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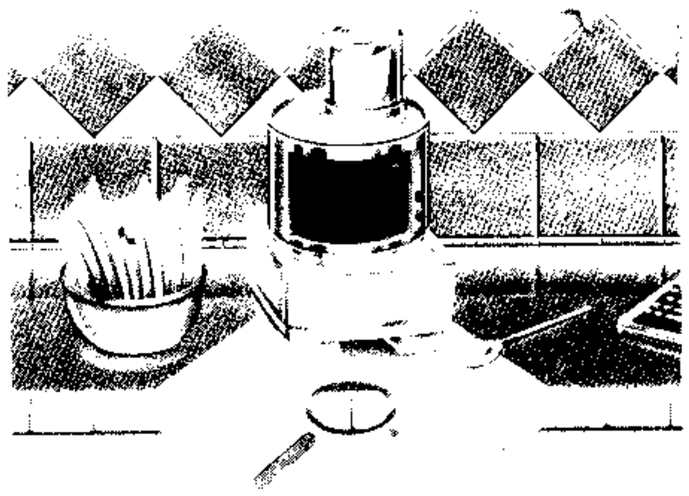

Outside HCM

What better place than the kitchen to depict modern home productivity? Appliances like the food processor have revolutionized home cooking, turning it from tedious work to something more like play. Today, computers are pulling off a similar revolution in the home. But instead of processing food, the home computer processes information—freeing you for other more creative tasks, or for play. With this handy appliance, *you* do the cooking—and *Home Computer Magazine* provides the recipes.

Inside HCM

Summertime, and the livin' is easy . . . or is it? Perhaps while you've stopped to smell the roses, gone camping, or launched your home-made boat, you've been ignoring something. How about that pile of paperwork—steadily growing *inside* the house while you play *outside*? Before summer slips away, you may have to interrupt your fun to take care of business. Wouldn't it be nice if there was an invention that saved time, energy, and—most of all—work? Fortunately, there is. It's called the home computer.

Playing with computers is fun—but if you want to enjoy the remaining summer daze, it's time to put your computer to work. This issue of *Home Computer Magazine* comes just in time to get you on the road to self-efficiency. Here you will find our own programs designed to increase your personal productivity—plus tutorials and informative reviews to guide you in making those crucial software purchases.

But before you spend a lot of money on, say, a super-powerful spreadsheet program, take a look at what a simple one can do. *Snap-Calc* is yours for the time it takes to key it in—with complete versions for all popular machines, including the brand new Apple *IIc*. When you've tired of staring at figures, our *Bars and Plots* program will let you plot your expenses visually—just type in the numbers and see them graphically displayed as colorful bars.

No matter what computer you own—Apple, Commodore, TI, or IBM—you will find reading our reviews quite productive. This month *HCM* looks at four different word processors, ranging from the powerful-but-RAM-guzzling *EasyWriter II* to the compact and adaptable *Personal Editor* (both for IBM). *EasyScript* for the Commodore 64 proves its worth to a veteran writer. And for the TI faithful, we take a look at the *Companion* word processor.

Home productivity depends on wise and informed financial decisions. And we examine three programs to help you navigate those uncharted monetary streams. *Count-Sil*, not really Dracula's blood-thirsty cousin, is an elementary spreadsheet package for TI and Commodore machines. We also look at the best-seller *Home Accountant* for Apple, IBM, and Commodore, as well as *Home Budget jr.* for the IBM family.

All work and no play can make your computer a dull toy—so this issue packs in plenty of fun as well. *Colorfun* tops the list of key-in programs tailored to the very young. A somewhat older group can learn early math skills the graphic way with *Elementary Addition and Subtraction*. And more advanced students can rocket ahead with *Missile Math* multiplication.

All games are, in a sense, *learning* games—and we try to enhance this aspect whenever possible. How about a colorful graphics adventure that teaches you about the inner workings of your computer's *Boolean Brain*? Or do you feel like embarking on an Indiana Jones-type odyssey in the steaming jungles of the *Wild Kingdom*? We also present *Cyber-Cipher*, a "golden oldie" with a new computer twist, and *Speeder*, a deceptively simple action game. Back by popular demand, a new version of *Robochase* is now here for the Apple, Commodore, and IBM PCjr. And during breaks in game-*playing* take time to learn some game-*building*, and discover why *Programming:* (is) *The Name of the Game*.

Beyond gaming, there is fun in creativity. Those of you with an artistic eye can weave multi-colored webs on your computer screen with *Spider Graphics*. You can also creatively explore other "natural" phenomena in this month's LOGO Times section: Venture into the *Binary Forest* and learn the recursive elements of growing colorful trees; or drift through some delicate pattern designing (but don't get snowed) with *LOGO Flakes*.

So, it's *Summertime, and the livin'* is *easy*—with a little help from your home computer.

Until next month, have fun reading, learning, and RUNing HCM

Gary's Gadget

By Gary M. Kaplan
Publisher & Editor-in-Chief

"Etched into the granite of a Washington D.C. government building . . . is the succinct message, 'Past is Prologue.' Nowhere is this statement more appropriate today than in the home computer industry."

By the time you read this, the Summer Consumer Electronics Show (SCES) in Chicago will already have come and gone, but its indelible imprint will be with us the rest of the year. For this is the most important trade show of the home computer industry—the place where buyers worldwide get a chance to preview new hardware, software, and accessory products that will be appearing (it is hoped) on Holiday shelves during the last quarter of the year. So, as I sit here writing this editorial (in advance of the show), I'm naturally curious about what this summer's Windy City extravaganza will bring . . .

Etched into the granite of a Washington D.C. government building—I now forget which one—is the succinct message, "Past is Prologue." Nowhere is this statement more appropriate today than in the home computer industry. As a veteran of more computer and electronics shows than I care to remember, I can now see that there is finally enough "history" behind us to provide a clearly printed playbill to the second act of the Christmas marketing drama soon to unfold on the silicon stage.

Starring in the lead roles are, of course, the industry's "Big 3"—Apple, Commodore, and IBM. No longer content to win only *hardware* roles—no matter how lucrative—each of these players will now start to aggressively seek the smaller-but-more-numerous *software* roles that many other less-renowned character actors have been picking up all along. And all this *without* having to resort to building a large installed base at fire-sale prices, in hopes of making up lost profits through after-market sales.

For the third-party players, the second act will be fraught with caution and re-casting. The well of venture capital funds that has financed many a Broadway production in the past—only to have the "Golden Boys" and "Fair Ladies" close shortly after opening night—has started to run dry. Surviving players now have to financially support their own professional activities, pay ever-increasing publicity fees to gain recognition, and reluctantly accept lower price-point remuneration under competitive pressure.

The time is now ripe for employing the winning tactics of other consumer industries. So expect to see "brand name recognition" tie-ins go way beyond the past's highly volatile book, movie, and arcade blockbuster associations—to blue-chip link-ups with more of the Fisher-Prices, Walt Disneys, and Gillettes of this world. Scratch a household name that kids, parents, and adults in general can trust, and you'll be sure to find a computer industry marketing guru camped out on their doorstep shaking a freshly drawn-up joint-venture contract. Just in the burger industry alone, there's potential for such ad pitches as *Where's the byte?*, *Flame-broiled software*, and *Little Macs with special DOS*.

Expect also to see tactics borrowed from the supermarket "Cereal Wars." With inadequate retail shelf space for the horde of new computer products coming down the pipeline, the present Kelloggs and Posts of the home computer industry will protect themselves from encroachment on their hard and soft turf by "homesteading" all the temporarily vacant tracts with competitive (to themselves!) product lines. (Did you really think that all those different breakfast foods were put out on the shelves so we could have plenty of *choice*?) There will be far less "vaporware"—products that are announced with great fanfare, only to die stillborn. Instead, we'll see new products be quickly born and quickly put out to pasture (if necessary), with each generation rapidly replaced by offspring waiting in the wings for that valuable shelf space. It pains me to say that this "cereal tactic" has already been imported by the computer publishing industry. Software and hardware are next, my friends.

Enter the dragon. Inscrutable Japan Inc. is finally ready to flex its samurai muscles. Until now, we've only been *hearing* about the MSX software standard for home computers among the Japanese consumer electronic giants. But now that the American computer market is more mature, and the major price wars are over, its time for Tokyo to use its collective consumer-appliance clout to promote "integrated electronic home systems." Expect to see color TVs with home computers *built in*, and home computers with VCR and video disk interfaces *built in*. By 1985, Japan will be offering fully integrated systems—with the compact laser disk migrating over from stereo music to data storage—including everything but the kitchen sink (unless, of course, the sink happens to be a Sony Washman).

Getting back to Act Two of our soon-to-be prime-time marketing drama, the "herd instinct" is unfortunately starting to overpower the industry at large. After all, the proverbial 40 million Frenchmen—from the country that gave us Bardot and Perrier—can't be wrong . . . Or, can they? I'm alluding to the powers-that-be in the software and peripheral industry who are exclusively chasing after the presently small, installed bases of new 128K machines—the *IIc*, Mac, and PCjr—and ignoring the over 5-million VICs, C-64s, and 99/4As that have been sold. There's a golden opportunity here for players who aren't blinded by the lights and lure of Broadway, and are ready to accept the less-flashy-but-steady roles that the summer-stock theater has to offer.

Letters to the Editor

Dear Sir:

Just received my issue of HCM and it's great. I am glad to see you included other top computers in your magazine. Maybe now we will see some cooperation between the computer literate of the other brands.

I was one of the first subscribers of 99'er when it was in it's infancy and I'm glad to see it grow as it has.

I now am the present owner of an APPLE II+. I would now be lost had I not gained the experience from programming my TI-99/4A. The Apple manuals were not as informative as the one I got with my TI-99/4A. Because I couldn't afford a disk right away I spent hours converting TI programs to Apple. Boy, the looks I got whenever I would ask for some help from other Apple users on how to change TI stuff to Apple. I hope this attitude toward users of different systems stops so we can all learn from each other's experiences.

Joseph C. Manning
Bloomsburg, PA

Thank you, Joseph, for your kind words about HCM*—they are greatly appreciated. We tend to share your hopes about the cross-pollination of ideas between the users of different brands of computers. After all, it is the same melting-pot concept that has made America great in the first place, right?*

An Apple Greeting

Dear Sir:

The program listing with this letter is a HELLO program that I made, and wanted to know if you would like to print in your fine magazine. If you decide to print it, the next paragraph explains what it does. By the way, the program is for an Apple computer.

This HELLO program makes it possible to press one letter such as A instead of typing out RUN HELLO. The program also locks, unlocks, loads, and deletes programs. Good luck and I hope your readers find it useful.

```
10 HOME
20 REM      BY    MAURICE    P
   ATRICK    TESSIER
30 REM      28    MONTGOMERY
   ST.
40 REM      SAUGERTIES, NY
   .Y.   1247
50 REM      FOR   APPLE  II
   E
60 REM  INCLUDES DOS 3.3
100 NOTHING TO TYPE
110 TEXT: CALL -936: VTAB 16: PRINT
   : PRINT "WHAT DO YOU WANT TO DO?
   ": PRINT : PRINT "TYPE A TO ADD
   A PROGRAM": PRINT "TYPE L TO LOC
   K A PROGRAM": PRINT "TYPE U TO U
   NLOCK A PROGRAM": PRINT "TYPE D
   TO DELETE A PROGRAM": PRINT "TYP
   E R TO RUN A PROGRAM": PRINT "TY
   PE C TO CATALOG A DISK"
115 PRINT "TYPE E TO EXIT TO BASIC
   ": PRINT : PRINT "TYPE ONE OF TH
   ESE LETTERS"
120 GET A$: IF A$ = "" THEN 120
130 PRINT A$;: IF A$ = "A" THEN A$
   = "B": PRINT ", THEN TYPE NEW": P
   RINT "AND PRESS RETURN": END
140 IF A$ = "L" THEN A$ = "LOCK"
150 IF A$ = "U" THEN A$ = "UNLOCK"
160 IF A$ = "D" THEN A$ = "DELETE"
170 IF A$ = "R" THEN A$ = "RUN"
180 IF A$ = "C" THEN A$ = "CATALOG
   "
190 IF A$ = "E" THEN A$ = "BYE"
200 HOME : VTAB 8: PRINT "PRESS R
   ETURN TO "A$" A PROGRAM"
210 PRINT : PRINT "OR TYPE ANY OTH
   ER LETTER TO": PRINT "RETURN TO
   THE MENU"
220 GET B$: IF B$ = "" THEN 220
230 IF B$ = CHR$ (13) THEN A$ = A$
   + CHR$ (13): PRINT A$: END
240 GOTO 110
```

Maurice P. Tessier 12477
Saugerties, NY

Thanks, Maurice, we typed it in and found that it works just fine. Any other readers out there having short and useful routines are welcome to share them through this column too.

Commodore Bulletin Board Revealed

Dear Sir:

I have been a staunch supporter of your magazine for well over a year. Now that your magazine includes coverage of the Commodore 64 your readers may be interested in the following. I am running an electronic bulletin board that I helped write using the Commodore 64 and Commodore 1650 automodem. Since I am using my home phone, I am currently only operating from 9 p.m. until 12 p.m. on Friday, Saturday, and Sunday (Central time). Features of the board include such things as download capability and remotely written menu file capability. Commodore owners and others may wish to check in and look around or page me and I'll be happy to chat with them. Set your modem to 300 baud, full duplex, 8 bit word length with one stop bit, no parity and modem set to originate. The number is 601-327-5062.

As an owner of two TI-99/4A's, a VIC-20, and a Commodore 64, your magazine is a welcome addition to our household. Keep up your excellent work.

Dave Barron
Columbus, MS 39702

Thanks for the information on your home-brew computerized bulletin board, Dave. I am sure that other home computer users out there will be calling to chat with you.

Four home computers! That's quite a cache. Glad you enjoy HCM*, and we hope that you also enjoy the conversations with the many users that will be contacting you on your bulletin board.*

Dear Sir:

I purchased *Home Computer Magazine* after becoming a recent owner of a Commodore 64.

I really enjoyed the programs for the C-64 and even more the informative articles that go much deeper into different areas of computing than could be accumulated in reference books.

It disappoints me when I see a program written for another computer that I really want. I enjoy seeing articles comparing the different BASIC languages.

Steve Kitchens
Decatur, IL 62521

Steve, we understand your disappointment when you see a program written for one machine that will not run on yours. That is why we try to put every program (where feasible) on each of the machines that we cover—if not in the same issue, then in consecutive issues.

Dear Sir:

I was pleased to find your magazine on the newsstand recently, having noticed your former publications in the past. I was always intrigued by your 99'er Magazine. However, since none of it applied to my system I really did not take the time to read an issue. Let me say I am quite pleased with your expanded publication and as proof enclose my check for a subscription. These are the things that particularly appeal to me:

1. Variety of typestyles—interesting look.
2. Articles regarding my C64 scattered throughout the publication.
3. Mixture of applications—home and games.
4. Reviews.
5. Easily-read listings mixed with text instead of being grouped at the back of the magazine.
6. Side-by-side articles for other sytems aid in understanding other systems.

I feel your publication is as good as most of the Commodore-only magazines I've read. Keep up the good work!

Jim Colbutt
Richardson, TX 75081

We really appreciate this kind of feedback, Jim. By listening to our readers, we try to change and improve publication of HCM*. It is particularly interesting to note your item 5 regarding the listings being mixed with text instead of grouped together in one spot. We have seriously listened to the readers that have responded and the overwhelming majority have asked to have all the listings in one spot so it is easier for them to key-in the programs. We hope that you won't be too unhappy to see, Jim, that in this issue we have therefore started grouping the listing in the center of the magazine.*

Dear Sir:

In Volume 4, No. 1 you published a letter from Jeff Strong on C-64 keyboard buffer problems. You suggested he clear the keyboard buffer using two lines of code. There is an easier way—using a single line of code:

100 POKE 198,0

This clears the buffer completely.

Matthew Leeds
San Francisco, CA 94121

Thanks Matt for showing us the easier way. Sharing this kind of information with fellow readers is well appreciated. Many readers tell us the first things they read in each issue are Letters to the Editor and the Tech Notes so as to make sure they have not missed any tricks.

Dear Sir:

Please accept my congratulations of the best home computer magazine I have ever seen. The detailed look on the IBM PCjr stunned even battle-hardened salesmen in a local IBM store. No one has ever seen such a fine and accurate presentation.

I would like to warn TI-99/4A users that OKIDATA printers such as the MICROLINE 83A will not work with the parallel port unless one builds an interface. Okidata does not consider the TI-99/4A users as a large enough market to concern itself with, and thus no technical customer support is offered (even though it is stated in their manual). I thus would appreciate it if an article could show how to build this support so those of us that are "stuck" with the 83A can get some use out of it.

Thank you and please keep up the superior product.

Wolly Barabash
Edmonton, Alberta, Canada T5J 2L8

We are gratified, Wolly, that you enjoyed the IBM PCjr article. You are right. We have seen several "battle-hardened salesmen" that sell IBM products using that particular HCM issue to sell the IBM PCjr—and very successfully, too.

Your comments on the difficulty of Okidata printers being connected to the TI home computer are not uncommon. Anytime a printer of a different manufacturer is attached to a computer there will be several minutes, if not hours, of your time or someone else's to correctly set up and operate that combination. Once you have found the proper cable, interface, and software write it down in a log book somewhere and don't lose it. If there are any readers who have already solved the Oki-TI compatibility problem, please let us know so we can help Wolly (and others) out.

TI Pro Runs HCM Listings

Dear Sir:

We very much enjoy your magazine and originally ordered it when we had a TI-99/4A and the magazine was the 99'er. But in December I got a TI Professional computer.

Now that the magazine has changed to include IBM PC programs, we've converted a couple of HCM programs to work on the TI PC—actually only a couple of simple changes are usually required. We do have a different color code set though. It's not always clear to me where the colors are in the programs. Our BASIC manual is somewhat cryptic regarding graphics instructions. We also have pixel ranges of 0-719 for columns, 0-299 for rows so our graphics come out smaller than they would on the PC.

There may be other PC-type users who have problems similar to ours.

Anyway, keep up the good work and I hope to see more PC/PCjr-type programs and games in the magazine in the future.

Barbara Taylor
Huntington Beach, CA 92646

Barbara, you've discovered the same thing that we have about the TI Pro. Almost any program that can run on the PCjr can be very easily converted to run on the TI PRO with its color RGB monitor. The BASIC languages of the two machines are very close, although the Pro does have a few more capabilities than the jr.

Dear Sir:

I was a subscriber of *99'er Magazine* and very much enjoyed all its features. When "*Home Computer Magazine*" replaced the former publication, I was again happy to receive the first issue.

Do you know of any software (or the necessary programming tools) that would essentially be a "spell-check" program to interface with TI-Writer? That might be an interesting task for a programmer.

William Koseluk
Goleta, CA 93117

That sounds like a really great suggestion, William. Perhaps one of the two million TI *owners out there has already written a spell-check program for* TI-Writer. *If so, they should send it in to HCM and get it published. What a great piece of productivity software that would be.*

Dear Sir:

It seems as if every time someone writes an article about some language other than BASIC, a fundamental necessity is to malign BASIC. It's called "comparison." I think BASIC and LOGO have been compared unfairly more than once.

I have a spot in my programming heart for both LOGO and BASIC (and I plan to tackle FORTH and PASCAL). One thing I have learned is that each of the languages, BASIC and LOGO, have their strong points. They also both have weak points, a fact usually overlooked by authors of LOGO articles.

Recently, I was going through some back issues of HCM and I came upon the article by Henry Gorman, Jr., "The BASIC Issue and the Tortoise's Retort," page 49, May 1983.

Once again, we are reminded that BASIC doesn't allow recursion. But for all practical purposes, a FOR-NEXT loop is recursive, and whether that is a "scientific truth" is only of academic interest. To make my point, I have included a TI-99/4A Extended BASIC routine that does what Mr. Gorman suggested can't be done with BASIC: it counts the words in a list.

Of course, in BASIC many more lines are required than the four that LOGO uses. But there are BASIC routines that are shorter than the equivalent LOGO procedures. Producing a random number greater than nine is an example.

Both languages have their weak points and TI BASIC is notably weak in high resolution graphics, but in general what can be programmed in one language can be programmed in the other. (Of course, one or the other is usually better, depending on the project requirements.) I have written BASIC routines which accurately mimic the LOGO primitives BUTFIRST, BUTLAST, FPUT, and LPUT. By the way, there is no LOGO primitive which is the equivalent of TI BASIC's "XOR." An equivalent procedure can be written, however.

One final observation. In the same issue of HCM (May 1983, page 52), Professor Holl shows us, in BASIC, how to insert a word right into the middle of a list at any designated position. There's no LOGO primitive for that! A forthcoming procedure, anyone?

The BASIC routine for counting words in a list must correctly return the number of words, including zero if the list is empty. Hint: the routine must not be fooled if the list contains

Continued on next page

HCM Review Criteria

Each month, *HCM* reviews software packages for the IBM PC and PCjr, Apple II, II+ and IIe, TI- 99/4A, and Commodore 64 and VIC-20 computers. These reviews take a detailed look at the quality of commercially available third-party software for these home computers.

At the beginning of each review, a review-at-a-glance box provides the user with an instant assessment of the program. Each software item will be evaluated, where relevant, with the criteria below.

- **Performance**—how well the activity responds to the player's commands; how well the sound effects, music, or speech are integrated with the software.
- **Documentation**—the quality of the printed matter that comes with the software: whether the instructions are clear and comprehensive; whether the machine configuration requirements are spelled out. Information such as how to load the program, use the keyboard, and restart the activity contributes to the documentation rating, as do tips on performance peculiarities.
- **Engrossment**—whether the game or activity has that intangible quality that holds the player on the edge of his seat while the hours tick by unnoticed.
- **Ease of Use**—the degree to which a user can interact with the software without outside help; the ease and effectiveness of error-handling features; whether the actual reading level of the activity is appropriate for the suggested audience.

Education-Specific Criteria

Educational software may also be evaluated in the following areas:

- **Concept Presentation**—whether the concepts are presented clearly, in logical order, and in enough depth for the learner to be able to apply the learning to other situations.
- **Rewards**—whether the audio-visual rewards are motivating and whether they are appropriate to the activity.
- **Graphics**—rates the quality of the graphics and whether they enhance or detract from the educational purposes of the activity.

Letters to the Editor

. . . from p. 7

extra spaces between the words, or at the beginning or end of the list.

```
100  CALL CLEAR :: DIM
     CH$(255) :: X=0 ::
     :  COUNT=0 :: INPU
     T  "LIST: " :: LIST$
110  FOR C=1 TO LEN(LI
     ST$)
120  CH$(C)=SEG$(LIST$
     ,C,1) :: IF ASC(CH
     $(C))=32 AND CH$(
     C)=CH$(C-1) THEN
     40
130  IF ASC(CH$(C))=32
     THEN COUNT=COUNT
     +1
140  X=ASC(CH$(C))
150  NEXT C
160  IF X=0 THEN PRINT
     X :: GOTO 180
170  PRINT COUNT+1
180  END
```

P.S. In LOGO II there is a primitive, LENGTH, which returns the count of words in a list.

Gene Thomas
Little Rock, AR 72205

Touché—your points are well taken, Gene.

Dear Sir:

I just received my first issue of *Home Computer Magazine* and want to commend you on the publication of a very fine magazine. There is a touch of irony in that several months ago I subscribed to *99'er Magazine*. During that period I scrapped plans to upgrade my very basic TI-99, gathered my courage and my checkbook, and bought a PCjr. I wondered every now and then what I was going to do with a subscription to a TI-99 magazine. Imagine my delight when my first issue, Vol. 4, No. 1, showed up and I found it contained the best article I have read in any publication about the PCjr.

Of particular interest was page 43 entitled, "Options for PCjr System Configuration." I had waited to purchase a monitor because I wanted really good resolution, a 12-inch screen, and sound from somewhere other than the computer. The IBM RGBI met the first two specifications, but does not have a speaker. Other monitors I found with good sound had degraded resolution. Even a trip to the IBM Product Center failed to produce any good answer. Then your magazine arrived! Mr. Kaplan and Mr. Balthrop must be the only two people in the world who know about the external speaker port. I have shown this configuration to three IBM distributors today, including the Product Center, and they didn't even know there was an external speaker port.

Thanks very much for your help. I look forward to future issues.

G. Michael Fairley
Fairfield, CT 06432

We are pleased that Home Computer Magazine *still fills your needs. In future issues you will find more information on how to use the PCjr sound, including music. We hope that in the future you will continue to find a lot of sound advice within* HCM.

Dear Sir:

In the letter "Support Needed Down Under Too," Steven Shraibman asks how to activate the special functions of the EPSON FX-80 printer. I, too, have the FX-80, and it works nicely with TI-Writer.

