory, would eagerly embrace genuine writing and data-management tools, provided they didn't have to visit

THE REAL ADD-IN STORY: Making 1-2-3 More Vertical

by Jim Seymour

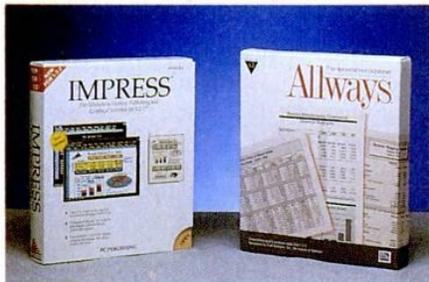
So maybe Lotus 1-2-3 was a little less important than we thought: Three years ago, when we last looked at 1-2-3 add-ins, we marveled at how many business people liked to stay in just this one program, all day. When they had to do something not easily accomplished within that program—say, word processing—they wanted to find a way to do it. So they had pounced on 1-2-3 add-ins. Those add-in programs, which supply many functions Lotus forgot (and some which Lotus no doubt never dreamed of), were beginning to appear in great numbers and seemed likely to extend 1-2-3's reign as the king of the corporate desktop.

Today, while 1-2-3 remains the most popular single program in business use, PC users are less likely to boot it and use add-ins to stay within its familiar bounds than to treat it as one of a suite of applications. Hard data is difficult to come by, but most corporate computing managers agree that the single-program user is much less common now than three years ago, and that the average number of applications used by business people is steadily increasing.

So much for the use of add-ins to create a "one size fits all" program atop the bones of 1-2-3. Indeed, the real story of 1-2-3 add-ins over the past couple of years is that, rather than turning a special purpose program into a general-use package, they've worked exactly the opposite way: They have been turning what we now recognize as a generalized number-crunching program into a series of very different and highly specialized applications. In fact, in areas such as forecasting, financial analysis, and linear programming for optimization, the combination of 1-2-3 and the appropriate add-ins has become the preferred, often dominant choice.

Marc Peterson, president of Personics and producer of add-ins such as *@Base* and *SeeMore*, agrees that add-ins are increasingly being used to turn

1-2-3 into a specialized vertical package. "Though some of our packages, such as *@Base*, provide horizontal functionality," Peterson says, "we increasingly find them being redeployed as tools within highly specialized applications by people using 1-2-3 as a development system."



Ironically, one factor that some thought might fundamentally change the add-in market has *not* materialized: a broader, more-functional version of 1-2-3 itself. While Lotus has acquired the competing spreadsheet-formatting add-ins (*Allways* and *Impress*), bundles them with different versions of 1-2-3, and has incorporated some of the database management smarts of Personics' *@Base* into *Symphony*, Lotus has generally not worried much about extending the functionality of 1-2-3. Some new features and functions have appeared in succeeding releases, but even 1-2-3, Release 3.1, and 1-2-3/G have been characterized not so much by any major extensions of the program's fundamental powers as by incremental additions and backwards compatibility.

PAST, PRESENT, AND FUTURE

Three years ago, we asked the experts where 1-2-3 add-ins were headed and which external functions would be added next, via the add-in path. A communications module was the most obvious missing link. In fact, Eric Shultz, developer of the best of the 1-2-3 add-in word processors, Blossom Software's *Write-in*, said he and his colleagues at Blossom had targeted communications as a target of opportunity.

Yet even today, no standard communications software has appeared as a 1-2-3

add-in. (Beyond, a startup led by former Lotus vice president Chuck Digate, has announced a release of *@Mail*, a limited e-mail add-in, for delivery this year.)

Other experts were just as far off. Three years ago Paul Funk, founder of Funk Software and developer of such add-in packages as *Sideways*, *InWord*, *Note-worthy*, and *Allways*, believed that 1-2-3 users were looking primarily for more-generalized 1-2-3 toolkits.

Today Funk says, "It looked to me that making 1-2-3 even more horizontal by adding functions was the way to go. We later decided to go back to our strategy of enhancing what was already in 1-2-3, to take care of deficiencies people wanted fixed. We had *Sideways* already, and we went on to do *P.D.Queue* and *Allways*." Funk says that very narrow vertical add-ins will also be a profitable market.

Peterson of Personics sees big opportunities for add-ins in succeeding releases of 1-2-3. "We're going to be changing our strategy," he says, "so that our new products appear first for Release 3.1 and 1-2-3's new *Windows* version, and then we'll go back and redo them for Version 2.x." But he also sees problems for add-in developers in the profusion of incompatible releases of 1-2-3. "It's a nightmare to develop all those versions," he says. "With so many platforms to support, the add-in business is becoming a minefield."

At the same time, those new (and, naturally, incompatible) versions of 1-2-3 should keep the market for add-ins alive for years to come. With Lotus's own strategy focused on delivering same-name/look-alike spreadsheet programs across many hardware platforms, rather than extending the core products with "4-5-6" functions, Lotus will continue to create a rich market for those remora riding its back.

We'll be able to go on fine-tuning the base program more precisely to meet our increasingly special needs. ■

the dreaded DOS prompt in order to do it.

The assumption proved false, as Jim Seymour reports here in "The Real Add-In Story: Making 1-2-3 More Vertical." The sales history of these horizontal add-ins demonstrated that Lotus users were less keen on turning 1-2-3 into a multiple-

application platform than on making it better at tasks it was originally intended to perform. The market for word processing and database add-ins has stagnated and is still dominated by Symantec (*4-Word*,

Spellin!), Funk Software (*InWord*), Blossom Software (*Write-In*), Personics (*@Base*), Intex (*Data Manager*), Goldata Computer Services (*D.A.V.E.*), PC Publishing (*Deja!*), Informix (*Informix Datasheet Add-In*), and Manusoft (*Fetch**).

A TOUR OF THE LOTUS ADD-IN TOOLKIT

by Christopher O'Malley

As plentiful and varied as it is, the field of commercial Lotus 1-2-3 add-ins is not without limits. There are no add-ins called Bill's Market Planner or XYZ Corp.'s Distribution Analyzer. That sort of specificity demands a custom-made solution, which means programming an add-in of your own—traditionally a forbidding challenge to even the most-experienced 1-2-3 users and in-house corporate developers.

For Release 3.x users and developers, creating your own 1-2-3 add-ins is a considerably less-daunting task with Lotus's *Add-In Toolkit for 1-2-3*. The *Toolkit* is a complete programming environment for 1-2-3, Release 3, that enables you to fashion custom @ functions, macro commands, data entry forms, and with more effort, entire add-in applications. Unlike add-ins created for Release 2, which still must be written in assembly language, add-ins produced with the *Toolkit* for Release 3 are written in Lotus's simpler, plain-English language.

However, be forewarned: The *Toolkit* does not make spawning your own 1-2-3 add-ins a day at the beach; spending a few days to a few months at a construction site is more like it. Officially, Lotus says the *Toolkit* is intended for "advanced macro writers" as well as application developers. Lotus officials are quick to concede that only very advanced 1-2-3 users who've hit a functional wall, or users with some prior programming experience, will feel comfortable working with the *Toolkit* to develop add-ins.

INSIDE THE TOOLKIT

The *Toolkit* consists of five basic parts: the Lotus Programming Language (or LPL), a library of procedures and data structures for 1-2-3, an editor, compiler, and debugger. Using the editor, you write the source code with LPL

commands and library functions. You then use the compiler to correct any syntax errors and generate an object file that can be invoked via the menu and run as a 1-2-3 add-in.

If your add-in doesn't work as expected, you can use the debugger window to follow your code as it runs—but only if you happen to be using OS/2. Unfortunately, the debugger doesn't work with DOS.

Depending on the complexity of the job, creating an add-in with the *Toolkit* can mean a major investment of time and energy. But it's an investment that could pay dividends on other platforms, too. Beginning with Release 3, Lotus officially unlocked the door to its spreadsheet's inner workings with a built-in technology that allows users to design custom business applications. It's that technology that makes the *Toolkit* possible, and Lotus is promising that add-ins written in LPL should run intact on other 1-2-3 platforms such as OS/2 and Unix.

A new version of the *Add-In Toolkit* for Release 3.1 of 1-2-3 is now available. In addition to supporting the new features of Release 3.1, the upgraded *Toolkit* adds a link to procedures written in C, allows debugging under DOS, and provides "event management" capabilities that enable you to write add-ins that can watch for and respond to basic spreadsheet actions, such as saving a file or entering a particular keystroke. The new version should also speed up the performance of most add-ins by a factor of two or more. ■

Add-In Toolkit for 1-2-3, Release 3.0, and Add-In Toolkit for 1-2-3, Release 3.1, Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 617-577-8500. **List Price:** \$395. **Requires:** 2MB RAM; Lotus 1-2-3, Release 3.x; DOS 3.0 or later.

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REVIEW CRITERIA

This evaluation of add-ins includes products in four categories: financial analysis, forecasting, optimization, and utilities. Products in the first three categories are all designed, in one way or another, to make 1-2-3 a sharper tool for performing numeric analysis. The fourth category includes add-ins for managing files, simplifying data entry, increasing available memory, printing worksheets in the background, saving files in the background, augmenting 1-2-3's built-in function library, and creating and debugging macros. We chose to evaluate 21 of the most important 1-2-3 add-ins introduced or improved since January 1988. All 21 work with 1-2-3, Release 2.0, 2.01, and 2.2. A few packages include separate versions for Release 3 as well.

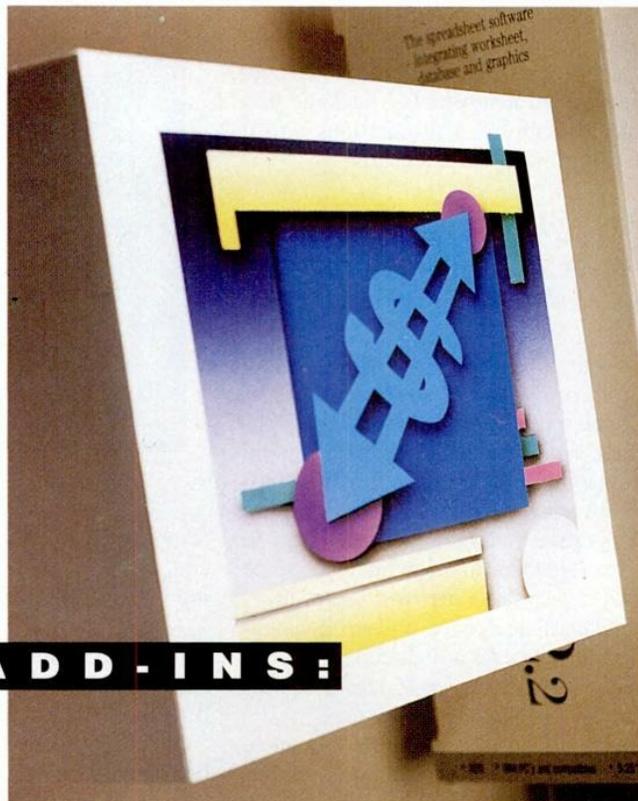
Always and *Impress*, two hugely successful desktop-publishing add-ins, are not covered here since they are bundled into 1-2-3 Release 2.2 and Release 3.1, respectively. For an evaluation of these add-ins, see "Who Needs a Graphics Package Anyway?" (*PC Magazine*, December 11, 1990).

For all their virtues, add-ins also have a few drawbacks. First, 1-2-3 enhanced by a suite of add-ins is a product upgraded by a committee—typically a committee of competitors. Most add-ins are designed to work harmoniously together, but the potential for conflict always exists.

Second, the more functionality you tack on via add-ins, the more menus and commands you have to master. In some cases—the combination of *Impress* with 1-2-3, Release 2.2, for example—you may find yourself dealing with two or more identically named menus, each with slightly different commands or areas of jurisdiction. The more you add in, the greater your potential for confusion.

These concerns are minor, however, if you're only looking to improve particular aspects of 1-2-3's functionality, such as its financial function library or its suitability as a forecasting tool. In this case, add-ins can help you construct spreadsheets perfectly suited to your tasks and extend the life of your 1-2-3 system for years to come.

Even if you've got the time
and the talent to write your
own 1-2-3 code, why
bother when you can use
one of these six add-in
solutions for knotty
financial tasks?



PHOTOGRAPHY: WALTER CHRZYŃSKI / ILLUSTRATION: KEITH LO BUE / CONSTRUCTION: CLAUDIA TELLER

FINANCIAL ADD-INS:

A Wealth of Spreadsheet Shortcuts

by Mike Falkner

Lotus 1-2-3 has the ability to handle many financial scenarios, but today's sophisticated financial environment often requires you to build complex formulas and memory-robbing tables. This demands significant development time that you could spend on analysis.

This collection of add-ins addresses the shortcomings of 1-2-3 and frees up your time for analyzing information instead of building spread-

sheets. Since each package has its own objective, we do not compare them feature by feature. Instead, we evaluate them for finesse in executing tasks and the usefulness they provide to the 1-2-3 user. Packages like *Financial Toolkit*, *Financial @nalyst*, and *The @Library General Applications* add more @ functions to 1-2-3, reducing complicated tasks to a single formula. *The Budget Express* makes it simpler to create

forecasts and review your work, and *Instant Analyst* helps you quickly spot trends. To whisk your accounting data into 1-2-3, there's F9.

Whether you just want some of the dredger removed from your spreadsheet tasks or need a substantial package that breaks through 1-2-3's limitations, you'll find solutions in these add-ins.

The @Library General Applications

by Mike Falkner

GreyMatter International offers three versions of *The @Library*: general statistical, and scientific and engineering applications. We evaluated the \$79.95 general add-in, which plugs some holes in 1-2-3's function library with 48 general purpose @ functions. You may find *@Library* to be a lean tool for financial analysis, since 40 of the functions perform vector algebra and statistical, date, and string calculations. Not strictly a financial tool, *@Library* is a good choice if you need this broad range of functions.

Recognizing that you may not need all 48 functions, GreyMatter supplies *@Library* as a single add-in file and as a set of four files, each one holding a related group of functions. If you just need financial and date functions, for example, just attach the 8K @FINDATE add-in instead of the entire 35K add-in.

To install *@Library*, you use a simple install program or just copy the *@Library* add-in and the help file into your 1-2-3 directory. Use /Add-in to attach @Li-

F18: (F2) +C18+F17
Enter name: payment5 Enter range: A18..F18

	A	B	C	D	E	F
1						
2						
3	Traditional Method			@Library Method		
4						
5	Loan Amount	10000		Interest on pmt five =	77.59	
6	Interest	10.00%		Cum Interest to pmt 5=	402.36	
7	Term	48		Formulas=	@FINT(B5,B6/12,B7,5)	
8	Payment	253.63			@CINT(B5,B6/12,B7,5)	
9						
10						
11		Beginning		Ending		Cum
12	Payment number	Balance	Interest	Principal	Balance	Interest
13						
14	1	10000.00	83.33	170.29	9829.71	83.33
15	2	9829.71	81.91	171.71	9658.00	165.25
16	3	9658.00	80.48	173.14	9484.85	245.73
17	4	9484.85	79.04	174.59	9310.27	324.77
18	5	9310.27	77.59	176.04	9134.23	402.36
19	6	9134.23	76.12	177.51	8956.72	478.48
20						

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**The @Library
General
Applications'
@FINT and @CINT
functions
eliminate the need
to create an
amortization table
to calculate the
interest paid for a
single period and
the interest
accumulated up to
a period.**

brary to load the functions. Once you attach *@Library*, it is invisible, co-existing with 1-2-3's other @ functions.

LOAN CALCULATION SHORTCUTS

As a financial tool, several of the *@Library* functions are convenient shortcuts for calculating loan information without building an amortization table or creating a formula. @CINT and @CPRIN calculate the interest and principal accumulated up to a certain period. Their siblings, @FINT and @FPRIN, calculate the interest and principal portion of one payment in a single period. Without these functions, you would have to build an amortization table that calculates the interest and principal paid for each period and accumulates them as running totals. Using

1-2-3's @VLOOKUP on a period number, you'd come up with the same results that *@Library* gets with one cell.

