



\$2.50

PUBLISHED BY SCHOLASTIC INC.

MAY 1985

VOLUME 3  
NUMBER 5

**PCir**

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

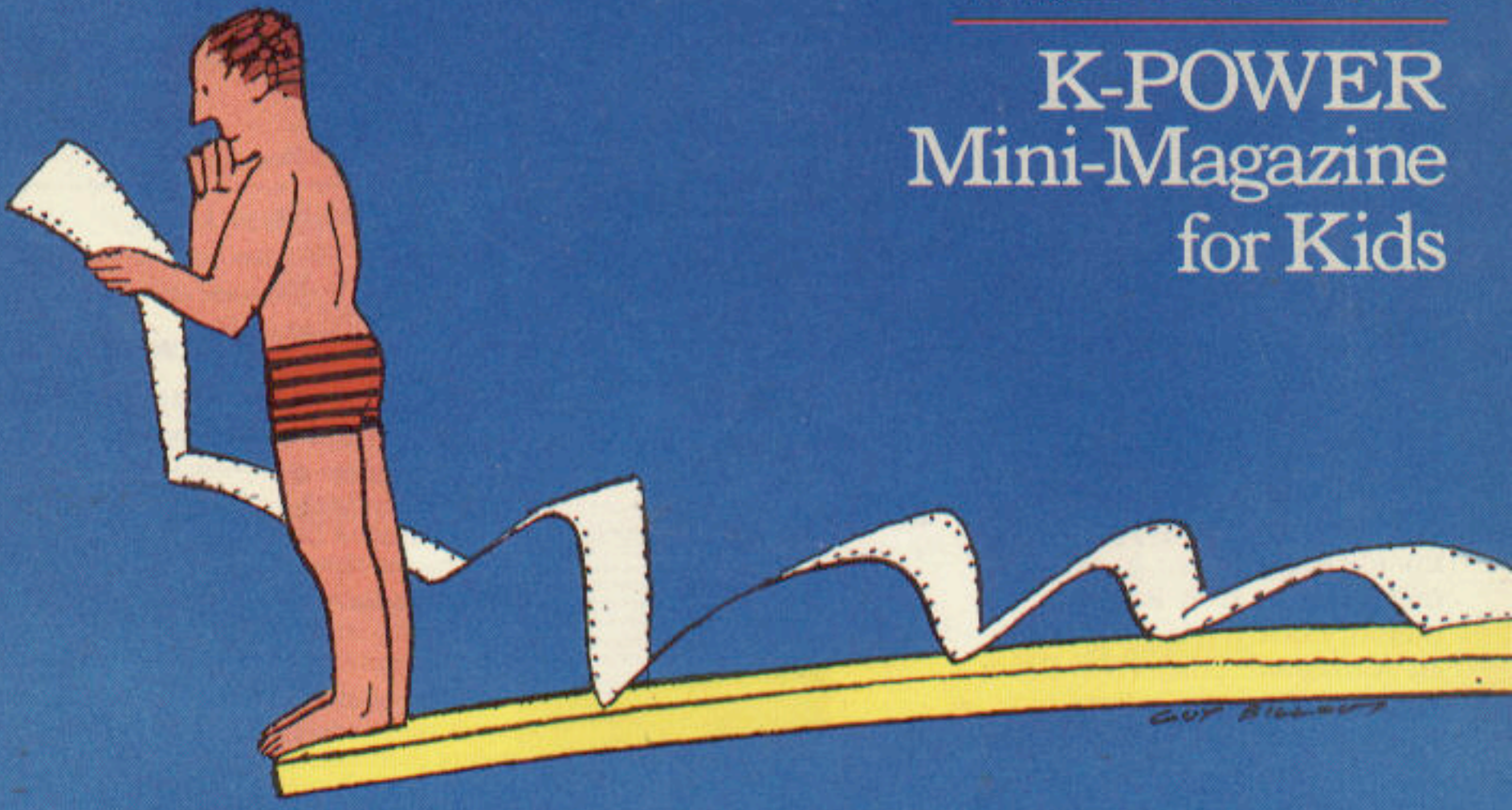
# FAMILY COMPUTING

**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**



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# FAMILY COMPUTING

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FAMILY COMPUTING (ISSN 0738-6079) is published monthly by Scholastic Inc., 730 Broadway, New York, NY 10003. Subscriptions: in the U.S. and possessions, 12 issues for \$19.97; outside the U.S. add \$6 (surface mail) or \$25.97 (air-mail). Office of publication: 351 Garver Rd., P.O. Box 2700, Monroe, OH 45050-2700. Second-class postage paid at Monroe, OH 45050-9998 and additional offices. POSTMASTER: Send address changes and notice of undelivered copies to FAMILY COMPUTING, P.O. Box 2511, Boulder, CO 80302. Printed in U.S.A. Copyright © 1985 by Scholastic Inc. All rights reserved.

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# COMPUTING CLINIC

EXPANDING THE APPLE II PLUS • PRINT BUFFERS •  
MIXING MACHINE LANGUAGE WITH BASIC •  
COMMODORE 64 FILES • TI SPEECH

BY JEFFREY BAIRSTOW



**I own an Apple II plus, and I have expanded it from 48K to 64K. I was wondering if I could expand the memory to 128K, or is 64K the limit?**

THOMAS SCANNELLO  
Hicksville, New York

Yes, you can expand the Apple II plus to 128K or more with a RAM card from companies such as Titan (RAM Board, \$199 for 64K, \$269 for 128K; [313] 662-8452) or others listed in mail-order ads. However, new commercial programs designed for the 128K Apple IIc or IIe are not likely to work. (Exceptions are Software Arts VisiCalc and VisiCorp's FlashCalc.) According to an Apple technician, this is because on the II plus, the RAM expansion card must go in one of the standard slots, where it will be accessed as a RAM disk. (Both Titan RAM cards include RAM disk software.) It will not, then, add any more "usable" memory. On an Apple IIe, on the other hand, the RAM expansion goes into an auxiliary slot, so programs can access this added memory directly.

