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OBJECT LESSON

► I would like to join Henrique Avila Vianna (Letters, *Nibble*, Vol. 10/No. 7) in thanking and congratulating John Romero for his games; I would also like to thank Bob Gardner for his program Diskoverer (*Nibble*, Vol. 7/No. 8).

However, I am glad Diskoverer and Major Mayhem were published before Checkit came along. I say this not because I don't like Checkit (far from it) but because part of the fun, and most of the learning experience, of Major Mayhem and Diskoverer came from following the source code and being able to experiment and introduce changes. Because of this, I have yet to type in City Centurion (*Nibble*, Vol. 9/No. 12)

I was able to take advantage of Bob's foresight and add a command to Diskoverer; Major Mayhem taught me all I know about bit-mapped shapes. I don't own an assembler. I can type in the hex listing error-free the first time, but I have virtually no hope of understanding what I am typing. I would love to turn Works Processor (*Nibble*, Vol. 10/No. 3) into a SYS file, but this seems impossible for me. Please, please, revert to including the object code with the source-code listing! I am sure that owners of assemblers will still be able to use the object code, and those of us who use CHECKIT will still be able to type in the hex dump. But we will all be able to follow the listing and learn from it.

Mike Beaumont
Auckland, New Zealand

To publish the object code next to the source code would take substantially more page space and, unfortunately, could force us to publish fewer or smaller programs. Most of our readers say a separate hex code listing is much easier to type into the system — particularly with Checkit to verify the process. We'll continue to consider the tradeoffs, but for the time being, it seems to us that we're best serving your interests by publishing the hex code as a separate listing.

And you can still use the Apple II's System Monitor to disassemble the code after you enter it; you can then send the disassembly to a printer for study.

— The editors

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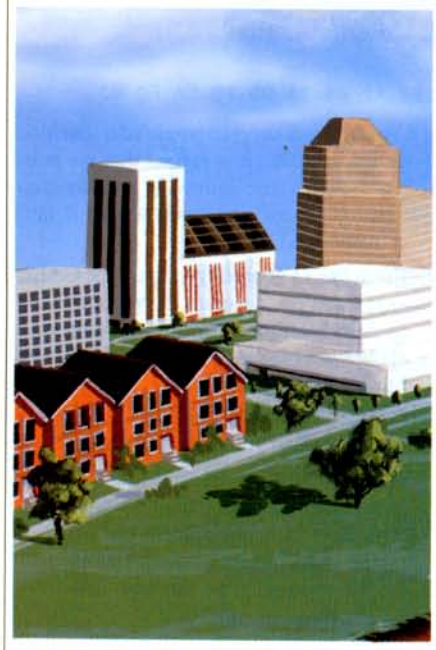

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FOR APPLE II ENTHUSIASTS

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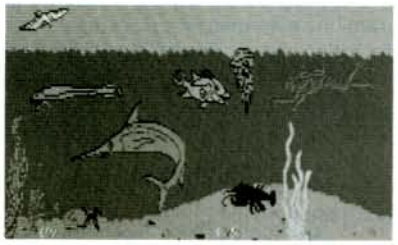

WELCOME TO NEW READERS

Welcome to *Nibble* magazine, one of the most interesting and useful publications available for Apple owners. *Nibble* publishes an outstanding collection of valuable Applesoft BASIC and other applications that you can type and run right from the magazine. And every application is supported with an article that shows you, step-by-step, how to put the project into your Apple II and how it works — *even if you know nothing about programming!*

If you're new to computing, however, you may find the world of programs a bit confusing at first. If this is the case, perhaps the best advice would be to spend some time with the manuals that came with your computer. Once you understand how to get Applesoft BASIC up and running, you'll be surprised at how easy it is to enter programs into your Apple. It's always a good idea to start small, with a short BASIC program. Don't forget to review the Typing Tips in this issue as well.

THE BASICS...

Applesoft BASIC is built right into your Apple II. You can type in and run BASIC programs without using your disk drives at all, but if you want to save your programs for later use, you'll need to follow the instructions in your owner's manuals to get BASIC and the disk operating system up and running.

Once you do, you will most likely see a "]" character, called a *prompt*. When you see the prompt, your computer is waiting for you to tell it what to do next. You can:

- Type commands from the disk operating system (e.g., CATALOG)
- Type commands in BASIC (e.g., PRINT 36*42)
- Type in a BASIC program line (e.g., 10 INPUT NAME$,ADRS$)

All BASIC programs consist of a sequence of numbered program lines. The program lines consist of a line number followed by one or more BASIC statements separated by colons. For example,

```
20 FOR I = 1 TO 5: PRINT CHR$(7):
   NEXT I
```

To enter a program, start with the first numbered program line and type it in — including the line number itself — exactly as it appears in the listing. Though a program line may span several printed lines in the listing, do not press Return (the Return key) until you have typed the entire program line. Repeat the process with the next program line, and continue until you have entered them all.

To enter the program in **Listing 1**, follow this sequence:

1. Make sure the Caps Lock key is down.
2. Type NEW and press Return to erase any program lines that may already be in memory.
3. Type **line 10** exactly as it appears, pressing Return after typing the last word in the line ("BELL").
4. Repeat this process for **lines 20-30**
5. Type SAVE RINGER and press Return to save the program on disk under the name RINGER.
6. Type RUN and press Return to start the program. If you entered each line correctly, you should hear a bell ring five times.

LISTING 1

```
10 REM RING THE BELL
20 FOR I = 1 TO 5: PRINT
   CHR$(7): NEXT I
30 END
```

...AND BEYOND

In addition to BASIC, *Nibble* also publishes programs written in *machine language*, the Apple's own internal language. Machine language may at first be intimidating, but you do not need to know all about it in order to use it and harness its power and lightning-quick speed. *Nibble* articles have special instructions for entering and saving machine language programs.

Often, programmers use what is called an *assembler* to translate *assembly language* into machine language. Assembly language is slightly more English-like and readable than machine language, which appears to be nothing more than *hexadecimal* numbers, or *hex codes*. Hex codes are usually two-digit numbers, with the letters *A* through *F* included as digits (e.g., 01, 23, 5F, and EE are all valid hexadecimal numbers).

If you have an assembler, you can type in the assembly language (or *source code*) listings in an article. If you don't have an assembler, you can enter the machine code directly into your computer. Machine language listings have lines that consist of a three- or four-digit hex number followed by a colon and several two-digit hex codes separated by spaces. For example,

```
300:A2 05 20 DD FB CA F0 03
```

Listing 2 is a short example of a machine language program in a format that we publish in *Nibble*. The following step-by-step instructions show you how to load it into your Apple and run it.

1. From the "]" screen prompt, type CALL −151 and press Return to switch into the System Monitor. You should now see a screen prompt, "*" (followed by the blinking cursor).
2. At the cursor, type

   ```
   300:A2 05 20 DD FB CA F0 03
   ```

   and press Return. Be sure to include the spaces between the pairs of hex characters. You have just entered the first line of the machine language program.
3. At the prompt, type the next line,

   ```
   308:4C 02 03 60
   ```

   and press Return. This is the second and last line of the machine language program.
4. Now press the Control and C keys together, followed by Return to go back to the familiar "]" prompt.
5. To save the machine language program as a *binary* disk file, type

   ```
   BSAVE RINGER.BIN,A$300,L$C
   ```

   The A$300 is the hexadecimal address in memory where the program resides. It corresponds to the 300 that you used in the first line of the program. The L$C specifies the length of the program, which contains 12 pairs of hexadecimal characters ($C is the hexadecimal equivalent of 12).

LISTING 2

```
300:A2 05 20 DD FB CA F0 03
308:4C 02 03 60
```

To run the program, type CALL 768 and press Return. This causes your Apple to begin running the machine language program at memory location 768 (which is the decimal equivalent of $300 hexadecimal). You should hear the bell ring five times each time you type CALL 768.

In this column, we have instructed you to press Return after typing a statement or a command. With the programs in the magazine, however, we do not include the Return instruction. Assume that you need to press Return at the end of each program line.

FIRST AID

To help you avoid typing mistakes, *Nibble* has developed the Checkit system, which alerts you of any typing mistakes you might make. The Typing Tips section explains Checkit and also has information about our Technical Support Department, which is devoted to helping you get your *Nibble* programs up and running.

ASK NIBBLE

by Roger Wagner

Where can you get answers to all your Apple questions?

Ask Nibble of course! Send your questions to Ask Nibble, 52 Domino Dr., Concord, MA 01742.

Q **Is there a way, from Applesoft BASIC, to load and save Double Hi-Res pictures?**

A To understand the solution, let's first consider why there's a problem. Apple II computers with 128K or more of memory (IIe, IIc, IIGS, and Laser computers) have two banks of 64K memory. But Applesoft BASIC was created for the Apple II Plus, which had only one 64K bank. Because of this, Applesoft has direct access — with POKEs, PEEKs, and CALLs — only to the first 64K bank.

A regular Hi-Res graphic screen corresponds to the chunk of memory from $2000 to $3FFF (or 8192 to 16383 in decimal). When you BLOAD a Hi-Res picture as a binary file, it is loaded into this block of memory, and the picture appears. Saving a picture is accomplished by BSAVEing the same range of memory to disk. So, a typical Applesoft graphics program might look like this:

```
Ø REM REGULAR HI-RES PROGRAM
5 D$ = CHR$ (4)
1Ø HGR
2Ø PRINT D$;"BLOADPICTURE1,A$2ØØØ,L$2ØØØ"
1ØØ REM USER PROGRAM HERE THAT CREATES NEW SCREEN
2ØØ REM SAVE NEW HI-RES SCREEN
21Ø PRINT D$;"BSAVE PICTURE2,A$2ØØØ,L$2ØØØ"
```

When the Apple IIe was created with 128K of memory, an additional 64K became available. This bank of memory technically has the same address range as the first 64K, and is parallel to the first. Applesoft doesn't have direct access to it, but parts of it are used in some Applesoft programs, notably in 80-column text and Double Hi-Res graphics. The 80-column text ability was created by changing the video display hardware to use each bank of memory alternately as characters are put on the screen.

So, on the 80-column screen, half the characters — the ones at VTAB positions 1, 3, 5, and so on — are stored in the second bank of memory (called the auxiliary bank). The characters at the even VTAB positions — 2, 4, 8, and so on — are stored in the first, or main bank.

Double Hi-Res (DHR) is accomplished by combining the banks of memory; it was discovered accidentally soon after Apple produced the first IIe machines. This technique required a small

---

Roger Wagner is the president of Roger Wagner Publishing Inc., the publisher of MouseWrite and the Merlin Assembler, and the author of Assembly Lines: The Book *and* Apple IIGS: Assembly Language for Beginners.

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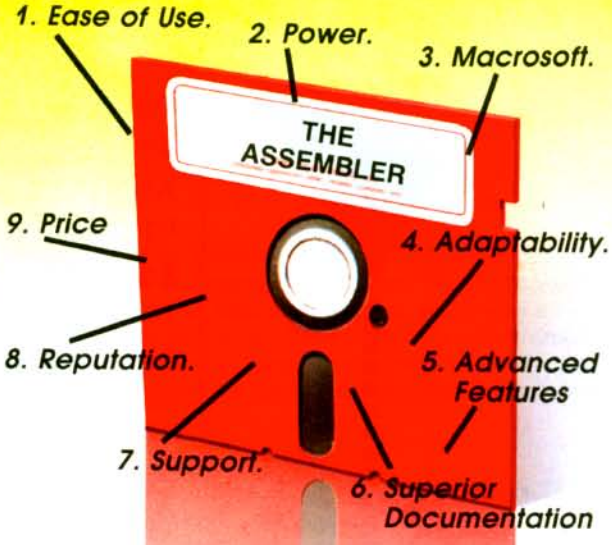

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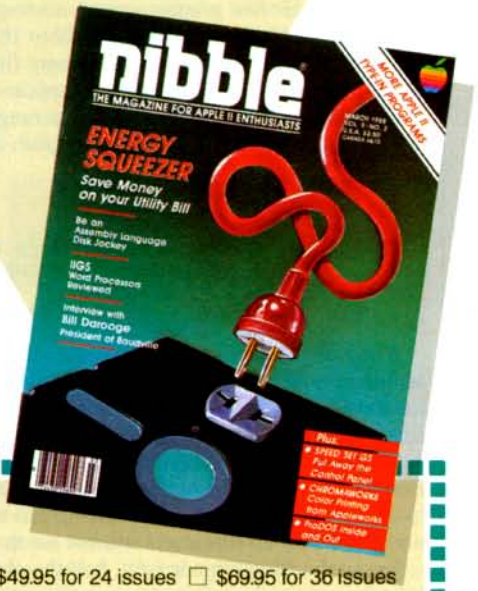

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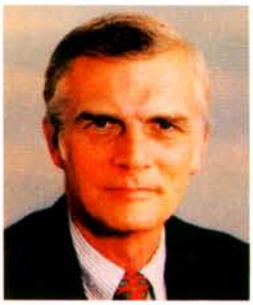


PAYING THE BILLS

A new year! New challenges and opportunities... and risks. In the continuing discussion of starting and managing your own business, two of the most misunderstood concepts are **PROFIT** and **CASH**.

In simplest terms, profit is what is left over after all your revenues are received and all your bills are paid. Profit is the *bottom line*. Cash, on the other hand, is the currency that you must have to pay the bills. You can't build cash without profit, but profit by itself is not enough.

PROFIT... SUCCESS?

Let's examine some of the ways that entrepreneurs can be trapped by profit myopia. First, there are several levels of profit that must be considered. The most commonly understood is *gross profit* or *gross margin*.

Let's say that you've developed your own software product that you're selling through direct mail. It costs $20 to produce the product, and you're selling it through the mail for $49.95. You'll probably think in terms of a $29.95 profit every time you sell one. And it's true that $29.95 is gross profit. But wait.

If you sell to dealers, they'll expect a 40-50 percent discount from your price. This means that if you sell your product for $49.95 to individuals, you'll get only $25 from a dealer sale. Your gross profit on a dealer sales drops to $5. Dealers will also insist on being able to return any unsold products after 6-12 months. But you can still book the initial sale as gross revenue and profit, realizing that there's a potential time-bomb ticking if returns are excessive. *A number of software companies were badly bruised by overstocking and heavy returns in the last holiday buying season.*

Remember, too, that all of the production costs are incurred up front, before you've shipped anything.

NETTING OUT

If you're an independent entrepreneur, it's tempting to conclude that you're making $29.95 on every individual sale and $5 on dealer sales. That's a dangerous place to stop.

Did you have to advertise the product to sell it? That costs money. Did you mail it to the buyer? That costs money too. Was the order processed using paper, forms, invoices, etc.? The supplies cost money. Was your computer used to do the processing? That's capital that was used in your business.

What about labor? Advertising costs? Supplies? Rent? Heat and light? All of those things cost money. All of them subtract more money from your sale and reduce gross profit.

Initially, it's easy to assign no value to these things, since many of you will start your businesses in your own homes. You may say: "Well, my spouse and I do all the work, so that doesn't count!" Well, with all respect... that's baloney. Remember, you're starting a business.

The simple fact is, if something costs money and you use it in your business, it reduces your profit and adds to your expense.

BENEFITS

Later, as your business grows and you begin to hire people, you'll learn about other expenses. These include such things as unemployment insurance, state and federal withholding taxes, and so on. And don't forget benefits.

If you're now working for a large company, you may take benefits for granted. When you hire people, you'll have to develop a benefits package of things like vacation pay, health and life insurance, holidays with pay, and sick days. Sick days take on a whole new meaning when it's *you* paying them. As a rule of thumb, a competent benefits package can add 25-50 percent to your cost of paying salaries.

You can see that the simple formula REVENUE − PRODUCT COST = PROFIT is dangerously deceptive. When you analyze these things and subtract them from revenue, you'll wind up with a *Net Profit/Income Before Tax*. Then Uncle Sam will demand his piece of the action... that is, assuming you have a profit. Then and only then will you arrive at a figure that represents what your business has earned.

CASH, NOT PROFIT, PAYS BILLS

Cash is grossly misunderstood by a surprising number of businesspeople... particularly in large companies. Cash, not profit, pays the bills. Interestingly, a highly profitable small company can still go bankrupt if it doesn't have the cash to pay its bills. Conversely, a company that is losing money and filing for bankruptcy protection to work out its credit problems can continue to operate *if it has built up a cash reserve* to pay its bills.

Like it or not, we live in a credit-oriented world. If you're selling to dealers, they will demand a payment schedule that makes partial payments at 30-, 60-, or 90-day intervals. And that will mean more cost to you, to follow up and *get paid* for what you've sold. You'll send invoices, and then statements, and then past due statements to keep the payment pressure at a peak.

Standard accounting practice will let you record profit, when you actually ship a product. But that's a far cry from actually getting paid for the shipment. The payment schedule can begin to drag out. The 30-day mark can become 45 or even 60 days, and the whole cash flow structure begins to crumble.

NO SURPRISES

Nasty surprises can be fatal. You can produce and ship products in large numbers. You can record revenues and tremendous profits as your accounts receivable skyrocket. And your business can literally fail because of its sales success, overextended credit, and your inability to pay the bills.

Face the fact, too, that some of your customers will never pay their bills. Their businesses will fail, and you'll have to write off the revenue, and take it as a loss. This will save you money at tax time, but the cash loss — your cost — is a total loss.

The message is simple: define your costs — *all* your costs. Be realistic in defining profit. Expect the availability of cash to lag behind the sale and resultant revenue, sometimes by many weeks. Plan to buffer your business against cash shortages and keep a consistent and vigilant hand on the controls. In short...

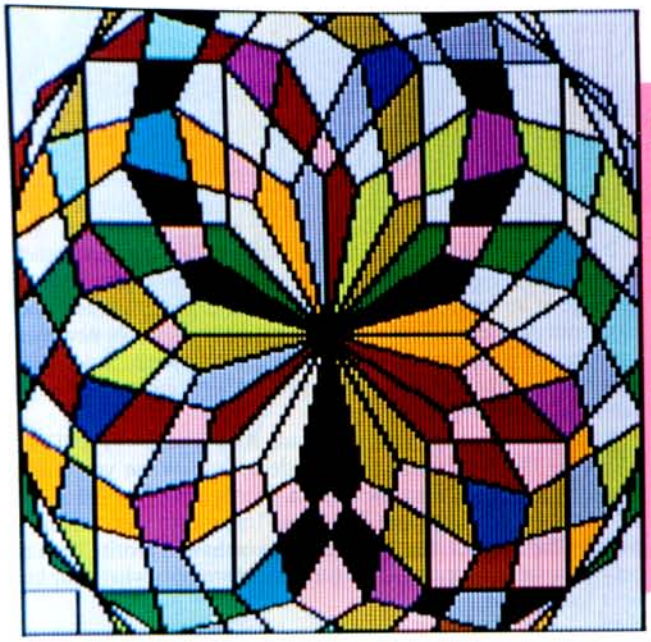
Understand what profit really is — and then manage the cash. It's your lifeblood.

Mike Harvey

Mike Harvey
Publisher

ON THE SCENE

Edited by Doug Herold



GET FORTH RIGHT

■ If you've been putting it off, now's a good time to come Forth. **GS16Forth II**, an upgrade of the original Forth implementation for IIGS, offers a range of new abilities designed for GS/OS System 5.0 and its tool sets. The product now compiles standard text files, so you can write source code on any word processor or development system that creates ASCII files. Also new is a desktop interface for easy writing, compiling, and debugging of code. Error messages are rendered with complete descriptions, rather than just numbers. Included in the GS16Forth II package is a LOGO system for newcomers to the language; you can use it to create complex screen graphics with turtle commands entered directly from the keyboard. A version of the board game Go is included as part of the tutorial. GS16Forth II requires a IIGS with at least 768K. It costs $49.95, or $15 for an upgrade. *GSF, 1049 Shady Lakes Circle S., Palm Beach Gardens, FL 33418; (407) 775-1782.*

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CREATURES FEATURED

■ Ever met a skelk? How about a gnuduck? You won't find them in any zoo, but your students might find them in **Creature Cube,** a 3-D program that teaches inference skills. A sequel to the award-winning education program Safari Search, Creature Cube pits the skills of 4 to 12 players against 10 games that develop problem-solving skills and logical thinking. In the title activity, a fictitious creature — a unidog (unicorn/dog) or perhaps a foxken (fox/chicken) — hides in a segment of a three-dimensional cube, and players must determine its lair by trial-and-error. Another game is like battleship, but involves hidden markers and clues. And in yet another game, students create buildings and even cities out of multi-colored cubes. Creature Cube costs $65, and includes a 5.25-inch disk, backup, and teachers' guide. *Sunburst Communications Inc., Pleasantville, NY 10570; (914) 769-5030.*

CIRCLE NUMBER 151

AFTER DARK

■ You no longer have to listen to those tales of **Dark Castle** from your friends in the Mac world, because now you can run it on your IIGS. As if you didn't know, this best-selling game is set in a haunted fortress of the Middle Ages. You're armed only with a handful of rocks, a little elixir, and some other odds and ends, but you have to ward off flying monkeys and careening fireballs, to say nothing of Merlin's malevolent magic. But even if you fail in your mission, you'll still enjoy the spectacular color graphics and more than 70 digitized sounds along the way. Dark Castle, $44.95, runs on a IIGS, and supports the SuperSonic Card from MDIdeas. *Electronic Arts Distribution, 1810 Gateway Drive, San Mateo, CA 94494; (415) 571-7171.*

CIRCLE NUMBER 153

MAPS ALIVE

■ A "living map" in **USA GeoGraph** will help you learn about the 50 states, plus six territories and the District of Columbia. A 105-category database, which can be viewed in text or graphic modes, is linked to the map, and called by just a mouse click. Easy-to-use commands let you compare states and observe economic, demographic, historical, and environmental patterns. Other features include zooming, English and metric measurements, the ability to add database categories, and the option to print anything displayed on the screen. Also available: World Geograph. USA Geograph runs on Apple IIGS computers with at least 768K of memory, ROM Version 01 or greater, a mouse, color monitor, and a 3.5-inch disk. The program comes with two 3.5-inch disks, a classroom guide, and user's guide. It costs $139. *MECC, 3490 Lexington Ave. North, St. Paul, MN 55126; (800) 228-3504 or, in Minnesota, (800) 782-0032.*

CIRCLE NUMBER 152

RAW DATA

ON-LINE LEISURE

■ GEnie users can now plug into their favorite pastimes by modem, courtesy of the Hobby RoundTable. It's among the newest of GE's RoundTable services, featuring on-line activity about model aviation, model boating, radio-controlled cars, model railroading, static (plastic, wood, and paper) modeling, dollhouses and miniatures, games, collectibles (die-cast vehicles, stamps coins, comic books, baseball cards, and more), arts and crafts, model rocketry, wines, treasure and relic hunting — even beekeeping. The Hobby RT features a bulletin board for posting and reading messages by category, real-time conference ability, and software libraries from which users can download public domain software about their hobbies. Subscribers can also upload files they want to share with others — for free. Weekly conferences with special guests — industry representatives, well-known hobbyists, and national or international award winners — are held on Thursdays at 9 p.m. There is no charge for RoundTable activity beyond GEnie's hourly rate, which ranges from 5 to $18 depending on time of day and access speed. (There is also a $29 registration fee.) For more information, contact GE Information Services at 1-800-638-9636, or type HOBBY$ at any GEnie menu prompt.

by Doug Herold

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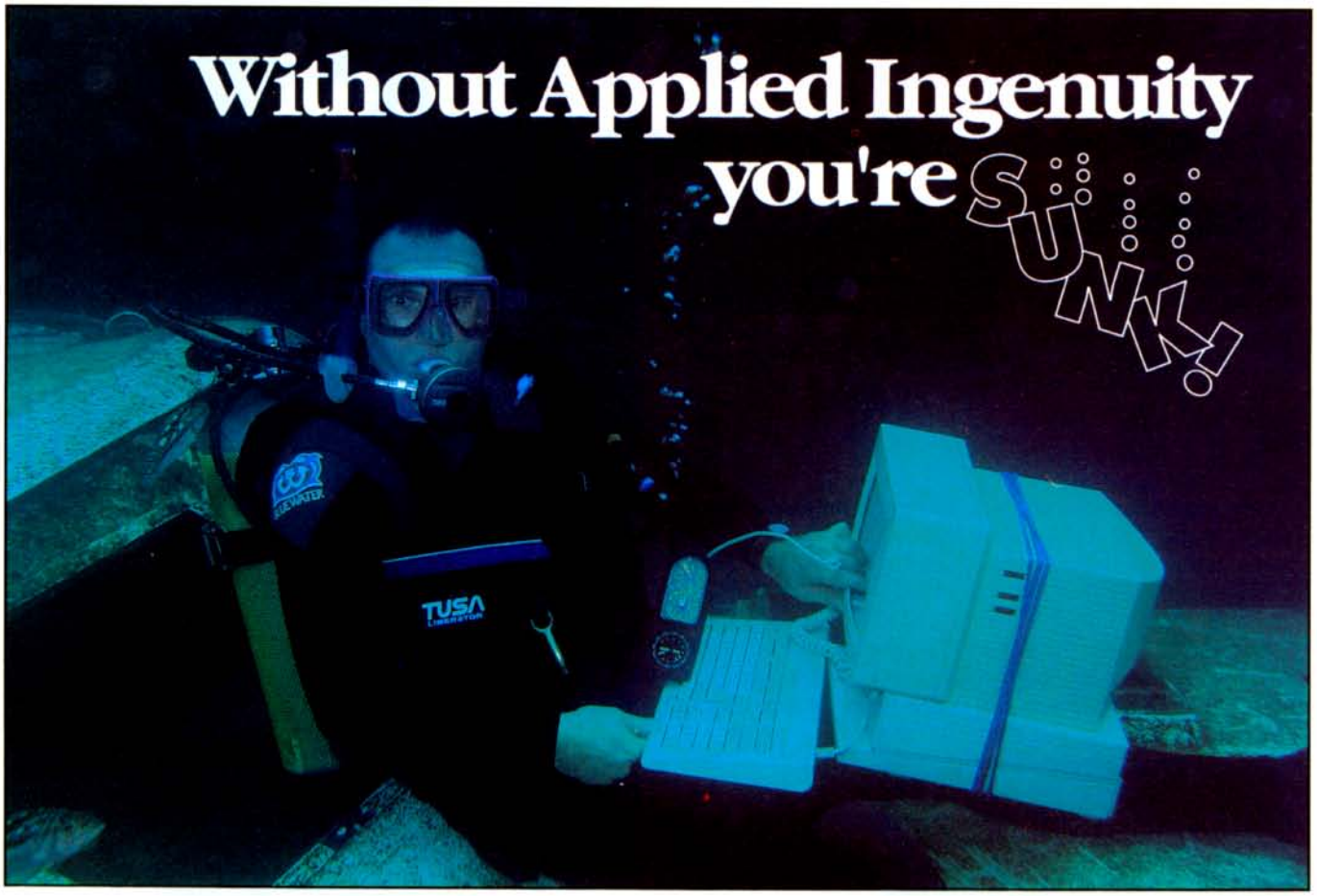

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■ Gradebook Plus, the comprehensive teacher's assistant, has been ugraded to run under GS/OS System 5 and to work with an Apple mouse. The new version, 4.0, which is also available for other Apple II series computers, now has a screen-editing window and mini-word processor to create letters and reports. It can import text files from other word processors and export data in text-file form for use in AppleWorks or the Macintosh version of Gradebook Plus. The program can keep track of eight classes, with 42 students per class and 69 entries per student. It automatically calculates weighted scores, class statistics, and grades based on the instructor's grading scale. Gradebook Plus 4.0 costs $59.95 ($24.95 for an upgrade from 3.04) or $199.95 for the site-license program ($69.95 for an upgrade). It runs on Apple II Plus, IIe, IIc, and IIGS computers, and comes on 5.25-inch or 3.5-inch disks. *Mindscape Inc., 3444 Dundee Road, Northbrook, IL 60062; (800) 999-2242.*

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CIRCLE NUMBER 159

KNIGHTS TO REMEMBER

■ It's not just a castle or city, it's an entire, medieval world. **Knights of Legend**, which took programmer Todd Porter eight years to build, contains 30 hamlets, with a myriad of unique and colorful personalities in each. While on various quests, you'll be able to aim every blow and feel every wound. Fatigue will be as lethal as a swordblow. Knights of Legend has a menu-and-icon interface, and you might find the fantasy, role-playing elements familiar: The program is from the developers of the classic Ultima series. Knights of Legend costs $49.95, and runs on II Plus, IIc, IIe, and IIGS computers. *Origin Inc., 136 Harvey Road, Building B, Londonderry, NH 03053; (603) 644-3360.*

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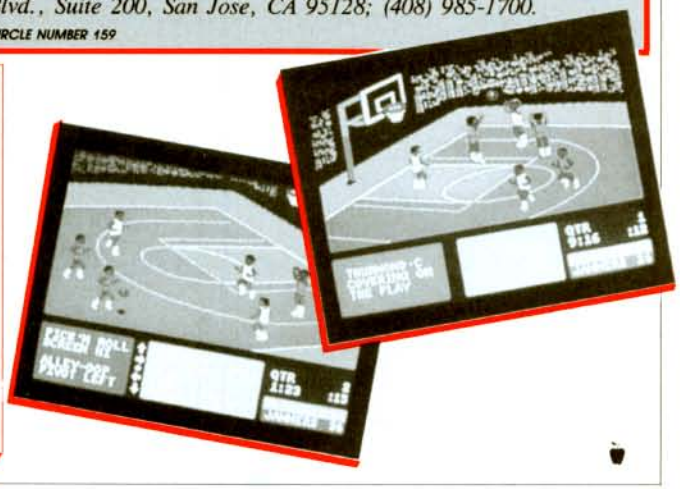

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by Neil Shapiro

PIE THROWING & OTHER ANTICS

In my local bookstore I found two books by Jane Austen, three by Mark Twain, one by Charles Dickens, none by Marcel Proust, and six about The Three Stooges. Next to the bookstore, in the mall, is a software store. That store does not carry any of the writers, but it does sell **The Three Stooges** from Cinemaware, for your Apple IIGS. And, all I can say to that is:

Nyuck! Nyuck!

Wise guys, eh?

If you have been lucky enough never to learn of The Three Stooges, you should avoid this game. An appreciation of "Stoogemania" is a definite advantage. Rabid fans of Larry, Moe, and Curly (and you know who you are) will enjoy this game the most. But even those of us who only giggle, ashamed at the filmed antics of the Stooges, will find this game has a certain pie-in-the-face, finger-in-your-eye charm.

I don't think I can explain the cinematic antics of The Three Stooges. So, instead, I'll explain the game!

Billed as a "Cinemaware Interactive Movie" for your IIGS, The Three Stooges game lets you control the exploits of the slapstick trio as they careen, punch, and even work their way around Stoogeville. In this game, they are men with a mission as well as men with a schtick.

A widow with three beautiful daughters lives on the outskirts of town, where she runs an orphanage. The widow is having some bank-related problems. Yes, an evil banker is anxious to foreclose on the orphanage, putting the widow, her three daughters, and the indeterminate number of orphans onto the cruel streets.

But, thank goodness, she can turn to The Three Stooges. And, if that isn't lucky enough, she has you to control the Stooges. What a lucky lady!

The Stooges on the screen are smaller than the original actors, but this is a cartoon version of the Stooges, and it's more important that the faces be recognizable. They are. Also, gag lines and Stooge sounds are stored on disk to be unleashed when needed.

There's just no doubt the real Three Stooges are on your screen.

It's up to you to find enough money in Stoogeville to pay off the banker. Five grand will pay off the orphanage's mortgage, ten will pay off the mortgage and repair the orphanage. An unspecified amount "more than that" will win the widow's daughters for the Stooges. (But don't you think the girls would run away from home first?)

The game is played on a map of a winding street comprising180 squares. From each square the Stooges can journey to any of the next six squares. But here's the first action sequence: The six possible squares are shown at the top of the screen and Moe's hand moves quickly from square to square. You must press the joystick button on the right square. Watch out, for many of the squares are mousetraps and you lose a day (from

Neil Shapiro is founder and Chief Sysop of CompuServe's MAUG. Write to him at MCU Inc., P.O. Box 520, Bethpage, NY 11714.

a 30-day limit). Worse still, each day the animation speeds up so it becomes harder to pick the right square.

The solution is a little bit of Stooge action! As Moe, you can knock some sense into Larry and Curly; the joystick button will make Moe feint, duck, poke, slap, kick, and punch. The more his blows land on Larry and Curly, the slower the animation becomes and the easier the game to play. But if he misses or gets clobbered in return, the animation speeds up.

If you land on a money square, you'll see the Stooges in an animated sequence: They'll walk to the square and find a moneybag or billfold. The streets of Stoogeville are not paved with gold, but many citizens seem to drop things.

On the other hand (or poking finger) there are ways to *earn* money. You can play doctor, which allows you to control the Stooges as they careen through a hospital to an operating room, picking up items from a nurse's cart along the way. Or you can race Curly as he eats crackers from a bowl before hungry oysters can get his meal. These and other sequences are controlled with the joystick. The faster you go, the more money you receive.

My favorite sequence is "Help Wanted: Waiters." This is a hilarious, animated pie-fight sequence. The Three Piemen are lined up on the right of your screen behind a table of meringued ammunition. Across the hall are three upper-crusty people just asking for it, but armed with their own gloppy stockpile of pies. With the joystick (or keyboard) you can control any of the Stooge as they ducks and throw pies.

Wham! Blam! Splat!!! Woo! Woo! Boy, I only wish this sequence could be played by itself. Nyuck! Nyuck! What a riot. Ooops, sorry. Back to describing the game.

A Stooge trivia test comes up when you step on certain squares. I must admit I did not earn many dollars there, but true Stooge fans will be well rewarded.

All in all, The Three Stooges is a fun game. It is not a classic; I suspect it will become repetitive after a bit of playing. However, it's certainly a unique way to poke a lazy afternoon right in the eye!

The Three Stooges, $49.95, is available from Cinemaware Corp., 4165 Thousand Oaks Blvd., Westlake Village, CA 91362; (805) 495-6515. It requires an Apple IIGS with 1.25 MB RAM; a joystick is optional. The program includes two 3.5-inch disks, manual, and an interesting short history of the Stooges.

Please circle 120 on Reader Service Card

A TURKISH DELIGHT

Broderbund's new **Prince of Persia** takes place, of course, in old Persia, not Turkey. But who could resist the subhead? Not I! This game really and truly is an unmitigated delight and it will thrill anyone with the slightest interest in arcade games.

Every so often, every few years, a game for the Apple II comes along that pushes the ol' Apple II to new heights, new wonders, new achievements. Later, all other games in its category must be judged against it. Prince of Persia is that game for this year.

Remember the Karateka game? This new one was written by Karateka's author, Jordan Mechner. He has taken the fluid animation of Karateka to new heights.