The functions @EFF and @NOM are mere shortcuts that return the effective and nominal interest rate for a given interest rate. Although you can use just one 1-2-3 formula to replace each function, using the add-in's @EFF to calculate the effective rate is a whole lot simpler than remembering the formula $(1 + (\text{int}/\text{periods}))^{\text{periods}}$.

BETTER FORECASTS

Although the remaining *@Library* functions do little with financial calculations, several do help you create a better forecast. Instead of placing the date (02/15/91, for example) at the top of your report, you can use @LDATE to make it more professional as "February 2, 1991." You can use the functions @NESUM and @NECOUNT to sum and count a range of cells, similar to their 1-2-3 counterparts @SUM and @COUNT. Unlike 1-2-3, however, they skip @NA's and @ERR's, eliminating inadvertent division by zeros and other errors, guaranteeing a value at the bottom of the column.

The *@Library* also includes an optional help add-in called @LIBHELP to assist you when you can't remember the syntax for each function. When you hit the hotkey that you assign to @LIBHELP, you'll get a display including the name of each function group in a 1-2-3-style menu. Simply select the group that you want to view on-screen, and the add-in displays the syntax and a brief description of all functions residing in that group.



EDITORS' CHOICE

- Financial @nalyst
- Financial Toolkit

Many of these financial add-ins can assist you in marshalling Lotus 1-2-3 data to cut the time you spend analyzing financial tasks and performing complex calculations. Two packages stand out: Intex Solutions' *Financial Toolkit* and Tech Hackers' *Financial @nalyst*. They stretch the capability of 1-2-3 and have the depth of functionality and the smarts to save you time.

While both packages provide calculations for net present value, future value, and loan amortizations, *Financial @nalyst*

stretches beyond those tasks to provide more options for complex cash-flow analysis and loan amortizations.

Bringing valuable functions to a specific market—loans and investments—*Financial Toolkit* handles adjustable rate mortgages, bond calculations, and depreciation calculations. And it's now compatible with 1-2-3, Release 3. (Tech Hackers does provide add-ins to *Financial @nalyst* that address these areas, but they are sold separately.)



FACT FILE

**The @Library
General
Applications,
Version 1.0**

GreyMatter
International Inc.,
P.O. Box 388,
Cambridge, MA
02141; 617-876-
6969.

List Price: \$79.95.

Requires: 35K RAM (including 15K help add-in), or 8K RAM if only the date/financial module is loaded, DOS 2.0 or later.

In Short: *The @Library* is a set of general-purpose functions covering more than financial calculations. It handles basic loan and amortization problems well, but lacks the depth needed for a serious financial analysis tool.



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The *@Library* doesn't pretend to be a hotbed of financial functions, and compared with packages like the *Financial Toolkit*, it obviously isn't. The *@Library's* financial functions are a small part of the package, while the functions in the *Financial Toolkit* are sophisticated and targeted at the financial professional. The *@Library* loan functions handle simple, fixed-term loans, while the *Financial Toolkit* goes much farther, handling mortgages with adjustable rates, graduated payments, and balloon payments at the end of a note.

The financial functions in the *@Library* are reliable, but not strong enough to handle today's complex financing arrangements. Unless you're looking for basic loan and annuity calculations or a general purpose @ function library, save the space set aside to add-in @ functions for a more-sophisticated financial package.

The Budget Express

by Mike Falkner

You can't do a good spreadsheet analysis unless you build a good spreadsheet. *The Budget Express*, a \$149 add-in from Symantec Corp., cuts down the time needed to build your model and gives you powerful tools to speed up your analysis.

Like most 1-2-3 add-ins, you can install *The Budget Express* with a setup program or simply copy it to your 1-2-3 directory. You use /Add-in Attach to load *The Budget Express* and then assign it to one of four Alt-key combinations to invoke it. Once attached, *The Budget Express* uses 64K of

conventional memory and up to 256K of EMS when available for goal seeking and consolidations.

The Budget Express documentation is clearly written. The package comes with an excellent tutorial and example files that bring you up to speed quickly. While in 1-2-3, press F1 and you get context-sensitive help.

The Budget Express begins its work right away as you start building your spreadsheet. When you type a date at the top of a column and move the cursor to the right, *The Budget Express* anticipates your next move by loading the next month into the 1-2-3 edit line as if you typed it. After you enter row labels, you can use *The Budget Express* to indent a range of row labels by a fixed number of spaces and, based on how you indent the labels, automatically create total lines at the bottom of each group of rows.

OUTLINING AND TREND ANALYSIS

Once you establish row groups in your forecasts by indenting labels, you can use *The Budget Express's* powerful outlining feature to summarize your spreadsheet. Using the Hide option, you can reduce a range of rows to a single row that contains the title you used at the top of the section and the total you created at the bottom. Use Hide with your cursor in a column heading to reduce monthly columns to quarterly or yearly columns. By reducing rows and columns, you can fit your entire spreadsheet onto a single screen for easy review. Later, when you complete all of your work, you can expand the rows or columns with the Show option.

The Budget Express not only summarizes your data but also helps you analyze trends without adding more formulas. With the Analysis option, *The Budget Express* calculates the change between months and places the values where the original information was shown. If you prefer, you can also calculate the percent



FACT FILE

**The Budget Express,
Version 1.10**

Symantec Corp.,
10201 Torre Ave.,
Cupertino, CA 95014;
408-253-9600.

List Price: \$149.

Requires: 64K RAM,
DOS 2.0 or later.

In Short: *The Budget Express* helps you to build spreadsheets faster and enhances your ability to view and manipulate information. Although 1-2-3, Release 2.2, reduced the need for the package's consolidation feature, the remaining functions can still save you time and effort.



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change between periods, the running totals, or the percent change in running totals. You simply use Restore to bring back the original information.

When you modify a forecast, you often save a copy beforehand in case you change your mind. Using *The Budget Express's* Goalseek option, you can modify cells and ranges without losing your original information. You point to a cell and enter the number that you want—the goal. You then specify a range, change it by a percentage or amount, and watch the cells and a status bar report the results. You can

G10: (,2) 9600
Enter range for modification: G13..G10

	A	B	C	D	E	F	G	H
1					Jan	Feb	Mar	Q1
2								
3	Expenses							
4	Facilities							
5	Rent				3,000.00	3,000.00	3,000.00	9,000.00
6	Utilities				400.00	375.00	300.00	1,075.00
7	Maintenance				250.00	250.00	250.00	750.00
8	Total Facilities				3,650.00	3,625.00	3,550.00	10,825.00
9	Payroll							
10	Manufacturing				8,000.00	8,000.00	9,600.00	25,600.00
11	Marketing				2,400.00	2,400.00	2,400.00	7,200.00
12	Corporate				3,000.00	3,000.00	3,000.00	9,000.00
13	Legal				10,000.00	10,000.00	10,000.00	30,000.00
14	Total Payroll				23,400.00	23,400.00	25,000.00	71,800.00
15	Advertising							
16	Print				500.00	500.00	600.00	1,600.00
17	Radio				250.00	250.00	350.00	850.00
18	Television				0.00	0.00	1,000.00	1,000.00
19	Total Advertising				750.00	750.00	1,950.00	3,450.00
20	Total Expenses				27,000.00	27,775.00	30,500.00	86,075.00

Goal: 80,000.00 Now: 86,075.00

The Budget Express's Goalseek option allows you to set a goal and then modify a range of cells by an amount or percentage to reach that goal.

undo recent changes, save the revised spreadsheet, or restore the original spreadsheet when you're finished.

SPREADSHEET CONSOLIDATION

One of *The Budget Express's* more powerful and complicated features is its ability to build a consolidated spreadsheet from several files. You build a consolidation configuration by selecting the files to merge and by describing the method used to combine each row. You can match rows by labels, location on the spreadsheet, or by manually linking the rows. *The Budget Express* then reads each file and generates a consolidated spreadsheet based on your specification.

Now that *1-2-3*, Release 2.2, has spreadsheet linking, however, you can get by without *The Budget Express* for most consolidations. Goal seeking, consolidations, and outlining require additional conventional memory, so you'll need to reserve some memory for these tasks. To conserve memory, it would be helpful to have several smaller add-ins for the independent functions like consolidations and outlining so you could select and load only what you need.

The Budget Express reduces the drudgery of creating budgets and enhances your ability to view and manipulate information. With patience you can accomplish what you set out to do with *The Budget Express*, but you'll need a few hours before it pays for itself.

F9

by Thomas White

The majority of the financial analysis done by today's businesses centers on information in accounting systems. Unfortunately, PC-based accounting systems lack the analytic capabilities of *1-2-3*, forcing you through the awkward steps of downloading data and importing it into *1-2-3*, or worse, rekeying the data. *F9*, a \$599 package from Synex Systems Corp., provides a quick, easy approach to transferring your general ledger data into your spreadsheet.

Synex Systems, which also developed the *SQZ! Plus* and *Cambridge Spreadsheet Analyst* add-ins, has designed *F9* to import data from popular general ledger systems directly into *1-2-3*. Each time you press the *F9* key, the program extracts the desired general ledger information in the blink of an eye to keep your spreadsheet

DEMONSTRATION, INC.		
For the 3 months ending March 31st 1991		
		Year To Date
SALES		
5100	Sales - Software	285,500
5200	Sales - Hardware	52,450
	TOTAL SALES	257,950
COST OF SALES		
1500	Beginning Inventory	74,888
6100	Purchases	135,888
6200	Direct Labor	8
6300	Overhead	8
1500	Ending Inventory	(54,238)

F9 allows you to bring your accounting data—such as the account number, account description, and year-to-date balances shown here—directly into *1-2-3*. The next time you access this spreadsheet, simply press *F9* to retrieve the most-current accounting data.

updated. *F9* comes in versions for *AccPac Plus*, *Great Plains Accounting Series*, *Macola*, *Platinum*, *SBT*, and *Solomon*. Versions for *RealWorld*, *MAS 90*, *Lake Avenue*, and *Peachtree* are expected soon.

LEDGER-TO-SPREADSHEET LINK

The Install program copies all *F9* program files to your *1-2-3* program directory, and if necessary, installs the Lotus Add-in Manager. If your accounting system is based on Novell's Btrieve database, as *Platinum*, *Macola*, and *Great Plains* are, you must load the Btrieve manager into memory before accessing *1-2-3*. (You'll lose another 75K of RAM on top of the 89K required by the add-in.)

When creating a new spreadsheet, you first access the *F9* Setup menu to define several defaults so you don't have to specify them within each @ function you create in the spreadsheet. You can set defaults for company identification, the current accounting year, the DOS directory where the accounting data files reside, any rounding needed as the data is brought over, and cell labels for imported data that contain zeros or a requested account that doesn't exist. If you forget what an option does, you can press *F1* within the *F9* menu for help.

You can then access the Chart menu option to select the general ledger data you want to bring into *1-2-3*. You select the View option to display current general ledger data, and then you're able to point and highlight (similar to the *1-2-3* Copy command) those elements to insert into your spreadsheet. Once you've made your selection, *F9* prompts you for the location

in your spreadsheet where you want the data.

EIGHT HANDY FUNCTIONS

The cells you create with the Chart option display one of eight *F9* functions. @GL brings over account balance data; @NGL performs the same duties as @GL but reverses the sign; @DESC brings over the account description, such as cash; and @ACCTTYPE imports the account type, such as asset or liability. Other functions include @CONAME, @CURRPERIOD, and @CURRDATE, which display company name, current period, and date of the last closed period, respectively. You may be disappointed with @CURRDATE, which brings the date over in a format that



FACT FILE

F9, Version 1.00
Synex Systems Corp., 800-1176 W. Georgia St., Vancouver, BC, Canada V6E 4A2; 604-688-8271.

List Price: \$599.
Requires: 512K RAM, DOS 2.0 or later.

In Short: *F9* extracts financial information from popular general ledger systems directly into *1-2-3*. Its ability to bring over different types of data, such as account balances and budgets for any period or company, summarized to any level, makes this an exceptional tool for any business requiring stronger analysis, reporting, or consolidation capabilities than its accounting software allows.



CIRCLE 618 ON READER SERVICE CARD

you can't adjust with *1-2-3's* /Range Format Date command. @CENTER centers text over a range of columns.

While at first these functions provide only the basics, you gain tremendous flexibility when you explore the arguments for each function. For example, the @GL function lets you input the chart of account number, the accounting period, the company identifier, and the accounting year as arguments. To display the cash account balance for the second accounting period in 1991 for company ABC, you would enter @GL("1010-0000","2","ABC","1991").

When specifying the arguments, you can use full wildcarding within the account number to retrieve summary balances. There are several alternatives for the period argument, such as This Month, Last Month, This Quarter, Last 5 Months, Budget Month. And you can specify any period or range of periods, budget or actual data, and beginning period or ending period.

Since the @GL and @NGL functions include a company argument, your spreadsheet can include information from multiple general ledger companies, allowing you to perform consolidations. Although many accounting systems perform consolidations, they fall short in complex scenarios.

F9 is a wonderful marriage of two important financial tools: the accounting system and the spreadsheet. If you conduct much of your financial analysis work on data from an accounting system supported by *F9*, you should run out and buy this package.

Financial @analyst

by Thomas White

Financial @analyst, a \$195 *1-2-3* add-in from Tech Hackers, is suited to the serious investor who has been frustrated with the limited financial capabilities of *1-2-3*. This package is loaded with 42 functions that address a wide variety of complex investment scenarios, particularly in the areas of cash flow analysis and loan amortization.

MODULAR DESIGN

Financial @analyst consists of six add-in modules that take up nearly 117K RAM. Fortunately, you can select the modules that contain the functions you need for a particular spreadsheet. For example, if you are a mortgage broker interested in

calculating only mortgage loans, you may need only the functions provided in the 28K amortization module. For those with math coprocessors, *Financial @analyst* provides a second version of each add-in that takes advantage of the performance increase this chip provides.

The finance add-in module consists of five functions for cash flow analysis, including three that may look familiar to *1-2-3* users: net present value, internal rate of return, and future value. Each of the functions in this module will go far beyond those provided by *1-2-3*. For each function, you can input up to ten arguments so that complex cash flow transactions can be calculated correctly. For instance, the @NETPV function accommodates different discount rates for each cash flow, variable length time periods between cash flows, and an initial payment occurring prior to the first period.

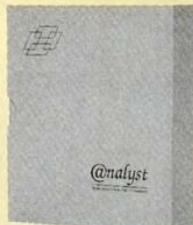
Financial @analyst provides a handy feature for the scenarios that consist of many cash flow payments. Instead of listing each payment in a separate cell, you can group consecutive payments together and minimize both your time and your spreadsheet's memory requirements. If you have ten payments at \$100 each and 20 payments at \$200 each, you can simply enter 10, \$100, 20, and \$200 in four adjacent cells. *Financial @analyst* will correctly incorporate the cash flow payments into the desired @ function.

LOAN ANALYSIS

The amortization add-in module is used to perform useful annuity calculations such as mortgage loan computations. It

FACT FILE

EDITORS' CHOICE



Financial @analyst, Version 1.11
 Tech Hackers Inc.,
 50 Broad St., New York, NY 10004;
 212-344-9500.
List Price: \$195.
Requires: 117K RAM, DOS 2.0 or later.

In Short: *Financial @analyst* provides 42 financial functions geared toward the financial professional or serious personal investor who requires tools that model real-life investment scenarios.

CIRCLE 619 ON READER SERVICE CARD

includes such functions as @AMAIN, which calculates the amount of interest paid to date on a loan after a specific number of payments have been made, and @AMPMTI, which computes the interest amount of any one particular loan payment.

Each of the eight amortization functions addresses advanced loan characteristics by allowing you to input balloon payment, advance payment, and partial, first month payment information as arguments in the function. Additionally, it will calculate interest for residual amounts due after the last payment. For instance, if a 60-month loan is to expire on April 30, 1991, but the final balloon payment is not due until June 15, 1991, you can calculate the monthly payment by entering the amount of the balloon payment and two and a half months in the @AMPMT function.