**What is a print buffer, and how do I use it with my computer?**

PETER SULLIVAN  
South Pasadena, California

Print buffers permit files or data to be transferred (or "dumped") from the computer at a very high speed into a holding bin, and then fed from this bin (or buffer) to the printer at a much slower rate. This way, the printer can handle the input easily, without being overloaded. And the computer is free to be used for other tasks.

Print buffers (also called "spoolers") often are boxes that stand between the computer and the printer. An example of the stand-alone type is the Microfazer made by Quadram Corp. (Orange Micro and Practical Peripherals are two other companies that sell buffers.) Also, many printers are sold with built-in buffers, from 2K on up. A 2K buffer will store about a page of text.

I use a word processor, *Multimate*,

with yet another type of print buffer. The program contains a RAM-based print spooler. When I send a long file to the printer, it is stored in a special area of RAM and fed to the printer while I work on another document. For serious word processing, some form of buffer is essential so that work is not interrupted while printing takes place.

**I have a TI-99/4A with a speech synthesizer, but my 2-year-old daughter hates the male-sounding voice. Can I program the synthesizer for a female voice?**

TIM ROTZELL  
St. Louis, Missouri

You can program a female-sounding voice if you have or can get the Terminal Emulator II cartridge and its documentation. On page 34 of the documentation, there's an explanation of how to adjust the pitch, or highness, of the voice in a BASIC program (which is listed on page 37). The pitch can be assigned a value between 0 and 63—with 0 being a whisper, 1 the highest pitch, and 255 the lowest. If you need to know more about speech-synthesizer programming, you can call TI at (800) TI-CARES.

**FAMILY COMPUTING's Primer (October 1984) suggested that machine language is the only language a computer understands. Does this mean I can program in machine language together with BASIC on my Radio Shack Color Computer?**

ANDY SZUL JR.  
Philadelphia, Pennsylvania

Machine language is indeed the only language a computer understands—without the benefit of an assembler, an interpreter, or a compiler, which translates programs written in other languages into machine language. (See Dr. Cursor's Klinik in this issue for more on machine language.) If you'd like to know more about assembly language, your local Radio Shack Computer Center has several useful, well-written books on the subject. *Getting Started with Color BASIC*, (page 267), which comes

with every Color Computer, explains how to use machine language in BASIC programs.

To answer your question: Yes, you can mix machine language into a BASIC program on any microcomputer. Once you've written the machine-language program, three steps are involved:

1. Find an area of memory not used by BASIC, the operating system, or your program, where you can put the machine language. On the Color Computer, you can tell BASIC to reserve memory space with the CLEAR statement.

2. Place your machine-language program into the area of memory you've selected. There are several ways to do this, including POKEing it in using DATA statements, or reading a binary file from disk or tape with the CoCo's LOADM or CLOADM statement.

3. Tell your BASIC program where you've put your machine language, and use the USR call in BASIC to execute the routine. (On some micros, the CALL statement performs both functions.)

## READER INPUT

With regard to your comments on erasing Commodore 64 disk files (Computing Clinic, February 1985), I also had problems erasing files and stumbled on this solution:

```
OPEN 15,8,15
PRINT#15,"SØ:FILENAME.PRG",8
CLOSE 15
```

My machine did not recognize the SCRATCH instruction without the filetype (PRG). Maybe this will help your readers.

SHIRLEY EHRLICH  
Herington, Kansas

Thanks for your suggestion. According to Commodore, and my own tests, the only time you actually need to use the filetype extension (PRG here) is when you are using the Epyx Fast Load Cartridge (see New Hardware Announcements). However, you have nothing to lose by using it at any time. Incidentally, the full command is "SCRATCHØ:FILENAME.FILETYPE".8, but the command can be shortened to "sØ" as in Shirley Ehrlich's example above.

JEFFREY BAIRSTOW is a contributing editor for FAMILY COMPUTING.

# 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	Statistics							Ease of Use ERROR HANDLING
			MEMORY REQUIRED	MAX # ROWS/COLS	# OF MATH FUNCTIONS	SORTING: NUMERIC/ALPHA/REVERSE	LINK CAPABILITY	COMMUNICATION		
<b>ADAM</b>										
ADAM CALC	Coleco 999 Quaker Lane S. West Hartford, CT 06110	\$49	80K	255/255	31	ALL	YES	SOME	GOOD	
<b>Apple</b>										
APPLEWORKS	Apple Computer 20525 Mariani Ave. Cupertino, CA 95014	\$250	64K	999/127	16	ALL	YES	EXTENSIVE	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	EXTENSIVE	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	
<b>Atari</b>										
SYNCALC	Synapse 5221 Central Ave. Richmond, CA 94804	\$49	48K	255/128	32	ALL	YES	SOME	GOOD	
<b>Commodore</b>										
CALC RESULT	Handic Software 520 Fellowship Road Mt. Laurel, NJ 08054	\$49	64K	254/63	22	NONE	YES	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	
<b>IBM PC and PCjr</b>										
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, PCjr	2048/256	55	ALL	YES	EXTENSIVE	EXC	
MULTIPLAN	Microsoft 10700 Northrup Way Bellevue, WA 98009	\$195	128K	255/63	46	ALL	YES	EXTENSIVE	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 (PCjr)	128K	255/52	47	ALL	YES	EXTENSIVE	GOOD	
PFS: PLAN	Software Publishing 1901 Landings Drive Mountain View, CA 94033	\$140	128K	48/20 (128K) 176/64 (256K) 255/70 (320K)	15	NONE	YES	EXTENSIVE	GOOD	
SUPERCALC 3	Sorcim Corp. 2310 Lundy Ave. San Jose, CA 95133	\$395	96K	254/63 (96K) 999/127 (192K)	60	ALL	YES	EXTENSIVE	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	
<b>Radio Shack</b>										
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	
<b>Texas Instruments</b>										
MULTIPLAN	Triton Products P.O. Box 8123 San Francisco, CA 94128	\$99	32K (and disk drive)	255/63	44	ALL	NO	SOME	EXC	
<b>Timex</b>										
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

				Data Entry		Sheet Design				Printing Options		Documentation			Overall		
FILE HANDLING	HELP FEATURES	SEARCH FUNCTION	NAMED CELLS	MOVING AROUND	AREA REPLICATION	INDIVIDUAL COLUMN WIDTH	MOVE ROW/COL.	NUMERIC FORMATS	LOCKED CELLS	FORMULAS	OVERALL QUALITY	OVERVIEW	TUTORIAL	INDEX	PERFORMANCE	VALUE FOR MONEY	COMMENTS
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 gen-

eral 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?