Jaffar the Grand Vizier has stolen both power and your girlfriend — who happens to be the deposed Sultan's daughter. Jaffar throws you into the Sultan's dungeons and gives the Princess a choice between marraige and death — within the hour. All of this, by the way, is shown in a brief but well-animated "movie" at the beginning of the game.

So, there you are, in the dungeons. Can you get out? Can you save the Princess? It will not be easy, but it will certainly be the arcade experience of your life.

You see, what makes this game so wonderful (am I gushing?) is that the little onscreen character does not move like a little, onscreen character — he moves like a person. With the joystick you can have him swing up lithely onto a ledge and duck under a falling portcullis, have him leap madly over booby-trapped pits, sprint across bridges that fall apart underfoot, have him swordfight his way through encounter after encounter.

When you first enter the dungeon, the first task is to find a sword with which to fight. That will take you to room after room on the first level, where many training-type challenges await you. Many rooms are action puzzles. For example, you have to run through a portcullis but have to time your run exactly right because a certain floorboard sends it rushing downward, closing off the exit.

Once you have a sword in hand, the first few swordsmen are fairly easy to overcome. But, by the second level of the dungeon, you'll find yourself getting skewered more frequently. Luckily, on this level, there are various potions you can find to restore your strength.

The only thing I can criticize about Prince of Persia is that the swordfighting routines — while they look wonderful — just do not *feel* quite right because of the simple joystick control. All you can do is to strike, parry, advance, and retreat. It would be nice to aim the sword; that would add another dimension to the fighting.

Conflict in the Middle East

But nothing is perfect. And I think you'll agree Prince of Persia comes as close to that as any arcade game has come in a long, long, long time.

Now, if only I could just rescue that hapless Princess, I could sleep nights.

Prince of Persia, $34.95, is available for the Apple IIe (128K), IIc, and IIGS from Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101; (800) 521-6263. It includes one 5.25-inch disk and a manual.

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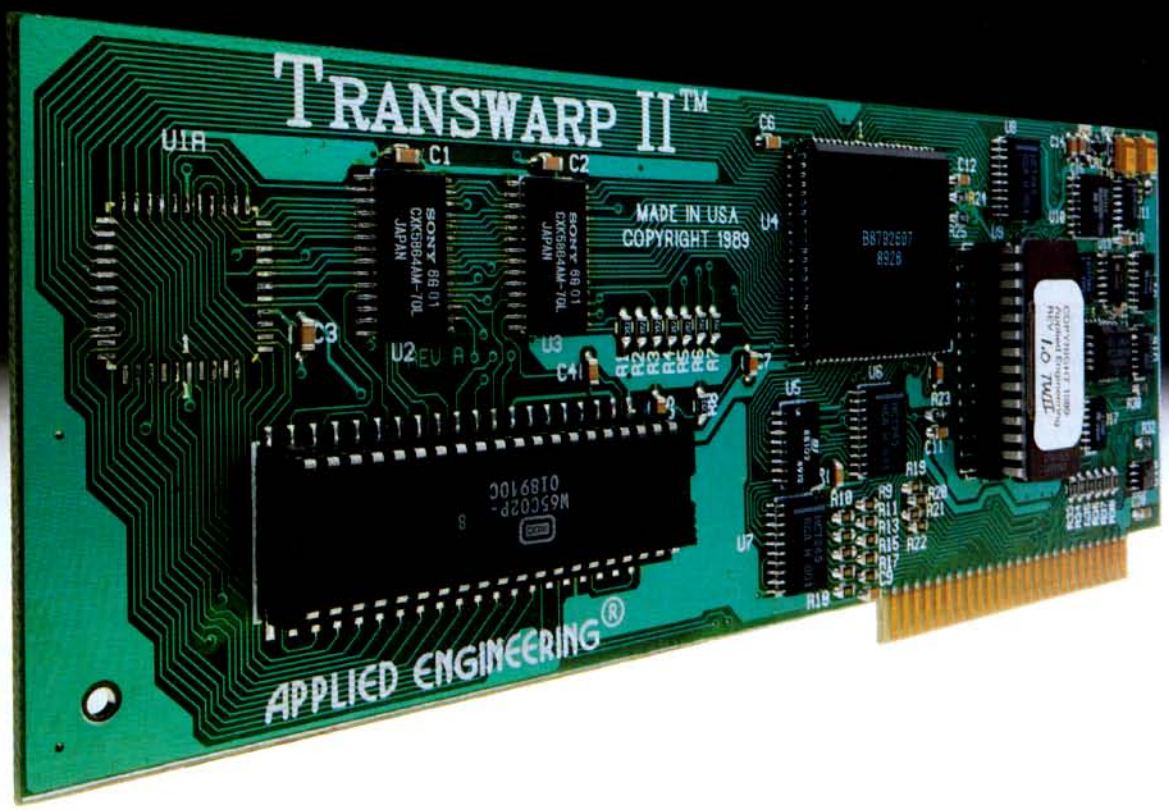

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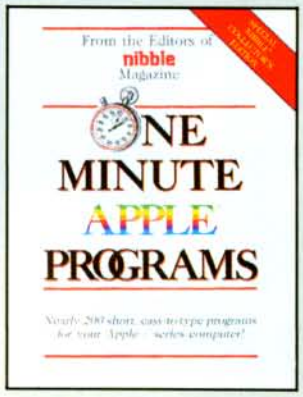

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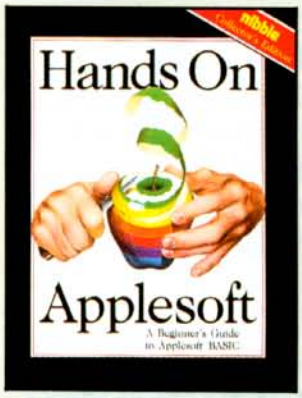

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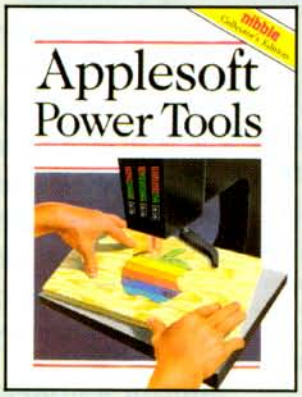

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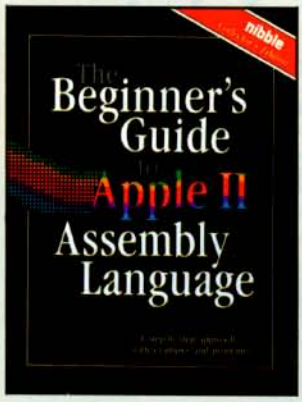

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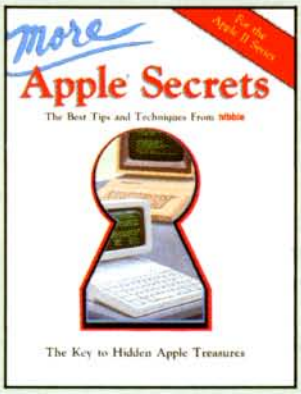

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by Robert Albanito

REAL ESTATE ADVISOR

The numbers went in one ear, out the other, then floated in air before my eyes: 12 percent, 3 points, 30 years, $946 a month... They'd puff away and be replaced by even more grotesque combinations.

If you plan on purchasing a home, you will probably experience confusion, frustration, and doubt. Real Estate Advisor can help restore order to your life.

Its setup menu can be quickly changed to provide a comparison of mortgage scenarios, allowing you to determine which financing would best meet your needs. The program creates a five-year, itemized report of mortgage costs, most deductions, estimated taxes, and estimated tax refunds. Also, it creates a four-page report comparing the cost of owning a home to that of renting. (The results might surprise you!)

Real Estate Advisor also gives you a report of mortgage payment tables, with interest and payment ranges of your choice, allowing you to see the result of rate changes. You can also make a report of net mortgage payment tables showing your mortgage payments after estimated tax refunds.

Finally, the program makes yearly and monthly amortization schedules that show the principal, interest, loan balance, and total interest and mortgage payments for the life of the mortgage. All reports can be displayed on the screen or sent to your printer.

USING THE PROGRAM

When you run Real Estate Advisor, you will be asked to "get or create" a file. If this is your first time through, there will be no file to get, so select "create" and the setup menu (**Figure 1**) will appear on the screen. The setup

Robert Albanito, P.O. Box 30047, Chicago, IL 60630. *This program is compatible with DOS 3.3 and ProDOS. It requires an 80-column IIe, IIc, or IIGS.*

menu contains the information used by the program. It has 26 line items, with values that can be changed to fit almost any scenario. When you select create, the setup menu uses data contained within the program to obtain its values. In the Modifications section of this article, you will learn how to change this data so the setup menu will appear with your personal profile. There are eight sample reports with explanations to help you understand how to interpret each report.

You can move the cursor with the Left- and Right-Arrow keys; a value will be highlighted with each keypress. When you reach a value you want to change, press the Return key. This removes the old value so you can enter a new one. Commas are unnecessary; the program will insert them for you.

After entering a new value, press the Return key again. Your new value will be highlighted to let you know it has been changed.

The program checks most entries to see if they are acceptable. If your entry is not acceptable, an explanation will appear and the original value will return, allowing you to enter another value. The setup menu instructions (**Figure 2**) contain a list of what the program expects in each line item.

After entering your changes, you can use the four options on the bottom of the screen. Pressing the Escape key will quit the setup menu and display the main menu; the P key will print the setup menu on your printer; the S key will let you save the setup menu values to disk; and the N key will let you retrieve a saved file from disk. When you retrieve a file, you will be asked to specify the slot number, the drive number, and the filename or pathname, depending on the version of DOS you are using. You can also press the question mark key to see a catalog of the disk.

The main menu (**Figure 3**) has six options, and uses the setup menu information to create reports and send them to the screen or your printer. You may want to look at the setup menu while going through each report.

The itemized five-year report (**Figure 4**) lists information for the first five years of a mortgage. The top left of the report contains the value of home, amount of mortgage, interest rate, and length of mortgage. These amounts are from the setup menu and let you see the mortgage information from which the report is derived. The upper-right section tells you how much money is needed to purchase the home. Under that, you'll find the five years of the report, each above a column of values for that year. The left side of the report identifies the values in each column.

The first five lines contain mortgage information. For example, in 1990 the monthly mortgage payment is $859.68 and the additional monthly cost is $83.33. The total

```
                    ---- SETUP MENU ----

VALUE OF HOME                100,000.00   SALARIES                    40,000.00
AMOUNT OF MORTGAGE            80,000.00   OTHER TAXABLE INCOME             0.00
INTEREST RATE (%)                10.00   F.I.T.W.                         0.00
LENGTH OF MORTGAGE (YRS.)           15   STATE INCOME TAX                 2.50
PROPERTY TAX                  1,000.00   MONTH OF FIRST PAYMENT              1
MORTGAGE INSURANCE                0.00   OTHER YEARLY HOME COSTS      2,000.00
NUMBER OF POINTS                  3.00   APPRECIATION OF HOME (%)         5.00
CLOSING COSTS                 1,000.00   MONTHLY COST OF RENT           500.00
I.R.A. CONTRIBUTION           2,250.00   OTHER YEARLY RENTAL COSTS    1,000.00
CHARITIES                       500.00   YEARLY RENT INCREASES (%)        4.00
TOTAL PERSONAL INT. PAID          0.00   TAX DEFERRED/FREE RATES (%)      6.00
MARITAL STATUS                 MARRIED   ESTIMATED INFLATION              4.00
PERSONAL EXEMPTIONS                  2   CURRENT YEAR                     1990


     USE THE <ARROWS/RETURN> KEYS TO CHANGE...<ESC> FOR MAIN MENU
        <P> PRINT SETUP      <S> SAVE SETUP      <N> NEW SETUP
```

Figure 1: The setup menu

SETUP MENU INSTRUCTIONS	
VALUE OF HOME	The home's cost.
AMOUNT OF MORTGAGE	The amount you are going to finance.
INTEREST RATE	The interest rate currently available.
LENGTH OF MORTGAGE	The number of years for which you want financing.
PROPERTY TAX	The yearly cost of taxes on the property.
MORTGAGE INSURANCE	The yearly cost of insurance.
NUMBER OF POINTS	The percentage of the loan the lender charges for the loan, usually 2-5.
CLOSING COSTS	Additional charges including application fee, recording fees, city revenue stamps, and attorney's fees. If unknown use $1,000.00.
I.R.A. CONTRIBUTION	The amount put into your I.R.A. accounts.
CHARITIES	The amount contributed to charity.
TOTAL PERSONAL INT. PAID	The interest paid on personal loans or credit cards
MARITAL STATUS	Enter M if you're married, S if you're single.
PERSONAL EXEMPTIONS	The number of people you support.
SALARIES	The yearly income earned.
OTHER TAXABLE INCOME	Any taxable income. Interest from CDs, bank accounts, credit unions, S & Ls, or bonds.
F.I.T.W.	The Federal Income Tax Withheld from your paycheck or other income. The program will calculate this based on the (W4) format if you enter zero.
STATE INCOME TAX	The percentage taken out of your paychecks.
MONTH OF FIRST PAYMENT	The month number your first mortgage payment begins.
OTHER YEARLY HOME COSTS	The yearly cost of electricity, gas, water bill, and maintenance.
APPRECIATION OF HOME	The yearly percentage house values increase in your area. If unknown, estimate 4-7%.
MONTHLY COST OF RENT	The cost you pay each month to rent.
OTHER YEARLY RENTAL COSTS	Yearly cost of gas, electricity, and maintenance.
YEARLY RENT INCREASES	The percentage your rent increases each year.
TAX DEFERRED/FREE RATES	The percentage you can get yearly from tax-free and tax-deferred investments.
ESTIMATED INFLATION	The estimated rate of inflation. If unknown use 4%.
CURRENT YEAR	Enter the year. Example 1990

Figure 2: Setup menu instructions

```
                    MAIN MENU

              ITEMIZED FIVE YEAR REPORT
              RENTAL AND OWNERSHIP ANALYSIS
              MORTGAGE AND INTEREST RATE TABLES
              AMORTIZATION SCHEDULES
              SETUP MENU
              QUIT

        USE <ARROWS> TO SELECT...<RETURN> TO EXECUTE
```

Figure 3: The main menu

ITEMIZED FIVE YEAR REPORT

VALUE OF HOME	100,000.00	DOWN PAYMENT	20,000.00
AMOUNT OF MORTGAGE	80,000.00	PROPERTY TAXES	1,000.00
INTEREST RATE (%)	10.00	MORTGAGE COST (POINTS)	2,400.00
LENGTH OF MORTGAGE (YRS.)	15.00	CLOSING COSTS	1,000.00
		TOTAL NEEDED TO PURCHASE	24,400.00

	1990	1991	1992	1993	1994
MONTHLY MORTGAGE PAYMENT	859.68	859.68	859.68	859.68	859.68
ADDITIONAL MONTHLY COST	83.33	83.33	83.33	83.33	83.33
TOTAL MONTHLY PAYMENT	943.02	943.02	943.02	943.02	943.02
TOTAL PRINCIPAL	2,425.37	2,679.34	2,959.90	3,269.84	3,612.24
LOAN BALANCE	77,574.63	74,895.28	71,935.38	68,665.54	65,053.30
TOTAL INTEREST	7,890.84	7,636.87	7,356.31	7,046.36	6,703.97
PROPERTY TAX	0.00	1,000.00	1,000.00	1,000.00	1,000.00
I.R.A.	2,250.00	2,250.00	2,250.00	2,250.00	2,250.00
MORTGAGE INS.	0.00	0.00	0.00	0.00	0.00
POINTS AMOUNT	2,400.00	0.00	0.00	0.00	0.00
CLOSING COSTS	1,000.00	0.00	0.00	0.00	0.00
STATE TAX	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
CHARITIES	500.00	500.00	500.00	500.00	500.00
PERSONAL INTEREST	0.00	0.00	0.00	0.00	0.00
PERSONAL EXEMPTION	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00
TOTAL DEDUCTIONS	19,040.84	16,386.87	16,106.31	15,796.36	15,453.97
INCOME	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00
OTHER TAXABLE INCOME	0.00	0.00	0.00	0.00	0.00
TOTAL INCOME	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00
ADJUSTED GROSS INCOME	20,959.16	23,613.13	23,893.69	24,203.64	24,546.03
F.I.T.W.	4,282.50	4,282.50	4,282.50	4,282.50	4,282.50
EST. FEDERAL TAX	3,143.87	3,541.97	3,584.05	3,630.55	3,681.90
EST. FEDERAL REFUND	1,138.63	740.53	698.45	651.95	600.60
STATE TAX WITHHELD	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
EST. STATE TAX	893.75	893.75	893.75	893.75	893.75
EST. STATE REFUND	106.25	106.25	106.25	106.25	106.25
TOTAL REFUNDS	1,244.88	846.78	804.70	758.20	706.85
NET MORTGAGE PMT.	755.94	789.12	792.63	796.50	800.78

Figure 4: Itemized five-year report

RENTAL AND OWNERSHIP ANALYSIS

OWNERSHIP ANALYSIS

VALUE OF HOME	100,000.00	LENGTH OF MORTGAGE (YRS.)	15.00
AMOUNT OF MORTGAGE	80,000.00	TAX DEFERRED/FREE RATES (%)	6.00
INTEREST RATE (%)	10.00	APPRECIATION OF HOME (%)	5.00
TOTAL NEEDED TO PURCHASE	24,400.00	ESTIMATED INFLATION (%)	4.00

YR.	OTHER COST & MORT.INS	PROP. TAXES W/INFLATION	MORTGAGE PAYMENTS	LOST INT. ON SAVINGS	ACTUAL HOME COST
1	2,000.00	1,000.00	10,316.21	1,464.00	14,780.21
2	2,080.00	1,040.00	10,316.21	1,551.84	14,988.05
3	2,163.20	1,081.60	10,316.21	1,644.95	15,205.96
4	2,249.73	1,124.86	10,316.21	1,743.65	15,434.45
5	2,339.72	1,169.86	10,316.21	1,848.27	15,674.05
6	2,433.31	1,216.65	10,316.21	1,959.16	15,925.33
7	2,530.64	1,265.32	10,316.21	2,076.71	16,188.88
8	2,631.86	1,315.93	10,316.21	2,201.31	16,465.32
9	2,737.14	1,368.57	10,316.21	2,333.39	16,755.31
10	2,846.62	1,423.31	10,316.21	2,473.40	17,059.54
11	2,960.49	1,480.24	10,316.21	2,621.80	17,378.74
12	3,078.91	1,539.45	10,316.21	2,779.11	17,713.68
13	3,202.06	1,601.03	10,316.21	2,945.86	18,065.16
14	3,330.15	1,665.07	10,316.21	3,122.61	18,434.04
15	3,463.35	1,731.68	10,316.21	3,309.96	18,821.20
	40,047.18	20,023.59	154,743.13	34,076.02	248,889.92

Figure 5: Expenses associated with owning a home

monthly payment, $943.02, is the total of the first two lines. The total principal is $2,425.37 and the loan balance is $77,574.63. Next are total interest ($7,890.34), property tax ($0), IRA ($2,250), mortgage insurance ($0), points amount ($2,400), closing costs ($1,000), state tax ($1,000), charities ($500), personal interest ($0), and personal exemption ($4,000). These are combined for total deductions ($19,040.84).

Income ($40,000.00) and other taxable income ($0) are combined in the next line, total income ($40,000). The next eight lines contain tax information. The adjusted gross income is your total income minus your total deductions ($40,000 − $19,040.84 = $20,959.16).

The estimated federal refund is calculated by subtracting estimated federal tax from federal income tax withheld ($4,312.50 − 3,143.87 = 1,168.63).

The estimated state refund is calculated by subtracting the estimated state tax from the state tax withheld ($1,000 − $893.75 = $106.25).

The total refund is calculated by adding the estimated federal and estimated state refunds ($1,168.63 + $106.25 = $1,274.88).

The last line is net mortgage payment. This is figured by dividing total refunds (a yearly amount) by 12 to get the monthly refund amount. Then it is subtracted from your monthly mortgage payment ($1,274.88 / 12 = $106.24; $859.68 − $106.24 = $753.44, or net mortgage payment).

The rental and ownership analyses create three reports and a summary, demonstrating which is most beneficial, owning or renting.

Ownership Analysis

The Ownership Analysis is a two-page report. The first page (**Figure 5**) contains the expenses associated with owning a home. The upper part of the report shows you the value of home, amount of mortgage, interest rate, total needed to purchase, length of mortgage, tax deferred/free rates, appreciation of home, and estimated inflation. Again, this information is from the setup menu.

Below these items are six columns. The first column shows you the year the values in each line occur. In the next column, other cost & mortgage insurance, the values $2,000 and $0 from the setup menu are added together and displayed in the first year. That amount is multiplied by the estimated inflation (4 percent) and added to the result to yield a value for the second year ($2,000 + $0 = $2,000; $2,000 × .04 = $80; $2,000 + $80 = $2,080). The process is then repeated to give you the next year, the next, and so on. Take a look at the value in the 15th year; you will be paying $3,463.35 then if your increases keep up with inflation.

The next column, property tax/inflation, is calculated in the same way. Mortgage payments will remain constant unless you have an adjustable rate mortgage (ARM), which fluctuates with interest rates. ARMs are impossible to calculate — no one can predict interest rates.

Lost interest on savings represents the yearly, compounded interest you lose for removing $24,400 from your bank account for the down payment. This is calculated in the same way as the first two columns, except the program uses the tax deferred/free rate, 6 percent. Actual home cost is the total of the other columns ($2,000 + $1,000 + $10,316.21 + $1,464 = $14,780.21).

Finally, the bottom of the columns show the totals for each.

The second page is the income part of the Ownership Analysis (**Figure 6**). The top of the page is the same as the previous page, and as before, the first column shows the year. The estimated tax refunds column, the projected refund you will receive from the IRS is much larger in the first year than in the second year; you have more one-time deductions in the first year. The minus signs before the figures in the last two years indicate you *owe* the IRS the indicated amounts, assuming your income and deduction status remain the same.

The appreciation column contains the amounts your home will increase in value during the represented years. It is figured by multiplying the value of home by the appreciation of home ($100,000 × .05 = $5,000).

The result is added to the value of your home. The process is repeated to obtain values for each of the following years.

The net cost of home is calculated by taking the actual home cost and subtracting from it the estimated tax refunds. Appreciation is subtracted from the result ($14,780.21 − $1,274.88 − $5,000 = $8,505.33).

Principal paid, cumulative equity, and cumulative home value will be useful if you want to sell, refinance, or take out a second mortgage.

The principal paid column contains amounts that went for principal from your mortgage payments during the indicated years. In the first year, cumulative equity is calculated by adding the appreciation and principal paid to the value of home and subtracting from that the amount of mortgage ($100,000 + $5,000 + $2,425.37 − $80,000 = $27,425.37).

After the first year, appreciation and the principal paid are combined with cumulative equity to get the next value for cumulative equity ($27,425.37 + $5,250 + $2,679.34 = $35,354.72).

Cumulative home value is calculated by adding the appreciation to the value of home (first year: $5,000 + $100,000 = $105,000; second year: $5,250 + $105,000 = $110,250).

Totals end each column, except for the two containing cumulative values; they reflect current amounts.

Rental Analysis

The Rental Analysis (**Figure 7**), is a one-page report. The values for monthly cost of rent, other yearly rental costs, yearly rent increases (a percentage), tax deferred/free rates (a percentage), total needed to purchase, and estimated inflation are obtained, once again, from the setup menu.

The values in other costs with inflation are calculated in the same manner as the examples from the last report that involved inflation percent. Rent cost with increases is a yearly amount, calculated by multiplying the monthly cost of rent by 12 ($500 * 12 = $6,000).

The rest of the years are figured by multiplying the yearly rent increases (a percent figure) by the yearly rent cost and then adding the result to yearly rent ($6,000 × .04 = $240; $6,000 + $240 = $6,240, or second-year rent; $6,240 × .04 = $249.60; $6,240 + $249.60 = $6,489.60, or third-year rent).

Rental payments are calculated by adding the other costs with inflation amounts and the rent cost with increases amounts ($1,000 + $6,000 = $7,000.)

The amounts listed under cash saved by renting are calculated by taking the values from the rental payments and subtracting

RENTAL AND OWNERSHIP ANALYSIS

OWNERSHIP ANALYSIS

VALUE OF HOME	100,000.00	LENGTH OF MORTGAGE (YRS.)	15.00
AMOUNT OF MORTGAGE	80,000.00	TAX DEFERRED/FREE RATES (%)	6.00
INTEREST RATE (%)	10.00	APPRECIATION OF HOME (%)	5.00
TOTAL NEEDED TO PURCHASE	24,400.00	ESTIMATED INFLATION (%)	4.00

YR.	EST. TAX REFUNDS	APPRECIATION	NET COST OF HOME	PRINCIPAL PAID	CUMULATIVE EQUITY	CUMULATIVE HOME VALUE
1	1,244.88	5,000.00	8,535.33	2,425.37	27,425.37	105,000.00
2	846.78	5,250.00	8,891.27	2,679.34	35,354.72	110,250.00
3	804.70	5,512.50	8,888.76	2,959.90	43,827.12	115,762.50
4	758.20	5,788.13	8,888.12	3,269.84	52,885.09	121,550.63
5	706.85	6,077.53	8,889.67	3,612.24	62,574.86	127,628.16
6	650.11	6,381.41	8,893.81	3,990.49	72,946.76	134,009.56
7	587.43	6,700.48	8,900.97	4,408.34	84,055.58	140,710.04
8	518.19	7,035.50	8,911.63	4,869.96	95,961.04	147,745.54
9	441.70	7,387.28	8,926.34	5,379.90	108,728.22	155,132.82
10	357.19	7,756.64	8,945.71	5,943.25	122,428.11	162,889.46
11	263.84	8,144.47	8,970.43	6,565.59	137,138.17	171,033.94
12	160.72	8,551.70	9,001.27	7,253.09	152,942.96	179,585.63
13	46.79	8,979.28	9,039.09	8,012.58	169,934.82	188,564.91
14	-83.66	9,428.25	9,089.45	8,851.60	188,214.67	197,993.16
15	-343.19	9,899.66	9,264.73	9,778.48	207,892.81	207,892.82
	6,960.52	107,892.82	134,036.57	79,999.99		

Figure 6: Income from ownership

RENTAL AND OWNERSHIP ANALYSIS

RENTAL ANALYSIS

MONTHLY COST OF RENT	500.00	TAX DEFERRED/FREE RATES (%)	6.00
OTHER YEARLY RENTAL COSTS	1,000.00	TOTAL NEEDED TO PURCHASE	24,400.00
YEARLY RENT INCREASES (%)	4.00	ESTIMATED INFLATION (%)	4.00

YR.	OTHER COSTS W/INFLATION	RENT COST W/INCREASES	RENTAL PAYMENTS	CASH SAVED BY RENTING	INT. YIELD ON SAVINGS	NET COST OF RENTING
1	1,000.00	6,000.00	7,000.00	7,780.21	466.81	-1,247.02
2	1,040.00	6,240.00	7,280.00	7,708.05	957.30	-1,385.35
3	1,081.60	6,489.60	7,571.20	7,634.76	1,472.83	-1,536.39
4	1,124.86	6,749.18	7,874.05	7,560.40	2,014.82	-1,701.17
5	1,169.86	7,019.15	8,189.01	7,485.04	2,584.81	-1,880.84
6	1,216.65	7,299.92	8,516.57	7,408.76	3,184.43	-2,076.62
7	1,265.32	7,591.91	8,857.23	7,331.64	3,815.39	-2,289.80
8	1,315.93	7,895.59	9,211.52	7,253.80	4,479.54	-2,521.82
9	1,368.57	8,211.41	9,579.98	7,175.33	5,178.84	-2,774.18
10	1,423.31	8,539.87	9,963.18	7,096.36	5,915.35	-3,048.52
11	1,480.24	8,881.47	10,361.71	7,017.03	6,691.29	-3,346.61
12	1,539.45	9,236.72	10,776.18	6,937.50	7,509.02	-3,670.34
13	1,601.03	9,606.19	11,207.23	6,857.94	8,371.03	-4,021.75
14	1,665.07	9,990.44	11,655.51	6,778.52	9,280.01	-4,403.02
15	1,731.68	10,390.06	12,121.74	6,699.47	10,238.78	-4,816.51
	20,023.59	120,141.53	140,165.11	108,724.80	72,160.26	-40,719.94

Figure 7: Rental Analysis

Table 1: Variable Definitions

AG	ADJUSTED GROSS INCOME	MI	MONTHLY INTEREST
AM	ADJUSTED MORTGAGE PAYMENT	MP	MONTHLY PAYMENT
BM	BEGINNING MONTH OF FIRST PAYMENT	MM	MAIN MENU SELECTION
CC	CLOSING COSTS	AC	OTHER COSTS
CH	CHARITIES	PE	PERSONAL EXEMPTIONS
CT	COUNT	PI	PERSONAL INTEREST
DI	DOWN PAYMENT INTEREST	PS	POINTS
DP	DOWN PAYMENT	PT	PROPERTY TAX
EI	ESTIMATED I.R.A.	RT	RENT
EQ	EQUITY	SA	SAVED AMOUNT
ET	ESTIMATED FEDERAL TAX	SI	STATE INCOME TAX
ES	ESTIMATED STATE INCOME TAX	SR	STATE REFUND
EW	ESTIMATED FEDERAL TAX WITHHELD	TD	TOTAL DEDUCTIONS
FR	FEDERAL REFUND	TH	TOTAL HOME PAYMENTS
HA	HOME APPRECIATION	TI	TOTAL INCOME
HV	HOME VALUE	TP	TOTAL PRINCIPAL
I	TOTAL INTEREST	TR	TOTAL REFUND
IR	MONTHLY INTEREST RATE	TY	TOTAL YEAR PAYMENT
L	LOAN AMONT	Y	NUMBER OF YEARS
M	NUMBER OF MONTHS	YR	YEAR

them from the actual home cost values that are listed on the first page of the Ownership Analysis report ($14,780.21 − $7,000 = $7,780.21).

Interest yield on savings is the interest you would earn on the money you saved by renting instead of purchasing. The value is obtained by multiplying the first-year value from the cash saved by renting column by the tax deferred/free rates percent ($7,780.21 × .06 = $466.81, or first-year interest yield).

The amounts are combined with the value for the second year's cash saved by renting, and the result is multiplied by the tax deferred/free rate again to obtain the second-year interest yield on savings amount. The process is repeated to obtain the third year, and so on ($7,780.21 + $466.81 = $8,247.02; $8,247.02 + 7,708.05 = $15,955.07; $15,955.07 × .06 = $957.30).

Net cost of renting is calculated by adding the yearly cash saved by renting amounts to the yearly interest yield on savings values, and subtracting the result from the yearly values under rental payments ($7,780.21 + $466.81 = $8247.02, or first-year savings; $7,000 rent expense − $8,247.02 savings = $ −1,247.02 net).

In the example, income exceeds expenses. The negative net means you actually saved $1,247.02 that year while paying nothing for rent. A positive number will reflect a loss for the year.

Totals end each column.

The summary (**Figure 8**) contains important column totals from the ownership & rental reports, listed side by side so you can compare the data more easily.

The first four items, other costs, mortgage/rent, property tax and lost interest on savings, are combined to yield the total cash expended. This is the total amount owning or renting costs you.

The next four items — cash saved by renting, interest yield on savings, tax benefits (or refunds), and appreciation of property — are combined to yield the total income and equity values. This is the amount of income owning or renting will provide you.

Net cost is the amount owning or renting will cost you. It is obtained by subtracting total income & equity from total cash expended ($248,889.92 -$114,853.34 = $134,036.57, or net cost of owning; $140,165.11 -$180,885.06 = -$40,719.94, or net cost of renting).

A positive net amount indicates an expense; a negative net amount indicates a savings. So, in the summary, it would cost you $134,036.57 to own a home, and save you $40,719.94 to rent.

Selecting the mortgage and interest rate tables option will take you to the mortgage tables menu. You will have three options: The mortgage rent tables, second-year net tables, and the main menu. If you choose either of the first two options, you will be asked for increment amounts. The amounts will start with the cost of the home above the first column, and each column thereafter will decrease by the increments you choose. Do not use commas when entering the amount. If you choose not to enter an amount, the program will default to increments of $2,000.

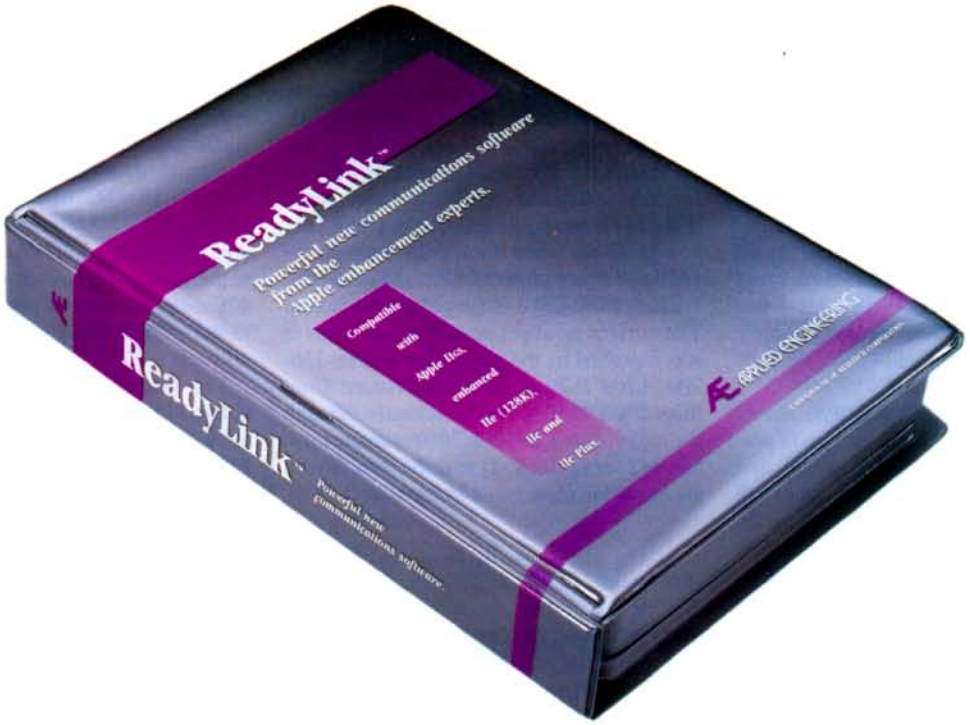
The mortgage payment tables option will show the monthly mortgage payments for the different loan balances and interest rates. The interest rates are in the first column on the left, beneath the title RATE. The column range is 3 percent below to 0.5 percent above the interest rate in the setup menu. This range lets you compare the mortgage types available. After the rate column are eight columns, each topped with a mortgage amount. Each column contains the amount of your monthly mortgage payment under the specified percentages and mortgage amounts. For example, a $90,000 mortgage at 10 percent would give you a monthly mortgage payment of $967.14; a $96,000 mortgage at 9.5 percent would give you a monthly mortgage payment of $1,002.46. The value of the home is from the setup menu; all payment tables will start with the amount in the setup menu.