Financial @analyst provides a module that performs date functions such as cal-

H11: (CB) @NETPV(H9,C6,.09,H5,H6) READY

	A	B	C	D	E	F	G	H
1								
2								Sample Net Present Value
3								Computation
4		Cash Flow Entry						
5		Traditional		Financial @analyst				
6		Approach		Approach				Initial outlay (\$5,000)
7		\$100		2 \$100				Time from initial 1.5
8		100		2 500				outlay to first
9		100		8 1,000				Flow (months)
10		500		2 2,000				Interest Rate 0.0%
11		500						Net Present Value \$1,335
12		1,000						
13		1,000						
14		1,000						
15		1,000						
16		1,000						
17		1,000						
18		1,000						
19		2,000						
20		2,000						

16-Apr-91 11:06 PM

***Financial @analyst* lets you streamline the entry of cash flow payments by grouping like-payments together. Note that the net present value function can incorporate initial cash flow payment.**

culating the day of the week a certain date falls on, the date of the "nth" occurrence of a specific weekday (the 3rd Tuesday in April, for example), and determining the starting date of the quarter that a particular date falls within.

Another module has nine functions for calculating business days so you can calculate the number of business days between two dates. Beware, however, that this add-in doesn't automatically determine holidays. It searches a list of holidays that you create as a range within your spreadsheet.

The final two add-ins provide functions that are math oriented. The first converts a decimal number to a fractional number and vice versa. This is handy for bond calculations in which it is common to represent the bond price in 32nds. For instance, before a conversion to a fractional number, a bond price would be represented as 85.625; as a fraction it would be 85.20, in which the 20 represents 20/32. The second add-in provides advanced algebraic calculations such as factorials and linear interpolation.

For those of you who have built huge, overly complex spreadsheets to make up for the limitations found in the 1-2-3 financial functions, you'll find *Financial Analyst* a blessing. For those who don't have enough time or fortitude to create that type of spreadsheet, you now have one less excuse.

Financial Toolkit

by Mike Falkner

It takes a lot of work to get what you want out of 1-2-3's financial functions, especially when you're handling complicated loans and investments. *Financial Toolkit*, a \$199.95 add-in from Intex Solutions, tackles these tough issues with 20 @ functions that can handle just about any situation involving interest. For more specialized financial features, Intex recently extended its product line to include add-ins for bond, mortgage-backed, and option price calculations.

To install *Financial Toolkit*, you simply copy a single file to your 1-2-3 directory and attach the file FTK with the /Add-in menu choice. 1-2-3 brings the functions into memory, using up 15K RAM. The documentation is exceptional, clearly describing the syntax and use of each function in great detail. With this description, you often get five or more robust,

real-world examples to clarify any doubts about the use of a function.

FINE-TUNED SOLUTIONS

The format of *Financial Toolkit's* @ functions are similar to 1-2-3's financial functions, with each function preceded by an "@FTK_." For example, @FTK_PMT() calculates the payment required for a mortgage much like 1-2-3's @PMT(). However, *Financial Toolkit* functions go beyond the 1-2-3 calculations and use up to seven arguments to implement solutions for more-complex loan or investment problems. One function, @FTK_BAL(), calculates the remaining balance of a loan and uses the loan amount, payment, interest rate, number of payments, and the timing of payments (at the beginning or end of the period), which is the method used for calculating interim interest and the reporting period to fine-tune the calculation.

Financial Toolkit matches 1-2-3's fi-

The flexibility in *Financial Toolkit* makes it a valuable tool for a loan officer, construction loan planner, or investment analyst who needs more than simple loan calculations. Within the function, interest rates can also be either a single number or a range of percentages. This is perfect for calculating adjustable rate and graduated payment mortgages. When applicable, the functions will accept balloon payments and interest caps on adjustable rate mortgages. Instead of building amortization tables to come up with the value for a certain period, you simply specify the period that you want and get the right value.

HEAVYWEIGHT INVESTMENTS

One of the *Financial Toolkit's* more-powerful features is the ability to handle partial interest payments due at the start of a loan. To calculate the interest for 15 days before a 48-month loan begins, for example, you simply use 48.5 as the term of the loan and select one of many calculation methods (zero payment, interest

C10: (F2) @FTK_ARM(C8,0,B8..B13,B3,4)

	A	B	C	D	E	F	G
1	Traditional Method						
2							
3	Term=	48 months					
4							
5	Pmt	Interest	Beginning	Payment	Interest	Principal	Ending
6	No.	Rate	Balance				Balance
7							
8	1	0.8%	10000.00	253.63	83.33	170.29	9829.71
9	2	0.8%	9829.71	253.63	81.91	171.71	9658.00
10	3	0.8%	9658.00	253.63	80.40	173.14	9494.05
11	4	0.7%	9494.05	251.37	75.09	176.28	9308.57
12	5	0.7%	9308.57	251.37	73.69	177.67	9130.90
13	6	0.7%	9130.90	251.37	72.29	179.08	8951.82
14							
15							
16	Financial Toolkit Method						
17							
18	Payment four=	251.37					
19	Formulas=	@FTK_ARM(C8,0,B8..B13,B3,4)					
20							

Without *Financial Toolkit's* @FTK_ARM() function, you must create an amortization table for an adjustable rate mortgage to calculate principal and interest for a period. With @FTK_ARM(), you need only a single formula.

financial functions and adds several more. @FTK_PV, @FTK_FV, @FTK_PMT, @FMT_INT, and @FTK_TERM mirror their 1-2-3 counterparts, with the added flexibility of more arguments. @FTK_ARM and @FTK_CAP handle adjustable rate mortgages, calculating payments and capping a range of interest rates. Two functions calculate nominal and effective yields, four give you details on payments and balances for a period, two more handle graduated or stepped payments, and four others help measure investment risk. A sleeper function, @FTK_DEP, calculates depreciation using six different methods.

only, full payment, pro-rata, bond). The *Financial Toolkit* calculates the partial interest and principal and adjusts the loan balances accordingly, saving you the hassle of creating a complicated formula from scratch.

To really use the *Financial Toolkit*, you should have a good grasp of 1-2-3 and some background in working with loan calculations. While the examples guide you through many scenarios, you need to understand how your loan works. If not, you'll have a difficult time matching it to the examples. The package could also use a help add-in as a memory jog. With six or

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EDITORS' CHOICE

Financial Toolkit, Version 1.0

Intex Solutions Inc.,
 161 Highland Ave.,
 Needham, MA
 02194; 617-449-
 6222.

List Price: \$199.95.
Requires: 10K RAM,
 DOS 2.0 or later.

In Short: *Financial Toolkit* has 20 @ functions with the power to solve heavyweight loan and investment calculations. It handles difficult scenarios (adjustable mortgages, graduated payments, balloons) with a minimum of hassle.



CIRCLE 620 ON READER SERVICE CARD

more arguments in some functions, it's difficult to remember their syntax without help.

If you've ever created a forecast with a complicated loan, you'll truly appreciate the *Financial Toolkit*. It not only implements heavyweight loan and investment functions, it also backs them up with the business acumen to help you make them work.

Instant Analyst
 by Thomas White

Instant Analyst is the newest addition to Personics Corp.'s line of successful spreadsheet add-ins, including *SeeMORE* and *@Base*. The \$69.95 1-2-3 add-in is designed as an easy-to-use tool to assist you in analyzing trends and relationships in your spreadsheet. *Instant Analyst* provides two basic features: the ability to display one or more cells in a certain color if the data in those cells meet a specific criteria, and the ability to set up ratio calculations easily.

To install *Instant Analyst*, you simply type IASETUP from the A: prompt so that the software will copy the necessary files to your Lotus directory and install the 1-2-3 Add-in Manager if you have not already done so. The installation routine will also configure 1-2-3 to auto-load *Instant Analyst* each time you start up 1-2-3. *Instant Analyst* uses 41K RAM.

SMART COLORS

The ability to apply colors to your spreadsheet is a convenient feature if you need to identify exception conditions quickly. You can highlight in green all sales figures that

are more than 110 percent of budget or highlight in blinking red the investment analysis data that doesn't meet your desired rate of return. To invoke the colors feature (*Instant Analyst* calls this feature Smart Colors), you access the *Instant Analyst* menu and select the Define Test option. You're then prompted to enter the range of cells you want to analyze, the operation (for instance, >, =, or <) to apply to each cell in the range, the cell or range of cells containing the data to compare against, and, of course, the color of the cell if it meets the criteria you defined. You can define up to eight different Smart Color tests within one spreadsheet.

Instant Analyst provides up to 16 different color options, including 8 that blink. If you have a monochrome graphics monitor, your options include reverse video, different levels of shading, and blinking cells. However, because it is difficult to distinguish between the different shading levels, you may only feel comfortable including up to six different color options in your spreadsheet.

RATIO ANALYSIS

Ratio analysis, the other main feature of *Instant Analyst*, provides a simplified menu-driven approach to calculating ratios within your spreadsheet. Ratios provide an effective means of identifying relationships between data and the trends associated with those relationships. To create a ratio using *Instant Analyst*, you specify the cell or range of cells as the divisor, and the cell or range of cells as the numerator. In *Instant Analyst* vernacular,

PC MAGAZINE FACT FILE

Instant Analyst, Version 1.0

Personics Corp., 63
 Great Rd., Maynard,
 MA 01754; 508-897-
 1575.

List Price: \$69.95.
Requires: 41K RAM,
 DOS 2.0 or later.

In Short: *Instant Analyst* spots trends and exception conditions within your spreadsheet data. Though it's not a full trend-analysis package (no statistical or regression capabilities are provided), it offers a menu-driven approach to setting up ratios and lets you highlight exception conditions by displaying those cells in different colors.



CIRCLE 621 ON READER SERVICE CARD

this is the analysis range. Your analysis range numbers are temporarily replaced with the calculated ratios. Typing T will toggle back to your original numbers. If you want to save these ratios or view the ratios alongside the original figures, you can copy the calculations to another portion of your spreadsheet.

If you're a proficient 1-2-3 user, calculating ratios is a relatively simple task, and you may find the ratio analysis feature slows you down. However, it may come in handy to those less proficient with 1-2-3 who want to avoid formulas at all costs.

This is not the product for you if you're looking for a meat-and-potatoes financial analysis or trend analysis package. But if you need an inexpensive, easy-to-use tool to highlight trends and exception conditions in your 1-2-3 data, you should consider *Instant Analyst*.

CS0: (W31) ^ABC COMPANY

ABC COMPANY		Budget	Actual
PROVISIONAL FINANCIAL STATEMENT			
REVENUE:	Total Sales	1,100,000	1,200,000
EXPENSES:	Salaries - Management	350,000	200,000
	Salaries - Sales	370,000	440,000
	Salaries - Clerical	130,000	165,000
	Rent	65,000	65,000
	Professional Services	40,000	25,000
	Utilities	18,000	18,500
	Travel and Entertainment	5,500	6,700
	Office Supplies	2,000	1,800
	Automobile Expense	6,500	8,700
	Taxes Due	7,000	5,600
		1,014,000	1,036,300
	NET INCOME (LOSS)	86,000	163,700

16-Apr-91 10:13 PM

The Smart Colors feature in *Instant Analyst* displays cells in specific colors if the data in the cells meets the criteria you have defined. This example displays in red all expenses that exceed budget by more than 20 percent; expenses falling under budget are displayed in blue.

These four forecasting
add-ins model the future so
you can better evaluate the
risks of business
decisions.

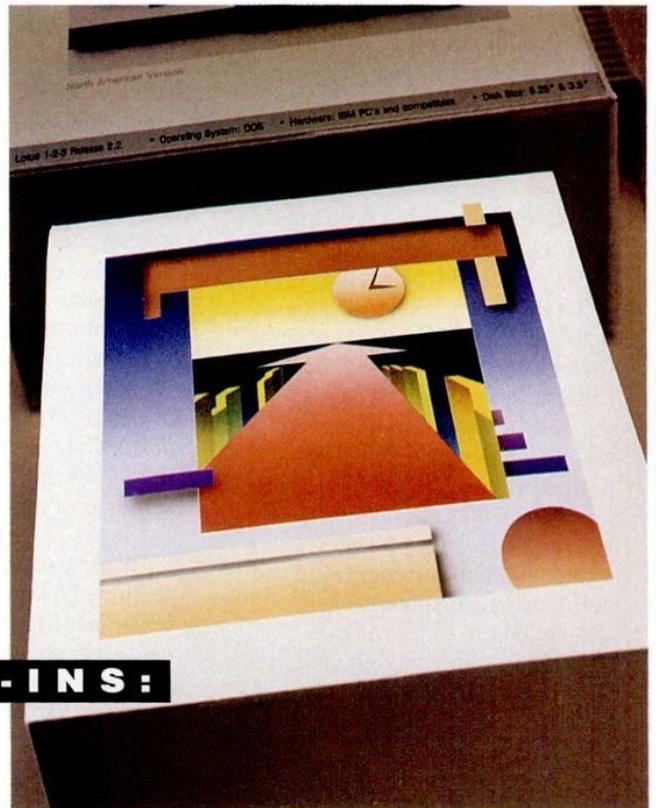
FORECASTING ADD-INS:

Garbage In, Gospel Out

by Jack McGrath

There are only three basic forecasting methods: magic, hope, and mathematics. All three generate similar forecasts, which are basically wrong. Some are more wrong than others, but only mathematically based forecasts are suited to computerization. That doesn't make them any better than forecasts produced in other ways, only more defensible.

Three of the four forecasting add-ins we evaluate in this story—*ForeCalc*, *Tomorrow*,



and *TrendSetter Expert*—are for time-series forecasts. They produce forecasts that are extensions of the past and useful for forecasting such basic business needs as budgets, cash flow, profit, and inventory. If you have to build a forecast that assumes the future will resemble the past, then you should consider these packages.

All three time-series add-ins reviewed here use exponential smoothing, an averaging tech-

PHOTOGRAPHY: WALTER CHRZYNSKI / ILLUSTRATION: KEITH LO BUE / CONSTRUCTION: CLAUDIA TELLER



The possibility of forecasting the future is exciting, and being able to do it easily with a *Lotus 1-2-3* add-in makes the idea even more appealing. You should, however, approach forecasting with a solid understanding of your problem, what these packages can tell you, and how reliable the results will be.

Of the four packages evaluated in this category, *ForeCalc* offers the best combination of forecast control, flexibility, and ease of use—all features that will satisfy both the experienced hand and the newcomer. An honorable mention goes to *@RISK*, a modeling language that lets you start from scratch with no historical data and build statistical forecasts and simulations.

Keep in mind, though, that the only way to judge the accuracy of your forecast is to wait and see what actually happens.

nique in which greater weight is given to more-recent data. In exponential smoothing, the weight—one or more so-called smoothing constants—is applied and re-applied to the data, with the effect of smoothing out the differences between data points. It's a technique that's relatively easy to implement in *Lotus 1-2-3*, though problems can arise dealing with seasonality and finding good values to use as smoothing constants.

The fourth add-in, *@RISK*, is a statistical forecaster that builds forecasts based on the probabilities of events, not from past history. Probabilistic forecasts are useful when you have no historical data, as when you launch a new product or when you measure the impact of a competitive strategy. They are also useful to examine dependency relationships, as when the selling price of a product will affect demand.

With the exception of *@RISK*, most of the work that these add-ins do is within the reach of a mathematically inclined, mildly macromaniacal user with the know-how to push *1-2-3* beyond traditional spreadsheet tasks. These add-ins do the work for you so you can know the risks before you take them.

@RISK

by Jack McGrath

How could you have forecasted Cabbage Patch doll sales the year they first hit the toy stores? How about forecasting the revenue you might realize by striking oil on your lease even before you drill? Such cases present you with little or no historical data to extend into the future, so techniques like exponential smoothing and regression are useless. Forecasts that deal with uncertainty require you to deal with probabilities, and if you want to do that in *Lotus 1-2-3*, you need Palisade Corp.'s *@RISK*. At \$395, *@RISK* is not a beginner's package, but if you consider yourself a *1-2-3* modeler, give *@RISK* a serious look.

When you use *@RISK*, it is not enough to know how to generate a template that lends itself to a probability-based forecast. You should know how to interpret the results as well. One popular use of a program like *@RISK* is to run Monte Carlo simulations of net present values, a technique commonly used to evaluate alternative investment opportunities. (The *@RISK* tutorial centers on such a template, though it runs a different kind of simulation called a Latin Hypercube Sampling.) The results are always impressive and invariably difficult to interpret.