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 side-ways-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.

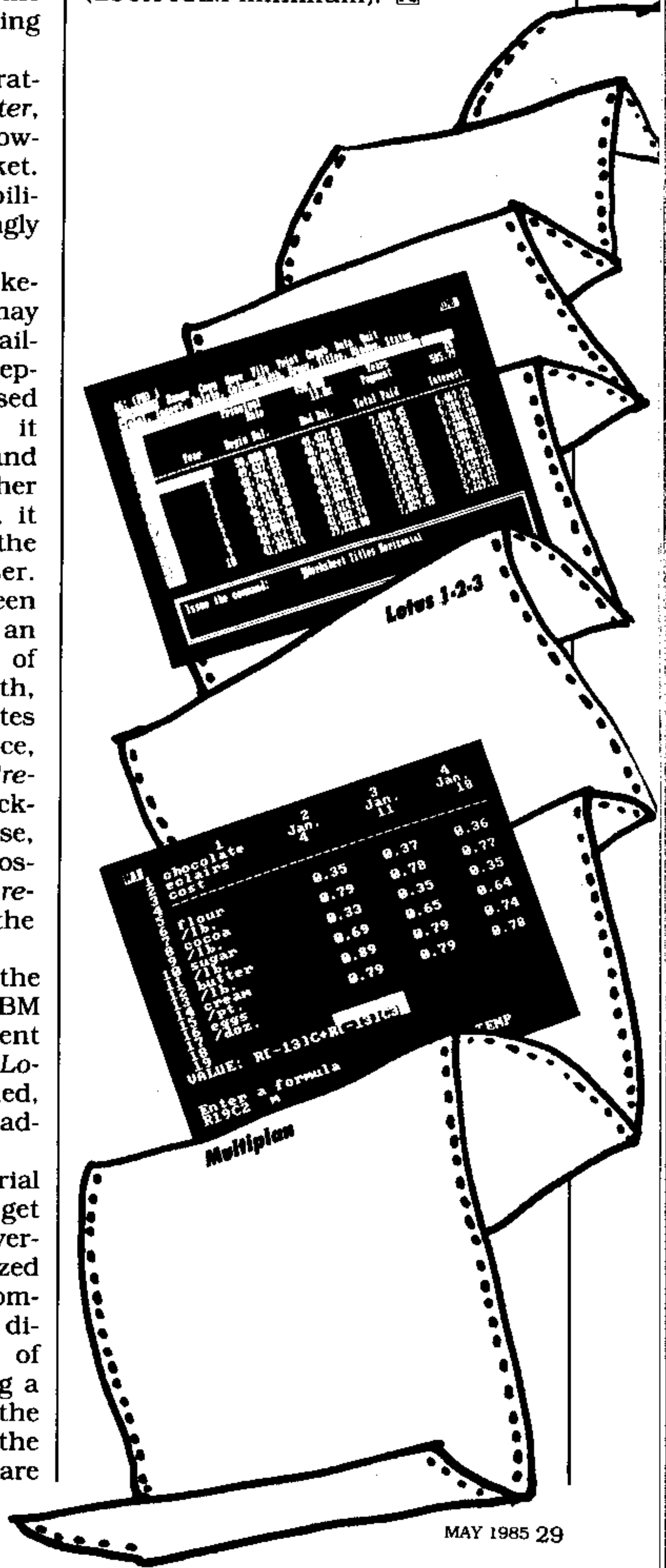
Like *VisiCalc* and Apple II in the early '80s, *Lotus 1-2-3* and the IBM PC have been a hot item in recent years. And for good reason, since *Lotus 1-2-3* is a powerful, well-designed, and remarkably easy-to-use spreadsheet.

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). ☐



## TIPS TO THE TYPIST

### 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 ( $2^2 = 2$  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 easi-

ly 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.