The second-year net tables option is iden-

RENTAL AND OWNERSHIP SUMMARY

	OWN	RENT
OTHER COSTS	40,047.18	20,023.59
MORTGAGE/RENT	154,743.13	120,141.53
PROPERTY TAX & MORTGAGE INS.	20,023.59	0.00
LOST INTEREST OF SAVINGS	34,076.02	0.00
TOTAL CASH EXPENDED	248,889.92	140,165.11
CASH SAVED BY RENTING	0.00	108,724.80
INTEREST YIELD ON SAVINGS	0.00	72,160.26
TAX BENEFITS	6,960.52	0.00
APPRECIATION OF PROPERTY	107,892.82	0.00
TOTAL INCOME & EQUITY	114,853.34	180,885.06
TOTAL CASH EXPENDED	248,889.92	140,165.11
TOTAL INCOME & EQUITY	-114,853.34	-180,885.06
NET COST	134,036.57	-40,719.94

Figure 8: Rental Analysis summary



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tical to the mortgage payment tables option, except that the amounts are your second-year net monthly mortgage payment. This is the monthly payment after the estimated tax returns have been subtracted from it. The first year is not used; usually, it is a partial year and contains one-time deductions.

If you choose the third option, and return to the main menu, you'll be able to select the option for amortization schedules. Once there you will have three options: yearly amortization schedule, monthly schedule, or return to the main menu.

The yearly amorization schedule shows the amount of mortgage, interest rate (a percentage), length of mortgage (in years), and monthly mortgage values in the upper-left corner. These values are used to calculate the amounts in the amortization table. The first column contains the year and the second contains the yearly mortgage payment. This is calculated by multiplying the monthly mortgage amount by 12 ($859.68 × 12 = $10,316.21, or the yearly mortgage payment).

Paid interest is the portion of the yearly mortgage payment composed of interest for the loan. Paid principal is the total amount of your yearly mortgage payment used to reduce the amount of your loan. Loan balance is the amount of the loan remaining, calculated by subtracting the paid principal amount from the mortgage balance (first year $80,000 − $2,425.37 = $77,574.63 loan balance; second year $77,574.63 − $2,679.34 = $74,895.28 loan balance).

The last two columns are cumulative; one totals the interest paid and the other totals the mortgage amount paid.

The monthly amortization schedule is the same as the yearly schedule, except for the different time interval.

The remaining options let you return to the setup menu or quit the program.

ENTERING THE PROGRAM

Type in the program from **Listing 1** and save it to disk with the command

```
SAVE R.E.ADVISOR
```

For more help with *Nibble* listings, see the Typing Tips section in this issue.

HOW THE PROGRAM WORKS

Line 90 turns on the 80-column card and jumps over most of the program's routines to the title screen in **line 2470**. **Line 2480** sets the dimensions of the variables. **Lines 2490-2500** read the data stored in **lines 3630-3720**. **Lines 2520-2540** let you get or create a new setup file. If you elect to create a new file, the data in **line 3720** is read and **line 2580** sends you to the setup menu, which begins at **line 2770**. If you elect to get a file, **line 2530** sends you to the subroutine starting at **line 3180** to determine which slot and drive to use. **Line 3220** determines the disk operating system being used and continues to **lines 3260-3300** for the DOS 3.3 filename, or to **lines 3340-3430** for the ProDOS pathname. **Lines 3410-3420** check for a valid pathname. You then return to **line 2530** and proceed to **lines 2550-2560** to read the file. If the file is a Real Estate Advisor file, **line 2580** sends you to the setup menu. If the file is *not* an Real Estate Advisor file, you go to the error routine in **lines 3470-3620** and return to **line 2520** to begin again.

Lines 2770-2810 display the setup menu. The correct arrangement of the amounts is accomplished by the subroutine in **lines 130-200**. **Line 2820** obtains information from **lines 2900-2920** to move correctly through the menu. **Lines 2380-2870** let you perform one of four options: 1) exit the setup menu and go to the main menu in lines **2680-2820**; 2) print the setup menu (**line 2840** jumps to **lines 770-810** to turn on the printer); 3) save the setup with lines **2840-2850** (**line 2860** adds the letters REA.FILE at the end of the data, so it can be recognized by the program); or 4) create a new setup file by going to **line 2520**. (**Lines 2940-3140** are used to check some of the values entered in the setup menu, and will display a message if the value is incorrect.)

Lines 2680-2730 contain the main menu, and **line 2680** lets you proceed to the selected routine. **Lines 240-320** calculate the monthly mortgage payment, and **lines 360-710** calculate the rest of the data used by the programs routines with the exception of **line 1170**, which performs calculations for the own vs. rent routine. **Table 1** contains a list of variables and the values they represent in these routines. Variables A(1) through A(26) represent the setup menu amounts.

In the IRA routine **line 420** checks to see if the value in A(9) (the IRA amount) is greater than $0. If so, it goes to the subroutine in **lines 690-720**. **Line 690** is for a single person; a full deduction is given if earnings are below $25,000. If earnings are between $25,000-$35,000, a partial deduction is calculated. The same applies to **line 700**, which is for married individuals. A full deduction is allowed for earnings below $40,000, and a partial deduction is allowed between $40,000-$50,000. **Line 710** rounds up to the nearest $10. If earnings are above the allowable ranges, the variable EI will contain a negative number; when you return to **line 420** , it will make all negative values equal to zero. In other words, no deduction is allowed.

The federal income tax withheld is calculated in **lines 550-570**. **Line 550** is used to calculate a yearly amount from a weekly FITW. If the amount in variable EW is above $500, it is assumed the yearly amount was entered. If EW equals zero in **lines 560-570**, the yearly FITW will be calculated for you. **Lines 580-590** calculate the estimated federal taxes.

The rest of the program's routines are straightforward and take the data supplied by the described subroutines and print it in various formats. All routines exit to **lines 2590-2630**, which reroute output to the screen, initialize the variables, and allow the setup menu to be restored to its original values if changes were made.

> Modifications to the program will depend on changes to tax laws or IRAs.

MODIFICATIONS

If your printer card is in a slot other than 1, change the 1 in PR#1 in **line 770** to the number of the slot you are using.

The data in **line 3720** can be changed to an individual profile so that when a file is created it will have most of the values already established. It currently contains values for the setup menu (**Figure 1**).

Modifications to the program calculations will depend on changes to tax laws or IRAs. Information for making the changes can be found in the income tax form the IRS mails you at the start of the year.

In **line 450**, the amount allowed for personal exemption is $2,000. After 1989, the amount may be adjusted for inflation by the IRS.

In **lines 560-570**, the amounts for basic standard deduction are $3,100 for single and $5,200 for married. After 1989, the amounts may be adjusted if necessary for inflation by the IRS.

In **line 580**, the estimated tax for a married couple is 15 percent of adjusted gross income to $29,750, and 28 percent for more than $29,750. In **line 590** the single estimated tax is 15 percent of adjusted gross income to $17,850, and 28 percent for more than$17,850. For the tax years after 1989, income brackets may be adjusted for inflation by the IRS.

In **line 600**, the personal exemption amount is $1,000, or the same as the exemption in Illinois. Check your state income tax booklet for the correct value to enter in your state.

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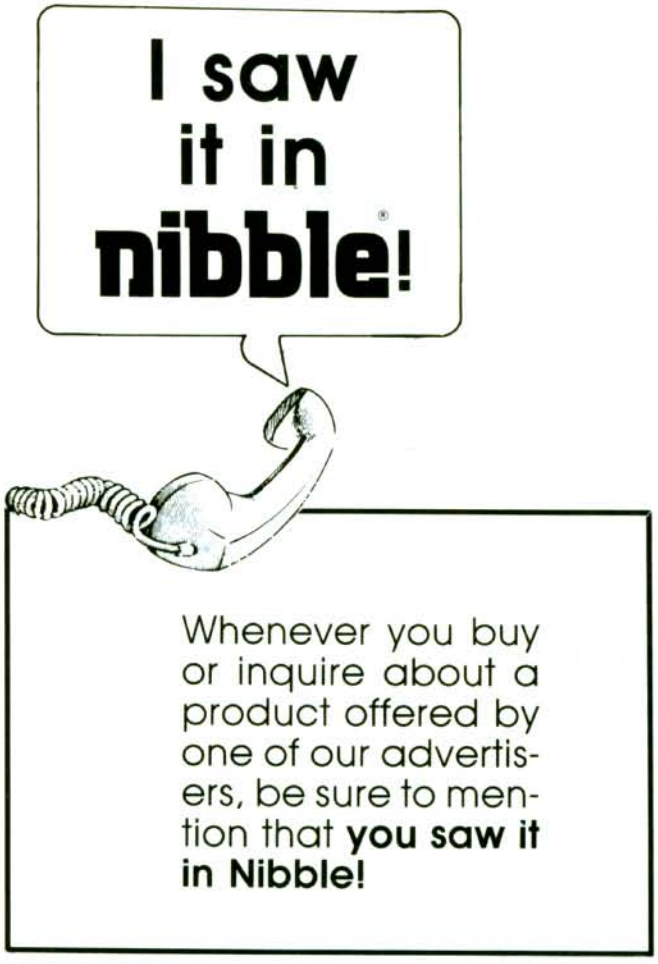

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LISTING 1: R.E. ADVISOR

```
37 | 10  REM   ************************
C0 | 20  REM   * R.E. ADVISOR         *
B9 | 30  REM   * BY ROBERT A. ALBANITO *
AE | 40  REM   * COPYRIGHT (C) 1990    *
CB | 50  REM   * MINDCRAFT PUBL. CORP. *
24 | 60  REM   * CONCORD, MA 01742     *
45 | 70  REM   ************************
3A | 80  REM
36 | 90 D$ =  CHR$ (4): PRINT : PRINT D$"PR#3": PRIN
   |      T : GOTO 2470
1C | 100  REM
D7 | 110  REM  LINEUP AMOUNTS IN COLUMNS
DE | 120  REM
2F | 130 A$ = "": IF Z = 4 OR Z = 13 OR Z = 18 OR Z
   |      = 26 THEN A$ =  STR$ (W): GOSUB 200: RETUR
   |      N
BF | 140  IF Z = 12 AND W = 1 THEN A$ = "SINGLE":
   |      GOTO 200
A6 | 150  IF Z = 12 AND W = 2 THEN A$ = "MARRIED":
   |      GOTO 200
A1 | 160 A$ =  STR$ ( INT ((W) * 100 + .5) / 100): I
   |      F W < 1 AND W > 0 THEN 200
5F | 170 A$ = A$ +  RIGHT$ (".00",4 +  LEN ( STR$ (
   |      INT (W))) -  LEN (A$))
39 | 180 A$ =  LEFT$ (A$, LEN (A$) - 1)
0C | 190  IF W <  =  - 1000 OR W >  = 1000 THEN A$ =
   |       LEFT$ (A$, LEN (A$) - 6) + "," +  RIGHT$
   |      (A$,6): REM  ADD COMMA IF IN THOUSANDS
25 | 200  POKE 36,G -  LEN (A$): PRINT A$;: RETURN
A4 | 210  REM
1D | 220  REM  CALCULATE MONTHLY PAYMENT
5E | 230  REM
6D | 240 L = A(2): REM  LOAN AMOUNT
1E | 250 IR = A(3) / 1200: REM  MONTHLY INTEREST RAT
   |      E
E8 | 260 Y = A(4): REM  # YEARS
16 | 270 BM = A(18): REM  BEGINNING MONTH
80 | 280 M = Y * 12: REM  # OF MONTHS
F1 | 290 U = (1 + IR) ^ M
88 | 300 MI = L * IR: REM  MONTHLY INTEREST
F0 | 310 MP = MI * U / (U - 1): REM  MONTHLY PAYMENT

B7 | 320 YR = A(26):CT = 0: RETURN
60 | 330  REM
55 | 340  REM  PROGRAM CALCULATIONS
AE | 350  REM
A5 | 360 CT = CT + 1:TP = 0:I = 0
F5 | 370 TY = (13 - BM) * MP: IF M < 12 THEN TY = M
   |      * MP: REM  TOT YEAR PMT
59 | 380  FOR AA = BM TO 12:MI = L * IR:P = (MP - MI
   |      ):TP = TP + P:I = I + MI:L = L - P:M = M -
   |      1: IF M > 0 THEN  NEXT :AA = 0:BM = 1: REM
   |       I = TOTAL INT. TP= TOTAL PRINCIPAL
80 | 390  IF MM = 4 THEN  RETURN
8E | 400 TI = 0:EI = 0:TD = 0:AG = 0:A = 0:EW = 0:ET
   |      = 0:FR = 0:TR = 0:AM = 0
78 | 410 TI = A(14) + A(15): IF MM = 2 AND T$ = "Y"
   |      AND DI > A(15) THEN TI = TI + DI - A(15):
   |      REM  TOTAL INCOME/DI=INT.ON INVESTED DOWN
   |      PAYMENT/T$=TAXABLE OR NON TAXABLE
8A | 420 EI = A(9): IF EI > 0 THEN  GOSUB 690: IF EI
   |      < 0 THEN EI = 0: REM  CALCULATE I.R.A.
3C | 430 PT = 0: IF CT > 1 THEN PT = A(5): REM  PROP
   |      ERTY TAX
17 | 440 PS = 0:CC = 0: IF CT = 1 THEN PS = (A(7) /
   |      100) * A(2):CC = A(8): REM  POINTS/CLOSING
   |      COSTS
```

```
36  450 PE = A(13) * 2000: REM  PERSONAL EXEMPTIONS
FC  460 SI = (A(17) / 100) * A(14): REM  STATE INCO
        ME TAX
45  470 CH = A(10): REM  CHARITIES
58  480 PI = 0: IF YR < 1991 THEN PI = .1 * A(11):
        IF YR < 1990 THEN PI = .2 * A(11)
2F  490 YR = YR + 1
89  500 TD = I + EI + PS + CC + PE + SI + CH + PI +
         PT + A(6): REM  TOTAL DED
45  510 AG = TI - TD: REM  ADJUSTED GROSS INCOME
07  520  REM
EA  530  REM  CALCULATE F.I.T.W. & FEDERAL TAXES
F5  540  REM
BE  550 EW = A(16): IF EW > 0 AND EW < 500 THEN EW
        = EW * 52: GOTO 580: REM  CALCULATE YEARLY
         FITW FROM WEEKLY AMOUNT
1B  560  IF EW = 0 AND A(12) = 1 THEN A = TI - (EI
        + PE + 3100):EW = (.15 * A): IF A > 17850
        THEN EW = (.15 * 17850) + (.28 * (A - 1785
        0)): REM  ESTIMATE SINGLE FITW
DE  570  IF EW = 0 AND A(12) = 2 THEN A = TI - (EI
        + PE + 5200):EW = (.15 * A): IF A > 29750
        THEN EW = (.15 * 29750) + (.28 * (A - 2975
        0)): REM  ESTIMATE MARRIED FITW
CD  580 ET = (.15 * AG): IF A(12) = 2 AND AG >  = 2
        9750 THEN ET = (.15 * 29750) + (.28 * (AG -
         29750)): REM  ESTIMATED MARRIED FEDERAL TA
        XES
C5  590  IF A(12) = 1 AND AG >  = 17850 THEN ET = (
        .15 * 17850) + (.28 * (AG - 17850)): REM  E
        STIMATED SINGLE FEDERAL TAXES
19  600 ES = ((TI - EI) - (A(13) * 1000)) * (A(17)
        / 100): REM  ESTIMATED STATE INCOME TAX
61  610 FR = EW - ET: REM  ESTIMATED FEDERAL REFUND

AB  620 SR = SI - ES: REM  STATE TAX REFUND
C3  630 TR = FR + SR: REM  TOTAL TAX REFUND
65  640 AM = (TY - TR) / (13 - BM): IF AM > MP THEN
         AM = MP: REM  ADJUSTED MORTGAGE PAYMENT
7E  650  RETURN
3E  660  REM
3B  670  REM  I.R.A. CALCULATIONS
38  680  REM
D1  690  IF A(12) = 1 AND TI > 25000 THEN EI = (350
        00 - TI) * (A(9) / 10000): REM  SINGLE I.R.
        A.
12  700  IF A(12) = 2 AND TI > 40000 THEN EI = (500
        00 - TI) * (A(9) / 10000): REM  MARRIED I.R
        .A.
F3  710  IF  INT (EI) / 10 -  INT (EI / 10) > 0 THE
        N EI =  INT (EI / 10) * 10 + 10: REM  ROUND
         UP TO NEAREST TEN
CE  720  RETURN
75  730  REM
8A  740  REM  PRINTOUT MENU
87  750  REM
1B  760 F$ = "PRINTOUT MENU":A1 = 13:A2 = 14:CC =
        - 3:LC = 33: GOSUB 2690:X = X - 12:G$ = "S
        ": IF X = 2 THEN G$ = "P"
8A  770  HOME : IF G$ = "P" THEN  PRINT  CHR$ (21):
        VTAB 12: POKE 36,16: PRINT "PRINTING":
        PRINT  CHR$ (4)"PR#1": PRINT  CHR$ (9);"80
        N": RETURN
4E  780  RETURN
04  790  FOR X = 1 TO 79: PRINT "-";: NEXT : PRINT
        : RETURN
AF  800  IF G$ = "S" THEN  IF C = 8 THEN C = 0:
        GOSUB 1020: IF  ASC (H$) = 27 THEN 2620
89  810  RETURN
9E  820  REM
5F  830  REM  ITEMIZED 5 YEAR REPORT
6C  840  REM
4E  850  GOSUB 760:VT = 14: IF G$ = "S" THEN  VTAB
        12: HTAB 33: PRINT "ANALYZING DATA"
C4  860  GOSUB 240
A8  870  FOR X = 1 TO 5: GOSUB 360
4E  880 MC = (A(6) + A(5)) / 12: REM  ADDITIONAL MO
        NTHLY COST
7E  890 B(1,X) = MP:B(2,X) = MC:B(3,X) = MP + MC:B(
        4,X) = TP:B(5,X) = L:B(6,X) = I:B(7,X) = PT
        :B(8,X) = EI:B(9,X) = A(6):B(10,X) = PS:B(1
        1,X) = CC:B(12,X) = SI:B(13,X) = A(10):B(14
        ,X) = PI:B(15,X) = PE:B(16,X) = TD
```


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LISTING 1: R.E. ADVISOR *continued*

```
E7  900 B(17,X) = A(14):B(18,X) = A(15):B(19,X) = T
        I:B(20,X) = AG:B(21,X) = EW:B(22,X) = ET:B(
        23,X) = FR:B(24,X) = SI:B(25,X) = ES:B(26,X
        ) = SI - ES:B(27,X) = TR:B(28,X) = AM:B(29,
        X) = AM + MC: NEXT
05  910  IF G$ = "S" THEN  HOME
40  920  POKE 36,28: PRINT "ITEMIZED FIVE YEAR REPO
        RT": PRINT : PRINT
E9  930 T = 0:C(1) = A(1) - A(2):C(2) = A(5):C(3) =
         (A(7) / 100) * A(2):C(4) = A(8)
E1  940 C$(1) = "DOWN PAYMENT":C$(2) = "PROPERTY TA
        XES":C$(3) = "MORTGAGE COST (POINTS)":C$(4)
        = "CLOSING COSTS"
80  950  FOR X = 1 TO 4: POKE 36,0: PRINT A$(X);:W
        = A(X):G = 37: GOSUB 160: POKE 36,42: PRIN
        T C$(X);:C$(X) = "":W = C(X):G = 78: GOSUB
        160:T = T + W: PRINT : NEXT
1F  960  POKE 36,69: PRINT "---------": POKE 36,42:
        PRINT "TOTAL NEEDED TO PURCHASE";:W = T:
        GOSUB 160: PRINT : PRINT : PRINT : PRINT
31  970 A = A(26):G = 30: FOR X = 1 TO 5: POKE 36,G
        : PRINT A;:A = A + 1:G = G + 11: NEXT :
        PRINT : PRINT :A = 0:G = 0
37  980  FOR Y = 1 TO 28:C = C + 1: POKE 36,0: PRIN
        T B$(Y);:G = 23: FOR X = 1 TO 5:G = G + 11:
        W = B(Y,X):B(Y,X) = 0: GOSUB 160: NEXT X
B0  990  GOSUB 800
F2  1000  PRINT : NEXT Y
A9  1010 C = 0: GOTO 2590
4A  1020  VTAB 24: POKE 36,20: PRINT "PRESS ANY KEY
        TO CONTINUE...<ESC> TO EXIT";: GET H$: POK
        E 49168,0: IF  ASC (H$) = 27 THEN  RETURN
97  1030  VTAB 23: PRINT : VTAB VT: POKE 36,0: CALL
         - 958: RETURN
17  1040  REM
FE  1050  REM  OWN VS RENT ANALYSIS
15  1060  REM
0F  1070  GOSUB 760: FOR X = 1 TO 4:E$(X) = A$(X):E
        (X) = A(X): NEXT :E$(5) = A$(24):E(5) = A(2
        4)
31  1080  FOR X = 6 TO 10:E$(X) = A$(X + 14):E(X) =
         A(X + 14): NEXT
B4  1090 E$(11) = "TOTAL NEEDED TO PURCHASE":DP = (
        A(1) - A(2)) + (A(7) / 100) * A(2) + A(5) +
         A(8):E(11) = DP
35  1100 E$(12) = A$(25):E(12) = A(25)
09  1110  GOTO 1120
BF  1120 AA$ = "OWNERSHIP ANALYSIS": GOSUB 1860
31  1130  PRINT "          OTHER COST      PROP. TAXES
            MORTGAGE         LOST INT.          ACTU
        AL": REM  SPACES 8/5/1/5/7/9
08  1140  PRINT "YR.      & MORT.INS      W/INFLATION
            PAYMENTS       ON SAVINGS        HOME
        COST": REM  SPACES 5/1/5/5/6/1/7
6C  1150  GOSUB 790:C = 0:AC = 0: GOSUB 240:BM = 1
99  1160 C = C + 1:CT = CT + 1
A7  1170 AC = ((A(25) / 100) * AC) + AC: IF AC = 0
        THEN AC = A(19): REM  INFLATION OF OTHER C
        OSTS
F6  1180 PR = ((A(25) / 100) * PR) + PR: IF PR = 0
        THEN PR = A(5): REM  INFLATION OF PROPERTY
         TAX
7F  1190 MH = ((A(25) / 100) * MH) + MH: IF MH = 0
        THEN MH = A(6): REM  INFLATION OF MORTGAGE
         INSURANCE
39  1200 DI = (DP + SA) * (A(24) / 100):SA = SA + D
        I: REM  INTEREST YIELD OF DOWN PAYMENT
47  1210  POKE 36,2 -  LEN ( STR$ (CT)): PRINT CT;
B0  1220 G = 17:W = AC + MH:C(1) = C(1) + W: GOSUB
        160:G = 32:W = PR:C(2) = C(2) + W: GOSUB 16
        0:G = 47:W = MP * 12:C(3) = C(3) + W: GOSUB
         160:
FC  1230 G = 63:W = DI:C(4) = C(4) + W: GOSUB 160:G
        = 79:W = AC + PR + MH + DI + (MP * 12):TH(
        CT) = W:C(5) = C(5) + W: GOSUB 160: PRINT
F1  1240 VT = 15: GOSUB 800
84  1250  IF CT < A(4) THEN 1160
0D  1260  GOSUB 790
9D  1270 G = 17:W = C(1): GOSUB 160:G = 32:W = C(2)
        : GOSUB 160:G = 47:W = C(3): GOSUB 160:G =
        63:W = C(4): GOSUB 160:G = 79:W = C(5):
        GOSUB 160: PRINT
B7  1280 CT = 0:AC = 0:PR = 0:MH = 0:DI = 0:SA = 0
F3  1290  IF G$ = "P" THEN  PRINT  CHR$ (12): GOSUB
         1860
86  1300 VT = 12:C = 8: GOSUB 800
AD  1310  PRINT "       EST.TAX                  NET
        COST     PRINCIPAL    CUMULATIVE    CUMULAT
        IVE": REM  SPACES 6/16/2/5/4/4
F9  1320  PRINT "YR.   REFUNDS  APPRECIATION   OF H
        OME         PAID        EQUITY       HOME VA
        LUE": REM  SPACES 3/2/3/1/8/8/6
1B  1330  GOSUB 790:C = 0:AC = 0::BM = 1
80  1340 C = C + 1: GOSUB 360
98  1350  IF HA = 0 THEN HV = A(1)
CC  1360 HA = HV * A(20) / 100:HV = HV + HA: REM  C
        ALC. APPRECIATION
37  1370  POKE 36,2 -  LEN ( STR$ (CT)): PRINT CT;
0E  1380 G = 13:W = TR:C(6) = C(6) + W: GOSUB 160:G
        = 25:W = HA:C(7) = C(7) + W: GOSUB 160:G =
         38:W = TH(CT) - (HA + TR):C(8) = C(8) + W:
        GOSUB 160
78  1390 G = 51:W = TP:C(9) = C(9) + W: GOSUB 160:G
        = 65:W = C(7) + C(9) + (A(1) - A(2)): GOSU
        B 160:G = 79:W = HV: GOSUB 160: PRINT
94  1400 VT = 15: GOSUB 800
3F  1410  IF CT < A(4) THEN 1340
57  1420  GOSUB 790
57  1430 G = 13:W = C(6): GOSUB 160:G = 25:W = C(7)
        : GOSUB 160:G = 38:W = C(8): GOSUB 160:G =
        51:W = C(9): GOSUB 160
AB  1440 CT = 0:C = 0:AC = 0
A2  1450  IF G$ = "P" THEN  PRINT  CHR$ (12)
19  1460 VT = 1:C = 8: GOSUB 800
FC  1470 AA$ = "RENTAL ANALYSIS":A1 = 7:A2 = 9:
        GOSUB 1830: PRINT : PRINT : PRINT
A1  1480  PRINT "    OTHER COSTS   RENT COST      R
        ENTAL     CASH SAVED   INT. YIELD   NET  CO
        ST": REM  SPACES 4/3/6/5/3/1/3
09  1490  PRINT "YR. W/INFLATION  W/INCREASES    PA
        YMENTS     BY RENTING   ON SAVINGS  OF RENTI
        NG": REM  SPACES 1/2/4/4/3/1/2/1
06  1500  GOSUB 790:YR = 0
4B  1510 CT = CT + 1:C = C + 1:RT = RT * (1 + A(23)
        / 100): IF RT = 0 THEN RT = A(21): REM  CA
        LCULATE RENTAL INCREASE
09  1520 AC = ((A(25) / 100) * AC) + AC: IF AC = 0
        THEN AC = A(22): REM  INFLATION OF OTHER C
        OSTS
B7  1530  POKE 36,2 -  LEN ( STR$ (CT)): PRINT CT;:
        G = 14:W = AC:C(10) = C(10) + W: GOSUB 160:
        G = 27:W = RT * 12:C(11) = C(11) + W: GOSUB
         160:G = 40:W = W + AC:C(12) = C(12) + W:C3
        = W: GOSUB 160:G = 53:W = TH(CT) - W: IF W
        < .01 THEN W = 0.00
35  1540 C(13) = C(13) + W:C4 = W:SA = SA + W: GOSU
        B 160:S1 = SA * (A(24) / 100):SA = SA + S1
00  1550 G = 66:W = S1:C(14) = C(14) + W:C5 = W:
        GOSUB 160:G = 79:W = C3 - (C4 + C5):C(15)
        = C(15) + W: GOSUB 160: PRINT
CA  1560 VT = 15: GOSUB 800
8D  1570  IF CT < A(4) THEN 1510
86  1580  GOSUB 790
0D  1590 G = 14:W = C(10): GOSUB 160:G = 27:W = C(1
        1): GOSUB 160:G = 40:W = C(12): GOSUB 160:G
        = 53:W = C(13): GOSUB 160:G = 66:W = C(14)
        : GOSUB 160:G = 79:W = C(15): GOSUB 160:
        PRINT
FB  1600  IF G$ = "P" THEN  PRINT  CHR$ (12)
BA  1610 VT = 1:C = 8: GOSUB 800
55  1620  REM
B2  1630  REM  SUMMARY
A7  1640  REM
87  1650  POKE 36,25: PRINT "RENTAL AND OWNERSHIP S
        UMMARY": PRINT : IF G$ = "P" THEN  PRINT
7C  1660  POKE 36,38: PRINT "OWN           RENT":
        PRINT : REM  SPACES 10
3D  1670  PRINT "OTHER COSTS";:G = 41:W = C(1):
        GOSUB 160:G = 55:W = C(10): GOSUB 160:
        PRINT
AC  1680  PRINT "MORTGAGE/RENT";:G = 41:W = C(3):
        GOSUB 160:G = 55:W = C(11): GOSUB 160:
        PRINT
B7  1690  PRINT "PROPERTY TAX & MORTGAGE INS.";:G =
```

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     41:W = C(2): GOSUB 160:G = 55:W = 0: GOSUB
      160: PRINT
38   1700  PRINT "LOST INTEREST OF SAVINGS";:G = 41:
     W = C(4): GOSUB 160:G = 55:W = 0: GOSUB 160
     : PRINT
1B   1710  GOSUB 1820: PRINT "TOTAL CASH EXPENDED";:
     G = 41:W = C(5): GOSUB 160:G = 55:W = C(12)
     : GOSUB 160: PRINT : PRINT : IF G$ = "P"
     THEN  PRINT : PRINT
29   1720  PRINT "CASH SAVED BY RENTING";:G = 41:W =
      0: GOSUB 160:G = 55:W = C(13): GOSUB 160:
     PRINT
2C   1730  PRINT "INTEREST YIELD ON SAVINGS";:G = 41
     :W = 0: GOSUB 160:G = 55:W = C(14): GOSUB 1
     60: PRINT
2C   1740  PRINT "TAX BENEFITS";:G = 41:W = C(6):
     GOSUB 160:G = 55:W = 0: GOSUB 160: PRINT
0D   1750  PRINT "APPRECIATION OF PROPERTY";:G = 41:
     W = C(7): GOSUB 160:G = 55:W = 0: GOSUB 160
     : PRINT
6D   1760  GOSUB 1820: PRINT "TOTAL INCOME & EQUITY"
     ;:G = 41:W = C(6) + C(7): GOSUB 160:G = 55:
     W = C(13) + C(14): GOSUB 160: PRINT : PRINT
      : IF G$ = "P" THEN  PRINT : PRINT
31   1770  PRINT "TOTAL CASH EXPENDED";:G = 41:W = C
     (5): GOSUB 160:G = 55:W = C(12): GOSUB 160:
     PRINT
C0   1780  PRINT "TOTAL INCOME & EQUITY";:G = 41:W =
      0 - (C(6) + C(7)): GOSUB 160:G = 55:W = 0
     - (C(13) + C(14)): GOSUB 160: PRINT
3B   1790  GOSUB 1820
0C   1800  PRINT "NET COST";:G = 41:W = C(8): GOSUB
     160:G = 55:W = C(15): GOSUB 160: PRINT
C6   1810  GOTO 2590
D3   1820  POKE 36,31: PRINT "----------     --------
     --": RETURN : REM  4 SPACES
8C   1830  POKE 36,26: PRINT M$(2): PRINT : PRINT
4C   1840  POKE 36,40 -  INT ( LEN (AA$) / 2): PRINT
      AA$: PRINT :AA = 0
2B   1850  FOR X = A1 TO A2: POKE 36,0: PRINT E$(X);
     :G = 37:W = E(X): GOSUB 160: POKE 36,41:
     PRINT E$(X + 1 + (A2 - A1));:G = 79:W = E(
     X + 1 + (A2 - A1)): GOSUB 160: PRINT : NEXT
      : RETURN
52   1860 A1 = 1:A2 = 3: GOSUB 1830: POKE 36,0: PRIN
     T E$(11);:G = 37:W = E(11): GOSUB 160: POKE
      36,41: PRINT E$(12);:G = 79:W = E(12):
     GOSUB 160: PRINT : PRINT : PRINT : RETURN