If Steven wants his entire work in proportional, he can: 1) Press [CTRL U]. This sets the control character mode; a seldom-used mode because it isn't on the TI-Writer reference card. (All characters have 64 subtracted from their ASCII-value. Control characters are represented on the screen by tiny hexadecimal numbers). Then press [FCTN R] (an ESCape; represented by a tiny 1b), [CTRL U] (toggles the control character mode off), "p" (lower-case P) and then a "1" (numeral one). These keystrokes should appear as 'bp1 on the monitor. These codes must be sent to the printer before the text. Putting it at the beginning of the file will accomplish this. The formatter will send them to the printer like any other characters.

2) He could also use the transliterate command of the TI-Writer formatter to define characters that turn the proportional spacing on and off. For example, .TL 123:27,112,49 and .TL 125:27,112,48 will toggle the proportional mode by surrounding the text with braces {and}. That is, "*Home {Computer} Magazine*" would have the word "Computer" in proportional but neither of the other words.

Italics can work similarly by surrounding the text to be italicized with braces so it comes out in italics. To do this define 123 as 27,52 and 125 as 27,53. I chose 123 and 125 (left and right braces) arbitrarily. For me, they are unused characters. Any little-used character(s) could be used. Italics and proportional can be set at the same time also as evidenced by this letter which uses proportional, italics, and graphics; all out of TI-Writer.

When using the proportional mode, do not use the formatter commands & (underline) and @ (overstrike). TI-Writer counts columns and the columns do not line up in proportional mode. The underline will come later in the line than you wanted, so use the FX-80's own underlining and double-striking.

Please pass this along to Steven or publish it, so more users can utilize TI-Writer to its fullest.

Glenn Davis
St. Paul, MN 55117

Thank you very much, Glenn, for those tips on the use of TI-Writer with the Epson FX-80 printer. You are one of the few bold people to dig deeper into TI-Writer's capabilities including the formatter. Perhaps your explorations will encourage others to make discoveries that they too can share with our readers.

Pocket Canon Plays the Pops

Dear Sir:

I really enjoyed the Pocket Canon in your LONG awaited Vol. 4, No. 1 magazine. One thing I did find annoying was the "POP" of the canon. To do away with this unwanted noise I simply changed the duration in line 230 to a negative number. Changing this to a negative number causes the previous sound to stop and the new one to start immediately. This could be a problem in some applications, if there wasn't enough delay between two sound statements it would cut the duration of the previous sound short. But since the Pocket Canon program has a built delay of approximately 500 milliseconds it creates no problems in the program.

Your magazine is very much appreciated. Being from a small town it is one of the only ties I have with the outside "TI computer world." I do hope you will include articles on the newly released TI-FORTH.

Timothy Maes
Beeville, TX 78102

Gee whiz, Timothy, we thought that all cannons were supposed to pop. If not even "boom." Seriously though, we would love to receive articles on TI-FORTH *or any of the other* FORTH *implementations, particularly of a beginning nature.*

TI Bulletin Board!

Dear Sir:

I would like to find out more about the TI-99/4A computer's power in the communications line—especially the BBS. I would like to find out if there is anyone writing the programs for a BBS and if so, I want to find out if they are compatible with other BBS. I mean can you upload and download programs over the telephone lines? Is there someone I can get in touch with that can give me that information?

I have been calling all of the BBS I can find in my area and I have found no TI systems around. Do you people know of any? If not in my area, some other locale?

Paul Reinhard
Bellflower, CA 90706

Paul, a few months ago we heard that the Chicago Users Group was about to go on-the-air with a bulletin board system for Texas Instruments and we have heard of others that were starting up. As an example we would like to refer you to the following letter.

Dear Sir:

I don't know if you put these kind of things in your magazine or not, but way over here on the east coast there is a BBS called The *99'er Bull Board* and it operates 24 hours. The number is (301) 434-0117 and it has lots of interesting information for the TI users.

Phil Simerly
Silver Spring, MD

Thanks for the information, Phil. Perhaps one of the TI bulletin board system operators would like to share with us how to actually go "on-the-air" with the TI machine.

New Dimensions For His Apple

Dear Sir:

A few months ago I purchased an Apple IIe system for use in my home business and it has worked well for me. Recently while visiting a computer dealer, I saw *Home Computer Magazine* on his bookshelf. Having some time I looked through the magazine and noticed the article entitled "3-D IIe" about three dimensional graphics on the Apple IIe. I found that article very interesting since I have not considered using the Apple II for anything except business before reading your magazine. Now, after hours, my oldest son spends time keying-in game programs from *HCM*. Your magazine is definitely worth the cover price, but I'm going to subscribe to save money anyway.

Grant Withers
Royal Oak, MI

Well, Mr. Withers, I'm glad to see that reading HCM *has taught you to not take your Apple computer for granted. We hope that you enjoy the other exciting articles that you'll see in the next few months.*

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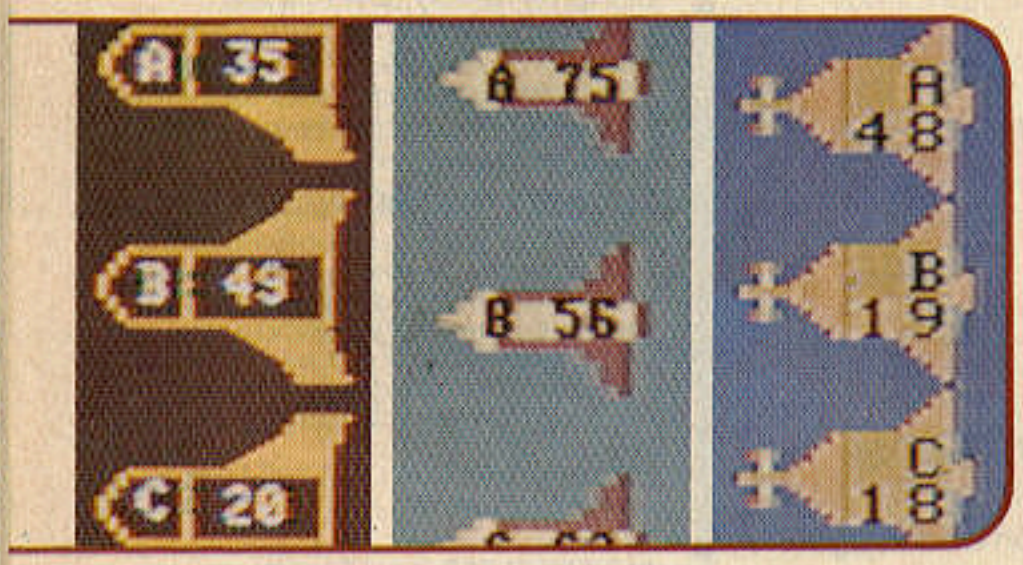
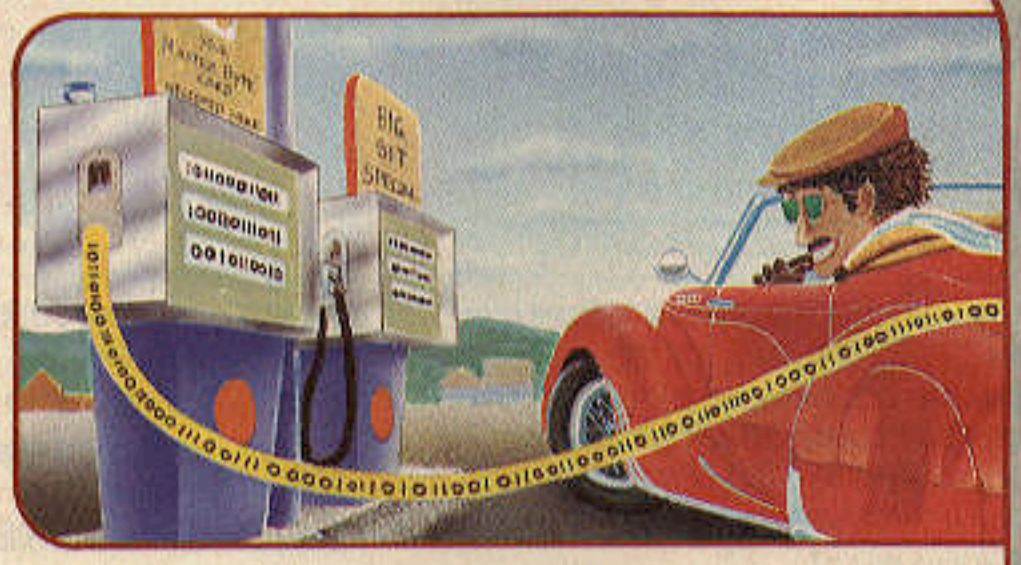
Circle 3 on Reader Service Card.

HOME COMPUTER™ magazine





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Burger-building in a chaotic kitchen.

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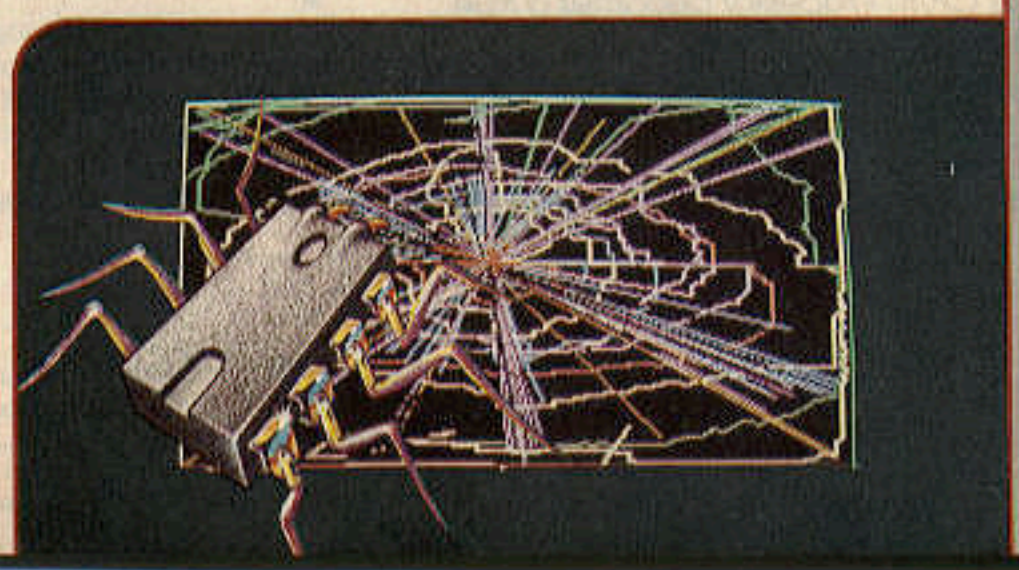

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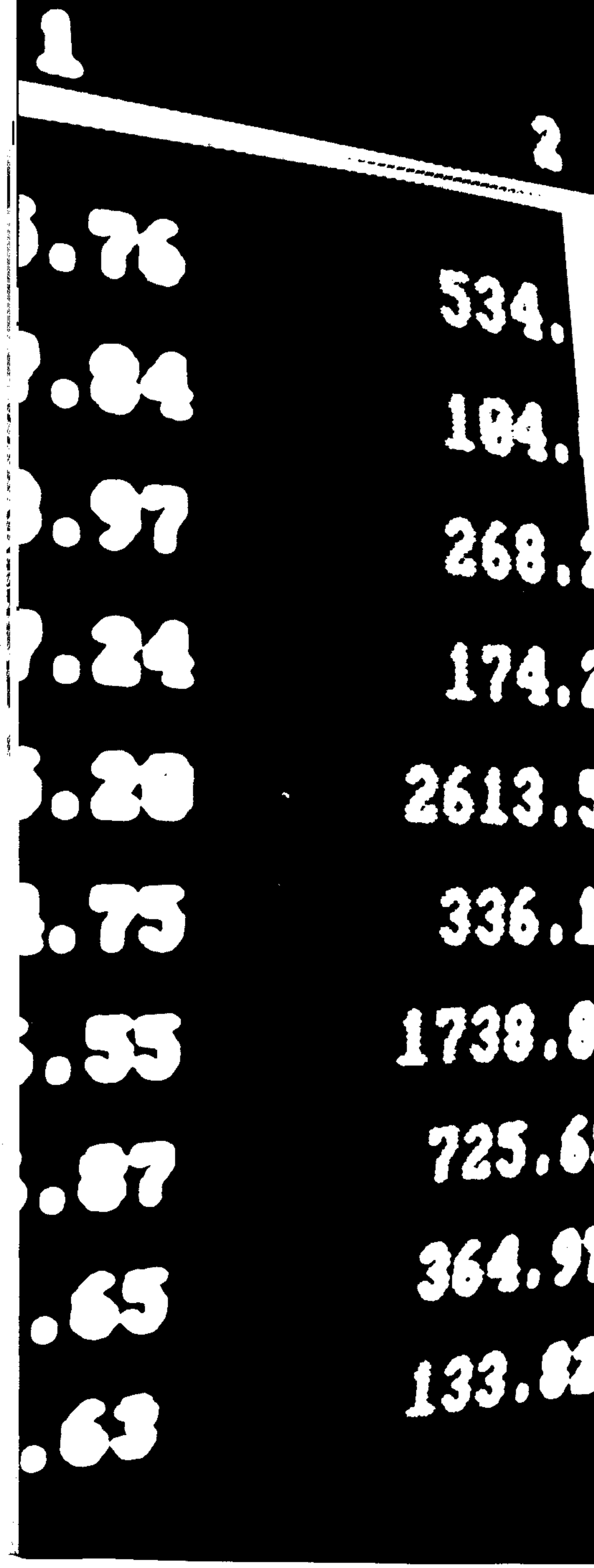
Snap-Calc™



The spreadsheet program is a handy tool for doing many financial calculations simultaneously. Its inherent versatility turns a computer into a super "What if . . ." machine. Using very simple commands, you can easily customize a spreadsheet for your own applications. These could include tracking your investments, evaluating alternative purchase options, calculating your company payroll, or tabulating accounts receivable. *Snap-Calc*™ is such a spreadsheet program written in BASIC.

The *Snap-Calc*™ spreadsheet itself is a matrix of numeric values. After you have entered values into the program, it will execute calculations that you have previously specified, and display the results through screen windows.

With *Snap-Calc*™ you will be able to create a formula for each row of the matrix. This same formula will then be used for all of the columns. You may also create names for each of the rows, and indicate which rows are to be included in the printed reports. (You may want to use certain rows to calculate other data.) In addition, you can specify the number of columns the spreadsheet will have, and set up a *totals* column which sums all columns used. The photo at the right is an example of the data entry screen.

DATA ENTRY IS A SNAP

To make an entry in any field, simply move the cursor to the field that you wish to change and type in the new value. A second set of cursor keys lets you move three columns left or right, or five rows up or down at one time. Not only is the screen updated with every key press, but the current value on the screen is stored in the spreadsheet. You can leave that entry field at any time, and the value displayed will be saved automatically.

LOGIC ENTRY MODE

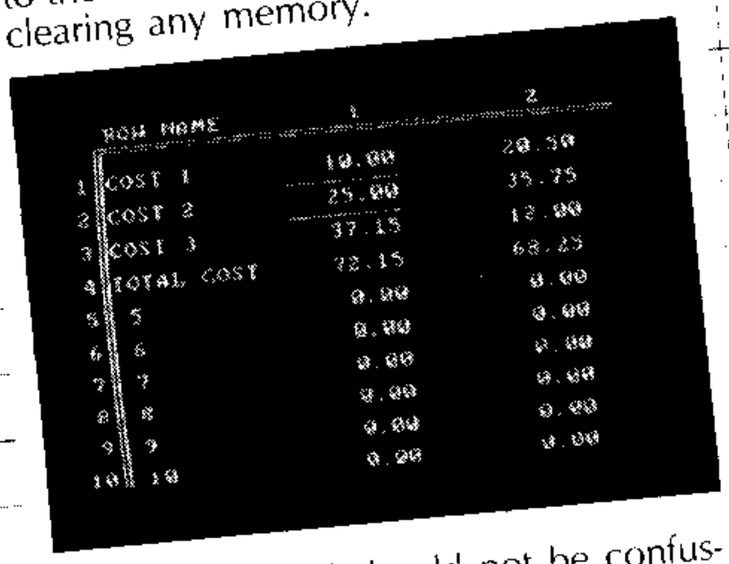
When you select this mode, the screen will clear and a prompt > will appear at the bottom of the screen. At this point, you can enter logic commands. These commands will let you specify the *totals* column and *last* column in the spreadsheet. You can also assign a logic name to your model, as well as row labels. The

by Gary Strauss
and the HCM Staff

most powerful aspect to this option is that it lets you define equations for any of the rows in the spreadsheet. (See **r = eq** below.)

Two types of commands are used in this option: immediate action commands, and logic function commands. The immediate action commands are as follows:

NEW When this command is used, the memory will clear and you will be prompted to enter one of four suboptions. If you select Data, then all of the data entered on the spreadsheet will be cleared. If you select Logic, your current logic model will be erased from memory. If the third suboption—Both Data And Logic—is selected, both data and the logic model will be cleared from memory. The fourth suboption, Abort New Command, is an escape which allows you to return to the normal logic entry screen without clearing any memory.



ROW NAME	1	2
1 COST 1	10.00	20.50
2 COST 2	25.00	35.75
3 COST 3	37.15	12.00
4 TOTAL COST	72.15	68.25
5 5	0.00	0.00
6 6	0.00	0.00
7 7	0.00	0.00
8 8	0.00	0.00
9 9	0.00	0.00
10 10	0.00	0.00

This command should not be confused with the BASIC command NEW, which erases the program in memory. Exercise caution when using this command. Always save your data and logic model to disk first.

LIST This command will list the logic model on the screen. The first item listed is the logic name. If no logic name has been assigned, then the message LOGIC NAME IS with no name following it will be printed.

TOTAL COLUMN IS col is always on the second line; here col is the totals column. If col is set to 0, then the totals column has been turned off. The default value for the totals column is 13.

LAST COLUMN IS col is always the next item listed and col is the last column in which data entry can occur. This value must always be less than the total column value. The default for this value is 12.

From this point on, the information listed is determined by the logic commands that you have entered into the model. If you created a row label for a row, the message r IS nnn will list, where r is the row number and nnn is the name of the row. Even if you entered the row name in the data entry section of the program, it will be displayed here. Following the row name will be all equations defined for that row. The message r = eq will list, where r is the row number and eq is the equation for that row.

PRINT This command performs the same functions as the LIST command except that the output is directed to the system printer.

MOVE xx TO yy This command allows you to move all of the data from column xx into column yy. You would then have duplicate entries—the information in column xx is not erased after the transfer.

END This command will cause you to exit the Logic Entry mode and return to the Data Entry mode. You may at any time return to Logic Entry mode and append changes to your logic model.

The following logic function commands affect the logic model itself:

LOGIC NAME IS nnn This command lets you create or change the name of the logic model, where nnn is the name of your logic. LOGIC NAME IS SAVINGS, for example. The name you assign to your logic model will be used as the file name when you save your model to disk or tape.

TOTAL COLUMN IS col
or
TOTAL COLUMN IS OFF This command lets you create or change the column that you want to use as your totals column. If the Off option is used, then the totals column will be set to zero and will not be calculated when the logic model is calculated.

LAST COLUMN IS col This command creates or changes the last column in which you will be able to enter data.

Continued on next page

Logically, this should be the column just before the totals column (if the totals column is in use), because you may not move your cursor beyond the LAST column when entering data. If the totals column is several columns beyond that point, you may not be able to display it on the screen.

The only restriction in designating the last column is that it must be a lower column number than the totals column, unless of course the totals column is turned off. In that case you can make the last column any value your machine will allow. The computer system you use will determine the maximum number of columns available.

r IS nnn This command is used for naming any of the rows in the spreadsheet. The row number is r and nnn is the name you assign to the row. An example might be: 3 IS ROW#3, where the name ROW#3 is given to row number 3.

r = eq This is by far the most powerful of the logic model's commands. It lets you assign an equation eq to a row r. The equation can be made up of other row numbers; real numbers called constants; an operator called LAG, which lets you access a previous column; or arithmetic operators. Rules for constructing the equation are as follows:

(1) A row can be specified by simply using the row number in the equation. For example 5 = 1 + 2 means that the value from row 1 is to be added to the value in row 2 and the total is to be placed in row 5. This same equation format is then used for all of the columns in the spreadsheet. Notice that there are spaces between each item. This is a requirement of the system so that the computer can decipher it easier, and execute it more quickly.

(2) A real number can be used as a constant in the equation when placed within parentheses. Taking the example from the previous paragraph, let's try: 5 = 1 + 2 * (12.53). The equation will now take the sum of row 1 plus row 2 and multiply it times 12.53. There is no priority of multiplication over addition—everything is executed from left to right. Rows 1 and 2 are added together before the sum is multiplied by 12.53.

You can use data from the previous column with the LAG modifier. When this modifier precedes a row number, the information will come from the same row number, but from the previous column. For example: **5 = 1 + LAG 2**. Here row 1 from the current column will be added to row 2 from the previous column. If the column currently being calculated is 8, then LAG 2 would cause the value from column 7 row 2 to be used. If you set up an equation such as: **5 = LAG 2**, then the value of the previous column, row 2 would be placed in row 5. In another example, **5 = 4 + LAG 5**, a running total for row 4 would be created in row 5.

There are four operators that you can use in your equations. They are:

+	**Add.**
−	**Subtract.**
*	**Multiply.**
/	**Divide.**

The length of an equation is limited only by the maximum string length for each system. There are minor differences in how the equation is to be entered on each machine, so consult the *Snap-Calc*™ section which covers your machine.

Once you have entered one of the above logic function commands, you can use the LIST command to check whether the command has been received and interpreted properly, or to simply check logic statements that have already been entered.

CALCULATE MODEL

When the key for the Calculate Model function is pressed, the computer will begin calculating your logic model using the data currently entered on the spreadsheet. All of the equations for each row will be executed in ascending order of row number. For example, if an equation in row 3 uses the result of an equation in row 5, you may have a problem. Because you can't enter data into a calculation field, field number 5 will probably be set to zero and will not contain the proper information when row three does its calculation. You should design your logic model with this in mind.

In addition, Calculate Model provides an automatic row total in the totals column. The totals column defaults to column 13 when the program is first run, but you may move it to a different column, or turn it off completely using logic model statements. If the totals column has been turned off with a logic statement, then the row total will not be calculated.

LOAD DATA FILE

When you select the Load Data File option, a menu of three suboptions will prompt you for the type of file to be loaded. The first suboption loads the data file only, which contains the data that has been entered into your spreadsheet. Select the second suboption if you wish to load the logic model. The third suboption lets you load both data and the logic model in one step. Once you have entered your file type, you will be prompted for the file name of the file you requested. The name you enter must reside on the data disk currently in the drive, or on a cassette tape.

SAVE DATA FILE

The primary difference between the Save Data File and the Load Data File options is in creating file names. If you choose to save the logic model in either the Load Logic Only, or Load Data and Logic modes, the file created for the logic model will use the LOGIC NAME as the name of the file. This is important to keep in mind so that when creating a logic name you only use characters that are legal in the file system being used. If the logic name has not been declared, then you will be prompted for the name of the file. That name will then become the logic name for that model when loaded at a later time. If you no longer want to keep a logic name, or wish to create a modified version, a logic name can be changed at any time.

CLEAR FIELD/ERASE

The Clear Field and Erase option can be used to back out of an entry and clear the field, or to simply reset a field back to zero. To use this function, place the cursor over the value that you wish to set to zero and press the key associated with this function. If the field is numeric, it will be redisplayed with a value of zero. If the field is a row label, it will be erased and left blank. Erasing a label from a row does not affect the rest of the row, or any equations set up for the row.

PRINT REPORT

The Print Report option allows you to generate a hard-copy report of your spreadsheet data on your system printer. Before the program starts printing, you will be prompted for the title of the report, the date, and the maximum number of rows to be printed in the report. The report generated here is formatted for an 80-column printer. This limitation restricts the report to printing only six columns of data across the page. Since there are more than six columns in most spreadsheets, the report will print all of the rows for the first six columns, then form feed to the top of the next sheet of paper and print the next six columns. This continues until all of the columns have been printed. The report will include every column up to the column designated as the totals column (or the column designated as the last column, if the totals column is turned off).

An asterisk (*) as the first or only character in a row name will prevent that row from being printed in the report. This allows you to "pretty up" your report by not printing rows that contain intermediate data for calculations. You may want to print only a summary report, and not a detailed report on every row in your spreadsheet.

EXIT

If you want to exit any of the programs, you can do so by pressing the exit key for your machine, as described in the text for each computer. The Exit option allows you to back out and return to the data entry screen—but you will first be prompted with a message inquiring whether you want to halt the program and lose any data currently in memory.