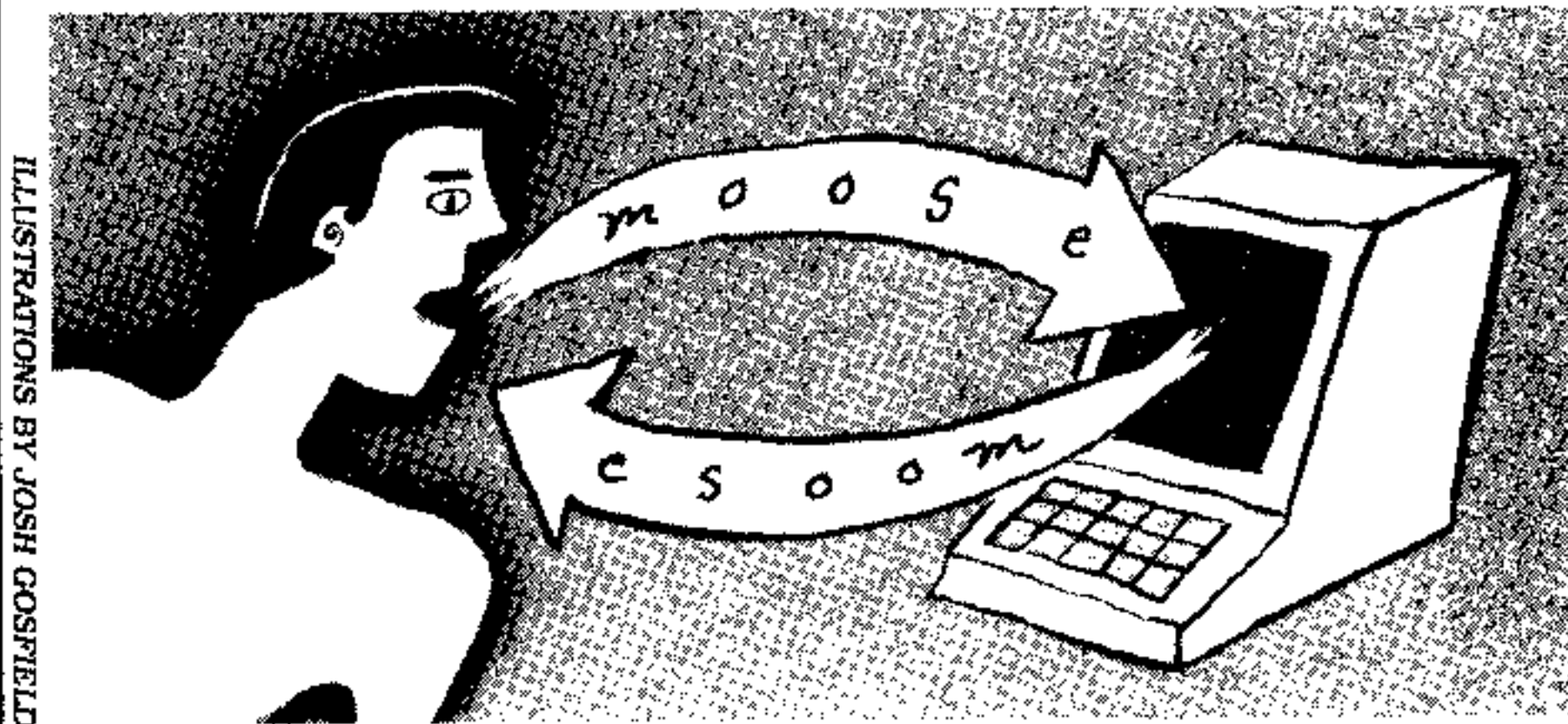
We're proud of our programs, and we want you to enjoy them as much as we enjoy writing them. If you just can't figure out what's wrong with a program, we'd like to help. But we can't if you don't provide us with important information. When you write us, please indicate:

- 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. ☐

# BACKWARD SPELLER

BY JOEY LATIMER



ILLUSTRATIONS BY JOSH GOSFIELD

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

## IBM PCjr/Backward Speller

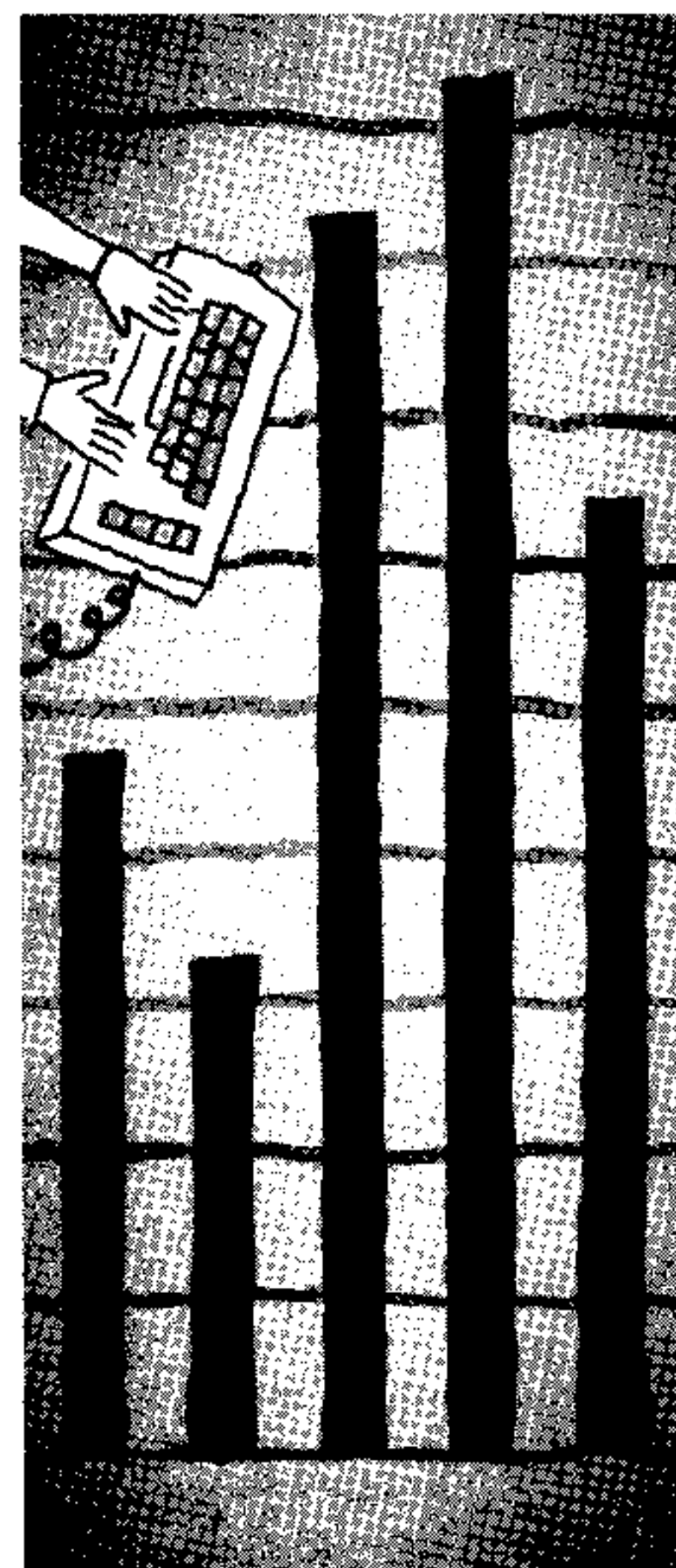
```

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



# BAR GRAPH

BY JOHN JAINSCHIGG



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  $3/5 \times 20 = 12$  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.