32   1870  REM
45   1880  REM  MORTGAGE TABLES AND MENU
4C   1890  REM
8A   1900 F$ = "MORTGAGE TABLES MENU":A1 = 7:A2 = 9:
     CC = 3:LC = 29: GOSUB 2690:HH = X - 6: HOME
      : ON HH GOTO 1910,1910,2680
3C   1910  HOME : VTAB 14: POKE 36,30: PRINT "(DEFAU
     LT = $2,000)": VTAB 12: POKE 36,28: INPUT "
     ENTER TABLE INCREMENTS ";IN$:IN =  VAL (IN$
     ): IF IN = 0 THEN IN = 2000
60   1920  GOSUB 760:A$ = "MORTGAGE PAYMENT ": IF HH
     = 2 THEN A$ = "2ND YEAR NET "
E5   1930 A$ = A$ + "TABLES " +  STR$ (A(4)) + " YEA
     R LOAN": POKE 36,40 -  LEN (A$) / 2: PRINT
     A$: PRINT
06   1940 L1 = A(1)
9B   1950 L2 = L1: POKE 36,0: PRINT "RATE";:G = 16:
     FOR X = 1 TO 8
AE   1960  IF L2 < 0 THEN 1990
09   1970  IF L2 < 1000 THEN W = L2: GOSUB 160: GOTO
      1990
16   1980 A$ =  STR$ ( INT (L2)):A$ =  LEFT$ (A$, LE
     N (A$) - 3) + "." +  RIGHT$ (A$,3): POKE 36
     ,G -  LEN (A$): PRINT A$;: REM  REMOVE CENT
     S
2E   1990 L2 = L2 - IN:G = G + 9: NEXT : PRINT :
     GOSUB 790
60   2000 R = (A(3) - 3): FOR Z = 1 TO 15
52   2010 L = L1:X = 0:G = 5:W = R: GOSUB 160:G = 16
     : FOR X = 1 TO 8:IR = R / 1200: GOSUB 260:W
     = MP
D5   2020  IF HH = 2 AND W > 0 THEN L2 = L: GOSUB 36
     0: GOSUB 360:W = AM:L = L2: REM  2ND YEAR N
     ET
87   2030  IF W > 0 THEN  GOSUB 160
7A   2040 G = G + 9:L = L - IN: NEXT : PRINT
51   2050 R = R + .25: NEXT : IF L < 1 THEN 2590
CF   2060 L1 = L:C = C + 1: IF C = 3 THEN 2590
B6   2070  IF G$ = "P" THEN  PRINT : PRINT : GOTO 19
     50
D5   2080 VT = 3: GOSUB 1020: IF  ASC (H$) = 27 THEN
      2620
A5   2090  GOTO 1950
B5   2100  REM
D4   2110  REM  AMORTIZATION SCHEDULES MENU
6B   2120  REM
11   2130 F$ = "AMORTIZATION SCHEDULES MENU":A1 = 10
     :A2 = 12:CC = 0:LC = 26: GOSUB 2690:HH = X
     - 9: ON HH GOTO 2170,2310,2680
19   2140  REM
60   2150  REM  YEARLY AMORTIZATION TABLE
E7   2160  REM
7A   2170  GOSUB 760: POKE 36,26: PRINT "YEARLY AMOR
     TIZATION SCHEDULE": PRINT : PRINT : PRINT
3C   2180  FOR X = 2 TO 4: POKE 36,0: PRINT A$(X);:W
     = A(X):G = 37: GOSUB 160: PRINT : NEXT :
     GOSUB 240: POKE 36,0: PRINT "MONTHLY MORTG
     AGE";:W = MP:G = 37: GOSUB 160: PRINT :
     PRINT : PRINT
7E   2190  PRINT "          MORTGAGE       PAID
     PAID         LOAN       CUMULATIVE    CUMULATI
     VE": REM  SPACES 8/6/8/8/6/3
DD   2200  PRINT "YEAR     PAYMENT      INTEREST    PR
     INCIPAL     BALANCE      INTEREST      MORTGAG
     E ": REM  SPACES 4/5/4/4/5/5
76   2210  GOSUB 790:C = 0
1C   2220  GOSUB 360:C = C + 1
E9   2230 C(1) = TY:C(2) = I:C(3) = TP:C(4) = L:C(5)
     = C(5) + I:C(6) = C(6) + TY:
66   2240 G = 4: PRINT YR;: FOR X = 1 TO 3:W = C(X):
     G = G + 12: GOSUB 160: NEXT : FOR X = 4 TO
     6:W = C(X):G = G + 13: GOSUB 160: NEXT :
     PRINT
26   2250 VT = 14: GOSUB 800
F7   2260  IF M = 0 THEN 2590
19   2270 YR = YR + 1: GOTO 2220
94   2280  REM
6F   2290  REM  MONTHLY AMORTIZATION TABLE
E2   2300  REM
AA   2310  GOSUB 760: POKE 36,26: PRINT "MONTHLY AMO
     RTIZATION SCHEDULE": PRINT
64   2320  FOR X = 2 TO 4: POKE 36,0: PRINT A$(X);:W
     = A(X):G = 37: GOSUB 160: PRINT : NEXT :
     GOSUB 240: POKE 36,0: PRINT "MONTHLY MORTG
     AGE";:W = MP:G = 37: GOSUB 160: PRINT :
     PRINT :MT = BM:PC = 0
C9   2330  PRINT "                          PAID       PAID
           LOAN          CUMULATIVE     CUMULA
     TIVE": REM  SPACES 20/6/8/9/4
2A   2340  PRINT "PMT.  MO. YEAR     INTEREST  PRINCI
     PAL     BALANCE          INTEREST       MORTGAG
     E ": REM  SPACES 2/1/4/2/4/8/6
04   2350  GOSUB 790
F1   2360 CT = CT + 1:TP = 0:I = 0
8C   2370 MI = L * IR:P = (MP - MI):TP = TP + P:I =
     I + MI:L = L - P
6D   2380 C(1) = I:C(2) = TP:C(3) = L:C(4) = C(4) +
     I:C(5) = C(5) + MP
04   2390 G = 15: POKE 36,3 -  LEN ( STR$ (CT)):
     PRINT CT"    ";MT$(MT)", "YR;: FOR X = 1 TO
      2:W = C(X):G = G + 10: GOSUB 160: NEXT :G
     = 34: FOR X = 3 TO 5:W = C(X):G = G + 15:
     GOSUB 160: NEXT : PRINT
7E   2400 MT = MT + 1:M = M - 1
FB   2410 VT = 11: IF MT > 12 AND G$ = "S" THEN
     GOSUB 1020: IF  ASC (H$) = 27 THEN 2620
E0   2420  IF MT > 12 THEN MT = 1:YR = YR + 1
81   2430  IF G$ = "P" AND MT = 1 THEN PC = PC + 1:
     IF M > 0 AND PC = 4 THEN  PRINT  CHR$ (12)
     :PC = 0: GOTO 2330
15   2440  IF M = 0 THEN 2590
3E   2450  GOTO 2360
10   2460  REM  TITLE SCREEN
F4   2470  HOME : VTAB 10: POKE 36,18: PRINT "R E A
     L  E S T A T E  A D V I S O R": HTAB 30:
     PRINT "BY ROBERT A. ALBANITO": HTAB 20:
     PRINT "COPYRIGHT(C) 1990 MINDCRAFT PUBL. C
     ORP.": VTAB 24: HTAB 27: PRINT "PRESS RETUR
     N TO CONTINUE";: GET ZZ$: POKE 49168,0
```

LISTING 1: R.E. ADVISOR *continued*

```
80  2480  DIM A$(26),A(26),B$(29),B(29,5),E$(12),E(
      12),M$(14),V$(27),TH(40),MT$(12),C(15)
36  2490  FOR X = 1 TO 26: READ A$(X): NEXT : FOR X
      = 1 TO 29: READ B$(X): NEXT : FOR X = 1 TO
       14: READ M$(X): NEXT
20  2500  FOR X = 1 TO 12: READ MT$(X): NEXT
06  2510  ONERR  GOTO 3470
5E  2520  HOME : VTAB 12: HTAB 13: PRINT "GET AN EX
      ISTING SETUP FILE OR CREATE A NEW ONE? (G/C
      ) ";: GET G$: POKE 49168,0: IF G$ = "C" OR
      G$ = "c" THEN  FOR X = 1 TO 26: READ V$(X):
      NEXT : GOTO 2580
8F  2530  IF G$ = "G" OR G$ = "g" THEN SW = 1: GOSU
      B 3180: GOTO 2550
20  2540  GOTO 2520
26  2550  PRINT D$;"VERIFY"F$
86  2560  PRINT : PRINT D$"OPEN"F$:FO = 1: PRINT D$
      "READ"F$: FOR X = 1 TO 27: INPUT V$(X): NEX
      T : PRINT D$"CLOSE"F$:FO = 0: IF V$(27) = "
      H.P.FILE" THEN 2580
03  2570 E = 5: GOTO 3500
C4  2580  FOR X = 1 TO 26:A(X) =  VAL (V$(X)): NEXT
       : GOTO 2770
47  2590  IF G$ = "P" THEN  PRINT  CHR$ (12): PRINT
       CHR$ (4)"PR#0": PRINT  CHR$ (4)"PR#3":
      PRINT : IF MM = 0 OR MM = 5 THEN H = 0:
      GOTO 2770
4F  2600  IF G$ = "P" THEN G$ = "": GOTO 2620
58  2610  VTAB 24: POKE 36,34: PRINT "PRESS ANY KEY
      ";: GET G$: POKE 49168,0
82  2620 A = 0:AG = 0:AM = 0:BM = 0:C = 0:C1 = 8:C2
      = 0:C3 = 0:CC = 0:CT = 0:DI = 0:DP = 0:EI
      = 0:ET = 0:EW = 0:FR = 0:HA = 0:HV = 0:I =
       0:IN = 0:IR = 0:L = 0:MC = 0:MP = 0:MI = 0
      :MM = 0:AC = 0:WD = 0:PE = 0:PS = 0:PT = 0
81  2630 RT = 0:R = 0:SA = 0:SI = 0:SR = 0:TD = 0:T
      I = 0:TP = 0:TR = 0:TY = 0:U = 0:VT = 0:H$
      = "": FOR X = 1 TO 15:C(X) = 0: NEXT : FOR
       X = 1 TO 40:TH(X) = 0: NEXT :X = 0
A9  2640  IF CG = 1 THEN  HOME : VTAB 10: POKE 36,2
      2: PRINT "RESTORE SET-UP TO BEGINNING VALUE
      S? ";: GET G$: POKE 49168,0: IF G$ = "Y" OR
       G$ = "y" THEN  FOR X = 1 TO 26:A(X) =  VAL
       (V$(X)): NEXT :CG = 0
6C  2650  REM
95  2660  REM  MAIN MENU
6E  2670  REM
B5  2680 Z = 0:MM = 0: HOME :F$ = "MAIN MENU":A1 =
      1:A2 = 6:CC = 9:LC = 25: GOSUB 2690:MM = X:
      ON MM GOTO 850,1070,1900,2130,2770: PRINT
      CHR$ (21): HOME : END
CF  2690  HOME : VTAB 8: POKE 36,40 - ( LEN (F$) /
      2): PRINT F$: VTAB 10: FOR X = A1 TO A2:
      POKE 36,LC: PRINT M$(X): NEXT :X = A1: VTA
      B 10 + (A2 - A1 + 2): POKE 36,18: PRINT "US
      E <ARROWS> TO SELECT...<RETURN> TO EXECUTE"

65  2700 V = X + CC: VTAB V: INVERSE : POKE 36,LC:
      PRINT M$(X);: WAIT  - 16384,128: GET G$:
      POKE 49168,0:H =  ASC (G$): NORMAL : POKE
      36,LC: PRINT M$(X): IF H = 13 THEN  RETURN

84  2710  IF H = 21 OR H = 10 THEN X = X + 1: IF X
      > A2 THEN X = A1
CE  2720  IF H = 8 OR H = 11 THEN X = X - 1: IF X
      < A1 THEN X = A2
CA  2730  GOTO 2700
A9  2740  REM
C2  2750  REM  SETUP MENU
2B  2760  REM
81  2770  HOME
7E  2780  VTAB 1: POKE 36,29: PRINT "----  SETUP ME
      NU  ----": PRINT : IF H = 80 THEN  RETURN
09  2790  VTAB 4: FOR Z = 1 TO 13: POKE 36,1: PRINT
       A$(Z);:W = A(Z):G = 38: GOSUB 130:Z = Z +
      13: POKE 36,41: PRINT A$(Z);:W = A(Z):G = 7
      8: GOSUB 130:Z = Z - 13: PRINT : NEXT :
      PRINT
EA  2800 V = 3:Z = 1:LT = 1:AA = 0
70  2810  VTAB 22: CALL  - 958: HTAB 10: PRINT "USE
       THE <ARROWS/RETURN> KEYS TO CHANGE...<ESC>
       FOR MAIN MENU": HTAB 13: PRINT "<P> PRINT
      SETUP      <S> SAVE SETUP      <N> NEW SETU
      P":F1$ = "AMOUNT TO LARGE... PLEASE RE-ENTE
      R"
E2  2820 V = Z + 3 + AA: VTAB V: INVERSE : POKE 36,
      LT: PRINT  LEFT$ (A$(Z) + "
                ",27);: WAIT  - 16384,128: GET G$:
      POKE 49168,0:H =  ASC (G$): NORMAL : REM
      23 SPACES
38  2830  IF H = 27 THEN 2680
18  2840  IF H = 80 OR H = 112 THEN  GOSUB 770:
      GOSUB 2780: FOR Z = 1 TO 26: POKE 36,20:
      PRINT A$(Z);:W = A(Z):G = 61: GOSUB 130:
      PRINT : NEXT : GOTO 2590
04  2850  IF H = 83 OR H = 115 THEN SW = 2: VTAB 18
      : CALL  - 958: GOSUB 3180: VTAB 18: PRINT :
      CALL  - 958: POKE 36,30: PRINT "SAVING SET
      UP TO DISK"
21  2860  IF H = 83 OR H = 115 THEN  PRINT : PRINT
      D$"OPEN"F$:FO = 1: PRINT D$"WRITE"F$: FOR X
      = 1 TO 26: PRINT A(X): NEXT : PRINT "H.P.F
      ILE": PRINT D$"CLOSE"F$:FO = 0: ON SS GOTO
      2750: VTAB 19: CALL  - 958: GOTO 2770
72  2870  IF H = 78 OR H = 110 THEN 2520
01  2880  IF H = 13 THEN G$ = "": GOTO 2930
44  2890  POKE 36,LT: PRINT  LEFT$ (A$(Z) + "
                    ",27);: REM  23 SPACES
51  2900  IF H = 21 OR H = 10 THEN Z = Z + 1: IF Z
      > 13 THEN AA =  - 13:LT = 41: IF Z > 26
      THEN Z = 1:AA = 0:LT = 1
1A  2910  IF H = 8 OR H = 11 THEN Z = Z - 1: IF Z
      < 14 THEN AA = 0:LT = 1: IF Z < 1 THEN Z =
       26:AA =  - 13:LT = 41
52  2920  GOTO 2820
9C  2930  VTAB V: POKE 36,LT + 27: PRINT "
      ";: VTAB V: POKE 36,LT + 37 -  LEN (G$):
      PRINT G$;: PRINT ;: GET A$: POKE 49168,0:A
      =  ASC (A$): IF A = 13 THEN 3000: REM  10
      SPACES
8E  2940  IF Z = 12 THEN  IF A = 83 OR A = 115 THEN
       G$ = "1": GOTO 3110
92  2950  IF Z = 12 THEN  IF A = 77 OR A = 109 THEN
       G$ = "2": GOTO 3110
07  2960  IF Z = 12 THEN F1$ = "ENTER <M> OR <S>.."
      : GOTO 3130
3E  2970  IF A < 46 OR A > 57 OR A = 47 THEN G$ = "
      ": GOTO 2930
CE  2980 G$ = G$ + A$: IF  LEN (G$) > 6 THEN 3130
85  2990  GOTO 2930
54  3000 H =  VAL (G$): IF G$ = "" THEN H = 0:F1$ =
       "NO ENTRY": GOTO 3140
1D  3010  IF Z = 26 THEN  IF H < 1990 OR H > 2000
      THEN F1$ = "INCORRECT DATE...": GOTO 3130
03  3020  IF Z = 2 AND H > A(1) THEN F1$ = A$(Z) +
      " TO HIGH...": GOTO 3130
89  3030  IF Z < 7 AND H < 1 OR Z = 13 AND H < 1 OR
       Z = 14 AND H < 1 OR Z = 18 AND H < 1 THEN
      F1$ = A$(Z) + " TO LOW...": GOTO 3130
91  3040  IF Z = 14 AND H <  = A(16) THEN F1$ = A$(
      Z) + " TO LOW...": GOTO 3130
BF  3050  IF Z = 3 OR Z = 17 OR Z = 20 OR Z = 23 OR
       Z = 24 OR Z = 25 THEN  IF H > 20 THEN 3120

DF  3060  IF Z = 4 AND H > 45 THEN F1$ = A$(Z) + "
      TO LONG...": GOTO 3130
C3  3070  IF Z = 7 AND H > 7 THEN 3120
F4  3080  IF Z = 8 OR Z = 9 THEN  IF H > 4000 THEN
      3120
94  3090  IF Z = 16 AND H >  = A(14) THEN 3120
8F  3100  IF Z = 18 AND H > 12 THEN 3120
89  3110  INVERSE :A(Z) =  VAL (G$):W = A(Z): VTAB
      V: POKE 36,LT: PRINT A$(Z);:G = LT + 37:
      GOSUB 130:A = 0:G$ = "":CG = 1: GOTO 2820
A3  3120 F1$ = A$(Z) + " TO HIGH..."
88  3130 G$ = "":A$ = "":A = 0:F1$ = F1$ + " PLEASE
       RE-ENTER"
26  3140  VTAB 20: CALL  - 958: POKE 36,40 -  LEN (
      F1$) / 2: PRINT F1$: FOR XY = 1 TO 3000:
      NEXT :XY = 0: VTAB 20: CALL  - 958: VTAB V
      : POKE 36,LT + 27: PRINT "        ";:G = LT
      + 37:W = A(Z): GOSUB 130: PRINT : GOTO 281
      0
```

```
17  3150  REM
EE  3160  REM  SET SLOT# & DRIVE#
0D  3170  REM
74  3180  VTAB 19: HTAB 26: PRINT "SLOT (1-7):";:
        GET SL$: POKE 49168,0:SL =  VAL (SL$):
        PRINT SL
8F  3190  IF SL < 1 OR SL > 7 THEN 3180
9D  3200  VTAB 19: POKE 36,41: PRINT "DRIVE (1-2):"
        ;: GET DR$: POKE 49168,0:DR =  VAL (DR$):
        PRINT DR
67  3210  IF DR < 1 OR DR > 2 THEN 3200
40  3220 SS = 2: IF  PEEK (48896) = 76 THEN 3340:
        REM  DETERMINE IF USING PRODOS
BA  3230  REM
C7  3240  REM  DOS 3.3
AC  3250  REM
87  3260  POKE 43626,SL: POKE 43624,DR
6E  3270  VTAB 23: HTAB 26: PRINT "PRESS (?) TO CAT
        ALOG DISK"
0E  3280  VTAB 21: HTAB 26:F$ = "": INPUT "FILE NAM
        E: ";F$: IF  LEN (F$) < 1 THEN 3280
8E  3290  IF F$ = "?" THEN SS = 1: HOME : PRINT D$;
        "CATALOG": FOR X = 1 TO 3: PRINT : NEXT :
        GOTO 3270
41  3300  RETURN
7E  3310  REM
77  3320  REM  PRODOS
74  3330  REM
53  3340  PRINT  CHR$ (4);"PREFIX,S";SL$;",D";DR$
D4  3350  PRINT  CHR$ (4);"PREFIX": INPUT PF$
86  3360  PRINT  CHR$ (4);"PREFIX";PF$: PRINT
F1  3370  VTAB 19: CALL  - 868: HTAB 26: PRINT "PRE
        FIX:"PF$: PRINT
87  3380  VTAB 23: HTAB 26: PRINT "PRESS (?) TO CAT
        ALOG DISK"
86  3390  VTAB 21: HTAB 26:F$ = "": INPUT "PATH: ";
        F$:NF = 1
50  3400  IF F$ = "?" THEN  HOME : PRINT D$;"CAT":
        FOR X = 1 TO 3: PRINT : NEXT : GOTO 3380
18  3410  IF  LEN (F$) > 0 THEN  FOR NC = 1 TO  LEN
        (F$):NA =  ASC ( MID$ (F$,NC,1)):NF = ((NA
        > 64 AND NA < 91) OR (NA > 96 AND NA < 122
        ) OR (NA = 46) OR (NA > 47 AND NA < 58 AND
        NC > 1)) AND NF = 1: NEXT
AF  3420  IF F$ = "" OR  LEN (F$) > 15 OR NF = 0 OR
        LEFT$ (F$,1) = "." THEN  VTAB 21: POKE 36
        ,32: PRINT "INVALID PATH NAME": FOR X = 1 T
        O 1500: NEXT : VTAB 21: POKE 36,30: CALL  -
        868: GOTO 3380
2E  3430  RETURN
23  3440  REM
5E  3450  REM  ERROR ROUTINE
E5  3460  REM
B1  3470 E =  PEEK (222): POKE 216,0: NORMAL
21  3480  ONERR  GOTO 3470
C2  3490  IF SW = 1 THEN  TEXT : HOME
84  3500  IF FO = 1 THEN  PRINT : PRINT D$;"CLOSE";
        F$
DD  3510  VTAB 12: IF SW = 2 THEN  VTAB 19
FA  3520  IF  PEEK (48896) = 76 AND E = 3 THEN  POK
        E 36,25: PRINT "NO DRIVE CONNECTED TO SLOT
        #";SL: GOTO 3610
B5  3530  IF E = 4 THEN  POKE 36,23: PRINT "DISK IS
        WRITE PROTECTED, REMOVE TAB": GOTO 3610
F0  3540  IF E = 5 THEN  POKE 36,26 -  LEN (F$) / 2
        : PRINT F$;"...IS NOT A R.E.ADVISOR FILE":
        GOTO 3610
DE  3550  IF E = 6 THEN  POKE 36,25: PRINT "THAT FI
        LE IS NOT ON THIS DISK!": GOTO 3610
    3560  IF E = 8 THEN  POKE 36,10: PRINT "A DISK
        ERROR HAS OCCURRED! CHECK THE DOOR OR DISK
        IN DRIVE ";DR: GOTO 3610
27  3570  IF E = 9 THEN  POKE 36,32: PRINT "THE DIS
        K IS FULL!": GOTO 3610
F3  3580  IF E = 13 THEN  POKE 36,24: PRINT "THE PR
        OGRAM ONLY USES TEXT FILES": GOTO 3610
77  3590  IF E = 255 THEN 2770
85  3600  HOME : POKE 36,25: PRINT "ERROR #"E"  HAS
        OCCURED!"
A3  3610  PRINT : POKE 36,27: PRINT "PRESS ANY KEY
        TO CONTINUE";: GET G$: POKE 49168,0
03  3620  ON SW GOTO 2520: VTAB 17: CALL  - 958:
        PRINT : GOTO 2810
88  3630  DATA  VALUE OF HOME,AMOUNT OF MORTGAGE,IN
        TEREST RATE (%),LENGTH OF MORTGAGE (YRS.),P
        ROPERTY TAX,MORTGAGE INSURANCE,NUMBER OF PO
        INTS,CLOSING COSTS
18  3640  DATA  I.R.A. CONTRIBUTION,CHARITIES,TOTAL
        PERSONAL INT. PAID,MARITAL STATUS,PERSONAL
        EXEMPTIONS,SALARIES,OTHER TAXABLE INCOME,F
        .I.T.W.,STATE INCOME TAX (%),MONTH OF FIRST
        PAYMENT
52  3650  DATA  OTHER YEARLY HOME COSTS,APPRECIATIO
        N OF HOME (%),MONTHLY COST OF RENT,OTHER YE
        ARLY RENTAL COSTS,YEARLY RENT INCREASES (%)
        ,TAX DEFERRED/FREE RATES (%),ESTIMATED INFL
        ATION (%),CURRENT YEAR
8E  3660  DATA  MONTHLY MORTGAGE PAYMENT,ADDITIONAL
        MONTHLY COST,TOTAL MONTHLY PAYMENT,TOTAL P
        RINCIPAL,LOAN BALANCE,TOTAL INTEREST,PROPER
        TY TAX,I.R.A.,MORTGAGE INS.,POINTS AMOUNT,C
        LOSING COSTS
F5  3670  DATA  STATE TAX,CHARITIES,PERSONAL INTERE
        ST,PERSONAL EXEMPTION,TOTAL DEDUCTIONS,INCO
        ME,OTHER TAXABLE INCOME,TOTAL INCOME,ADJUST
        ED GROSS INCOME,F.I.T.W.,EST. FEDERAL TAX,E
        ST. FEDERAL REFUND
8B  3680  DATA  STATE TAX WITHHELD,EST. STATE TAX,E
        ST. STATE REFUND,TOTAL REFUNDS,NET MORTGAGE
        PMT.,NET TOTAL MONTH PMT.
C4  3690  DATA  ITEMIZED FIVE YEAR REPORT,RENTAL AN
        D OWNERSHIP ANALYSIS,MORTGAGE AND INTEREST
        RATE TABLES,AMORTIZATION SCHEDULES,SETUP ME
        NU,QUIT
07  3700  DATA  MORTGAGE PAYMENT TABLES,2ND YEAR NE
        T TABLES,MAIN MENU,YEARLY AMORTIZATION SCHE
        DULE,MONTHLY AMORTIZATION SCHEDULE,MAIN MEN
        U,SEND TO SCREEN,SEND TO PRINTER
35  3710  DATA  JAN,FEB,MAR,APR,MAY,JUN,JUL,AUG,SEP
        ,OCT,NOV,DEC
67  3720  DATA  100000,80000,10,15,1000,0,3,1000,22
        50,500,0,2,2,40000,0,0,2.5,1,2000,5,500,100
        0,4,6,4,1990

TOTAL: B0B4

END OF LISTING 1
```


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Please circle 8 on Reader Service Card

by Leslie Schmeltz

AVOIDING MORE BUGS

DOS helps clear the error

Ready for another bug-hunting expedition?

Ideally, we would never have to locate and kill program bugs. But in the real world, bugs are an integral part of the life of any computer programmer. The disk operating system (DOS 3.3 or ProDOS) is quite communicative, and its error messages, while not exactly welcomed by programmers, do a pretty good job of pointing out the problems.

DISK ERRORS

Let's consider a group of errors that, at best, can be called careless. These are the operator errors caused by a failure to satisfy the basic requirements of the operating system. You are the source! DOS 3.3 or ProDOS error messages tell you the nature of the problem, just as the Applesoft error messages do. (DOS error messages lack the question marks that precede Applesoft error messages.)

WRITE PROTECTED appears when DOS tries to store information on a locked disk. A 5.25-inch disk is locked by covering the write-protect notch with an adhesive strip. A 3.5-inch disk is locked by sliding the write-protect switch so that the write-protect hole is open.

If you try to read a disk but forgot to insert one in the selected drive, the I/O ERROR message is displayed. There are other conditions that cause the I/O ERROR message: The door on the disk drive left open; the disk in the drive is damaged or not formatted correctly, and so on.

As in Applesoft, if you try to use a command in immediate execution mode (from the keyboard) that isn't intended for immediate execution, NOT DIRECT COMMAND reminds you.

By their nature, operator errors are relatively easy to correct. The solution to most of the errors noted here is simply to remedy the condition and try again. Although I'd like to be able to tell you it gets better with experience, I still leave the disk drive door open,

Keys to Bug Squashing

1. Anticipation. You must learn to anticipate and make provisions for hardware-related problems such as disk full, etc.
2. Proofreading. Since most errors are typographical, proofreading helps reduce their number significantly.
3. Experience. There's no substitute for it. You must learn which areas are likely to give you problems and monitor them carefully.

Disk Error Messages

WRITE PROTECTED
NOT DIRECT COMMAND
SYNTAX ERROR
FILE NOT FOUND
FILE LOCKED
DISK FULL
RANGE ERROR
VOLUME MISMATCH
PATH NOT FOUND
END OF DATA
NO BUFFERS AVAILABLE
FILE TYPE MISMATCH
PROGRAM TOO LARGE

Leslie R. Schmeltz, 3224 Magnolia Court, Bettendorf, IA 52722. *This program will run under DOS 3.3 and ProDOS. Hands On Applesoft is excerpted from the book* Hands on Applesoft, *published by MindCraft Publishing Corp.*

insert disks upside-down, forget to format disks, and, as a result, periodically get to see all the error messages I've just mentioned.

Play it Again, Sam!

Even though you've heard of a SYNTAX ERROR before, you'll encounter it again in disk operations. Each time you make a grammatical error in a disk command, the ever-popular SYNTAX ERROR appears.

When a disk command specifies a file that is not on the disk catalog, a FILE NOT FOUND error is generated. If you fail to type the name of a file exactly as it appears in the catalog, this error message reminds you. Of course, you might have accidentally deleted the file or changed disks.

Write operations are not permitted to locked disk files. Locked files are identified by an asterisk (*) preceding their name on the disk catalog. If you try to WRITE, RENAME, SAVE, BSAVE, or DELETE a locked file, the DOS error-trapping mechanism will generate a FILE LOCKED message.

If your disk has no more room but you attempt to store additional data, you will see a DISK FULL error message. This creates an interesting problem in that a portion of a file might be saved before this message is displayed. Cataloging the disk shows the file name, but not all the information is included in the file. Before attempting further operations, DELETE the incomplete file and save another copy of the original on a disk with more room.

Ridin' the Range

If your Apple could strum a guitar and yodel (we could call it Slim Bitman!), you might hear something like this coming from the computer some night:

Don't tell me a slot where a disk drive is not,
Or a volume that doesn't match up!
Watch your values of B, R, L, and A,
And my disks will read and write OK!

The lyrics may be corny, but the advice is valid. The slot number, for example, must be from 1 to 7, and the disk drive number either 1 or 2. Specifying a slot or drive outside the permissible range results in the RANGE ERROR message. It is possible to get into trouble with a perfectly legal command (at least in terms of range), but we'll cover that state of affairs in the next installment.

Values of B (byte), R (relative or absolute field for sequential access files, record number for random-access files), and L (record length for random-access files or number of bytes for binary files) should not exceed 32767. Except for record length (which is 1), the minimum acceptable value is 0 (zero). A, the starting address for a binary file, can range from 0 to 65535. (B and A have specialized uses that are beyond the scope of this article.)

Under DOS 3.3, volume numbers from 1 to 254 can be assigned to disks during the initialization process. If the volume specified in a disk command does not match the volume assigned to a specific disk, the VOLUME MISMATCH message appears. Volume numbers outside the 1 to 254 range usually cause the RANGE ERROR message.

Now come the exceptions. (You knew this was coming, didn't you?) Specifying a slot number from 8 to 16 in a program line will result in the SYNTAX ERROR message, rather than the RANGE ERROR you would expect. Similarly, any disk command parameter or command quantity less than 0 or greater than 65535 triggers the SYNTAX ERROR message. Oh well, nobody said this was going to be easy!

AND MORE BUGS

As you might have guessed, we have not yet exhausted the full list of disk error messages. They have been listed in decreasing order of their appearance in the normal course of programming operations. Bear with it a while longer, while we discuss the rest of the little rascals.

END OF DATA occurs when you try to retrieve more information from a file than was stored in it initially. This message is displayed after an INPUT or GET statement, and often is the result of a failure to reset the file pointer.

NO BUFFERS AVAILABLE is displayed when another file buffer required for input or output operations is not available. (A buffer is an area of memory that is set aside to hold data as it is transferred to and from the disk.) It normally occurs in a program when you have forgotten to CLOSE a series of files after OPENing them.

FILE TYPE MISMATCH is caused by an incorrect combination of a disk command and existing file type. You won't get away with trying to BRUN an Applesoft program file or LOAD a binary file. Check the disk catalog for the letters that identify the file type to avoid this problem.

PROGRAM TOO LARGE is displayed when a disk command attempts to RUN a program that is too large for the available memory.

SUCCESSFUL BUG SQUASHING

The errors we've discussed here can be eliminated using a process similar to the one outlined in the last article. First, determine the source and nature of the problem. Error messages are designed to give you at least a rudimentary clue about what is wrong. In a majority of cases, an examination of the offending line or statement will quickly reveal the source of the error.

Some problems, such as DISK FULL, are not directly related to program lines but reflect hardware considerations that need to be kept in mind during program operation. The key to eliminating hardware-related problems is anticipation. Change the disk before it gets full, be sure the drive is set up properly, and so on. While you can correct a problem after an error message is displayed, anticipating conditions that could precipitate errors is far more efficient (and satisfying).

If you have done your homework while learning storage operations, you know to dot your I's and cross your T's. Once you know the correct format and syntax requirements of specific commands, spotting errors becomes a relatively simple matter. A key to avoiding them is careful proofreading.

Another key to avoiding errors is experience. After a while, common problems will become quite familiar. You might find, for instance, that your most troublesome statements are contained in the creation and handling of random-access files. If so, it would seem logical to spend some extra time carefully examining and troubleshooting those types of statements. Experience points out strengths and weaknesses. Learn to eliminate your programming weaknesses, and errors will disappear like magic.

WRAPPING UP

The solutions to most of the problems covered so far are simple. If they're so simple, you say, why have we spent two chapters discussing bugs?

Last month, this series covered language-related errors. Together with the disk errors, they form a group of bugs we could loosely classify as pilot error. If you have ever heard reports of plane crashes, you know that pilot error is used to cover a multitude of sins not directly attributable to the aircraft. In other words, if the engines ran properly and the radios transmitted, all else must be the fault of the pilot. Computer programming is not really that different. If the hardware works correctly, any other problems are the fault of the programmer.

But before you get a large complex, let's make it clear that not all errors are pilot error — just the vast majority. Another group, called process errors, are much subtle, and difficult to detect. But enough bad news for now. I am reminded of a cartoon character popular a few years ago. Do you remember the fellow with the black cloud over his head in Lil' Abner?

I know just how he felt!

FEATURED GAME

by Donald W. Miller Jr., M.D.

Stranded

Strand or Be Stranded

You and your archrival are stranded on a tropical isle. You each have an unlimited supply of secret anti-matter bombs, which will disintegrate the land, leaving only sea remaining.

It is your mission to isolate your enemy on a quadrant surrounded completely by water. Without an escape, your archrival can easily be captured.

Keep this is mind, and you're ready to play the Lo-Res strategy game, Stranded.

USING THE PROGRAM

The Lo-Res playing field consists of 48 "land" quadrants surrounded by a blue sea. Two people can play against each other, or just one can play against the computer. To play against the computer, enter APPLE when asked for players' names.

The program will request a skill level for the Apple. At level one, the computer makes random moves and isn't too smart. Level two is about average; it plays a nice game. Level three is tougher than two, but probably only slightly harder than playing a human. And level four is the most difficult.

Initially, players are placed at opposite ends of the "isle." Each is asked which quadrant to "bomb," choosing from any on the field. The idea is to limit, either immediately or eventually, your opponent's movement.

The quadrants are labeled by their axes; the computer accepts first the X, then the Y coordinate. (For example, enter 1, then 3, for quadrant (1,3)). All invalid entries will be greeted with a bell.

Donald W. Miller, Jr., M.D., 734 Lake Ave., Racine, WI 53403. *This program is compatible with DOS 3.3 and ProDOS.*

Next, you must move to an adjacent quadrant. The move is entered as before.

Again, the idea is to avoid being cornered, to achieve greater mobility.

The game proceeds in this way until one of the players has no more moves. The Apple signals the end of the game and politely asks if another is desired.

ENTERING THE PROGRAM

Type in the Applesoft program from **Listing 1**, STRANDED. Then save it to disk with the command

```
SAVE STRANDED
```

For help with entering *Nibble* listings see the Typing Tips section.

HOW THE PROGRAM WORKS

Two methods of labeling the 48 squares were used. The first method labels each square sequentially from 1 to 48 (SQ), and the second labels a square according to its X and Y coordinates (X,Y). Variables were designed to translate from one system to the other (SQ=SQ(X,Y), X=X(SQ), Y=Y(SQ)).

The squares also are assigned a value of 1, represented by the variable V(SQ). When an individual square is bombed or occupied by a player, the value is changed to 0. This allows the computer to determine valid moves from a particular square.

The most extensively used subroutine starts at **line 90**; you might call it FIND. Basically, FIND takes a square and checks the value of the eight surrounding squares. Some of the surrounding squares can be phantoms — they do not exist — but by default their value is 0.

The subroutine tallies all possible moves from an individual square and identifies each of them for future use. Also, by checking one of the counters (CT), FIND determines a winner. If CT=0, no moves are possible.

In summary, a particular square's number (SQ) is input, and the moves from that square (PM( )) are generated and counted.

The program's strategy is to define the best move as the one that has the most possible future moves. It follows that the square to "bomb" is the opponent's best move. It bombs that square. Then the Apple chooses its own best move and makes it.

Level one uses FIND to locate all the possible moves (or blocks) and randomly picks one of these.

Level two goes a step further. It, too, finds the possible moves, but instead of blindly choosing one, it puts each into FIND. So, the possible moves after each of the *initial* possible moves are found and tallied. Confused? This is just a loop two levels deep.

Now the Apple has the information to make a more intelligent decision. It will choose the initial move that has the most possible future moves. Often, several of the possible moves are equally good at two squares deep. At level two, the Apple randomly chooses among these.

Level three goes yet another step. Instead of choosing randomly from the good moves generated by level two, it puts them into FIND, which selects the best. Again, several initial moves may be equally good, and only then does level three randomly choose one of them.

The actual code for game play is contained in **lines 90-540**, and the instructions are contained in **lines 1030-1100**.

I've incorporated two programming tricks you might want to use in your own programs, and both involve graphics.

Instead of switching to the Lo-Res screen and watching as each part of the field was drawn, the numbers added, and the players generated, I wanted a more "classy" presentation. Using various graphic soft switches, the blank Hi-Res screen is displayed while the game board is invisibly drawn on the Lo-Res screen in **lines 740-880.** The game board appears only after it is completely drawn.

Some of the same soft switches are used at the end of the game by rapidly alternating between the Lo-Res graphics screen and the text screen, as in **lines 970-990**.

For more information on these switches, refer to the Applesoft manual.

MODIFICATIONS

One modification that comes to mind immediately is to upgrade the graphics from Lo-Res to Hi-Res. Perhaps you could define an intricate shape table to define the players. Or maybe you would want to put in some obstacles, like a shark that moves around. But these changes are merely cosmetic. Once you get good enough at the game, you might want to improve the computer's movement algorithm. This should present an excellent challenge since it is already very difficult to beat the Apple at level four.

THE **FEBRUARY 1990 DISK** CONTAINS THIS PROGRAM

If you'd rather not type in the listing for this program, you can buy it on disk, complete, free of typos and ready to run. *Nibble*'s February 1990 programs are available on a single disk for an introductory price of $12.95 from *Nibble*, 52 Domino Dr., Concord, MA 01742. Add $2.50 for shipping/handling within the U.S. and Canada; $7.50 for overseas air mail. Introductory price expires 4/30/90; after that date, the price will be $16.95. See the Nibble Software Directory in this issue for ordering information. **ORDER NO.: W28**

LISTING 1: STRANDED