DISTRIBUTION FUNCTIONS

There's a difference between building a forecasting template in *1-2-3* and building one to use with *@RISK*. Instead of typing



@RISK,

Version 1.55

Palisade Corp.,
31 Decker Rd.,
Newfield, NY 14867;
800-432-7475, 607-
277-8000.

List Price: \$395.

Requires: 512K
RAM, DOS 2.0 or
later.

In Short: *@RISK*, a statistical forecasting tool, is for those who are at home with the details of probability distributions. The package can make your life simpler, especially if you have to build a forecast from little or no historical data.

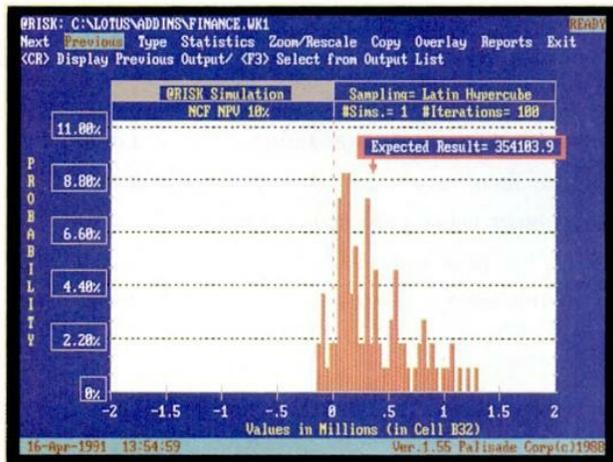


CIRCLE 405 ON READER SERVICE CARD

a series of values in a cell containing an uncertain variable (unit sales of a new product, for example), you let *@RISK* determine the value for the cell by using one of its probability distribution functions.

With *1-2-3*, if you estimate that unit sales could be as low as 1,000 or as high as 2,000, but would most likely be 1,400, you just plug in one of the three values and record the results. With *@RISK* attached, you might replace the single value with an *@TRIANG* function like this: *@TRIANG(1000,1400,2000)*.

On the other hand, you might want to use a normal distribution with mean sales of 1,400 units and a standard deviation of 300 units. Here you would use the *@NORM* function, as in *@NORM(1400,300)*. *@RISK* contains 30 such distribution functions, including Beta, Poisson, Normal, Erlang, Hypergeometric, and Pareto.



@RISK's own graphics program generates all the standard statistical forecasting graph types, such as the probability distribution graph shown here. You can access the actual data series used from within the graphics program.

Once you define all such uncertain cells in the template and use the appropriate distribution function, you would invoke @RISK and run a simulation. You can run as many as 25 simulations, each with as many as 32,767 iterations. Each iteration selects values from the distributions used in the uncertain cells and recalculates the worksheet using those values for the cells. When the simulation is complete, you can write the results in an area of the worksheet and view them graphically.

A GRAPHICS PROGRAM

@RISK does not use 1-2-3's graphics. When you want to view the graphs, @RISK closes 1-2-3 and runs RGRAPH, its own graphics program, which generates the kinds of standard graphs that statistical forecasts generally require—bar graphs of the distribution of each iteration, a cumulative curve of the distribution, and a summary distribution graph. Though complete, @RISK's graphics capabilities are wanting. If you have a CGA monitor, you won't notice, but on an EGA or VGA monitor the graphs are grainy. You can, however, export them to Lotus Printgraph for printing.

Of all the forecasters evaluated here, @RISK comes with the largest manual—250 pages. That's not surprising, since @RISK is more a modeling language than an add-in that automates processes that could be duplicated in 1-2-3.

@RISK is a product for the forecaster who wants to build a model from scratch. If you're not sure about what you're doing and the thought of such techniques makes you sweat, @RISK's documentation can help guide you through the procedures, but it's not a package for the uninitiated.

ForeCalc

by Jack McGrath

Business Forecast Systems' \$149 entry in the add-in forecaster market is a winner, generating impressive results on our tests. *ForeCalc* offers a significant degree of control and flexibility over the forecast without sacrificing simplicity. Unlike *Tomorrow* and *TrendSetter*, *ForeCalc* provides nine forecasting methods.

CHOOSING FORECAST PROFILES

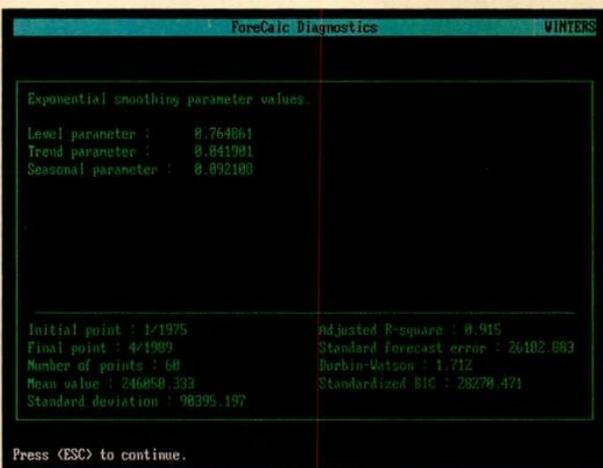
ForeCalc enables you to use such standard techniques as simple one-parameter, Holt two-parameter, and Winters three-parameter exponential smoothing. It also

lets you define up to six custom methods by selecting the treatment of trend and season in a forecast. Choices include no trend, level trend, or damped trend, and no seasonality, multiplicative, and additive seasonality.

If all those choices seem overwhelm-

Like *TrendSetter*, *ForeCalc* produces a graph of the forecast by writing graphing values to a range and generating some macro code. *ForeCalc*'s least attractive feature is the way it writes values on the worksheet. It uses the global format settings of the worksheet, rather than the local formats of the data itself.

For example, if you define a data series



ForeCalc's clean diagnostic screen presents values for the basic parameters used in the forecast, as well as statistics to measure the accuracy of the forecast method used.

ing, the *ForeCalc* documentation shows the forecast profiles of each of the methods. This makes choosing among them a simple matter of knowing which combination appears to fit your data. While this takes experience, you can also have the program select a method automatically. In this case, *ForeCalc* will make several passes at the data, testing various methods. When it finds one that seems to fit best, it generates the forecast and presents you with a screen that shows the forecasting method used, the upper and lower confidence limits of the forecast, and the forecast itself by period.

that is formatted to display two decimal places and choose to locate the forecast at the end of the data, the newly added data will not be formatted to display two decimals unless that is the global format. *ForeCalc* does not add labels to identify the periods included in the forecast, as *Tomorrow* and *TrendSetter* do. The diagnostics report is also a bit crowded. Unlike *TrendSetter*, which writes the forecast data, confidence limits, and the diagnostics on the same screen, *ForeCalc* permits you to write the various elements of the forecast wherever you want.

DIAGNOSTICS REPORT

This diagnostics report is a menu option that includes a set of standard statistics such as the mean, standard deviation, adjusted R-square, and standard forecast error of the data. Also included are the useful, less widely implemented statistics like Durbin-Watson and standardized BIC (Bayes Information Criteria), which measures the accuracy of the forecast method. You can write all of the diagnostics to your worksheet to support the forecast.

ForeCalc will use formulas as the data, so you can generate a forecast on summary data. If values are missing for any data points, you must interpolate a value for the missing point. Consequently, if

FACT FILE

EDITORS' CHOICE

ForeCalc,
Version 1.03
Business Forecast
Systems Inc., 68
Leonard St.,
Belmont, MA 02178;
617-484-5050.
List Price: \$149.
Requires: 512K
RAM, DOS 2.0 or
later.

In Short: *ForeCalc* is a well-designed, flexible, and useful forecaster. If you want control over the elements in your forecasts, this is the add-in you should be using.

CIRCLE 406 ON READER SERVICE CARD

you must regularly produce a forecast from spotty data, *ForeCalc* may not be the product for you.

Like the other forecasting add-ins, *ForeCalc* will prompt you for a confirmation when you want to overwrite a range that is not empty. If you confirm the overwrite, *ForeCalc* will do it, unless the range is protected. In this case, *ForeCalc* returns you to the menu without overwriting. It's a safer, more conservative procedure that borders on overkill. Since *ForeCalc* does not contain an undo feature, it's understandable that the program won't write to a protected range. But with *Lotus 1-2-3 Release 2.2's* undo feature, this level of user-proofing is probably unnecessary.

As a Forecaster with exponential smoothing, *ForeCalc* is an excellent package for the newcomer as well as the experienced hand. The documentation, short though it may be, is clear and complete. If you need to develop a time series forecast that's quick, accurate, and easy to use—and you don't mind having to reformat and label a few things—put *ForeCalc* on your software buy list.

Tomorrow

by Jack McGrath

Tomorrow is the easiest of the four forecasting add-ins reviewed, but there is no such thing as a reliable forecast just a keystroke away. It's a good package that will generate a forecast, but it's designed to protect the user from the mathematical basis of the process. You may find this a drawback when you're asked to defend or explain your forecast. Isogon Corp., a PC and mainframe software developer, sells *Tomorrow* for \$129.95.

AN ARSENAL OF TECHNIQUES

Though *Tomorrow* uses many of the techniques that *ForeCalc* and *TrendSetter Expert* use, this program entirely isolates you from the techniques. You feed the historical data into one end of *Tomorrow* and the program cranks out a forecast from the other end. The 40-page documentation is brief but complete. The only technical forecasting term used in the manual or on-screen is MAPE (for Mean Absolute Percentage Error).

According to Isogon, *Tomorrow* uses an optimized combination of forecasts. This includes linear regression and half a dozen of the standard flavors of expo-

ponential smoothing: single smoothing, adaptive-rate-response single smoothing, Brown's one-parameter double smoothing, Holt's two-parameter smoothing, Brown's one-parameter triple smoothing, and Gardner's three-parameter damped trend. Even though all you'll see is the



FACT FILE

Tomorrow,
Version 1.00
Isogon Corp., 330
Seventh Ave., New
York, NY 10001;
212-967-2424.

List Price: \$129.95.

Requires: 55K RAM,
DOS 2.0 or later.

In Short: *Tomorrow* allows you little control over the forecasting methods you use. It does the job, but if you need tight control over the construction of your forecasts, you'll be disappointed.



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output, that's an impressive arsenal.

Tomorrow's menu-driven interface simplifies forecast preparation. All you really need is the budget template in which you have entered actual data. If you include a set of labels identifying the data, *Tomorrow* will use those labels in the forecast output, a nice touch that the other packages lack. If you include summary formulas in the data, *Tomorrow* will replicate those formulas in the output. In effect, *Tomorrow* clones the portion of the template that you have defined as the source of the data. The range you define for the forecast will contain a replica of

the formulas, labels, and formats that are included in the input range, as well as a set of values representing the forecasted values.

If you define an output range that includes protected cells or cells that contain values or data, *Tomorrow* asks you to confirm overwrite of the ranges. Say yes and *Tomorrow* will write the forecast to a protected range. If you want to undo the overwrite to restore the contents of the range, you can do so from the *Tomorrow* menu.

The ability to include formulas in the ranges that will be used as data and generate new formulas in the forecast has a downside: The data cells must be all values, not formulas. If the cells containing the data you want to forecast are summary values that comprise a number of other addresses, you will either have to apply the forecast to the underlying cells or copy the formulas to another part of the worksheet with the Range Value command.

An improved package would permit you to use formulas as data by using the evaluated contents of cells. The problem is that when Isogon chose to replicate formulas included in the data set, they locked themselves out of using formulas. Unfortunately, *Tomorrow* is not capable of generating any graphs. If you want them, and most users do, you have to build them yourself using *1-2-3's* Graph menu.

REALITY CHECK

Isogon describes *Tomorrow* as a product for the person who doesn't need to understand statistics but wants to predict the future. That's not unreasonable, but it's not necessarily a good idea. *Tomorrow*

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5	Co	Tomorrow	Release 1.00	Isogon Corporation					24
6	Co								74.2
7	Fi	Direction.....		Horizontal					177.3
8	Co	Location.....		Right					36.0
9	To	Seasonality.....		Automatic					45.6
10		Annotation.....		Nil					333.1
11									
12									
13									
14		Cost of materials	27.5	27.9	28.1	83.5			
15		Cost of labor	63.0	63.3	63.3	191.8			
16		Fixed costs	12.0	12.0	12.0	36.0			
17		Cost of sales	102.5	103.2	103.4	53.7			
18		Total costs	121.0	121.7	122.3	365.0			
19									
20									

As *Tomorrow's* settings screen shows, you can control only one part of the forecast: seasonality. All the remaining settings deal with the worksheet.

won't explain the forecast or tell you how to improve it. The only control you can exercise over the forecast is in choosing to calculate seasonality automatically or manually and indicating the number of data points to include in a year: four for quarterly, twelve for monthly, and so on.

While *Tomorrow* is technically proficient and simple to use, it's also inflexible. Be prepared for a reality check if you make a critical business decision based on its output. If you run a small business and want to get a loose handle on next year's or next month's sales figures but you don't want to wade through a morass of details, then you will get your money's worth from *Tomorrow*.

TrendSetter Expert

by Jack McGrath

TrendSetter Expert from Concentric Data Systems uses what it calls "proprietary expert systems logic" to produce a single forecast from four techniques. While the \$149 package does not offer any control over the forecasting techniques, it does produce a report that includes statistical information you can use to refine and improve forecasts.

TrendSetter Expert is a hybrid add-in. That is, before you can attach it to *Lotus 1-2-3*, you must run one of a pair of memory-resident modules that come with the program. Which one you run depends on whether you have a math coprocessor installed. The menu-driven package uses a form to set up a forecast. You can define up to a dozen ranges as data, and you can view and edit all settings concerning a forecast on a single screen.

DIAGNOSTIC REPORTS

After you run a forecast, *TrendSetter Expert* will write the results and a diagnostic report directly on the worksheet. The data can contain formulas, so you can use summary data. However, *TrendSetter Expert* does not generate new formulas as *Tomorrow* can. It handles intermittent data, and you can include zero as an actual value. If your data includes too many zeros, the program will not analyze any seasonality in the data, although it will still produce a forecast.

TrendSetter Expert uses four forecasts: single exponential smoothing, double smoothing, a regression of the entire series, and a regression on the last full season in the series. *TrendSetter Expert*'s diagnostics include several statistics that allow you to refine or improve your forecasts. For example, even though you define a season as 12 periods (monthly seasonality) the program may report that there's a different seasonal pattern in the data. If the forecast looks off the mark, you can try running another at one of the seasonalities suggested by the program.

SEASONALITY PATTERNS

We tested all three time-series add-ins with a data series consisting of an unusual set of quarterly values. Only *ForeCalc* produced results very close to those produced manually (in that you would generate a forecast based on a set of mathematical formulas, not on an add-in's series of menu options), without using a forecaster.

TrendSetter Expert's forecast was a long way off the mark, as was *Tomorrow*'s. The problem in both cases turned



FACT FILE

TrendSetter Expert, Version 1.0

Concentric Data Systems Inc., 110 Turnpike Rd., Westboro, MA 01581; 508-366-1122.

List Price: \$149.

Requires: 170K RAM, DOS 2.0 or later.

In Short: If you have to produce a time-series forecast from an intermittent data set or calculate seasonal indexes, *TrendSetter Expert* fits your needs. Despite excellent documentation, it gives you little control over the design of your forecasts.

CIRCLE 409 ON READER SERVICE CARD



out to be that we let the programs identify seasonality automatically. *TrendSetter Expert* identified a season of around 30 periods and reported that other possible seasonal patterns existed in the data. When seasonality was set manually to four periods per year, both *TrendSetter Expert* and *Tomorrow* produced forecasts that more closely resembled *ForeCalc*'s and our manually produced forecast.

To its credit, *TrendSetter Expert* reported on the seasonality it used, and that's what made it possible to solve the problem and generate a more accurate forecast. *Tomorrow*'s scant diagnostics gave no hint of the problem.

A unique feature missing from *ForeCalc* and *Tomorrow* is *TrendSetter Expert*'s ability to generate a seasonal index (called seasonal factors) for each period in the forecast. Whenever you have to produce a quick and dirty forecast, having a set of seasonal indexes available is handy.