```
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
```

# Computer Camps: Heaven for Hackers

If you're worried about how you're going to fill those long summer days ahead (when computer classes and clubs are on vacation), never fear! Summer means computer camps! We're talking about "hacker heaven," here . . . camps where you can enjoy all sorts of outdoor activities (sunshine . . . swimming . . . remem-



Camp can be "hacker heaven" for computer lovers.

ber?) combined with computer instruction ranging from the basics in BASIC; to composing and producing computer music, creating graphic designs, becoming an ace at word processing; or learning Logo, Pascal, or even more advanced languages. There is a camp out there for you, your computer system, your age group, and your interests—in your

area. It just takes a little looking.

To get you started, K-POWER put together a sampling of camps from around the country. These are just a few camps you might want to send away for info on—there are tons more you probably can find in local newspapers or the *Yellow Pages*, by asking computer teachers or at computer stores, or by calling your local board of recreation. There are sever-

al good books out there on camps, including *Camps 'n Computers*, from the American Camping Association and Verbatim Corp., 323 Soquel Way, Sunnyvale, CA 94086; (800) 538-1793 and *The Complete Guide to Computer Camps and Workshops*, published by Bobbs-Merrill Co., Inc., 630 Third Ave., New York, NY 10017; (212) 697-7050.

## A Sampling of Summer Computer Camps:

**COMPUTER TUTOR**  
980 Magnolia Ave.  
Larkspur, CA 94939  
(415) 461-7533;  
(800) 227-2861  
Camp located on Stanford University campus

**EXPERCAMP** (formerly The Original Computer Camp)  
559 San Ysidro Road  
Santa Barbara, CA 93108  
(800) 235-6965  
Camps located in California

**D.U.C.K./DUKE UNIVERSITY COMPUTER KAMP**  
Room 04 North Building,  
Computer Science Dept.  
Duke University  
Durham, NC 27706  
(919) 684-5645  
Camp located on campus in North Carolina

**MARIST COLLEGE COMPUTER CAMP**  
Marist College  
Poughkeepsie, NY 12601  
(914) 471-3240 ext.345  
Camp located in New York

**MIDWEST COMPUTER CAMP**  
9392 Lafayette Road,  
Unit C3  
Indianapolis, IN 46278  
(317) 297-2700  
Camp located in Indiana

**MT. RAINIER COMPUTER CAMP**  
9061 N.E. 34th St.  
Bellevue, WA 98004  
(206) 453-8790  
Camp located in Washington

**NATIONAL COMPUTER CAMPS**  
P.O. Box 585  
Orange, CT 06477  
(203) 795-9667  
Camps located in Connecticut, Georgia, Ohio, Maryland, Missouri

**NEW ENGLAND COMPUTER CAMP**  
Banner Lodge  
Moodus, CT 06469  
(203) 873-1421  
Camp located in Connecticut

**SESAME PLACE COMPUTER CAMPS**  
100 Sesame Road  
Longhorne, PA 19047  
(215) 752-7070  
Camp located in Pennsylvania

**UNIVERSITY COMPUTER CAMPS OF AMERICA**  
2480 Crooks Road  
Troy, MI 48084  
(313) 362-4499  
Camp located in Michigan

# LOGON

L E T T E R S

### STUCK ON ZORK

Your tips for *Zork* were great (November/December 1984 K-POWER). My friends and I have had *Zork* for two years and we still haven't figured it out. If you can tell me these three things, I think I could win:

1. How do you get into the Cyclops' room?
2. How do you get into Hades?
3. Print up a list of the 20 treasures.

I'm sure these tips will help other *Zork* fans. You make a great magazine!

ROBERT FEIGLEY  
Baltimore, Maryland

Dear Robert,

Your wish is our command! According to 14-year-old hintster Tim Scott of Fargo, North Dakota, "to get rid of the Cyclops, say the name of the Greek hero made by Homer who put out the eye of a one-eyed giant in the *Odyssey*." To get through the invisible barrier of Hades, "ring the bell, light the candles with the matches from the dam, and read the book;" Tim says.

To get a list of the 20 treasures, we had to turn to *The Book of Adventure Games*. (It's \$19.95 from Arrays, Inc./The Book Division; [213] 410-9466.) The treasures are: Beau-

tiful Painting, Jewel Encrusted Egg, Ivory Torch, Egyptian Sceptre, Pot of Gold, Crystal Skull, Jeweled Scarab, Large Emerald, Platinum Bar, Trunk of Jewels, Crystal Trident, Jade Figurine, Sapphire Bracelet, Huge Diamond, Bag of Coins, Silver Chalice, Clockwork Canary, Brass Bauble, and the Ancient Parchment.

Good luck! And let us know if you have any hints to share with other gamers. We pay hintsters like Tim Scott \$10 for each original hint or strategy tip we use. (But enough already, with the *Zork* hints! We're drowning in them!) THE EDITORS

## ZORK II and ZORK III

Infocom. Text adventure. Your mission: To explore the great underground empire of Zork, solving complex puzzles and collecting treasure in the process. (Hints and game for most computers.)

🔑 *Zork II.* Crystal is invisible in water.

🔑 *Zork II.* Fire and ice don't mix. Maybe you should lead one to the other.

🔑 *Zork II.* You'd do well to ponder this sentence for the answer to the riddle room.

🔑 *Zork II.* You can't push the button in the carousel room—maybe you can get something to do it for you.

🔑 *Zork II.* It might help to know a little about unicorns' characteristics; that will help you decide whose help to enlist.