```
37  10  REM  ********************************
C0  20  REM  * STRANDED                       *
B9  30  REM  * BY DONALD W. MILLER, JR., M.D. *
AE  40  REM  * COPYRIGHT(C) 1990               *
CB  50  REM  * MINDCRAFT PUBL. CORP.           *
24  60  REM  * CONCORD, MA 01742               *
45  70  REM  ********************************
A6  80  LOMEM: 16384: HGR : PRINT  CHR$ (17): GOTO
       550
63  90 CT = 0:A = X(SQ):B = Y(SQ)
08  100  FOR L = 1 TO 5 STEP 4:DR(L) = SQ(A,B - W):
       DR(L + 1) = SQ(A + W,B):DR(L + 2) = SQ(A +
       W,B + W):DR(L + 3) = SQ(A - W,B + W):W =  -
        W: NEXT L
5C  110  IF V THEN  FOR L = 1 TO 8:V(DR(L)) = V(DR(
       L)) - 1: NEXT :V = 0
9B  120  FOR L = 1 TO 8: IF V(DR(L)) > 0 AND T(DR(L
       )) THEN CT = CT + W:PM(CT,M) = DR(L)
B2  130  NEXT L:NM(M) = CT: RETURN
2C  140  FOR K = 1 TO NM(0):TM(K) = TM(K) + V(PM(K,
       0)): IF DF > 2 THEN SQ = PM(K,0):M = 1:
       GOSUB 90: FOR N = 1 TO NM(1):TM(K) = TM(K)
       + V(PM(N,1)): NEXT N: IF DF > 3 THEN  GOSU
       B 160
96  150  NEXT K: RETURN
3E  160  FOR LL = 1 TO NM(1):SQ = PM(LL,1):M = 2:
       GOSUB 90: FOR LM = 1 TO NM(2):TM(K) = TM(K
       ) + V(PM(LM,2)): NEXT LM: NEXT LL: RETURN
ED  170  HOME : VTAB 23: HTAB 14: PRINT "APPLE'S TU
       RN"
C1  180 NN(1) = 3 - I:NN(2) = I
27  190  FOR NN = 1 TO 2
EA  200 XX = (PL(0,NN(NN)) - 1) / 4:YY = (PL(1,NN(N
       N)) + 2) / 5
72  210 M = 0:SQ = SQ(XX,YY): GOSUB 90
8E  220  IF DF = 1 THEN RN =  RND (1) * NM(0) + 1:S
       Q = PM(RN,0):XX = X(SQ):YY = Y(SQ): ON NN
       GOSUB 340,370: IF CT = 0 THEN 970
7F  230  IF DF = 1 THEN 330
3F  240  GOSUB 140
BD  250 FF = 0
5B  260  FOR N = 1 TO NM(0)
CF  270  IF TM(N) >  = TM(1) AND TM(N) >  = TM(2)
       AND TM(N) >  = TM(3) AND TM(N) >  = TM(4)
       AND TM(N) >  = TM(5) AND TM(N) >  = TM(6)
       AND TM(N) >  = TM(7) AND TM(N) >  = TM(8)
       THEN FF = FF + 1:RF(FF) = N
DB  280  NEXT N
2F  290 RN =  RND (1) * FF + 1:SQ = PM(RF(RN),0):XX
       = X(SQ):YY = Y(SQ)
```

LISTING 1: STRANDED *continued*

```
9B  300  FOR N = 1 TO 8:TM(N) = 0: NEXT
F7  310  ON NN GOSUB 340,370
E8  320  IF CT = 0 AND NN = 1 THEN 970
77  330  NEXT NN:I = NN(2): GOTO 540
85  340 BX = 4 * XX + 1:BY = 5 * YY + 2
92  350  COLOR= CL(3): FOR N = BY - 4 TO BY: HLIN B
     X,BX + 3 AT N: FOR P = 1 TO 3:S =  PEEK (SO
     ): NEXT P: NEXT N:SQ = SQ(XX,YY):V = 1:
     GOSUB 90:V(SQ) = 0
5C  360 M = 0:X1 = (PL(0,3 - I) - 1) / 4:Y1 = (PL(1
     ,3 - I) + 2) / 5:SQ = SQ(X1,Y1): GOSUB 90:
     RETURN
F2  370  COLOR= 4:X = PL(0,I):Y = PL(1,I): GOSUB 40
     0
A4  380 T(SQ((X - 1) / 4,(Y + 2) / 5)) = 1
AC  390  COLOR= CL(I):X = XX * 4 + 1:Y = YY * 5 - 2
     : FOR P = 1 TO 15:S =  PEEK (SO): NEXT :T(S
     Q(XX,YY)) = 0: GOSUB 400:PL(0,I) = X:PL(1,I
     ) = Y: RETURN
D8  400  HLIN X + 1,X + 2 AT Y: HLIN X,X + 3 AT Y +
      1: HLIN X + 1,X + 2 AT Y + 2: HLIN X,X + 3
     AT Y + 3: HLIN X,X + 3 AT Y + 4: RETURN
87  410  FOR I = 1 TO 2
F6  420  IF Z AND  LEFT$ (N$(I),5) = A$ THEN 170
96  430  HOME : VTAB 23: HTAB 1: PRINT N$(I)" ("CL$
     (I)"), BOMB COORDINATES ?";: GET AN$: PRINT
      AN$;:XX =  VAL (AN$): PRINT " ";: GET AN$:
     PRINT AN$;:YY =  VAL (AN$)
02  440  IF XX > 8 OR XX < 1 OR YY > 6 OR YY < 1
     THEN  PRINT B$: GOTO 430
2C  450  IF V(SQ(XX,YY)) < 1 OR  NOT T(SQ(XX,YY))
     THEN  PRINT B$: GOTO 430
71  460 X = XX:Y = YY: GOSUB 340: IF CT = 0 THEN 97
     0
EE  470  HOME : VTAB 23: HTAB 1: PRINT "AND NOW YOU
     R MOVE, "N$(I)" ? ";: GET AN$: PRINT AN$;:X
     X =  VAL (AN$): PRINT " ";: GET AN$: PRINT
     AN$;:YY =  VAL (AN$)
77  480 M = 0:X1 = (PL(0,I) - 1) / 4:Y1 = (PL(1,I)
     + 2) / 5:SQ = SQ(X1,Y1): GOSUB 90:F = 0
33  490  IF XX > 8 OR XX < 1 OR YY > 6 OR YY < 1 OR
       NOT T(SQ(XX,YY)) THEN  PRINT B$: GOTO 470

FA  500  FOR N = 1 TO CT: IF SQ(XX,YY) = PM(N,0)
     THEN F = 1
8E  510  NEXT : IF  NOT F THEN  PRINT B$: GOTO 470
C2  520  IF V(SQ(XX,YY)) < 1 THEN  PRINT B$: GOTO 4
     70
D9  530 X = XX:Y = YY: GOSUB 370
DA  540  NEXT I: GOTO 410
A2  550  TEXT : HOME : HTAB 13: PRINT " ";: PRINT "
     ! STRANDED !"
24  560  VTAB 3: HTAB 11: PRINT "A GAME OF STRATEGY
     ": VTAB 5: HTAB 19: PRINT "BY": PRINT : HTA
     B 8: PRINT "DONALD W. MILLER JR., M.D.":
     PRINT : HTAB 10: PRINT "COPYRIGHT(C) 1990"
     : PRINT : HTAB 10: PRINT "MINDCRAFT PUBL. C
     ORP."
FD  570  VTAB 15: HTAB 6: INVERSE : PRINT "BE SURE
     CAPS LOCK KEY IS DOWN": NORMAL : VTAB 22:
     HTAB 1: PRINT "PRESS RETURN TO CONTINUE";:
     GET QQ$
01  580  DIM X(48),Y(48),V(48),SQ(9,9),PM(9,9),CL(3
     ),CL$(2),N$(2),RF(8),DR(8),NM(8)
67  590  DIM T(48)
EF  600 B$ =  CHR$ (7):A1$ = "apple":A$ = "APPLE":W
     = 1:SO =  - 16336
4E  610 CL$(1) = "BLACK":CL$(2) = "WHITE":CL(1) = 0
     :CL(2) = 15:CL(3) = 7
C0  620  FOR X = 1 TO 8
BC  630  FOR Y = 1 TO 6
F2  640 SQ = SQ + 1:X(SQ) = X:Y(SQ) = Y:SQ(X,Y) = S
     Q
EA  650  NEXT : NEXT
35  660  HOME : VTAB 6: PRINT "DO YOU NEED INSTRUCT
     IONS ?";: GET AN$: ON (AN$ = "Y" OR AN$ = "
     y") GOTO 1030
58  670 PL(0,1) = 5:PL(1,1) = 13:PL(0,2) = 33:PL(1,
     2) = 18
60  680  RESTORE
3D  690  FOR I = 1 TO 48: READ V(I):T(I) = 1: NEXT
     :Z = 0:T(3) = 0:T(46) = 0
08  700  DATA  3,5,5,5,5,3,5,8,8,8,8,5,5,8,8,8,8,5,
     5,8,8,8,8,5,5,8,8,8,8,5,5,8,8,8,8,5,5,8,8,8
     ,8,5,3,5,5,5,5,3
14  710  FOR I = 1 TO 2: HTAB 4: VTAB 2 * I + 8:
     PRINT "PLAYER #"I" ";: INPUT N$(I): IF
     LEFT$ (N$(I),5) = A$ OR  LEFT$ (N$(I),5) =
      A1$ THEN Z = 1:N$(I) = A$
FB  720  NEXT
41  730  IF Z THEN  VTAB 16: HTAB 1: PRINT "WHAT LE
     VEL OF SKILL SHOULD THE APPLE    PLAY AT ?
     (1-4) ";: GET DF$:DF =  VAL (DF$): IF DF
     < 1 OR DF > 4 THEN 730
65  740  POKE  - 16297,0: POKE  - 16304,0
32  750  COLOR= 7: FOR Y = 0 TO 39: HLIN 0,39 AT Y:
     NEXT
BA  760  COLOR= 4: FOR Y = 3 TO 32: HLIN 5,36 AT Y:
     NEXT
52  770 Y = 34:I = 1:CR = CL(1)
0D  780  FOR X = 6 TO 34 STEP 4
D8  790 CR = 15 - CR: COLOR= CR
6A  800  ON I GOSUB 890,900,910,920,930,940,950,960
52  810 I = I + 1: NEXT
02  820 X = 1:I = 6
41  830  FOR Y = 28 TO 3 STEP  - 5
6D  840 CR = 15 - CR: COLOR= CR
E3  850  ON I GOSUB 890,900,910,920,930,940
4C  860 I = I - 1: NEXT
CF  870  FOR I = 1 TO 2: COLOR= CL(I):X = PL(0,I):Y
     = PL(1,I): GOSUB 400: NEXT
49  880  POKE  - 16298,0: POKE  - 16301,0: POKE  -
     16304,0: POKE 34,20: GOTO 410
BB  890  VLIN Y,Y + 4 AT X + 1: RETURN
E1  900  HLIN X,X + 2 AT Y: HLIN X,X + 2 AT Y + 2:
     HLIN X,X + 2 AT Y + 4: PLOT X + 2,Y + 1:
     PLOT X,Y + 3: RETURN
93  910  HLIN X,X + 2 AT Y: HLIN X,X + 2 AT Y + 4:
     VLIN Y + 1,Y + 3 AT X + 2: PLOT X + 1,Y +
     2: RETURN
DE  920  VLIN Y,Y + 2 AT X: VLIN Y,Y + 4 AT X + 2:
     PLOT X + 1,Y + 2: RETURN
7F  930  HLIN X,X + 2 AT Y: HLIN X,X + 2 AT Y + 2:
     HLIN X,X + 2 AT Y + 4: PLOT X,Y + 1: PLOT
     X + 2,Y + 3: RETURN
0E  940  VLIN Y,Y + 4 AT X: VLIN Y + 2,Y + 4 AT X +
     2: PLOT X + 1,Y + 2: PLOT X + 1,Y + 4:
     RETURN
CC  950  HLIN X,X + 2 AT Y: VLIN Y + 1,Y + 4 AT X +
     2: RETURN
70  960  VLIN Y,Y + 4 AT X: VLIN Y,Y + 4 AT X + 2:
     PLOT X + 1,Y: PLOT X + 1,Y + 2: PLOT X + 1
     ,Y + 4: RETURN
6F  970  HOME : FOR N = 1 TO 5
76  980  PRINT B$: POKE  - 16303,0: PRINT B$: POKE
     - 16304,0
5F  990  NEXT
6A 1000  VTAB 23: HTAB 11 - ( LEN (N$(I)) / 2):
     PRINT N$(I)" IS THE WINNER !!!": FOR N = 1
     TO 3500: NEXT
75 1010  HOME : VTAB 23: PRINT "ANOTHER GAME ? ";:
     GET AN$: IF AN$ = "Y" THEN  TEXT : HOME :
     GOTO 670
B8 1020  TEXT : HOME : NORMAL : END
F1 1030  HOME : HTAB 14: PRINT "INSTRUCTIONS":
     NORMAL : PRINT
5A 1040  PRINT "   YOU AND YOUR ARCHRIVAL ARE STRA
     NDED  TOGETHER ON A TROPICAL ISLE.  YOU EAC
     H  HAVE AN UNLIMITED SUPPLY OF SECRET ANTI-
     MATTER BOMBS WITH WHICH YOU CAN MAKE    LAN
     D VANISH AND ONLY SEA REMAIN !"
61 1050  PRINT "   IT IS YOUR MISSION TO ISOLATE Y
     OUR   ENEMY ON A QUADRANT SURROUNDED
        COMPLETELY BY WATER. WITHOUT AN ESCAPE,
     YOUR ARCHRIVAL CAN EASILY BE CAPTURED."
0A 1060  PRINT "   YOU DO THIS BY FIRST CHOOSING A
           QUADRANT TO BOMB NEAR THE ENEMY, AND
        THEN, YOU MAKE YOUR ESCAPE TO A SAFER
     QUADRANT.  YOU MAY BOMB ANYWHERE, BUT   YOU
      MAY ONLY MOVE TO ADJACENT QUADRANTS.";
32 1070  PRINT "   TO PLAY, FIRST ENTER THE X, THE
     N THE Y COORDINATE OF THE MOVE."
68 1080  PRINT "   IF YOU WANT TO PLAY THE COMPUTE
     R,    JUST ENTER 'APPLE' WHEN ASKED FOR A
        PLAYER'S NAME."
0A 1090  REM
F1 1100  VTAB 24: HTAB 8: PRINT "(ANY KEY TO START
     GAME)";: GET AN$: HOME : GOTO 670
```

TOTAL: AE90

END OF LISTING 1

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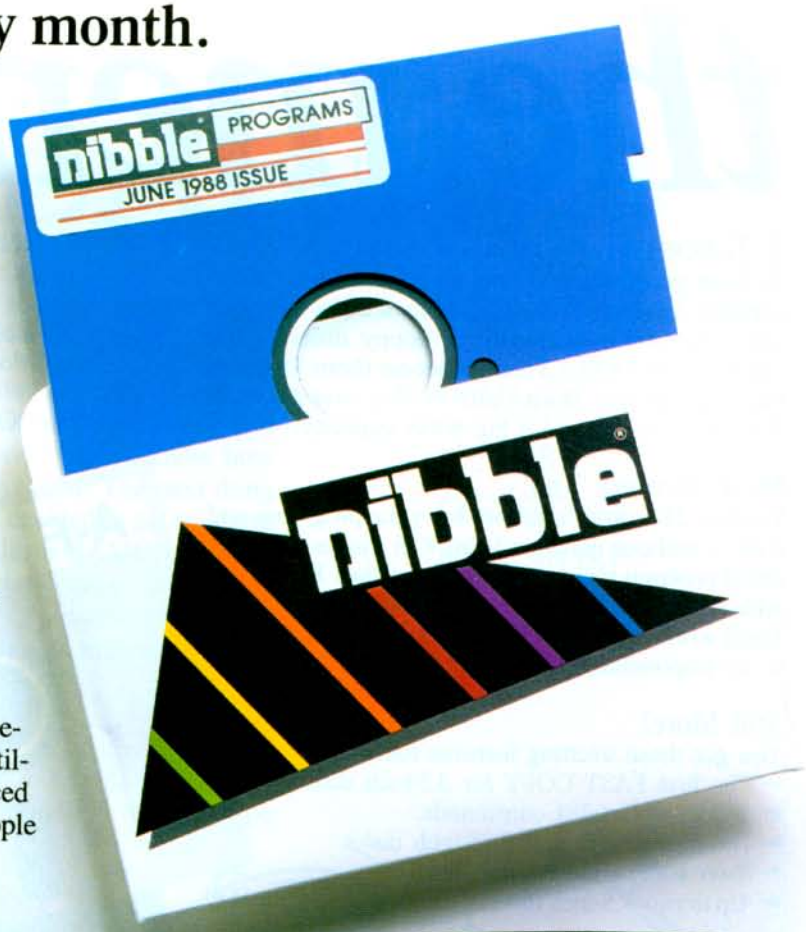

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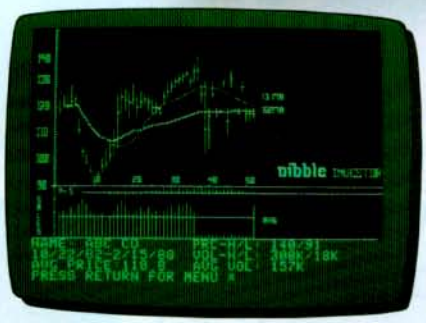

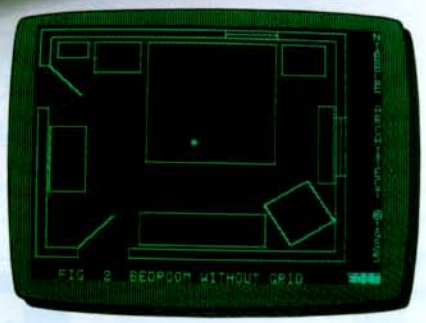

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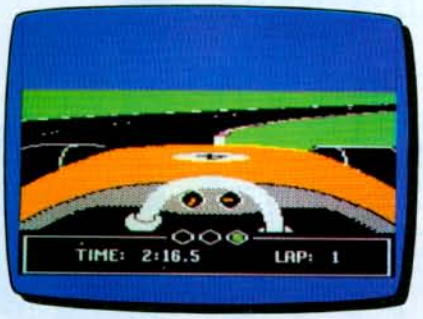

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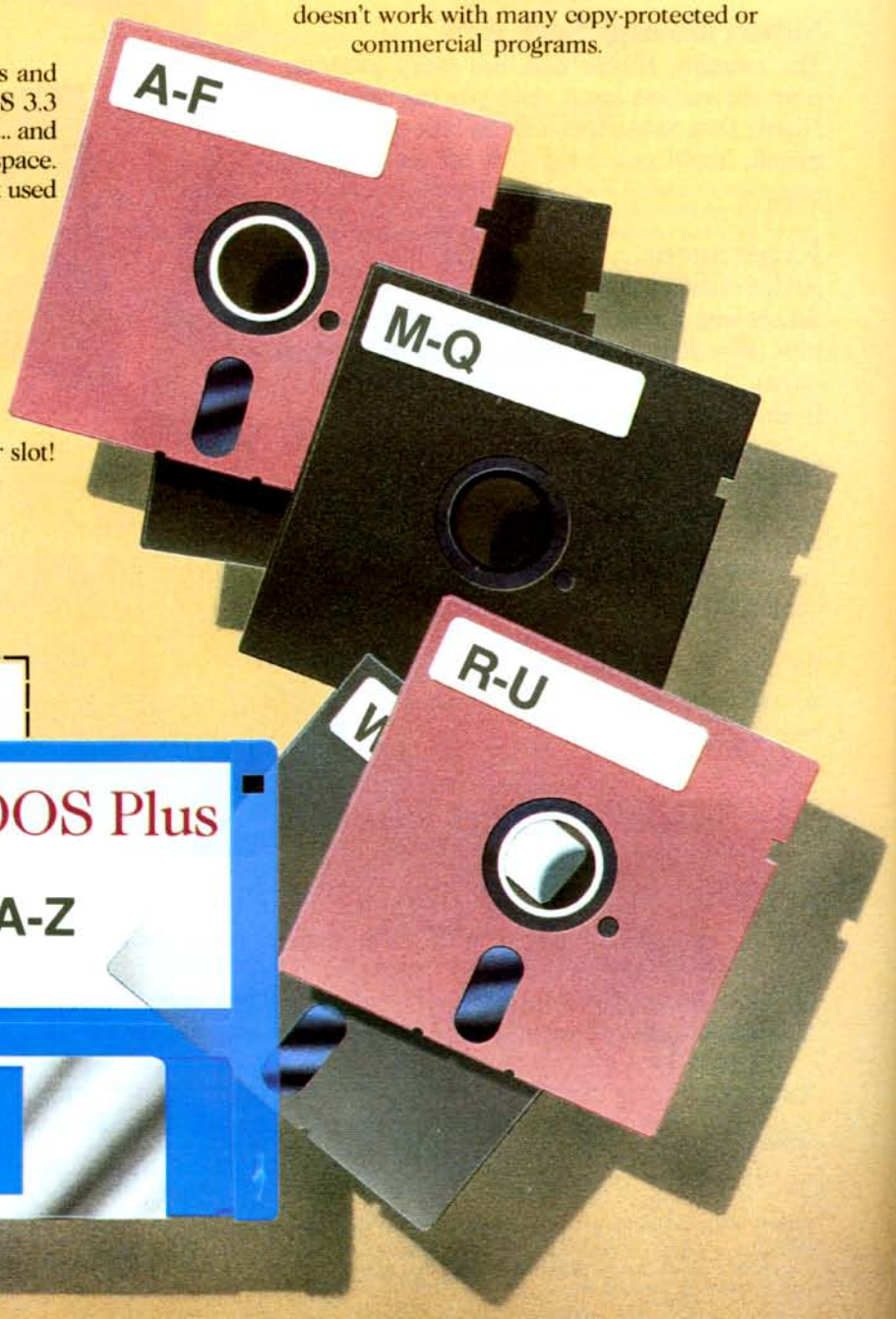

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by Elwood J.C. Kureth

GS ALARM

Your first defense against computer stupor

The idea for GS.ALARM surfaced one day after I missed 45 minutes of a Pistons-Celtics game. I had intended to use the computer for only 30 minutes, but you know how time accelerates when you sit down at the keyboard. The next thing I knew, an hour and 15 minutes had elapsed; I decided to get an alarm program for my IIGS that would work while in BASIC.

I searched but couldn't find what I wanted — that is, a program to remind me of terribly important appointments or events, such as Pistons-Celtics games, that I might miss because of Computer Accelerated Time. So, I wrote GS.ALARM.

USING THE PROGRAM

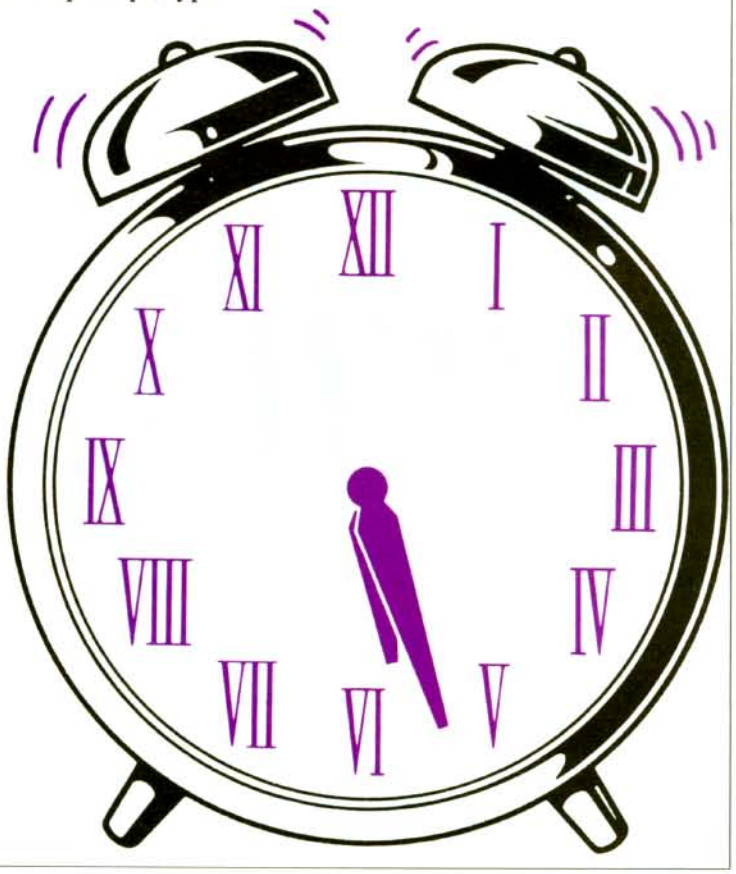
To run GS.ALARM, boot your computer with ProDOS, insert the disk containing the GS.ALARM file and, at the BASIC prompt, type

```
BRUN GS.ALARM
```

The screen will clear and you will be reminded that the IIGS clock must be in AM/PM format. Use the IIGS Control Panel to determine your setting.

Next, you will be prompted to enter your appointment time. You must enter the time in the proper format. If the hour is a two-digit number — say, 11:45 in the morning — then enter 11:45 AM. If the hour is a single digit number — for example, 9:45 in the morning, then enter 9:45 AM. One space is required between the last digit of the time and AM or PM. Press Return.

If you want to quit GS.ALARM without setting an alarm, press Control-Q and Return. Control-Q must be the first character you type. If you start to enter a time and decide to quit, move the cursor back to the first character position, press Control-Q, then press Return.



Elwood J.C. Kureth, 48251 N. Brooks, Mt. Clemens, MI 48045. *This program requires a IIGS and ProDOS.*

The next prompt verifies the time you've entered. If the time is correct, type a Y (upper- or lowercase) and press Return. If the time is incorrect, type N, press Return and enter the correct time.

Next, you'll enter your alarm message. It can be as long as 160 characters, or four screen lines in 40-column mode. If you enter more than 160 characters, you will get a fast, unreadable screen when your message is displayed.

If you don't want to enter a reminder, you can quit the program by pressing Control-Q and Return. Otherwise, edit your message and press Return. Answer the prompt, press Return, and the screen will clear. You will then find yourself back in BASIC. Your message will be displayed and an alarm will sound at the time you've set. Press Return twice and you will return to the BASIC prompt.

A minor inconvenience of GS.ALARM is that if your message flashes on the screen when you are typing a BASIC line, you will lose that line.

If you want to run GS.ALARM after you've set an alarm, simply type CALL 36865 at the BASIC prompt. If your previous alarm setting has not been activated, you will see a message on the screen indicating that you've set an alarm. It will show you the current alarm time, and ask you if you want to set a new alarm time. If you type Y you have a chance to set your new alarm time and new message and return to BASIC.

Control-Reset: Warning

Control-Reset disconnects GS.ALARM, and any message you have entered will be lost. If the situation requires a Control-Reset, be sure to run GS.ALARM again by typing CALL 36865 at the BASIC prompt.

The alarm set message will appear on the screen, showing you the alarm time and asking you if you want to set a new one. *Always* type Y after a Control-Reset, and enter the alarm time and message. Otherwise, nothing will happen because your alarm has been disconnected and your message destroyed by the Control-Reset.

The trick to GS.ALARM is one of many IIGS interrupt sources

ENTERING THE PROGRAM

If you have an assembler (Merlin 16 was used here), type in the source code from **Listing 1**, assemble it, and save the object code with the filename GS.ALARM. If you do not own an assembler, enter the Monitor with

```
CALL -151
```

and then type in the hex codes from **Listing 2**. Now save the file with

```
BSAVE GS.ALARM,A$9001,L$456
```

For more help with *Nibble* listings, see the Typing Tips section in this issue.

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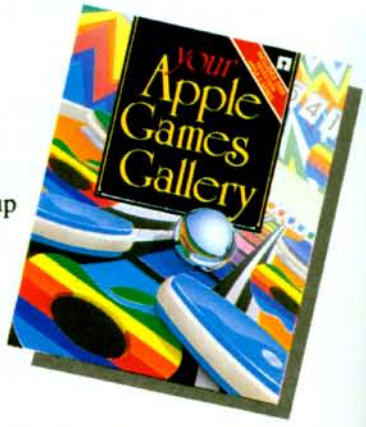

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HOW THE PROGRAM WORKS

GS.ALARM's logic is straightforward. The key is the IIGS clock. You enter a time (in AM-PM format) and a message (as many as 160 characters) that are stored in memory as ASCII values. GS.ALARM then calls a tool known as ReadTimeASCII from the IIGS toolbox. This tool stores the date and time in memory as a string of ASCII characters. GS.ALARM then checks the entered time with the IIGS time. If they match, an alarm goes off and your message appears on the screen. If no match is detected, GS.ALARM calls ReadTimeASCII for another check, saves the time, and compares it again to the alarm time. This sequence, which takes place in milliseconds, is repeated until the alarm time and IIGS time agree.

The trick to making GS.ALARM work is using one of the many IIGS *interrupt* sources. An interrupt is usually caused by an external signal that tells the computer to stop what it's doing and pay attention to a more important task.

In the case of GS.ALARM, I used the clock chip interrupt source. A one-second timer interrupt is generated by the 1-hertz signal from the clock chip. The interrupt is enabled by setting a bit in the Video Graphics Controller (VGC) register. Now, once a second, the system will jump out of the BASIC system environment in which you're programming and go to the user interrupt vector, which contains the address of GS.ALARM's main routine. The system goes to that part of memory and executes the routine that compares the times.

After a single comparison, GS.ALARM performs an RTI (Return from Interrupt) back to the BASIC system (unless there is a match, at which point GS.ALARM jumps to the message routine). It's this jumping back and forth that lets you program in BASIC as the time check is made. All this transpires so fast you'll never notice it's working.

GS.ALARM checks your entry for the correct format and character validity and position. GS.ALARM does this by checking each character or characters in the time string against characters valid for that position.

In **lines 166 to 170**, GS.ALARM checks the second digit of the minutes. This number can only be in the range 0 to 9. So, the program first makes sure the number is not less than 0 — that is, it doesn't have an ASCII value of less than 48.

If the character's ASCII value is less than 48, it's not within the range of acceptable characters and GS.ALARM asks you to re-enter the time.

If the ASCII value is greater than 48, GS.ALARM checks to determine if it's greater than 57, the ASCII value for 9. If it is, you're forced to re-enter the time.

In **line 169**, GS.ALARM uses a colon (:) as a comparison character. This is because the Branch on Plus (BPL) instruction in **line 170** will execute if the ASCII value in the time string is greater than or equal to the compared value. If we used the number 9 for the comparison, the re-enter message would be displayed whenever you entered a 9 at that position, even though it is a valid character for that spot.

To make the check function correctly, the program uses the character that has the next highest value in the Apple character set, which is the colon. The colon has an ASCII value of 58.

THE **FEBRUARY 1990 DISK** CONTAINS THIS PROGRAM

If you'd rather not type in the listing for this program, you can buy it on disk, complete, free of typos and ready to run. *Nibble*'s February 1990 programs are available on a single disk for an introductory price of $12.95 from *Nibble*, 52 Domino Dr., Concord, MA 01742. Add $2.50 for shipping/handling within the U.S. and Canada; $7.50 for overseas air mail. Introductory price expires 4/30/90; after that date, the price will be $16.95. See the Nibble Software Directory in this issue for ordering information. **ORDER NO.: W28**

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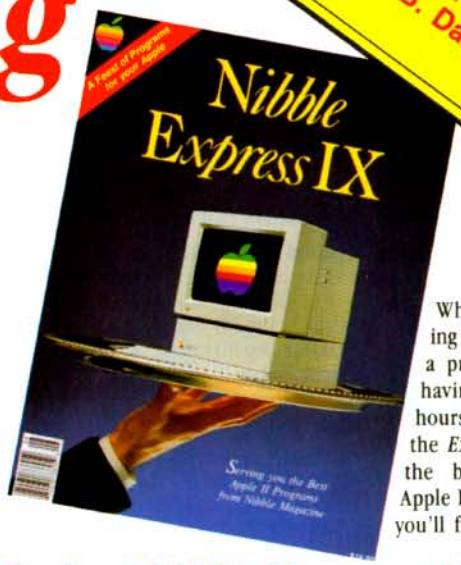

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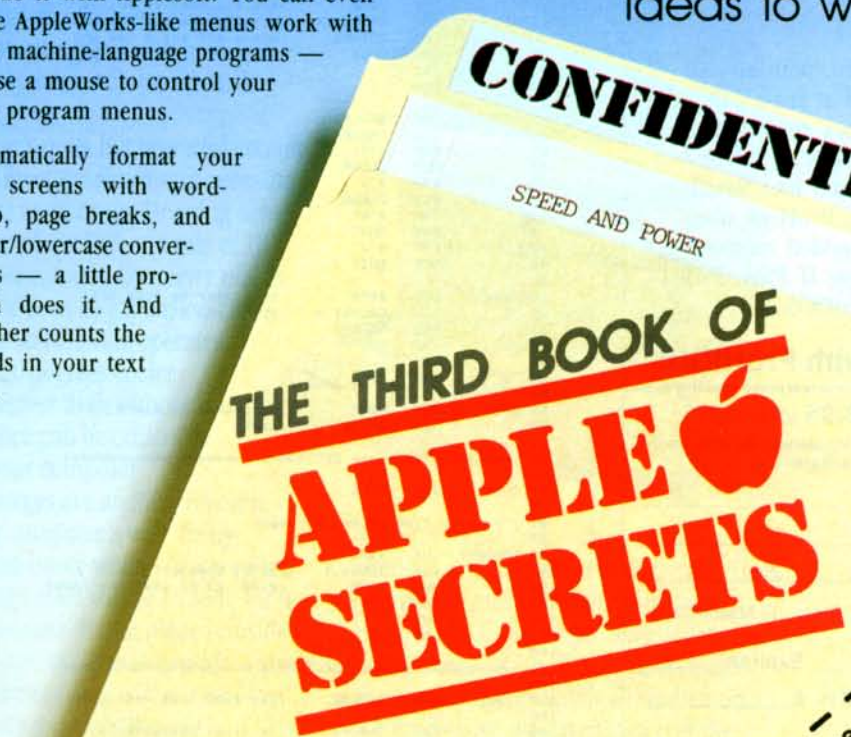

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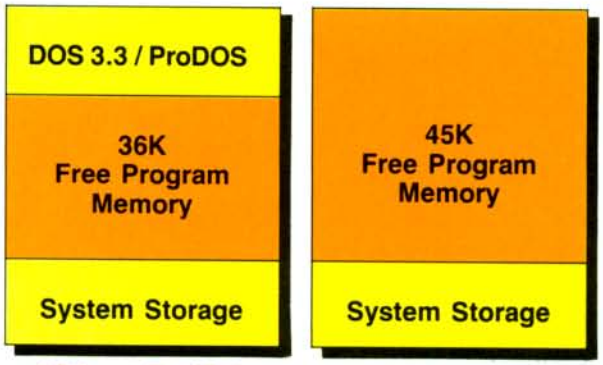

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LISTING 1: GS.ALARM Source Code

```
*******************************
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*                             *
*     by Elwood J.C. Kureth   *
*     Copyright(c) 1990       *
*     MindCraft Publ. Corp.   *
*     Concord, MA 01742       *
*                             *
*******************************
*
*
*
* MERLIN 8/16 ASSEMBLER
*
*
*================== SECTION 0 ======================*

BELL     =     $FBDD      ;monitor bell routine
COUT     =     $FDED      ;monitor output routine
HOME     =     $FC58      ;monitor clear screen
STROBE   =     $C010      ;keyboard strobe
INBUFF   =     $200       ;input buffer use by GETLN2
TEFLAG   =     $3CE       ;previous time/event flag
GETLN2   =     $FD6F      ;monitor input routine
VGCINT   =     $C023      ;VGC interrupt register
DOSWARM  =     $3D0       ;DOS warmstart vector
SCANINT  =     $C032      ;Scan-line interrupt reg
KEYBOARD =     $C000      ;read keyboard
USERVECL =     $3FE       ;user interrupt vector-low
USERVECH =     $3FF       ;user interrupt vector-high

         ORG   $9001

         LDA   #$00       ;set HIMEM to $9000
         STA   $4C
         LDA   #$90
         STA   $4D

BEGIN    JSR   HOME

*================== SECTION 0a ====================*

         LDA TEFLAG       ;check flag to see if
         CMP #"S"         ;alarm has already been
         BNE CLEAR        ;set

RESET    LDY   #$00       ;tell user that he/she
:1       LDA   RMSSG,Y    ;has already set alarm
         BEQ   DISPLAY
         JSR   COUT
         INY
         BRA   :1

DISPLAY  LDY   #$00       ;display current alarm
:1       LDA   TEBUFF,Y   ;time
         JSR   COUT
         CPY   #$07
         BEQ   ASK
         INY
         BRA   :1

ASK      LDY   #$00       ;ask the user if he/she
:1       LDA   RMSSG2,Y   ;wants to remove the old
         BEQ   GETANS     ;alarm and set a new one
         JSR   COUT
         INY
         BRA   :1

GETANS   JSR   GETLN2
         LDA   INBUFF
         CMP   #"Y"
         BEQ   CLEAR
         CMP   #"y"
         BEQ   CLEAR
         CMP   #"N"
         BEQ   QUIT
         CMP   #"n"
         BEQ   QUIT

YorN1    LDY   #$00       ;tell user to type only
:1       LDA   CMSSG2,Y   ;a 'Y' or 'N'
         BEQ   GETANS
         JSR   COUT
         INY
         BNE   :1

QUIT     JSR   HOME       ;no change to alarm -
         JMP   DOSWARM    ;quit

*================== SECTION 1 ====================*

CLEAR    JSR   HOME

* Display time prompt message.

