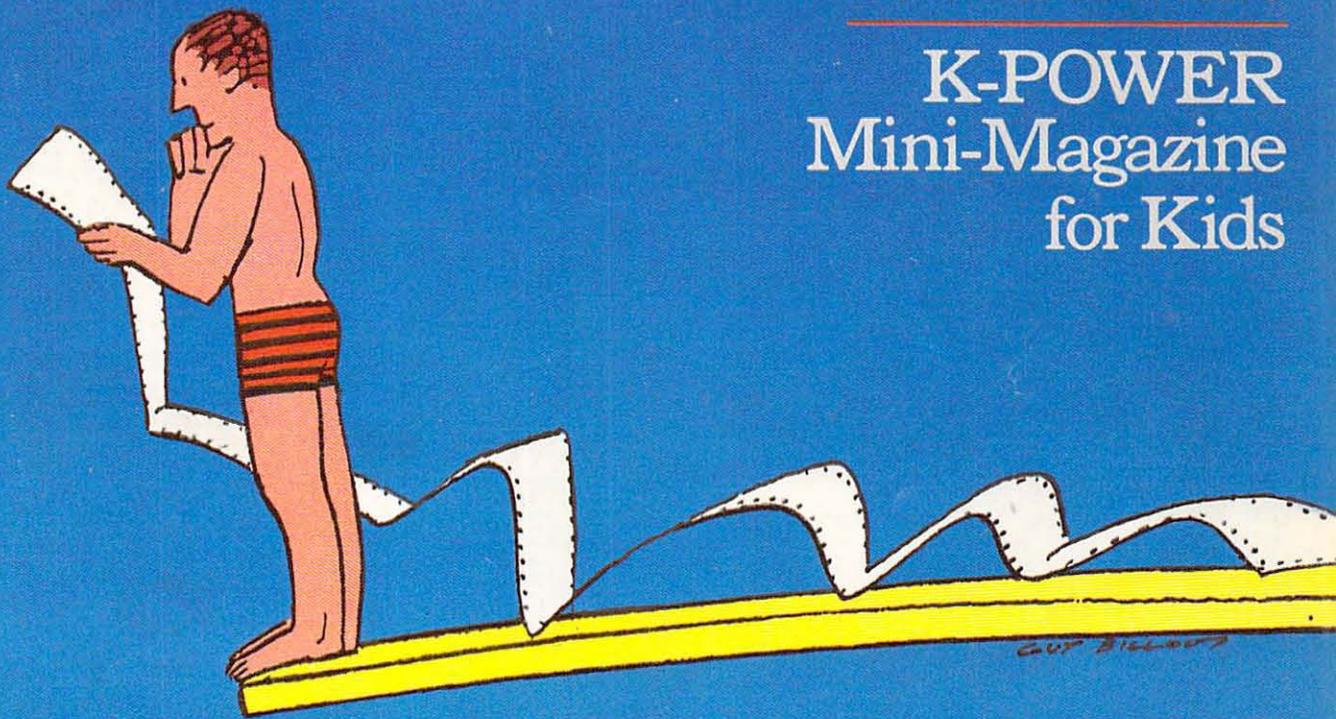**PCjr** A Second Look at the Machine and Its Software

FAMILY COMPUTING

Spreadsheets at Home:
New Tools for Decision-Making

Buyer's Guide to Portable Computers

Building Reading Skills With Software

K-POWER Mini-Magazine for Kids

INSIDE:
ORIGINAL PROGRAMS FOR ADAM.

FAMILY COMPUTING

Page 23

Page 25

Page 31

Page 38

REVIEWS OF SOME NOTABLE PROGRAMS
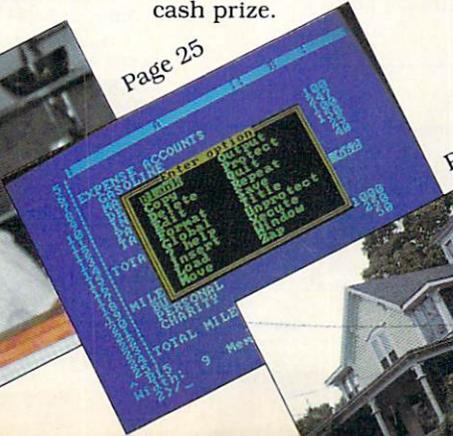
BY SHARON AKER, JOE GELMAN, ROBIN RASKIN, AND DAVID WILSON

Reviews and chart entries for this report on spreadsheets were written by our regular contributors. Each writer looked at programs for the computers they know best: Aker on the Commodore and the Macintosh; Gelman on the TI-99/4A, and Radio Shack Model III and Color Computer; Raskin on the IBM and Atari; and Wilson on the Apple and ADAM.

Programs written for more than one machine were reviewed separately in each format. This accounts for some of the differences in opinion—and capabilities—that you'll note in this report. Remember that a program's features are dependent on the computer that runs it. In this report, we've tried to focus on those programs that take best advantage of the machine(s) they are designed for. As always, the best advice we can give you is: Look carefully at a piece of software before you buy—especially when it's expensive.

ADAM

Overall, **ADAMCalc** is slow and will frustrate experienced spreadsheet users. Unfortunately, ADAM owners don't have much choice.

ADAMCalc sports a greater number of cells than most spreadsheets but requires a memory upgrade to use them. The program is further enhanced with an on-screen calculator, the option to change the color of both the background and type, model templates, and well-indexed, clearly written documentation. Unlike other programs which give you a letter and number cell reference, e.g. B43, ADAMCalc annoyingly requires cells to be designated by numbers for both column and row, which results in a tedious method of cell designation, e.g. [5,1] or [44,63].

APPLE II SERIES AND MACINTOSH

Just a few short years ago, spreadsheets—so widespread and widely used now—were beyond the comprehension of most computer users. The introduction of **VisiCalc** changed the makeup of the computer-owner population dramatically. The software made owning an Apple computer desirable for a multitude of businesspeople who were not at all interested in computers per se. The spreadsheet provided, in effect, the first legitimate answer to the question, "What's a computer good for?"

Although spreadsheets have evolved considerably since VisiCalc was introduced, working with it is still comparatively comfortable. That speaks volumes for the originality and design sense of its creators. VisiCalc has all the essentials, interconnected in a convenient matrix, and presented without nonsense or pretense. **Advanced VisiCalc**, available in the same package, adds many conveniences without complicating or taking away from the original. However, the on-line tutorial is sluggish, and I do wish there was some printed documentation for the program.

PractiCalc II is just plain sensational. I especially liked the rapidity of recalculation (even with a fair amount of entered data); the enhanced labeling mode, which allows easy insertion of paragraphs of text into the spreadsheet; the facility for searching through spreadsheets using wild cards; its easy-to-use option menu; and its sparse, unimposing, but totally sufficient documentation. My only misgiving about this program is the decision to label rows with letters, and columns with numbers—contrary to custom. There are so many things done well, however, I will not quibble. This is a best buy.

Editor's note: In addition to Practicorp's marketing of this program, now Spinnaker markets PractiCalc II as Spreadsheet, part of its Better Working series. The spreadsheet will integrate with the word-processing and data-base programs included in the series.)

FlashCalc, VisiCorp's (now Paladin's) replacement for its VisiCalc program, is another strong entrant into the home spreadsheet market. The program lives up to its name. It calculates more rapidly than any of the other spreadsheets we examined here. FlashCalc is accompanied by complete and lucid documentation and requires only one disk. I liked its expansive, full-prompt menu, but was a little annoyed by its slow scroll. This program provides substantial benefits over regular VisiCalc, but falls considerably short when compared to Advanced VisiCalc.

I must agree with critics of **AppleWorks**. It's too expensive ($250) for home users and too limited for real business uses. Still, I find that in practice, I keep using it in preference to other more powerful programs. One reason is that once you learn how to use the program (and it is easy to learn!) you'll find that for most limited spreadsheet, word-processing, and data-base chores, it is fun and convenient. The facility it provides for transfer of data from data-base to spreadsheet and spreadsheet to word processor becomes more useful as I daily conceive of new applications. I would not like to give up AppleWorks now that I have grown dependent on it.

There is only one spreadsheet program available for the Mac for now, so users are lucky that it is an excellent one. Microsoft's **Multiplan** has every feature you could want in a spreadsheet, and then some. In addition, information from Multiplan can easily be transferred into Microsoft's Mac programs for word processing and charting.

Multiplan makes excellent use of the Mac menus and mouse. The mouse, in particular, makes spreadsheeting easier than on other computers. Clicking right on a cell is faster than scrolling to it or typing in a reference like R2C4. And, the first time you define a group of cells in a formula by simply dragging across them with the mouse cursor, you'll wonder how people manage on other computers.
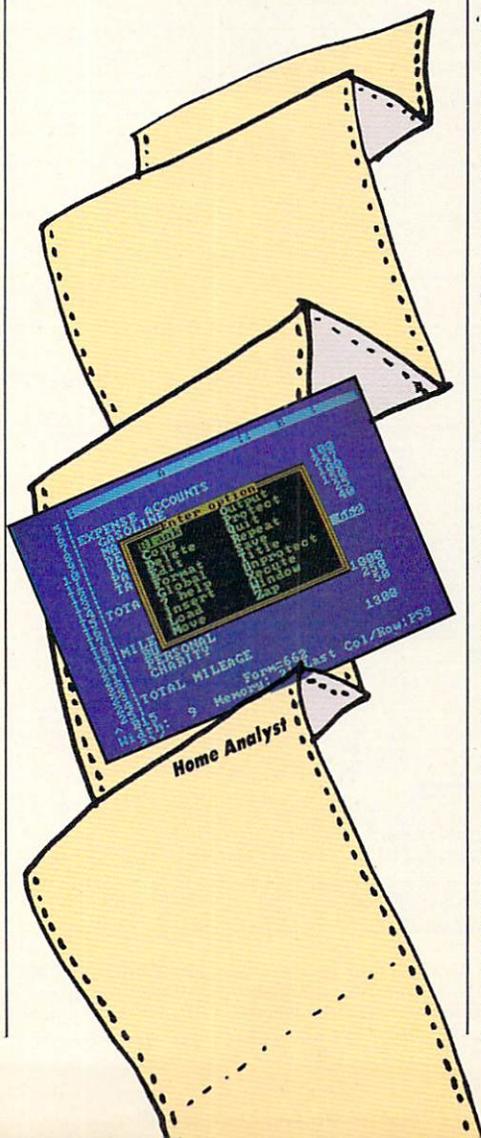
SUMMING UP SPREADSHEETS: THE SOFTWARE AT A GLANCE

KEY TO CHART AND EVALUATIONS

To get the most out of this article and its accompanying chart, we've detailed the terms and the criteria used to evaluate the software reviewed.

STATISTICS

MATH FUNCTIONS FOR FORMULAS: In general, the more math functions, the more powerful the program. However, you may not actually need all those functions. Don't evaluate programs on this number alone.

SORTING: 1) Numeric sort—can columns be sorted numerically? 2) Alpha sort—can columns be sorted alphabetically? 3) Reverse sort—can columns be sorted from highest value to lowest?

LINK CAPABILITY: Can you incorporate information from one spreadsheet file into another?

COMMUNICATION: Can info from sheet come from, or be "pasted" into, another program—word processor, data base, graphics?

EASE OF USE

ERROR HANDLING: Consider how well the program accommodates problems. Any crashes or freezes when using the sheet? Can you back out of a wrong menu choice? Are you prevented from accidentally wiping out an entire file if you try to save another under the same name? Are you prevented from quitting the program if the current sheet hasn't been saved?

FILE HANDLING: Overall rating based on ease of operation as well as the following specifics: 1) Can you initialize (or format) a new data disk from within the spreadsheet program? 2) Can you check which sheets are stored on your data disk? 3) Is it easy to rename and delete files?

NAMED CELLS: Can you name cells or groups of cells so the names can be used in formulas instead of cell designations? (For example, A20−A19 can be expressed as GROSS−EXPENSES.)

DATA ENTRY

MOVING AROUND: Can you 1) Move from one row/column to the next as data is entered? 2) Move up a row, back a column? 3) Move to top or bottom of screen? 4) Move to beginning or end of current row/column? 5) Move to beginning or end of sheet? 6) Use GOTO commands?

AREA REPLICATION: Can you replicate portions of rows, columns, or other sections of the sheet?

SHEET DESIGN

INDIVIDUAL COLUMN WIDTH: Can individual columns be of different widths?

MOVE ROW/COLUMN: This is almost the same as Replicate (under Data Entry), except that the original data is removed here.

NUMERIC FORMATS: Can you define number cells to contain: 1) Dollar amounts that automatically will have dollar signs and two decimal places? 2) Numbers with fixed decimal places? 3) Integers? 4) Percents (is the percent sign automatically added?)

PROGRAM	MANUFACTURER	PRICE	MEMORY REQUIRED	MAX # ROWS/COLS	# OF MATH FUNCTIONS	SORTING: NUMERIC/ ALPHA/ REVERSE	LINK CAPABILITY	COMMU- NICATION	ERROR HANDLING
ADAM									
ADAM CALC	Coleco 999 Quaker Lane S. West Hartford, CT 06110	$49	80K	255/255	31	ALL	YES	SOME	GOOD
Apple									
APPLEWORKS	Apple Computer 20525 Mariani Ave. Cupertino, CA 95014	$250	64K	999/127	16	ALL	YES	EXTEN- SIVE	EXC
FLASHCALC	Paladin Software 2895 Zanker Road San Jose, CA 95136	$99	64K	254/63	41	NONE	YES	SOME	AVG
MULTIPLAN (Macintosh)	Microsoft 10700 Northrup Way Bellevue, WA 98009	$195	128K	255/63	30	ALL	YES	EXTEN- SIVE	EXC
PRACTICALC	Practicorp 44 Oak St., The Silk Mill Newton Upper Falls, MA 02164	$49	48K	250/100	36	ALL	NO	SOME	GOOD
VISICALC	Software Arts 27 Mica Lane Wellesley, MA 02181	$179, comes with advanced version	64K/128K (Adv)	254/63	36	NONE	NO	SOME	GOOD
Atari									
SYNCALC	Synapse 5221 Central Ave. Richmond, CA 94804	$49	48K	255/128	32	ALL	YES	SOME	GOOD
Commodore									
CALC RESULT	Handic Software 520 Fellowship Road Mt. Laurel, NJ 08054	$49	64K	254/63	22	NONE	NO	SOME	AVG
CAL-KIT	Batteries Included 30 Mural St. Richmond Hill, Ontario L4B 1B5 Canada	$49.95	64K	99/26	5	NONE	NO	SOME	GOOD
CREATIVE CALC	Creative Software 960 Hamlin Court Sunnyvale, CA 94089	$49	64K	255/64	12	NONE	NO	SOME	AVG
MULTIPLAN	HesWare 150 N. Hill Drive Brisbane, CA 94005	$99	64K	255/63	40	ALL	NO	SOME	EXC
SPREADSHEET	Spinnaker 1 Kendall Square Cambridge, MA 02139	$49	64K	250/100	30	ALL	NO	NO	GOOD
SWIFT-CALC	Cosmi 415 N. Figueroa St. Wilmington, CA 90744	$24	64K	254/26	13	NO REVERSE	NO	NO	GOOD
IBM PC and PC/r									
CREATIVE CALC	Creative Software 230 E. Caribbean Drive Sunnyvale, CA 94089	$59	128K	255/64	13	NONE	YES	SOME	GOOD
FLASHCALC	Paladin Software 2895 Zanker Road San Jose, CA 95136	$129	64K	254/63	42	ALL	NO	SOME	POOR
HOME ANALYST	Peachtree 3445 Peachtree Road, N.E. Atlanta, GA 30326	$99	128K	254/63	22	NUMERIC ONLY	NO	SOME	GOOD
LOTUS 1-2-3	Lotus Development Co. 245 First St. Cambridge, MA 02142	$495	192K, PC/ 128K, PC/r	2048/256	55	ALL	YES	EXTEN- SIVE	EXC
MULTIPLAN	Microsoft 10700 Northrup Way Bellevue, WA 98009	$195	128K	255/63	46	ALL	YES	EXTEN- SIVE	GOOD
MY CALC	Computer Easy 414 E. Southern Tempe, AZ 85282	$19	128K	255/62	43	ALL	NO	SOME	GOOD
PERFECT CALC	Thorn EMI 3197 C Airway Ave. Costa Mesa, CA 92626	$199/ $139 (PC/r)	128K	255/52	47	ALL	YES	EXTEN- SIVE	GOOD
PFS: PLAN	Software Publishing 1901 Landings Drive Mountain View, CA 94303	$140	128K	48/20 (128K) 176/64 (256K) 255/70 (320K)	15	NONE	YES	EXTEN- SIVE	GOOD
SUPERCALC 3	Sorcim Corp. 2310 Lundy Ave. San Jose, CA 95133	$395	96K	254/63 (96K) 9999/127 (192K)	60	ALL	YES	EXTEN- SIVE	EXC
VISICALC	Software Arts 27 Mica Lane Wellesley, MA 02181	$179; advanced version on same disk	192K	254/63	42	NUMERIC ONLY	NO	SOME	POOR
Radio Shack									
VISICALC (Model III)	Software Arts 27 Mica Lane Wellesley, MA 02181	$99	48K	254/63	26	NONE	NO	SOME	GOOD
ELITE*CALC (Color Computer)	Elite Software Suite 301, 201 Penn Center Blvd. Pittsburgh, PA 15235	$69/$79 w/Calc-List	16K, with Extended BASIC	255/255	23	ALL	NO	SOME	GOOD
Texas Instruments									
MULTIPLAN	Triton Products P.O. Box 8123 San Francisco, CA 94128	$99	32K (and disk drive)	255/63	44	ALL	NO	SOME	EXC
Timex									
VU-CALC	Games To Learn By P.O. Box 78 Collinsville, CT 06022	$16	16K	26/36	5	NONE	NO	NO	AVG

LOCKED CELLS: Can you prevent cell contents from being changed (except after an unlock command)?.