🔑 *Zork II.* Before eating the cake, think about *Alice in Wonderland*. P.S. Avoid the orange cake.

🔑 *Zork III.* Murder doesn't pay and you'll find you have to trust many people. In the case of the hooded figure, only wound him.

🔑 *Zork III.* To get the key from the south shore, you'll need the grue repellent from the Scenic Vista. Be sure to get hold of it before the earthquake ruins the water tunnel.—CHARLES ARDAI, 14, *New York, New York*; BRUCE KAMIMURA, 14, *Richmond, B.C., Canada*; BLAKE LINDNER, 14, *Pinckeyville, Illinois*; MARK SUTER, 15, *Bulger, Pennsylvania*

## H I N T H O T L I N E

**NECROMANCER**, Synapse Software. (C 64) Arcade/strategy. Your mission: To grow an army of trees and use them to destroy the enemy forces, ultimately to do battle with the enemy necromancer.

🔑 The best way to grow trees is first to plant one in each corner. When they mature, plant a group of trees between them. The outer, older trees will protect the inner, younger ones from the attacking trolls.

🔑 At the second set of screens, it may be easier to go straight down and proceed to the third set. But beware: You'll find that all the spiders you failed to kill on previous screens will appear now.—DAVID LANGENDOEN, 16, *Brooklyn, New York*

**50 MISSION CRUSH**, SSI. (Apple, Atari, C 64) Strategy/tactics. Your mission: To fly over German-occupied France in your *Flying Fortress* airplane and bomb strategic cities.

🔑 Fly diagonally over the anti-aircraft fields. This diminishes your vulnerability.

🔑 Always carry extra bombs. Your heavier load will burn more fuel, but if you use the bombs effectively, it will improve your score greatly.—SPECIAL Ks

**SHATTERED ALLIANCE**, SSI. (Apple, Atari) Strategy/tactics. Your mission: To put together an army and defeat the computer's, or your opponent's, enemy forces.

🔑 If possible, concentrate your attacks on weaker units, such as light infantry or cavalry. If you rout

these units quickly, you'll lower the morale of the army as a whole. Also, the more you rout, the easier it is to rout other units; it works like a chain reaction.

🔑 To rout the enemy, set your heavier units on some of the enemy's weaker ones, then cast haste spells on your unit at every turn. This way, at each turn you'll be attacking. Before long, the enemy will turn tail and flee.

🔑 Establish exactly what arms your opponent has; it's quite a shock to see half your medium cavalry decimated by the pikemen you'd thought were a bunch of wimpy infantry.—D. L.

**SERPENTINE**, Broderbund Software. (Apple, Atari, C 64, VIC-20) Arcade. Your mission: To use your snakes to rid the world of their evil cousins.

🔑 Get a snake to follow you, and when he makes a turn, double back and nail him.

🔑 Don't kill the last snake until you lay an egg (just cut him down to size). When doing this, stay as close to home as possible. This way, the frog won't have time to eat the egg while you can't defend it.—PETER COCKCROFT, 17, *New York, New York*

**IMPOSSIBLE MISSION**, Epyx. (Apple, C 64) Arcade/strategy. Your mission: To infiltrate the stronghold of Alvin, a mad professor, and reach his control room before he blows up the world. Collect pieces of a puzzle scattered throughout the rooms, and

put them together to gain entry.

🔑 Sometimes a gap actually may be too small to jump over. Don't worry, in these cases, you can just walk across the hole.—JEROME GOEMAAT, 12, *Bussey, Iowa*

**BLADE OF BLACKPOOLE**, Sirius. (Apple, Atari, C 64) Graphic adventure. Your mission: To venture forth in search of the Blade of Blackpoole.

🔑 The shield protects, but it weighs a lot and may slow you down.

🔑 Bees need honey and plants need bees.—DAMON OSGOOD, 16, *Brooklyn, New York*

**ASYLUM**, Screenplay. (Apple, Atari, C 64, IBM PC) Graphic adventure. Your mission: To escape the insane asylum where you're being held captive, before a maniac (who you alone can stop) destroys the world.

🔑 The janitor will take anything dropped in the halls. So, leave valuable stuff in empty rooms.

🔑 The baseball bat has many purposes; don't lose it.—STEVEN KADISH, 15, *Leonia, New Jersey*

We're looking for a few good hints! Help K-POWER readers be all that they can be by sending us hints for your favorite games. We have all the *Zork* and *Pac-Man* hints we can handle, but we'll be glad to publish and pay \$10 for hints we've not heard of. Send them to Hint Hotline, c/o K-POWER, 730 Broadway, New York, NY 10003. (Note: the computer systems listed in brackets indicate the computer versions the hints work for.)

# MUSIC PROGRAMS

## BY JOEY LATIMER

Most programs change your computer keyboard into a piano keyboard that lets you play just one note at a time. This month's Microtones gives you something better! With this *Fat Keyboard* program, which I worked on with Technical



Editor John Jainschigg, when you play one note—you get three or four! The notes can make up either a major, minor, or seventh chord, depending on which you select. The end result is (in record biz lingo) a real "fat" sound!

### ATARI/FAT KEYBOARD