TPROMPT  LDY   #$00
:1       LDA   TMSSG,Y    ;print message
         BEQ   TIME       ;done, go to user for input
         JSR   COUT
         INY
         BNE   :1

*================== SECTION 2 ====================*

TIME     JSR   GETLN2     ;get time from user

         LDA   INBUFF     ;is first character a
         CMP   #$91       ;CONTROL-Q?
```

continued on page 48

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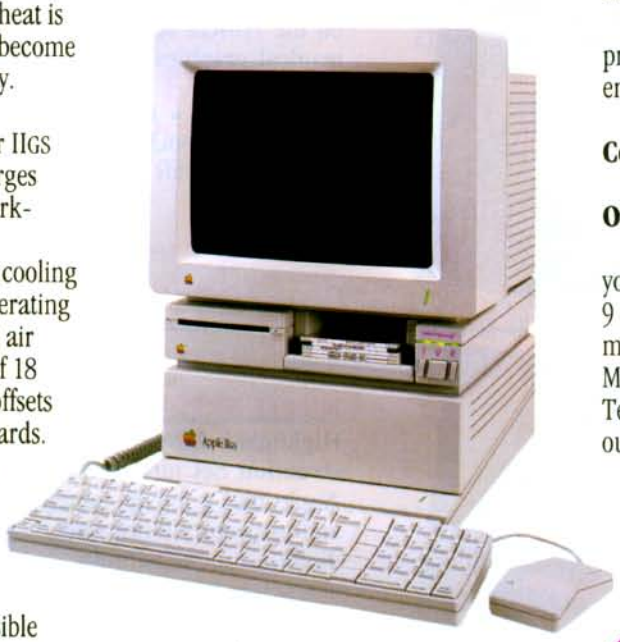

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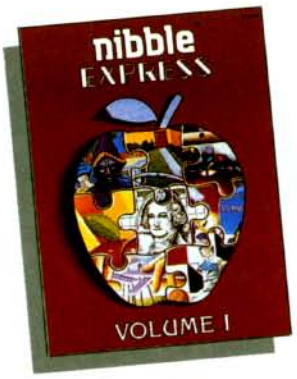

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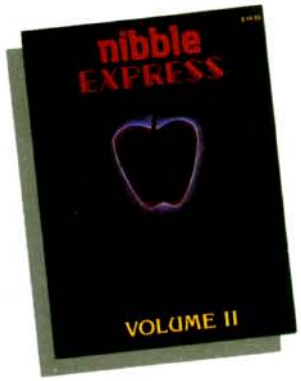

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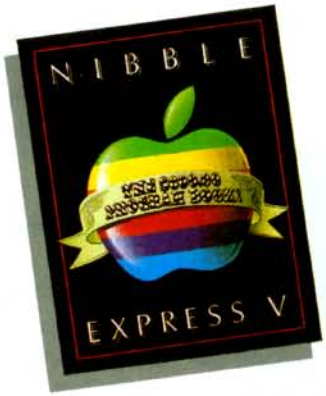

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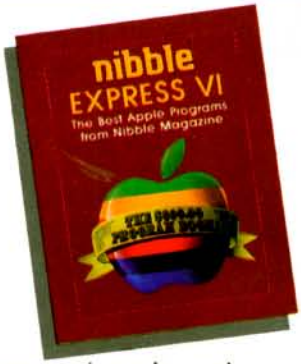

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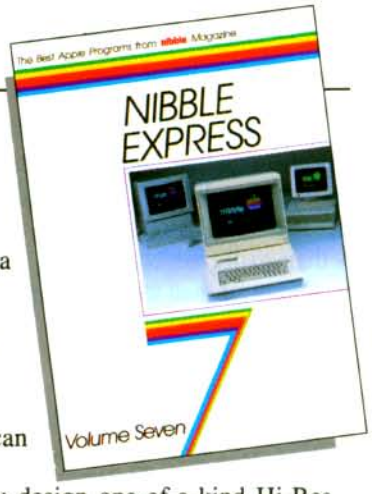

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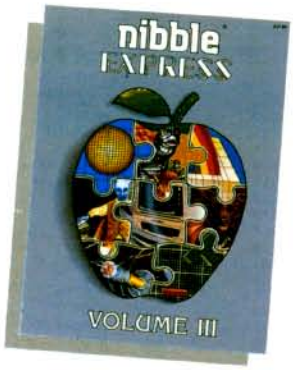

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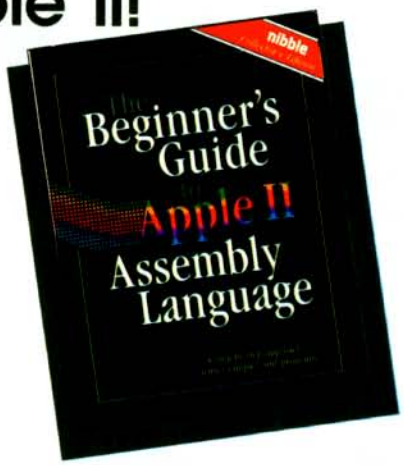

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LISTING 1: GS.ALARM Source Code *continued from page 44*

```
111             BNE   TIMCHK
112             JSR   HOME          ;yes - quit APPEAR
113             JMP   DOSWARM
114
115 * Ensure the user is entering the time in the correct
116 * format and is using valid characters.
117
118 TIMCHK     TXA
119             TAY
120             DEY
121             LDA   INBUFF,Y
122             CMP   #"M"
123             BEQ   CHECKP
124             CMP   #"m"
125             BNE   ERRORTIM
126             LDA   #"M"
127             STA   INBUFF,Y
128
129 CHECKP     DEY
130
131             LDA   INBUFF,Y
132             CMP   #"P"
133             BEQ   CHECKSP
134             CMP   #"p"
135             BNE   NOTP
136             LDA   #"P"
137             STA   INBUFF,Y
138             BRA   CHECKSP
139 NOTP        CMP   #"A"
140             BEQ   CHECKSP
141             CMP   #"a"
142             BNE   ERRORTIM
143             LDA   #"A"
144             STA   INBUFF,Y
145             BRA   CHECKSP
146
147 ERRORTIM JSR   HOME
148             LDY   #$00
149 :1          LDA   ERROR,Y
150             BEQ   TIME
151             JSR   COUT
152             INY
153             BNE   :1
154
155 CHECKSP   DEY
156
157             LDA   INBUFF,Y
158             CMP   #" "
159             BNE   ERRORTIM
160             BRA   CHKMIN1
161
162 CLEAR2     BRA   CLEAR
163
164 CHKMIN1   DEY
165
166             LDA   INBUFF,Y
167             CMP   #"0"
168             BMI   ERRORTIM
169             CMP   #":"
170             BPL   ERRORTIM
171
172 CHKMIN2   DEY
173
174             LDA   INBUFF,Y
175             CMP   #"0"
176             BMI   ERRORTIM
177             CMP   #"6"
178             BPL   ERRORTIM
179
180 CHKCOLON DEY
181
182             LDA   INBUFF,Y
183             CMP   #":"
184             BNE   ERRORTIM
185
186             CPX   #$08
187             BNE   CHK07
188
189 CHK08     DEY
190
191             LDA   INBUFF,Y
192             CMP   #"0"
193             BMI   ERRORTIM
194             CMP   #"3"
195             BPL   ERRORTIM
196
197             DEY
198
199             LDA   INBUFF,Y
200             CMP   #"1"
201             BNE   ERRORTIM
202
203             BRA   FULL8
204
205 CLEAR1     BRA   CLEAR2
206
207 CHK07     DEY
208
209             LDA   INBUFF,Y
210             CMP   #"1"
211             BMI   ERRORTIM
212             CMP   #":"
213             BPL   ERRORTIM
214
215 * Transfer GETLN2 buffer (INBUFF) contents to
216 * time/event buffer (TEBUFF).
217
218 ONLY7     LDA   #" "          ;put SPACE character at
219             STA   TEBUFF        ;start of buffer
220
221             DEX                 ;bring pointer back one
```

```
222                             ;byte to point at last
223                             ;character of time string-
224                             ;X now equals 6
225             LDY   #$07
226 :1          LDA   INBUFF,X
227             STA   TEBUFF,Y
228             DEX
229             DEY
230             BEQ   DONE2
231             BNE   :1
232
233 FULL8       DEX             ;X now equals 7
234             LDA   INBUFF,X
235             STA   TEBUFF,X
236             CPX   #$00      ;beginning of buffer?
237             BEQ   DONE2     ;yes - finished
238             BNE   FULL8     ;no - get more
239
240 DONE2                       ;finished section 2
241
242 *================== SECTION 2a ==================*
243
244 * Give user a chance to change his time.
245
246 CHANGE      LDY   #$00
247 :1          LDA   CMSSG,Y   ;print time ok? prompt mssg
248             BEQ   CHNGTIME  ;done-go to user for input
249             JSR   COUT
250             INY
251             BNE   :1
252
253 CHNGTIME    JSR   GETLN2
254             LDA   INBUFF
255             CMP   #"Y"
256             BEQ   EPROMPT
257             CMP   #"y"
258             BEQ   EPROMPT
259             CMP   #"N"
260             BEQ   CLEAR1
261             CMP   #"n"
262             BEQ   CLEAR1
263
264 YorN2      LDY   #$00      ;tell user to type only
265 :1          LDA   CMSSG2,Y  ;a 'Y' or 'N'
266             BEQ   CHNGTIME
267             JSR   COUT
268             INY
269             BNE   :1
270
271
272 *================== SECTION 3 ==================*
273
274 * Display event message prompt.
275
```

```
276 CLEAR4     JSR   HOME
277
278 EPROMPT    LDY   #$00
279 :1          LDA   EMSSG,Y   ;print event prompt mssg
280             BEQ   EVENT     ;done - go to user for input
281             JSR   COUT
282             INY
283             BNE   :1
284
285 *================== SECTION 4 ==================*
286
287 EVENT       JSR   GETLN2    ;get event from user
288
289             LDA   INBUFF    ;is first character a
290             CMP   #$91      ;CONTROL-Q?
291             BNE   XBUFF2
292             JSR   HOME      ;yes - quit APPEAR
293             JMP   DOSWARM
294
295 * Place the event in the time/event buffer
296 * immediately after the time.
297
298 XBUFF2      LDX   #$00
299             LDY   #$08      ;point past end of time
300                             ;string in TEBUFF
301 :1          LDA   INBUFF,X
302             STA   TEBUFF,Y
303             CMP   #$8D      ;carriage return?
304             BEQ   EPROMP2   ;yes - finished
305             INX
306             INY
307             BNE   :1
308
309 *================== SECTION 4a ==================*
310
311 * Ask the user if the message is OK. Set a flag
312 * (SETFLAG) if the message is OK. SETFLAG will
313 * notify APPEAR that a time and an event have been
314 * entered and the current alarm has not yet been
315 * activated (gone off.)
316
317 EPROMP2     LDY   #$00
318 :1          LDA   EMSSG2,Y  ;is message ok? prompt
319             BEQ   GETANS2
320             JSR   COUT
321             INY
322             BNE   :1
323
324 GETANS2     JSR   GETLN2
325             LDA   INBUFF
326             CMP   #"Y"
327             BEQ   SETFLAG
328             CMP   #"y"
329             BEQ   SETFLAG
```


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LISTING 1: GS.ALARM Source Code *continued*

```
330             CMP   #"N"
331             BEQ   CLEAR4
332             CMP   #"n"
333             BEQ   CLEAR4
334
335 YorN3       LDY   #$00          ;tell user to type only
336 :1          LDA   CMSSG2,Y      ;a 'Y' or 'N'
337             BEQ   GETANS2
338             JSR   COUT
339             INY
340             BNE   :1
341
342 SETFLAG     LDA   #"S"
343             STA   TEFLAG
344             JSR   HOME
345
346 *================= SECTION 5 ==================*
347
348 * Set user interrupt vector to address of main
349 * routine (starting at MAIN), enable the 1-second
350 * timer interrupt (bit 2 - VGCINT), and jump to
351 * BASIC.
352
353 SETVEC      LDA   #$EE
354             STA   USERVECL
355             LDA   #$91
356             STA   USERVECH
357
358             LDA   VGCINT
359             ORA   #%00000100
360             STA   VGCINT
361
362             JMP   DOSWARM
363
364 *================= SECTION 6 ==================*
365
366 * Save some registers by pushing them on the stack,
367 * place the processor in 16-bit mode and access the
368 * miscellaneous tool ReadTimeASCII, which returns the
369 * date and time as a string of characters.
370
371 MAIN        PHP
372             PHB
373             PHA
374             PHX
375             PHY
376
377             CLC                 ;emulation to native
378             XCE                 ;e = 0 = native (enable)
379             REP   $30           ;m & x = 0 (accumulator,
380                                 ;memory locations, and
381                                 ;index registers = 16 bits)
382
383 MTSTART     LDX   #$0203        ;misc. tools startup
384             JSL   $E10000       ;entry point for toolbox
385                                 ;routines
386             PEA   ^DTBUFF       ;pointer to input buffer
387                                 ;(high word)
388             PEA   DTBUFF        ;low word
389             LDX   #$0F03        ;ReadTimeASCII
390             JSL   $E10000       ;put string in memory
391 MTSHUT      LDX   #$0303        ;misc. tools shutdown
392             JSL   $E10000
393
394             SEC
395             XCE                 ;back to emulation (8 bits)
396
397 *================= SECTION 7 ==================*
398
399 * Compare the time/event buffer to the IIGS date/time
400 * buffer. When the times in both buffers match, buzz
401 * the alarm and display the event message.
402
403 COMPARE     LDA   TEBUFF+6      ;check for AM or PM.
404             CMP   DTBUFF+18
405             BNE   NOMATCH
406
407 OKAMPM      LDX   #$04          ;AM/PM match; now check
408             LDY   #$0D          ;the rest of the time.
409
410 GETMORE     LDA   TEBUFF,X
411             CMP   DTBUFF,Y
412             BNE   NOMATCH
413             DEX
414             DEY
415             CPY   #$08          ;end of DTBUFF? If so, the
416                                 ;times match. Fall through
417                                 ;to ALLMATCH and alert the
418                                 ;user.
419             BNE   GETMORE
420
421 ALLMATCH    LDA   VGCINT        ;turn off interrupt
422             AND   #%11111011
423             STA   VGCINT
424
425             LDY   #$00
426 :1          LDA   CRS,Y
427             BEQ   PRINT
428             JSR   COUT
429             INY
430             BRA   :1
431
432 PRINT      LDY   #$08          ;point to start of event msg
433 :1          LDA   TEBUFF,Y      ;print event mssg.
434             JSR   COUT
435             CMP   #$8D
436             BEQ   RINGBELL      ;go ring bell
437             INY
438             BRA   :1
439
```


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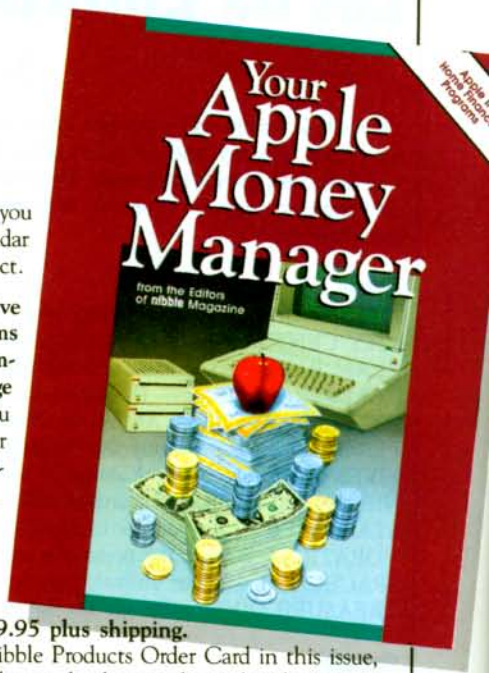

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```
440 * ---------------------------------------------- *
441
442 * Restore the registers by pulling from the stack,
443 * reset 1-second interrupt (bit 6 - SCANINT), and
444 * return from interrupt (RTI) to BASIC.
445
446 NOMATCH  PLY
447        PLX
448        PLA
449        PLB
450        PLP
451
452        LDA   SCANINT
453        AND   #%10111111
454        STA   SCANINT
455
456        RTI
457
458 * ---------------------------------------------- *
459
460 RINGBELL LDA   #"N"        ;first, remove the 'S'
461        STA   TEFLAG       ;from the flag location
462                           ;so APPEAR knows the alarm
463                           ;has been activated
464        JSR   BELL
465        LDA   KEYBOARD     ;read keyboard
466        CMP   #$80         ;was a key pressed?
467        BCC   RINGBELL     ;no - ring again
468        STA   STROBE       ;clear character from kybd
469
470        PLY                ;restore registers
471        PLX
472        PLA
473        PLB
474        PLP
475
476 DONE7   RTI               ;Event displayed. Back to
477                           ;BASIC
478
479 +============ messages and data storage ==========+
480
481 RMSSG    ASC   "YOU'VE SET AN ALARM FOR - ",8D,8D,00
482
483 RMSSG2   HEX   8D,8D
484        ASC   "DO YOU WISH TO REMOVE THIS ALARM "
485        ASC   "AND SET A NEW ONE? (Y or N) ",00
486
487 TMSSG    ASC   "ENSURE THAT IIGS CLOCK",8D
488        ASC   "IS IN AM - PM FORMAT",8D,8D
489
490        ASC   "Set Time (example - 8:30_PM",8D
491        ASC   "CONTROL-Q and RETURN to Quit):",8D,8D
492        HEX   00
493
494 ERROR    ASC   "INVALID TIME ENTRY - REENTER:",8D
495        ASC   "(example - 8:30_PM)",8D,00
496
497 EMSSG    HEX   8D
498        ASC   "Event or Appointment",8D
499        ASC   "(Message limited to 160 characters"
500        ASC   " -",8D
501        ASC   "4 full screen lines in 40-column"
502        ASC   " mode"8D
503        ASC   "CONTROL-Q and RETURN to Quit):",8D,8D
504        HEX   00
505
506 EMSSG2   HEX   8D
507        ASC   "Is Message OK? (Y or N) ",00
508
509 CMSSG    ASC   "Is time OK? (Y or N) ",00
510
511 CMSSG2   ASC   "Type 'Y' or 'N' only ",00
512
513 CRS      HEX   8D,8D,8D,8D,8D,8D,8D,8D,00
514
515 DTBUFF   DS    20           ;date and time buffer for
516                            ;ReadTimeASCII
517
518 TEBUFF                      ;time and event buffer
```

END OF LISTING 1

LISTING 2: GS.ALARM

Start: 9001 Length: 456

```
1C|9001:A9 00 85 4C A9 90 85
29|9008:4D 20 58 FC AD CE 03 C9
9A|9010:D3 D0 52 A0 00 B9 78 92
80|9018:F0 06 20 ED FD C8 80 F5
BA|9020:A0 00 B9 56 94 20 ED FD
48|9028:C0 07 F0 03 C8 80 F3 A0
D4|9030:00 B9 95 92 F0 06 20 ED
69|9038:FD C8 80 F5 20 6F FD AD
DF|9040:00 02 C9 D9 F0 1F C9 F9
57|9048:F0 1B C9 CE F0 11 C9 EE
54|9050:F0 0D A0 00 B9 24 94 F0
F1|9058:E3 20 ED FD C8 D0 F5 20
65|9060:58 FC 4C D0 03 20 58 FC
C2|9068:A0 00 B9 D5 92 F0 06 20
D5|9070:ED FD C8 D0 F5 20 6F FD
DB|9078:AD 00 02 C9 91 D0 06 20
8B|9080:58 FC 4C D0 03 8A A8 88
75|9088:B9 00 02 C9 CD F0 09 C9
76|9090:ED D0 27 A9 CD 99 00 02
B5|9098:88 B9 00 02 C9 D0 F0 2A
69|90A0:C9 F0 D0 07 A9 D0 99 00
1F|90A8:02 80 1F C9 C1 F0 1B C9
38|90B0:E1 D0 07 A9 C1 99 00 02
53|90B8:80 10 20 58 FC A0 00 B9
97|90C0:3F 93 F0 B1 20 ED FD C8
42|90C8:D0 F5 88 B9 00 02 C9 A0
8D|90D0:D0 E8 80 02 80 8F 88 B9
97|90D8:00 02 C9 B0 30 DC C9 BA
A0|90E0:10 D8 88 B9 00 02 C9 B0
81|90E8:30 D0 C9 B6 10 CC 88 B9
9A|90F0:00 02 C9 BA D0 C4 E0 08
63|90F8:D0 18 88 B9 00 02 C9 B0
47|9100:30 B8 C9 B3 10 B4 88 B9
A8|9108:00 02 C9 B1 D0 AC 80 22
FC|9110:80 C2 88 B9 00 02 C9 B1
C6|9118:30 A0 C9 BA 10 9C A9 A0
74|9120:8D 56 94 CA A0 07 BD 00
48|9128:02 99 56 94 CA 88 F0 0F
2F|9130:D0 F4 CA BD 00 02 9D 56
B4|9138:94 E0 00 F0 02 D0 F3 A0
B1|9140:00 B9 0E 94 F0 06 20 ED
2F|9148:FD C8 D0 F5 20 6F FD AD
6E|9150:00 02 C9 D9 F0 1C C9 F9
88|9158:F0 18 C9 CE F0 B2 C9 EE
11|9160:F0 AE A0 00 B9 24 94 F0
A4|9168:E3 20 ED FD C8 D0 F5 20
81|9170:58 FC A0 00 B9 72 93 F0
0F|9178:06 20 ED FD C8 D0 F5 20
F0|9180:6F FD AD 00 02 C9 91 D0
67|9188:06 20 58 FC 4C D0 03 A2
C4|9190:00 A0 08 BD 00 02 99 56
B0|9198:94 C9 8D F0 04 E8 C8 D0
A2|91A0:F2 A0 00 B9 F4 93 F0 06
84|91A8:20 ED FD C8 D0 F5 20 6F
1A|91B0:FD AD 00 02 C9 D9 F0 19
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■Hex File Checker is a machine-language lifesaver. Use it, and you'll no longer have to check machine-language programs byte by byte to find the typo that slipped by. Just enter the starting address of the program you want checked, and this utility will step through it eight bytes at a time so you can compare the code to the listing.

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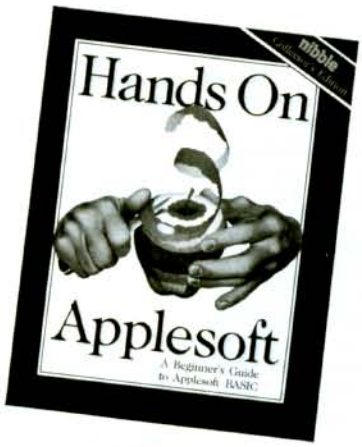

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by Mark Craven

APPLESOFT POPPING

It's as popular as the WAIT command, and about as well understood — that is, not very well.

Meet POP.

No, I'm not talking about dear old Dad. And I'm not talking sodas or modern culture.

This POP is an Applesoft command. It's as popular (no pun intended) as the WAIT command, and about as well understood — which is to say, not very well.

But POP can be useful when applied properly. Therein lies the problem — applying it properly. To do this, you need to understand the fundamentals.

USING THE PROGRAMS

Study the four listings and run the programs as you read the tutorial section of this article. You should find the programs self-explanatory; any special instructions will be covered by the tutorial.

ENTERING THE PROGRAMS

Type in **Listing 1** and save it with the command

```
SAVE POP1
```

Repeat this step with the three remaining listings, substituting the appropriate filename when you issue the SAVE command.

For help with entering *Nibble* listings, see the Typing Tips section.

HOW THE PROGRAMS WORK

Executing a POP "causes one RETURN to "pop" off the top of the stack of RETURN addresses," says the Applesoft Programming Reference Manual. "The next RETURN encountered after a POP causes a branch to one statement beyond the second most recently executed GOSUB." So there you have it, right? It's great if you know what the stack is. Those of you who do, skip the next few paragraphs. The rest of you stay put.

Mark Craven, 662 Raygene Way, North Salt Lake, Utah 84054. *This program is compatible with DOS 3.3 and ProDOS.*

Page 1 of RAM ($0100-$01FF hex, 256-511 decimal) is reserved for use by this mysterious stack. Here, addresses are stacked, or piled up, on a last-in-first-out basis. Applesoft needs to know where to go when RETURNing from a GOSUB. (See **Figure 1**.)

ADDR #1 was the first address put on the stack, and ADDR #N was the most recent. The addresses are retrieved in reverse order — that is, ADDR #N would be the first off and ADDR #1 would be the last off. Naturally, there is a finite number of addresses that can be stored within this limited space of 256 bytes; Applesoft allows only 25 active GOSUBs before the ?OUT OF MEMORY ERROR is displayed. This is demonstrated in the first program, POP1 (**Listing 1**). Note that we execute GOSUBs with abandon but never a RETURN. A RETURN would remove the addresses from the stack. So, when the maximum number of addresses are on the stack, we get the message, ?OUT OF MEMORY ERROR.

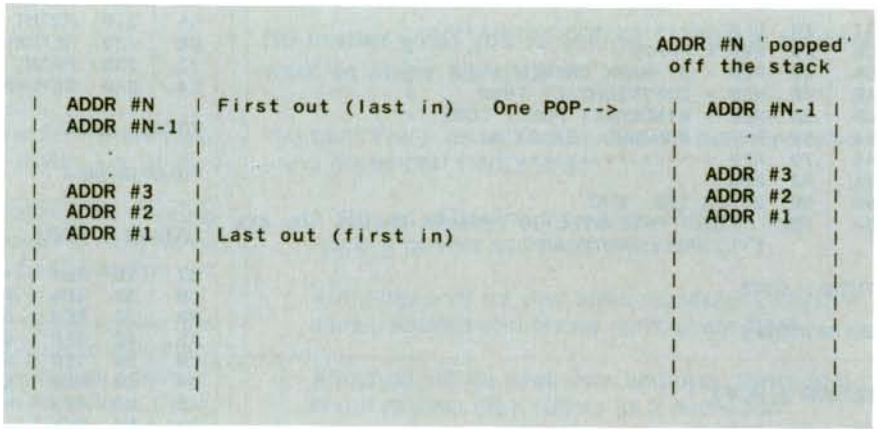

Figure 1: The "stack"

To fix this problem, use the next program, POP2 (**Listing 2**). This program goes overboard in the other direction. Note that in **line 90** we execute the GOSUB and in **line 100**, rather than just RETURN to end the program, we POP the address off the stack and GOTO **line 90** again. Running this program will show that overzealous use of POP can cause your program to run for a very long time! In this program, the stack never gets to grow at all, since every executed GOSUB is followed by a POP, stripping off the RETURN address. Not very effective programming.

Overzealous use of POP can make your program run a very long time.

POP3 (**Listing 3**) is another simple program with lots of GOSUBs with which to play. Running this program without any changes will just print the five messages indicated in **lines 150-230**. Note that there are five GOSUBs and five RETURNs. Now, be bold. Change **line 240** to POP:RETURN instead of RETURN. Run the program and see what happens.

Got the error message, didn't you? But this time, the error message was ?RETURN WITHOUT GOSUB ERROR.

By executing the POP, you removed an address from the stack. When the program looked for the last address on the stack and found none, the error message was displayed and the program was halted.

This error is really the only error you will ever see displayed because of the POP command. All other errors manifest themselves in less obvious, more devious ways.

When you use the POP command within nested GOSUBs, make sure the subsequent program logic returns the flow within the previously executed GOSUB. If this is not the case, you will RETURN from a GOSUB to a part of your program from which you did not start the next time a RETURN is encountered.

If you want to exit several GOSUBs, you should issue a POP for each GOSUB, then continue normal program flow, free of any pending GOSUBs. This is demonstrated in the last demo program, POP4 (**Listing 4**).

In this program, you have two choices. You can press Return to execute a normal RETURN statement in **line 150**, whereupon a message will be printed indicating normal program flow is continuing. Or, you can press Escape and branch from the GOSUB with a GOTO 170 in **line 140**. This will clear the address on the stack generated from the GOSUB in **line 90** and direct program flow to **line 170**, which will print a message indicating you just executed a POP. Run the program several times using the two options. Then list it and follow the logic of your choices.

Remember, when you issue a POP, there is no associated branch as in a RETURN. If you want the program flow to go someplace special, you must supply that branch. See the GOTO in POP4, **line 140**.

One of the most practical uses I have found for the POP command is in subroutines where one option to the user is RETURN TO MAIN MENU — or a similar statement in which the user can choose to exit the routine entirely and move to another part of the program.

An example of this is in NIBBLE MEDIC (*Nibble* Vol. 6/No. 3; errata in Vol. 6/No. 6), a program in which I used subroutines extensively for input error checking.

The program was within only one GOSUB routine when checking errors; a simple POP:GOTO *line number* was executed whenever an input error was found. This saved some coding space by not having to check for an error flag on the RETURN each time a check was made.

Study the uses of POP within program listings, read all you can about it in your programming manuals. Use it with care, and in situations where there is a real need — it's easy to get carried away. And that's when you get into trouble.

Still, that shouldn't stop you from adding another Applesoft command to your repertoire. Get POPping!

LISTING 1: POP1

```
37 |  10  REM   ************************
C0 |  20  REM   * POP1                  *
B9 |  30  REM   * BY MARK CRAVEN        *
AE |  40  REM   * COPYRIGHT(C) 1990     *
CB |  50  REM   * MINDCRAFT PUBL. CORP. *
24 |  60  REM   * CONCORD, MA 01742     *
45 |  70  REM   ************************
3A |  80  REM
DD |  90  GOSUB 100
69 | 100  J = J + 1: PRINT "# "J;" THIS WILL NOT RUN
   |      VERY LONG...": GOTO 90

TOTAL: C3C2

END OF LISTING 1
```

LISTING 2: POP2

```
37 | 10  REM ************************
C0 | 20  REM * POP2                  *
B9 | 30  REM * BY MARK CRAVEN        *
AE | 40  REM * COPYRIGHT(C) 1990     *
CB | 50  REM * MINDCRAFT PUBL. CORP. *
24 | 60  REM * CONCORD, MA 01742     *
45 | 70  REM ************************
3A | 80  REM
68 | 90  GOSUB 100: END
5A | 100  PRINT "THIS WILL GO FOREVER UNLESS YOU RES
        ET": POP : GOTO 90
```

TOTAL: C3C2

END OF LISTING 2

LISTING 3: POP3

```
37 | 10  REM ****************************
C0 | 20  REM * POP3                     *
B9 | 30  REM * BY MARK CRAVEN           *
AE | 40  REM * COPYRIGHT(C) 1990        *
CB | 50  REM * BY MINDCRAFT PUBL. CORP. *
24 | 60  REM * CONCORD, MA 01742        *
45 | 70  REM ****************************
3A | 80  REM
D8 | 90  GOSUB 150
49 | 100  GOSUB 170
51 | 110  GOSUB 190
CB | 120  GOSUB 210
63 | 130  GOSUB 230
7E | 140  END
A0 | 150  PRINT "THIS IS LINE # 1."
F5 | 160  RETURN
29 | 170  PRINT "THIS IS LINE # 2."
D2 | 180  RETURN
3D | 190  PRINT "THIS IS LINE # 3."
3D | 200  RETURN
55 | 210  PRINT "THIS IS LINE # 4."
08 | 220  RETURN
72 | 230  PRINT "THIS IS LINE # 5."
E4 | 240  RETURN
```

TOTAL: 3584

END OF LISTING 3

LISTING 4: POP4

```
37 | 10  REM ************************
C0 | 20  REM * POP4                   *
B9 | 30  REM * BY MARK CRAVEN         *
AE | 40  REM * COPYRIGHT(C) 1990      *
CB | 50  REM * MINDCRAFT PUBL. CORP.  *
24 | 60  REM * CONCORD, MA 01742      *
45 | 70  REM ************************
3A | 80  REM
78 | 90  HOME : GOSUB 120
B1 | 100  PRINT : PRINT : PRINT "THIS IS THE NORMAL
        RETURN FROM THE GOSUB"
73 | 110  END
BA | 120  PRINT "PRESS <ESC> TO EXECUTE A 'POP' OR P
        RESS": PRINT "<RETURN> FOR A NORMAL RETURN
        FROM GOSUB"
2C | 130  VTAB 12: HTAB 1: PRINT "PRESS <ESC> OR <RE
        TURN>..";: POKE  - 16368,0: GET X$
AD | 140  IF X$ =  CHR$ (27) THEN  POP : GOTO 170
7B | 150  IF X$ =  CHR$ (13) THEN  RETURN
45 | 160  GOTO 130
5F | 170  PRINT : PRINT : PRINT "THIS IS A 'GOTO' AF
        TER EXECUTING A 'POP'"
92 | 180  END
```

TOTAL: 64A9

END OF LISTING 4

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LETTERS *continued from page 2*

MISCOMMUNICATION

► Loren Wright's otherwise excellent review of four modem packages ("Let Your Fingers Do the Talking," *Nibble*, Vol. 10/No. 10) contained some small errors.

I was the GEnie sysop that Wright contacted about the Ymodem and Xmodem 1K bug with GEnie. There appears to have been a miscommunication between us. Xmodem CRC transfers are definitely not as fast as Xmodem 1K transfers.

However, I have found that if ProTerm is told to receive files with Xmodem CRC, and GEnie is instructed to send with Xmodem 1K, these 1K transfers usually go through without difficulty.

Also, I should mention that since the article was written, GEnie has begun to support Zmodem. Yet, again, ProTerm doesn't work reliably with GEnie's implementation. We have been told by Checkmate Technologies that Greg Schaefer, ProTerm's programmer, is working on a fix, but as of today (Oct. 12, 1989) no fix has been made.

ProTerm is an excellent modem program, along with several others not reviewed by Wright, including Don Elton's Talk Is Cheap, which has a fantastic macro programming language and other solid features, and Bob Garth's Apple Communications Terminal (ACT).

Thanks for your excellent publication.

Don Esmay
GEnie Apple II File Librarian
Blue Island, IL

THE ERROR TRAP

■ **DB Construction Kit** (Vol. 10/No. 9, p. 28, **Listing 1**: DCK): **Line 1200** is missing. Add the following line.