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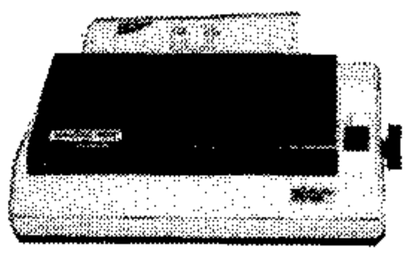

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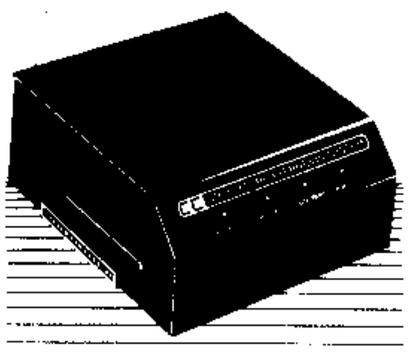

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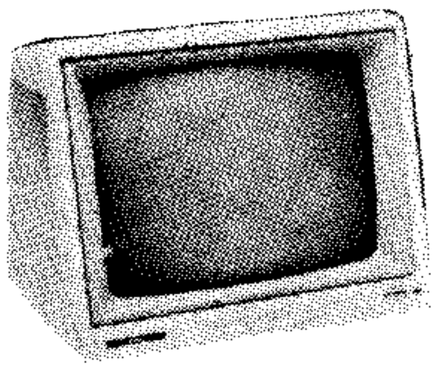

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The Apple version of *Snap-Calc*™ is different from the other versions because of the Apple's keyboard. The IBM PC and PCjr, Commmodore 64, and TI-99/4A computers all have function keys that can be used to select the options. But this is not the case on the Apple; its [CONTROL] key is used with a letter to activate the following functions:

Press [CONTROL]	for FUNCTIONS:
L	Load data.
S	Save data.
E	Clear entry/erase.
Z	Calculate logic model.
P	Print spreadsheet.
F	Start logic entry mode.
I	Cursor up one cell.
J	Cursor left one cell.
K	Cursor right one cell.
M	Cursor down one cell.
Y	Cursor up five cells.
G	Cursor left three cells.
H	Cursor right three cells.
B	Cursor down five cells.

You don't need to press the [CONTROL] key to initiate these two functions:

[RETURN] Cursor down one cell.

[ESC] Exit program.

Data Entry

Because the Apple screen is 40 characters wide, it can display three columns of information on the screen at one time. These columns can include the row labels and two columns of values, or three columns of values. The row labels field can be up to ten characters long, but the numeric fields of the spreadsheet will stretch to 11 characters long.

One character is reserved for the negative sign (to be used as needed). Another character is reserved for the decimal point. This leaves five digits to the left of the decimal point, and two digits to the right of the decimal point. Thus, the largest number that can be entered or displayed is 99999.99.

When entering numbers into a numeric field of the spreadsheet, you simply need to move the cursor (the cursor is the cell which is set to inverse video) to the cell you wish to work on. Then enter the value. You do not need to press [ENTER] to save the value in the field. If you fill up the five digits to the left of the decimal point, the numbers will automatically begin entering to the right of the decimal.

Snap-Calc™ on the Apple can handle up to 30 columns and 60 rows of information in the spreadsheet. However, these limits can be altered by changing the values assigned to variables A and B in line 580. A dictates the maximum number of rows to be used, while B dictates the maximum number of columns. Beware of increasing these figures, though, when you may not have sufficient memory—you could find yourself with a disastrous headache one day when your program runs out of memory, and you lose all of your data. For most home spreadsheet applications, 60 rows and 30 columns should be adequate.

Files

The Apple computer does not store information to cassette tapes, only to a disk drive. Thus the Apple version does not prompt you for a device type. Instead, the first prompt (when loading or saving files) asks whether you wish to work with the spreadsheet data, or the logic model. The logic model includes all of the specifications that you established in the Logic Entry mode.

The next prompt asks you for the file name. If you are saving a logic model to disk, you may not get the file name prompt. If you assigned a name to the logic model when in the Logic Entry mode, this name is used as the file name. Finally, if no name has been given to the logic model, then you will be asked for the file name. The file name you enter will then become the new logic name of the model the next time you load it into memory.

Continued on page 24

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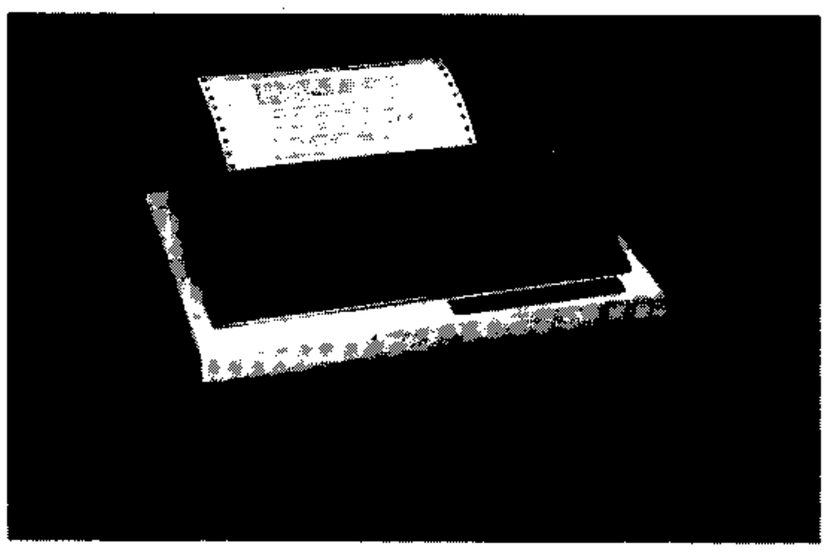

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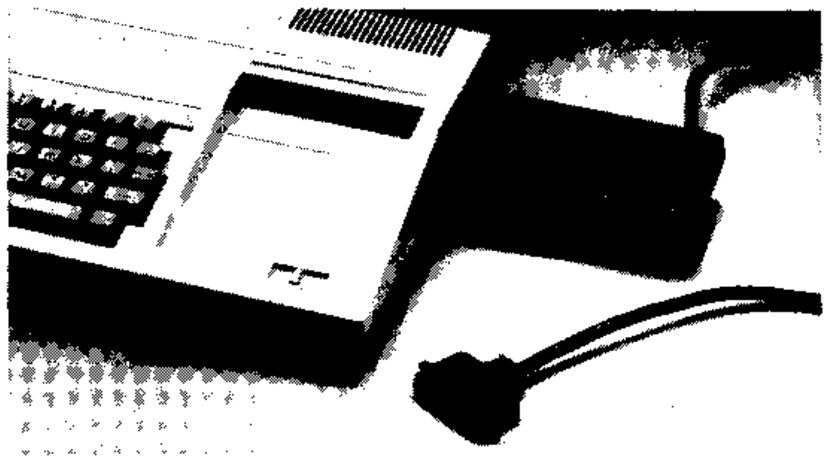

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Logic Entry

The same logic entry conventions are used for the C-64 as for the other systems. The only difference here is the length of the entry—the Commodore allows only 78 characters to be entered with the INPUT statement. If you exceed this length, the entire entry may be lost. Thus, when in this mode, you should never let your entries exceed two lines on the screen.

The only time you can legally have a longer entry is when you enter equations for a row. If you need a more complex equation than what will fit on one row, you can break it up over two or more rows. Or, you can have one equation use the result of a previous equation. However, equations are calculated in row number order. For example, an equation in row 10 could not use the result of an equation in row 12, because row 12 would not be calculated yet.

SNAP-CALC (C-64)
Explanation of the Program

Line Nos.	
100-170	Program header.
180-210	Initialize variables.
220-490	Main control loop.
500-530	Exit program routine.
540-840	Subroutine to calculate logic model.
850-870	Subroutine to return a value in an equation.
880-1390	Control loop for logic entry mode.
1400	Subroutine to return a numeric value from an entry string.
1410-1420	Delete the cursor (sprite).
1430-1530	Subroutine to place entry string into F$( ) array.
1540-1700	Subroutine to rebuild entry string for listing to the screen or printer.
1710-2600	Subroutines for file handling.
2610-2760	Routine to build row names on the data entry screen.
2770-3130	Routine to build the cell value in data entry mode.
3140-3150	Routine to display the mode on the screen.
3160-3250	Subroutine to input the logic entry string.
3260-3280	Key scan routine.
3290-3510	Subroutine to display the data entry screen.
3520-3750	Subroutine to move the cursor one position.
3760-4210	Subroutine to print the report.
4220-4310	Routine to clear data or logic from memory.
4320-4350	Subroutine to simulate the PRINT USING statement.
4360-4390	Subroutine to check for logic entry errors.
4400-4460	Routine to store the sprite cursor's shape data in memory.
4470-4600	Sprite data for the cursor.
4610	Subroutine to simulate the PRINT AT statement.
4620-4650	Routines for opening and closing the printer port. HCM

For the Key-in listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

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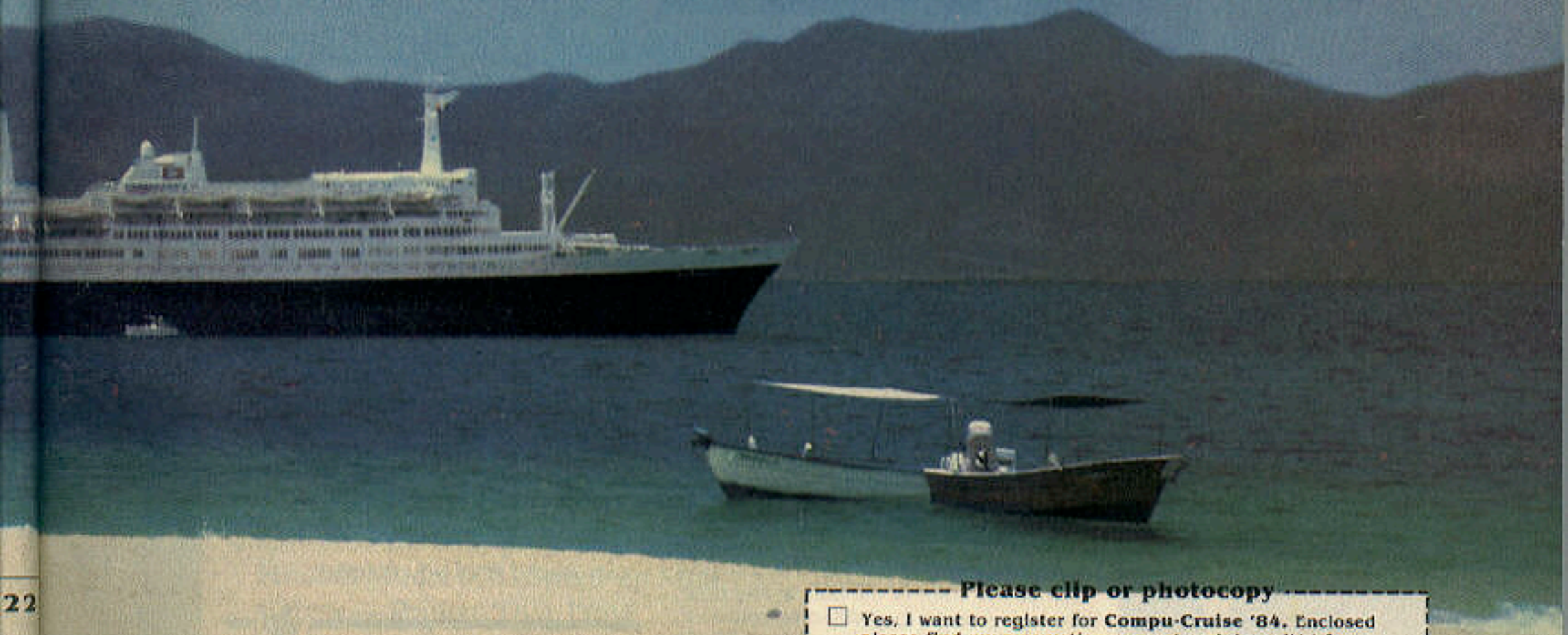

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BARS and PLOTS

by **John Gunter** *and the HCM Staff*

How many times have you gazed bleary-eyed at bunches of numbers before being able to figure out what the numbers really meant? Think how much easier and quicker it would have been to view a graphic representation instead. The program presented here will do just that—allow you to enter numerical values at the keyboard and instantly see them transformed into a bar graph on screen.

Two versions of this program are provided—one for the TI-99/4A, and one for the VIC-20. There are some basic differences between the two, but both versions perform the same fundamental operations.

The program allows you to scale your input to enter either large or small values for clear visual comparison. You can also change the color of the bars at any time, displaying up to four different colors on the 99/4A, and three colors on the VIC-20. Bar value corrections are made by simply moving a *bar cursor* at the bottom of the graph.

FUNCTIONS

C (Change color)

When you press C in response to ENTER DATA, you will be prompted to enter a number that represents your color choice. Any bars you create following this input will appear with the new color. The color choices on the TI-99/4A are blue, red, yellow and grey. The VIC-20 gives you a choice of red, blue or green.

ERASE (Erase a bar)

This command erases any bar positioned above the cursor.

P (Print report)

When this command is chosen, the computer executes a screen dump of the current graph displayed to a printer. If you are using the TI-99/4A, you are first prompted for your printer's parameters. Any printer should work for this function, because only standard ASCII characters are used to plot the graph. With the VIC-20, the printer output goes to the system's default printer on port #4.

END (Exit program)

Here the two systems differ slightly. Because the 99/4A has more memory, it was possible to add several extras to it which are not available on the VIC-20.

If you enter END on the VIC-20, the program will stop, and you will be returned to BASIC. On the 99/4A, however, you are asked to enter two lines of text as a LEGEND at the bottom of the chart. Now you can select one of several options by pressing a key. If you press S (for Stop) the program will halt and you will return to BASIC. If you press N (for New) the screen will clear, and you will be prompted for new parameters to begin a new chart. If you press P (for Print) you will get a hard-copy screen dump of the chart, including the two legend lines you entered.

The 99/4A not only contains more memory than the VIC-20, but it also can display more characters on the screen—up to 25 bars in the graph for the TI machine, compared to only 15 on the Commodore. Each bar is displayed on the screen with high resolution—i.e., the top character in the graph is redefined so that you get a more accurate representation of its true value.

In this version of the program, you can use any one of four colors to generate your bar graphs—all four colors can be used in the same graph. The computer

Continued on page 30

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Bars and Plots

itself is capable of creating up to 16 colors. For each color, however, a number of new characters must be redefined for the top of the bars. Thus, you are limited to using only four of them.

After starting the program, you will be asked whether or not a printer will be used. If you reply Y for yes, the program will also ask you to enter your printer's parameters—e.g., RS232. The message PLEASE WAIT — GOTTA REST will appear while the computer prepares itself and defines the graphics shapes.

Next, the screen will clear and display the bar graph's grid. You will be asked to enter the maximum value for the graph. The program can handle a maximum value of 100,000. The minimum value is 20. The grid scale is rounded off to the next highest multiple of 20—i.e., if you enter a scale of 67, the scale used will be 80. This makes the calculations for character definition easier, and prevents messy values from appearing at the quarter, half, and three-quarters marks.

The next prompt will ask you to enter a side label. This label can be up to 24 characters long, and is displayed on the left side of the screen. You can then enter a label for the bottom of the grid. This label will be displayed right under the grid, and can be up to 25 characters long, which allows for one character under each bar.

Now you're ready to start entering data onto the graph. The asterisk cursor is under the active bar. You can enter any value from 0 to the maximum value of the chart, or one of the commands mentioned earlier in the text. If you enter a number, a bar will be displayed at that point. If there is already a bar at that point on the graph, then the new bar will replace the old bar.

If you make a mistake while entering a value, you can press [FCTN] 3 (erase), clear the entry, and start over. If you enter the wrong value, or you simply wish to move to a different bar position, use the [FCTN] key with S and D to move the cursor back and forth. Move the cursor to the bar on which you want to make an entry and enter data as you normally would.

Bars and Graphs (TI-99/4A) Explanation of the Program

Line Nos.	
100-160	Program header.
170-240	Display the title screen and input printer option.
250-280	Key input routine. Wait for the [ENTER] key, then clear the screen.
290-620	Initialize graphics and program variables.
630-730	Draw the grid on the screen for the bar graph.
740-760	Enter the maximum grid value.
770-920	Key input routine to simulate the input statement.
930-1020	Subroutines to move the bar cursor left and right.
1030-1070	Subroutine to build the input string.
1080-1130	Subroutine to erase an entry from the input routine.
1140-1180	Test the contents of the input string. If nothing was input, then use the last value entered.
1190-1390	Check the value entered for maximum value to ensure that it is legal.
1400-1460	Enter the side label for the graph.
1470-1560	Enter the bottom label for the graph.
1570-1780	Enter a bar color.
1790-1890	Routine to enter data onto the graph and accept commands.
1900-2550	Subroutines to handle the different commands.
2560-2690	Routine to print the graph.

HCM

For the Key-In listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

VIC

The VIC-20 version of this program is much shorter because of its memory constraints. We have, however, squeezed as many of the same features into this shortened version as possible.

When you run the program, there will be a slight delay while the program variables are initialized, the graphics characters are placed into RAM, and their shapes changed. The bar grid is then displayed on the screen, and you are asked to enter the maximum value for the grid. The maximum value must be a multiple of 16 (e.g., 32, 48, 272) and can't excede 100,000.

If the value you enter is not a multiple of 16, then the program will round your entry off to the next highest multiple. For example, if you enter a maximum value of 263, the computer will round it off to 272 which is the next highest multiple of 16.

Multiples of 16 are used for two reasons: (1) it makes the calculations for displaying graphics easier, and (2) it prevents you from entering a maximum value that leaves fractions when divided by 2 or 4. You don't want these fractions to show up when the values along the left side of the grid are displayed, representing 1/4, 1/2, and 3/4 of full scale.

After entering the maximum value, you will be asked to enter the side label and bottom label, which will then be displayed with the grid. Next, you will be asked to choose one of three colors—red, blue, or green.

Now you're ready to start entering data onto your grid. When prompted with ENTER DATA, you can either enter a value—which will draw a bar on the graph—or one of several commands. A numeric value will produce a bar on the grid at the current bar cursor position. This is indicated by an asterisk below the bar. If the value you enter excedes the maximum value for the grid, the bar will be drawn to the top of the grid.

If you want to enter bars in an order other than from left to right, you can move the bar cursor to any position before making your entry. You may also wish to do this to make corrections to existing bars. To move the bar cursor, simply press R (for move right) or L (for move left) and then press [RETURN]. The cursor will move one position in the indicated direction.

A number of other commands are available from the ENTER DATA prompt. If you enter P and press [RETURN] you will get a printed copy of the screen from the system's printer. This is a default output to device #4. If you use a different device port for your printer, you may want to slightly modify your program in line 840. Here, we have assigned device #4 to channel #4 in the OPEN statement. You may change the device port to one of your choice.

A problem may arise if you use a printer that is not compatible with Commodore graphics. This program does a screen dump of the screen graphics, and uses the special Commodore graphics characters to create the graph on the printer. If your printer cannot print Commodore graphics, the results will be unpredictable.

You may change the color of the bars at any time. If you enter C on the ENTER DATA line, you will see the three color choices and can select one of them. After making your selection, you return to the data entry mode. Any bars created after changing the color will be drawn with the new color. Bars made before the color change will stay the same.

The NEW command lets you clear the screen and start with a completely new bar graph. The old bar graph erases from memory, as does the screen.

If you simply want to erase a single entry on the bar graph, use the ERASE command. Move the bar cursor to the bar you want to erase and enter ERASE at the ENTER DATA line. The bar will be cleared, and the bar cursor will remain where it is.

When you're ready to end the program, enter END on the ENTER DATA line. The program will halt, taking you back to the BASIC system.

Bars and Graphs (VIC-20) Explanation of the Program

Line Nos.	
100-170	Program header.
180-220	Initialize program graphics and variables.
230-310	Graphics data.
320-460	Enter maximum data value, side label, and bottom label.
470-540	Enter data and check for commands entered.
550-630	Display the bar on the screen.
640-660	Draw the bar grid on the screen.
670-690	Check for valid numeric entries.
700-750	Convert a string input to its poke values. Display either the side or bottom label.
760	Subroutine to erase a bar from the grid.
770-790	Subroutine to change the bar color.
800-830	Move the bar cursor to the right or left.
840-980	Routine to print a screen dump to the printer.
990-1000	Key scan routine.
1010	End of the program.

HCM

For the Key-in listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

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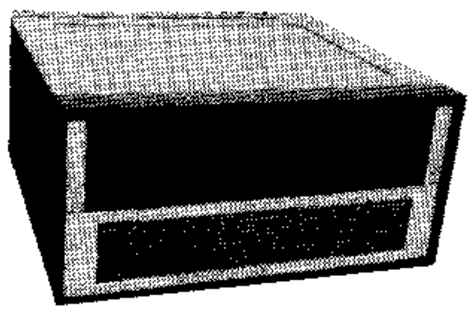

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Snap-Calc . . . from p. 14

REQUIRED EQUIPMENT: TI Extended BASIC

The TI-99/4A is the machine on which *Snap-Calc*™ was originally designed. The TI version differs from the other versions because of the 99/4A's keyboard layout and screen size incompatibilities.

The Keyboard

The TI keyboard does not have separate function keys. On the 99/4A, you select functions by pressing the [FCTN] key in the lower right corner of the keyboard, in conjunction with the numeric keys. The functions perform as follows:

Press [FCTN]	for FUNCTION
1	Load data from disk or cassette.
2	Save data to disk or cassette.
3	Cancel entry/erase.
5	Calculate the logic model.
6	Print report.
7	Logic entry mode.
9	Exit *Snap-Calc*™.

In addition, several other keys work with the [FCTN] key to move the cursor:

KEYS	FUNCTIONS
[FCTN] E	Move the cursor up 1 cell.
[FCTN] S	Move the cursor left 1 cell.
[FCTN] D	Move the cursor right 1 cell.
[FCTN] X or [ENTER]	Move the cursor down 1 cell.

The [CTRL] key is useful for moving the entire window of the spreadsheet.

Press [CTRL]	for FUNCTION
E	Move up 5 cells.
S	Move left 3 cells.
D	Move right 3 cells.
X	Move down 5 cells.

Screen Size

The 99/4A is capable of printing only 28 columns, using the PRINT and DISPLAY AT commands. This limits screen displays of row labels to nine characters wide, and numeric entries to seven characters wide—including a decimal point.

Data Storage

The 99/4A is capable of saving and recalling information from both a cassette recorder and a disk drive. Either device will work with this program. When you select either SAVE or LOAD, you must decide whether you want to work with the spreadsheet data or the logic model, which are kept in two different files.

After making your selection, you are prompted to input the device name. If you are using a cassette, simply type CS1 and press [ENTER]. For a disk drive, enter DSK1 or DSK2. It is not necessary to enter the period separator or the file name at this time, because the computer will just ignore them.

If you selected a device other than a cassette, you will also be prompted for the file name. The only exception to this is when you are saving the logic model. In this case, if you have already assigned a logic name, the logic model will automatically use that name for the file. If no name has been assigned, or you are loading the logic model, you will be prompted for the file name. The file name will then be used as the logic model name. When saving or loading data you are always asked for the file name.

Reports

The 99/4A can work with a maximum of only 13 columns because of its memory limitations, so this program is designed to print all 13 columns on one page. To do this, it is necessary to set the printer to condensed mode, which allows an 80-column printer to print 132 columns. This is done in line 1440. CHR$(15) sets condensed mode on most printers. If your printer requires a different code to enter condensed mode, however, you may need to change line 1440 to your printer's specifications. If you are using a letter-quality printer, or one of the less expensive dot matrix printers, you may not be able to print in condensed mode.

Logic Mode

The maximum string length on the 99/4A is 127 characters. You are limited to this size when you enter commands. If the calculation you enter gets too big, it should be broken down into smaller parts.

It's in this mode that you set up your logic model. It can include row labels, a totals column, a last column, a name for your model, and row equations. If you assign a row name longer than nine characters, it will be truncated. All spaces are removed. If you want spaces in your row name, you can enter them directly in Data Entry mode.

The maximum number of rows you can use for data or equations is 20, and the maximum number of columns is 13. But, if you run the program with the 32K memory expansion connected, you could easily modify the program to accept more columns and rows. The modifications are simple using the following procedure:

In line 190 change the value assigned to A to the number of rows you want. Then change the value assigned to B to reflect the number of columns you want. You also need to change the values used to dimension the arrays in this same line. D$( ) and E$( ) need to be expanded to the number of rows you wish to use. The J( ) array should have its first value set to the number of rows you wish to use, and the second value set to the proper number of columns.