TrendSetter Expert's documentation is cleanly designed and clearly written. The chapters on improving forecasts and forecasting techniques are especially well done. One minor concern with the documentation is that it ends with a paragraph advising that the real test of forecast accuracy is waiting to see how close your forecast is to reality. That paragraph is too important to be buried in the back.

While *TrendSetter Expert* has many advantages, especially for dealing with intermittent data, you have no control over the forecasting method used. Comparatively, you get much more information from this forecast than from *Tomorrow*'s, and you'll be satisfied with the techniques and the implementation.



Most of the entries on *TrendSetter Expert*'s forecast-settings sheet relate to the worksheet. However, the add-in gives you some control over basics of the forecast, such as confidence levels.

Add linear programming, optimizing, backsolving, and goal seeking to your spreadsheet vocabulary with these advanced problem-solvers.

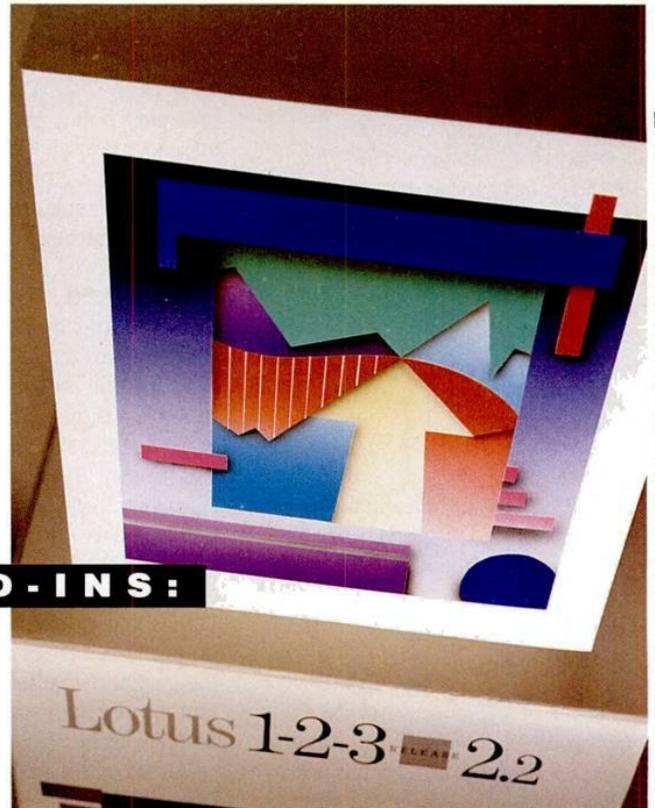
OPTIMIZING ADD-INS:

The Educated Guess

by John C. Nash

What mix of products should you produce to yield the highest profit? What engine control settings use the least fuel? Your basic spreadsheet can't give you answers to these resource allocation problems, which are also known as goalseeking or optimization problems, but there are a few ways to solve them. You can brush up on simultaneous equations and iterative recalculation, you can use *Lotus 1-2-3/G's* Solver and Backsolver functions (which run under OS/2), or you can use *1-2-3* optimization add-ins.

Each of these methods uses linear or nonlinear programming techniques or nonlinear-equation solving methods. We tested *What-If*



PHOTOGRAPHY: WALTER CHRZYŃSKI / ILLUSTRATION: KEITH LO BUE / CONSTRUCTION: CLAUDIA TELLER

Analyst, *What-If Solver*, and *What'sBest!*, requiring each package to solve nonlinear equations (such as sales needed for profit), to minimize or maximize nonlinear functions with a few constraints (often involving scientific or engineering problems), and to optimize a linear objective function subject to a large number of linear constraints (as in determining proportions of animal feed to ensure the proper amounts of protein and carbohydrates).

The comparison reveals what the packages can and can't do, but it also gives insight into the complexity of optimizing software. By design or by mistake, it's easy to create difficult problems that trip the software. You should have a good



• What-If Solver

All three of the packages reviewed here are technically stable, but for wide-range problem-solving flexibility, the choice is *What-If Solver*. It's easy to invoke and use, and it will attempt to optimize complicated functions and constraints of a number of variables.

If linear programming is your game, however, you will not want to ignore *What'sBest!*, a reliable choice for this specialty.

understanding of your optimization problem and be prepared to spend time checking the accuracy of the results.

What-If Analyst

by John C. Nash

What-If Analyst, \$49.95 from Frontline Systems, can help minimize the error in trial-and-error work. While a reliable and efficient rootfinder can be written in a few lines of conventional programming code or in the Lotus macro language, *What-If Analyst*, which works with 1-2-3, Release 2.x and Release 3, does the work for you. It finds the root of a single nonlinear equation—one equation in one unknown, meaning there is one variable to solve to satisfy the equation. The \$99.95 *Premium Edition* solves several simultaneous nonlinear equations; that is, ten equations in ten unknowns.

Computing an internal rate of return, *What-If Analyst* automates a function otherwise programmed in code or in the Lotus macro language.

```

B3: -0.2928932183
Press ENTER to keep, ESC to restore old contents
*** What-if Value: -0.29 Result value: -0.00 Iterations: 7 ***
  A      B      C      D      E      F      G      H
1  IRR1 -- internal rate of return  J C Nash for PC Magazine
2
3  rate = -0.29289 = cell b3
4
5  x = 1/(1+rate) = 1.414213 = cell c5
6
7  Prob A: (x^2 + 2) =0      3.999999 target value = 0
8  complex roots          Alt A to run Prob. 1
9
10 Prob B: (x^2 - 2) =0     -0.000000 target value = 0
11 real roots             Alt B to run Prob. 2
12
13 Prob C: (x^2-7x+6) =0   -1.89949 target value = 0
14 two real roots         Alt C to run Prob. 3
15 Note use of bounds to select results
16
17
18
19
20
21
22
16-Apr-91 09:34 PM
    
```

Many real-world problems can be formulated as nonlinear equations, including the internal rate of return on investments (@IRR in 1-2-3), the premium for an insurance policy given the probabilities of losses, or the sales necessary to achieve a given level of profit. There are also a number of scientific and engineering problems that can be formulated this way.

GOAL SEEKER

Both versions of *What-If Analyst* have a simple interface. You define the "what if" cells that are the variables in the nonlinear equations, then define the "result" or goal cells that compute each equation, and finally the "target" or right-hand side of each equation. A Go command sets the add-in to work to solve the equations.

For *What-If Analyst*, there can be just one "what if" cell and one "result" cell. Unlike the *Premium Edition*, there is an option to set lower and upper bounds for the "what if" cell. This feature is important if more than one solution exists, as in an internal rate of return problem.

Other options allow the user to control how quickly the search for a solution is stopped by setting limits on the number of iterations or the "precision" for relative change in one or more variables. Such controls and the use of bounds are not for the novice, yet there are many problems where they must be employed to obtain an accurate result.

PREMIUM EDITION

The manuals for both versions of *What-If Analyst* are short, clear, and straightforward, though limited in problem formula-



What-If Analyst, Version 1.1
 Frontline Systems Inc., 124 University Ave., #101, Palo Alto, CA 94301; 800-451-0303 ext. 55, 415-329-6877.
List Price: \$49.95; *Premium Edition*, \$99.95.

Requires: 40K RAM (60K RAM for *Premium Edition*), DOS 2.0 or later.

In Short: *What-If Analyst* is a straightforward tool for solving a wide class of nonlinear equations such as return on investments and goal-seeking problems. It's easy to use and modestly priced.



CIRCLE 409 ON READER SERVICE CARD

tion and hints to ensure reliable use of the programs. There is just one example worksheet for the regular version and four for the *Premium Edition* (two of which show how to use macros with the product). The limits on the number of variables and equations (actually 10 of each) for the *Premium Edition* are buried deep in Chapter 5 of the manual.

What-If Analyst and *Premium Edition* are different in several ways. The *Premium Edition* does not let you set bounds on variables, but it does claim to let you minimize functions and solve for nonlinear least-squares problems. We found, however, that the minimization algorithm in the *Premium Edition* was not up to a difficult test problem with five variables. Using various starting values for the variables, *What-If Analyst* required many iterations (in one case it stopped at 1,000). For a set of starting values, which are at a "saddle point," it returned ERR in the working cells.

While the *Premium Edition* solves larger problems, it does not add enough value in the sophistication of the algorithms to justify the extra cost. If you need to solve return-on-investment, sales-needed-for-profit, or similar problems with a single variable, the basic version of *What-If Analyst* is a reasonable value, especially if you do not program or write macros.

What-If Solver

by John C. Nash

If you covet the analytic capabilities of 1-2-3/G but have no plans to move to OS/2, then *What-If Solver* may be your

spreadsheet's best friend. This \$199.95 add-in from Frontline Systems solves linear problems and finds the minimum or maximum of a nonlinear function of up to 40 variables with up to 20 constraint conditions. In addition, the variables may be restricted to occur between upper and lower bounds.

Example worksheets show you how *What-If Solver* can help you choose an efficient investment portfolio, maximize interest income, allocate advertising dollars, and minimize payroll costs.

Following the straightforward installation procedures, you can have *What-If Solver* running smoothly in about half an hour. A few keystrokes set an optimization in progress, and the simple-to-use features save and load problem information. For the more advanced user, there are choices of settings for convergence control and adjustment of the method, but these are configured so that they don't become an obstacle for the novice.

PERFORMANCE TESTS

To test the performance of the optimizer, we created a Genrose problem, which is a common test of nonlinear optimization software. In setting up the problem, and particularly in building macros to run it for different numbers of parameters, we encountered a minor obstacle where *What-If Solver* simply beeped and displayed an "ERROR" message with the explanation "Break," even though we had not touched the keyboard. This disappeared when we fixed errors made in specifying the problem, but we could not reliably duplicate the conditions giving rise to the "Break"

error. This suggests that some variable was not always initialized properly in our worksheet, 1-2-3, or *What-If Solver*.

A sample linear-programming problem for formulating a least-cost animal feed (an example supplied with *What's-Best!*) was solved quickly and correctly. On the other hand, adding some simple constraints to the Genrose problem caused the *Solver* to stop in several cases with the constraints unsatisfied. You may prefer optimization software that tries a little harder to find feasible points, even if they are not optimal.

Execution timings are quite respectable, running only slightly slower than for a compiled BASIC program.

DIAGNOSTICS DILEMMA

Nonlinear optimization can be a troublesome task, and *What-If Solver* lacks diagnostics that may help to identify the problem. It is quite easy to provide functions and constraints for which there are no solutions at all. Some constraints— $B(1) < 1$ and $B(1) > 3$, for example—cannot be simultaneously satisfied. The inconsistency here is obvious, but similar situations may be quite difficult to detect.

For the software developer, providing diagnostic information is a serious and perhaps impossible chore. Nevertheless, new users need some sort of suggestion as to what may be ailing the problem defined in their worksheet. In this capacity, *What-If Solver* may disappoint you.

The manual is quite short and to the point, including good explanations of the optimization process as well as adequate installation and operation instructions. A

minor fault: The critical limits on number of variables and constraints are buried in Chapter 5.

Overall, *What-If Solver* is a useful tool for solving modest-sized optimization problems with 2 to 25 variables. Given the difficulties of nonlinear optimization, it should be used with care. Since problems can be defined and run via macros that invoke *What-If Solver*, some of the tests and precautions necessary could be provided by expert users in the form of macro code. The resulting spreadsheet templates could then serve a wide class of users in an organization.

What'sBest!

by John C. Nash

What'sBest!, Personal Version 1.5, \$149 from Lindo Systems, solves linear programming problems in a *Lotus 1-2-3* environment. *PC Magazine* recognized the software as one of the best packages of 1986, calling it a "linear-programming power-to-the-people" tool. Lindo Systems offers five versions of the package, ranging in price from \$149 for the Personal Version that handles 400 variables to the \$4,995 Extended Version that handles 32,000 variables.

By swapping 1-2-3 out of memory during solutions and back in to display results, *What'sBest!* allows you to work with relatively large models. In our admittedly small tests, the swap mechanism worked smoothly once *What'sBest!* was correctly installed. Yet the package is not nearly as easy to set up and use as the Frontline packages.

C17: (F2) U (M) 200
Minimum value found: 19550.000000 Press: ENTER to keep, ESC to discard
Trial Solution: 4

Item	Nutrients Per Unit Weight of:				Nutrients:			Dual Value
	Grain 1	Grain 2	Grain 3	Grain 4	Minimum Required	Surplus		
Nutrient A	2	3	7	1	1250	0.00	\$0.00	
Nutrient B	1	1	0	1	250	0.00	\$0.00	
Nutrient C	5	3	0	1	900	250.00	\$0.00	
Nutrient D	0.6	0.25	1	1	232.5	0.00	\$0.00	
Cost Per Unit Weight	\$41.00	\$35.00	\$96.00	\$100.00				
Weight Units to Purchase	200.00	50.00	100.00	0.00				
Dual Value	\$0.00	\$0.00	\$0.00	\$0.00				

* Total Cost \$19,550

16-Apr-91 09:44 PM

Solving both linear and nonlinear problems, *What-If Solver* can find the most efficient allocation of limited resources. Here it's finding the least-cost formulation of animal feed.

PC MAGAZINE FACT FILE EDITORS' CHOICE

What-If Solver, Version 1.1
Frontline Systems Inc., 124 University Ave., #101, Palo Alto, CA 94301; 800-451-0303 ext. 55, 415-329-6877.
List Price: \$199.95.
Requires: 512K RAM, DOS 2.0 or later.



In Short: *What-If Solver* is a good nonlinear optimization tool for modest problems with 2 to 25 variables and fewer than 20 constraints. The package is easy to use, but the problems it handles can often be very difficult to solve by any method, so users need to understand the tasks they are trying to accomplish.

CIRCLE 410 ON READER SERVICE CARD

TACKLING LINEAR PROBLEMS

What'sBest! allows 400 variables and 200 constraints in a maximum of 800 numeric cells. You can declare 40 binary variables to handle integer (whole number) situations, such as the decision to have or not have a facility built at a given location. This is a useful feature and a reasonable alternative to general mixed-integer linear programming.

Tackling serious "can we do it better?" problems is *What'sBest!*'s forte. For example, what's the proper editorial mix of news, reviews, columns, and tips



**What'sBest!,
 Personal
 Version 1.5**
 Lindo Systems Inc.,
 1415 N. Dayton
 Ave., Chicago, IL
 60622; 800-441-
 2378, 312-871-2524.
List Price: \$149.

Requires: 256K RAM, DOS 2.0 or later.
In Short: *What'sBest!* is a linear programming add-in that is best suited for serious users who need to solve problems with large numbers of variables and constraints.

CIRCLE 411 ON READER SERVICE CARD

that satisfies different groups of readers? Or what's the cheapest workshift schedule that best satisfies manpower requirements?

What'sBest! cannot be compared directly with *What-If Analyst* and *What-If Solver*. While *What'sBest!* allows you to solve large linear problems, *What-If*

I17: (CB) U @SUMPRODUCT(C14..F14,C17..F17) READY

	A	B	C	D	E	F	G	H	I	
1	SWINE & ROSE'S Hog Farm									
2		Nutrients Per Unit Weight of				Nutrients:				
3	Item	Grain 1	Grain 2	Grain 3	Grain 4	Minimum Required	Surplus	Dual Value		
4	Nutrient A	2	3	7	1	1250	0.00	\$0.00		
5	Nutrient B	1	1	0	1	250	-0.00	\$1.00		
6	Nutrient C	5	3	0	1	900	250.00	\$0.00		
7	Nutrient D	0.6	0.25	1	1	232.5	-0.00	\$40.00		
8	Cost Per	Unit Weight								
9	Unit Weight	\$41.00	\$35.00	\$96.00	\$100.00					
10	Weight Units	to Purchase								
11	to Purchase	200.00	50.00	100.00	0.00					
12	Dual Value	\$0.00	\$0.00	\$0.00	\$51.00					
13							*****			
14							= Total			
15							= Cost			
16							= \$19,550			
17							*****			
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20										
21										
22										
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Here *What'sBest!* solves the same limited-resource problems as *What-If Solver*. The program is available in five versions for different-size problems. The Extended Version can solve problems with up to 32,000 variables.