PRINTING OPTIONS

FORMULAS: Can you print the formula for a cell instead of its value?

OVERALL QUALITY: Can headers or footers be printed? Can pages be numbered? Are rows or columns

FILE HANDLING	HELP FEATURES	SEARCH FUNCTION	NAMED CELLS	Data Entry		Sheet Design				Printing Options		Documentation			Overall		COMMENTS
				MOVING AROUND	AREA REPLICATION	INDIVIDUAL COLUMN WIDTH	MOVE ROW/COL.	NUMERIC FORMATS	LOCKED CELLS	FORMULAS	OVERALL QUALITY	OVERVIEW	TUTORIAL	INDEX	PERFORMANCE	VALUE FOR MONEY	
EXC	GOOD	YES	NO	AVG	YES	YES	YES	GOOD	YES	YES	GOOD	GOOD	AVG	GOOD	AVG	GOOD	Integrates with *SmartWriter*.
EXC	EXC	YES	NO	GOOD	YES	YES	YES	EXC	YES	YES	EXC	EXC	EXC	GOOD	EXC	GOOD	Easy to learn; convenient to use; a 3-in-1 package.
GOOD	GOOD	NO	NO	AVG	YES	YES	YES	AVG	YES	YES	GOOD	AVG	AVG	EXC	GOOD	AVG	An improvement over *VisiCalc*.
GOOD	EXC	YES	YES	EXC	YES	YES	YES	EXC	YES	YES	EXC	GOOD	GOOD	GOOD	EXC	EXC	Feature-laden; makes good use of mouse.
GOOD	GOOD	YES	NO	GOOD	YES	YES	YES	AVG	NO	NO	AVG	GOOD	AVG	GOOD	EXC	GOOD	One of the best. Also distributed as *Spreadsheet* ($59) by Spinnaker.
GOOD	NO	NO	NO	AVG	NO	NO	YES	GOOD	NO	NO	AVG	GOOD	GOOD	GOOD	AVG	AVG	All the essentials; advanced version adds features.
EXC	NO	YES	YES	GOOD	YES	YES	YES	EXC	YES	YES	GOOD	EXC	GOOD	YES	EXC	EXC	Makes good use of Atari's features, including color.
GOOD	GOOD	NO	NO	GOOD	YES	NO	YES	AVG	NO	YES	GOOD	GOOD	AVG	POOR	GOOD	GOOD	Has color option.
EXC	GOOD	NO	NO	EXC	NO	YES	NO	AVG	NO	YES	GOOD	GOOD	GOOD	NO	AVG	AVG	Designed for simple applications; bonus: 20 templates.
GOOD	NO	NO	NO	GOOD	YES	YES	NO	AVG	NO	NO	AVG	GOOD	EXC	AVG	GOOD	GOOD	Has color option; interfaces with *Creative Writer*.
AVG	GOOD	NO	YES	EXC	YES	YES	YES	EXC	YES	YES	EXC	GOOD	EXC	GOOD	EXC	EXC	Files can be saved in format readable by some word processors.
POOR	NO	YES	NO	AVG	YES	YES	YES	GOOD	NO	YES	GOOD	AVG	EXC	GOOD	GOOD	GOOD	Interfaces with data base and word processor.
AVG	NO	NO	NO	GOOD	YES	YES	NO	EXC	NO	NO	AVG	POOR	POOR	NO	GOOD	EXC	Pop-up menus make command selection convenient.
AVG	NO	NO	NO	EXC	NO	YES	YES	AVG	NO	NO	GOOD	GOOD	GOOD	YES	GOOD	GOOD	A no-frills, comprehensive package.
EXC	GOOD	YES	NO	GOOD	YES	YES	YES	GOOD	YES	YES	GOOD	GOOD	GOOD	YES	GOOD	GOOD	Spruced-up *VisiCalc*.
EXC	GOOD	YES	YES	EXC	YES	YES	YES	GOOD	YES	YES	GOOD	AVG	GOOD	YES	GOOD	GOOD	Includes helpful templates; good for beginners. Uses color well.
GOOD	EXC	YES	YES	EXC	YES	YES	YES	EXC	YES	YES	EXC	EXC	EXC	EXC	EXC	EXC	Doubles as a powerful data base.
EXC	GOOD	YES	YES	EXC	YES	YES	YES	GOOD	YES	YES	GOOD	GOOD	GOOD	YES	GOOD	GOOD	Complex but comprehensive.
POOR	GOOD	YES	NO	AVG	NO	YES	YES	GOOD	NO	YES	GOOD	AVG	POOR	NO	EXC	EXC	Best buy!
GOOD	EXC	YES	YES	EXC	YES	YES	YES	GOOD	YES	YES	GOOD	EXC	EXC	YES	EXC	GOOD	Interfaces with data base and word processor.
AVG	EXC	NO	YES	GOOD	NO	YES	YES	GOOD	NO	YES	EXC	GOOD	AVG	GOOD	GOOD	EXC	Interfaces with data base and word processor.
EXC	EXC	YES	YES	EXC	YES	YES	YES	EXC	YES	YES	EXC	EXC	EXC	YES	EXC	EXC	For the more serious user.
AVG	GOOD	YES	NO	GOOD	YES	NO	YES	GOOD	NO	YES	AVG	AVG	GOOD	GOOD	AVG	AVG	Special *jr* version now on the market.
AVG	NO	NO	NO	GOOD	NO	NO	YES	GOOD	NO	YES	GOOD	GOOD	AVG	AVG	AVG	AVG	Nothing fancy, but serviceable.
AVG	AVG	NO	NO	GOOD	YES	YES	YES	GOOD	NO	Requires purchase of *Calc-List*	AVG	AVG	AVG	NO	AVG	AVG	Has lookup table.
GOOD	EXC	NO	YES	GOOD	YES	YES	YES	GOOD	YES	YES	GOOD	GOOD	GOOD	AVG	GOOD	GOOD	Slow on the TI-99/4A; has color option.
NO	NO	NO	NO	POOR	NO	NO	NO	POOR	NO	NO	POOR	POOR	NO	NO	POOR	GOOD	Covers the basics, but not much more.

separated by lines? How are wider-than-paper spreadsheets handled? Are various printers supported?

DOCUMENTATION

OVERVIEW: How well is the idea of the spreadsheet explained—its general functions, some of its specific uses? Is its terminology defined?

TUTORIAL: The step-by-step guide for creating a spreadsheet.

INDEX: How easily can you look up what you need?

ATARI

Since *VisiCalc* no longer is marketed for the Atari, owners of this computer are severely limited when it comes to choosing spreadsheet programs. Fortunately, there's **SynCalc**, an exceptional value at $49.

SynCalc is a handsome spreadsheet package that takes advantage of Atari's superb color and its unique keyboard. It's easy to use since it's both command- and menu-driven. The program is fully compatible with *AtariWriter* (by storing the contents of your spreadsheet in a text file), *SynFile* (a data base), and *SynTrend* (a graph package), making it a nice quasi-integrated system for the home or small business.

COMMODORE 64

It doesn't take computer users long to learn that high price and high performance do not always go hand in hand when it comes to software. In the case of the Commodore spreadsheet programs included in this review, however, the two most expensive are the best—both in terms of ease of use and number of options. And, although even the highest-priced programs come in under $100, you still can get a good spreadsheet for half that price if you do not need some of the extra functions in the larger programs.

Multiplan and **Spreadsheet** are exceptional programs. They are powerful enough for business, and still easy enough for beginners. Their options always seem go one step further than expected.

In *Multiplan*, you can name cells so that referring to them in formulas is easier, e.g. GROSS EXPENSE. *Multiplan* can use "supporting sheets," an option that makes a cell in one spreadsheet dependent on the data in another. And, you can view eight different portions of the spreadsheet on the screen at the same time.

Spreadsheet's screen setup—alternate columns appear in different shades of gray—makes it easy to see which column you are in. One of its special advanced features is the "direction function," which lets you set up a spreadsheet for someone else to work with; you can design the sheet with built-in prompts, such as COMMISSION LEVEL?, so the user with a minimum of spreadsheeting knowledge can fill in the cells.

Swift Calc is proof that you don't have to give up performance for price. While it does not match the more expensive packages in power, it has more than enough options for home use. In addition, it is simple to use and its "pop-up" command menus are impressive for a package of this price ($24).

Another package at the low-price end of the Commodore list is Tri Micro's **Your Home Office**. It is an integrated package—that is, both the spreadsheet and a word processor are in the computer at the same time. You can take your spreadsheet figures and PASTE them into a letter or report you are writing; in fact, the "pasting" operation is the only way you can get the spreadsheet printed.

The spreadsheet in *Your Home Office* is limited in both size and features. While you may not need anything bigger or fancier than what is provided in this package, some of its limitations may be hard to live with. The absence of on-screen prompts may slow you down as you try to recall, or take time to look up, the correct command abbreviation.

Calc Result has a special approach to spreadsheeting—it has 32 pages of spreadsheets in each package. Since the pages are, in effect, on top of each other, this lets you work in three dimensions. In addition to the usual spreadsheet intersections of rows and columns, you also can use the intersections of cells from one page to another for special calculations. There are a number of advanced features, including the ability to show four different parts of the spreadsheet on the screen at the same time. *Calc Result* definitely is a package to consider.

IBM PC AND PC*jr*

The spreadsheets available for the IBM run the gamut of price and abilities. Here are some of my criteria in looking them over. The ones I like best are "A.V.," or "After *VisiCalc*" and its clones. These second-generation spreadsheets have left the domain of long mnemonic lists of commands and rely on easy-to-read menus. They are easily formatted into handsome displays with capabilities like currency labeling, centering, and text crossover. You can reference a formula you have created by name, and then use that complex formula as a single command. These programs will store data in a format that can be translated to other applications programs like word processors or data bases. The best have the ability to create macros, which let you represent complex formula sequences with a few keystrokes.

All of these spreadsheets are consistent, comprehensive, and visually pleasing. I had to probe for their weaknesses.

The winner of my "best-for-the-buck" spreadsheet award goes to a little jewel called **My Calc**. OK, so it has a little less storage room and a few less formula and format capabilities than its big-name counterparts,
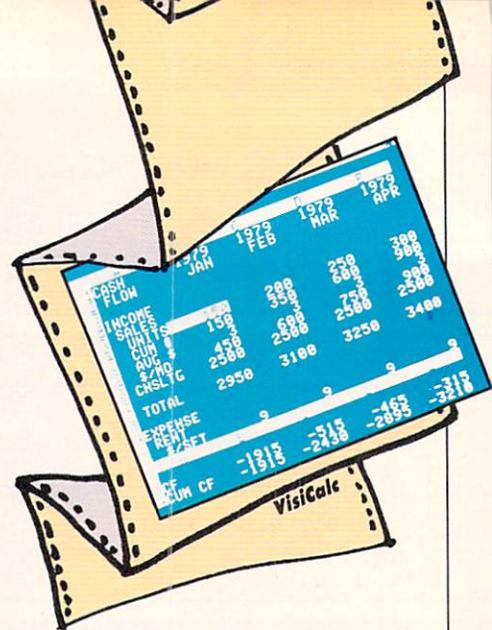
but if you want a lot of spreadsheet for a little money, take a look. Its simplicity works to its advantage, and for $19 you can achieve some spectacular results.

My Calc has a complete repertoire of mathematical operations and functions. There's a modest on-screen tutorial (show me an on-screen tutorial that truly answers your questions when you need 'em answered and I'll eat my disk) and the program operates smoothly and efficiently. The nine-page brochure gives a tightly packed, no-frills explanation. But if you like, or need, examples and tutorials, *My Calc* is not for you.

My Calc's most serious limitations are that it is slow and it uses memory inefficiently. You have to be careful how you arrange your entries; if you mix long and short rows, or long and short columns, *My Calc* will use up more memory than you expect. Also, it won't move or copy blocks of data.

For those folks who just are not numerically inclined, Peachtree's **Home Analyst** offers a partial solution. It contains the traditional spreadsheet for those who'll want to write their own template, but it also contains two templates that can be used for common household functions.

Home Analyst makes excellent use of "pop-up" menus, which make exploration much easier. Instead of having to remember a list of alphabetical commands, you can hit ESCAPE and have a menu supply your choices.

There are a few annoying weaknesses and shortcomings in *Home Analyst*, including the fact that the documentation is inversely proportional to the difficulty of the subject—it gets sparse as the going gets tough. The difficult EXECUTE command, which allows you to merge your spreadsheet files with Peachtree's *Home Writer*, is barely discussed.

Those who need to intermingle spreadsheet data should look elsewhere.

Modeled in the *VisiCalc* tradition, **FlashCalc** uses mnemonic commands (e.g. s for SAVE) to create the worksheet format. It has more features than *VisiCalc*, consequently it has a lot of mnemonics to remember. Without any on-screen help the lists of alphabetical commands are cumbersome. A glossary would have been a thoughtful addition.

FlashCalc does include a full repertoire of built-in logical and mathematical functions, including many helpful financial ones. Unfortunately, like *Home Analyst*, it cannot share data between spreadsheets.

One powerful home spreadsheet that lets you integrate up to 15 different spreadsheets is **Perfect Calc**. You can work with sections of large files and work with as many as seven worksheets at once. An advanced feature lets you use one spreadsheet to calculate a value, and then use that value in another spreadsheet. The on-screen messages are unusually complete. Although I didn't test this feature, you can use the mouse to eliminate the keyboard drudgery of many spreadsheet maneuvers. And, you can enter formulas that are up to 77 characters long. (Only programs like *Lotus 1-2-3* and *SuperCalc* provide more formula room.)

Perfect Calc's greatest asset is that when combined with its relatives, *Perfect Writer*, *Filer*, and *Link*, you have a series of software that looks alike, acts alike, and can share data.