```

10 DIM A(40),B(24),C(2,2),AS(16),QS(27),KS(3),SS(1),RS
(1),MS(1),LS(1)
20 LS=CHR$(153):RS=CHR$(25):MS=CHR$(252):SS=CHR$(32)
30 FOR I=1 TO 3:KS(I)=CHR$(160):NEXT I
40 ST=0:F=1:POKE 752,1:SETCOLOR 2,0,0
50 READ AS,QS
60 FOR I=0 TO 39:A(I)=-1:NEXT I
70 FOR I=0 TO 12:READ K:A(K)=I:NEXT I
80 FOR I=0 TO 24:READ N:B(I)=N:NEXT I
90 FOR I=0 TO 2:FOR J=0 TO 2:READ D:C(I,J)=D:NEXT J:NE
XT I
100 PRINT CHR$(125):POSITION 13,0:PRINT "*FAT KEYBOARD
*"
110 PRINT ;PRINT
120 FOR V=1 TO 9:IF V=7 THEN SS=MS
130 PRINT " ";LS;KS;SS;KS;SS;KS;MS;KS;
140 PRINT SS;KS;SS;KS;SS;KS;MS;KS;RS
150 NEXT V
160 FOR I=5 TO 33 STEP 2:P=INT(I/2)-1
170 IF AS(P,P)<>"X" THEN POSITION I,8+F*4:PRINT AS(P,P
)
180 F= NOT F:NEXT I
190 POSITION 4,18:PRINT "PRESS KEY ALONE FOR MAJOR CHO
RD,"
200 POSITION 8,19:PRINT "<SHIFT>+KEY FOR MINOR,"
210 POSITION 8,20:PRINT "<CTRL>+KEY FOR SEVENTH."
220 IF PEEK(753)=3 THEN 260
230 IF ST=0 THEN 220
240 ST=0:FOR I=0 TO 3:SOUND I,0,0,0:NEXT I

```

```

250 POSITION 15,15:PRINT "          ":GOTO 220
260 K=PEEK(764)
270 CT=(K>=64)+(K>=128)
280 K=K-CT*64-11:IF K<0 OR K>40 THEN 220
290 IF A(K)=-1 THEN 220
300 POSITION 15,15:PRINT QS(CT*9+1,CT*9+9)
310 SOUND 0,B(A(K)),10,4
320 FOR I=1 TO 3:SOUND I,B(A(K)+C(CT,I-1)),10,5:NEXT I
330 ST=1:GOTO 210
1000 DATA Q2W3EXR5T6Y7UXIX
2000 DATA **MAJOR***MINOR***SEVENTH*
3000 DATA 36,19,35,15,31,29,18,34,16,32,40,0,2
4000 DATA 243,230,217,204,193,182,173,162,153
4010 DATA 144,136,128,121,114,108,102,96,91
4020 DATA 85,81,76,72,68,64,60
5000 DATA 4,7,12,3,7,12,4,7,10

```

### COMMODORE 64/FAT KEYBOARD

```

10 DIM A(54),B(2,24),C(2,1)
20 RS=CHR$(146)+CHR$(161):LS=CHR$(18)+CHR$(161)
30 MS=CHR$(18)+CHR$(98):SS=CHR$(146)+CHR$(32)
40 KS=CHR$(18)+""
50 SA=0:F=-1:S=54272
60 FOR I=0 TO 24:POKE S+I,0:NEXT I:POKE S+24,15
70 POKE S+5,79:POKE S+6,234:POKE S+12,79
80 POKE S+13,234:POKE S+19,79:POKE S+20,234
90 READ AS,QS
100 FOR I=0 TO 54:A(I)=-1:NEXT I
110 FOR I=0 TO 12:READ K:A(K)=I:NEXT I
120 FOR I=0 TO 24:READ B(1,I),B(2,I):NEXT I
130 FOR I=0 TO 2:FOR J=0 TO 1:READ C(I,J):NEXT J:NEXT I
140 POKE 53281,0:POKE 53280,0
150 PRINT CHR$(147);TAB(13);CHR$(150);"*FAT KEYBOARD*"
160 PRINT:PRINT:PRINT CHR$(5)
170 FOR V=1 TO 9:IF V>6 THEN SS=MS
180 PRINT " ";LS;KS;SS;KS;SS;KS;MS;KS;
190 PRINT SS;KS;SS;KS;SS;KS;MS;KS;RS
200 NEXT V
210 FOR I=5 TO 33 STEP 2:P=INT(I/2)-1
220 IF MIDS(AS,P,1)="X" THEN 240
230 POKE 214,8-F*4:PRINT:PRINT TAB(I);MIDS(AS,P,1)
240 F=NOT F:NEXT I
250 POKE 214,18:PRINT
260 PRINT CHR$(150);" PRESS KEY ALONE FOR MAJOR CHOR
D,"
270 PRINT TAB(8);"<SHIFT>+KEY FOR MINOR,"
280 PRINT TAB(8);"<CTRL>+KEY FOR SEVENTH.";CHR$(158)
290 K=PEEK(197):IF K<>64 THEN 340
300 IF SA=0 THEN 290
310 SA=0:POKE S+4,32:POKE S+11,32:POKE S+18,32
320 POKE 214,15:PRINT:PRINT TAB(15);"
330 GOTO 290
340 K=K-8:IF K<0 OR K>54 THEN 290
350 IF A(K)=-1 THEN 290
360 CT=-((PEEK(653)=4)-(PEEK(653)>=1))
370 POKE 214,15:PRINT:PRINT TAB(15);MIDS(QS,CT*9+1,9)
380 POKE S+4,33:POKE S+11,33:POKE S+18,33
390 POKE S,B(2,A(K)):POKE S+1,B(1,A(K))
400 POKE S+7,B(2,A(K)+C(CT,0))
410 POKE S+8,B(1,A(K)+C(CT,0))
420 POKE S+14,B(2,A(K)+C(CT,1))
430 POKE S+15,B(1,A(K)+C(CT,1))
440 SA=1:GOTO 290
1000 DATA Q2W3EXR5T6Y7UXI
2000 DATA **MAJOR***MINOR***SEVENTH*
3000 DATA 54,51,1,0,6,9,8,14,11,17,16,22,25
4000 DATA 8,97,8,225,9,104,9,247,10,143,11,48,11,218
4010 DATA 12,143,13,78,14,24,14,239,15,210,16,195
4020 DATA 17,195,18,209,19,239,21,31,22,96,23,181
4030 DATA 25,30,26,156,28,49,29,223,31,165,33,135
5000 DATA 4,7,3,7,7,10

```



## TI-99/4A/FAT KEYBOARD