```
1200 REM
```

■ **Nibble Assembler** (Vol. 10/No. 11, p. 16): The program does not correctly assemble programs with BASIC.SYSTEM 1.0. The program requires BASIC.SYSTEM 1.1 or greater. If you are receiving a "No buffers available" error when running programs assembled by Nibble Assembler you should check the version of BASIC.SYSTEM.

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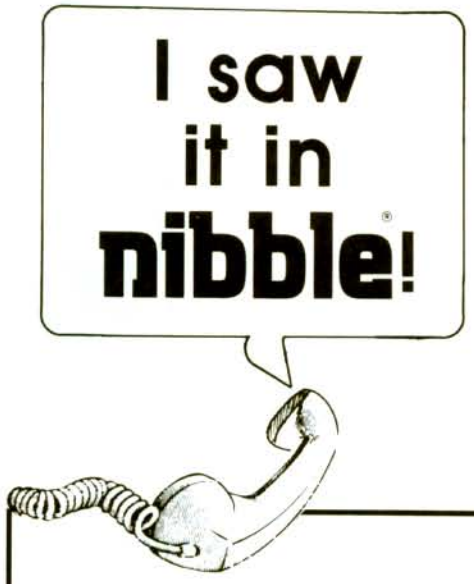

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by Kenn Chapman

CHOOSE WITH BOOLEANS

It's either *on* or *off*

A Boolean, you say? Well, not lately. I'm on a diet. Oh, you mean a Boolean. *Of course! Right. What's a Boolean?*

If those words could be yours, fear not — this article will not cover some exotic little trick of machine language.

If, instead, you are thinking, *Another article about Boolean logic — so who cares?* then hold on a minute. Even you old-time hackers can learn some Boolean tricks — in Applesoft.

Boolean logic can be used in Applesoft programs to save time and space, thereby solving problems more efficiently.

To understand Boolean logic is to understand the difference between yes and no. Now, is that difficult? You now understand everything about Boolean logic. Sort of.

If it were really that simple, you would have understood and used it long ago, right? Well, let's muddy the waters and explain it a bit more.

A Boolean expression is one that can be evaluated to True/False, on/off, yes/no, 1/0. The Applesoft Basic Programming Reference Manual includes a table of Boolean operators. Unfortunately, the manual says almost nothing about how to use these Boolean operators and, worse yet, they look just like normal arithmetic operators.

USING THE OPERATORS

Consider the problem of toggling upper- and lowercase. This is an important concern when you're writing a program on the IIe or IIc for possible use on the II Plus, which is without lowercase. One solution is to have your program BLOAD a machine-language program, through which all output to the screen will be routed. That way, you can have lowercase text in your program or text files, but if the program is being run on an Apple II Plus, the screen will display the text in uppercase.

Suppose that your machine-language program is loaded in memory at address $9400 (37888 decimal). And suppose it takes the value of the second byte (37889) and adds it to the ASCII value of the given character to produce lowercase. In other words, to activate lowercase, you POKE 32 into memory location 37889; to turn it off, you POKE 0 into location 37889.

Normally, you would use a separate IF statement every time you wanted to change the case status. But IF statements are messy. For one thing, they often demand the use of a GOTO after the condition has been satisfied, and that's a transgression in structured programming.

Suppose we set up a single subroutine to accomplish both tasks — turning lowercase on and off. All you need to do is set a flag, F, before calling the subroutine. If you want lowercase on, set F = 1. To turn lowercase off, set F = 0. Then: GOSUB 10.

As you may know, computers operate on electronic impulses. And an electronic component is either on or off. That's why the lowest level of machine-language the computer can understand consists of instructions rendered in binary numbers. Of course, in the binary numbering system, you can only have the value 0 or 1. To the computer, those numbers represent on and off.

```
10 POKE 37889, 0 + (32 * (F > 0
)): RETURN
```

That's all there is to it. The last part — (F > 0) — is the Boolean expression. If F is set to 1, the expression evaluates as TRUE and returns the value 1. If F = 0, the expression evaluates as FALSE and returns a value of 0. If you substitute either of these values for the Boolean expression, you get 0 + (32 * 1) = 32 for lowercase,

Kenn Chapman, Qayar Systems, M.P.O. Box 622, Hamilton, Ontario, L8N 3S7.

and 0 + (32 * 0) = 0 for uppercase.

This solution surfaced while I was working on a bulletin board program that would be called by a variety of computers. Some would accept lower case; others would not.

In the same program, I needed to contol the line feeds after a return. Again, because of the variety of computers calling the BBS, it was necessary to issue (F = 1), or suppress (F = 0) the line feeds. The following expression accomplished both functions depending on the value of F:

```
20 POKE 1914, 6 + (16 * (F > 0))
```

The value 6 or the value 22 is POKEd into memory location 1914, which tells the modem if it should send a line feed character after the RETURN character.

Computers operate on electronic impulses; components are either on or off.

A much more practical example is the common Yes/No response. Suppose you have a menu routine that offers the choice of just having the letters displayed or the full word/command displayed. Does this mean you have to write two complete routines? Not at all.

```
10 HOME: PRINT "<C>";: ON (A$ = "Y") GOSUB 20:
   RETURN
20 PRINT "HOICE";: RETURN
```

If you want abbreviated commands, **line 10** will print <C>; if you want full commands, **lines 10-20** generate <C>HOICE. The advantage of this structure is that it lets you pack more instructions into a single line of code, thereby reducing the number of line numbers, not to mention the elimination of one more IF instruction. Also, this example assumes that when program control RETURNs from a GOSUB, the next executable instruction is performed.

How often have you seen or written a program that asks if you want a report sent to the printer or the screen? If the answer is "printer," two instructions are required, often as subroutines, and an IF test. How about a single subroutine?

```
10 PRINT D$ "PR#" (F = 1): RETURN
```

or

```
10 PRINT D$ "PR#" (PR$ = "Y"): RETURN
```

The latter is preferred; it doesn't require F=1 to be set every time a report is processed. A PR#0 statement can be issued at the end of the report and even if the printer is already off, it won't do any harm.

To conclude: Boolean expressions can be used whenever a Yes/No or toggle situation exists. And it will improve your program's execution by eliminating otherwise "bloated" commands.

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by Steve McLendon

If you've written many game programs, you've probably had need of a random-number generator, perhaps to simulate a six-sided die. If your program is written in BASIC, obtaining a random number is easy — type RND (1), followed by the appropriate multipliers. But if you've graduated to assembly language, the matter is not so simple. There is no opcode or mnemonic that generates a random number. You must build the subroutine yourself.

ASSEMBLY RANDOM NUMBER GENERATOR

Assemble complete disorder

When your machine program needs a random number, it should be able to jump to a random-number subroutine and fetch one. The Monitor has a subroutine that generates a random number — KEYIN, at $FD1B. It generates a random number from 0 to 65,535 in location $4E (LSB) and $4F (MSB). The only problem with KEYIN is that it requires a keyboard input to exit. In some cases this may be acceptable, but if you need the program to fetch a random number and continue, KEYIN is not the answer.

AN ASSEMBLY SOLUTION

Perhaps the most convenient means of accomplishing the task is to use the same subroutines BASIC uses. When you ask for RND (1) in BASIC, the muscle comes from the subroutine located at $EFAE. It uses this subroutine to generate the random number each time you do a RND (1). On exit, the number is stored in memory locations $C9-$CD. Memory location $C9 holds the exponent, while $CA through $CD contain the mantissa for Applesoft's floating-point scheme.

Generally, a random number between 0-255 is all that is required. It can be scaled to whatever you need. Suppose you want to generate a random number from 1 to 6. Appropriate scaling would take the form

$$\frac{N*6}{255}$$

in which N represents your 0-255 random number.

Steve McLendon, 2919 New Plymouth, Webster, TX 77598. This program is compatible with DOS 3.3 and ProDOS.

USING THE PROGRAM

Using RANDOM.TEST is simple. Just run it and keep pressing Return for a random number between 1 and 6. If you would like to incorporate this random number system into your own programs use the same format that appears in **lines 110-120.** First, BLOAD RANDOM.GEN. Then issue a CALL 24583. To extract the number, execute a PEEK(24580). Whatever variable you assign to the PEEK will hold the new random number.

ENTERING THE PROGRAM

If you have an assembler, type in the source code from **Listing 1** (the MindCraft Assembler was used here). Assemble it, then save the object code as RANDOM.GEN. If you don't have an assembler, enter the Monitor with

```
CALL -151
```

Enter the hex codes from **Listing 2** and then type

```
BSAVE RANDOM.GEN,A$6000,L$71
```

You might also want to enter the demo program from **Listing 3**, RANDOM.TEST. Once it is entered, save it with

```
SAVE RANDOM.TEST
```

For help entering *Nibble* listings, see the Typing Tips section.

HOW THE PROGRAM WORKS

Listing 1 is an assembly subroutine to generate a random number between 1 and 6. After setting the initial conditions, the program jumps to the subroutine at $EFAE. It then picks the number from 0 to 255 generated by $EFAE and placed in memory location $CC. Remember that $C9 through $CD hold the complete, floating-point random number. Actually, any of the $CA-CD addresses will return a number from 0 to 255, but I found that memory location $CD favors numbers in the middle of the range (100-150). Location $CC gives a more even (random) distribution.

After the appropriate multiplication and division, the random number is stored in QUO. When N*6 is divided by 255, there is usually a remainder (REM). If the remainder is ignored, QUO returns a 6 only 5 to 6 percent of the time — instead of the 16-17 percent a six-sided die yields. To get the number 6, $CC would have to return a perfect 255. To remedy this, the program checks to see if there is a remainder. If so, QUO is incremented by 1.

Finally, QUO is checked for zero (there is no zero on a die). If QUO=0, then QUO=1.

To check the *randomness*, I wrote a BASIC program to call this subroutine 1,000 times, counting the number of times each number was generated. The distribution was very even — a 6 was generated just as many times as any other number from 1 to 5.

MODIFICATIONS

If you need a random number other than 1 to 6 — say 1 to 20 — load MUL2 with the number 20 ($14) in **line 11**; or, in the actual machine code, change memory location $6008 to $14 (or whatever number you require). If you're using Applesoft, then POKE 24584,X (in which X is the highest random number required) immediately before CALLing this routine.

LISTING 1: RANDOM.GEN Source Code

```
 1 ********************************
 2 *  RANDOM.GEN SOURCE CODE      *
 3 *  BY STEVE MCLENDON           *
 4 *  COPYRIGHT(C) 1990           *
 5 *  MINDCRAFT PUBL. CORP.       *
 6 *  CONCORD, MA 01742           *
 7 *  MINDCRAFT ASSEMBLER         *
 8 ********************************
 9          ORG $6000
10 MUL1     DFS 1          ; =RANDOM NUMBER 'N' (0-255)
11 MUL2     DFS 1          ; =UPPER LIMIT of NUMBER (6)
12 PROL     DFS 1          ; =LSB OF PRODUCT N*6
13 PROH     DFS 1          ; =MSB OF PRODUCT N*6
14 QUO      DFS 1          ; =QUOTIENT of DIVIDING N*6 BY 255
15 DIV      DFS 1          ; =DIVISOR (255)
16 REM      DFS 1          ; =REMAINDER of DIVIDING N*6 BY 255
17          LDA #$06
18          STA MUL2
19          LDA #$FF       ;DIVISOR=255
20          STA DIV
21          JSR $EFAE      ;GET 0-255 RANDOM NUMBER
22          LDA $CC
23          STA MUL1
24          LDA #$0
25          STA PROH
26          LDX #8         ;START TO MULTIPLY N*6
27 SHIFT    ASL
28          ROL PROH
29          ASL MUL2
30          BCC CHCNT
31          CLC
32          ADC MUL1
33          BCC CHCNT
34          INC PROH
35 CHCNT    DEX
36          BNE SHIFT
37          STA PROL
38          CLC
39          LDX #8         ;START TO DIVIDE N*6 BY 255
40          LDA PROH
41 LOOP     ASL PROL
42          ROL
43          BCC DIVID
44          JMP SUB
45 DIVID    CMP DIV
46          BCC DIV1
47 SUB      SBC DIV
48          INC PROL
49 DIV1     DEX
50          BNE LOOP
51          STA REM
52          LDA PROL
53          STA QUO
54          LDA REM
55          CMP #$01       ;CHECK IF REMAINDER >1
56          BCC ZCHK
57          INC QUO
58 ZCHK     LDA QUO
59          BNE RET
60          INC QUO        ;ELIMINATE ZERO RESULT
61 RET      RTS
```

END OF LISTING 1

LISTING 2: RANDOM.GEN

```
Start: 6000          Length: 71

53 6000:00 00 00 00 00 00 00 A9
02 6008:06 8D 01 60 A9 FF 8D 05
8B 6010:60 20 AE EF A5 CC 8D 00
EF 6018:60 A9 00 8D 03 60 A2 08
5B 6020:0A 2E 03 60 0E 01 60 90
E8 6028:09 18 6D 00 60 90 03 EE
4F 6030:03 60 CA D0 EB 8D 02 60
7F 6038:18 A2 08 AD 03 60 0E 02
58 6040:60 2A 90 03 4C 4C 60 CD
06 6048:05 60 90 06 ED 05 60 EE
64 6050:02 60 CA D0 E9 8D 06 60
DB 6058:AD 02 60 8D 04 60 AD 06
6B 6060:60 C9 01 90 03 EE 04 60
0D 6068:AD 04 60 D0 03 EE 04 60
62 6070:60

TOTAL: 1021
```

END OF LISTING 2

LISTING 3: RANDOM.TEST

```
37  10  REM   ************************
C0  20  REM   * RANDOM.TEST          *
B9  30  REM   * BY STEVE MCLENDON    *
AE  40  REM   * COPYRIGHT(C) 1990    *
CB  50  REM   * MINDCRAFT PUBL. CORP.*
24  60  REM   * CONCORD, MA. 01742   *
45  70  REM   ************************
49  80  PRINT  CHR$ (4);"BLOAD RANDOM.GEN"
3C  90  HOME
1B  100  POKE 34,2: PRINT "PRESS RETURN TO GET A NE
        W RANDOM NUMBER": PRINT
9C  110  CALL 24583
9A  120 X =  PEEK (24580): PRINT X" ";
2E  130  GET A$: IF A$ =  CHR$ (13) THEN 110
DC  140  TEXT : END

TOTAL: 97C3
```

END OF LISTING 3

by Lisa Maddox

Education can be child's play

STORYBOOK LEARNING

Teachers and parents have known for years that children learn better when learning is fun. The three programs reviewed here make it just that. They approach children's literature and reading skills in entertaining ways, appropriate for the user's age. Yet each one offers something unique and creative. **The Ugly Duckling**, from Byte Works, is a talking, animated storybook for the IIGS, designed to help your child learn to read; **Stone Soup**, from William K. Bradford, works on reading and writing skills and runs on the Apple IIc, IIe, and IIGS; Compu-Teach's **Once Upon a Time... II**, for all Apple IIs, lets your child create high-quality, illustrated storybooks.

THE UGLY DUCKLING

The Ugly Duckling, based on the story by Hans Christian Anderson, opens with a "choice page" containing seven buttons — four for children and three for adults. The child buttons let children choose one of four ways to experience the story. The storyteller — a digitized, female voice — reads the choices to the child, who selects one by pressing a key as the choice is read. The mouse-activated parent buttons let you print the story (see **Figure 1**), choose between color and black-and-white printing, and quit the program.

The story begins after another voice prompt and keypress. As the storyteller narrates, the text appears below animated illustrations. Each word is highlighted as it is read to help the child follow along. You can select Stop and Go buttons at any time. You

Lisa Maddox, 1 Maureen Road, Lexington, MA 02173. Mrs. Maddox is pursuing a degree in Child Study at Tufts University and is a teacher's aide in Lincoln, MA.

can also use the Go button to have the page reread. Two arrow buttons will move you to the previous or the next page of text.

At two points in the story, your child can choose variations in the plot. The story breaks and a new choice page appears with buttons for two options — for example, having the duckling stay or leave. As before, the storyteller reads the choices, and prompts for a keypress.

On the initial choice page, child buttons activate the Read & Wait and Wait & Read modes. These options slow things down so the child can think as the storyteller reads. The Read & Wait approach highlights a word, reads it, then waits for the child to press a key or the Go button. The Wait & Read mode highlights each word but does not read it until the child presses a key or the Go button. This lets the child read each word, then check for the correct pronunciation.

In these modes, shorter words tend to sound muffled, but they are not unintelligible.

Finally, a No Sound button takes the child through the story with nothing read aloud.

The more interest you show in the program, the more interest your children will show.

You can print the story of The Ugly Duckling in full color, using a color ribbon and an ImageWriter II, or you can print the story in black-and-white to create a coloring book.

The Ugly Duckling is successful at meeting its goals. It was designed for pre-readers and beginning readers, and it's easy enough for young children to use with little adult supervision. Children must know how to put in the disks correctly and, if you only have one disk drive, how to change them. The Ugly Duckling helps children with this process by ejecting disks automatically. In addition, on-screen graphics demonstrate the correct way to insert a disk in the drive; the graphics and disks are color-coded for easier recognition. Of course, if you don't have a color monitor, this won't help. The program just ejects an incorrect disk and waits for the right one.

Another aspect that makes this program easy to use is that, in most cases, the storyteller reads directions to children, and allows them to choose without reading all the words. Also, children never have to press a specific key, because any key will do — that is, any key but the Open Apple, Control, or Shift keys. Using the mouse is simple also; you just click on an icon, such as an arrow, and the mouse cursor is restricted to the bottom area of the screen.

An "auto mode" reads the story automatically if no buttons or keys are pressed after the program begins.

The illustrations are well done; the animation is simple, but adds interest.

The Ugly Duckling handles errors well. Unfortunately, at least two bugs exist in the program. On two pages, the word highlighting lags behind the reading. I also could not use the Go button to repeat the text in these cases; it just ignored the command. (These problems have reportedly been fixed in a later version.)

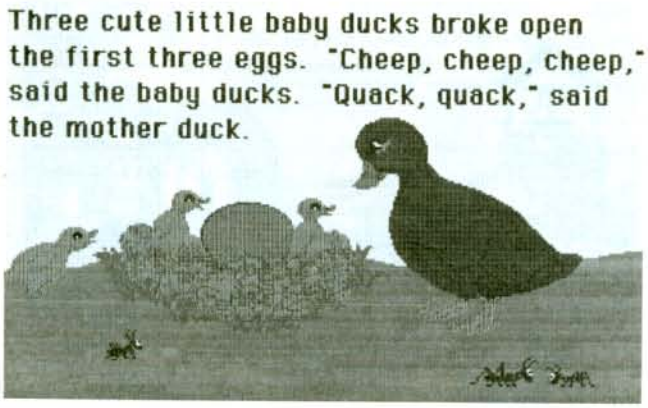

Figure 1: Ugly Duckling printout

Documentation

The documentation is just eight pages long, but is well done, and explains how to use the program completely. It also instructs adults in helping children learn with the software, and in using the program with children in a personal way. For instance, it says, "We like to use this mode (no sound) as a bedtime story, with our daughters occupying a knee while we read the story to them."

The documentation also notes, correctly, that the more interest you show in the program, the more interest your children will show.

Summary

On the whole I was pleased with The Ugly Duckling. The story is a classic, and should have wide appeal to children. The animation adds an aspect to the story that a picture book could not. And the four approaches to the storytelling will aid children as they begin to learn words. The ability to print the storybook also is a big plus; children can color, and learn the story without having to be near a computer.

STONE SOUP

Also based on a children's classic, Stone Soup is a three-part program, comprised of Story Teller, Story Maker, and Activities sections. The sections are chosen from a "contents page," which instructs you to select the proper disk from the two double-sided disks included in the package. It is also available on a 3.5-inch disk.

"Once upon a time, there was a beggar," the Story Teller begins. And an animated beggar walks across the screen. If you click on him with the mouse, you can move him to a different spot and he'll start walking from his new location. You can even make him walk in the air!

A scroll icon at the top of each page calls up a window of text when pressed with the cursor; some pages have numbered speech balloons, which operate in the same manner. Right- and Left-Arrow keys control movement between pages (see **Figure 2**).

Stone Soup is great fun. You can move most characters and objects in the scenes, so you are motivated to explore. If you want to produce more copies of a particular object, just select it and press the Space bar.

The software comes with a story guide, containing hints about hidden things in each scene. For example, in one scene, you can take the door off a farm house, move a woman, and find the food she is hiding. In another scene, the beggar will sit down to rest when you move him to the chair.

The Story Maker portion of Stone Soup can be used to retell the story or create a new story with the same objects, characters, and scenery. Graphic menu items provide the ingredients for your story. Select "Character" and you can add any of the animals or characters from Stone Soup; "Objects" provides inanimate objects from the story; "Background" presents a choice of two backdrops; and the

Figure 2: Stone Soup screen

ABC option lets you add short words and phrases. You can also create your own text by placing the cursor and typing.

The fourth menu item is a disk, which lets you save scenes or open existing ones.

The last item on the menu is a scroll icon, for printing pages. You can print your scenes in color on an ImageWriter II, or in black and white on other printers.

You can do a lot of nifty things in Story Maker. For example, you can take a log from the Objects menu and add it to the fire under the soup pot. You can create your own story, and you can label things in the scene as well. You also get a blank page to create an entire scene with text.

The Activities segment of Stone Soup offers six activities. Story Ideas contains seven scenarios from which children can develop their own stories. These are story-starters, some with humorous prompts. The second, for instance, reads, "What's this dinosaur doing in my soup?" In the picture, two girls sit at a table before a bowl of soup. A dinosaur's head and neck rise from the soup. You can select the dinosaur's head and pull the entire body out of the bowl. It's a neat idea, and is sure to delight any child (or adult).

As with Story Maker, you have the menu at your service so you can change or add text, objects, and characters.

A Puppet page contains main characters from Stone Soup, rendered so that you can print the page and make them into finger puppets or glue them to popsicle sticks.

A Treasure Hunt encourages children to explore each scene. And another activity, Recipes, centers around stone soup itself.

Stone Soup could stand some improvements. I found myself wishing that Story Maker and Story Ideas included, like Story Teller, an option to return to the previous page.

If you forget to save your scene before advancing to the next page, it's gone. A popup reminder about saving would be helpful. Also, if you create a story, you must save each page one by one. There is no way to save the whole thing at once.

Documentation

The documentation for Stone Soup is excellent. A 16-page user's manual complements the Story Guide, including complete directions for all of the features and a section on troubleshooting. There are "quick start" directions, and advice on how to work with children on the program.

Summary

The program is easy to use, although young children will need quite a bit of help to operate it. The story is a classic with a lot of appeal, and the options and hidden activities are great fun. And on the creative side, Story Ideas and Story Maker offer substantial inspiration. In addition to Stone Soup, Bradford's Explore-a-Classic series includes The Three Little Pigs and The Princess and the Pea.

ONCE UPON A TIME... II

Once Upon a Time... II, like its namesake, allows children to create their own stories, illustrate them, and print them in storybook form (see **Figure 3**).

The program opens with burst of multivoice music, courtesy of Bach, and a simple background. At hand are a set of option buttons and four pull-down menus.

Once Upon a Time... II provides objects from the forest, the ocean, and from the age of dinosaurs.

You can place objects by pressing the Draw Object button. A window will appear with a list of words representing objects you would find, for instance, underwater. These include barracudas, treasure chests, and puffer fish. When you click on a word from the list, a digitized voice reads the word. This will help beginning readers to choose their objects. To get an object onto your page you must type it in a text box below the list of words. After you have finished typing, click the OK button. The object will appear on your page, and the voice will identify it.

To choose the setting from which you select objects, click on one of the three buttons at the bottom of the Draw Object window. You can use objects from any of the settings on the same page of your story. For example, you might want to put a whale with a moose walking on its back, next to a scenic volcano.

Once you have an object on the screen, you can enlarge or shrink it to one of four sizes. If you choose the Flip option, it will reverse the object horizontally. An Erase Object button will remove the object from your page.

Adding words to the picture is easy. Just select the Write/Edit button and a message window will request your text, limited to four lines. Type whatever you want and select the OK button, and your words will appear at the bottom of the correct page. If you type more than four lines, it will simply stop and show what fits on your page. Users have the option of producing pages with only text, as well.

To make a new page, select the Next Page button, and a window will appear. If you choose a graphic page, you have a choice of eight backgrounds. These include a simple day background, a prehistoric day and night, a day and night in the forest, and three underwater settings. You can use any of the backgrounds within your story, switching between ocean, forest, and prehistory as you wish.

Objects can be moved about the screen with the mouse. When you select an object, it will be outlined in blue if you have a color monitor.

To liven things up a bit, you can select an object, then choose one of many colors from the Color menu. But an object can only be one color; if you want the woman to have a magenta dress, you'll have to settle for a magenta face as well.

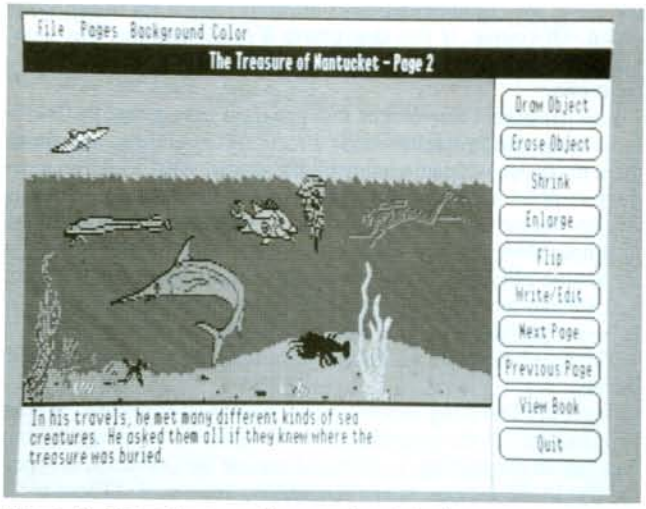

Figure 3: Once Upon a Time. . .II printout

You move through your story by pressing the View Book button. If the pace of the pages is too fast for your child, you can flip pages manually by clicking the Next Page and Previous Page buttons.

The Pages menu also contains options for inserting, deleting, swapping, and copying pages.

The version for the II Plus, IIe, and IIc is similar to the IIGS version but lacks the speech and the ability to change colors of objects.

Documentation

The 12-page manual that accompanies Once Upon a TIme ... II is more than adequate, and it's arranged well, so that you can find what you are looking for quickly. Adults can learn from it what to expect from children who use this program.

Summary

The makers of Once Upon a Time... II say children will have fun while learning "object categories, perspectives, word recognition, storytelling, and basic computer skills." It's a valid claim. The program's open-ended nature might also help children improve their writing and reading skills.

I was happy with Once Upon a Time... II. The screen arrangement makes the program easy to use. Also, the digitized voice in the IIGS version will help young readers make selections, even if they are unsure of the words they are seeing.

You can create some beautiful, and even funny, scenes with this program. The graphics are excellent. And the package even comes with colored pencils, with which children can enhance their storybooks.

SUMMARY

All three of these programs provide fun, enchanting ways for your children to develop skills at various stages of childhood.

For children who cannot yet read, or are just starting to read, The Ugly Duckling is an excellent choice. Its animated pages and digitized storyteller will pique your child's interest.

Beginning readers and writers will love the hidden surprises and the ability to rearrange the story in Stone Soup. Younger, non-reading children will need help with the text.

Once Upon a Time... II is the most open-ended of the three, and will help beginning to advanced writers develop skills in the composition and design of their own stories.

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The Byte Works Inc.
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(505) 898-8183
Price: $49.95

CATEGORY	RATING
Performance	●●●●○
Ease of Use	●●●●●
Documentation	●●●●○
Overall Rating	●●●●●

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Nibble Review Card

Stone Soup

William K. Bradford
Publishing Co. Inc.
P.O. Box 1355
Concord, MA 01742
(800) 421-2009
Price: $75

CATEGORY	RATING
Performance	●●●●○
Ease of Use	●●●●○
Documentation	●●●●●
Overall Rating	●●●●○

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Nibble Review Card

Once Upon a Time . . . II

Once Upon a Time . . . II
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(203) 777-7738
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TYPING NIBBLE LISTINGS IN FOUR EASY STEPS

There are four main steps to typing in a program:

1. Create a work disk.
2. Type in and save the CHECKIT program.
3. Type in the listing with CHECKIT installed.
4. Save the program to disk.

STEP 1: CREATING A WORK DISK

Most *Nibble* programs work with either DOS 3.3 or ProDOS. If you have one particular program in mind, check the article for operating system compatibility.

If you are using ProDOS, copy the files PRODOS and BASIC.SYSTEM from a ProDOS master disk or from your System Utilities disk to a newly formatted disk. Apple IIGS owners should copy the file P8 from the subdirectory /SYSTEM.DISK/SYSTEM and rename it PRODOS in addition to copying BASIC.SYSTEM.

If you choose DOS 3.3 as your operating system, first boot your DOS 3.3 system master disk, then remove the disk from the drive and follow these steps:

1. Type **NEW** and press Return.
2. Type **10 HOME** and press Return.
3. Insert a blank disk into the disk drive, type **INIT HELLO** and press Return.

STEP 2: TYPING IN CHECKIT

You're ready to type in the CHECKIT program shown on the following page. But before you type any program, clear the Apple's memory by typing NEW followed by Return. Remember, computers are very picky about how programs are typed. Be sure to type the program exactly as it is listed, including punctuation and spacing. After you've typed the program, save it on disk with the command

```
SAVE CHECKIT
```

STEP 3: USING CHECKIT TO ENTER A PROGRAM

CHECKIT watches your typing to see if you type a program line correctly. When you press Return at the end of a line, CHECKIT prints a number that will match the one published in the magazine if you've typed the line correctly. If the line is mistyped, the number printed won't match. CHECKIT runs only in the 40-column mode.

Once you've entered the CHECKIT program and saved it to disk, install it by typing

```
RUN CHECKIT
```

The first time you run CHECKIT, you may get the message "ERROR IN DATA STATEMENTS." If this occurs, recheck the data statements at and before the line listed. Correct any errors and save CHECKIT to disk before running it again.

If there are no errors in CHECKIT you'll be given the option to choose whether you'll type an Applesoft or hexadecimal listing. Some articles have more than one listing and may contain both hex and Applesoft BASIC listings. You must RUN CHECKIT before typing in each separate listing. The article will describe the listings and identify them as either hex code or Applesoft BASIC code. The following two sections describe the process of entering an Applesoft BASIC listing and a hex listing.

Applesoft Programs

If the listing you wish to enter is identified as Applesoft BASIC, answer **N** to CHECKIT's question "Are you entering a hexadecimal file?" and the Applesoft BASIC version of CHECKIT will be installed. Once it is installed, you may begin typing in the Applesoft BASIC listing. Applesoft BASIC lines listed in *Nibble* begin with a CHECKIT code, followed by a line number and the Applesoft commands. Do not type in the CHECKIT code! Type in the line number and all of the characters up to the next line number before pressing Return.

Be careful to maintain spacing between quotes. Also, avoid resetting the Apple II when CHECKIT is installed. You can omit the comments after REM statements, although they usually contain useful information when you're reading the listing.

Let's enter a sample Applesoft BASIC listing. Boot your work disk and run the CHECKIT program. Since you're not entering a hex program, answer **N** to the question asked and CHECKIT will be installed in your Apple. Now you're presented with an Applesoft BASIC prompt character and a flashing cursor. You're ready to begin typing the listing. To enter the program shown in **Example 1**, type