Another easy-to-use favorite is Microsoft's **Multiplan**. It requires few keystrokes and supplies a complete command list to guide you through your spreadsheet. Its data-sorting feature is one of the easiest I've ever used. The choices are all crystal-clear and the on-screen help is comprehensive. Another plus: Its print functions are many and varied.

In addition to being straightforward, there's a lot of power to this program. With its sorting features and many formats, it's a good package for those who work with a lot of data. Unfortunately, *Multiplan* has no graphics and is sluggish when you do split-screen calculations.

SuperCalc 3 is the natural evolution of a fine product. An enhanced version of *SuperCalc* and *SuperCalc 2*, this package adds more exciting features with each version. It lets you independently scroll your windows; track and forecast complex data; and perform sorts alphabetically, numerically, or by date (great for loan payments and personal schedules). With its "SuperData Interchange," it'll accept data from other formats so you

can use info from multiple spreadsheets and other programs like *Lotus 1-2-3* and *VisiCalc*. It can be used as a powerful programming tool to set up canned applications so that even a novice in the family can input data.

Calculation times are very fast, since *SuperCalc* only recalculates the dependent cells. It solves complex forward referencing and circular calculations in which formulas can refer to cells ahead of it as well as behind it. If you plan to do any heavy-duty tax or financial projections, this circular referencing capability is a must.

SuperCalc's graphics are remarkable and are accomplished with one keystroke. You can view graphs on your display screen or reproduce them on a plotter or printer. A sideways-printing utility included on the disk lets you achieve better-looking printed results.

SuperCalc, which can be integrated with *EasyWriter* and *SuperWriter*, undoubtedly is one of the most powerful spreadsheets on the market. Don't be dissuaded by its capabilities—this spreadsheet is surprisingly easy to learn.

Unless your name is Forbes, Rockefeller, or the like, **Creative Calc** may be one of the best spreadsheets available for your personal record-keeping. Its creativity should be praised for a number of reasons. First, it takes greater advantage of the PC and PCjr keyboards than almost any other PC spreadsheet package. Second, it most clearly defines and meets the needs of the home/personal user. Third, it strikes a balance between having enough features to make an effective package without hordes of extras you'll never require. Fourth, realizing the home user integrates spreadsheets with correspondence, the Creative people made the *Creative Calc* and *Creative Writer* packages nicely integratable. All of these, plus its very affordable price and cosmetically appealing layout, make *Creative Calc* a creative solution to the home spreadsheet dilemma.
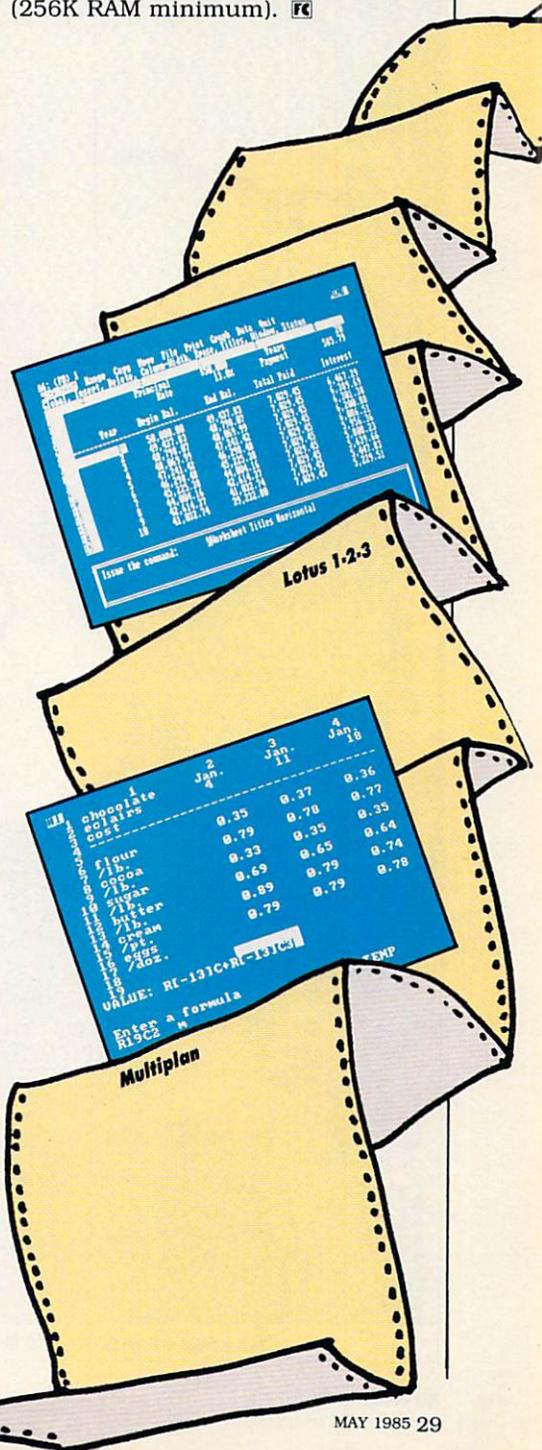
Like *VisiCalc* and Apple II in the early '80s, **Lotus 1-2-3** and the IBM PC have been a hot item in recent years. And for good reason, since *Lotus 1-2-3* is a powerful, well-designed, and remarkably easy-to-use spreadsheet.

The excellent disk-based tutorial provides a guided tour that will get you calculating in no time. The over-360-page manual is well-organized and includes a complete index. Commands to *Lotus* may be entered directly or selected from a series of easy-to-use menus. If you're using a color monitor, you'll appreciate the clever use of color highlighting on the screen. HELP screens (over 200) are

available at any time.

In addition to being a sophisticated spreadsheet, *Lotus* doubles as a data base and, to top it off, will produce a wide variety of reports and graphic charts (bar, line, and pie) on the screen and printer. Though easy to use, *Lotus* is recommended for handling more complex tasks, such as cost analysis for a small business.

Owners or prospective owners of the PCjr will be pleased to know that this program runs equally well on that machine. The IBM PCjr version comes on two cartridges. A tutorial and two utility disks comprise the rest of the package. Owners of the IBM PC version of *Lotus 1-2-3* can obtain a free "install" kit from dealers that will enable it to run on the PCjr (256K RAM minimum). rc
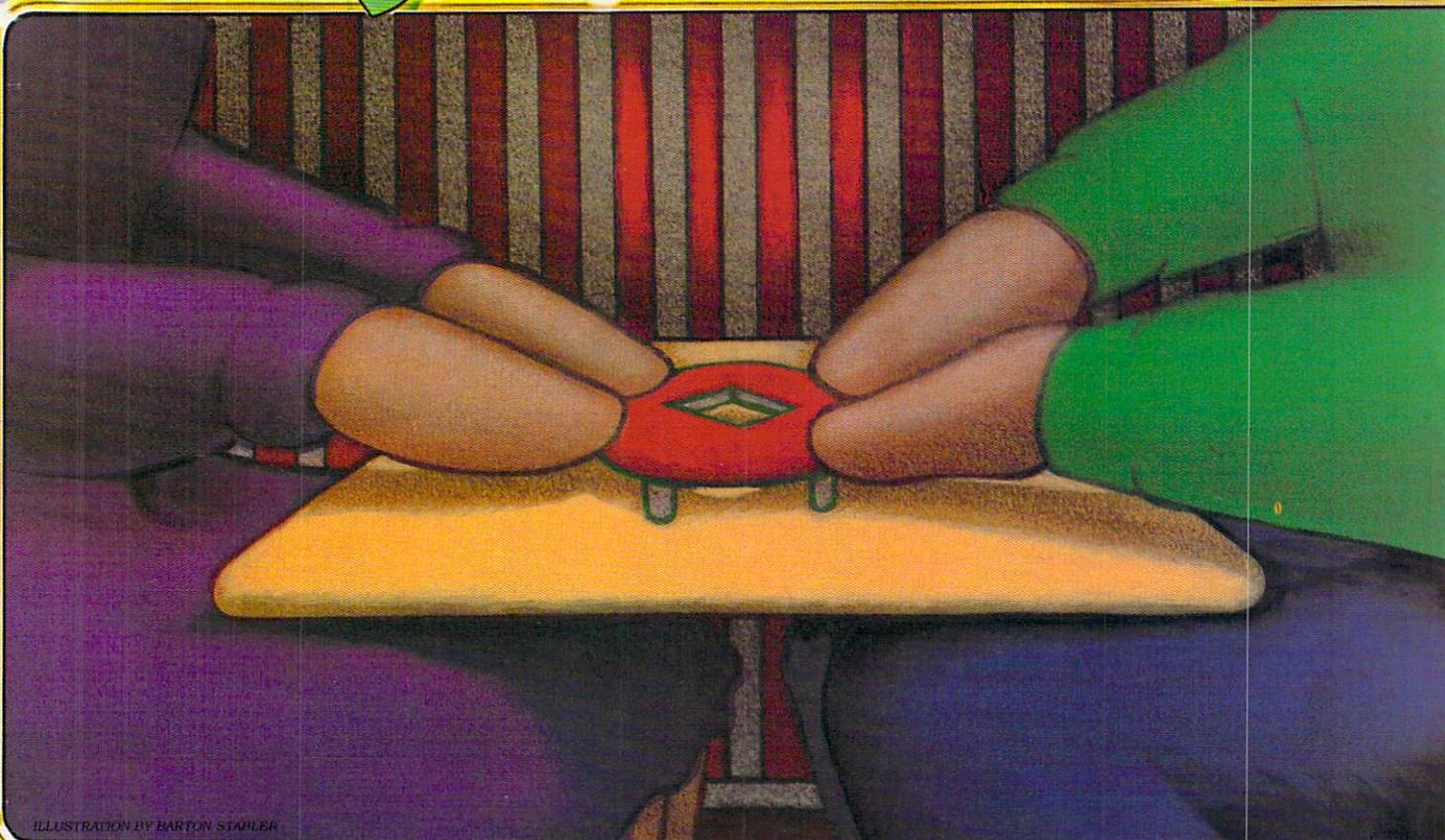
the Programmer

ILLUSTRATION BY BARTON STABLER

ILLUSTRATION BY JIM CHERRY III

TIPS TO THE TYPIST
HOW TO TYPE IN FAMILY COMPUTING'S PROGRAMS

Typing in FAMILY COMPUTING's programs is a great way to become familiar with your computer and get some free software "to boot." But it's frustrating to type in a long program only to find it doesn't work as it should. When this happens, simple typing errors are most often the cause. So, to help you gain greatest value from the time you spend computing with us, we've put together some tips on how to avoid typing errors—and what to do if a program doesn't run right. Read them carefully and you'll be up and running in no time!

SOME GENERAL RULES

1. Do set up your computer in a well-lighted, comfortable location, and prop the magazine up so that you don't have to strain to read the printed listing.

2. Do read instructions and program headings carefully. Make sure your computer has enough memory, the right version of BASIC, and the appropriate peripherals (joysticks, printers, disk drives, etc.) for a program.

3. Don't let fatigue and boredom contribute to inaccuracy. If you're new to programming, try typing in shorter programs first. Type in a longer program in easy stages, SAVEing each installment as you go.

4. Until you are fairly familiar with BASIC, **do** assume that every word, number, letter, space, and punctuation mark in a program listing must be copied accurately if the program is to function as intended.

5. Do watch out for potential trouble spots. About 90 percent of all typing errors occur in DATA statements: long lines filled with numbers or incomprehensible secret codes. If possible, have someone else read DATA to you as you type, and help you proofread it if you have trouble later on. Proofreading from a printout is best.

6. Do be aware that program listings printed in FAMILY COMPUTING sometimes differ from what you will see on your computer's screen or in printouts you produce at home. Our program listings are printed 54 characters wide. Thus, a single BASIC program "line" (sometimes called a "logical line") may appear as several lines in our listing. If you are typing along and reach the right margin of the printed listing, don't press RETURN or ENTER until you've checked to see if the program "line" you're typing really ends there. The way to tell is to check if the line following begins with a multiple of 10 that follows in sequence from the previous logical line. REM statements are the exception and typing them in is optional.

Several computers (ADAM, Apple, Atari, and TI) format BASIC programs according to unique rules of their own. Don't let this throw you—just type in the listing exactly as printed in the magazine and your computer is guaranteed to accept it, even though it may end up looking a little different on your screen.

7. One foolproof way to correct an error in a BASIC program line is to type the line in again from the beginning, and press RETURN or ENTER to make it replace the old line in your computer's memory. But this laborious approach is not the only way to handle typos. **Do** learn to use your computer's editing commands and function keys to correct errors as you go along.

8. Do try to understand your computer's error messages and what they signify. Some provide very detailed information on what may be wrong with a particular program line; others just provide cryptic codes that you have to look up in the manual; and some give you codes that can be positively misleading. More on this in "Debugging Hints," below.

TYPING TIPS FOR SPECIFIC MACHINES

ADAM
● FAMILY COMPUTING's programs are written in Revision 79 SmartBASIC, and are not guaranteed to run under earlier SmartBASICs that contained bugs. To determine if you have Revision 79, boot your SmartBASIC Data Pack, enter PRINT PEEK(260), and press RETURN. If the computer prints out a number lower than 79, contact Coleco Customer Service at (800) 842-1225 and request the latest revision.

● Our ADAM listings are copies of ADAM printouts, and contain both uppercase and lowercase. If you like, you can type in the greater portion of any program in lowercase to speed typing. But be careful: You *must* enter text between quotation marks (for example, in PRINT statements) and the contents of DATA statements exactly as printed—in uppercase and lowercase.

Apple
● Unless otherwise specified, FAMILY COMPUTING's Apple programs will run under Applesoft (*not* Integer) BASIC on the Apple II (with language card), II plus, IIe, and IIc.

● Fixing mistakes in an Apple program line isn't easy. If you're going to be doing much programming, we recommend you look at a utility called GPLE (Global Program Line Editor), $50, from Beagle Brothers Software, 3990 Old Town Ave., Suite 102C, San Diego, CA 92110; (619) 296-6400. GPLE will give your Apple sophisticated and easy-to-use editing capabilities.

Atari
● Our Atari programs are designed to run under Atari BASIC on Atari 400, 600XL, 800, and 800XL machines, except as otherwise specified.

● Owners of Atari 400 and 800 machines should be aware that their machines lock up sometimes during long typing sessions. SAVE your program often as you're working on it.

Commodore 64 and VIC-20

• Commodore 64 and VIC-20 editing can seem very confusing if you're not accustomed to it. Read your manual and learn all about "quote mode," etc. You'll be glad you did.

• Many readers are confused by a caret (∧) character that doesn't appear on their keyboard but sometimes shows up in Commodore 64 and VIC-20 listings. This is the exponentiation operator ($2 \wedge 2 = 2$ squared, or 4). It's entered by pressing the up-arrow (↑) key—*not* the up-cursor key—and appears as an up-arrow on the screen, but not in listings produced on a standard printer.

• Sometimes invisible characters sneak into a program line on Commodore computers. They can cause seemingly inexplicable problems to occur. The cure may be as simple as typing the line in again from the beginning.

IBM PC and PCjr

• Our IBM programs will run under built-in Cassette BASIC on the PC and PCjr, unless otherwise specified. PC owners may occasionally require a Color Graphics Adapter, or Disk or Advanced BASIC; and PCjr owners occasionally need Cartridge BASIC to run our programs. The program heading will say if this is so. Separate listings are occasionally provided for PC and PCjr where incompatibilities exist.

• The IBM PCs have a quirk you should be aware of. If you finish entering one program line very close to the right margin of the screen and then press ENTER and type in another, the two lines may get linked together invisibly. This can also happen when you're fixing typos in a block of program lines you've LISTed on the screen. When you RUN a program that contains a linked pair of lines, you'll probably get a SYNTAX ERROR—but when you LIST the lines on the screen, they'll look perfectly normal. If you've got an otherwise inexplicable problem, check for this phenomenon by LISTing the offending line, and its neighbors.