```

10 DIM A(148,2),B(24),C(2,1)
20 CALL CHAR(128,"0000000000000000")
30 CALL CHAR(129,"1818181818181818")
40 CALL CHAR(130,"FFFFFFFFFFFFFF")
50 CALL CHAR(136,"F0F0F0F0F0F0F0")
60 CALL CHAR(137,"0F0F0F0F0F0F0F")
70 CALL COLOR(13,2,16)
80 CALL COLOR(14,1,16)
90 KS=CHRS(128)&CHRS(128)
100 MS=CHRS(129)
110 SS=CHRS(130)
120 LS=CHRS(136)
130 RS=CHRS(137)
140 OK=-1
150 READ AS
160 FOR I=0 TO 148
170 A(I,1)=-1
180 NEXT I
190 FOR I=0 TO 2
200 FOR J=0 TO 12
210 READ K
220 A(K,1)=J
230 A(K,2)=I
240 NEXT J
250 NEXT I
260 FOR I=0 TO 24
270 READ B(I)
280 NEXT I
290 FOR I=0 TO 2
300 FOR J=0 TO 1
310 READ C(I,J)
320 NEXT J
330 NEXT I
340 CALL CLEAR
350 PRINT TAB(8);"*FAT KEYBOARD*"
360 PRINT
370 FOR V=1 TO 9
380 IF V<>7 THEN 400

```

```

390 SS=MS
400 PRINT " ";LS;KS;SS;KS;SS;KS;MS;KS;
410 PRINT SS;KS;SS;KS;SS;KS;MS;KS;RS
420 NEXT V
430 FOR I=1 TO LEN(AS)
440 Z$=SEGS(AS,I,1)
450 IF Z$="X" THEN 470
460 CALL HCHAR(24+5*(ASC(Z$)<65),I+4,ASC(Z$))
470 NEXT I
480 PRINT
490 PRINT
500 PRINT TAB(12);"MAJOR"
510 PRINT TAB(12);"MINOR"
520 PRINT TAB(12);"SEVENTH"
530 PRINT
540 PRINT
550 PRINT " PRESS KEY ALONE FOR MAJOR,"
560 PRINT " <SHIFT>+KEY FOR MINOR,"
570 PRINT " <CTRL>+KEY FOR SEVENTH."
580 PRINT " (<ALPHA LOCK> MUST BE UP.)"
590 CALL KEY(5,K,S)
600 IF S=-1 THEN 590
610 IF OK=-1 THEN 650
620 CALL SOUND(-1,44733,30,44733,30,44733,30)
630 CALL HCHAR(15+OK,13,32)
640 OK=-1
650 IF S=0 THEN 590
660 K=K-35
670 IF (K<0)+(K>148) THEN 590
680 IF A(K,1)=-1 THEN 590
690 CALL HCHAR(15+A(K,2),13,42)
700 CALL SOUND(4250,B(A(K,1)),1,B(A(K,1)+C(A(K,2),0)),
1,B(A(K,1)+C(A(K,2),1)),1)
710 OK=A(K,2)
720 GOTO 590
1000 DATA QX2WX3EXRX5TX6YX7UXXI
2000 DATA 78,15,84,16,66,79,18,81,19,86,20,82,70
2010 DATA 46,29,52,0,34,47,2,49,59,54,3,50,38
2020 DATA 110,143,116,144,98,111,146,113,147
2030 DATA 118,148,114,102
3000 DATA 131,139,147,156,165,175,185,196,208
3010 DATA 220,233,247,262,277,294,311,330,349
3020 DATA 370,392,415,440,466,494,523
4000 DATA 4,7,3,7,7,10

```

## M I C R O N O T E S

If you've really got rhythm, and a Commodore 64, this one's for you: **Sight & Sound's Kawasaki Rhythm Rocker** (\$34), a program written by jazz guitarist, composer, and recording artist Ryo Kawasaki. He's included lots of great electronic percussion and synthesizer sounds you can add to preprogrammed bass lines.

To get those music terms down, you might check out Sight & Sound's **3001 Sound Odyssey** (\$34) for the C 64. It teaches important electronic music-composition terms such as ADSR, waveform, filters, and ring modulation. The program includes the "Microsynth" synthesizer, which spruces up the rhythm patterns you record. Sight & Sound, 3200 S. 166th St., P.O. Box 27, New Berlin, WI 53151; (800) 558-0910.

**Activision** has gone into tune-making, too, with **The Music Studio** (\$29) for the C 64. The program's creative icons make writing, editing, and printing out music a breeze. Point to the ear icon to hear music; a note to see the music you play; the trash can to throw out music you're working on; and the instrument palette to select instruments and sound effects—you can write a chord to include up to three instruments. In no time at all you'll be a master of different keys and note lengths, and setting such details as waveforms,

pulse widths, resonance, and ring (vibration) modulation. Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043; (415) 960-0410.

Let **Covox's Voice Master** (C 64, \$90; Apple II/II plus/IIe, \$120 includes Sound Master interface board) make a maestro out of you. All you do is hum or whistle into the headphone mike, and watch the notes scroll by on a musical score on your screen. Turn to the EDIT mode to change or correct any of the notes, save the song to disk, and grab your musical score from the printer. Later on, you can go back to the PERFORMANCE mode to change octaves or musical keys, or add chords—all from the tune you hummed or whistled. Covox, Inc., 675-D Conger St., Eugene, OR 97402; (503) 342-1271.

Another way to get your Apple to talk, give off stereo sound effects, or make music is with the **Mocking-board** (\$99 to \$195) from **Sweet Micro Systems**. It comes in different versions: a sound and music synthesizer (A; \$99), a speech synthesizer upgrade unit that plugs into the music synthesizer (B; \$89), a combination stereo sound, music, and speech synthesizer (C; \$179), and the same combo for the Apple IIc (D; \$195). Sweet Micro Systems, 50 Freeway Drive, Cranston, RI 02920; (401) 461-0530.

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