Solver's nonlinear capabilities allow you to handle smaller but much more general problems. Probably the best-known spreadsheet alternative to *What'sBest!* when it comes to linear programming is Borland's *Quattro Pro*.

SETUP

The thorough manual cautions you to load 1-2-3 via a special *What'sBest!* program, WB.EXE. You must also set *What'sBest!* to automatically attach every time 1-2-3 loads. This important detail is covered in Appendix C of the manual and also on page 5 of "Getting Started." Once installed, *What'sBest!* is relatively easy to use.

Much of the manual describes the setup and running of different classes of problems, such as product mix for most profit, minimum shipping cost, and staff sched-

uling. Worksheets for these examples accompany the software. The manual includes an extensive discussion of the use and interpretation of dual values to variables, as well as an approximate method for handling simple nonlinear objective functions. A special add-in @function, Sumproduct, greatly eases the task of creating objective functions and constraints.

What'sBest! capably solves linear programming problems and is not expected to perform nonlinear programming. Evolution to an equally good product for nonlinear optimization would involve a good deal of careful design and implementation. If your work lends itself to formulation as a linear problem, and you use a spreadsheet environment for much of the data handling and modeling, *What'sBest!* is the tool of choice.

WHAT GOAL-SEEKING AND OPTIMIZING ADD-INS DO

by John C. Nash

Part-time mathematicians who pick up a goal-seeking or optimizing package can soon find themselves lost in an obscure world of statistics. This group of evaluated Lotus 1-2-3 add-ins have very specific functions. Here are some real-world examples to help you figure out which packages you need to solve the problems you have.

Frontline Systems' *What-If Analyst* and *Premium Edition* solve nonlinear equations (up to ten); for example, you already know the relationship between

sales and profits and want to know the volume of sales necessary to achieve a given profit level.

What-If Solver solves nonlinear optimization problems (possibly constrained), of which linear programs are a subcategory: The fuel efficiency of a vehicle is a known (and nonlinear) function of several variables, such as weight, tire pressure, wind resistance, fuel/air mix, gear ratio, and road type (gravel, paved). You want to know the best settings of tire pressure, fuel/air mixture, and gear ration for given settings of the other variables in

order to maximize efficiency.

What'sBest! solves linear programs, or to impress your friends, constrained optimization of a linear objective function. Here is an example: As a pet food manufacturer, you can use cereal to replace meat as long as the packaged product has the right amount (per volume or weight) of carbohydrate, protein, minerals, and vitamins. As long as these "right amount" constraints are satisfied, we can vary the amounts of meat and cereal to produce least-cost pet foods. ■

These eight time-saving add-ins make 1-2-3 more efficient by letting you customize as much as your budget and PC memory allow.



PHOTOGRAPHY: WALTER CHRZYNSKI / ILLUSTRATION: KEITH LO BUE / CONSTRUCTION: CLAUDIA TELLER

UTILITY ADD-INS: Something For Everyone

by Carol Levin

Rounding out Lotus 1-2-3, Release 2.2's function set with add-ins is one alternative to upgrading to Release 3. This diverse collection of utilities—which cover needs from improved screen viewing and macro debugging to background printing and expanded memory usage—can also save you from the headaches of spreadsheet chores. They're all helping 1-2-3 keep up with the competition.

There's broad appeal for packages that recover damaged worksheets, which we cover in the sidebar comparing *The Norton Utilities* with *Rescue Plus*, a utility specializing in 1-2-3 files. For a

look at the popular spreadsheet publishing add-ins, *Allways* and *Impress* (now bundled with 2.2 and 3.1, respectively), see "Lotus 1-2-3, Release 3.1: Graphic Improvements" (*PC Magazine*, February 12, 1991). Many others, like Spreadsheet Solutions' *@Ease* (516-222-1429), a formatting savior, are in the Lotus enhancements catalog.

Rather than comparing this multi-purpose group of add-ins for an Editors' Choice, we leave the choice to you. The winners are the ones that fit your needs. You'll find most do their job simply and well. And the best thing about them is that you can pay for them out of your aspirin budget.

Beyond 640

by Bruce Brown

The promise of expanded memory utilization for *Lotus 1-2-3* was a cruel tease. While actual spreadsheet cell contents are held in expanded memory, *1-2-3*, Release 2.x's memory-hungry cell address records, or "pointers," must be stored in conventional memory. This is why you often see "Out of memory" error messages, even when you have free megabytes of expanded memory. Intex Solutions' *Beyond 640* solves the cell pointer problem and makes the expanded memory promise come true.

RELOCATING CELL POINTERS

When you invoke *Beyond 640*, you're asked to set a conventional memory threshold between 0 and 640K (the default is 32K), beyond which all cell pointers are stored in expanded memory. This lets you use up to 4MB of expanded memory for cell pointers and cell contents, as well as keep track of remaining conventional memory. When unused conventional memory gets down to *Beyond 640*'s threshold, all additional cell pointers are stored in expanded memory.

If you typically use RAM resident programs such as Borland's *SideKick*, *Lotus Express*, or other *1-2-3* add-ins that use conventional memory, you'll need to set a moderately high threshold. For example, if you use the popular *Allways* add-in, which uses almost 100K RAM, you should set the threshold at a minimum of

100K. If you should decide to keep all cell contents and pointers in expanded memory, set the threshold to 640K. This strategy reserves all your conventional memory for DOS, TSRs, *1-2-3*, and any other add-ins you may have.

At first thought, a 640K threshold seems ideal. Depending on the physical type of expanded memory in your computer, however, you may pay a speed penalty. Expanded memory that's mounted on a memory card plugged into an 8-bit or 16-bit interface slot is slower than memory mounted directly on the motherboard. This results in slower calculating times, which becomes increasingly aggravating for larger, more-complex spreadsheets. Newer machines with all memory located on the motherboard or on special high-speed memory cards largely obviate the problem of slower expanded memory.

While you may wonder why Lotus didn't use expanded memory efficiently in the first place, the answer probably lies with the speed of expanded memory on computers then in use. If you're tired of dumping your TSRs to build a moderately sized spreadsheet, or if you consistently run out of conventional memory because of cell pointer clutter, *Beyond 640* handles both problems admirably.

Guardian

by Bruce Brown

Picture this: You're building a spreadsheet and decide to save it after an hour's work, but by mistake you hit /File Retrieve instead of /File Save. The result is one lost hour. Or this: You finish building a beautiful spreadsheet and quit *Lotus 1-2-3*, only to discover later that you never saved the file. These common user errors join power outages and flickers as culprits in irrevocable loss of *1-2-3* work.

Intex Solutions' \$95 *Guardian* add-in can prevent future losses and help safeguard spreadsheets from inadvertent human error, power loss, and equipment failure. While not invincible (*Guardian* can't do a thing for a thoroughly trashed hard disk), this versatile program makes minimal memory demands and more than pays for itself by providing automatic spreadsheet backup. *Guardian* also lets you save multiple versions of spreadsheets and archive files to save disk space.

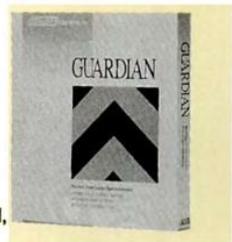


FACT FILE

Guardian, Version 2.0
 Intex Solutions Inc.,
 161 Highland Ave.,
 Needham, MA
 02194; 617-449-6222.

List Price: \$95.
Requires: 28K RAM, DOS 2.0 or later.

In Short: *Guardian* provides virtually foolproof spreadsheet backup to protect you from losing work by accident or power failure. You can save multiple versions of the same worksheet and use an archiving function to save old backups in alternate directories or drives. If you've lost a worksheet more than once, you need this program.



CIRCLE 416 ON READER SERVICE CARD

AUTO BACKUP AND ARCHIVE

Using *Guardian*'s simple installation procedure, you copy all the program files to your *1-2-3* directory. Each time you invoke the program, a configuration screen appears from which you select options for automatic backups and version control, and indicate whether you want the program to back up your current worksheet when you retrieve a new file.

The Auto-Save feature lets you specify intervals of time and keystrokes after which *Guardian* will back up your current worksheet. The time interval between backups can vary from 1 to 120 minutes. To back up after a specified amount of work, you can set the keystroke interval from 25 to 10,000 keystrokes. To have it both ways, you can activate the time and keystroke interval thresholds simultaneously.

While you can get carried away by choosing minimal intervals so that *Guardian* saves your spreadsheets almost all of the time, it's more reasonable to set intervals that fit your work pace. You could schedule *Guardian* to back up at 5-minute intervals for a minimal delay on a fairly fast computer. If saving by keystrokes matches your work style, you can set the interval at 100 or 200 keystrokes and then let practice tell whether to raise or lower the interval.

VERSION CONTROL

If *Guardian*'s sole purpose were automatic backup, it would be worth its price, but there are other features that are valuable tools for frequent spreadsheet users.

One of the best is the version-control

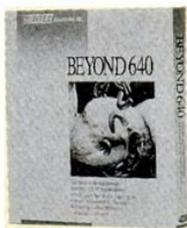


FACT FILE

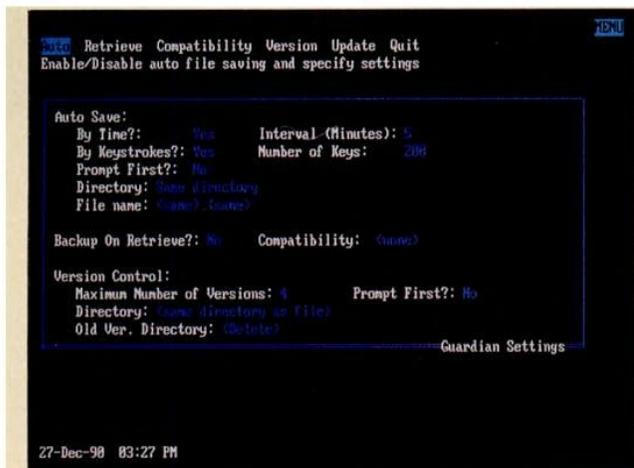
Beyond 640, Version 1.02
 Intex Solutions Inc.,
 161 Highland Ave.,
 Needham, MA
 02194; 617-449-6222.

List Price: \$95.
Requires: 4K RAM, LIM 3.2 or 4.0 expanded memory, DOS 2.0 or later.

In Short: *Beyond 640* makes use of expanded memory by pushing file pointers out of conventional memory, enabling you to use up to 4MB of expanded memory for worksheets. If you routinely run out of workspace even though you have plenty of expanded memory available, this program provides the answer.



CIRCLE 415 ON READER SERVICE CARD



When you invoke Guardian, a single set-up screen lets you select various options for backup interval, archiving, and version control.

feature, which is helpful if you rely on spreadsheets for budgeting or financial planning. This feature lets you make minor changes and save successive versions of the spreadsheet without needing to assign and keep track of different filenames yourself. You can save up to 50 successive versions of your current worksheet, with the file extensions .V00, .V01, and so on, up to the number of versions you've specified. If you exceed the specified number, *Guardian* deletes the oldest version and shifts the version numbers backward so that the last saved version has the highest version number. To keep your directories clean and to save drive space, you can specify any subdirectory or drive for saved versions.

Guardian also comes with the public-domain *Lharc* archiving program that lets you reduce file size by roughly 50 percent and save precious space for working with large spreadsheets. 26K of RAM isn't a high price to pay for the insurance *Guardian* provides. Even if you don't need the archiving capability, the automatic backup feature could make you an enthusiastic convert.

Look&Link

by J. Blake Lambert

Look&Link, a \$99.95 worksheet viewing and linking add-in from Personics, makes life inside *1-2-3* easier by combining worksheet viewing with consolidation and recalculation, and by extending Release 2.2's cell-linking capability with range linking.

It's actually three add-ins in one: *Look*

for worksheet viewing, cutting, and pasting; *Link* for consolidating and recalculating groups of worksheets; and *Linkfun* for defining connections between worksheet cells or ranges with an @functions set. Created out of real-world needs, *Look&Link* is efficiently designed and integrated with *1-2-3*.

BROWSING WORKSHEETS

Look displays the file you request at the bottom right of the screen in a window that you can move and resize. You can then swap *1-2-3*'s active worksheet and the browsed worksheet, and combine information. When you want to try your hand at linking, *Look* lets you see the cells you're connecting. This makes linking as easy as highlighting a range in *1-2-3*.

The Combine command makes it easy to copy formulas or values and to add or subtract from the browsed worksheet to the active one. The Formula command provides a menu-driven method of linking files using menu choices.

DEPENDENCY-TREE MENU

The *Link* add-in makes quick work of consolidating and recalculating sets of worksheets by allowing one spreadsheet to grab the contents of a cell or range of cells from another. *Look&Link*'s method is easier and more powerful than *1-2-3*, Release 2.2, especially when it comes to protecting you from consolidation and recalculation mistakes. It does this by providing a special dependency-tree menu for defining, clearing, saving, importing, exporting, and listing relationships between linked worksheets.

The dependency tree tells *Link* which

worksheets to sum when consolidating and what order to follow during recalculation. For example, you could define spreadsheets for compact disc, album, and tape sales as dependents or subworksheets of a music sales spreadsheet. In turn, you could define this spreadsheet as a dependent of a storewide sales sheet.

Look&Link calculates the spreadsheets at the lowest levels first; data then flows upward to the top worksheet. To visualize this hierarchy, you can create a dependency tree in an indented outline form. *Link*'s Recalc command recalculates all of the worksheets in a dependency tree. With Consolidate, you can sum the same cell or range in all worksheets on a given level and send the result to the worksheet at the next higher level.

When you load a file, *Link* lets you enter an alias for the path and filename, so you could, for example, set up STOCKS as a substitute name for the complete worksheet path and filename, C:\WK1\NETWORTHSTOCKS.WK1. This ability makes it easier to enter names into spreadsheet linking formulas.

Link speeds up its work if you load worksheets into conventional or LIM expanded memory. But if it doesn't find what it needs in memory it looks on-disk. Before recalculating or consolidating, you can unload worksheets from memory with the Worksheet Purge command. These operations use worksheets on-disk rather than worksheets in memory. *Link*'s memory command provides statistics on the amount of conventional and expanded memory in use, the amount used by each worksheet file and its pointers, and the amount available.



FACT FILE

Look&Link, Version 1.14
 Personics Corp., 63 Great Rd., Maynard, MA 01754; 800-445-3311, 508-897-1575.
List Price: \$99.95.
Requires: 55K RAM for Look utility, 35K RAM for Link utility, DOS 2.0 or later.

In Short: *Look&Link* is a simple addition to *1-2-3* that lets you look at a worksheet without removing the current *1-2-3* worksheet. With this three-in-one add-in, you can copy, combine, and link two worksheets, as well as consolidate and recalculate sets of linked files.



CIRCLE 417 ON READER SERVICE CARD

BS: (C8) [U13] 18086849
 1) @UKS@ 2) @UKSSUM 3) @UKSAVG 4) @UKSMIN 5) @UKSMAX 6) <<1-2-3>>
 Access cell values in the browsed sheet

Southern Region Sales		
Product Line	Cash Sales	Installment Sales
Appliances	\$11,462,559	\$18,488,088
Automotive	\$2,446,597	\$947,924
Cooling and Heating	\$4,124,887	\$7,519,357
Hardware		
Lawn & Garden		
Lighting		
Office		
Outdoor Living		
Pet Care		
Sporting Goods		

Eastern Region Sales	
Product Line	Cash Sales
Appliances	\$18,886,849
Automotive	\$1,447,853
Cooling and Heating	\$5,557,333
Hardware	\$4,882,661
Lawn & Garden	\$814,675
Lighting	\$264,336
Office	\$1,445,242

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Look&Link lets you view, cut, copy, and link cells from another worksheet into your current 1-2-3 worksheet.

Linkfun loads worksheets or groups of worksheets and links cells and ranges. You can also use *Look&Link* menus to set up connections with Release 2.2's linking syntax, but if you work with password-protected files, it will not let you swap, consolidate, load them into memory for faster processing, or access them with *Link @functions*. *Look&Link* is an excellent value that makes 1-2-3 more flexible, more powerful, and easier to use.