TI-99/4A

• Most of our TI programs are written in standard TI BASIC, so don't use Extended BASIC unless told to do so.

• Lowercase letters appear a little shorter than uppercase letters on the TI screen, but the two are otherwise almost identical. Not so for uppercase and lowercase letters in our TI listings. Where lowercase is required in a TI program, it will appear as *standard* lowercase in our printed listings (abcd as opposed to ABCD).

TRS-80 Color Computer

• Except where otherwise specified, our programs will run under Standard, Extended, or Disk Extended Color BASIC.

TRS-80 Models III and 4

• Our TRS-80 Model III programs will run under either Cassette or Disk BASIC, except where otherwise specified. They'll also run on Model 4s and 4Ps in Model III mode (under Model III BASIC). Most programs will also run on Model Is, but this isn't guaranteed.

Special note to owners of Kaypro and other CP/M machines: Some of our Model III text-only programs can easily be made to run on CP/M machines under Microsoft BASIC-80. If you want to try your hand at translations, see Helpful Hints, page 50, in the April FAMILY COMPUTING.

DEBUGGING HINTS

Sometimes even the most careful typist makes a mistake. Don't expect your program to run right off the bat. If you have problems, remain patient and follow these general instructions for a probable quick fix.

1. Write down any error messages you receive.

2. If necessary, look these up in your manual, and check the indicated lines for simple mistakes. Also check related lines (see No. 4, below), such as the DATA statements corresponding to a READ routine. Correct all the problems you can find, and SAVE a corrected copy of the program before typing RUN again. If you're lucky, all systems will be GO; if not . . .

3. LIST the program in screen-size chunks (check your manual for instructions on how to LIST parts of a program). Even better, if you have a printer, get a printout. Compare what you've typed in—letter by letter—to the published program. Make sure that you haven't typed the numeral 0 (which is slashed in our listings) for the letter O (which isn't), swapped a small letter "l" for the numeral one, dropped or mixed up some punctuation, switched uppercase text for lowercase or vice versa (particularly in DATA statements or within quotes), or miscounted the characters (and/or spaces) between a pair of quotes. Get someone to help you if possible.

4. Check your DATA statements—then check them again. Mistakes in DATA statements are the single most common cause of program failures. Bad DATA can cause a program to malfunction at any point, which can be misleading. If you can't find your error in the lines the computer specifies, check your DATA statements line by line, letter by letter, comma by comma. Then have someone else do it. If necessary, try again the next day—exhausted proofreaders are careless proofreaders. And finally . . .

WHAT TO DO WHEN YOU'VE DONE IT ALL

We test our programs carefully, both before and after publication. Typographical mistakes are rare—but sometimes we *do* find errors. When we do, we publish corrections—usually within one or two issues.

We're proud of our programs, and we want you to enjoy them as much as we enjoy writing them. If you just can't figure out what's wrong with a program, we'd like to help. But we can't if you don't provide us with important information. When you write us, please indicate:

• Which program you're having trouble with.
• Which type of computer you own, the type of BASIC you are using, how much RAM your computer has, and what DOS and peripherals you're using, if any.
• What error messages your computer has given you.
• Your name, address, and telephone number.

If possible, please enclose a printout. Send a stamped, self-addressed envelope for faster replies. Address all correspondence to Programming P.S., FAMILY COMPUTING, 730 Broadway, New York, NY 10003. FC

BACKWARD SPELLER

BY JOEY LATIMER
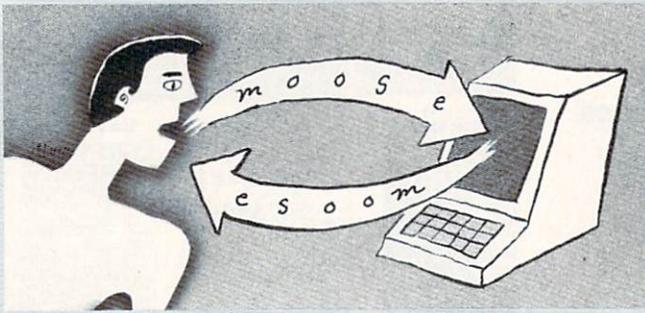
Are you tired of calling your friends, family, and pets by their normal, everyday names? With *Backward Speller*, you type the name FRED and the computer displays DERF; Spot, your dog, becomes TOPS; and monkey Bonzo forever becomes OZNOB! As you can see, some words sound more interesting spelled backward.

When you run the program, the computer asks you to type in a word. An INPUT statement puts your word in a variable, WS. (The dollar sign means that the variable WS is a *string* variable—a place where you can store text.) The letters in WS are then pulled out, one by one, last to first, and printed on the screen.

In all versions of the program but the Atari, which uses subscripts to refer to portions of a string, the function MIDS (or its equivalent, SEGS, in the TI ver-

sion) is used to pull individual characters from WS for printing. This operation is repeated by a FOR–NEXT loop that uses the LEN function to figure out how many letters WS has, and counts from that number (the last letter of your word) down to 1 (the first letter, naturally!). The expression STEP -1 tells the FOR–NEXT loop to count backward.

I chose to keep *Backward Speller* simple, but those of you with color computers might try coloring the letters. Can you make only the backward word a different color?

If you come up with an interesting "custom" version of one of our beginner programs, we might mention it in a future issue. Send a printout (no tapes or disks, please), with explanation, to Beginner Programs, FAMILY COMPUTING, 730 Broadway, New York, NY 10003.

ADAM/*Backward Speller*

```
10 HOME
20 PRINT "Type a word;"
30 PRINT "then press <RETURN>."
40 PRINT
50 INPUT "What is the word? ";w$
60 PRINT
70 PRINT "Spelled backward it's"
80 FOR x = LEN(w$) TO 1 STEP -1
90 PRINT MID$(w$,x,1);
100 NEXT x
110 PRINT "!"
120 PRINT
130 PRINT "Press <P> to play again"
140 PRINT "or any other key to quit.";
150 GET k$
160 IF k$ = "P" OR k$ = "p" THEN 10
170 END
```

Apple/*Backward Speller*

```
10 HOME
20 PRINT "TYPE A WORD; THEN PRESS <RETURN>."
30 PRINT
```

```
40 INPUT "WHAT IS THE WORD? ";W$
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S ";
70 FOR X = LEN(W$) TO 1 STEP -1
80 PRINT MID$(W$,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN"
130 PRINT "OR ANY OTHER KEY TO QUIT.";
140 GET K$
150 IF K$ = "P" THEN 10
160 END
```

Atari/*Backward Speller*

```
10 DIM W$(100)
20 OPEN #1,4,0,"K:"
30 PRINT CHR$(125);
40 PRINT "TYPE A WORD; THEN PRESS <RETURN>."
50 PRINT
60 PRINT "WHAT IS THE WORD";
70 INPUT W$
80 PRINT
90 PRINT "SPELLED BACKWARD IT'S ";
100 FOR X=LEN(W$) TO 1 STEP -1
110 PRINT W$(X,X);
120 NEXT X
130 PRINT "!"
140 PRINT
150 PRINT "PRESS <P> TO PLAY AGAIN"
160 PRINT "OR ANY OTHER KEY TO QUIT.";
170 GET #1,K
180 IF K=ASC("P") THEN 30
190 END
```

Commodore 64/*Backward Speller*

```
10 PRINT CHR$(147);
20 PRINT "TYPE A WORD; THEN PRESS <RETURN>."
30 PRINT
40 INPUT "WHAT IS THE WORD";W$
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S ";
70 FOR X=LEN(W$) TO 1 STEP -1
80 PRINT MID$(W$,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN"
130 PRINT "OR ANY OTHER KEY TO QUIT."
140 GET K$
150 IF K$="" THEN 140
160 IF K$="P" THEN 10
170 END
```

IBM PC & TRS-80 Model III/*Backward Speller*

```
10 CLS
20 PRINT "TYPE A WORD; THEN PRESS <ENTER>."
30 PRINT
40 INPUT "WHAT IS THE WORD";W$
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S ";
70 FOR X=LEN(W$) TO 1 STEP -1
80 PRINT MID$(W$,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN OR ANY OTHER KEY TO
   QUIT."
130 K$=INKEY$
140 IF K$="" THEN 130
150 IF K$="P" OR K$="p" THEN 10
160 END
```

IBM PCjr/*Backward Speller*

```
10 CLS
20 PRINT "TYPE A WORD; THEN PRESS <ENTER>."
30 PRINT
40 INPUT "WHAT IS THE WORD";W$
```

```
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S ";
70 FOR X=LEN(W$) TO 1 STEP -1
80 PRINT MID$(W$,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN"
130 PRINT "OR ANY OTHER KEY TO QUIT."
140 K$=INKEY$
150 IF K$="" THEN 140
160 IF K$="P" OR K$="p" THEN 10
170 END
```

TI-99/4A/*Backward Speller*

```
10 CALL CLEAR
20 PRINT "TYPE A WORD;"
30 PRINT "THEN PRESS <ENTER>."
40 PRINT
50 INPUT "WHAT IS THE WORD? ":W$
60 PRINT
70 PRINT "SPELLED BACKWARD IT'S"
80 FOR X=LEN(W$)TO 1 STEP -1
90 PRINT SEG$(W$,X,1);
100 NEXT X
110 PRINT "!"
120 PRINT
130 PRINT "PRESS <P> TO PLAY AGAIN"
140 PRINT "OR ANY OTHER KEY TO QUIT.";
150 CALL KEY(3,K,S)
160 IF S=0 THEN 150
170 IF K=ASC("P")THEN 10
180 END
```

TRS-80 Color Computer/*Backward Speller*

```
10 CLS
20 PRINT "TYPE A WORD; THEN PRESS <ENTER>.";
30 PRINT
40 INPUT "WHAT IS THE WORD";W$
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S"
70 FOR X=LEN(W$) TO 1 STEP -1
80 PRINT MID$(W$,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN"
130 PRINT "OR ANY OTHER KEY TO QUIT."
140 K$=INKEY$
150 IF K$="" THEN 140
160 IF K$="P" THEN 10
170 END
```

VIC-20/*Backward Speller*

```
10 PRINT CHR$(147);
20 PRINT "TYPE A WORD;"
30 PRINT "THEN PRESS <RETURN>."
40 PRINT
50 PRINT "WHAT IS THE"
60 PRINT "WORD";
70 INPUT W$
80 PRINT
90 PRINT "SPELLED BACKWARD IT'S"
100 FOR X=LEN(W$) TO 1 STEP -1
110 PRINT MID$(W$,X,1);
120 NEXT X
130 PRINT "!"
140 PRINT
150 PRINT "PRESS <P> TO PLAY"
160 PRINT "AGAIN OR ANY OTHER"
170 PRINT "KEY TO QUIT."
180 GET K$
190 IF K$="" THEN 180
200 IF K$="P" THEN 10
210 END
```

BAR GRAPH
BY JOHN JAINSCHIG

Almost nothing's as useful as a graph when you're trying to compare data or spot a trend. *Bar Graph* makes it easy to use your computer to graph small amounts of data: bills, stock prices, heights or weights, or even the way your moods shift from day to day!

When you RUN the program, you will be asked to enter a name and a value for each item you want to graph. For example, if you're graphing your 1984 phone bills, you might enter JANUARY, JAN, or 1/84 as the name of your first item. If your January bill was for $95.75, you would enter 95.75 as this item's value. Note that dollar signs, unit symbols (e.g., lbs., oz.), etc. must be omitted when entering values. Note also that *Bar Graph* will not accept values less than zero.

When you're finished entering items, just press RETURN or ENTER when asked for the name of the next item. The program will ask you to supply a title for the graph; then it will draw the graph on the screen, using the name you've supplied for each item to label the corresponding bar. The program will print only as much of a label as will fit on the screen . . . don't be surprised if WEDNESDAY comes out as WEDN.

PROGRAM NOTES

Bar Graph is a simple program that graphs a body of data by scaling its values to fit in the limited space of your computer's screen. A general-purpose graphing program should be able to handle values of any size. For this reason, it can't simply draw a five-block bar to represent the value 5; a 10-block bar for 10, and so on, as this would restrict the program to handling only numbers in a very limited range.
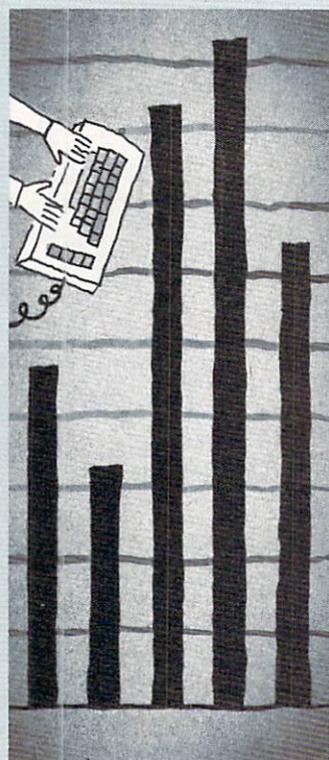
The answer to this problem is *scaling*: converting a group of values to numbers that will fit nicely on the screen while maintaining their proportions to one another. *Bar Graph* does this by finding the largest value in a group of items and determining what fraction of this value each other value represents. It then multiplies this fraction by the maximum number of graphic units that can be displayed to determine the number of units in that value's bar. For example, if the largest value you input is 5 and your screen has room for a bar 20 units high, the value 5 will be drawn as a 20-unit bar, and the value 3 as a bar 3/5 as high, or 3/5 × 20 = 12 units high.

It might be interesting to modify *Bar Graph* to work with a printer, or add routines to save a group of values to tape or disk for later retrieval. Or you could try redesigning the program to work in graphic modes of higher resolution, improving its ability to depict small differences between values over a broader range.