```
10 REM RING THE BELL
```

followed by a Return. The CHECKIT code for that line (37) will be printed if you've typed the line correctly. If the code doesn't match, type the line again, paying careful attention to detail. Now type **lines 20** and **30**. After you've typed in the entire program, enter Control-Z (hold down the Control key and press Z) for the final check code. If the code you get doesn't match the printed code, you've probably skipped a line or have an extra line in your program.

EXAMPLE 1: BASIC.PROGRAM

```
37|10 REM RING THE BELL
54|20 FOR J = 1 TO 5: PRINT
  |   CHR$(7): NEXT J
91|30 END

TOTAL: 1CB9
```

Hex Programs

If the listing you wish to enter is identified as hex code, answer **Y** to the question asked by CHECKIT and the program will ask two other questions. It asks, "What is the starting address of the file?" and "What is the length of the file?" These numbers will be included at the top of the hex listings. Be sure the Caps Lock key is down when answering these questions and when entering the program. You'll have to enter the System Monitor with the command CALL −151. (The System Monitor is simply the part of your computer used for entering machine language.)

Machine language programs are published in a "hex dump" format. This means that an address is displayed followed by bytes stored in those addresses. The numbers may look unfamiliar because they are in hexadecimal (base 16) notation. For instance, in **Example 2**, the number stored in address 0300 is A2. In address 0301, the value 05 is stored.

To type in **Example 2**, you should boot your work disk and run CHECKIT. Answer **Y** to the first question asked. As you can see from the beginning of **Example 2**, the starting address is 0300 and the length is C. These numbers should be entered at the next input prompts. CHECKIT will be installed and you should see a System Monitor prompt. Now enter

```
0300:A2 05 20 DD FB CA F0 03
```

followed by a Return. The number 73 should be printed below your line. If it's not, retype the line. Now enter the second line in a similar fashion and press Control-Z for the final check code. Again, if this final number doesn't match, you've probably skipped a line in your typing.

EXAMPLE 2: HEX.PROGRAM

```
START:300                    LENGTH:C

73|0300:A2 05 20 DD FB CA F0 03
80|0308:4C 02 03 60

TOTAL: E52E
```

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To check your typing by listing the program, first type the address you want to check and press Return. This will display the address and the byte entered at the address. To display a range of addresses, type the first address you'd like to see, followed by a period and the last address. For example, to see addresses 0300 to 03A0, type

```
0300.03A0
```

followed by a Return.

Special Note for IIGS owners: When displaying an area of memory, an additional number followed by a slash (/) will appear before the address in your display. To the right of the eight bytes listed in the line, there will be eight additional characters displayed. These have no relationship to the numbers produced by CHECKIT and may be ignored.

STEP 4: SAVING THE PROGRAM ON DISK

You should save the program to your work disk periodically while entering the listing and after completing a program. Saving a program on disk is simply a matter of giving the correct command. This command is always given in the article accompanying the program listings.

Technical Support

If you run into a problem with a *Nibble* program that you can't solve, send your questions and a SASE to the Nibble Technical Support Department at 52 Domino Dr., Concord, MA 01742. Phone support is available on the Tech Support line from Monday through Friday between 2 and 5 PM EST at (508) 371-1669.

Nibble Hotline

If you have a 300- or 1200-baud modem, you can reach our Nibble Hotline at (508) 369-8920. The latest errata are listed, and you can download one-liners or order Nibble/Mindcraft software. The parameters are 8 data bits, 1 stop bit, no parity, full duplex.

LISTING 1: CHECKIT

```
10  REM  ************************************
20  REM  * CHECKIT, COPYRIGHT 1988           *
30  REM  * BY MINDCRAFT PUBL. CORP.          *
40  REM  * CONCORD, MA 01742                 *
50  REM  ************************************
60  TEXT : HOME : NORMAL : PRINT "CHECKIT": PRINT
    "COPYRIGHT 1988 BY MINDCRAFT PUBL. CORP."
70  ONERR  GOTO 90
80  FOR I = 0 TO 377: READ ML:CS = CS + ML: NEXT
    : RESTORE : IF CS = 48127 THEN 100
90  PRINT : PRINT "ERROR IN DATA STATEMENTS!"
    : PRINT "PROBABLY LOCATED ON OR BEFORE L
    INE "; PEEK (123) +  PEEK (124) * 256: END

100  POKE 216,0: POKE 768,0: DIM H(3):H(0) =
    1:H(1) = 16:H(2) = 256:H(3) = 4096
110  VTAB 6: PRINT "ARE YOU ENTERING A HEXADE
    CIMAL": PRINT "FILE?";: GET A$: POKE  -
    16368,0: PRINT A$
120  IF A$ = "N" OR A$ =  CHR$ (110) THEN  GOSUB
    370: POKE 34218,128: GOTO 210
130  IF A$ <  > "Y" AND A$ <  >  CHR$ (121) THEN
    110
140  POKE 768,1: VTAB 10: CALL  - 958: PRINT
    "WHAT IS THE STARTING ADDRESS OF THE": PRINT
    "FILE (IN HEX)";: INPUT H$: GOSUB 290:A =
    H
150  IF A < 736 OR A > 39424 THEN  PRINT : PRINT
    "INVALID ADDRESS. PLEASE DOUBLE-CHECK": PRINT
    "AND RE-ENTER": GOSUB 350: GOTO 140
160  VTAB 13: CALL  - 958: PRINT "WHAT IS THE
     LENGTH OF THE FILE": PRINT "(IN HEX)";:
     INPUT H$: GOSUB 290:B = H
170  IF B < 1 OR B > 32000 THEN  PRINT "INVAL
    ID LENGTH. PLEASE DOUBLE-CHECK": PRINT "
    AND RE-ENTER": GOSUB 350: GOTO 160
180  TEXT : HOME : NORMAL : POKE 34,1: VTAB 2
    : PRINT "INSTALLING CHECKIT..."
190  IF A >  = 6144 THEN  GOSUB 320: POKE 579
    9, INT (A / 256): POKE 5798,A - 256 *  PEEK
    (5799): POKE 5801, INT (B / 256): POKE 5
    800,B - 256 *  PEEK (5801): POKE 5802,0:
     GOTO 230: REM  ABOVE $1800 SOMEWHERE
200  IF A < 6144 THEN  GOSUB 370: POKE 34215,
     INT (A / 256): POKE 34214,A - 256 *  PEEK
    (34215): POKE 34217, INT (B / 256): POKE
    34216,B - 256 *  PEEK (34217): POKE 3421
    8,0: GOTO 210: REM  BELOW $1800 SOMEWHER
    E
210  IF  PEEK (48896) <  > 76 THEN  POKE 56,0
    : POKE 57,133: CALL 1002: GOTO 250
220  PRINT  CHR$ (4);"IN#A$8500": GOTO 250
230  IF  PEEK (48896) <  > 76 THEN  POKE 56,0
    : POKE 57,22: CALL 1002: GOTO 250
240  PRINT  CHR$ (4)"IN#A$1600": GOTO 250
250  TEXT : HOME : NORMAL : POKE 34,1: VTAB 2
    : PRINT "CHECKIT INSTALLED"
260  IF  PEEK (768) = 1 THEN  PRINT : PRINT "
    ENTER THE MONITOR BY TYPING": PRINT " CA
    LL -151"
270  NEW
280  END

290 H = 0:L =  LEN (H$): ON L < 1 OR L > 4 GOTO
    300: FOR I = 1 TO L:D =  ASC ( MID$ (H$,
    I,1)):H = H + H(L - I) * (D - 48 * (D <
    58 AND D > 47) - 55 * (D > 64 AND D < 71
    )): NEXT
300  RETURN
310  REM  $1600 VERSION
320  FOR I = 0 TO 377: READ ML: POKE 5632 + I
    ,ML: NEXT I:C = 5632
330  FOR I = 0 TO 18: READ ML: POKE C + ML, PEEK
    (C + ML) - 111: NEXT
340  RETURN
350  VTAB 21: PRINT "PRESS RETURN TO CONTINUE
     ";: GET CH$: PRINT CH$: POKE  - 16368,0
    : RETURN
360  REM  $8500 VERSION
370  FOR I = 0 TO 377: READ ML: POKE 34048 +
    I,ML: NEXT I
380  RETURN
390  DATA  216,32,27,253,201,154,240,31,201,1
    41,208,26,134,224,32,178,133,32,251,218,
    32,128,254,56,165,8
400  DATA  229,9,32,218,253,32,132,254,166,22
    4,169,141,96,32,106,134,44,170,133,16,43
    ,169,1,133,6,169
410  DATA  8,133,7,160,0,177,6,133,251,200,17
    7,6,133,252,240,63,200,177,6,32,79,134,2
    00,177,6,32
420  DATA  79,134,165,251,133,6,165,252,133,7
    ,208,221,173,167,133,133,7,173,166,133,1
    33,6,160,0,177,6
430  DATA  32,79,134,230,6,208,2,230,7,230,25
    1,208,2,230,252,165,251,205,168,133,165,
    252,237,169,133,144
440  DATA  227,162,0,189,171,133,32,237,253,2
    32,224,7,144,245,44,16,192,32,128,254,16
    4,8,166,9,32,64
450  DATA  249,32,251,218,32,132,254,169,152,
    96,0,0,0,0,0,20,15,20,1,12,58,32,32,106,
    134,133
460  DATA  6,169,2,133,7,160,0,177,6,201,176,
    144,73,201,186,176,69,177,6,44,170,133,1
    6,53,201,210
470  DATA  208,4,166,251,240,61,201,162,208,8
    ,72,169,1,69,251,133,251,104,201,160,208
    ,6,166,251,208,25
480  DATA  240,26,201,191,208,19,132,226,160,
    0,185,117,134,32,79,134,200,192,5,144,24
    5,164,226,176,3,32
490  DATA  79,134,200,196,224,144,188,96,166,
    224,104,104,169,141,96,132,226,136,177,6
    ,201,160,240,249,201,186
500  DATA  240,8,201,176,144,36,201,186,176,3
    2,164,226,200,177,6,201,197,208,23,200,1
    77,6,201,205,208,16
510  DATA  169,210,32,79,134,169,197,32,79,13
    4,169,205,32,79,134,96,164,226,177,6,24,
    144,135,162,8,10
520  DATA  38,8,38,9,144,14,72,165,8,73,33,13
    3,8,165,9,73,16,133,9,104,202,208,232,96
    ,169,0
530  DATA  133,8,133,9,133,251,133,252,96,208
    ,210,201,206,212
540  DATA  16,41,44,73,79,92,97,106,123,128,1
    35,180,203,246,249,261,316,321,326
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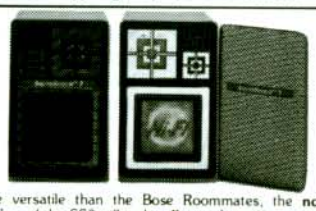

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Send In Your Entries!!!!

The One-Liner and Two-Liner Contests are ongoing events with several winners chosen every month! If you're one of the lucky winners, you can choose your favorite Nibble disk as your prize. . . just for having fun on your own. All you need to do is create the most interesting, attractive, useful, and/or clever program that can be typed using just one or two program lines.

Several months ago, MICRO. T.V., by Bill Currie from Mordialloc, Victoria, Australia, won this contest. After reviewing his entry, I wondered, *Does Bill live in the outback or has he watched too many Australian Rules football games?* The question was answered when Bill submitted his latest winning entry, PYRAMID. Bill writes that Mordialloc is a suburb of Melbourne. As for the football, the Hawthorn Hawks have won the 1989 Premier-ship and Bill is once again at his Apple, programming up a storm.

Run the program and watch as the slaves cut, transport, and lay the stones to create the Great Pyramid. The approximate date is printed during the construction and the site office is drawn on completion. Would you believe that the contractor is the Tutankhamon Construction Company? PYRAMID runs with DOS 3.3 or ProDOS and will work on any Apple II capable of displaying MouseText.

```
36 |  1  HGR : HOME : FLASH : POKE
         49167,0: FOR C = 99 TO
       0 STEP  - 2: FOR B = 0 T
       O 15:A =  RND (C) * 114
       + 4: POKE 228,A * (C >
       3): HPLOT 280 - A,159 TO
        0,99 TO 99 - C,C TO 99
       + C,C: VTAB 21: PRINT "
       bc";: HTAB A: PRINT "NFG
       N": NEXT B,C: FOR D = 0
       TO 1: POKE 243,32 * D:
       PRINT "^^^ TUTANKHAMON
       CONSTRUCTION COMPANY ^^^
       ";: NEXT : NORMAL

TOTAL: 0001
```

Antonio Napoli from Milano, Italy, developed this short machine-language routine to invert any picture loaded into Hi-Res page 1. Type in Negascreen and save it to disk with the command

```
BSAVE NEGASCREEN,A$310,L$1C
```

With NEGASCREEN loaded into your Apple's memory, BLOAD your favorite Hi-Res screen at memory location $2000. Use a CALL 784 command, and watch as the screen is inverted. A second CALL 784 will restore the original graphic. NEGASCREEN is compatible with DOS 3.3 and ProDOS. Antonio will receive the *Nibble* disk Font Foundry for his entry.

```
Start: 310                Length: 1C

EA |0310:A2 20 A9 00 A8 85 FB A9
71 |0318:20 85 FC B1 FB 49 FF 91
70 |0320:FB C8 D0 F7 E6 FC CA F0
B6 |0328:02 D0 F0 60

TOTAL: 7E04
```

Another Australian, John Pye from Barnawartha, is in the spotlight this month with his entry MENU.MAKER. This subroutine lets you create menus that can be called with a GOSUB 100 command from any part of a larger program. The subroutine requires the following variables be defined before it is used.

T$: This is the title of the menu. It can be as long as 39 characters.

C: This is the number of options in the menu. The maximum is 8.

C$ (1 to C): This array contains the names of the options in the menu. Options should be less than 30 characters long.

To better illustrate the use of these variables, add these lines to the beginning of John's subroutine

```
10 T$ = "DEMO MENU": C = 3:
    C$(1) = "QUIT": C$(2) =
   "RETRY": C$(3) = "BEEP": GOSUB
   100: IF S = 1 THEN END
20 IF S = 2 THEN GOTO 10
30 IF S = 3 THEN PRINT CHR$(7):
   GOTO 10
```

John will receive the *Nibble* disk WindoWorks for his effort.

```
03 | 100  HOME : INVERSE : PRINT
       TAB( 20 -  LEN (T$) / 2
       )T$ TAB( 40): NORMAL :
       PRINT : FOR I = 1 TO C:
       VTAB 5 + 2 * I: PRINT
       SPC( 5)C$(I): NEXT :
       VTAB 24: PRINT "HIGHLIG
       HT CHOICE WITH ARROWS &
       <RETURN>";:S = 1:R$ =
       CHR$ (13):H$ =  CHR$ (8
       ):U$ =  CHR$ (21)
D5 | 110  VTAB 5 + S * 2: HTAB 5:
       INVERSE : PRINT " "C$(S
       )" ";: GET I$: HTAB 5:
       NORMAL : PRINT " "C$(S)
       " ";:S = S + (I$ = U$) -
        (I$ = H$):S = C * (S =
       0) + (S = (C + 1)) + S *
        (S <  > 0 AND S <  > C
       + 1): ON (I$ = H$ OR I$
       = U$) GOTO 110: RETURN

TOTAL: EEA9
```

Typing These Programs ★ ★ ★ ★ ★ ★

Here are a few tips for typing in one-liners and two-liners. Be sure to omit spaces when typing in Applesoft programs, unless the spaces appear in strings between quotes, or in REM or DATA statements. You'll find it easier (and often essential) to substitute the question mark (?) for the PRINT statement. And when typing in machine language programs, it's safe to type in just the second digit of a hexadecimal pair if the first digit is a zero, e.g., the hex pair 03 can be typed in simply as 3. For more information on typing in programs, see the Typing Tips section.

The Ground Rules ★ ★ ★ ★ ★ ★ ★ ★

Your programs must be your own, original work and may be written in Applesoft or machine language. You must be able to enter your program directly from the keyboard, without using a programming aid or line editor. Programs must be submitted on disk, accompanied by an 8.5- × 11-inch sheet of paper with your name, address, Nibble disk choice, program instructions and the words "One-Liner Contest" or "Two-Liner Contest."

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modification to the motherboard, and constitutes the difference between the revision "A" and "B" motherboards on the Apple IIe. If Double Hi-Res programs don't display graphics properly on your Apple IIe, and you know you've got 128K, you might have the revision "A" board (although these are very rare). It is my understanding that Apple dealers will still upgrade old revision "A" boards at no charge.

So, if Applesoft doesn't know about the extra 64K of memory, how are 80-column text and Double Hi-Res achieved? In Applesoft, when you execute the PR#3 statement to turn on the 80-column card, you activate some additional assembly-language routines on the 80-column card that handle the auxiliary bank of memory to produce 80 columns while in your Applesoft program. Double Hi-Res is a little trickier. There are no built-in routines anywhere in the computer. To create a DHR image, assembly-language routines must be loaded into memory to draw to both banks in a coordinated way. Past issues of *Nibble* contain articles on this.

But what if you just want to load a DHR image you've downloaded from an on-line service, or created with a DHR paint program such as 816/Paint or Dazzle Draw? This is fairly simple.

To make it easier for 65C02 assembly-language routines to use the auxiliary bank (remember, the 65C02 can't access the auxiliary bank directly either), you can use some softswitch locations that will make the auxiliary bank of memory appear to be in bank 1. That is, any POKE, PEEK, CALL, or assembly-language instruction like LDA or STA can be made to use the auxiliary bank, even though the instruction is being executed in the main bank. This can get tricky (like sawing off the tree limb on which you're sitting), but if you're careful, you can load and save DHR pictures with simple BASIC commands.

The key is re-assigning the softswitches that usually toggle the display of pages 1 and 2 of text and graphics — locations $C054 and $C055. Normally, when you POKE location $C055 (49237 decimal), the screen displays page 2. This is how the HGR2 command works in Applesoft. For easy access to the auxiliary bank, Apple Computer engineers added two new softswitches, locations $C000 and $C001 (49152 and 49153 decimal) that can change the function of locations $C054 and $C055 so they control bank access rather than page display.

If you write to memory location $C000 with a POKE (the value doesn't matter), $C054 and $C055 function as a page switch. But if you write to location $C001, any subsequent access to location $C055 will switch the auxiliary bank of memory from $400 to $7FF (the text display area) and from $2000 to $3FFF (the Hi-Res page display area) so that it appears to be in main memory. This lets 65C02 or BASIC routines use the auxiliary bank as if it were in the main bank.

So, to load or save a DHR picture from BASIC, all you have to do is load or save the half of the DHR image that is in main memory, then set the softswitches to address the auxiliary bank. Load or save the second part of the image. ProDOS makes this easy by letting you read or write part of a file from disk.

The new, DHR version of our BASIC program is **Listing 1**. The program requires ProDOS. Type it in and save it to a ProDOS disk with

```
SAVE DHR.PROGRAM
```

In the first third of the program, the DHR image is loaded in two parts. The current standard for DHR image files is to store the auxiliary memory part of the picture in the first half of the file, and the main memory portion in the second half.

The program starting at **line 240** is a brute-force routine to draw a line on the Double Hi-Res screen by POKEing a value (255) directly into memory. You'll notice that although there are 80 byte positions across the screen, there are only 40 addresses. This is because the auxiliary memory bank has the same address range. You might wonder about **line 280**. Since H is odd when this part of the program is executed, the value 8744 + H/2 will have a fractional value. But the POKE function in Applesoft automatically ignores any fractional remainder, so this won't be a problem.

These lines show how it is possible to draw to the DHR screen from BASIC, even though the task is usually conducted with assembly-language routines. (If you want to explore this further, review the Apple IIe or IIc technical reference manuals from Addison-Wesley. Also, I discuss DHR graphics in *Assembly Lines: The Book*, Volume II.)

The third part of this program saves the modified DHR screen back to disk by reversing the BLOAD procedure.

Don't be discouraged by the apparent complexity of this subject. If all you want to do is load a fancy title screen or picture for your own programs, just copy the first third of the example program into your listing; don't worry about the way it works.

LISTING 1: DHR.PROGRAM

```
37   10  REM   ************************
C0   20  REM   * DHR.PROGRAM           *
B9   30  REM   * BY ROGER WAGNER       *
AE   40  REM   * COPYRIGHT(C) 1990     *
CB   50  REM   * MINDCRAFT PUBL. CORP. *
24   60  REM   * CONCORD, MA. 01742    *
45   70  REM   ************************
3A   80  REM  DOUBLE HI-RES PROGRAM
E0   90 D$ =  CHR$ (4)
09   100  HGR
48   110  POKE 49246,0: REM  $C05E = DHR "ON"
DE   120  REM  LOAD AUX BANK PART OF IMAGE
F7   130  POKE 49153,0: REM  $C001 = ENABLE 80STORE
C1   140  POKE 49237,0: REM  $C055 = PG2 = AUX BANK
84   150  PRINT D$;"BLOADPICTURE2,A$2000,L$2000"
CA   160  REM  LOAD MAIN BANK PART OF IMAGE
43   170  POKE 49152,0: REM  $C000 = 80STORE = PAGE2
        USE
71   180  POKE 49236,0: REM  $C054 = PG1 = MAIN BANK
91   190  PRINT D$;"BLOADPICTURE2,A$2000,L$2000,B$20
        00"
E7   200  REM  "B$2000" LOADS PART OF FILE STARTING
        FROM BYTE $2000
A4   210  REM  USER PROGRAM HERE THAT CREATES NEW SC
        REEN
1D   220  REM  SAMPLE: HERE'S SOME BRUTE-FORCE CODE
        TO DRAW
5E   230  REM  ON THE DHR SCREEN WITH POKES
DD   240  POKE 49153,0: REM  ENABLE BANK USE OF PG2
        SW
31   250  FOR H = 20 TO 60: REM  SCREEN HAS 80 BYTE
        POSITIONS
00   260  IF H / 2 <  >  INT (H / 2) THEN 300: REM
        LIN 300 IF H IS ODD
1E   270  POKE 49237,0: REM  ENABLE AUX BANK
A1   280  POKE 8744 + H / 2,255: REM  PUT BYTE ON SC
        REEN
40   290  GOTO 320
7A   300  POKE 49236,0: REM  ENABLE MAIN BANK
00   310  POKE 8744 + H / 2,255: REM  PUT BYTE ON SC
        REEN
E6   320  NEXT H
C5   330  POKE 49152,0: REM  RESTORE NORMAL PG2 SW U
        SE
55   340  REM  SAVE NEW DHR SCREEN
AE   350  REM  SAVE AUX BANK PART OF IMAGE
3B   360  POKE 49153,0: REM  $C001 = ENABLE 80STORE
62   370  POKE 49237,0: REM  $C055 = PG2 = AUX BANK
74   380  PRINT D$;"BSAVE PICTURE2,A$2000,L$2000"
62   390  REM  SAVE MAIN BANK PART OF IMAGE
D4   400  POKE 49152,0: REM  $C000 = 80STORE = PAGE2
        USE
19   410  POKE 49236,0: REM  $C054 = PG1 = MAIN BANK
94   420  PRINT D$;"BSAVE PICTURE2,A$2000,L$2000,B$2
        000"
C4   430  REM  "B$2000" SAVES PART OF FILE STARTING
        AT BYTE $2000

TOTAL: 3101
```

END OF LISTING 1

POW! ZAP! KER-PLUNK!

If you marvel at the thought of being the Stan Lee or Jack Kirby of the 1990s, but don't have the knack with a pen and brush, then **Pow! Zap! Ker-plunk!** by Pelican Software is right up your Apple II alley.

Creating a comic strip involves visual and intellectual planning, much like the scripting of a play. This program makes it easy to express yourself in a mode that demands a lot of creativity. And it's a great way to put words into someone's mouth without having them scream back at you!

To create your own dynamic cast, you can choose from dozens of heroines, monsters, musclemen, city dudes, and other characters on the clip-art disks supplied with the copy-protected program.

Pow! Zap! Ker-plunk! provides a screen of work space for each panel of your strip. You can load one of eight files to create the best background for your adventure. There are four backgrounds per file; you scan through them by pressing the Space bar. Press Return when you like what you see. What could be easier?

The same interface is used throughout the program.

After your background is established, you load character files until you find an appropriate creature or person for your idea. And you can add supporting characters and special effects — arms climbing out of the pavement, worms, little flying monsters, globs, wands, dogs, cats, birds, and so on.

Next, give your characters speech balloons, or bubbles as they are called in the program, and enter the text of their "lines." If you have an Echo or Cricket speech synthesizer, you can hear them speak. Finally, type in the necessary narrative elements — "Meanwhile, back on Main Street" — in a text box. (Text boxes, like the other objects in this program, can be moved around the screen with the cursor keys or a mouse. But once you place an object, you can't move it again.)

For a finishing touch, you can enter a full page of Hi-Res text in one of four fonts.

When you're finished with a panel, save it to disk. You can print panels at any size, from actual comic strip scale to poster size. Also, you can print panels singly or arrange several on a comic book page; four layouts are provided.

Pow! Zap! Ker-plunk!, costs $49.95, or $59.95 for the school version; an additional graphics disk is $19.95. The program requires an Apple IIe, IIc, or IIGS; supports dozens of printers and interface cards; and comes on 3.5-inch and 5.25-inch disks. Documentation includes a 45-page illustrated instruction manual and a booklet describing the contents of each graphic file. Pow! Zap! Ker-plunk is compatible with graphics from Learning Lab Software Publishing Co. programs: Monsters and Make Believe, Dinosaur Days, and Robot Writer. To order, contact *Pelican Software Inc., 21000 Nordhoff St., Chatsworth, CA, 91311; 800-247-4641* or *800-222-7026* in California.

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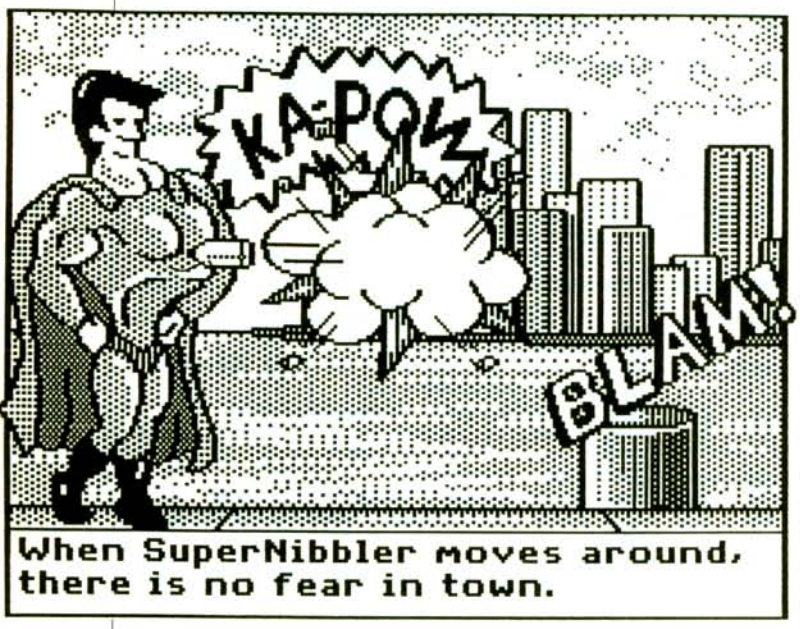

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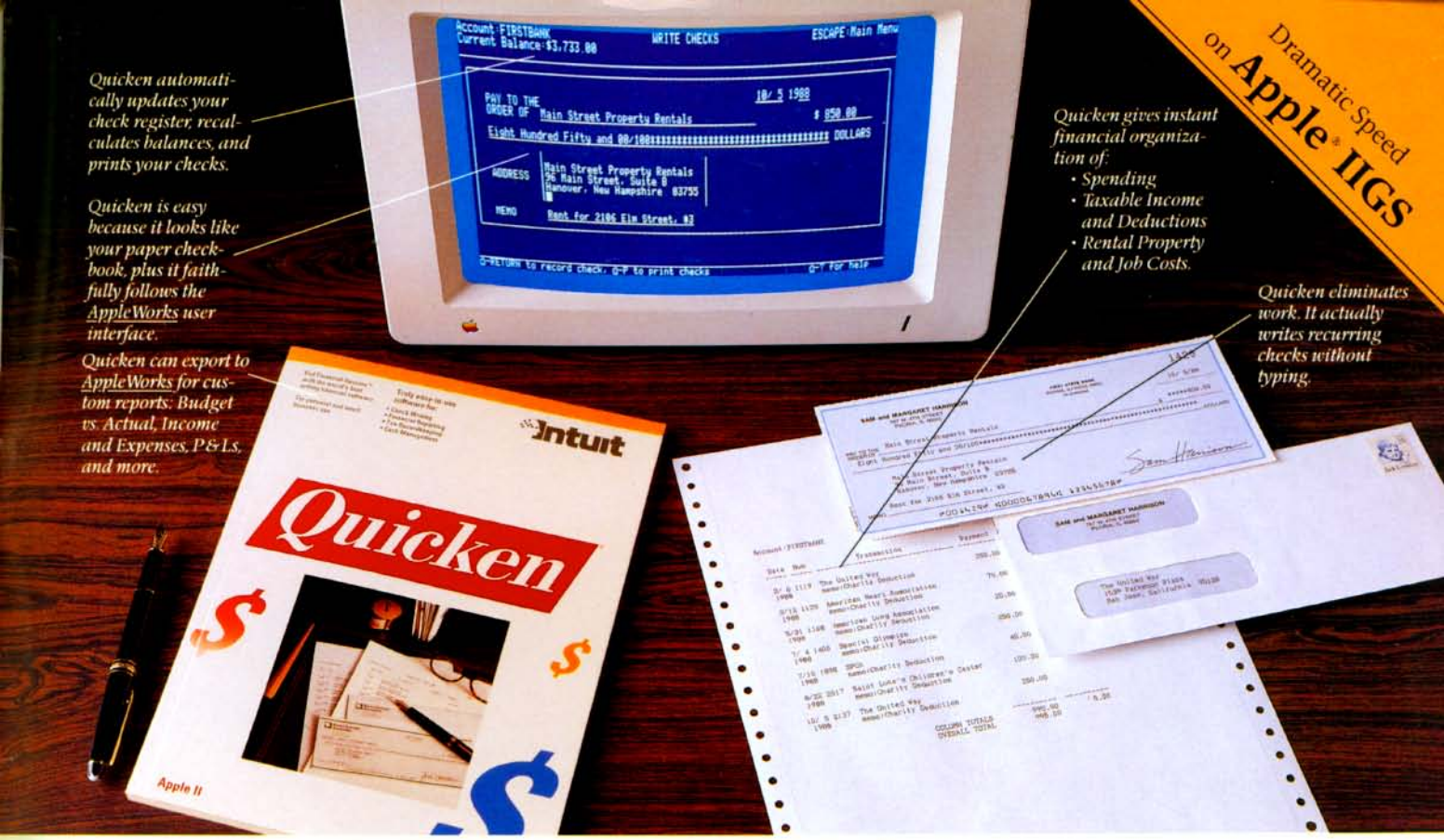

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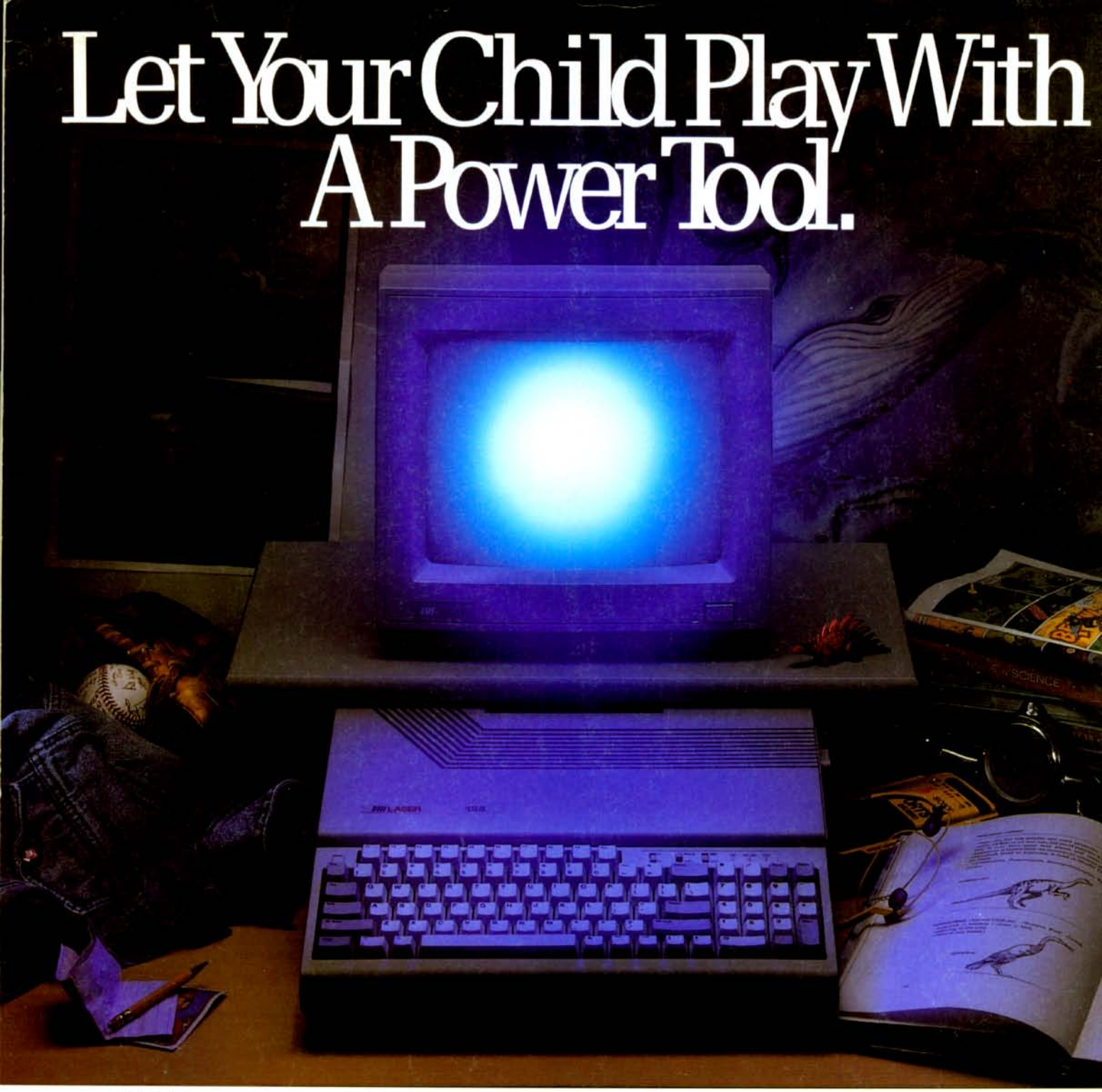

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