Macro Editor/Debugger by Craig Stinson

No self-respecting C, Pascal, or assembler programmer would go to work without decent editing and debugging tools. Yet *Lotus 1-2-3* macro programmers, employing the world's most widely used application development language, have been doing just that for nearly a decade. Now, by adding in Personics Corp.'s \$199.95 *Macro Editor/Debugger (MED)*, hardy macro writers can discover what they've been missing all this time. *MED* brings modern amenities to the wilderness of 1-2-3.

As its name suggests, *MED* is both an editor and a debugger. You can use it to create new macros, modify existing ones, and, perhaps most importantly, track down errors when things go awry (as they all too often do).

You can invoke *MED* in the conventional add-in manner, by pressing an Alt-function key combination. Or you can simply attach it and press Shift-F2 to invoke 1-2-3's Step mode. Then, whenever you run a macro, *MED*'s debugging

window appears over the lower half of your screen. From the debugging window, you can press F2 to switch to the editing window. From either window, you can press the slash key to summon *MED*'s own menu system.

THE EDITING WINDOW

The editing window is divided, by default, into three panes: routine and variable labels, macro code, and comments. The labels and code must be in adjacent columns, but the comments can be offset from the code by whatever number of columns you specify. If you need to give more width to your code column, you can simply eliminate the comments pane or labels pane.

Unlike *Quattro Pro* and *Excel*, the *MED* editor stops short of letting you select macro commands from menus, but it offers conveniences not found in those

competing products. Enter text in the labels column, for example, and *MED* automatically turns it into a range name for the adjacent code cell. If you delete text from the labels column, a range name is removed. Press F3 while typing a macro command, and *MED* lets you incorporate a cell or range address by pointing to it. Press F3 twice and you can build a range name into a macro command by selecting the name from a list.

You can also insert a row within the editor window; *MED* will poke the new cells into the three working columns of the current macro. First it checks to ensure that you won't butt two macros together in the process. Delete a row, and *MED* takes cells only from the three working columns; the rest of the worksheet is not affected.

THREE MACRO MODES

The debugging window is split into two panes. On the left, you see the current code cell plus six lines of context. The right pane displays the current values of up to four watchpoint variables plus the name of the current routine, and the name of the current caller for subroutines. You'll find the caller information invaluable for sorting out macros that overflow the return stack.

You can begin macro execution at any cell. Just point to it and run in any of three modes: an instruction at a time, a cell's worth of instructions at a time, or full speed to the next breakpoint. At any point while execution is paused, you can easily switch to the editor, fix a statement, or change a variable's value, then return to the debugger to resume execution from where you left off.

FS7: (C2) [U12] *F45-F55

	A	B	C	D	E	F
41	INCOME STATEMENT 1990: Beckmesser Editorial Services, Inc.					
42						
43		Q1	Q2	Q3	Q4	YTD
44	Net Sales	\$21,000.00	\$26,600.00	\$22,400.00	\$29,600.00	\$99,600.00
45	Operating Expenses:					
46	Payroll	4,200.00	5,320.00	4,400.00	7,140.00	21,140.00
47						
48	(OPEN FILE_NAME, A) (BRANCH FILE_ERROR)					Name: NR
49	(BRANCH AGAIN)					Caller: C6
50	(GETLABEL "ENTER LOG FILE NAME - ", FILE_NAME)					U1
51	(OPEN FILE_NAME, U) (BRANCH FILE_ERROR)					U2
52	(GETLABEL "COMMENTS ", LOG_TEXT)					U3
53	(WRITELN REVISION_STRADATE_STRING@LOG_TEXT)					U4
54	(GETLABEL "ENTER Y TO ADD MORE COMMENTS LINES ", LO)					Status
	If successful, the rest of this cell will be skipped. Press ENTER or ✓					
	MED					

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The debugging window in *Macro Editor/Debugger* displays informative messages while you single-step through your macros.



FACT FILE

Macro Editor/ Debugger, Version 1.0

Personics Corp., 63
Great Rd., Maynard,
MA 01754; 800-445-
3311, 508-897-1575.

List Price: \$199.95.

Requires: 62K RAM,
DOS 2.0 or later.

In Short: Macro

Editor/Debugger creates, modifies, and tracks down errors in macros. If you've ever spent an hour or two debugging 1-2-3 macros, this product is a must-own add-in that could make macro development fun.



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MED can store up to nine breakpoints in three types. Execution breakpoints stop your macro when a specified code cell is reached. Update breakpoints stop when a specified cell gets a new value. And conditional breakpoints stop whenever a stated condition (a variable exceeding some value, for example) is met. You can attach a count value to any breakpoint, so that execution proceeds until the breakpoint has been reached a specified number of times.

MED is well tailored to the needs of 1-2-3 programmers. For example, it overlays its window on 1-2-3 rather than reducing the size of the 1-2-3 window. So if your macro depends on the window's having a standard number of rows, *MED* won't interfere. You can remove *MED*'s display at any time if you should want to take a peek at the underlying worksheet window.

You can leave {windowsoff} and {paneloff} instructions in the macro while you debug. *MED* will continue to update the screen and panel so you can see what's going on. Since it keeps a snapshot of the screen's status at the time the {paneloff} or {windowsoff} instruction appears, you can always take a look at the screen as the macro's user will see it. If your macro includes a {breakoff} instruction, *MED* will provide an on-screen indicator but still allow you to interrupt your macro, should you so desire.

On top of all these valuable services, *MED* offers a clearly written manual that includes a tutorial, a chapter on undocumented characteristics of the 1-2-3 macro language, and a full elaboration of each *MED* error message. If you're serious

COVER STORY

LOTUS 1-2-3 ADD-INS

P.D.Queue

by Craig Stinson

The ability to crunch numbers while a spreadsheet prints is one of numerous enticements for the *Lotus 1-2-3*, Release 2.x, user to make the move up to Release 3.1. With Funk Software's *P.D.Queue*, you can enjoy the convenience of background printing without doing the big upgrade.

BACKGROUND PRINTING

This \$89.95 add-in intercepts any jobs on their way to any printer and turns them into spool files on disk. The data is then unobtrusively fed to the appropriate printer while you continue to work. Additional jobs sent to the printer while the first job is printing are automatically stored in a queue and output in the order in which they were received.

The most obvious benefit of *P.D.Queue* is that it makes 1-2-3's WAIT light go off a lot sooner than it otherwise would, a convenience of particular interest to those with dot-matrix printers. But it can also make a big difference to anyone who prints lots of worksheets on any kind of printer. In our evaluation, a LaserJet II print job that held up the system for 52 seconds without *P.D.Queue*'s intervention took only 8 seconds with the add-in in place.

P.D.Queue can work with output from *Always* and *Impress*, as well as from 1-2-3. Without *P.D.Queue*, these publishing add-ins increase printing time dramatically; with *P.D.Queue*, the delays are



FACT FILE

P.D.Queue, Version 1.0

Funk Software Inc.,
222 Third St.,
Cambridge, MA
02142; 617-497-
6339.

List Price: \$89.95.

Requires: 30K RAM,
DOS 2.0 or later.

In Short: P.D.Queue

brings background printing to 1-2-3, Release 2, allowing you to work while your printer churns. It stores up to 99 print jobs and reduces idle time without interfering noticeably with foreground work.

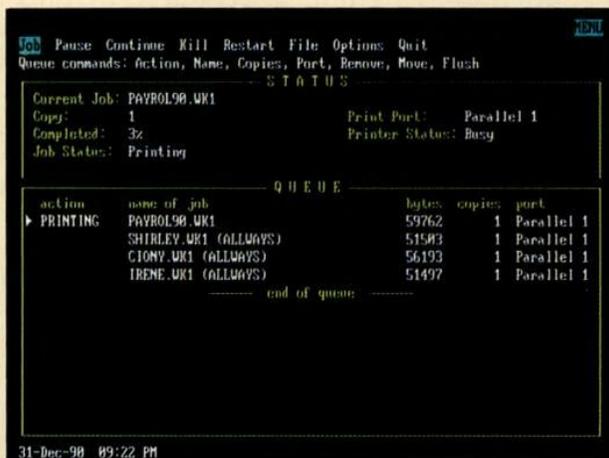


CIRCLE 419 ON READER SERVICE CARD

minimal. You can store up to 99 jobs in *P.D.Queue*'s print queue. While a job waits in line, you can pop up the add-in (by pressing an Alt-function key) to move the job to another position in the queue, remove it from the queue, or change its status to "hold" or "keep." A job in "hold" status stays in the queue but is not printed until you release it. The remaining jobs in the queue simply move around it as their turn comes. A job with "keep" status is printed but remains in the queue, allowing you to print it again whenever the need arises.

REDIRECTING OUTPUT

After a job has joined the queue, you can pop up *P.D.Queue* and change the number of copies to print or redirect output to a different printer, but not to a file. If you sometimes print locally and sometimes print to the network printer, you'll appreciate the freedom that *P.D.Queue* gives you to change your mind in mid-queue.



P.D.Queue reports the status of your printer and each job in the queue. The add-in intercepts print jobs and turns them into spool files on-disk so you can work in 1-2-3 while printing continues in the background.

SPREADSHEET FILE RECOVERY: Norton Utilities vs. Rescue Plus

by Ed Perratore

One of the most interesting new features of Symantec's *The Norton Utilities* 5.0 is its ability to repair damaged *Lotus 1-2-3*, *Symphony*, and *dBASE* files with its File Fix utility. Even if a damaged or erased file is severely fragmented across a floppy disk or hard disk, *Norton* makes a brave attempt to save it.

But does it do well enough? The truth is an ambiguous "maybe." Even the best file recovery algorithms offered today are most successful when the file is stored on one contiguous portion of the disk. Beyond that, it takes more technical savvy than you might expect to piece your lost data together.

All is not lost, however, especially if the erased or damaged file happens to be a *Lotus 1-2-3* file. Intex Solutions' *Rescue Plus* does not pretend to be the last word on spreadsheet file recovery, but in our tests, it repeatedly bested *Norton's* File Fix program.

FIVE UTILITIES

Rescue Plus, Version 1.3, is a \$129.95 collection of five utilities. *Rescue*, the flagship program, is the best route to restoring damaged *1-2-3* or *Symphony* files when your disk and its FAT (file allocation table) are intact. If you've lost a few bytes anywhere in the file, *Rescue* will make the file readable.

If the damage goes beyond the file itself, with bits and pieces scattered all over your disk, you'll need to do some file resurrection. That's where three other utilities—*ResQDisk*, *ResQView*, and *ResQFile*—come in. They aren't elegant or integrated, but collectively they offer a way to rebuild your lost file manually, using a technique that *Norton's* Disk Editor utility has yet to match.

ResQDisk lets you search a disk for *1-2-3* data and generates crude but valuable reports on cluster ranges containing spreadsheet data, the size, and starting cluster of existing spreadsheet files on the disk. *ResQView* lets you view clusters to determine whether the lost data is present. *ResQFile* lets you build and edit a chain of clusters from a list

you compile, recreating the file as completely as any other software available.

If you've forgotten a password, *ResQ-Pass* will retrieve it for you, provided the file is not damaged in the particular part of the worksheet where the password information is stored.

TESTING THE PROGRAMS

To compare the performance of *Rescue Plus* and its chief competition, *Norton's* File Fix, we attempted to recover small (6K–17K) and large (110K) files on several test disks. Throughout the testing, *Rescue Plus* did its job three to four times faster than *Norton*, often with better results.

On the easiest test, we used *Norton's* Disk Editor to scramble the first or last few bytes of a file. The two programs performed similarly—damaged files were restored intact—but with exceptions.

First, *Rescue Plus* blanked out cells containing any of three *1-2-3* @functions: @CTERM, @ISAAF, and @ISAAP, the last two of which are new to *1-2-3*, Release 2.2. (Intex claims it will resolve these problems in the product's next release.) *Norton's* problems were greater: it consistently blanked out a total of 18 @functions, including the popular @IF.

For the next test, we delved into the FAT of a test disk and jumbled several numbers to skew its record of where certain fragmented files were stored beyond their starting clusters. We used *Norton's* Disk Doctor II to create .DD files from the lost clusters.

On this test, again *Rescue Plus* returned a file that was complete except for the three unsupported @functions. *Norton's* Disk Editor/File Fix combination dropped about 13K of data.

On the last test, the most challenging, we looked at the packages' unerase functions. We filled a 360K floppy disk with



Rescue Plus's utility *ResQDisk* forms the first line of defense against permanent data loss. In this screen, the program is searching the entire disk for spreadsheet data; it will send its report to the printer.

2K and 4K text files, mapped their locations, then deleted them in selected groups to force fragmentation of six .WK1 files. Once all six files were copied—each fragmented much the way a typical hard disk stores data—we did a complete (*.*) deletion.

The results were not pleasant. From the 110K test file, *ResQDisk* unerased 90K; *Norton*, a mere 24K. Smaller files yielded poor results as well, with both programs restoring 12 to 40 percent of the original files without manual intervention. The lesson learned: back up often and defrag your hard disk.

While no one buys *Norton* solely for its File Fix program, the \$179 package offers a wealth of helpful utilities. If you work largely with *1-2-3* and you need the best insurance now available for spreadsheet file damage, *Rescue Plus* is the better choice. ■

The Norton Utilities, Version 5.0, Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014; 408-253-9600. **List Price:** \$179; upgrade from Version 4.5, \$49. **Requires:** 512K RAM, DOS 2.0 or later.

CIRCLE 397 ON READER SERVICE CARD

Rescue Plus, Version 1.3, Intex Solutions Inc., 161 Highland Ave., Needham, MA 02194; 617-449-6222.

List Price: \$129.95 (\$149.95 for Release 3.0—compatible edition).

Requires: 256K RAM, DOS 2.0 or later. CIRCLE 615 ON READER SERVICE CARD

The degree to which *P.D.Queue*'s background activities interfere noticeably with your foreground work depends on your computer, your printer, and the size of your printer's buffer. (*P.D.Queue* sends data to the printer in bursts, filling the printer's buffer; when the buffer's contents have been printed, *P.D.Queue* sends another burst.) On a 16-MHz 386 system used for testing, a worksheet that otherwise took 24 seconds to recalculate took less than a second longer with *P.D.Queue* printing; without stopwatch timing the difference would have been undetectable.

Error handling in *P.D.Queue* is disappointing. If you run out of disk space while the add-in is writing a spool file, you'll hear a distinctive beep. But if your printer runs out of paper or someone kicks out the cable, you won't be notified unless you pop up the add-in to check the status of the queue. If your printer is down the hall, it might be a while before you know anything is wrong. This one complaint aside, *P.D.Queue* is a thoroughly satisfactory utility. It'll help you get more work done in *1-2-3*.

3-2-1 Gosub

by Craig Stinson

With Frontline Systems' *3-2-1 Gosub*, you can expand *1-2-3* Release 2.x's built-in function library much the way an *Excel* user can add to the *Excel* function library. With the \$99.95 Standard Edition, your custom functions are reinterpreted each

time they're called and must be stored on the worksheet where they're used. With the \$249.95 Developer Edition, you get a compiler that turns your custom functions into add-ins of their own. Consequently, your functions do their calculations more quickly and can be used in any one of your worksheets.

BUILDING CUSTOM FUNCTIONS

For creating custom functions (as opposed to custom applications), the Developer Edition of *3-2-1 Gosub* is an alternative to Lotus's *Add-in Toolkit* for Release 2.x. You can use it for your own benefit or for creating commercial add-ins, by including acknowledgments and disclaimers prescribed in Frontline Systems' license agreement. Unlike the Lotus *Toolkit* for Release 2.x, it requires no knowledge of C or assembler.

Whether compiled or simply stored on the worksheet, a custom function offers the same benefits as a built-in function: It allows you to encapsulate a complex calculation in a simple statement. If you use lengthy formulas or sequences of formulas repeatedly on your worksheets, you can probably save time and improve readability by employing custom functions instead. If you sometimes have to modify complex routines that are used in many places, you'll be way ahead of the game by storing the changeable logic in a custom function definition.