ADAM/*Bar Graph*

```
10 DIM a(29),l$(29)
20 FOR j = 1 TO 30:b$ = b$+" ":NEXT j
30 m = 0:i = 1
39 REM --GET NAME OF ITEM--
40 GOSUB 1000:IF i <> 16 THEN 80
50 VTAB 3:PRINT "Warning! If you add more items"
60 PRINT "there will be no space between"
70 PRINT TAB(5);"the bars in your graph."
80 VTAB 7:PRINT "Please enter the name of"
90 PRINT "item #";i;"."
100 IF i = 1 THEN 130
110 PRINT "(Just press <RETURN> if"
120 PRINT "you have no more items.)"
130 PRINT:INPUT "";l$(i)
140 IF l$(i) <> "" THEN 200
150 IF i = 1 THEN 40
160 VTAB 12:PRINT "Are you finished entering"
170 PRINT "items?"
180 GET k$:IF k$ = "Y" OR k$ = "y" THEN 250
190 GOTO 40
199 REM --GET VALUE FOR THAT ITEM--
200 GOSUB 1000:VTAB 7:PRINT "What is the value for"
210 PRINT "item #";i;" (";l$(i);")";
220 INPUT a(i):IF a(i) < 0 THEN 200
230 IF m < a(i) THEN m = a(i)
240 i = i+1:IF i < 30 THEN 40
250 i = i-1:IF m = 0 THEN m = 1
260 HOME:PRINT "What is the title of your"
270 PRINT "graph?"
280 PRINT:INPUT "";t$:IF t$ = "" THEN 260
290 IF LEN(t$) > 30 THEN t$ = LEFT$(t$,30)
300 c = INT(16-(INT(30/i)*i)/2)+1
309 REM --DRAW GRAPH--
310 HOME:PRINT TAB(c-1);m
320 FOR j = 1 TO 18:PRINT TAB(c-1);CHR$(124):NEXT j
330 PRINT TAB(c-1);"0"
340 lw = INT(30/i)-(i < 16)
350 FOR j = 1 TO i:VTAB 21:HTAB c
360 IF LEN(l$(j)) >= lw THEN PRINT LEFT$(l$(j),lw):G
OTO 380
370 PRINT l$(j)
380 ch = INT(a(j)/m*18+.5):IF ch < 1 THEN 430
390 FOR k = 1 TO ch
400 VTAB 20-k:HTAB c
410 INVERSE:PRINT LEFT$(b$,lw):NORMAL
420 NEXT k
430 c = c+INT(30/i):NEXT j
440 VTAB 22:PRINT TAB(16-LEN(t$)/2);
450 INVERSE:PRINT t$:NORMAL:PRINT
460 PRINT " (Press any key to continue.)";
470 GET k$:HOME
480 PRINT "Press <D> to draw another"
490 PRINT "graph or <Q> to quit."
500 GET k$:IF k$ = "Q" OR k$ = "q" THEN END
510 IF k$ = "D" OR k$ = "d" THEN 30
520 GOTO 500
999 REM --SET UP SCREEN FOR INPUT--
1000 HOME:PRINT TAB(11);"*BAR GRAPH*"
1010 VTAB 22:HTAB 5:INVERSE
1020 PRINT "You have room left for":NORMAL
1030 PRINT TAB(10);:FLASH:PRINT 30-i;
1040 INVERSE:PRINT " item(s)."
1050 NORMAL:RETURN
```

Apple/*Bar Graph*

```
10 DIM A(37),L$(37)
20 FOR J = 1 TO 38:B$ = B$+" ":NEXT J
30 M = 0:I = 1
39 REM --GET NAME OF ITEM--
40 GOSUB 1000:IF I <> 20 THEN 80
50 VTAB 3:PRINT CHR$(7);"WARNING! IF YOU ADD MORE ITEM
S, THERE"
60 PRINT TAB(8);"WILL BE NO SPACE BETWEEN THE"
70 PRINT TAB(12);"BARS IN YOUR GRAPH."
80 VTAB 7:PRINT "PLEASE ENTER THE NAME OF ITEM #";I;".
"
90 IF I = 1 THEN 120
100 PRINT "(JUST PRESS <RETURN> IF"
110 PRINT "YOU HAVE NO MORE ITEMS.)"
120 PRINT:INPUT "";L$(I)
130 IF L$(I) <> "" THEN 180
140 IF I = 1 THEN 40
150 VTAB 12:PRINT "ARE YOU FINISHED ENTERING ITEMS?";
160 GET K$:IF K$ = "Y" THEN 230
170 GOTO 40
179 REM --GET VALUE FOR THAT ITEM--
180 GOSUB 1000:VTAB 7:PRINT "WHAT IS THE VALUE FOR"
190 PRINT "ITEM #";I;" (";L$(I);")";
200 INPUT A(I):IF A(I) < 0 THEN 180
210 IF M < A(I) THEN M = A(I)
220 I = I+1:IF I < 38 THEN 40
230 I = I-1:IF M = 0 THEN M = 1
240 HOME:PRINT "WHAT IS THE TITLE OF YOUR GRAPH?"
250 PRINT:INPUT "";T$:IF T$ = "" THEN 240
260 IF LEN(T$) > 38 THEN T$ = LEFT$(T$,38)
270 C = INT(21-(INT(38/I)*I)/2)
279 REM --DRAW GRAPH--
280 HOME:PRINT TAB(C-1);M
290 FOR J = 1 TO 18:PRINT TAB(C-1);CHR$(124):NEXT J
300 PRINT TAB(C-1);"0"
310 LW = INT(38/I)-(I < 20)
320 FOR J = 1 TO I:VTAB 21:HTAB C
330 IF LEN(L$(J)) >= LW THEN PRINT LEFT$(L$(J),LW):GOT
O 350
340 PRINT L$(J)
350 CH = INT(A(J)/M*18+0.5):IF CH < 1 THEN 400
360 FOR K = 1 TO CH
370 VTAB 20-K:HTAB C
380 INVERSE:PRINT LEFT$(B$,LW):NORMAL
390 NEXT K
400 C = C+INT(38/I):NEXT J
410 VTAB 22:PRINT TAB(20-LEN(T$)/2);
420 INVERSE:PRINT T$:NORMAL:PRINT
430 PRINT TAB(6);"(PRESS ANY KEY TO CONTINUE.)";
440 GET K$:HOME
450 PRINT "PRESS <D> TO DRAW ANOTHER GRAPH"
460 PRINT "OR <Q> TO QUIT.";
470 GET K$:IF K$ = "Q" THEN END
480 IF K$ = "D" THEN 30
490 GOTO 470
999 REM --SET UP SCREEN FOR INPUT--
1000 HOME:PRINT TAB(16);"*BAR GRAPH*"
1010 VTAB 22:HTAB 3:INVERSE
1020 PRINT "YOU HAVE ROOM LEFT FOR ";
1030 FLASH:PRINT 38-I;
1040 INVERSE:PRINT " ITEM(S)."
1050 NORMAL:RETURN
```

Apple/*Bar Graph*

```
10 DIM A(37),L$(37)
20 FOR J = 1 TO 38:B$ = B$+" ":NEXT J
30 M = 0:I = 1
39 REM --GET NAME OF ITEM--
40 GOSUB 1000:IF I <> 20 THEN 80
```

Atari/*Bar Graph*

```
10 DIM L$(760),R$(20),B$(38),T$(38),A(37)
19 REM --PREPARE FOR KEYBOARD INPUT--
20 OPEN #1,4,0,"K:"
29 REM --FILL L$ WITH BLANKS, B$ WITH SOLID BLOCKS--
30 B$=CHR$(160):B$(38)=B$:B$(2)=B$
40 L$=" ":L$(760)=L$:L$(2)=L$
50 M=0:I=1
59 REM --GET NAME OF ITEM--
60 GOSUB 1000:IF I<>20 THEN 100
70 POSITION 1,5:PRINT CHR$(253);"WARNING! IF YOU ADD M
ORE ITEMS, THERE"
80 POSITION 5,6:PRINT "WILL BE NO SPACE BETWEEN THE"
90 POSITION 9,7:PRINT "BARS IN YOUR GRAPH."
```

DISGUISES AT DUSK
Which One Hides an Impostor?

PUZZLE BY PETER FAVARO AND SARAH KORTUM
PROGRAM BY STEVEN C.M. CHEN

If you're not a puzzle fan, you can still have fun with this program. See "A Built-in 'Oracle'" and "Customizing the Message."

When the *Sodaville Gazette* reported on a mysterious crime fighter, the small hamlet had a new folk hero. He (or she?) was known as "The Chameleon" because of his (her?) habit of donning all kinds of disguises to combat Sodaville's regular thugs, punks, and small-time operators. Why, just last week The Chameleon foiled a plot to steal one of Farmer Hansen's prize 100-pound pea pods by posing as a monstrous legume. After bursting from the pod, The Chameleon mesmerized the poachers with a hypnotic spell until police arrived on the scene.

The Chameleon was such a popular hero that several local children formed a club to honor this character of a thousand disguises. The club met each day at dusk to try to crack famous, unsolved mysteries. The children used a computer that, mysteriously, acted like a Ouija board: When they all pressed down the space bar together, words that were vital clues to the unsolved mysteries would be spelled out on the screen. The club members believed that their hero was communicating to them through the computer.
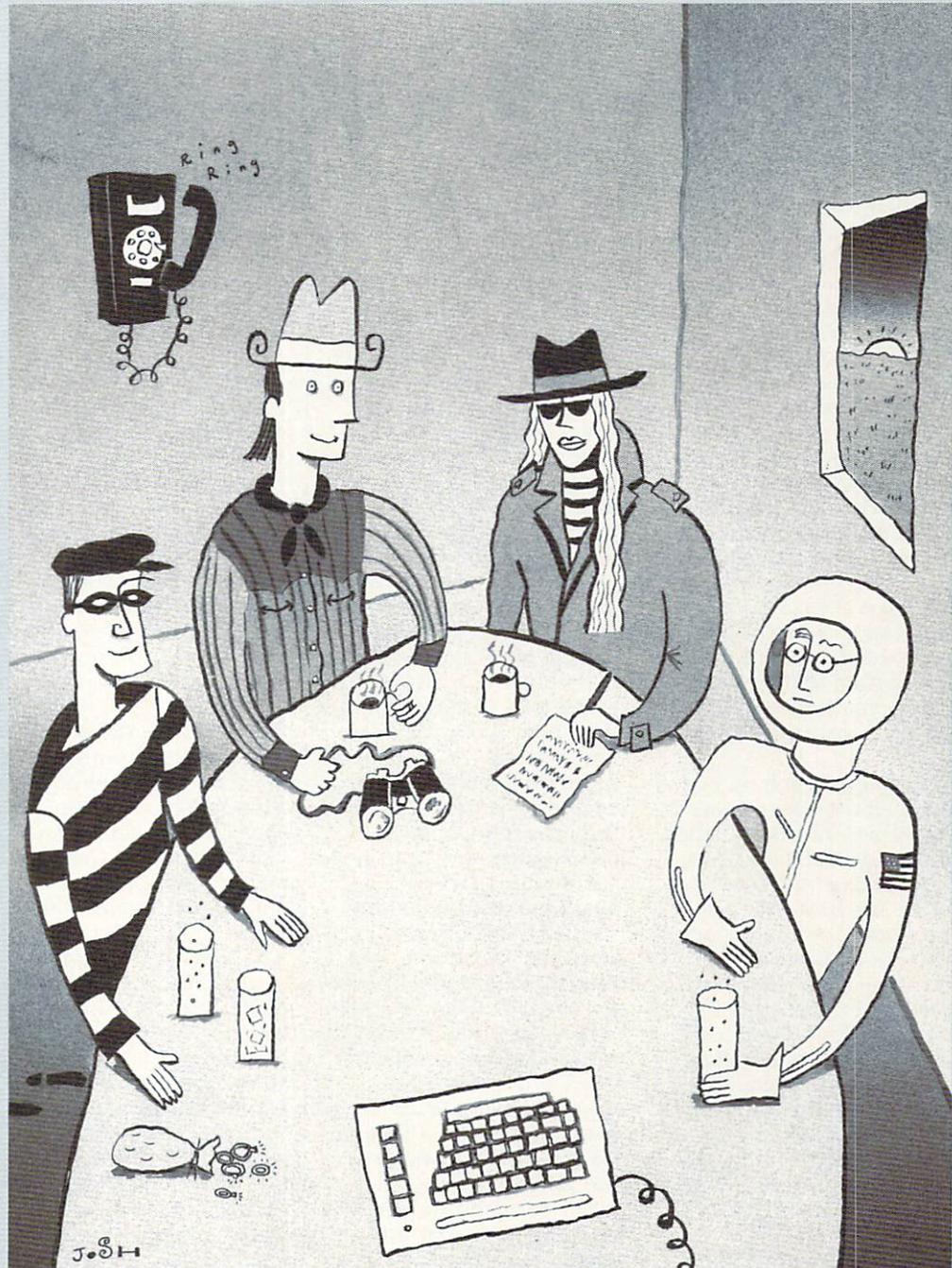
The members never revealed their true identities to each other, always coming to meetings in disguise. They even had to sign in with assumed names. Today there were four members in atten-dance: "Marla West," a secret agent; "Hopalong Jones," a rugged cowboy; "Marcus Felini," a notorious cat burglar; and "Bob Ringwood," a brave space-shuttle pilot.

The members assembled minutes before sunset. Hopalong and the shuttle pilot arrived on foot; the others came by bike. The secret agent offered to take the meeting's minutes. Refreshments were served by Felini. Marla had hot choc-

olate, and Hopalong drank a mug of steaming tea. Felini and Ringwood had soda pop since both were clad in hot costumes and needed to cool off. Felini had an extra glass of ice water to quench his thirst.

Just as the meeting was about to begin, Bob noticed that Felini's muddy sneakers were marking up the floor. "Some cat burglar," he snorted, "leaving footprints all over the place!" Seconds later the phone rang. Marla picked it up and afterward claimed that it was her mother, reminding her to take some poison-ivy medication. For emphasis, she raked her side and squirmed around acting itchy. The cowboy took off his 10-gallon hat, scratched his head, and gave Marla a funny look.

A crime was chosen from a long list of unsolved mysteries. But when the computer was turned on and everyone had a finger on the space bar, the words IMPOSTOR PRESENT . . . MEETING CANNOT CONTINUE were spelled out on the screen. Could it be that in their midst was someone who wasn't a member of the club?

They eyed each other suspiciously. Marla was twitching, but that could have been the poison ivy. The cowboy nervously fingered his hat while his eyes darted from person to person. Ringwood scratched his ear and searched the room for clues. Felini offered a series of quick but shabby reasons why he couldn't possibly be the impostor. The cowboy had a ready rejoinder to Felini's cries of innocence: "A guilty conscience needs no accusin', pardner."

Then the secret agent had a brilliant idea. To solve the mystery of who was the impostor, why not proceed as they did when solving any other mystery: Ask the computer for clues! They all crowded around the keyboard, and as they held down the space bar, nine of the impostor's characteristics were spelled out on the screen, one after another, over and over. Unfortunately, the kids soon discovered that many of these characteristics were shared by more than one of them. They realized that it was not going to be easy to discover who among them was the only one to have *all nine* of the characteristics.

HOW TO PLAY

Type each line of the program into your computer exactly as shown, carefully making the appropriate modifications, if needed. (*See "Tips to the Typist," page* 46, *for help with typing in programs.*) Then SAVE it to disk or cassette. Before RUNning the program, make sure to set your computer to all uppercase letters. Also, double-check lines 5000 and 5010 to make sure you used all capital letters for the DATA.

When the program begins, the 26 letters of the alphabet appear on the screen, along with a symbol representing the planchette of a Ouija board. Just hold down the space bar to make the planchette move from letter to letter, spelling out words. Removing your hand from the space bar at any time stops the motion; depressing it again makes the motion resume. At the end of each word, the planchette will return to its "home" position near the center of the screen, and you'll have to release the space bar and press it down again to make the planchette resume its motion. Press the "Q" key at any time to stop the program.

The same nine clues will be spelled out over and over again. If you study them carefully in conjunction with the story line and the illustration, you should be able to figure out who the impostor is. Once you've fingered the culprit, you can check your answer against the solution on page 58.

A BUILT-IN 'ORACLE'

You can use this month's program, *Magical Messages*, in three different ways. When you first RUN the program, your computer will act just like the one in the children's club, spelling out the impostor's characteristics. But you can also have fun with the program after you've solved the puzzle, or instead of working on the puzzle at all.

You can change the program so it will spell out a message *you* choose (*see "Customizing the Message"*). Or, you can press the "Y" key at any time to move to a different screen displaying the words YES, NO, and MAYBE. You can then ask the computer any yes or no question, and when you hold down the space bar, the planchette will move to a random answer. (Again, make sure you release the space bar after the planchette returns "home" before asking the next question.) But beware of asking questions like "Am I the prettiest one of all?"—we can't guarantee that the computer will give correct answers!

CUSTOMIZING THE MESSAGE

You can customize the program to fool your friends! The program can spell out any words you like. Just follow these four simple steps:

1. Delete lines 5000 and 5010.

2. Type in new DATA statements, starting at line 5000, that contain the line number, the word DATA, and the words you want spelled out—in all caps—separated by commas. For example, to make the program spell out the message IMPOSTOR PRESENT MEETING CANNOT CONTINUE, you would add one new state-

ment:

```
5000 DATA IMPOSTOR, PRESENT, MEETING, CANNOT, CONTINUE
```

3. Change NUM=9 in line 10 to reflect the number of words in your DATA statements. In the case of our example, you'd change NUM = 9 to NUM = 5.