SNAP-CALC (TI-99/4A) Explanation of the Program

Line Nos.	
100-160	Program header.
170-200	Initialize program variables and functions.
210-280	Main control loop for data entry mode.
290-300	Exit program routine.
310-320	Subroutine to clear an entry and display the new value.
330-470	Subroutine to calculate the logic model.
480-490	Subroutine to return the value to be used in the equation.
500-690	Control loop for logic entry mode.
700	Subroutine to return a numeric value from the entry string.
710	Subroutine to delete the cursor.
720-750	Subroutine to take entry string apart by placing each word into a cell of the F$() array.
760-910	Subroutine to rebuild the entry string for listing to the screen or printer.
920-1090	Subroutine for file handling.
1100-1120	Builds the row names from the entry string.
1130-1140	Creates a cell value for the spreadsheet during data entry mode.
1150-1160	Control loop repaints the data entry screen.
1170	Routine to display the current mode.
1180-1190	Input the logic entry string.
1200	Direct output to either the screen or the printer.
1210	Key scan routine.
1220	Relocate the cursor.
1230-1250	Key scan routine waits for a different key to be pressed before continuing.
1260-1300	Display the data entry screen.
1310-1390	Move the cursor up, down, left, and right one position.
1400-1490	Print the report.
1500-1520	Image formats for printing single items.
1530-1540	Clears the logic model from memory.
1550-1570	Error routine.
1580-1590	Image formats for a full screen.
1600-1620	Open and close the printer port.

HCM

For the Key-In listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

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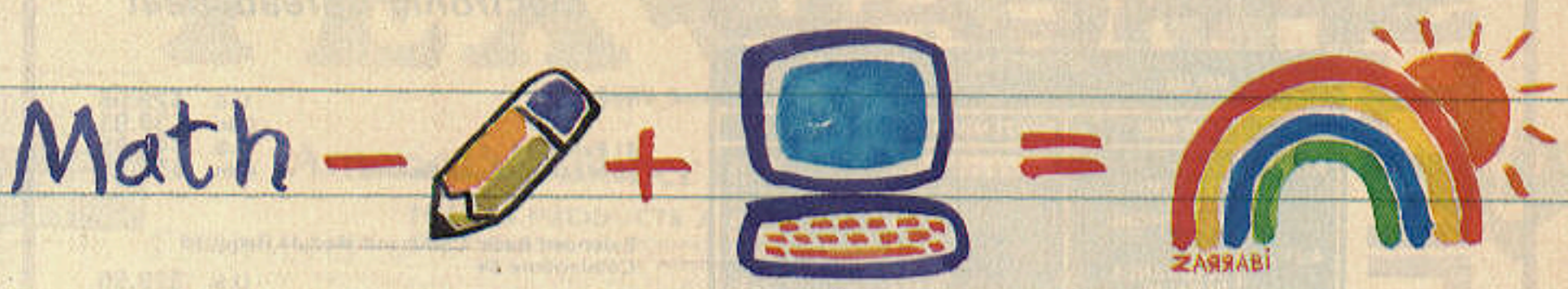


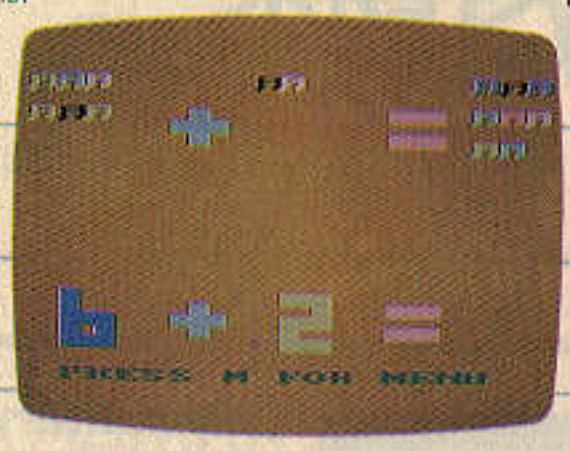
Elementary Addition and Subtraction

by Mark Dewese
and the HCM Staff

In the previous issue of *Home Computer Magazine* we introduced a VIC-20 version of *Basic Addition and Subtraction*, an educational program for preschoolers. Now for parents of preschoolers with either a Commodore 64 or TI-99/4A, we present two additional versions.

Basic Addition and Subtraction makes learning the basics of addition and subtraction an entertaining experience for a small child. The program offers simple problems (with answers ranging from zero to nine) on three levels of difficulty.

You help your child get started by selecting either addition or subtraction from the first menu. The next menu lets you choose one of the three difficulty levels. The easiest level is aimed at children just learning to count; each problem is accompanied by a graphic representation of the problem—including a graphic answer. The next level includes graphics of the problem, but the answer's graphics do not appear until the child indicates an answer. The hardest level displays only numeric problems.



To enter an answer, the child presses any one of the number keys. The computer evaluates the answer and provides immediate feedback. As with most good educational software, the child is rewarded for selecting the right answer—in this case, with a little tune and colorful graphics.

If the answer if not correct, the computer erases the child's incorrect answer and offers another chance. Following a correct answer, the screen is erased and a new problem appears. At any point you may change modes by pressing M and returning to the first menu.

The TI version of *Basic Addition and Subtraction* will run with either BASIC or Extended BASIC. If you use Extended BASIC and have the Speech Synthesizer, you can use the speech option part of the program, which is displayed on the first screen. If you have both Extended BASIC and the Synthesizer, press S. If you don't have one or the other, then press any other key to turn the speech option off. If you don't have those items and press S anyway, you will get an error message, and the program will halt the first time it tries to speak.

If you enter the program under BASIC and later attempt to run it under Extended BASIC, you will get a syntax error in the speech routines. This is caused by the double colons in the lines of code that utilize the speech option. In Extended BASIC, the colons are interpreted as a break between statements for multiple statement lines. The only time the colon becomes a legal operator in BASIC is within the PRINT statement to designate a carriage return. If you later load the program under Extended BASIC you will find spaces between each of the colons, making them illegal operators for Extended BASIC.

Even if you are using BASIC and don't have a Speech Synthesizer, enter all of the lines in the program—don't skip those that only work with speech. There is important program logic in these lines and the program won't work properly without them.

***Basic Addition and Subtraction* (TI-99/4A)**

Explanation of the Program

Line Nos.	
100-180	Program header.
190-310	Title screen.
320-540	Initialization and opening.
550-670	First menu.
680-830	Second menu.
840-920	Begin displaying problem.
930-1150	Define graphics characters.
1160-1250	Choose graphic.
1260-1700	Select and display left number.
1710-1750	Print sign.
1760-2330	Select and display right number.
2340-2430	Get answer.
2440-2560	Draw graphic of answer.
2570-2630	Get player's input.
2640-2680	Make computing noise.
2690-2860	Evaluate answer and branch appropriately.
2870-2950	Print final score.
2960-2980	Right answer noise.
2990-3720	Print answer.
3730-4270	Speech routines.

For the Key-in listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

On the Commodore 64, when you want to put characters on the screen memory by POKEing them directly into video memory, you have to give the character a color by POKEing a corresponding color memory location. This means that you have to constantly update and keep track of two addresses. It is much simpler, however, to derive a color memory address directly from the character memory address. You can do this by initializing a variable to a value that will be added to the character memory address. Consider the following BASIC lines for example:

```
10 S=54272:AD=1024
20 FOR I=0 TO 999
30 POKE AD,1:POKE S+AD,2
40 AD=AD+1:NEXT
50 END
```

This short program is a simplified version of the POKE graphic character subroutines in the main program. It POKEs red A's on the screen beginning in the upper left corner. Line 10 initializes a constant (S) and a variable (AD). S is used as an *offset* to color memory. AD is the character address. AD (1024) is also the starting address of the screen in memory. The value for S is found by subtracting 1024 from the address of the first

Continued on next page

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Elementary

color position (55296-1024 = 54272). Line 20 begins the program loop and line 30 POKEs the character and color to the character and color memory respectively. In this way the correct color memory location is derived by adding the character memory address to the constant S.

Line 40 updates the character memory address in preparation for POKEing the next position, and then returns control to the beginning of the FOR__NEXT statement in line 20. This programming concept is very useful when you are POKEing different locations on the video screen and need to find the corresponding color memory addresses.

Basic Addition and Subtraction (C-64)
Explanation of the Program

Line Nos.	
100-170	Program header.
180	Read sprite definitions.
190-210	Initialization.
220	Read in sound data.
230-300	Sprite data.
310-320	Sound data.
330-450	Display program prompts and messages.
460-660	Derive and display left and right numbers.
670-910	Input answer, evaluate, and reward.
920-940	Get keyboard input.
950-1020	Sound subroutine.
1030-1210	Print subroutines to position numbers on screen.
1220	Print plus sign.
1230	Print equal sign.
1240	Print minus sign.
1250	ON GOTO statement for numbers.
1260-1300	Position cursor subroutines.
1310-1390	Poke graphic character subroutines.
1400-1410	Clear portions of screen subroutines.

For the Key-in listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

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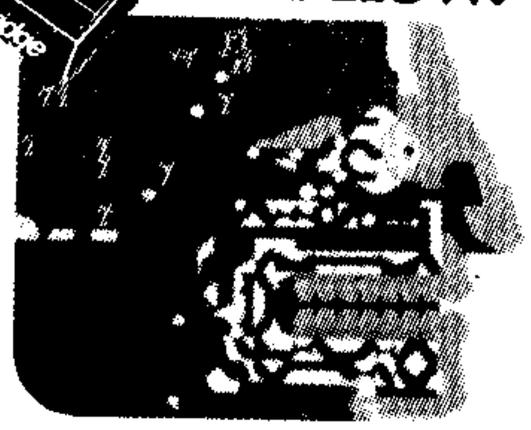

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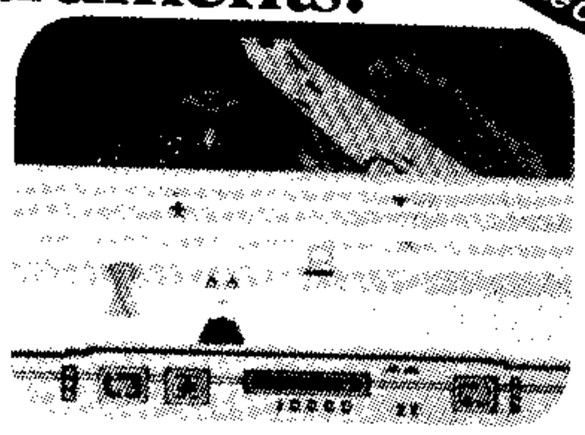

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Introduction

LOGO Times is an information resource for users who want to create their own *personal* languages—languages that will easily allow them to communicate with the computer in a totally new audiovisual realm of applied imagination, exploration, and self-discovery. The articles on these pages concern the use of the LOGO language, but readers do *not* need any additional software or equipment (or even a computer) to understand and learn from the material presented here.

If readers want to actually *experience* a LOGO environment, they will need a computer, the requisite software and/or cartridges, and any additional hardware required for a particular implementation. A disk drive is required for some LOGO implementations, but in other cases, a user's work may be saved on cassette tape, or copied into a notebook (for later re-keyboarding).

The varieties of LOGO we'll consider include—but are not limited to—Terrapin LOGO for the Apple II, II+ or IIe and the Commodore 64, TI LOGO for the TI-99/4A, and LOGO Computer Systems LOGO for the IBM PC and PCjr.

- **Apple:** Terrapin LOGO requires an Apple II, II+ or IIe with 64K of RAM, one disk drive with controller, and a blank, initialized disk.
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- **IBM PC or PCjr:** LOGO Computer Systems LOGO requires the PC or PCjr with 128K bytes of RAM, one disk drive, and a blank, initialized disk.

In each issue, one or more of the articles may refer to or build upon the topics discussed in a previous article. It is therefore recommended that for maximum benefit and understanding, new readers obtain the appropriate back issues of *Home Computer Magazine* containing *LOGO Times* articles.

LOGO Listings

As you enter LOGO statements, the last thing you do at the end of every statement is to press [ENTER] on the TI and IBM (the key with the ↵ symbol), or [RETURN] on the Commodore 64 and Apple. This signals the system to begin a new line. In our typeset listings, single LOGO statements may carry over from one line to the next without ending. The end of a LOGO statement is marked with a curved arrow (↵) to indicate that you press [ENTER] or [RETURN] at that point.

Notice

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Our Contributing Editors

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Logo Contents

August, 1984

41. The Binary Forest *by Robert Keller*
Fractaled Forestry

44. LOGO Flakes *by James Schwartz*
Getting the Drift

The computer trees in the *Binary Forest* are an example of a fractal, a relatively new object in the field of mathematics. The landmark paper on fractals in the mid-70's posed this question: How long is the coastline of England? The paper demonstrated that if you measure the distance by the path a person walks, it is quite a bit greater than the figure commonly accepted by geographers. This is because there is quite a bit of detail—little bays and inlets and rocks and spits—ignored by the mapmakers. As the beetle crawls, up and down every hillock, stone, and blade of grass, the distance is greater still. If you measure as the microbe slithers—or however they move—up and down every grain of sand, the distance is enormously greater. (In fact, the paper said the distance could be shown to be infinitely great.)

England is a *fractal*—when you look at it from an airplane, you see something with a jagged outline. When you get down on your knees and look at its shoreline, you see another version of the same jagged outline. Use a microscope, and you see the same jaggedness repeated on another level.

Understanding fractals allows mathematicians to make better models of them than have ever before been possible. Computer graphics programmers, taking the cue, have been building successful and realistic images—even whole mountain ranges—composed of smaller and smaller versions of the same basic shape.

The basic shape of the binary trees—the trunk and two branches—is repeated on a smaller and smaller scale until the smallest resolution of the LOGO graphics screen, 1 unit, is reached. (When the length of a branch becomes short enough, it turns green and becomes a leaf.)

Our natural tendency as human artists is to find some easy and abstract way to represent the small leaves and branches on a tree. But the computer makes the fractal approach possible, for it does the tedious work without complaint.

The basic tree structure works like this:

```
TO TRUNK :LENGTH
PD FD :LENGTH
MAKE "LENGTH :LENGTH*.75
BRANCHES :LENGTH
END
```

This procedure accepts the value you supply for :LENGTH and uses it to draw a trunk. Then it reduces :LENGTH and calls the procedure BRANCHES.

```
TO BRANCHES :LENGTH
RT 30
FD :LENGTH
BK :LENGTH
LT 60
FD :LENGTH
BK :LENGTH
END
```

Here, the turtle turns to the right 30 degrees and travels forward :LENGTH, then it backs up :LENGTH. It has just drawn a right-hand branch. Next, it turns left 60 degrees, travels forward :LENGTH, and backs up again. It has drawn a left-hand branch.

LOGO Flakes

by James Schwartz

No matter what they say about LOGO's advanced list processing capabilities and artificial intelligence roots, I love its simple, elegant graphics and its potential as a thinking stimulator. After diving head first into LOGO in July, 1981—and trying with varying degrees of success to learn and then teach its inner mysteries—I now believe that its greatest strength is its seemingly simple surface. LOGO truly is for learning.

As an educator, I have spent the past two years collecting and developing successful, educational uses for LOGO, looking for its best function. I've found it in the type of LOGO activity that develops a structure, lends itself to solving by pieces, and opens the door for creative exploration. The snowflake activity included here is an example of just such an ideal LOGO learning activity.

The Program

Remember your grade school science lessons? All snowflakes are variations on a six-sided geometric design. According to one of LOGO's learning foundations, we should begin by creating the simplest possible snowflake, and worry about how to make it more complex later. I imagine such a snowflake looks like Diagram 1.

The *Rule of 360* says that if the turtle is to make a complete spin, from the beginning of its drawing to the end, it must turn a total of 360 degrees. Therefore, each of six equal turns must be 60 degrees. In an effort toward elegance (and to simplify later developments) let's use REPEAT and the Rule of 360 to create this first design:

```
TO FLAKE0
REPEAT 6 [FD 21 BK 21 RT 60]
END
```

Setting Up The Pieces

The two most significant steps used to spice up this design are FD 21 and BK 21. These two steps form a single branch of the snowflake. Another LOGO learning foundation is to solve by pieces, so let's make a BRANCH procedure and an appropriate modification to FLAKE:

```
TO FLAKE0
REPEAT 6 [BRANCH RT 60]
END

TO BRANCH
FD 21 BK 21
END
```

We now have a very significant improvement! Any change of the BRANCH procedure will result in a new snowflake. For a simple modification, why not put some crosspieces (Diagram 2) on the branch?

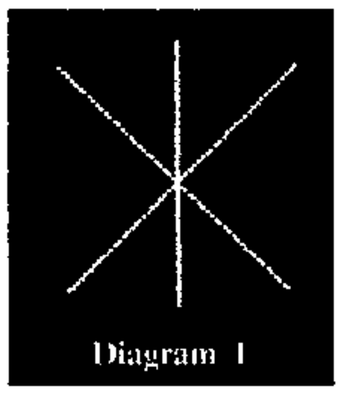

Diagram 1

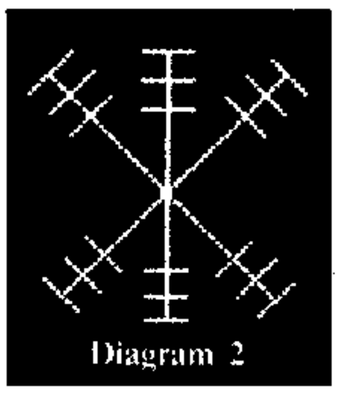

Diagram 2

Are you developing a habit of solving by pieces? If so, you have probably noticed that each branch is composed of three T-shaped pieces:

```
TO BRANCH1
REPEAT 3 [TEE]
END

TO TEE
FD 7
RT 90
FD 3
BK 6
FD 3
LT 90
END

TO FLAKE1
REPEAT 6 [BRANCH1 RT 60]
END
```

Become Creative

If that was easy, why not try a branch composed of a TEE, a Y, and an ARROW?

```
TO Y
FD 7
RT 45
FD 3
BK 3
LT 90
FD 3
BK 3
RT 45
END

TO ARROW
FD 7
RT 135
FD 3
BK 3
RT 90
FD 3
BK 3
RT 135
END
```

(Did you notice the Rule of 360 in one of these pieces?)

Continued on page 46

HERE'S AN OFFER YOU CAN'T REFUSE

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Huntington, WV 25705

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Send cheque or money order by air mail to: Berniel Mok
P.O. Box 70969 Kowloon Central P.O. Hong Kong

Circle 59 on Reader Service Card.

LOGO Flakes . . . from p. 44

Take time to create a flake you like by arranging these three segments in different ways. You can, of course, use more than three segments to make a branch—just be sure to back up the turtle enough so it finishes the branch in the same place that it started it.

Here is an easy way to create a new flake without destroying a previous one: first, type TO FLAKE. Then move the cursor back and add a number to the word FLAKE (such as FLAKE1). Then move the cursor down one line, to the end of the word BRANCH. Add a number to the end of BRANCH (such as BRANCH1). Now press [FCTN] 9. Type TO BRANCH1, and define your new branch. This new flake will be called FLAKE1, and your original FLAKE will remain unchanged. This process defines all subsequent flakes.

Up to now, we have provided a flexible structure to work within, we have practiced solving by pieces, and we have opened the doors for creativity. (How many different branch segments and branches can you invent?) Now let's move on to the use of variables as a way of enhancing our creative explorations.

By giving our branch segments variable-length crosspieces, we will open up whole new worlds of snowflake design:

```
TO TEE :L
FD 7
RT 90
FD :L
BK :L * 2
FD :L
LT 90
END

TO Y :L
FD 7
RT 45
FD :L
BK :L
LT 90
FD :L
BK :L
RT 45
END

TO ARROW :L
FD 7
RT 135
FD :L
BK :L
RT 90
FD :L
BK :L
RT 135
END
```

Now, when we use these procedures in BRANCH, we will also need to specify numbers as inputs so that the variable :L will have a value.

```
TO BRANCH
ARROW 10
ARROW 20
ARROW 25
ARROW 20
ARROW 10
BK 35
END
```

At this point—with an infinite variety of shapes, and the ability to make those shapes in any sizes and combinations of sizes—we truly have some raw materials for creative exploration. Each new design—whether it is created through careful analysis leading to synthesis, or whether it results from combining elements randomly—will bring joy to the artist's heart.

Increasing Complexity

At some point in your creative exploration you may be troubled by the fact that larger flakes wrap around the screen, marring their beauty. The flakes could, of course, be made smaller by changing the length of each of the segments that compose the branches. This can lead to problems, though, because great changes in the length of these segments will result in disproportional flakes.

But, we can include a variable in the flake procedures to control the size of the flake, and then use this variable in each segment as a scale variable. Thus, the procedures given above for TEE, ARROW, and Y are rewritten as follows:

```
TO ARROW :X
FD :H
LT 135
FD :X
BK :X
LT 90
FD :X
BK :X
LT 135
END
TO TEE :X
FD :H
LT 90
FD :X
BK :X * 2
FD :X
RT 90
END
TO Y :X
FD :H
RT 45
FD :X
BK :X
LT 90
FD :X
BK :X
RT 45
END
```

The BRANCH procedures provided here offer some ideas for the scale variable :H. Each FLAKE procedure must be changed to allow input of a value for :H (for example, TO FLAKE :H). The SEE procedure is a top-level procedure which allows the user to choose a scale. It then displays a few of the snowflakes that are designed using these techniques.

Notice that this activity has brought you from a relatively simple procedure to some complex programming concepts and techniques. Each step from beginning to end involved a small, easily-learned concept. At every stage there was an element of beauty and an opportunity for creativity.

Although this activity was presented as a complete package, it is, in reality, open-ended. Refine it and experiment with it. The only logical END to this activity is the question, "I wonder if . . ." HCM

Complete key-in listing for *LOGO Flakes* is on the following page.

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HOME COMPUTER™ magazine

Emerald Valley Publishing Co.
P.O. Box 5537, Eugene, OR 97405

AN EMERALD VALLEY BOOK

HOME COMPUTER™ product news

STICKYBEAR LEARNINGWARE

Four new software learning and game programs have been released by the Computer Software Division of Xerox Education Publications. The programs are initially for use on Apple II computers, and are each priced at $39.95. *Stickybear BOP* is a multilevel computer game for the family, and includes a game disk, a full-size poster, a stand-up game, and Stickybear stickers. *Stickybear ABC* is an alphabet program for three- to six-year-olds featuring animated pictures with sound. The pictures display objects that move over color backgrounds, without the need for special hardware. *Stickybear Numbers* allows children ages three to six to develop number recognition and build counting skills through play. *Old Ironsides* is a two-player game of naval strategy with three-masted ships which recreate the age of sailing.

Xerox Education Publications
245 Long Hill Road
Middletown, CT 06457
(203) 347-7251

K-TEL RELEASES 160 TITLES

K-TEL Software, Inc., a wholly-owned subsidiary of K-TEL International, Inc., has released for shipment 160 titles of budget priced software for Apple, Commodore 64, VIC-20, and Atari computers. The software includes game, educational, and business titles, and will be marketed under the "K-TEL" brand.

K-TEL Software, Inc.
11311 K-TEL Drive
Minnetonka, MN 55343
(612) 932-4000

ANALOG & VIDEODISK I/O

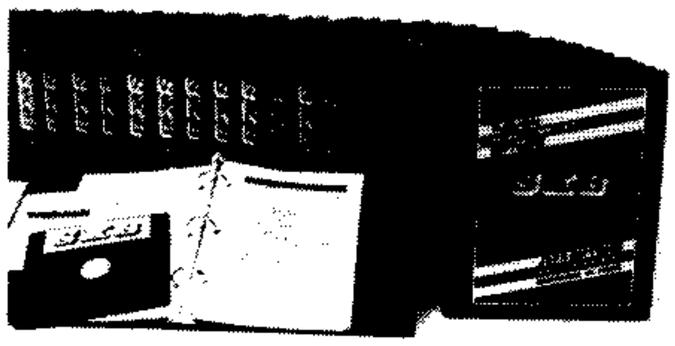
Micromagic has introduced two new hardware products for the TI-99/4A. The ADM-100 Analog to Digital Interface plugs directly into the 99/4A, does not require additional peripherals, cartridges, or an expansion system, and can be used with TI BASIC. A built-in three-step attenuator provides for three input ranges of 0-5, 0-10, and 0-50 volts dc. Software is supplied to make the computer function as a digital voltmeter. Its total cost is $79.95. The LVM-99 Videodisc Interface/Controller also plugs directly into the 99/4A and requires the TI Mini Memory to operate. The unit interfaces the computer to the Magnavox 8010, Sylvania 7200, or Pioneer VP-1000 videodisc players. Its cost of $249 includes demonstration software and all cables and connectors.

Micromagic Software
4129 Abercorn Road
Knoxville, TN 37921

MAKE IT *Ez* ON YOURSELF

Softron, Inc. has announced two aids for disk drive users, and a keyboard overlay *Ez Disk*(tm) for the Commodore 64 and VIC-20 allows users to call up a menu to Load, Save, and Run BASIC and machine language programs. It will also Show Directory, Read Errors, Rename, Erase, and Compress files. The program supports up to four disk drives, and is available for $24.95. *Ez Disk Plus*(tm) for the Commodore 64 performs all of the above functions, plus it prints files directly from disk to screen or printer, appends programs, and more. *Ez Disk Plus* sells for $34.95. Keyboard Soft/Lay(tm), is a keyboard overlay for the Commodore 64 and VIC-20. BASIC commands, memory locations, maps, sprites, and sound information are provided for easy reference It is available for $8.95.