EMULATING RELEASE 3

3-2-1 Gosub includes 11 "function-building" functions. You use these in combination with ordinary *1-2-3* formulas to define your own functions. Here's how you might write a *3-2-1 Gosub* custom function to emulate Release 3's @D360:

```
@ArgCheck ("##")
360*@YEAR (@Arg (1))
30*@MONTH (@Arg (1))
@IF (@DAY (@Arg (1))=31#AND#@DAY
(@Arg (2))>29, 30, @DAY (@Arg (1)))
360*@YEAR (@Arg (2))
30*@MONTH (@Arg (2))
@IF (@DAY (@Arg (2))=31, 30, @DAY
(@Arg (2)))
@SUM (A2 . .A4) "@SUM (A5 . .A7)
+A8-A9
```

The first formula, @ArgCheck ("##"), ensures that two numeric arguments are passed to the custom function; if more,

fewer, or wrong arguments are given, @ArgCheck terminates the function and returns ERR. @Arg(1) returns the value of the first argument, and @Arg(2) returns the value of the second. The value returned by the custom function is the value of the last cell in the definition (A8-A9 in the example).

You would store these statements in a contiguous range and assign a name to the entire range such as DAY360 (not D360, since D360 is a worksheet cell address). Then you could call the function with a formula such as @(\$DAY360,END,START), where END and START are names of cells containing dates.

The processing of a custom function definition normally runs row-by-row through the definition range and stops at the lower-right corner cell. But you can use a @GotoIf function to build loops (recursive or otherwise) and other alternative execution paths. An @Return function allows you to terminate your function at points other than the lower-right corner cell.

Other function-building functions offered by *3-2-1 Gosub* include @Assign, which lets you poke values into cells; @Subrow and @Subcol, which allow you to operate on selected row and column elements within range arguments; and a couple of simple but useful debugging functions.

With this modest toolkit, you can take *1-2-3* into some fairly sophisticated mathematical territory. The *3-2-1 Gosub* distribution disk includes some sample custom functions for performing arithmetic on complex numbers, calculating the future value of a series of unequal payments, performing various kinds of bond calculations, finding prime numbers, converting polar coordinates, solving quadratic equations, and a good deal more. Just for grins, there's even a custom function that returns 1 if the moon is full on a specified date—a decision-support tool of inestimable value.

With the help of these examples and Frontline's terse but cleanly written manual, you should be able to tailor *1-2-3* to your specialized needs—provided you have a solid understanding of *1-2-3*, some knowledge of programming concepts, and patience. Designing functions in *3-2-1 Gosub* is not as straightforward as writing simple BASIC programs, but for the person versed in *1-2-3*, it's an order of magnitude simpler than using the *Add-In Toolkit*.



FACT FILE

3-2-1 Gosub,

Version 1.0

Frontline Systems,
124 University Ave.,
#101, Palo Alto, CA
94301; 415-329-
6877.

List Price: Standard
Edition, \$99.95;
Developer Edition,
\$249.95.

Requires: 3K RAM, DOS 2.0 or later.

In Short: *3-2-1 Gosub* lets you write custom functions by encapsulating a complex calculation in a simple statement. Its eleven "function-building" functions take you into sophisticated mathematical territory. The Developer Edition includes a compiler so you can create function add-ins without programming in C or assembler.



CIRCLE 421 ON READER SERVICE CARD

```
Append Extract Compare Describe Begin WAS Remove Set dir Quit
Compare of INCOME.WK1 to INCOME2.WK1,
Use PGDN or PGUP to scroll, any key to move down, ESC to return to menu
```

```
CELL VALUE CHANGED
From Formula Cell D7 $196875
formula = @@"("<<SALES88.WK1>>QTR3")
To Formula Cell D7 $144325
formula = @@"("<<SALES88.WK1>>QTR3")
```

```
CELL VALUE CHANGED
From Formula Cell E7 $483888
formula = @@"("<<SALES88.WK1>>QTR4")
To Formula Cell E7 $391558
formula = @@"("<<SALES88.WK1>>QTR4")
```

```
CELL VALUE CHANGED
From Formula Cell F7 $1274915
formula = @SUM(B7..E7)
To Formula Cell F7 $968815
formula = @SUM(B7..E7)
```

Worksheet Archive System Release V1.21 Copyright 1989 TRM Computers

The Worksheet Archive System can provide a detailed comparison of any two worksheet files.

the DOS command line (TRM expects to release an add-in version also compatible with Release 3.1 this spring). If you have plenty of memory, you'll probably find the need to do your archiving from DOS, instead of from within 1-2-3, which can be an inconvenience. The opposite may be true if memory is limited; WAS, unlike *The Worksheet Utilities*, won't reduce the memory available for your spreadsheets. (If memory is quite limited, however, you won't even be able to run WAS by shelling out to DOS. You'll have to quit 1-2-3 altogether to run the archive program. That's a big nuisance.)

In short, WAS may be the right choice for users with limited memory or disk space, or for users with a particular need for detailed comparisons of worksheet iterations. Otherwise, this product looks pale next to its principal competitor.

Worksheet Archive System

by Craig Stinson

At \$79.95, TRM Computers' *Worksheet Archive System* (WAS) is almost as expensive as Funk Software's *The Worksheet Utilities*, even though the latter provides many services in addition to worksheet archiving. That's a serious strike against WAS. But the two programs take different approaches to archiving, and WAS has a few unique tricks up its disk sleeve.

A WORKSHEET HISTORY

In building its archive, WAS stores a history of the changes made to a worksheet, along with your comments and the dates on which changes were made. When you want to restore a particular version, WAS

uses its history transcript to recreate that version. *The Worksheet Utilities*, in contrast, preserves a compressed copy of each version. When you want to restore an earlier version of a worksheet, the program simply finds and unpacks it.

If you're archiving a large number of large worksheets, you're likely to save disk space with WAS. This may not be true, however, if you like to insert or delete rows or columns near the upper-left corner of your worksheets. In its history transcript, WAS records the contents and attributes of each changed cell, not the commands by which the changes are made. An insertion at row 2 of a 1,000-row worksheet, therefore, causes WAS to track at least 998 rows of modified cells.

VERIFY WORKSHEET CHANGES

As a by-product of its archiving method, WAS is able to offer a handy Compare command. This command presents—on-screen, in a disk file, or at your printer—a cell-by-cell listing of the differences between any two iterations of a worksheet. The list includes information about formatting and range name differences, as well as about changes in cell contents.

When it comes to giving a precise account of how you got from point A to point H, WAS's Compare command is beyond compare. This command also makes it possible to verify that a worksheet passed from user to user has not been modified in some subtle, unauthorized way.

Unlike *The Worksheet Utilities*, WAS is an add-on, not an add-in; that is, it's a standalone .EXE program that runs from

The Worksheet Utilities

by Craig Stinson

Funk Software introduced *The Worksheet Utilities* in January, 1988, the era of *Lotus 1-2-3*, Release 2.01. While it has never been upgraded and some of its functionality has since been rendered superfluous by Release 2.2, this \$99.95 general-purpose utility set adds considerable value to 1-2-3.

TWO ADD-INS IN ONE

The Worksheet Utilities consists of two add-ins, CellWorks and FileWorks, which you can attach and detach separately to conserve resources. CellWorks includes five components: PrintSet, Formula Editor, Search and Replace, AutoSave, and Range Column Width. FileWorks is a DOS shell, a file compressor, and a worksheet archival system.

Search and Replace and Range Column Width are essentially equivalent to Release 2.2's /Range Search and /Worksheet Column Column-Range commands. They allow you to perform automatic global replacements and apply width changes to two or more adjacent columns. Release 2.2 users won't need these components.

AutoSave provides insurance against power outages and pilot errors by copying the current worksheet at user-configurable time intervals to a file that is named AUTOSAVE.WK1. A Restore command replaces the current worksheet with AUTOSAVE.



FACT FILE

Worksheet Archive System, Version 1.12

TRM Computers,
 2106 Arborview, Ann Arbor, MI 48103;
 313-994-6289.

List Price: \$79.95.
 Requires: 256K RAM, DOS 2.0 or later.

In Short: An add-on that must be run from the DOS command line, *Worksheet Archive System* is valuable chiefly for its detailed file-comparison capability.



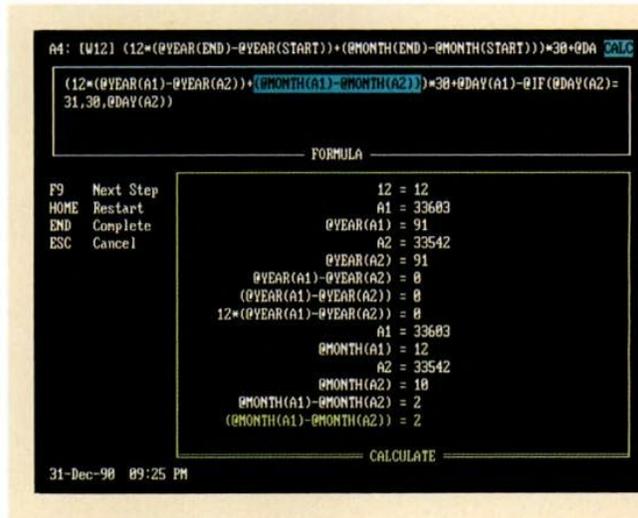
CIRCLE 421 ON READER SERVICE CARD

COVER STORY
LOTUS 1-2-3 ADD-INS

PrintSet looks like an implementation of the *Symphony* (and Release 2.2) print settings—sheet feature, but provides two important services omitted by Lotus: It lets you create a library of setup strings for each printer on your system, and it allows you to save named combinations of print settings—print range, margins, headers, footers. *Always* and *Impress* eliminate the need to find setup strings in printer manuals, but the ability to invoke reports by name (instead of by chasing around the worksheet or writing custom-menu macros) remains invaluable. Unfortunately, PrintSet stops short of offering print preview or spooling, which is provided by Funk's spooler, *P.D.Queue*.

FORMULA EDITING

Formula Editor, the jewel of CellWorks, provides the best formula entry/editing services found in any spreadsheet package. You can enter the editor in Ready or Edit mode to get a multiline control panel plus a full screen of information and options. Here you select functions and operators from lists, read complete help information on any function (the help messages actually reproduce—with per-



The *Worksheet Utilities' Formula Editor* lets you debug complex formulas by calculating one term at a time.

mission—Lotus's printed documentation), and assign range names without leaving a formula.

As you build a formula, the editor shows you the exact placement of parentheses. And when you've stuffed so much logic into a formula that you can't read it, you can use the Calculate command (F9)

to sort it all out. Each time you press F9, the editor displays the current value of one term of the formula, beginning at the innermost and working its way out.

A GOOD DOS SHELL

From within 1-2-3, FileWorks offers the commands you'd expect from a good DOS

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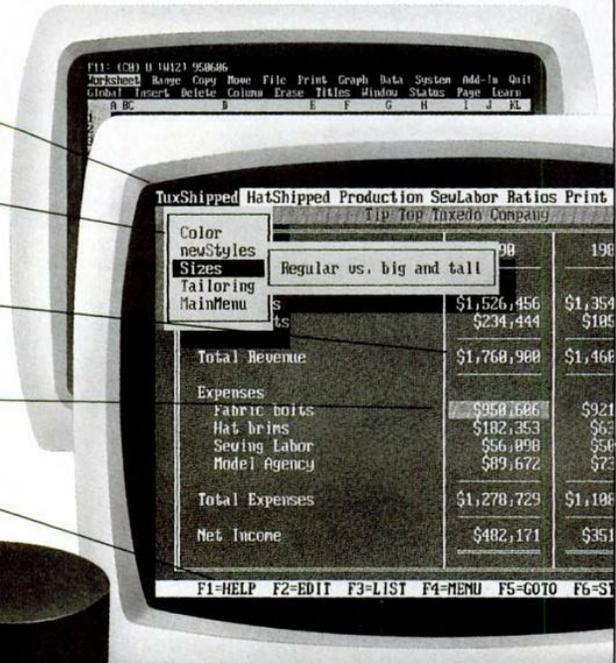
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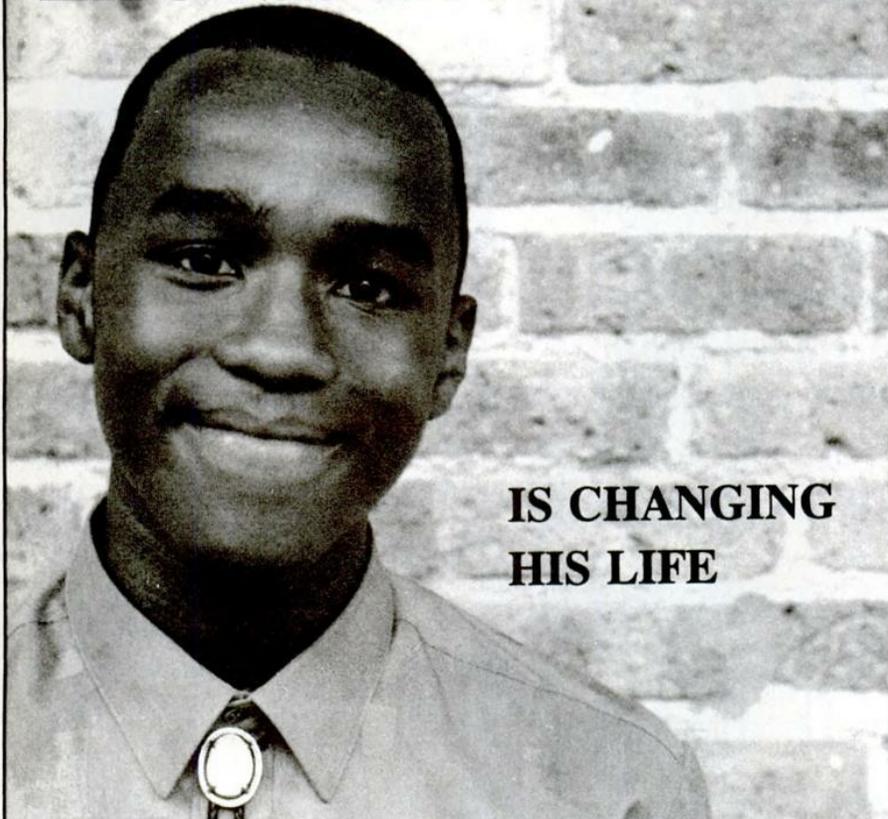


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shell: copy, move, rename, delete, change file attributes; create, remove, and change directories; and sort and print directory listings. Its windows show only .WK1 files, but you can alter or remove the filter to apply commands to other file types.

You can annotate files with comments, keywords, and "owner" names. These can then form the basis for filtered listings, helping you zero in on files containing particular kinds of information. A "peek" command gives you a look inside a selected file. Compared with the file-viewing capability of newer shell pro-



FACT FILE

The Worksheet Utilities, Version 1.01

Funk Software Inc.,
222 Third St.,
Cambridge, MA
02142; 617-497-6339.

List Price: \$99.95.

Requires: 70K RAM
for *Cell Works* utility,
110K RAM for *File Works* utility.

In Short: Although some of its functionality has been duplicated by Release 2.2, *The Worksheet Utilities* is still a bargain for its formula editor, print-settings libraries, and worksheet archival services.



CIRCLE 420 ON READER SERVICE CARD

grams (such as *The Norton Commander* and *Lotus Magellan*), this aspect of *The Worksheet Utilities* is primitive: worksheets are listed rather than displayed as grids, and you can scroll only in the forward direction. But FileWorks redeems itself with an excellent search capability. You can find files containing particular words, formulas, or even range names.

FileWorks also performs compression and decompression, and most importantly, provides a system for archiving worksheets. FileWorks creates a separate subdirectory for each worksheet you archive, then stores each iteration of each worksheet, compressed along with dates and your comments. It's a more disk-intensive archival approach than that used by *Worksheet Archive System*, but you may appreciate knowing that your entire file is preserved, not just a history of changes.

The Worksheet Utilities is a great bargain for a wide spectrum of 1-2-3 users. After using it for a day or two, you may wonder why Lotus didn't incorporate all of its ideas into Release 2.2. ■