4. Retype line 80 (line 110 in the Atari version), removing the word REM. Line 80 will now read as follows:

```
80 FOR I=1 TO NUM:PT(I)
=I:NEXT I:GOTO 170
```

except for the Atari version, where you'll change line 110 to read

```
110 FOR I=1 TO NUM:PT
(I)=I:NEXT I:GOTO 210
```

PROGRAM NOTES

Although the way the planchette moves may look uneven, the method used to compute its path is actually quite sophisticated. The jagged appearance comes from the fact that we're working in a very low-resolution mode: the text screen. The motion is irregular because of a pause of random length between moves, designed to simulate the jerky motion of a real planchette.

The program actually computes the mathematical equation for a circle that runs through the starting and ending points of a particular path. If we used the very same equation on a computer with an ultra-hi-res mode, the planchette would move from one letter to another along an almost perfect curve. Note to programmers: If your computer has a hi-res graphics mode but no curve-drawing commands, studying this program may help you learn how to write BASIC programs that draw hi-res circles and arcs.

Apple/*Magical Messages*

```
10 NUM = 9
20 DIM WD$(NUM),F(3),PT(NUM),RN(NUM),HP(26),VP(26)
30 DL = 400:SP = 2:LS = 1:RM = 40:M$ = CHR$(127)
40 HP(0) = INT(RM/2):VP(0) = 12:RC = 0
50 F(1) = 1:F(2) = 7:F(3) = 13
70 FOR I = 1 TO NUM:READ WD$(I):RN(I) = RND(1):NEXT I
80 REM FOR I = 1 TO NUM:PT(I) = I: NEXT I: GOTO 170
90 FOR I = 1 TO NUM:PT(I) = I:FOR J = 1 TO NUM
100 IF RN(J) > RN(PT(I)) THEN PT(I) = J
```

```
110 NEXT J:RN(PT(I)) = Ø:NEXT I
120 FOR I = 1 TO NUM:T$ = "":A$ = WD$(I)
130 V = ASC(LEFT$(A$,1))-64:FOR J = 2 TO LEN(A$)
140 N = ASC(MID$(A$,J,1))-V
150 T$ = T$+CHR$(N+26*(N < 65)):NEXT J
160 WD$(I) = T$:NEXT I
170 HOME:FOR I = 1 TO 13:HP(I) = I+SP*(I-1)+LS
180 HP(I+13) = HP(I):VP(I) = 2:VP(I+13) = 23:NEXT I
190 FOR I = 1 TO 26:VTAB VP(I)+1-2*(I < 14)
200 HTAB HP(I):PRINT CHR$(I+64);:NEXT I
210 X1 = HP(Ø):Y1 = VP(Ø):TX = X1:TY = Y1
220 XP = X1:YP = Y1:GOSUB 1090:FLAG = Ø
230 FOR I = 1 TO NUM:T$ = WD$(PT(I))+"ə"
240 FOR J = 1 TO LEN(T$):P = ASC(MID$(T$,J,1))-64
250 IF P < Ø OR P > 26 THEN 280
260 X2 = HP(P):Y2 = VP(P):GOSUB 2000
270 FOR D = 1 TO DL/5+RND(1)*DL/5:NEXT D
280 NEXT J:IF FLAG THEN 300
290 GOSUB 3000:FOR D = 1 TO DL:NEXT D
300 NEXT I:IF NOT FLAG THEN 230
310 HOME:T = HP(7)-HP(1)-4
320 PRINT SPC(LS-1);"YES";SPC(T);"MAYBE";SPC(T);"NO"
330 FLAG = Ø:X1 = HP(20):Y1 = VP(20)
340 TX = X1:TY = Y1:XP = X1:YP = Y1:GOSUB 1090
350 RC = INT(RND(1)*3)+1
360 X2 = HP(F(RC)):Y2 = VP(F(RC)):GOSUB 2000
370 X2 = HP(20):Y2 = VP(20):GOSUB 2000
380 GOSUB 3000:GOTO 350
1000 POKE -16368,Ø:K = PEEK(-16368)-128:Z = RND(1)
1010 ON K < Ø GOTO 1000:K$ = CHR$(K)
1020 IF K$ = CHR$(32) THEN 1080
1030 IF K$ <> "Y" AND K$ <> "Q" THEN 1000
1040 IF K$ = "Y" AND RC > Ø THEN 1000
1050 IF K$ = "Q" THEN END
1060 FLAG = 1:I = NUM:J = 254
1070 X = X2-XC:Y = Y2-YC:RETURN
1080 HTAB TX:VTAB TY:PRINT CHR$(32);
1090 HTAB XP:VTAB YP:PRINT M$;CHR$(8);
1100 TX = XP:TY = YP:RETURN
2000 DX = X2-X1:DY = Y2-Y1
2010 IF DX <> Ø OR DY <> Ø THEN 2070
2020 XP = X1:Y2 = Y1-7
2030 IF P < 14 THEN Y2 = Y1+7
2040 FOR C = 1 TO 2:FOR YP = Y1 TO Y2 STEP SGN(Y2-Y1)
2050 FOR D = 1 TO DL/8:NEXT D:GOSUB 1000:NEXT YP
2060 T = Y1:Y1 = Y2:Y2 = T:NEXT C:RETURN
2070 XM = (X1+X2)/2:YM = (Y1+Y2)/2
2080 IF DX = Ø OR DY = Ø THEN 2160
2090 XC = X1+(X2 > X1)*DX
2100 IF XM < HP(Ø) THEN XC = X2-(X1 < X2)*DX
2110 YC = YM-DX/DY*(XC-XM)
2120 R = SQR((XC-X2)^2+(YC-Y2)^2)+1E-05
2130 IF ABS(DY) > ABS(DX) THEN RD = 1-2*(XM >= HP(Ø)):
GOTO 2250
2140 RT = (((XM < HP(Ø))+(SGN(DX)+SGN(DY) <> Ø)) = 1)
2150 RD = 2*RT-1:GOTO 2220
2160 RD = 1:R = (ABS(DX)+ABS(DY))/2
2170 XC = XM:YC = YM:IF DX = Ø THEN 2200
2180 IF P > 13 THEN RD = -1
2190 GOTO 2220
2200 IF X1+R > RM THEN RD = -1
2210 GOTO 2250
2220 FOR X = X1-XC TO X2-XC STEP SGN(DX)
2230 XP = X+XC:YP = RD*SQR(R*R-X*X)+YC+Ø.2
2240 GOSUB 1000:NEXT X:GOTO 2280
2250 FOR Y = Y1-YC TO Y2-YC STEP SGN(DY)
2260 XP = RD*SQR(R*R-Y*Y)+XC+Ø.2:YP = Y+YC
2270 GOSUB 1000:NEXT Y
2280 IF FLAG THEN RETURN
2290 IF XP = X2 AND YP = Y2 THEN 2310
2300 XP = X2:YP = Y2:GOSUB 1000
2310 X1 = X2:Y1 = Y2:RETURN
3000 POKE -16368,Ø:IF PEEK(-16368) = 16Ø THEN 3000
3010 K = PEEK(-16368)-128:IF K = 32 THEN RETURN
3020 IF K = 81 THEN END
3030 IF K <> 89 OR RC <> Ø THEN 3010
3040 FLAG = 1:I = NUM:J = 254
```

```
3050 X = X2-XC:Y = Y2-YC:RETURN
5000 DATA WIBCQV,TAFUMMYM,LEFDUBQE,FNUZ,PVEEJ
5010 DATA CILCC,PISHQJSX,MEVAT,XUCQR
```

Atari/*Magical Messages*

```
10 NUM=9
20 DIM A$(20),CL$(1),S$(14),T$(20),WD$(NUM*20)
30 DIM F(3),PT(NUM),RN(NUM),HP(26),VP(26),WP(NUM+1)
40 POKE 752,1:POKE 82,0:SETCOLOR 2,0,0
50 CL$=CHR$(125):S$=" ":S$(14)=" ":S$(2)=S$
60 HP(Ø)=20:VP(Ø)=12:RC=Ø
70 F(1)=1:F(2)=7:F(3)=13
80 FOR I=1 TO NUM:READ T$:WP(I)=LEN(WD$)+1
90 WD$(WP(I))=T$:RN(I)=RND(1):NEXT I
100 WP(NUM+1)=LEN(WD$)+1
110 REM FOR I=1 TO NUM:PT(I)=I:NEXT I:GOTO 210
120 FOR I=1 TO NUM:PT(I)=I
130 FOR J=1 TO NUM:IF RN(J)>RN(PT(I)) THEN PT(I)=J
140 NEXT J:RN(PT(I))=Ø:NEXT I
150 FOR I=1 TO NUM:T$="":A$=WD$(WP(I),WP(I+1)-1)
160 V=ASC(A$(1,1))-64:FOR J=2 TO LEN(A$)
170 N=ASC(A$(J,J))-V:T$(LEN(T$)+1)=CHR$(N+26*(N<65))
180 NEXT J:WP(I)=WP(I)-I+(I=1)
190 WD$(WP(I),WP(I)+LEN(T$)-1)=T$:NEXT I
200 WP(NUM+1)=WP(NUM+1)-NUM-1
210 PRINT CL$;:FOR I=1 TO 13:HP(I)=I+2*(I-1)+1
220 HP(I+13)=HP(I):VP(I)=2:VP(I+13)=23:NEXT I
230 FOR I=1 TO 26:POSITION HP(I)-1,VP(I)-2*(I<14)
240 PRINT CHR$(I+64);:NEXT I
250 X1=HP(Ø):Y1=VP(Ø):TX=X1:TY=Y1
260 XP=X1:YP=Y1:GOSUB 1070:FLAG=Ø
270 FOR I=1 TO NUM:T$=WD$(WP(PT(I)),WP(PT(I)+1)-1)
280 T$(LEN(T$)+1)="ə":FOR J=1 TO LEN(T$)
290 P=ASC(T$(J,J))-64:IF P<Ø OR P>26 THEN 310
300 X2=HP(P):Y2=VP(P):GOSUB 2000
310 NEXT J:IF FLAG THEN 330
320 GOSUB 3000:FOR D=1 TO 10:NEXT D
330 NEXT I:IF  NOT FLAG THEN 270
340 PRINT CL$;"YES";S$;"MAYBE";S$;"NO"
350 FLAG=Ø:X1=HP(20):Y1=VP(20):TX=X1:TY=Y1
360 XP=X1:YP=Y1:GOSUB 1070
370 RC=INT(RND(1)*3)+1
380 X2=HP(F(RC)):Y2=VP(F(RC)):GOSUB 2000
390 X2=HP(20):Y2=VP(20):GOSUB 2000
400 GOSUB 3000:GOTO 370
1000 K=PEEK(764):POKE 764,255:Z=RND(1)
1010 IF K=33 THEN 1060
1020 IF K<>43 AND K<>47 THEN 1000
1030 IF K=43 AND RC>Ø THEN 1000
1040 IF K=47 THEN POKE 752,Ø:END
1050 FLAG=1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
1060 POSITION TX-1,TY-1:PRINT CHR$(32);
1070 POSITION XP-1,YP-1:PRINT CHR$(123);
1080 TX=XP:TY=YP:RETURN
2000 DX=X2-X1:DY=Y2-Y1:IF DX<>Ø OR DY<>Ø THEN 2050
2010 XP=X1:Y2=Y1-7:IF P<14 THEN Y2=Y1+7
2020 FOR C=1 TO 2:FOR YP=Y1 TO Y2 STEP SGN(Y2-Y1)
2030 FOR D=1 TO 10:NEXT D:GOSUB 1000:NEXT YP
2040 T=Y1:Y1=Y2:Y2=T:NEXT C:RETURN
2050 XM=(X1+X2)/2:YM=(Y1+Y2)/2
2060 IF DX=Ø OR DY=Ø THEN 2140
2070 XC=X1+(X2>X1)*DX
2080 IF XM<20 THEN XC=X2-(X1<X2)*DX
2090 YC=YM-DX/DY*(XC-XM)
2100 R=SQR((XC-X2)^2+(YC-Y2)^2)+1.0E-Ø3
2110 IF ABS(DY)>ABS(DX) THEN RD=1-2*(XM>=20):GOTO 2230
2120 RT=(((XM<20)+(SGN(DX)+SGN(DY)<>Ø))=1)
2130 RD=2*RT-1:GOTO 2200
2140 RD=1:R=(ABS(DX)+ABS(DY))/2
2150 XC=XM:YC=YM:IF DX=Ø THEN 2180
2160 IF P>13 THEN RD=-1
2170 GOTO 2200
2180 IF X1+R>40 THEN RD=-1
2190 GOTO 2230
2200 FOR X=X1-XC TO X2-XC STEP SGN(DX)
2210 XP=X+XC:YP=RD*SQR(R*R-X*X)+Ø.2+YC
2220 GOSUB 1000:NEXT X:GOTO 2260
```

```
310 CLS:T=HP(7)-HP(1)-4
320 PRINT STRING$(LS-1,32);"YES";STRING$(T,32);"MAYBE"
;STRING$(T,32);"NO"
330 FLAG=0:X1=HP(20):Y1=VP(20):TX=X1:TY=Y1
340 XP=X1:YP=Y1:GOSUB 1070
350 RC=RND(3):X2=HP(F(RC)):Y2=VP(F(RC)):GOSUB 2000
360 X2=HP(20):Y2=VP(20):GOSUB 2000
370 GOSUB 3000:GOTO 350
1000 IF INT(PEEK(14400)/128)=1 THEN 1060
1010 K$=INKEY$:IF K$=CHR$(32) THEN 1060
1020 IF K$<>"Y" AND K$<>"Q" THEN 1010
1030 IF K$="Y" AND RC>0 THEN 1010
1040 IF K$="Q" THEN END
1050 FLAG=-1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
1060 PRINT@(TY-1)*WL+TX-1,CHR$(32)
1070 PRINT@(YP-1)*WL+XP-1,CHR$(35);CHR$(24);
1080 TX=XP:TY=YP:RETURN
2000 DX=X2-X1:DY=Y2-Y1:IF DX<>0 OR DY<>0 THEN 2050
2010 XP=X1:IF P<14 THEN Y2=Y1+4 ELSE Y2=Y1-4
2020 FOR C=1 TO 2:FOR YP=Y1 TO Y2 STEP SGN(Y2-Y1)
2030 FOR D=1 TO DL/5:NEXT D:GOSUB 1000:NEXT YP
2040 T=Y1:Y1=Y2:Y2=T:NEXT C:RETURN
2050 FD=1:XM=(X1+X2)/2:YM=(Y1+Y2)/2
2060 IF DX=0 OR DY=0 THEN 2140
2070 XC=X1-(X2>X1)*DX
2080 IF XM<HP(0) THEN XC=X2+(X1<X2)*DX
2090 YC=YM-DX/DY*(XC-XM)
2100 R=SQR((XC-X2)[2+(YC-Y2)[2)+1E-5
2110 IF ABS(DY)>ABS(DX) THEN RD=1+2*(XM>=HP(0)):GOTO 2
240
2120 RT=(((XM<HP(0))+(SGN(DX)+SGN(DY)<>0))=-1)
2130 RD=-2*RT-1:GOTO 2210
2140 RD=1:R=(ABS(DX)+ABS(DY))/2
2150 XC=XM:YC=YM:IF DX=0 THEN 2190
2160 IF R>13 THEN FD=R/13
2170 IF P>13 THEN RD=-1
2180 GOTO 2210
2190 IF X1+R>RM THEN RD=-1
2200 GOTO 2240
2210 FOR X=X1-XC TO X2-XC STEP SGN(DX)
2220 XP=X+XC:YP=INT(RD*SQR(R*R-X*X)/FD+YC+0.2)
2230 GOSUB 1000:NEXT X:GOTO 2270
2240 FOR Y=Y1-YC TO Y2-YC STEP SGN(DY)
2250 XP=RD*SQR(R*R-Y*Y)+XC+0.2:YP=Y+YC
2260 GOSUB 1000:NEXT Y
2270 IF FLAG THEN RETURN
2280 IF XP=X2 AND YP=Y2 THEN 2300
2290 XP=X2:YP=Y2:GOSUB 1000
2300 X1=X2:Y1=Y2:RETURN
3000 IF INT(PEEK(14400)/128)=1 THEN 3000
3010 K$=INKEY$:IF K$=CHR$(32) THEN RETURN
3020 IF K$="Q" THEN END
3030 IF K$<>"Y" OR RC<>0 THEN 3010
3040 FLAG=1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
5000 DATA WIBCQV,TAFUMMYM,LEFDUBQE,FNUZ,PVEEJ
5010 DATA CILCC,PISHQJSX,MEVAT,XUCQR
```

MODIFICATIONS FOR OTHER COMPUTERS

ADAM/Magical Messages

Use the Apple version, with the following alterations: Add lines 60 and 4000:

```
60 FOR i = 28000 TO 28005:READ a:POKE i,a:NEXT i
4000 DATA 62,0,50,117,253,201
```

Also, change lines 10, 30, 1000, 1010, 3000, and 3010 to read as follows:

```
10 LOMEM:29000:num = 9
30 dl = 800:sp = 1:ls = 3:rm = 31:m$ = CHR$(255)
1000 GET k$
1010 IF k$ = CHR$(3) THEN END
3000 IF PEEK(64885) = 32 THEN CALL 28000:FOR d = 1 TO
100:NEXT d:z=RND(1):GOTO 3000
3010 CALL 28000:k = PEEK(64885):IF k = 32 THEN RETURN
```

IBM PCjr/Magical Messages

Use the IBM PC version, except change line 30 to read as follows:

```
30 DL=400:SP=2:LS=1:RM=40
```

VIC-20/Magical Messages

Use the Commodore 64 version, except change lines 10, 30, 40, and 3000 to read as follows:

```
10 NUM=9
30 DL=300:SP=0:LS=4:CLS=CHR$(147):PRINT CHR$(142);CHR$
(8)
40 RM=22:BM=21:MAX=6
3000 IF PEEK(197)=32 THEN 3000
```

PROGRAMMING P.S.