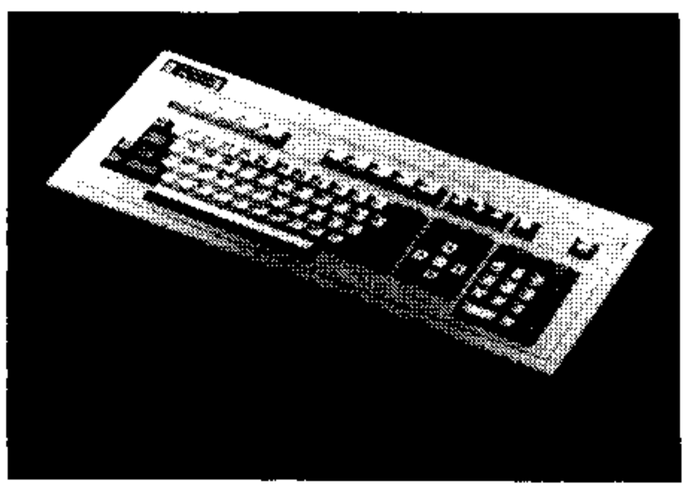
Softron, Inc.
150 Nassau St., Suite 2024
New York, NY 10038
(212) 608-2922



EXTENDING EXTENDED BASIC

J & KH Software has released its *Super Extended Basic* (SXB) for the TI-99/4A. The software adds a third layer of subroutines to TI BASIC and Extended BASIC. Most of its more than 100 subroutines fall into five categories: data base, string array, string, integer, and video display processor. *SXB* is priced at $99.95, and requires the TI Extended BASIC command module and 32K memory expansion.

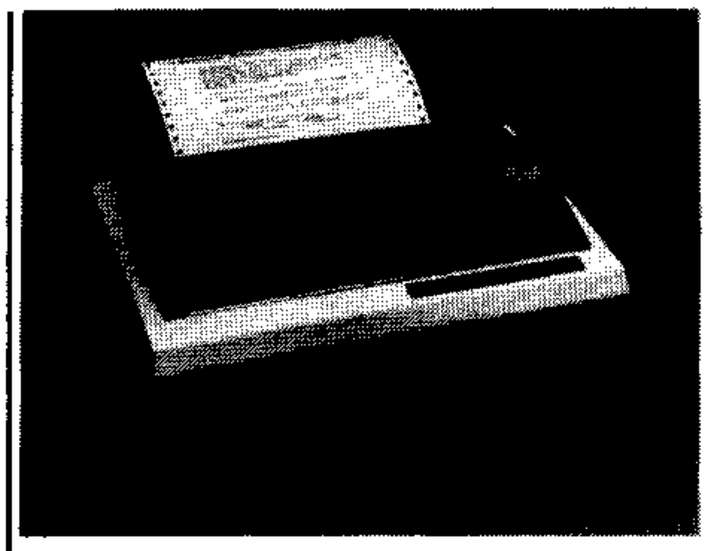
J & KH Software
2820 S. Abingdon St.
Arlington, VA 22206
(703) 820-4131



A NEW KEYBOARD FOR JR

Key Tronic Corporation has introduced a plug-compatible keyboard for the IBM PCjr. The KB5151jr is engineered similarly to Key Tronic keyboards for the IBM PC. Priced at $255, the new keyboard features LED indicators on lock keys, solid-state capacitive switches, and separate numeric, cursor, and function key areas

Key Tronic Corporation, Department E6
P.O. Box 14687
Spokane, WA 99214
1-800-262-6006



PLUG COMPATIBLE PRINTER

Axiom Corporation has announced a printer that is plug-compatible with the Texas Instruments 99/4A computer. The GP 100-TI does not require the TI interface box, because the printer is shipped with a cable that plugs directly into the side of the computer. It is compatible with TI's sidecar modules and expansion interface. Users can set the number of line feeds per line, line length, margins, and get dot-addressable graphics. The GP100-TI retails for $299.

Axiom Corporation
1014 Griswold Ave.
San Fernando, CA 91340
(818) 365-9521

SPEECH SYSTEMS GUIDEBOOK

WGBooks has announced the publication of *Speech Systems for Your Microcomputer*, a guidebook for microcomputer users considering voice technology. Author Gary A. Shade discusses applications of voice input and output in education, in the home, and for the handicapped. The book also examines existing speech systems on the market, and provides guidelines to help readers determine which system is best for their own home use. *Speech Systems for Your Microcomputer*, priced at $14.95, includes program listings, photographs, and a glossary of speech technology terms.

The Wayne Green Publications Group
Peterborough, NH 03458
(603) 924-9471

HOME COMPUTER product news

PLUG IN TO YOUR COMPUTER

Thought Technology has created a monitor and software program that together allow users to plug themselves into their home computers and mentally and physically interact with the system. The Calmpute 1(tm) monitors a user's tension level through galvanic skin resistance, which measures the opening and closing of the skin's pores. The monitor produces an individual stress profile, and automatically adjusts for individual differences in stress responses. The GSR monitor has inputs to monitor heart rate, temperature, and muscle activity. The *Calmpute*(tm) program demonstrates how both physical and mental stress factors affect people, and helps teach stress control. It includes several biofeedback games that stimulate users, who must remain calm under the games' pressures to win. The monitor and the software together retail for $79.95.

Thought Technology Ltd.
2180 Belgrave Ave.
Montreal, P.Q. Canada H4A 2L8

PHYSICAL SOFTWARE

Two new software packages–one for children, and one for the athletic population, are among the programs and software applications available from a new catalog by Digital Cybernetics International. Diet and exercise play an important role in *Physicalc*, which has capabilities to monitor and graph body weight and fat percentages over extended time periods. *Capitals* teaches users the names and correct spellings of the 50 U.S. state capitals. Digital Cybernetics also offers a number of educational- and engineering-oriented software. The catalog can be purchased by sending $1 to DCI.

Digital Cybernetics International
P.O. Box 264
East Amherst, N.Y. 14051-0264
(716) 688-1250 ext.1

COMPACT EXPANSION FOR 99/4A

Tex Micro Inc. has released TIMPAC, a "TI eMulating Peripheral Access Controller." At 1-1/2" high, TIMPAC includes everything necessary to add 32K RAM, printers, and floppy disk drives to the TI-99/4A. It will also accommodate a speech synthesizer card, a hard disk controller interface, and an access cable to the console expansion port. For $499, the purchaser receives TIMPAC, a Disk Access Cartridge, a Texdisk diskette, and a manual.

Tex Micro Inc.
Titusville, FL 32783-5366
(305) 267-4513

TI QUICK REFERENCE GUIDE

The *Q*Card*(tm) Reference Card is now available for users of TI BASIC and Extended BASIC. The brochure-size, fan-folding reference guide was compiled using excerpts from *The Texas Instruments User's Encyclopedia* by Gary Phillips and David Reese. Arranged in alphabetical order, it contains definitions and symbols for the commands and functions used in TI BASIC and Extended BASIC. The *Q*Card* costs $2.95.

Texas Instruments User's Encyclopedia
1001 Bridgeway, Suite 205
Sausalito, CA 94965
(415) 331-2395

COLOR DISPLAY MONITOR

Sakata U.S.A. Corporation has introduced its Sakata Model SC-100 CRT Composite Color Display Monitor. It is compatible with Apple II and IIe, Commodore 64, VIC-20 and other personal computers. The Model SC-100 13" CRT has 90 degree inline with 0.65mm dot pitch. It retails for $329.

Sakata U.S.A. Corporation
651 Bonnie Lane
Elk Grove Village, IL 60007
(312) 593-3211

BASIC TIPS FOR PROGRAMMERS

AMLIST, Inc. has announced the publication of *Basic TIPS: Comprehensive Program Instructions for the TI-99/4A* by Terrance K. Castle. The book stresses the effective use of commands and functions, instead of their definitions. Chapters cover programming structure, debugging, data files, graphics, sorting arrays, algorithms, and memory conservation. The manual includes 16 programs used as part of the book's teaching technique. *Basic TIPS* can be purchased for $15.95, which includes a cassette of all programs.

Distributed by TexComp
P.O. Box 33084
Grenada Hills, CA 91344
(818) 366-6631

A *NEWWORD* PROCESSOR

Newstar Software, Inc. has announced that *Newword*(tm), a word processing/merge print package, is now available for the IBM PC, PCjr, and compatibles. It is upward compatible with *Wordstar*(tm)/*Mailmerge*(tm) programs. The package features merge print, support of seven screen attributes, dot-matrix printer support, function key support with all 40 keys programmed by menu selection, and an "undelete" key. *Newword* retails for $249.

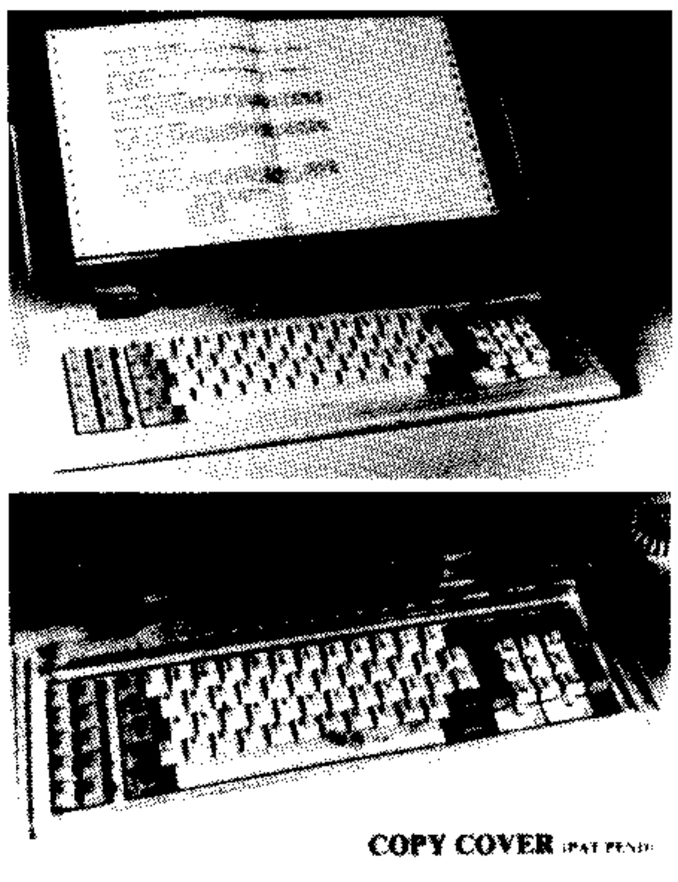
Newstar Software Inc.
1601 Oak Park Blvd.
Pleasant Hill, CA 94523
(415) 932-2278

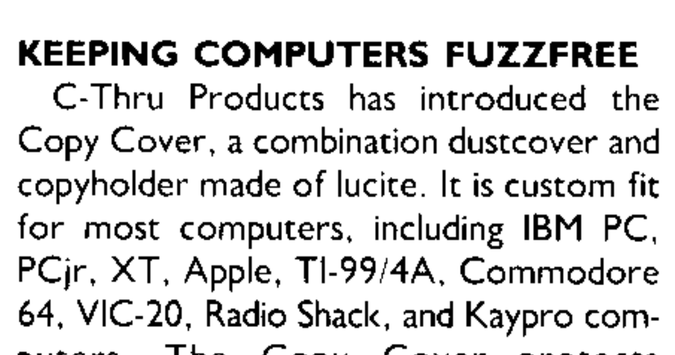
DISK ENVELOPE DESIGN

Triot Software has released its *Catalog-Comments Program Disk Envelope Designer*. This program allows users with an expanded TI-99/4A system to design individual disk envelopes with a catalog listing printed on the outside. Comments on each listing in the disk's catalog may also be stored on a separate comment file disk if the enveloped disk contains less than 54 files. Disk catalogs with more than 54 files can be printed on normal or legal size paper. The comment file disk enables users to update the catalog and alter comments at any time. The *Disk Envelope Designer* requires a 99/4A computer with 32K Memory Expansion, TI Extended BASIC, one or two disk drives, and a printer. It is available by ordering Version 1 of *Disk Envelope Designer* from Triot Software for $20, prepaid.

Triot Software
P.O. Box 115
Liscomb, IA 50148
(515) 496-5455

HOME COMPUTER™ product news



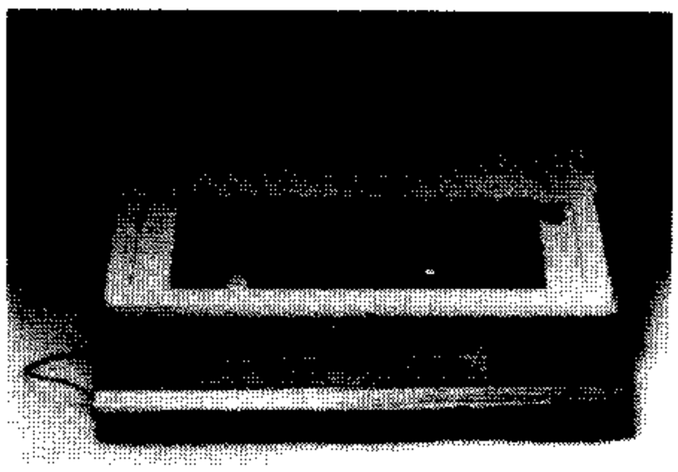


COPY COVER (PAT PEND)

KEEPING COMPUTERS FUZZFREE

C-Thru Products has introduced the Copy Cover, a combination dustcover and copyholder made of lucite. It is custom fit for most computers, including IBM PC, PCjr, XT, Apple, TI-99/4A, Commodore 64, VIC-20, Radio Shack, and Kaypro computers. The Copy Cover protects keyboards from dust and dirt, is static free, and becomes a copyholder when flipped up above the keyboard. It is available for $39.95.

C-Thru Products
6351 Lake Worth Road, Suite 111
Lake Worth, FL 33463



RELIEF FOR COMPUTER FATIGUE

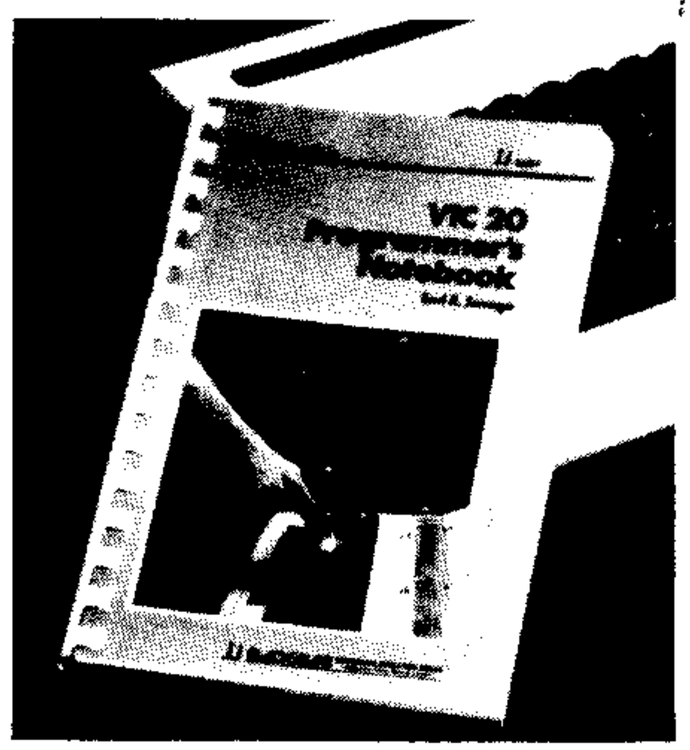
Discwasher has introduced a product designed to ease the arm, wrist, and shoulder fatigue that results from extended periods of work with a computer. Entry Rest, made of solid oak, is mountable on Apple II series computers. It has a built-in multi-function calculator with memory, and a static grounding bar that protects the computer from static charges. *Entry Rest* can be purchased for $34.95.

Discwasher
1407 North Providence Road
Columbia, MO 65205

TIPS FOR VIC-20 USERS

Howard W. Sams & Co., Inc. has released the *VIC-20 Programmer's Notebook* by Earl R. Savage. The book provides subroutines and programming ideas for both novice and experienced programmers, and includes information on adding memory, dealing with data, troubleshooting, and accessories. Program statements are written in VIC-20 language, and flowcharts illustrate program operations. The *VIC-20 Programmer's Notebook* is $14.95.

Howard W. Sams & Co., Inc.
4300 West 62nd St.
Indianapolis, IN 46268
(317) 298-5400



CUSTOM PRINTING PACKAGE

A software package that enables its users to write, design, and print greeting cards, stationery, letterhead, signs, and banners has been introduced by Broderbund Software. *The Print Shop* produces messages that can be written in one of eight different typestyles, in two sizes, and in solid, outline, or three-dimensional formats. It has nine border designs, ten abstract patterns, and a built-in graphics editor to create original pictures and symbols. *The Print Shop* requires an Apple II or IIe computer and a printer. It is priced at $49.95, and comes with a colored assortment of pin-feed paper, matching envelopes, and a reference manual.

Broderbund Software
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170

TRADING ON THE RUN

Redwick & Company has announced two software packages for the TI-99/4A, Apple IIe, and Commodore 64. *Cargo Run* is a non-graphic trade simulation game. The user is a galactic trader, buying and selling goods at various star systems, each with a distinct economic base. The trader must anticipate fuel use, taxes, market need, and availability while staying ahead of creditors. *Cargo Run*'s price is $29.95. The *Redwick Inventory/Invoice System* is a direct inventory update, invoice writing package that supports any number of inventory items, accessed by name. The system reports on stock levels, stock profits, taxes, shipping costs, daily sales, and other items. The *Inventory/Invoice System* is priced at $99.95.

Redwick Company
P.O. Box 45041
Winter Hill, MA 02145

CUSTOM FILING FOR THE HOME

Continental Software has introduced *The Home Cataloger*, a software program for the IBM PCjr, Apple II/IIe, and Commodore 64. This filing and cataloging program can create up to 1,500 individual entries, depending on the hardware used with it. The user can create customized filing systems, or select one of 10 predesigned cataloging lists, which include telephone, travel planner, insurance policies, studies, or books. *The Home Cataloger* can total numbers in any or all numeric categories, and can generate whole lists or lists of selected categories in any order. It is available for the suggested retail price of $49.95.

Continental Software
11223 South Hindry Ave.
Los Angeles, CA 90045
(213) 417-8031

MATH DRILLS FOR KIDS

Stilwell Software Products has developed an educational program designed to help tutor and drill grade school and junior high school age children. *Math School* has 36 different types of arithmetic problems for drills, and three levels of difficulty. Each session has different math problems, since the numbers are randomly selected. Users can time themselves on problem sets, and can have their test results analyzed to find areas they are not mastering. The tutor section also has three levels of difficulty, and provides immediate feedback and time to study problem answers. *Math School* is priced at $15, and will run on the IBM PC, PCjr, XT, and Portable.

Stilwell Software Products
16403 North 43rd Drive
Glendale, AZ 85306

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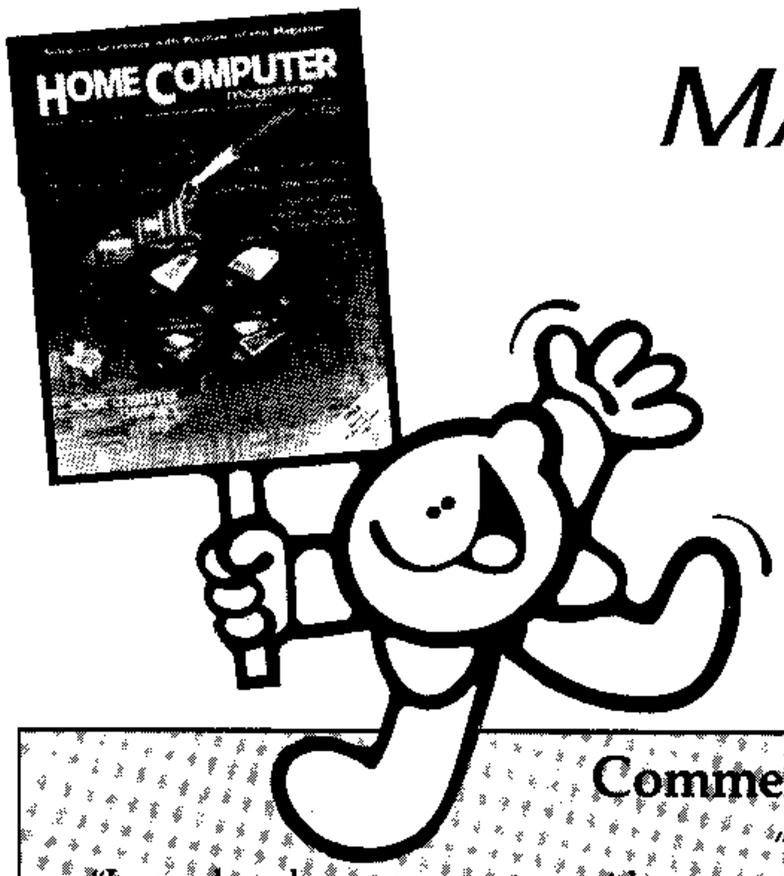

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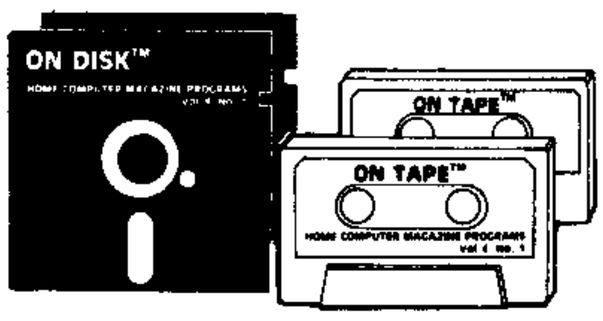

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HCM Review

VIC 64 TI

MATRIX LAYOUT

	Spreadsheet Total		Screen Display	
	Rows	Cols.	Rows	Cols.
TI cassette	16	14	11	2
TI disk	24	15	11	2
C-64 disk	40	25	13	3
VIC-20 cassette	40	25	13	3

Name: Count-Sil
Program Type: Spreadsheet
Machines: TI-99/4A, Commodore 64, VIC-20
Distributor: Systems Interface
1511 Merivale Road
Lancaster Mall
Nepean, Ontario K2G 3J3
Price: TI-99/4A disk $49.95; cassette $29.95
Commodore 64 disk $29.95
VIC-20 cassette $29.95

System Requirements:
Commodore 64: VIC-1541 disk drive
VIC-20: 16K Memory Expansion, cassette recorder.
TI-99/4A: TI Extended BASIC, 32K Memory Expansion, disk system or cassette recorder.

	Poor	Fair	Good	Excellent
Performance			▬	
Ease of Use				▬
Documentation				▬

Count-Sil

A review by Tom Green
HCM Staff

Some pay hundreds of dollars for a fancy spreadsheet program. Here's an inexpensive alternative from Systems Interface. *Count-Sil* is relatively slow—being written in BASIC—and uncomplicated; but for limited home applications, it may be well worth the money. Those who can make most use of the program, however, may need some introduction to the subject.

What's A Spreadsheet?

Imagine a business form with, say, a matrix of 20 columns by 30 rows. If each column has a width of 10 characters, the form would be too wide and too deep to be displayed on conventional monitors. To simulate this type of "spreadsheet" business form —and even larger ones with hundreds of columns and rows—spreadsheet programs allocate computer memory for storing complete *templates* (each row and column of the matrix labeled with headers) and associated data; the screen is just used as a floating window or viewfinder to display various sections of the form.

The matrix layout and maximum spreadsheet size for *Count-Sil*, reviewed here, differs somewhat from one system implementation to another:

First Appearances

The disk versions all have the same main menu selections: 1. Run Count-Sil; 2. Catalog Disk; 3. Delete File; 4. Exit.

The cassette version has three options: 1. Count-Sil; 2. Print Spreadsheet; 3. and Exit.

Once the program has completed its initializing process, the matrix is displayed. The areas within the row and column line divisions are called "cells." Below the matrix is the program's "work area" for command input. The word COMMAND with a flashing prompt indicator is presented when the program is ready for input.

Template Design

Count-Sil has 19 commands that aid in creating templates. Seven of these commands affect structure and cursor control; the remaining 12 commands are connected with handling data.

The TI version allows titles only at the head of a column or start of a row, but the C-64 version permits labeling inside the cells.

To display a list of the commands available on the disk version you can press H for Help. This feature lists each option with a summary of its function. (See Chart 1.) Four of these commands are not available on the TI cassette version of *Count-Sil*: the (H)elp, (I)nsert, (K)opy, and cursor (M)ovement commands. Within the framework of the template created, data input and manipulation will complete the spreadsheet.

Customizing Your Spreadsheet

Arithmetic manipulation of data is one of the most important assets of spreadsheet programs. *Count-Sil* allows you to define formulas or "expressions" that will perform computations using data from particular cell locations. The format is as follows: X=A+B+C, where X can be a column, row, or designated cell to display the result; A, B, and C can be a column, row, or designated cell used for computation; + represents any operand function of addition, subtraction, multiplication, division, or exponential. One hundred such expressions can be defined on the disk versions and the VIC-20 cassette version; 69 expressions are allowed for the TI cassette version.