Notes about previous months' programs

ADAM/A Musical Departure (February 1985, page 74)

A printing error made it difficult to tell where line 60 ended and line 70 began. Here are the lines:

```
60 b = 28000:FOR i = b TO b+5:READ a:POKE i,a:NEXT i
70 FOR i = 159 to 223 STEP 32:POKE b+6,i:CALL 28000:NE
XT i
```

Commodore 64/Computer Valentine (February 1985, page 64)

A tiny speck snuck into line 430 during the printing process, making it difficult to read. Here's the line again:

```
430 FOR X=1 TO 20
```

Title / Manufacturer / Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings — O	D	PS	GQ	EU	V
BANK PRESIDENT Infoware Corp. 2407 12th Ave. S. Nashville, TN 37204 (800) 325-8774 $74 ©1984	Complex financial simulation makes you and up to nine other players bank presidents. Issue loans, invest in CDs, real estate, and more to make your bank the most profitable. For ages 14+.†	IBM PC/PCjr (DOS 2.0, 2.1), 128K (d.).	90-day warranty.	★★★★	★★★★	★★★★	★★	D	★★★
C'EST LA VIE Adventure International P.O. Box 3435 Longwood, FL 32750 (800) 327-7172 $34 ©1984	Steer your character through a maze, picking up money to invest. Avoid tax collector and robbers in this cute Pac-Man/Monopoly hybrid. Fun for ages 8+, and adults, too.	Reviewed on Apple II series, 48K (d.). Also for Atari Home Computers, 48K (d. and cart.). Joystick optional.	1-year warranty (includes user-damaged); $5 fee thereafter.	★★	★★	★★★	★★	A	★★
CLEAR FOR ACTION Avalon Hill 4517 Harford Road Baltimore, MD 21214 (301) 254-5300 $25 (cass.); $30 (d.) ©1984	Exciting naval simulation set in the great Age of Sail. Take on single or multiple ships, steer, change sail configuration, board ships, and fire a variety of artillery. Use built-in ships or create your own.†	Reviewed on Atari Home Computers, 48K (d. and cass.). Also for TRS-80 Models I/III (cass.). Joystick for Atari.	Unlimited warranty.	★★★	★★★★	★★★	★★★	A	@
DRAGON'S LAIR Coleco Industries 999 Quaker Lane S. West Hartford, CT 06110 (203) 725-6660 $39 ©1984	Easy-to-play home version of interactive videodisc arcade game. Survive traps and battle to progress through adventure to rescue princess; for ages 10+.	Coleco ADAM (data pack). Joystick.	90-day warranty.	★★	★★	★★★	★★★	A	★★
FIELD OF FIRE Strategic Simulations, Inc. 883 Stierlin Road., Bldg. A-200 Mountain View, CA 94043 (415) 964-1353 $39 ©1984	Lead a company of men through a series of W.W.II battles, from North Africa to the Battle of the Bulge. Various levels of difficulty, character growth, and other extras make for one of the year's best; for ages 12+.†	Reviewed on Atari Home Computers, 48K (d.). Also for C 64 (d.). Joystick.	30-day warranty; $10 fee thereafter.	★★★★	★★★	★★★	★★	A	★★★★
GEMSTONE WARRIOR Strategic Simulations 883 Stierlin Road., Bldg. A-200 Mountain View, CA 94043 (415) 964-1353 $34 ©1984	Venture through a labyrinth in search of fragments of a magic gem. Use crossbow, "grenades," and a variety of magic objects to fight hordes while mapping your way in fast-moving, arcade/role-playing game.†	Reviewed on Apple II series, 48K (d.). Also for C 64 (d.). Joystick optional.	30-day warranty; $10 fee thereafter.	★★★	★★★	★★★★	★★★	A	★★★
PITSTOP II Epyx 1043 Kiel Court Sunnyvale, CA 94089 (408) 745-0700 $29–$35 ©1984	Steer your car through six different courses or drive the Grand Prix circuit against human or computer opponents. Various levels of difficulty and superb graphics make for best driving game ever. For ages 8+.†	Reviewed on C 64 (d.). Also for Apple II series, 48K (d.); Atari Home Computers, 48K (d.); IBM PC/PCjr, 128K (d.). Joystick.	30-day warranty; $10 fee thereafter.	★★★★	★★★	★★★★	★★★★	A	★★★★
RENDEZVOUS EduWare 28035 Dorothy Drive Agoura Hills, CA 91301 (818) 706-0661 $39 ©1982	Inventive, vivid simulation of space-shuttle launch, flight, orbit, and mission. Use mathematical and scientific skills and learn to fly the miracle of the '80s. For ages 12+.	Reviewed on Apple II series, 48K (d.). Also for Atari Home Computers, 48K (d.). Joystick for Atari.	90-day warranty; $12 fee thereafter or if user-damaged.	★★	★★	★★★	★★	A	★★
TIMESHIP—MURDER AT THE END OF TIME Five Star Software P.O. Box 631 Elk Grove Village, IL 60007 (312) 952-8088 $44 ©1984	Create a team of 1–4 characters; arm and equip them; send them through time to solve a mystery, finding clues, and fighting battles. Intriguing, though tough adventure/role-playing for advanced adventurers, 12+.	Apple II series, 48K (d.).	30-day warranty; $5 fee thereafter; $10 fee for backup.	★★★	★★★	★★★	★★	D	★★
TROLLS AND TRIBULATIONS Creative Software 960 Hamlin Court Sunnyvale, CA 94089 (408) 745-1655 $24 (Atari, C 64); $34 (Apple) ©1984	As a troll out for an afternoon of treasure-hunting, cretin-shooting, and adventuring, you run, jump, bounce, and shoot your way from level to level. Delightful arcade game for ages 8+.	Reviewed on C 64 (d.). Also for Atari Home Computers, 48K (d.). Planned for Apple II series.	90-day warranty (includes user-damaged).	★★★	★★	★★★	★★★★	E	★★

RATINGS KEY O Overall performance; D Documentation; PS Play system; GQ Graphics quality; EU Ease of use; V Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; @ ★★★ to ★★★★ depending on price; N/A Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

CLASSIFIED
Give Your Product or Service a Boost with Classified Exposure

FAMILY COMPUTING cannot be responsible for the accuracy of description, but will attempt to screen out misleading and/or incorrect statements.

Give Your Product or Service a Boost with Classified Exposure

Cost-effectively reach the more than 1 million FAMILY COMPUTING readers who want information on computing and computer-related products.

Active, aware users of: Apples, Ataris, Colecos, Commodores, Franklins, IBMs, TIs, Timex Sinclairs, TRSs, etc. who have an ongoing interest in system upgrade, adding peripherals, writing programs, acquiring software, joining data bases, bulletin boarding, and accessing you. Connect now by placing a classified ad for your product or service in FAMILY COMPUTING.

CATEGORIES:
BOOKS/MANUALS
BUSINESS OPPORTUNITIES
CAMPS
FOR FREE/TO SWAP
HARDWARE
MISCELLANEOUS
*PERSONALS
SMALL BUSINESSES
SOFTWARE
TELECOMPUTING
USERS' GROUPS

RATES:
Cost per line per issue in consecutive run:
1 × $16.95 3 × $14.50 6 × $13.60
34 characters per line, including spaces and punctuation
25 characters per line, including spaces and punctuation, in all caps or boldface
$15 additional for all/any boldface
$10 additional for italic lettering
25% additional for toned background
*Personals: 2 line minimum, $13.60 per line

TO PLACE YOUR AD:
• Print or type your copy
• Determine number of lines
• Decide frequency
• Send ad with check or M.O. to
FAMILY COMPUTING
730 Broadway
New York, NY 10003
Attn: Megan Van Peebles
Or call us at (212) 505-3636 and we will help you write an ad with real FAMILY pulling power.
All P.O. Box/Mail Order insertions must submit PHONE NUMBER for our records.
Ads received by the 20th of the month will appear in the issue approximately two months following receipt of the ad.

BOOKS/MANUALS

"How to create a Successful Word-Processing Business." You, too, can create a business that is just right for you. $19.95 plus $2.50 s/h. IL residents add $1.60 sales tax. Write Family Computing Center, 3809 N. Sterling, Suite 107, Peoria, IL 61615

EXPANDABLE COMPUTER NEWS 1st ADAM-only publication. $12/6 issues. Sage Enterprises, Rte. 2, Box 211, Russellville, MO 65074

ADAM technical manual, includes Z80 disassembler. $9.95, Peter Hinkle, 117 Northview Rd., Ithaca, NY 14850

THE BEST TECHNICAL SOURCE FOR THE COLECO ADAM
Send $15 for one year/6 issues to:
SERENDIPITY PRODUCTIONS
P.O. Box 07592
Milwaukee, WI 53207

BUSINESS OPPORTUNITIES

Use a Computer To Buy Foreclosures. Simple, do it from home. Invest in Real Estate at 20%–50% below market. It's easy. Free details. LIFESTYLE, P.O. Box 73335, Metairie, LA 70033

Spare time on your computer can earn you $ $. OEM ENTERPRISES P.O. Box 55, Hilltown, PA 18927

COMPUTER TEACHING OPPORTUNITY
Need people to teach children computer basics at home. References required. Call (212) 472-0626 or (212) 988-1606

CAMPS

National Computer Camps, America's 1st computer camps. 5 locations CT, MD, OH, GA, MO. Free Brochure. Box 585 Orange, CT 06477; (203) 795-9667

New England Computer Camp, Box 370 Moodus, CT 06469; (203) 873-1421 Residential, Ages 8–17, Co-ed; Apple & IBM. Swimming, tennis, music, & CIRCUS

1, 2, 4, 6 Week Programs. Ages 8–18 Co-ed Computer training + outdoor activities Midwest Computer Camp 9392 Lafayette Unit C3, Indpls, IN 46278; (317) 297-2700

SESAME PLACE SUMMER COMPUTER CAMP Langhorne, PA. For children 8–12 yrs old, computer experience combined w/ outdoor play; (215) 752-4900 for info.

Duke University, Computer Kamp for children ages 8–17. Residential or day sessions, co-ed. Further info available by calling (919) 684-5645.

FOR FREE/TO SWAP

ATTENTION TRS COCO OWNERS FREE 24-page CoCo catalog!!! CoCoNuts, Box 9866, San Jose, CA 95157

HARDWARE

* * * * * MODEMS * * * * *
* FREE Shipping & FREE Catalog *
* Mark I $69   Mark X $119 *
* Qubie Int/Ext $269/$289 *
* **Direct-Connect Devices** *
* (805) 543-6308, 651 Chorro St. 6 *
* * * San Luis Obispo, CA 93406 * * *

TS 2068 HARDWARE & SOFTWARE
KNIGHTED COMPUTERS (315) 593-8219 707 Highland St., Fulton, NY 13069 Call or write for free catalog!

ADAM HARDWARE & SOFTWARE Unbeatable Prices! 25% Cat. ADAM'S APPLE 4835 Edsal, Cleveland, OH 44124

FREE 68 pg. computer catalog. 1000's of items including disks, supplies, software & hardware, at great discount pricing. Call/write:
A.P. COMPUTER PRODUCTS
214A E. Main St., Dept C1
Patchogue, NY 11772
(516) 654-8811

AppleWorks $199, Panasonic Sr. Partner, IBM, more! Send for cat. 3A. DCA, 445 N. Pine, Reedsburg, WI 53959

PCjr owners! The FX-500 is a 5¼" 368K second disk drive. Completely compatible with DOS 2.1. Ready for easy installation, $399.95 XETEC INC 3010 Arnold Rd., Salina, KS 67401

DISCOUNT HARDWARE & SOFTWARE
Apple, Commodore, TI-99, Atari, IBM PC 30% below retail. TI ext.-BASIC $90. Gemini SG 10 $249; Panasonic 1090 $209 Printer interface: TI $69, Atari $50. Indus disk drive: Atari $239, C 64 $249. Add 3% s/h. Over 1000 software titles. Send $1 for cat. Specify computer.
MULTI VIDEO SERVICES, Box 246 E. Amherst, NY 14051; (716) 688-0469

Discount Hard/Software TI-99/4A Sundisk Software, Box 1690, Warren, MI 48090; TIBBS: (313) 751-1119

ATTENTION ADAM OWNERS! We sell HW/ SW at unbeatable prices. Now in stock modems and disk drives. Cat. 25¢ Visa/MC THE ADAM DEPOT, 419 Ridgway Ave. Johnsonburg, PA 15845; (814) 965-2487

ADAM HARDWARE Custom printer/monitor stand $38 + $5 s/h. Cooling fan $29.95 + $3 s/h. FREE Software catalog. STEVE JACOBY, Bx 2498, Clearwater, FL 33517

ADAM Discount hardware & software. Send stamped addressed envelope for **FREE** flyer. **DATA BACKUP** Box 335, Iona, ID 83427

ADD A PRINTER TO YOUR TI-99/4A Only $88. Write for FREE catalog of Hardware/Software: Alpha Company, 162 Chapel Dr., Churchville, PA 18966

WANT A PLEASANT SURPRISE? Call or write for low prices: Commodore, Atari, TI, IBM, Franklin, Apple, Corona, & more. All software & accessories. Factory-Sealed Manufacturers' Warrantees. GET PLEASANTLY SURPRISED! HARDWARE SOFTWARE ANYWARE CO. 57 13th St., Bklyn, NY 11215 (718) 768-3672 Pete Peterson

MISCELLANEOUS

THE PRIDE POWER STICK
ATARI, C 64, COLECO, TI
The small joystick that gives big performance. From $9.75 to $19.75
Pride Electronics (801) 298-1814 725 West 200 North, NSL, UT 85404

KODAK DISCS 5¼" DS/DD, list $4.85, $35/10. Very high quality. Free Supplies catalog. VISA/MC. Josslyn Hay. 376 E. Saint Charles Road, Lombard, IL 60148; (312) 629-7710

IN CASE OF FIRE
Protect your family & computer with the ultimate computer fire extinguisher. Use the **Halon 1211** that gives safe, clean noncorrosive defense against costly fires. All metal, rechargeable unit. $34.99 includes s/h. Limited quantity
NORTH MISSISSIPPI FIRE
P.O. Box 896 Fulton, MS 38843; (601) 862-2557 SASE for info today!