Using the Z command you can define a sequence of "work registers." The values stored in these registers can be used as numeric constants in the equations you set up. The disk and the VIC-20 cassette versions have up to 100 such registers; the TI cassette version has up to 71 work registers available.

Chart 1

HELP FILE

A- Select calculation decimal ACCURACY
B- Set BACKGROUND/BORDER color
C- COMPUTE expressions, all or partial
D- Change number of displayed DECIMALS
E- Enter EXPRESSIONS
H- Display HELP file
I- INSERT/DELETE rows or columns
J- JUMP to new spreadsheet location
K- COPY rows or columns of values
L- LOAD data files from storage
M- Change automatic cursor M0VEMENT
P- PRINT spreadsheet data
R- Enter ROW titles
S- SAVE spreadsheet data
T- Enter column TITLES
V- Select VALUE MODE for value entry
W- WIPES out selected data
X- EXIT MODE to system, or main menu
Z- Define work REGISTERS

As the spreadsheet takes shape, certain expressions may require computation results to be used as inputs for other cell locations. Pressing C (for Compute) allows you to perform expression computations one at a time or globally (all at once in sequence).

Upon completion, the spreadsheet can be Saved to disk or cassette. The print option of the cassette version is on the main menu and is limited to printing the spreadsheet as contained in memory.

Documentation

The user's guide supplied with the package is simple, yet thorough enough to ensure proper program execution. Two tutorial spreadsheets are quite informative in structuring procedures, forming arithmetic equations, and manipulating the work registers. You can use the preformatted spreadsheets to practice command manipulation, and to print hard copies as visual aids for template formatting.

Summary

Count-Sil's performance can be attributed to the language used to write the program—BASIC. Its command response is slow and certain data and format procedures take too much time to complete. And because the program was written for relatively small memory capacity requirements, its features are limited. The commands that are offered, however, provide enough power and flexibility to produce quality spreadsheets. With some practice in planning formats and a creative approach to their application, *Count-Sil* could introduce you the powerful world of computerized spreadsheets. HCM

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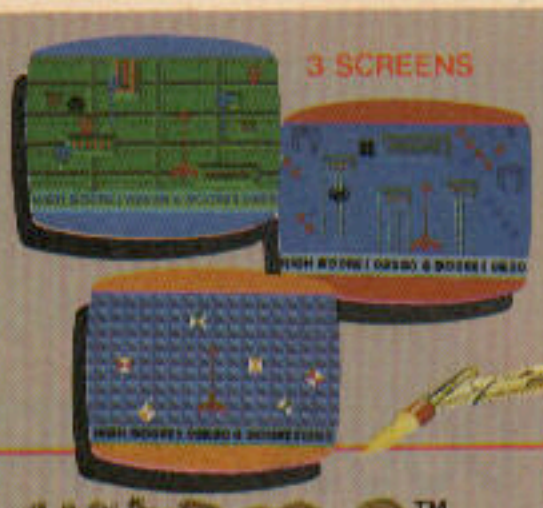

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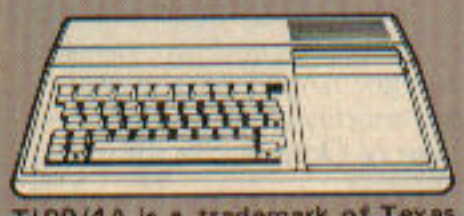

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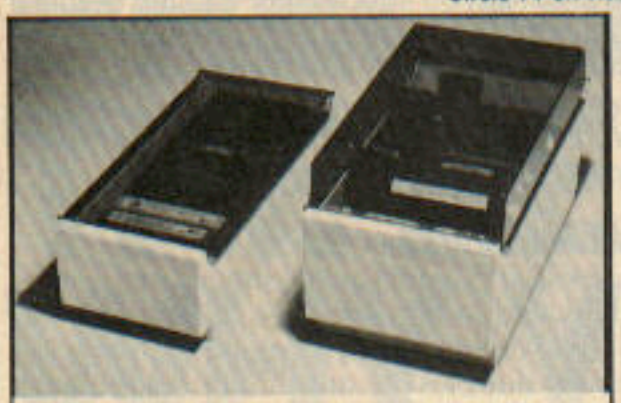

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lines. The component colors will then be horizontally adjacent, and will blend into one solid hue.

Don't let these details drive you away. With *Doublestuff*, you still come out ahead. Even with its hardware-related obstacles, this software's fine resolution and improved palette still bring out the colorful best in your Apple IIe.

Doublestuff takes you right to the heart of Applesoft BASIC. And, if you are a beginner, it will teach you a great deal about BASIC programming concepts. This software features an excellent on-disk demonstration with knock-out graphics. And its instructions are presented as a very lucid tutorial. Even experienced programmers can learn from the clear and useful documentation.

Programming in *Doublestuff*

To see how *Doublestuff* could be used as a programming tool, we modified the *Spider Graphics* program (in this issue of HCM) to use *Doublestuff* BASIC. The modifications required were surprisingly few—they mostly involved changing limit checks and expanding the Change Color option to include all 16 colors available with double hi-res. Here's a list of the changes:

```
160 REM APPLE II
270 PX = 2800 : PY = 100 : MODE
280 HCOLOR= 0 : HGR : HCOLOR= 1
410 IF PX < 560 AND PX > -1 AND PY < 192 AND PY > -1 THEN 430
```

Lines 280 and 670 demonstrate a unique feature of *Doublestuff*: Normally, in Applesoft BASIC, an HGR statement clears the screen to black—not so with *Doublestuff*. Instead, the screen is cleared to the color named in the last HCOLOR= statement.

With the minor changes listed above, *Spider Graphics* has access to all 16 hi-res colors available with *Doublestuff*. This modified *Spider Graphics* program is an ideal tool for visually exploring the doubled graphics capabilities of the Apple. So if you're tired of that small palette, don't stuff it—*Doublestuff* it! HCM

[Note: Doublestuff Software Development Inc. recently released an expanded version of this software called Doublestuff + *($69.95), which includes a complete drawing package. Also, they soon will release new versions that will run on the Apple IIc as well as the Apple IIe. We were unable to obtain copies of these versions in time for review.]*

```
610 HOME : REM  BTAB2K(1)
620 PRINT "PLEASE WAIT"
630 FOR I = 1 TO 70 : NEXT
640 HGR : REM  BTAB2K(1)
650 HCOLOR= 7
660 FOR I = 1 TO 70 : NEXT
670 HGR : REM  BTAB2K(1)
680 HCOLOR= 3
690 FOR I = 1 TO 70 : NEXT
700 HGR : REM  BTAB2K(1)
710 HCOLOR= 5
720 FOR I = 1 TO 70 : NEXT
730 HGR : REM  BTAB2K(1)
740 HCOLOR= 1
750 FOR I = 1 TO 70 : NEXT
760 HGR : REM  BTAB2K(1)
```

you across the board at a random pace (luck). Occasionally you are offered a choice of doors or paths which can either send you back or push you ahead (free will). And often you enter into on-screen contests that also determine your progress (combat). You may joust, shoot arrows, thread mazes, or (my favorite) fire catapults. More than 20 different contests await you. Joysticks are optional, but using the keyboard may be better to insure positive movement—either up-down or left-right.

Speaking through tapestried text panels, the Gamemaster addresses you as Sir or Lady followed by your previously typed-in name. Beyond these titles, however, the game seems to be non-sexist; Ladys are invited to joust right along with the Knights. After many such battles, you may scale the castle walls to assail the Black Knight. He may defeat you and send you back a few moves, but you can keep coming until he is either broken in combat or gives up in disgust. Do this, and you have freed the King and won his praise.

Chivalry delivers many pleasant surprises and perhaps a few disappointments. Humor plays a prominent role in the adventure and provides much of the fun. Play your darts too well at the Inn and you may upset the patrons: "We did not invite thee in to humiliate us," reads the message," Get thee hence!" And chasing through the Willow Path maze while avoiding the Black Knight's agent can be a crack-up—as well as a challenge to your dexterity with keyboard or paddle. Don't look for much challenge, however, from the Dragon; he apparently does not come out of his lair. I was disappointed to see only his eyes shining in the dark entrance, followed by a message informing me I had been burnt to a crisp. Perhaps a few flames would have been nice?

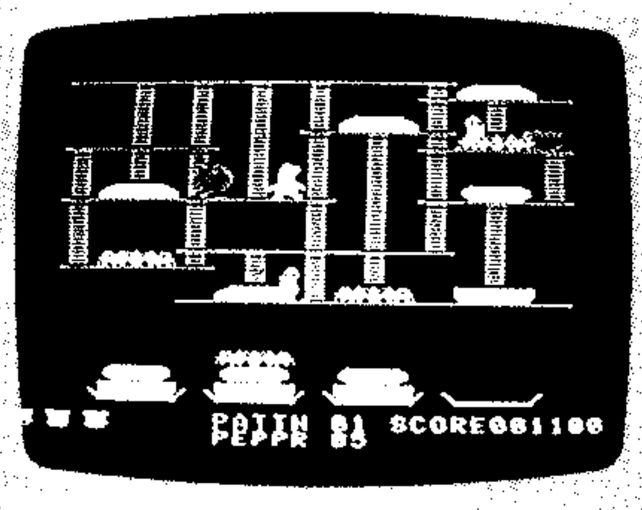
All quibbles aside, *Chivalry* has a lot of class. It is a bright and cheerful evocation of what was sometimes a dark age. Just the artwork in the package itself is engaging. So are the mood-setting madrigals that accompany each stage of the adventure; these simple, spare tunes work well with the Apple's limited sound.

Don't be surprised if you get so caught up in the game on the screen that you forget to even look at the gameboard! You will, however, still need it as a map and a record of your progress. Far from being a distraction, the board provides a common playing field and needed information while saving space on the disk for active game features. It is also a nice piece of artwork in itself, reflecting the above-average screen visuals for the graphically difficult Apple.

Although more expensive than a typical family boardgame, *Chivalry* provides so much more: humor, combat, a computer gamemaster, and a lively show for the money. The Connecticut Yankees at Weekly Reader have done well—adding just enough of the old dark medieval spirit as spice, and transforming Chivalry from decorous battle into a higher order of fun.

HCM

HCM Review



Name:	Burgertime
Program Type:	Arcade game
Machine:	TI-99/4A, IBM PC, Apple IIe
Distributor:	For 99/4A: Texas Instruments P.O.Box 10508 Lubbock, TX 79402 For IBM PC and Apple IIe: Intellivision 5150 Rosecrans Hawthorne, CA 90250
Price:	$29.95 TI-99/4A Cartridge $24.95 IBM PC Disk $24.95 Apple IIe Disk
	Poor Fair Good Excellent
Performance:	
Engrossment:	
Documentation:	

Burgertime

A review by Steve Nelson

HCM Staff

I am a junkfood junkie and proud of it, but I had never realized just how dangerous it was for fast-food restaurant employees to suport my habit until I played *Burgertime*: The game's hero must make my munchies while trying to avoid being munched in the process.

In *Burgertime* you control the hero, Chef Peter Pepper, a tireless maker of hamburgers beset by villainous rogues in his own kitchen. These villains are known by very innocuous names, Mr. Hot Dog, Mr. Pickle, and Mr. Egg—who at first glance, would seem to belong in any kitchen. But watch out—their single-minded intent is to prevent you from receiving your order of hamburgers. In order to do this, they attempt to dispatch Chef Peter.

In the two implementations of *Burgertime* we examined, there were some differences. (We were unable to get the Apple IIe version for review). The TI-99/4A version has six different kitchens (screens); each screen becomes progressively harder. *Burgertime* on the IBM PC is quite a bit more sophisticated. There are nine different levels of play, four starting speeds, and twelve kitchens. You also have a two-player option—something not available on the TI-99/4A.

The game begins in the first kitchen with four unfinished hamburgers. You must negotiate several tiers connected by ladders to reach the various portions of the giant burgers; the meat is on one level, the lettuce on another, and the top buns on still another. Racing around the levels, climbing ladders to get to the layers of the burgers, and avoiding the villains in the process is easier said than done.

A Dash of Spice

The game's creators, however, don't leave you totally defenseless. If you get in a tight spot, you can have Chef Peter throw pepper at the bad guys—stunning them momentarily to allow you to escape. And if you're fast and clever, you can lure Mr. Hot Dog and his cronies underneath a layer of one of the hamburgers and make it fall to the next level, effectively squashing them.

Once you have prepared all the burgers, you advance to the next level and begin again. Each of the different kitchens are progressively harder to negotiate. There are less ladders, and Mr. Hot Dog and his cronies move a little faster in their efforts to stop Chef Peter from completing his order.

As you become more skilled at the game, you can try building up points by squashing and dropping as many of the bad guys as possible, and by collecting bonus points for picking up ice cream cones and cups of coffee which appear periodically throughout the game.

Burgertime's graphics are excellent on both versions I tested. The IBM PC, however, was noticably sharper in detail. In both versions, movement of characters is very smooth—almost as good as a game in a coin arcade. You can play with a joystick or the keyboard. I found that I could control Chef Peter more effectively with the keyboard, but you may prefer using a joystick. The game responds very well to your input, moves along quite fast, and the instructions that come with both versions are excellent.

While the IBM PC's graphics are superior to the 99/4A's, it loses out in the sound effects department. Both versions of the game have a catchy tune that apparently is the *Burgertime* theme but the 99/4A's version lets you hear it repeatedly—suggesting a carnival atmosphere. Also, because of the special sound chip in the 99/4A, the sound effects of the TI version are far richer—adding much more to the excitement of play.

Burgertime is fast-paced, challenging, and fun. Other than adding more sound effects to the IBM PC version, my only suggestion would be to change the program so that Chef Peter has to be careful not to fall off the edges of the tiers (as if he doesn't have enough trouble filling his orders already). If you've ever played Donkey Kong or Mario Brothers, you will enjoy playing *Burgertime* as well.

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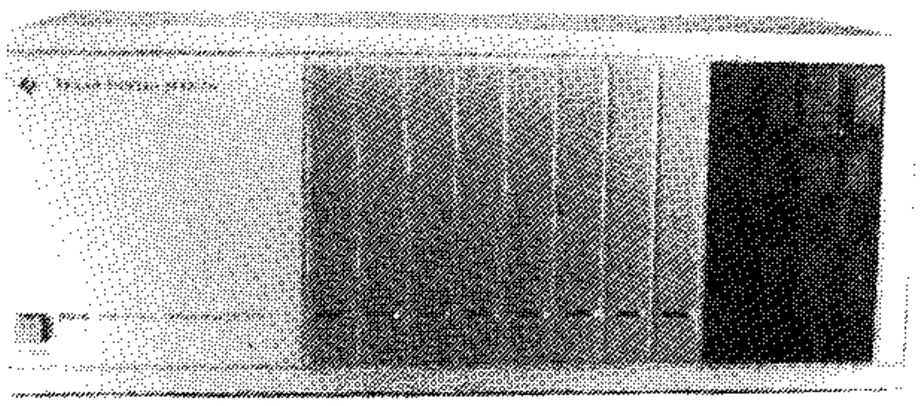

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ROBOCHASE

variables. To assure that the hi-res screen is protected, we PEEK the start of BASIC location in line 170 (page zero locations 103 and 104). If they are not above the hi-res screen, we POKE the proper values and RUN *Robochase* again. This causes the computer to reload the program at the new start of BASIC location and thus protect the hi-res screen.

ROBOCHASE (Apple II Family)
Explanation of the Program

Line Nos.	
100-160	Program header.
170	Protect hi-res screen.
180-190	Branch to subroutines, POKE shape table, and sound routines.
200-220	Clear screen, display title screen, and find out if joysticks or keyboard is used.
230-260	Initialize for new game.
270-290	Branch to routines to draw first screen.
300-480	Get player's input for move.
490-600	Move person and branch if move makes it necessary.
610-830	Move robots and branch if person is caught.
840-940	Move Spunky if he is in the game.
950-960	Draw object subroutine.
970-990	Read keyboard subroutine.
1000-1010	Make noise subroutine.
1020-1040	Title screen subroutine.
1050-1110	End game and play again option.
1120-1130	Get random number subroutine.
1140-1150	Delete person subroutine.
1160-1520	Subroutine to draw first screen.
1530-1590	Poke speaker machine language subroutine.
1600-1690	Poke shape table subroutine.
1700-1720	Person electrified subroutine.
1730-1780	Teleport person.
1790-1830	Person captured by robot.
1840-1930	Initialize next level subroutine.
1940	Draw barrier subroutine.
1950-1960	Update score, etc. subroutine.

For the Key-in listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

The rules of play for the PCjr version of *Robochase* are the same as for the other versions of this game. The biggest difference between the PCjr version of *Robochase* and the others is in the way its graphics and sound effects are created.

All of the shapes on the screen are created with the DRAW command. Only the perimeter barrier is created with the LINE command. The shapes for all of these figures are defined in subcommand strings in lines 370 to 410. Each of these strings contain subcommands that instruct the computer to draw the specific shape. These subcommands are extremely easy to learn and use. Simple subcommands like U for UP and L for LEFT make drawing shapes as easy as connecting the dots with a pencil. Other subcommands let you draw diagonally, move without drawing, or draw a line and then return to the spot the line started from. By adding a number after many of these subcommands, you can repeat the subcommand the specified number of times. For example, D8 would draw a line Down 8 pixels. (The pixel is the smallest dot the computer can work with on the screen.)

You can rotate the angle of a shape in two different ways. The A subcommand lets you set an angle of 0, 90, 180, or 270 degrees. This subcommand simplifies the problem of creating four different shapes to move in four directions. For examle: DRAW "A2" will cause all subsequent DRAW statements to draw their shapes at a 180 degree rotation from normal. The TA subcommand allows you more accuracy in selecting the angle of the shape. TA can be set to any value between -360 and +360. This gives the object a full 360-degree accuracy. You should keep in mind, however, that on small objects you may not be able to see the difference in just a few degrees of rotation because of the pixel resolution. In the statement: DRAW "TA 180" the shapes draw

after this statement will be drawn with a rotation of 180 degrees from normal.

The S subcommand lets you set the scale of the shape. The default size of the shape is 4. If you reduce the scale size to 1, you'll make the shape 1/4 of its original size. The maximum scale factor is 255, which will make the shape approximately 64 times larger than its original size. A scale of 8 will make the shape twice its normal size.

You can give your shapes color by placing the C subcommand, followed by the number of the color you've selected, in a string. You can paint the object you draw with color using the P subcommand, which saves you considerable time when you're drawing large objects. Use this subcommand cautiously, however: You must first establish a border to contain the filling, or it may spill out and fill the whole screen. Think of your shape as a bucket that you want to fill with water. If there are any holes in the bucket, the water will spill out.

The PLAY and SOUND commands create all of the sound effects in the program. The SOUND command lets you select a frequency, volume, and duration for a tone to be played. You can also optionally select one of the three voices in the computer to play the note.

The PLAY command is a little more complicated but offers up a whole new world in which to create computer music. Like the DRAW command, it lets you set up a subcommand string which is then executed. With the subcommand string for the PLAY command, you can select a note by its name (CDEFGAB), select the octave in which the note is to be played, adjust the tempo and length of the note, and set the volume.

The music (or simply a series of notes from the PLAY command) can play in either the background or foreground mode. In foreground mode, the program will not continue until the music has finished playing. In background mode, the program will continue executing while the music plays. You can select an *interrupt* to automatically check the music buffer and branch to a routine to fill the buffer when it gets low. If you do this, the continuous play of music in the background becomes transparent to the application program that is running.

ROBOCHASE (IBM PCjr) Explanation of the Program

Line Nos.	
100-180	Program header.
190-260	Initialize the program and define functions.
270-300	Display the title screen.
310-320	Input option to use the joysticks or the keyboard.
330-610	Inritialize a new game, display the playing screen, and set up the key branches.
620	Display the score and number of remaining transporter charges. Branch to appropriate input routine.
630-650	Input routine for the keyboard option.
660-710	Input routine for the joysticks option.
720-740	Move the player and branch to collision routine if a collision is detected.
750-830	Move Spunky and check for captures.
840-930	Move the ten robots.
940-1000	Subroutines to handle robot captures and collisions.
1010-1020	Player is captured by a robot.
1030-1050	Option to play again.
1060-1150	Subroutines to handle collisions between the player and other obstacles.
1160	Move player up to the next level.
1170-1190	Transporter subroutine.
1200-1230	Subroutines for the ON KEY GOSUB command. These subroutines are selected in lines 550 to 580. During the program, branches to these routines are interrupt-driven so that pressing a key at any time will always be detected.

For the Key-in listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

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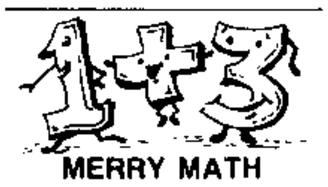

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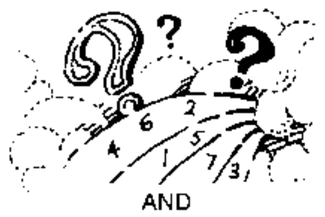

AND
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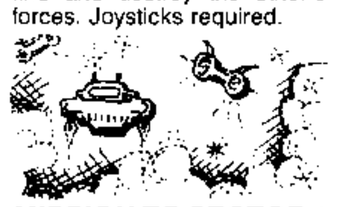

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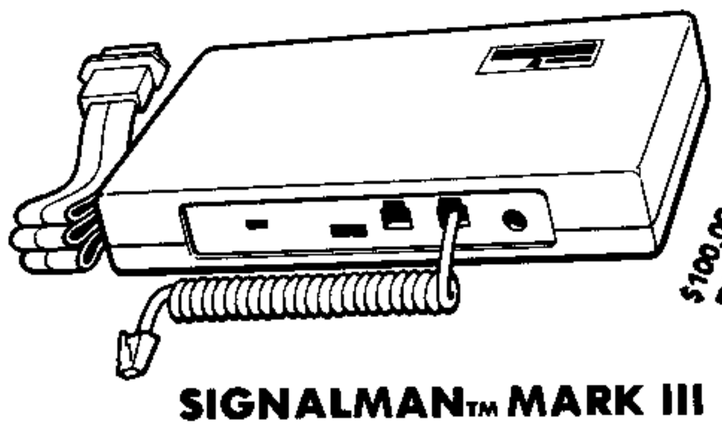

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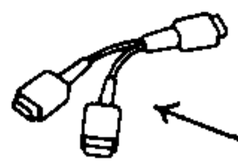

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Cyber-Cipher

by Oris B. Davis
and the HCM Staff

You are sitting quietly in your office at CIA headquarters playing with your newest toy—a Texas Instruments 99/8. Suddenly, your supervisor rushes in and hands you an envelope marked TOP SECRET—EYES ONLY. Locking your door and closing the blinds, you open the envelope.

The note inside informs you that the department's super computer has locked up, and it will become permanently jammed if too many attempts are made to break its access code—which no one can remember. You know the code is made up of four different color choices. Your mission—should you decide to take it—is to decipher the computer's color-coded password, and save the government from wasting 32 million dollars on its latest toy.

The Program

The program begins by asking you to select the level of difficulty. The difficulty levels determine how much help you will get from the computer, and the number of guesses you will be allowed to discover the password. The difficulty levels are explained below.

After entering your difficulty preference, the playing screen is displayed. On the left side of the screen are all of the possible color choices, and the appropriate key to press for each one: Blue = B, Lime = L, Yellow = Y, Red = R, Magenta = M, Green = G. Below this is the low score and a message line. The final code will be displayed on the top right side of the screen.

It is under this display where you will attempt to figure out the password by making guesses and interpreting clues. Make your guesses by pressing four keys to indicate your color selections. As you press each key in the first three levels of difficulty, you will see its corresponding color displayed on the right side of the screen. On levels 1, 3, and 4, you will also get an audible response, the tone of which changes depending on the color.

After you have made your selections, the computer checks your guess. For every color that is correct, but not in the right place, you get a white dot. For every color that is in the right place, you will get a black dot. For example, if the

password is:	and your guess is:
Blue	Blue
Red	Lime
Lime	Red
Blue	Green

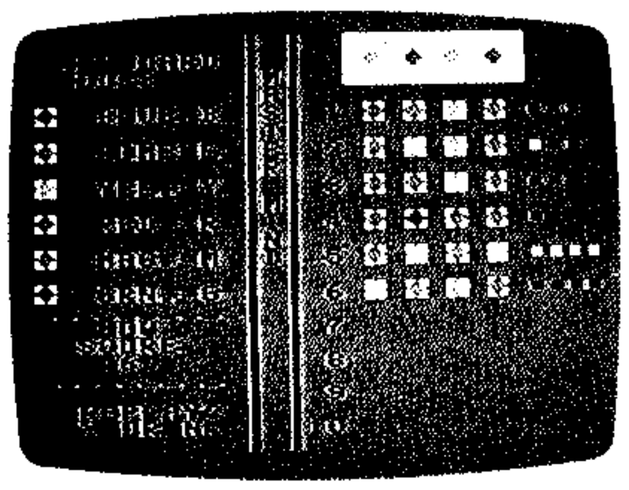
you would receive two white dots, and a black dot. The two white dots represent the center two colors, Lime and Red. The colors are in the password, but you don't have them in the right place yet. Your guess for blue was correct, so you would get one black dot. Green would not garner any dots because it isn't even in the password. Notice that colors can be repeated more than once—it's possible for the password to be all one color.

Levels of Difficulty

Level 1) This is the easiest level. You are given all of the clues at the computer's disposal, which includes displaying all of your guesses on the screen, giving you an audible feedback of the color, and providing you with the black and white dot clues. You are allowed up to ten guesses at the password.

Level 2) At this level you lose the audible feedback from each color and you only have nine guesses to solve the password.

Level 3) It's at this level that you must really put your brain to the test. After you make your selection and your inputs are displayed with the audible tone, your input is erased from the screen, forcing you to remember what your previous choices were. At this level, you only have eight guesses.



Level 4) Don't attempt this level right away. Learn the lower levels first, and become accustomed to the audible tones. On this level, the tones are your only feedback, so if you want to succeed, you must remember all of your selections. Here, you have only seven guesses before the CIA's Super Computer locks up forever.

CYBER-CIPHER (TI-99/4A) Explanation of the Program

Line Nos.	
100-170	Program header.
180-390	Initialize program graphics and variables.
400-540	Display the title screen and input the level of difficulty.
550-1130	Display the playing screen.
1140-1570	Input player's responses.
1580-1890	Check to see if the color is right.
1900-2250	Check to see if both color and location are correct.
2260-2400	Player loses a game routine.
2410-2600	Player wins a game routine.
2610-2640	Display the correct answer.
2650-2760	Option to play again.
2770-2780	Halt the program.
2790-2840	Time delay routines.
2850-2880	Routine to display strings vertically on the screen.
2890-2900	Screen data for display.

For the Key-In listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

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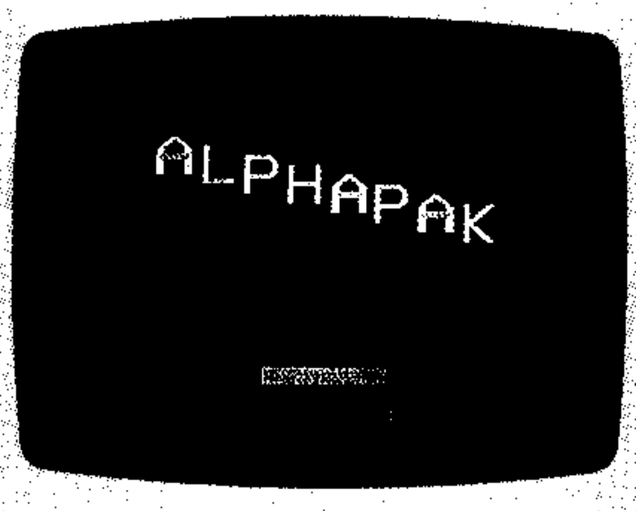
HCM Review



Name: Alpha-Pak
Program Type: Educational Game
Machine: TI-99/4A
Distributor: Smith-Ware
6841 SE Ramona
Portland, OR 97206
Price: $9.95, cassette, diskette
System Requirements:
Disk Drive or Cassette Player, Extended Basic

	Poor	Fair	Good	Excellent
Performance:			■■■■■■■■	
Engrossment:				■■■■■■■■■■
Documentation:			■■■■■	

ALPHA-PAK

A review by Wayne Koberstein

HCM Staff

Some of the simplest ideas are also the best. And what could be simpler than teaching a child the alphabet? "Easier said than done," you say, but *Alpha-Pak*, a new game by Smith-Ware, brings some variety to the letter-learning process without making it complicated.

Once the program is loaded, colorful letters fly out of a magician's hat and form the alphabet in a line above it, as a pleasant contrapuntal tune announces the title screen. *Alpha-Pak* contains five short "games," each with a different emphasis. Their titles describe their contents: Letter-Flash, Letter-Choice, ABC Countdown, Snail-Trail, and Alphabet Hop.

The first two look the same on screen. One letter at a time is displayed inside of a colored, lattice-like frame. Each time the letter changes, so does the frame color and—with an attached TI Speech Synthesizer—a voice speaks the letter. Letter-Flash automatically moves through the alphabet as you press the space bar for each succeeding letter. Letter-Choice displays individual letters as their corresponding keys are pressed.

Game 3, ABC Countdown, is an example of *Alpha-Pak*'s satisfying simplicity: By inserting the correct letters into gaps in the alphabet, the child keeps a fuse burning across the bottom of the screen. When the sequence is complete, a rocket climbs to a starlit sky and explodes in colorful fireworks.

In Snail Trail, punching the correct key will hoist a letter out of the snail's path for a little bird to carry away.

Nothing special happens at the end of Alphabet Hop—but it is still engaging. The object of this game is to choose the proper letter in the alphabetical sequence out of a group of four. Little ones should at least enjoy making the frog hop to the lily pad on which sits the correct letter.

A child can easily move between games by pressing 1 and returning to the menu. Once there, another number will call up another game. Of course, someone just learning the alphabet will not be able to read the menu. Perhaps a cartoon symbol representing each menu selection would be helpful—although after playing all the games a few times with an older person, a youngster will probably pick up which number calls which game. If not, there is always the element of surprise . . .

Wise to the ways of impatient-but-energetic youngsters, *Alpha-Pak* keeps the ball rolling as fast as they want it to go. It has the kind of computer responses that pre-schoolers enjoy—press the bar or a key and something interesting happens: a fuse burns on to a waiting rocket; a voice speaks a new letter or says "oh, oh" to mark a mistake; a frog jumps. This is all simple stuff—but it works.

Alpha-Pak's five mini-games do not represent a wide range of difficulty. They do each emphasize different aspects of learning the alphabet—from recognizing specific letters (and their place on the keyboard), to memorizing the proper alphabetic sequence (viewed both as a whole and in isolated groupings). Generally, the first two games introduce the alphabet and prepare the learner for the next three games, which test for memorization. If a mistake is made in this last group of games, the program allows repeated attempts until the right answer is given. If progress continues without error, the voice offers encouragement by saying: "You are doing very well."

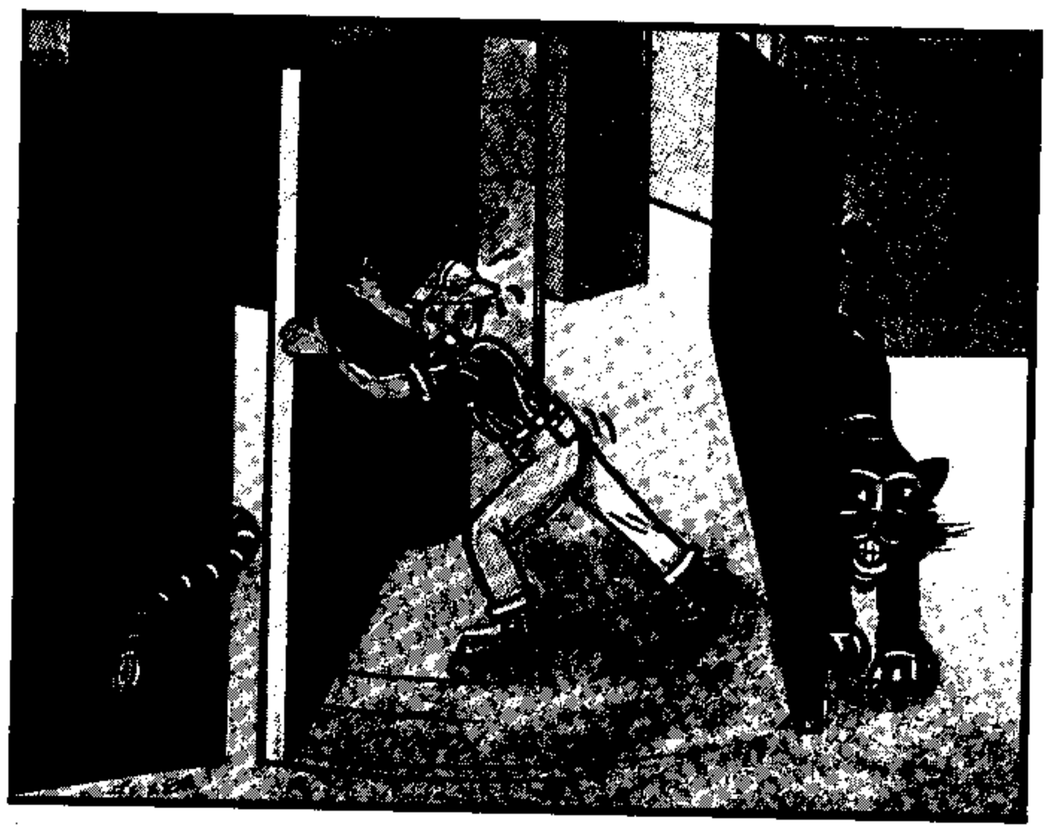
With five different fun-spirited games to choose from, it's doubtful that a youngster will get bored with *Alpha-Pak* before learning something.

Having enjoyed *Alpha-Pak* myself (even though I do know my alphabet), I can't presume to suggest much in the way of improvements. Usually, in reviewing a game, I run into something that begs changing; but in this case, I am happy with *Alpha-Pak* as it is. Its graphics could be fancier—but that would only distract from the game's purpose, which is not to present an arcade tour-de-force, but to involve children in learning their ABC's.

I strongly recommend using the TI Speech Synthesizer with this program. Humorous and even somewhat human-sounding, the voice greatly enhances enjoyment and involvement in the game.

Alpha-Pak offers no elaborate packaging or extra visual aids. (Instructions consist of two computer print-out pages.) Nor is there anything ostentatious about the price. However, the program ranks with, and even surpasses, more expensive software designed for the same purpose.

HCM



Wild Kingdom

by Monte Ulm
and the HCM Staff

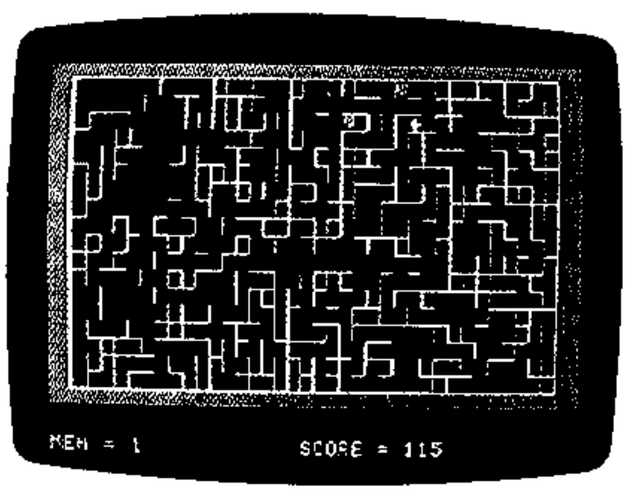
Only the stout of heart need read any farther, for this action game takes you into the most dangerous part of Africa.

You are in charge of an expedition to capture three vicious tigers which have been terrorizing the local villagers. Although you have devised an ingenious system of gates and pens to trap the animals, the only building materials available are the few trees you can find, and the tall grass. If angered, the tigers could easily break through these flimsy barriers.

Speed and cunning are your most valuable resources if you plan to pull off this feat without becoming the main course in the lion's den.

Three tigers are roaming around on the screen—one male, and two females. Your chief goal is to capture the male tiger first, because with this beast in captivity you can control the two females. To do this, you need to keep the male separated from the females, for if the females sense that the male is nearby, they will tear down the walls to get to him. Needless to say, this could be quite disastrous if you happen to be standing nearby when they escape.

The hungry tigers will constantly stalk you, so you must always be on your guard. The male tiger is especially dangerous, for if he senses that you are close to him, he may tear down the walls to get to you. You have to operate very quickly to trap him.



Your one defense is the power to open and close the walls. You have devised an ingenious method which lets you open and close a wall that is *one wall away from you*. You cannot close a wall that is *directly in front of you*. This trick allows you to use yourself as bait, standing on just the other side of a wall, enticing a tiger into a pen with three sides. When the tiger finally enters, you can close the other side—trapping the tiger—and run away.

If you press a key in a direction other than the one you are facing, you simply change directions and do not move—the next time you press a key in that direction you will move.

REQUIRED EQUIPMENT: Extended BASIC
OPTIONAL EQUIPMENT: joysticks

Wild Kingdom was originally written on the TI-99/4A. The game and its rules are the same on all the systems, but the keys used on the keyboard differ slightly.

The TI version uses character graphics to create the maze. Only four characters are needed to draw it—one is a blank, the second has a wall on the left side, the third has a wall on the top of the character, and the fourth has a wall on both the left side and the top. By randomly placing these characters on the screen, you create the maze.

Don't worry if it seems that entire portions of the maze are closed off to you. You can open and close various walls of the maze by placing the hunter one wall away from the wall you want to change, pointing him in the wall's direction, and pressing Y, or the fire button on the joystick.

To keep from upsetting the walls as the characters move about, we used sprites for the hunter and the three cats. This means that they can be placed anywhere on the screen without affecting the normal character graphics.

KEY FUNCTION
E Move hunter up.
S Move hunter left.
D Move hunter right.
X Move hunter down.
Y Open and close gates.

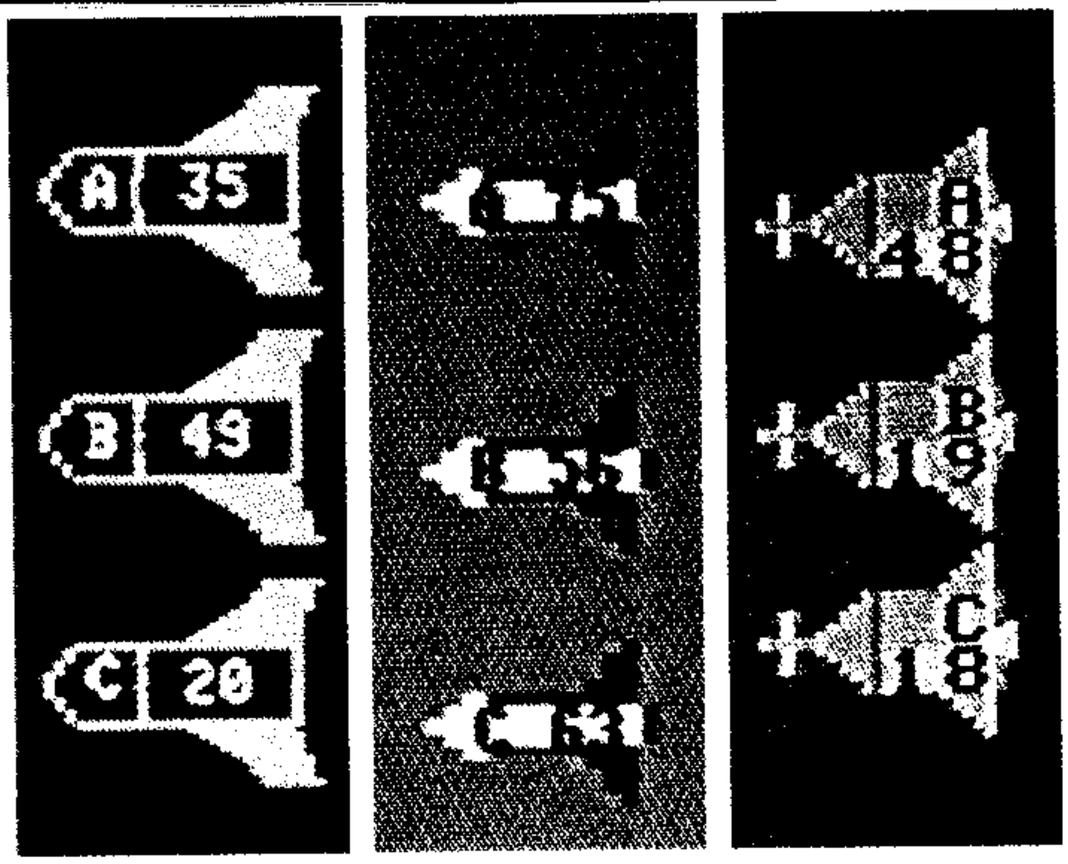
WILD KINGDOM (TI-99/4A)
Explanation of the Program

Line Nos.	
100-170	Program header.
180-190	Display the title screen and input an option to use the joysticks.
200-210	Branch to the setup routine for a new game.
220-380	Set up routine for a new game, and repaint the playing screen.
220	Initialize the game variables, and the array that keeps track of the screen contents.
230-250	Define character graphics and color.
260-270	Clear the screen and draw the border.
280-300	Draw the maze on the screen randomly.
310	Define the four characters that are used for the hunter. Create four arrows to indicate the hunter's direction.
320-380	Place the three tigers and the hunter on the screen.
390	Control loop for the entire program.
400-530	Scan the keyboard and move the hunter.
540-610	Control loop to move the two yellow (female) tigers.
620-730	Routine to open and close the gates to the walls when either [ENTER] or the fire button is pressed.
740-790	Control loop to move the black (male) tiger.
800-1070	Logic to determine the direction of movement for the tigers.
1080	Determine the proximity between each of the yellow cats and the black cat.
1090-1160	Routine to make the walls disappear when the cats break them down.
1170-1190	End of game routine. Restart new game.
1200	Physical end of the program.

For the Key-In listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

REQUIRED EQUIPMENT: C-64
OPTIONAL EQUIPMENT: joysticks

Wild Kingdom on the Commodore 64 is quite similar to the TI version. Both the C-64 and the TI use character graphics to create the maze, and both use sprites for the hunter and the cats. This was not the case for the Apple and the IBM machines.



MISSILE MATH

by J.C. Adelmann
and the HCM Staff

Convincing children that multiplication can be fun is about as easy as convincing vegetarians that meat is good for them—they just won't believe you. If this is the case in your household, then give *Missile Math* a try. When math exercises are transformed into computer games, they acquire a whole new appeal to the younger set, making learning a little bit easier. This exercise in multiplication skills is no exception. *Missile Math* is an educational game for the young student who has a basic understanding of multiplication. It provides a simple, yet effective method of testing and developing skills through multiplication of the numbers 1 through 9.

The program begins when you select the number you want to work with. This number will be the primary number in the multiplication problems. For example: If you select 6, then all problems will be composed of 6 times a number from 0 to 9.

You now have the option to view a multiplication table based on the number you selected. If you choose this option, then all of the problems that will be used in the current session will be displayed, with their answers. If you select 6, for instance, then a table starting with 6x0=0 and ending with 6x9=54 will be displayed.

After displaying the multiplication table, the program gets into full swing. Initially, you see three missiles on the right side of the screen. Within each missile is either the letter A, B, or C, and to the right of each letter is a number. One of these three numbers is the correct answer to a multiplication problem showing at the bottom of the screen. Enter your answer choice by pressing either the A, B, or C key.

If you choose a wrong answer, a low tone blurts forth, with the message that the answer is incorrect. The correct answer then displays, and the program starts a new problem.

When you select the right answer, you hear a short musical tune, and the rockets advance toward the left side of the screen. On the PC/PCjr and the Commodore 64 versions of the program, the student is given a little extra incentive to improve his or her score: The program begins by playing only a few notes of a tune. As the score improves, more of the tune is played with every correct response, until finally, the student gets to hear the entire tune.

The score is based on how many problems a student answers correctly from a series of 10. After the user has worked 10 problems, a final screen displays the student's score and percentage of correct answers.

The TI version of *Missile Math* will run in either BASIC or Extended BASIC. Character graphics are used to draw the missiles, and a well-known subroutine is used to display text without scrolling the screen. In most cases, you can take the text to be displayed, separate each character from the string, and convert it to its ASCII symbol. It is then simple to place each character on the screen—one character at a time—with the HCHAR, or VCHAR commands.

It takes time, though, to separate each character from its string of characters and convert them to an ASCII value. We decided speed was of greater concern in this program, so we opted to place the ASCII values in a numeric array, thus eliminating two steps in the process. Now, the program simply indexes into the array to extract a value. This method is much faster, but you pay a price for it—an enormous amount of memory is required to store each character that needs to be displayed.

Remember: a string uses one byte of computer memory to store one character; a numeric array of ASCII values requires nine bytes of memory to store each character. So, if you plan to display very much text, or if your program is pushing the limits of the system's memory capacity, then you may have to settle for the slower method.

Compare the code needed to execute each of these two methods:

METHOD 1 - Numeric array as used in this program

```
200 DIM MS1(22),MS2(12)
220 FOR I=1 TO 22
230 READ MS1(I)
240 NEXT I
1950 FOR I=6 TO 27
1960 CALL HCHAR(22,I,MS1(I-5))
1970 NEXT I
2000 DATA 84,72,69,106,67,79,82,82,69,67,84,106,65,78,83,
     87,69,82,106,73,83,106
```

METHOD 2 - String reconstruction to ASCII format (not used in this program)

```
5000 A$="THE CORRECT ANSWER IS "
6000 FOR I=1 TO LEN(A$)
6010 ASCII=ASC(SEG$(A$,I,1))
6020 CALL HCHAR(22,I+5,ASCII)
6030 NEXT I
```

Method 1 is much faster, but it requires a lot more memory to accomplish the same task.

MISSILE MATH (TI-99/4A)
Explanation of the Program

Line Nos.	
100-180	Program header.
190-270	Reserve space for arrays.
280-310	Input option to display the instructions.
320-450	Display the times table option.
460-480	Get the player's input.
490-960	Subroutine to create a random problem and set up the parameters.
970-1050	Calculate the number right, number wrong, and the percentage right.
1060-1120	Create colored strip for screen graphics.
1130-1440	Determine whether the response was correct or not. Change the numbers in the equation.
1450-1770	Subroutine to create the graphics reward for a correct answer. Move the missiles, and change the numbers displayed in them.
1780-1790	Data statements containing messages to be displayed.
1800-1880	Print instructions on the screen.
1890-1990	Print the correct choice and the answer.
2000-2010	Data statements.

For the Key-in listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

The Commodore 64 version of *Missile Math* is the only version that takes advantage of sprites. A sprite is a graphics shape that can be placed on the screen with high resolution positioning—it is not restricted to the normal boundaries of character graphics. The computer can place sprites at any pixel position on the screen.

Sprites also have the advantage of large size and flexibility. A sprite's normal size is 23 pixels wide by 20 pixels high. Compare this to a normal character which is 8 pixels wide by 8 pixels high. In addition to their normal large size, sprites can be expanded. Each sprite can be enlarged to either twice its normal width, twice its normal height, or both at the same time. You can then maneuver this large graphics shape around the screen with the highest possible resolution—on the pixel level.

We used three identical sprites in this program to create the three missiles. The subroutine in line 1050 reads the data in lines 1130 through 1150, and places it into memory starting at location 12288. This is enough data for one sprite shape, which is used for all three missile sprites. Line 890 tells the computer where to look in memory for each of the sprites' shapes. (This is done within the FOR__NEXT loop.) By placing the value 192 into locations 2040, 2041, and 2042, you are instructing the computer to get the shape information from the same place, starting at location 12288. The POKEs to locations 53287, 53288, and 53289 set up the sprites' colors.

The sprites are positioned in line 900 by POKEing their vertical coordinates into locations 53249, 53251, and 53253. Their horizontal coordinates are the same, because all three missiles are evenly lined up on the screen at all times. The horizontal coordinates are set in lines 570 to 590. Here, the missiles move toward the left side of the screen every time a problem is correctly answered. The variable XX contains the value of the new horizontal coordinate, while X1, X2, and X3 contain the addresses for the three sprites' horizontal registers—53248, 53250, and 53252.

MISSILE MATH (C-64)
Explanation of the Program

Line Nos.	
100-170	Program header.
180	Branch to initialize program variables, display title screen, and instructions.
190-270	Subroutines to produce sound effects and music.
280-300	Set up variables for display in missiles.
310-320	Clear bottom part of screen.
330-430	Main control loop. Calculate the values for the problem, and display the values inside the missiles. Display the problem at the bottom of the screen.
440	Accept user's response to the problem.
450-470	Display correct answer.
480	Check for correct response.
490	User entered incorrect answer.
500-590	User entered correct answer. Give graphics and music reward.
600-610	Wait for a key to be pressed before continuing to the next problem.
620-660	Initialize main control loop.
670-780	Program begins and restarts with this routine. Enter the number to work with and display the times table.
790-870	End of the 10 problems. Display the score and give the option to do it again.
880-920	Initialize program variables and constants.
930-1040	Display title screen.
1050	Place graphics information in memory for the missile, which is a sprite.
1060-1080	Load music routines into memory.
1090-1120	Input option to display the instructions.
1130-1180	Data containing the information for the sprite graphics and the music routines.
1190-1270	Display instructions.