New-Home Computer Cleaning Kit Everything you need to clean your computer safely. Used by thousands! Send $3 for info refundable w/order Domestick Soap Shoppee, Roosevelt Trail, South Casco, ME 04077-0007

DISKETTE STORAGE BINDERS Protect your valuable information. "Free Catalog" SASE; The Binder Man P.O. Box 570, N. Tonawanda, NY 14120

EconoDisk & EconoStand
EconoDisk SSSD/$13.95 SSDD/$16.95 Box 10 + $3 s/h **EconoStand** Smoke/clear plexiglass hides unsightly cords & wires $15.95 + $5 s/h **ZATOX** Box 921 Brnx, NY 10462; 409-9835. SASE for info.

TI-99/4A DUST COVERS Console $8; PEB $13; S. Syn. $5 Black/Brown leatherette. Send MO only + $3 s/h. Covers Unlimited, Box 3039, N. Attleboro, MA 02761

TI OWNERS, DON'T DESPAIR!!! TI, 3rd party HW/SW, services. At last a comprehensive list of dozens of vendors. Send $2 s/h FRANK MARI, 40 Fleetwood, 5C, Mt. Vernon, NY 10552

Protect your computer w/Halon fire extinguisher. UL listed $44 + $6 s/h MOSES, Box 6333, Washington, DC 20057

J CHECK Software for ADAM Dustcovers for **ADAM**. 3-piece set of softlined vinyl. In Blk/Brw/Beige $15 + $1.50 s/h **J CHECK SOFTWARE** Box 345, Millry, AL 36558

UNIVERSITY DEGREES WITHOUT CLASSES. Bachelor's, Master's, Doctorates. Accredited, economical, accelerated. Credit for technical knowledge and work experience. Write: Dr. John Bear P.O. Box 11447-FL Marina del Rey, CA 90925

PERSONALS

Dear Mom, For all you've done and still do; I love you very much. xxx **Pat**

Dear Mommy: I don't need my computer to tell you're the BEST! HAPPY MOTHER'S DAY. Love, Rowie

SMALL BUSINESS

CASHBOOK 1 for C 64. Quick & easy cash bookkeeping! Includes balance-sheet, financial statements, hard copy options. Disk $39.95 Visa/MC Rocky Software, Box 310, Erie, CO 80501

SOFTWARE

ADAM COPY UTILITY- $41.50 Back-up BASIC & other software. Contact: Sage Enterprises, Rte. 2 Box 211, Russellville, MO 65074

TI-99/4A SW/HW Dealer ARIZONA DISCOUNT SOFTWARE P.O. Box 5398, Glendale, AZ 85312; (602) 938-2540

TI-99/4A Software/Hardware bargains Hard-to-find items. **Huge selection.** Fast service. Free catalog. **DYNENT** Box 690, Hicksville, NY 11801

FREE catalog of Software/Hardware at FANTASTIC SAVINGS! Specializing in Apple, IBM, and CP/M. SBCC, Box 1191, Thousand Oaks, CA 91360; (805) 492-9391. Specify Apple or IBM.

FREE CATALOG of TESTED EDUCATIONAL SOFTWARE for Apple Atari/C 64/TRS-80 CoCo/TI-99/VIC-20 Moses, Bx 11038, Huntsville, AL 35805

SINCLAIR/TIMEX hobbyists: Get news, info, hardware, programs for serious–advanced applications! Send $1 (refundable) for catalog: THOMAS B. WOODS CO., P.O. Box 64, Jefferson, NH 03583

IBM PC & jr Software. Free list! Paradise Computer Works, R.D. 1 Box 273A, Newark Valley, NY 13811

ADAM Software on datapack/disk Three easy menu-driven programs to balance your checkbook & budget $18 SASE to: **E & T SOFTWARE** Box 821242 Dallas, TX 75382-1242

CLASSIFIED
Give Your Product or Service a Boost with Classified Exposure

CLONE w/UTILITIES for C 64. Duplicate protected disks in 4 minutes. $19.95 + $2 s/h. EDUCOMP 2139 Newcastle Ave., Ste. F Cardiff, CA 92007; (619) 942-3838

VIDEOTUNES—Compose and play music on your **ADAM**
FUTUREVISION, P.O. Box 34-FC
N. Billerica, MA 01862 Visa/MC
Send for **Free Catalog** (617) 663-8591

Educational software for your hungry child. C 64/ Apple/IBM our specialty. Write for free price list:
CHILDREN'S MENU
P.O. Box 175
Staten Island, NY 10314
TAKE A BYTE AND SEE!

ADAM SOFTWARE
PRINTSHOP instantly prints signs, greeting cards, announcements, etc. **CME** offers continual support with **Money-Back Guarantee.** $9.95 + $2 s/h
SASE for info **CME**
P.O. Box 339, Eastlake, CO 80614

VIC-20 and Commodore 64 owners! We have an exciting line of educational software. For free catalog send SASE to: **GENEREX, Inc.** P.O. Box 1269, Jackson, NJ 08527

600+ Apple/IBM Disks/Peripherals Very Competitive, 37¢ SASE Please L.A.C., Box 414, Storrs, CT 06268

Discounted Commodore Software!! Educ., Games, Business, & Utilities FREE CATALOG: SCS SOFTWARE 1443 Wendy St., #88, Canton, OH 44709

C 64 PUBLIC SOFTWARE
250 user-written programs (Games, Education, Business, Utilities) Assorted on 8 disks. $10 each Specify #1–8 or all 8 for $69.95.
SASE for FREE program & catalog!!!
PUBLIC SOFTWARE INC.
Box 35799, Fayetteville, NC 28303

TI-99/4A Word Processor & Print Pgm. Mail List—**DC Software Writers**, Box 335651, Northglenn, CO 80233 (E. B. req.)

HOME/BUSINESS APPLICATIONS SOFTWARE FOR COMMODORE 64: Word, data, mail-label management plus home and business accounting. 3 years in business. Free catalog. TOTL SOFTWARE Inc., Rt. 1, Box 1166, Lopez, WA 98261; (206) 468-2214

You read about
KITCHEN PLANNER
in Nov. Family Computing

Now, YOU can create a 1- to 14-day BALANCED MENU and SHOPPING LIST in less than 5 minutes! Easy to use. Compact, store-size printout. Send $29.95 + $1.50 handling. In CA add 6.5%. All Apple IIs. Sav-Soft Products, POB 24898, San Jose, CA 95154. VISA/MC. Call (408) 978-1048

Software at $1 over dealer cost. All best-sellers. Free catalog: Abbee Inc. 686S. Arroyo Pkwy #218, Pasadena, CA 91105

ADAM SOFTWARE. New for business: (Accts. payable/Accts. recd./Payroll) Also complex home finance, recipe, educ., games. SASE for catalog. STEVE JACOBY, Box 2498, Clearwater, FL 33517

Commodore 64 • Timex/Sinclair Free catalog—specify computer WMJ DATA SYSTEMS, 4 Butterfly Drive, Hauppauge, NY 11788

Back to basic education w/original programs that build reading skills. Ages 2–11. $10–$16 IBM PC SASE to OBERST FAMILY SOFTWARE 18814 111th Pl. S.E., Renton, WA 98055

Learning fun on the VIC-20. Send $5 for sample disk/tape (refunded on order) POOTER WORKS, 2659 Minkler Road, Sedro Wooley, WA 98284

C 64 Disk Magazine—Programs, games, utilities, tutorials, reviews, news, & more! $36/yr (6 issues). Sample $6 Micro, Box 457-FC, Lakeview, MI 48850

CO-CO-NUT SOFTWARE for TRS-80 Discount Prices!!! Free list: Suite 9 Box 1, R.R. 2, Tofield, Alberta TOB 4J0

BACK UP YOUR COSTLY DISKS
With Copy IIPC & Copy II+. Each backs up 100s of popular IBM or Apple protected programs $29.95 + $3 s/h (NY add tax). SASE for info & catalog of our exciting product line specify computer **RSD**. Box 272, Bronxville, NY 10708
All programs 25% below retail!

ADAM DATAPACKS: NIK Graphics Experimenter:("3D" art, Artmotion Graphics Rabbit graphics, Art Keyboard, more) $39. The Business Graphs Package (6 styles, Datafile, Stat. Pack) $29. DeskMaster $29. On datapacks. Add $1.50 s/h. Send 44¢ stamps for catalog
NICKELODEON GRAPHICS
5640 W. Brown, Glendale, AZ 85302

Free!   Discount catalog.
Software, hardware etc.
Call toll-free: (800) 223-5838
(in Florida, call)   (305) 771-6498

5 Super games: VIC-20/TI-99 (specify) on cassette tape. Send $2: B.E.S.T. 454 Davis Dr., Gallipolis, OH 45631

TRS-80/C 64/ATARI SOFTWARE
Games, Educ., Bus.—$19.99 per program Public Software 20 pgm. on disk—$9
Global Computers 4517 5th Ave. Brooklyn, NY 11220; (718) 435-7935

ADAM Owners. Great YAHTZEE Game Send $5 to Tom Maditz, 114 E. 3rd. St., Apt. 305, Weston, WV 26452

COMMODORE 64 OWNERS!!
Rent software with option to buy. Low prices and no membership fee. Hundreds of brand-name programs. Send $1 for catalog to:
Centsible Software
P.O. Box 263
Stevensville, MI 49127
Phone: (616) 465-6632

FREE PROGRAMS C 64/+4/TI-99/VIC-20/ CoCo/III/4/MC10/Timex. Send stamps! Ezra, Box 5222, San Diego, CA 92105

Improve your child's education.
Create multiple-choice tests. Give tests, save scores, retest; printer options. $20   **SUNSET DESIGNS**
SASE info 1815 18th Ave., SF, CA 94122

SAVE 38% on Software !!!
Davidson's Math Blaster
Retail **$49.95** our price **$30.97**. Free price list. Specify Apple, IBM, C 64
CREATIVE COMPUTER RESOURCES
Box 728, Grand Haven, MI 49417

C 64 and IBM PC SOFTWARE CHEAP!!! Send for your catalog of game, home-management, business, utility, and educational software available and you will also receive a disk utility program listing free, along with details on how to make money at home with your personal computer. PACEWARE, INC. Box 64-A, Pompano Beach, FL 33074

FUN CHILDREN'S SOFTWARE
Over 120 low-cost programs for kids TI-99/4A and C 64. **Free** brochure.
KIDware
Box 9762, Dept. F. Moscow, ID 83843

J CHECK Software for ADAM
Are you tired of playing games, and want to put your **ADAM** to work? Then you need **CHECK! CHECK** a BASIC program that keeps a record of your checking account. Includes: check #, amount, date, balance, deposit, payee & payor. Features formatted budget plans. Data base saves info for easy access at tax time. SASE for info Datapack $22.50 **J CHECK SOFTWARE** Box 345, Millry, AL 36558

T/S 1000 16K OR 64K
T-File homefile manager, all assembly language for fast entry and access of files. $10 **T-WARE** 40 Aspen, Great Falls, MT 59405

SuperShopper/HomeOrganizer Brings your family's daily living into the Computer Age. Hundreds of applications. GUARANTEED. Specify computer. For FREE details & BONUS gift write now: Dept. 114 GREEN MOUNTAIN MARKETING Box 261067, Denver, CO 80226

WEIGHT LOSS PACKAGE, C 64
SASE to McDevitt Microdesigns, 3223 Goldtree Ct., Louisville, KY 40220. SASE for details

SOFTWARE for C 64, ATARI, and IBM. Programs made to your needs, send for free catalog. 3-STAR SOFTWARE, 33 Stacy Drive, Windsor, CT 06095

ATARI tape/disk. Educational package (K–6). HMG, 6751 Nicoll, Elyria, OH 44039; (216) 327-0833

Type fast!
FasType™ is the fun and easy way to learn to type. **FasType™** for TRS-80 III/4/4P. Specify model Order **FasType™** from:
Press 'A' Software
Box 364, Jerome, AZ 86331
(602) 634-2688

30 minute cassette loaded with programs for your TI-99/4A. Only $5 D. Thompson, Box 481, Adelphi, OH 43101

ADAM SOFTWARE

SmartSPELLER™
Automatic spelling, typographical error detection & correction system for SmartWRITER documents.

DataCALC—Electronic spreadsheet AdamFILER—File management system

Send 44¢ stamps—catalog & order info
ADAMWORLD ENTERPRISES
424 E. John St., Lindenhurst, NY 11757
(516) 884-3196

ATARI USERS!
GRAVITY LAB turns your computer into a **SPACE LABORATORY!** Simulate real/experimental star/planetary systems. A must for stargazers and physics enthusiasts! Disk $9.95
MATRIX SOFTWARE
435 Prospect St., Long Branch, NJ 07740

Atari—original thinking games for kids & adults. For info SASE, COGITO, 2206 Nelson #C, Redondo Beach, CA 90278

Nutritional Computer Program
TRS-80 Analyzes your answers to 192 questions. Print charts showing probable deficiencies in vitamins etc.
Allied Systems Bx 245 Trona, CA 93562 (619) 372-5355. Send for more info.

TI-99/4A DISK SOFTWARE HIGH-PERFORMANCE SYSTEMS
JHB Software/Box 920952, Suite 345 Houston, TX 77292-0952

ADAM SOFTWARE! Includes: text adv., print in HGR, save full scrn picts, more! ALL for $27. Send check, MO, or SASE for info. REEDY SOFTWARE, 10085 60th St., Alto, MI 49302

APPLE-IBM Pay 50% less for software GUARANTEED-Business, Educational, Games SASE to OMEGA TECHNOLOGY, 14902 SE 1st St., Vancouver, WA 98684

TI-99 Owners. Original Biorhythm Program. Cute! 16K/cassette only. $5.98, A. BASILICATO, 4 Center St., Bldg. 5 #105, Sussex, NJ 07461

TELECOMPUTING

BULLETIN BOARD PHONE #s U.S. some Can., HI. Over 500. $5. BBS, 239-B BMVE, Horsham, PA 19044

BBS newsletter plugs you into software sources, game boards. Eight issues with huge BBS list for $26.50. Sample copy for $3.
PLUMB Box 300F
Harrods Creek, KY 40027

USERS' GROUPS

ADAM OWNERS
Join the NIAD USERS' group for the ADAM. Monthly newsletter, free software pgms., & discount buying service (CPM-$62.95). SASE for free info to: **NIAD,** Box 1114, Lisle, IL 60532

New National Timex Sinclair Users' Network (615) 877-6328 TS SERVICES, P.O. Box 15214, Red Bank, TN 37415-0214

Join the leading ADAM users' group
#1 ADAM USERS' GROUP
Receive "SPRITE CHASER" newsletter. Advanced updating, evaluations on programs, hardware, technical information direct from Coleco. Problem-solving—program exchange— discount buying service—etc.
Send $15 for Charter membership to:
#1 ADAM USERS' GROUP
Box 3761—Attn: Jay Forman
Cherry Hill, NJ 08034
(609) 667-2526 *VISA/MASTER—ADD $1

EVERY COMMODORE 64 FAMILY
should belong to this club. WHY? For free information, write:
DISK-OF-THE-MONTH CLUB
Box 936, Ocean Springs, MS 39564

Home is where the computer is. Reach your target market directly. Advertise in DIRECT ACCESS.

To Place Your Ad in DIRECT ACCESS Call (212) 505-3636 FAMILY COMPUTING 730 Broadway New York, NY 10003