For the Key-In listing refer to the Contents of HCM PROGRAM LISTINGS on page 67.

Text continues on next page

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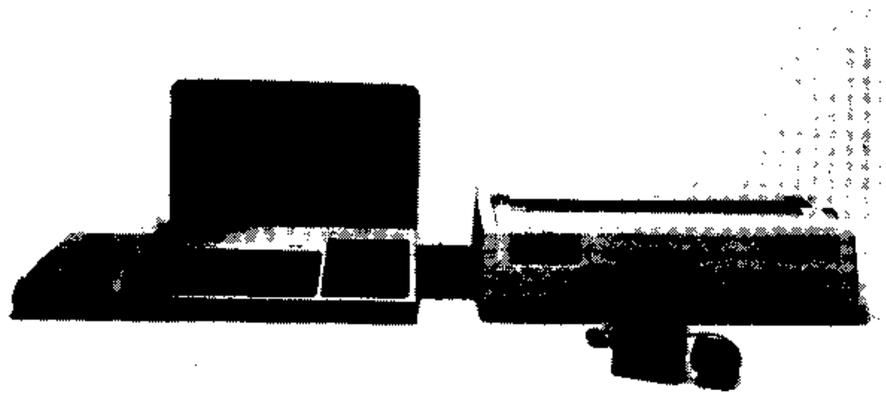

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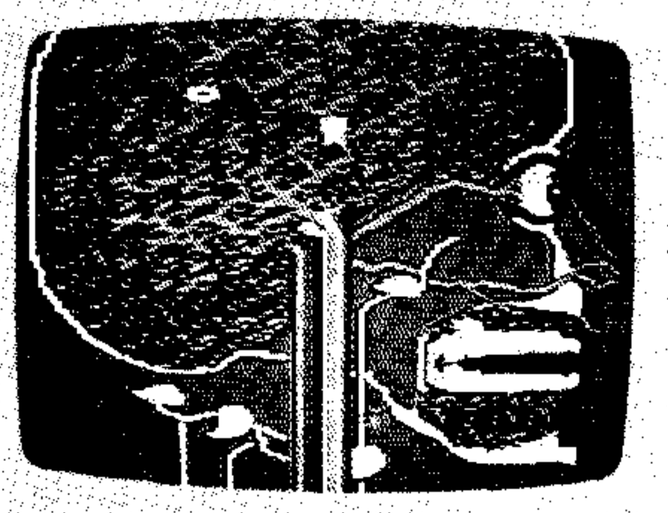
HCM Review



Name:	**Microsurgeon**
Program type:	**Surgical Simulation**
Machine:	**TI-99/4A, IBM PCjr**
Distribution:	**Imagic Co. 981 University Los Gatos, CA. 95030**
Price:	**$39.95 IBM cartridge $29.95 TI cartridge**

	Poor	Fair	Good	Excellent
Performance:				
Engrossment:				
Documentation:				

MICROSURGEON

A review
by Steve Nelson
HCM Staff

A few years ago I saw a movie about a team of doctors and scientists who were reduced in size along with a submarine-like ship and injected into a patient's bloodstream in order to perform microsurgery. At the time, the movie was considered pure science fiction, but technology has changed the face of medicine in many ways. Although scientists still are unable to reduce people down to the size of a speck of protoplasm, the concept of microsurgery is no longer just a figment of some screenwriter's fertile imagination.

Specialists in the field of medicine are performing microsurgery every day; but why should they get all the gorey—I mean, the glory—just because they went to college for ten years? Thanks to Imagic's new game, *Microsurgeon*, you too can perform delicate microsurgery and pilot a robot probe through the body of your patient.

The object of the game is to cure your patient of one of eight different conditions—each at a separate location in the body. You begin the game by selecting one of three levels of play (student, intern, surgeon). You are offered a choice of victims . . . er . . . patients to operate on, and are given some power units, the number of which increases or decreases during the game depending on your operating skills. Power units allow you to move your probe and dispense medication inside the body of your patient. You maneuver the probe in the body through the bloodstream and lymph system to discover what type of condition must be treated in each of the eight locations. Once you determine the condition, you cure it by shooting the disease with either ultrasonic rays, antibiotics, or aspirin. Each medication treats different conditions so you must be sure you have the correct diagnosis and cure.

Be forewarned, however, that while you are curing the brain, the lungs may go terminal. You must *monitor* all areas of the body to be sure you don't spend too much time in one place and neglect another. In the 99/4A version of the game, the patient status screen is visible at all times, but on the PCjr, you must periodically access the status screen by pressing [ENTER] or by pressing the two joystick buttons simultaneously.

Moving through the body is accomplished by using the keyboard or joystick. I preferred the keyboard because it gave me more control of the probe than the joystick did. Staying inside the blood vessels or lymph system allows you to move more quickly through the body searching for disease. If you stray out into the organs, your speed is slowed and your probe is subject to attack by white cells which take away power units if they touch your probe.

You must cure all eight conditions in the body and then exit through the eye, ear, nose, or mouth. Leaving by any other route causes the patient to go terminal.

Microsurgeon is quite challenging on the surgeon level and you will lose quite a few patients before your operating skills develop. The game comes with instructions that are very detailed, and it is a good idea to read them thoroughly before beginning to operate.

At the end of the game, assuming that you save your patient, you are awarded research funds based on the number of individual organs you saved, the power units left, and the overall condition of the patient.

The game looks quite different on each computer. The PCjr version has full screen graphics, and they are much more detailed than the 99/4A version of the game. In fact, if you have a weak stomach, I wouldn't recommend the IBM version because it is so realistic.

Another big difference between the IBM and the TI version is in the use of sound effects. *Microsurgeon* on the 99/4A employs sound effects galore. If you have a speech synthesizer, the computer talks to you as you move through the body. If you don't have a speech synthesizer, you are still treated to a wide assortment of sounds—including the patient's heartbeat and the sounds from inside the intensive care room. Unfortunately, implementation of the PCjr's sound effects are almost nonexistent—a difficult situation to understand because both the 99/4A and PCjr have the same TI sound chip.

Even though one version has far superior graphics, and the other, far superior sound, both have one important thing in common: they offer their purchasers an inexpensive and enjoyable way to vicariously experience a situation that very few get the opportunity to participate in in real life. And isn't that what computers are all about . . . HCM

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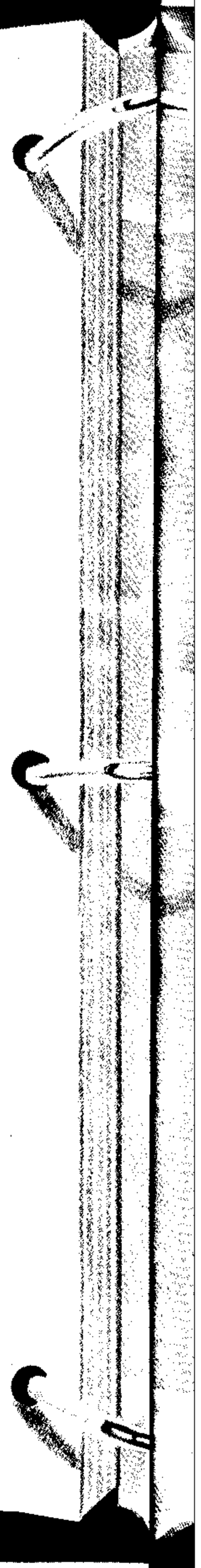
How To Build Your Own Cassette Cable



As products manufactured by Texas Instruments evaporate from retailers' shelves, many users fear they'll be unable to obtain necessary equipment for their computers. To assist our readers in getting the most out of their TI computers, **HCM** offers these complete instructions for building a cassette cable. To build the cable assembly, you'll need to get the parts specified in the Materials List below. Then just follow the directions.

INSTRUCTIONS

1) Cut three pairs of wires 26-1/2" long. Using nail polish or plastic model paint, distinctly mark the last inch of both ends of one pair of wires with one large dot. In a similar manner, mark the ends of the next pair of wires with two dots. Finally, repeat this operation using three dots for the last pair of wires. Allow the paint or nail polish to dry completely. This labeling lets you identify individual wire pairs when they are in the heat-shrink tubing.

2) Paint one of the red plastic, miniature plug hoods white. This jack will eventually plug into the monitor or external speaker output.

3) Locate the two 12-inch lengths of 1/8" heat-shrink tubing. Cut both lengths in half. Push all three pairs of wire through one of the 6" lengths. Stop pushing when 1 1/2" of wire is beyond the end of the heat-shrink. This end will be soldered to the D connector, and will not be used until the end of step 8.

4) Starting from the other end, thread all three wire pairs into the 12" length of 3/16" heat-shrink tubing. Slide this tubing up until it overlaps the 1/8" heat-shrink by 1/4".

5) Using a suitable heat source (a heat gun or, if necessary, a candle or cigarette lighter) carefully shrink the tubing.

6) Locate the remaining three 6" lengths of 1/8" heat-shrink. Slide a piece of this tubing over a pair of wires. When this tubing butts up against the 3/16" tubing, heat it until the 1/8" tubing is shrunk. Repeat this step for the two remaining wire pairs.

7) Cut a 1-1/2" piece of 1/4" diameter heat-shrink. Slide this piece up the cable until the 1/4" diameter heat-shrink straddles the junction of the 3/16" and the three 1/8" pieces of heat-shrink. Heat and shrink the tubing. For additional strength at this junction, step 7 can be repeated using a 2" piece of 1/4" heat-shrink.

8) Locate the wire pair marked with one dot. Trim this pair so that about 1/2" of wire protrudes beyond the end of the 1/8" heat-shrink. Slide the painted white plastic jack hood onto this pair of wires. Solder the white wire from this wire pair to the short terminal of the miniature jack. Solder the black wire to the longer terminal. At the other end of the wire pair marked with one dot, solder the black wire to contact 9 on the D connector and solder the white wire to contact 8 on the D connector.

9) Trim the wire pair marked with two dots in the same manner as you trimmed the wire pair in step 8. Slide the unpainted red plastic hood onto the wire. Solder the black wire to the long terminal of the miniature jack, and the white wire to the short terminal. At the other end of the wire marked with two dots, solder the white and black wires to the D connector's contacts 5 and 3, respectively.

10) Trim the remaining pair of wires as you did in the previous two steps. Slide the subminiature plastic hood over this set of wires. Again, solder the white wire to the short terminal and the black wire to the longer terminal. Solder the remaining white wire to contact 1 of the D connector. Solder the black wire to contact 2.

11) Install the plastic hood on the D connector. Screw the three plastic hoods onto the jacks. Plug the cable into your computer and cassette deck. The red jack plugs into the microphone input, the white jack plugs into the monitor or external speaker output, and the subminiature jack plugs into the remote input. If the remote cable does not turn on your cassette deck's motor, reverse the two wires in the subminiature jack. —**by Peter Bloch**

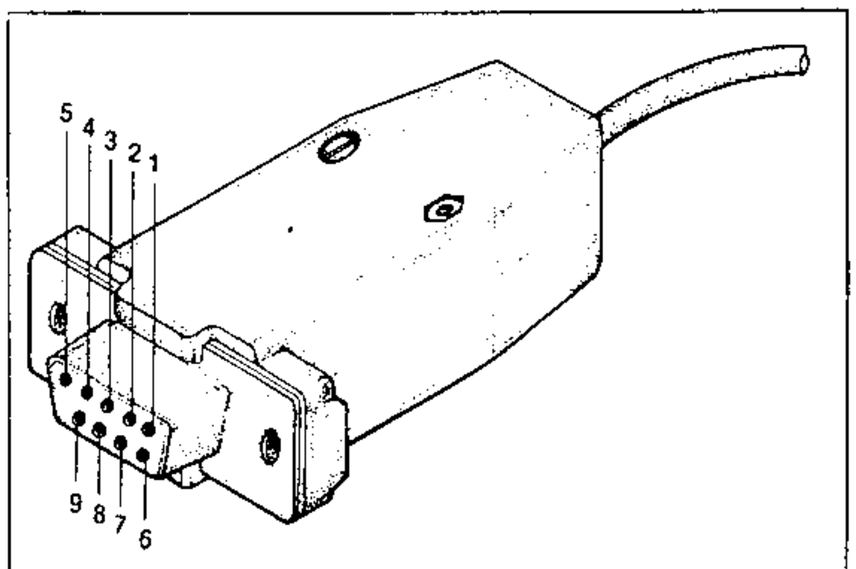
If all of this sounds like too much work, there is an alternative. You can still buy a ready-made single or double cassette cable for your 99/4A. To order, send $4.95 plus $2.00 shipping/handling ($4.00 if foreign) to:
EMERALD VALLEY PUBLISHING CO., P.O. Box 5537 Eugene, OR 97405.

MATERIALS LIST

RADIO SHACK PART NUMBER	QUANTITY OR SIZE	DESCRIPTION OF MATERIAL
274-289	1	1-1/6 subminiature phone plug (male).
274-287	2	1/8" miniature phone plugs (male).
278-755	80"	2-conductor wire. Twisted pair.
276-1538	1	D-subminiature 9 pin solder type connector (female).
276-1539	1	D-subminiature 9 pin connector hood.
278-1627A (Note: this one part number contains all of these sizes of heat shrink tubing, plus more.)	24"	1/8" heat-shrink tubing.
	12"	3/16" heat shrink tubing.
	1-1/2"	1/4" heat shrink tubing.

MISCELLANEOUS

rosin core solder, soldering iron, white and red plastic model paint or nail polish.



D—subminiature 9 pin connector (female)

PIN #	WIRE COLOR—PLUG
1	white—subminiature plug short terminal (REMOTE)
2	black—subminiature plug long terminal (REMOTE)
3	black—red plug long terminal (MIC)
5	white—red plug short terminal (MIC)
8	white—white plug short terminal (EAR)
9	black—white plug long terminal (EAR)

(4, 6, and 7 unused.)

programming:

THE NAME OF THE GAME

by the HCM Staff

Pssst! I've got a little secret for you, gang: *Designing* and *programming* your own game on your TI or Commodore home computer can be just as much fun as *playing* games produced by others. And best of all, it's really not as hard as you might think . . .

PART 1: GENERAL RECOMMENDATIONS

Pick A Game, Any Game . . .

You can have a maze, a game using dice, a card game, a memory-type game, a board game, a popular sport, a game involving logic, a game dependent on skills or reaction time, some form of hide-and-seek, an adventure, or a myriad of space and shooting games. Still don't have a game plan? Walk through a video arcade to get some ideas.

Let the Computer Play Too

If you write a game of Tic-Tac-Toe or Othello for two players, you're really only utilizing the computer's graphics—the game could just as well be played on paper or on a board. But, if you write the game for one person *against* the computer, you *are* using the computer to help go through a logic process. And because the TI and Commodore home computers are powerful logic tools, this is the best way to learn to use this power.

Plan Your Program

Don't just sit at the console and begin programming your game hoping that you can remember all the logic. Some programmers draw a flowchart first. On logic games you may prefer "tree diagrams"—i.e., if the player chooses one option, the program branches one way; then depending on the next choice, it branches again, and so forth. Other programmers prefer a more structured approach —each process of the game

Continued

is in a subroutine and the main program calls the subroutines in order. This type of program is easy to evaluate and easier for other programmers to follow than a program that has GOTO statements all over the place. What is best for you? Select a planning method that fits your needs, and then plan the logic before writing the program.

Look Through Your Listing

Once your program is written, there are usually still many ways to make it better. By sitting back and looking over the listing of your program's instructions, many things can be spotted. If you use the same group of lines several times, use a GOSUB, and place the subroutine near the end of the program. For example, a subroutine to read numeric key presses can be very useful.

TI BASIC

```
800 CALL KEY(0,KEY,STAT)
810 IF (STAT=0)+(KEY<48)+(KEY>57) THEN 800
820 RETURN
```

C-64 and VIC-20 BASIC

```
800 GET A$
810 IF A$<"0" OR A$>"9" THEN 800
820 RETURN
```

It is a simple matter now to access the routine many times with a simple GOSUB, as you will see in the program lines below:

TI BASIC

```
150 CALL CLEAR
160 GOSUB 800
170 PRINT CHR$(KEY);
180 GOTO 160
```

C-64 and VIC-20 BASIC

```
150 PRINT CHR$(147)
160 GOSUB 800
170 PRINT A$;
180 GOTO 160
```

Check for unnecessary statements. We have seen several listings that contain program statements that can never be executed because they have been by-passed, and subroutines that are never called. Other cases may occur because of editing. For example:

TI, C-64, and VIC-20 BASIC

```
900 GOTO 920
910 X=25
920 GOTO 980
    or
900 GOTO 910
910 Z=Z+1
    or
900 IF X=A THEN 910
910 GOTO 980
```

Be Sure To Include Instructions

Many players are anxious to play the game and won't read anything that comes with the game program, so it is wise to include simple instructions within your program. Players that are already familiar with the game, however, won't want instructions, so you must try to satisfy everyone. One method is to print the instructions on one screen with "PRESS ANY KEY TO START" at the bottom of the screen. The player can then look at the screen or immediately press any key to start the game.

TI BASIC

```
100 CALL CLEAR
110 PRINT "PRESS 'S' & 'D' TO GO"
120 PRINT "LEFT OR RIGHT."
130 PRINT "PRESS 'F' TO SHOOT."
140 PRINT :::"PRESS ANY KEY TO START."
150 CALL KEY(O,KEY,STAT)
160 IF STAT<1 THEN 150
170 REM PROGRAM CONTINUES FOR GAME
```

C-64 and VIC-20 BASIC

```
100 PRINT CHR$(147);"PRESS 'S' & 'D' TO GO LEFT OR
      RIGHT."
110 PRINT "PRESS 'F' TO SHOOT."
120 PRINT:PRINT:PRINT:PRINT "PRESS ANY KEY TO
      START."
130 GET A$
140 IF A$="" THEN 130
```

Another method is to inquire whether the player needs instructions:

TI BASIC

```
100 CALL CLEAR
110 PRINT "NEED INSTRUCTIONS? (Y/N)"
120 CALL KEY (0,K,S)
130 IF K=78 THEN 400
140 IF K<>89 THEN 120
150 REM PROGRAM PRINTS INSTRUCTIONS
400 REM PROGRAM CONTINUES FOR GAME
```

C-64 and VIC-20 BASIC

```
100 PRINT CHR$(147)
110 PRINT "NEED INSTRUCTIONS? (Y/N)"
120 GET A$
130 IF A$="N" THEN 400
140 IF A$<>"Y" THEN 120
150 REM PRINT INSTRUCTIONS
400 REM PROGRAM CONTINUES FOR GAME
```

If the player presses Y, instructions will be printed; if the player presses N, the game starts. Any other key pressed is ignored by the program. Be sure the instructions are as clear and concise as possible. Use enough blank lines to make the instructions easy to read. Make sure words are not divided at the end of lines, be sure to spell correctly, and use correct grammar.

Check for Speed and Captivation

You don't want the player to fall asleep between moves. If you have moving objects in your game, the player wants them to be as fast as possible. The main hints here are to have the moving objects be just one character and to minimize the logic between moves. Note that, generally, the more objects you have to move, the longer it will take.

Make Your Game "User Friendly"

This means considering all possibilities of input. You never know what some players will try to do. If you require an answer of "yes" or "no," can the players just press Y or N, or do they need to spell out the word and press [ENTER] or [RETURN]? Pressing one key has a lot less chance of error than using INPUT. What if you ask for a *number*, and a *letter* is pressed? What if you ask for a choice of 1 through 4 and the number 7 is pressed? If the player needs to use the arrow keys, is there a default value if he or she hits another key, or is that key ignored—or worse yet, does the program crash?

Test Your Game

Again, check all possibilities. If you say your spaceship can move to the right and to the left, be sure to check *both* directions. Make sure positive and negative numbers work correctly in your calculations. Check the scoring to see if it is adding correctly. Test the possibility of hitting the wrong key. Test moving objects at the edges of the screen.

PART 2: SPECIFIC HINTS

Random Numbers

Be sure to use the statement RANDOMIZE before using RND in TI BASIC or use RND (0) in Commodore BASIC so each game played will be different. If random numbers are computed at several different places, consider doing this at each occurance of RND to ensure total randomization throughout the game. Sometimes a single RANDOMIZE function at the beginning of the program does not satisfy the need. Shooting dice would need a random number from 1 to 6:

TI BASIC

```
100 RANDOMIZE
110 D1=INT(RND*6)+1
```

C-64 and VIC-20 BASIC

```
100 D1=INT(RND(0)*6)+1
```

In a space program or skill-type game you may want to place obstacles at random positions. If you have several objects, DEFine a few functions at the beginning of the program, then you can use them later in the coding:

Continued on next page

TI BASIC
```
100 DEF RX=INT(RND*24)+1
110 DEF RY=INT(RND*29)+2
120 CALL CLEAR
130 RANDOMIZE
140 FOR I=1 TO 5
150 CALL HCHAR(RX,RY,65)
160 NEXT I
170 CALL VCHAR(RX,RY,66)
180 STOP
```

C-64 BASIC
```
100 DEF FNRX(X)=INT(RND(0)*24)+1
110 DEF FNRY(X)=INT(RND(0)*40)+1
120 PRINT CHR$(147)
130 FOR I=1 TO 5
140 PP=FNRX(X)*40+FNRY(X)
150 POKE PP+1024,1:POKE PP+55296,1
160 NEXT I
170 PP=FNRX(X)*40+FNRY(X)
180 POKE PP+1024,2:POKE PP+55296,2
```

VIC-20 BASIC
```
100 DEF FNRX(X)=INT(RND(0)*23)+1
110 DEF FNRY(X)=INT(RND(0)*22)+1
120 PRINT CHR$(147)
130 FOR I=1 TO 5
140 PP=FNRX(X)*22+FNRY(X)
150 POKE PP+7680,1:POKE PP+38400,1
160 NEXT I
170 PP=FNRX(X)*22+FNRY(X)
180 POKE PP+7680,2:POKE PP+38400,2
```

The DEFinition statements must be numbered lower than the statements in which the functions are used. Lines 140-170 place five A's and one B in random X and Y positions, for X from 1 to 24 and Y from 2 to 30.

Another use of random numbers is choosing a random message or procedure. For example:

TI BASIC
```
500 PRINT A$(INT(RND*9)+1)
```

C-64 and VIC-20 BASIC
```
500 PRINT A$(INT(RND(0)*9)+1)
```

These lines choose one of nine messages previously stored in the A$ array. For random subroutines, the coding would be:

TI BASIC
```
510 ON INT(RND*5)+1 GOSUB 200,250,300,350,400
```

C-64 and VIC-20 BASIC
```
510 ON INT(RND(0)*5)+1 GOSUB 200,250,300,350,400
```

Games using a deck of cards may use an array to keep track of which cards are dealt. You may use C$(52) for the 52 cards, or a two-dimensional array C(13,4) where the first parameter is the number chosen and the second is the suit. An example for choosing ten cards follows. The values in the card array are initially zero. As a card is chosen, the corresponding C element is set equal to 1. In the following example we printed the card values, but remember you really should take advantage of the computer's graphics to *draw* the cards.

TI BASIC
```
100 REM CARDS
110 CALL CLEAR
120 DIM C(13,4),A$(13)
130 DATA ACE,2,3,4,5,6,7,8,9,10,JACK,QUEEN,KING
140 FOR J=1 TO 13
150 READ A$(J)
160 NEXT J
170 SUIT$(1)="HEARTS"
180 SUIT$(2)="CLUBS"
190 SUIT$(3)="DIAMONDS"
200 SUIT$(4)="SPADES"
210 PRINT "TEN CARDS CHOSEN:"::
220 RANDOMIZE
230 FOR I=1 TO 10
240 N=INT(13*RND)+1
250 S=INT(4*RND)+1
260 IF C(N,S)=1 THEN 240
270 PRINT A$(N):" OF ":SUIT$(S)
280 C(N,S)=1
290 NEXT I
```

C-64 and VIC-20 BASIC
```
100 REM CARDS
110 PRINT CHR$(147)
120 DIM C(13,4),A$(13)
130 DATA ACE,2,3,4,5,6,7,8,9,10,JACK,QUEEN,KING
140 FOR J=1 TO 13
150 READ A$(J)
160 NEXT J
170 SUIT$(1)="HEARTS"
180 SUIT$(2)="CLUBS"
190 SUIT$(3)="DIAMONDS"
200 SUIT$(4)="SPADES"
210 PRINT "TEN CARDS CHOSEN:":PRINT:PRINT
220 FOR I=1 TO 10
230 N=INT(RND(0)*13)+1
240 S=INT(RND(0)*4)+1
250 IF C(N,S)=1 THEN 230
260 PRINT A$(N);" OF ";SUIT$(S)
270 C(N,S)=1
280 NEXT I
```

ARROW KEYS

In games where you move a character up, down, left, or right, you may wish to have the player press the arrow keys. (The arrows are on the keys E, D, X, and S of the TI-99/4A). A CALL KEY statement on the TI machine, or GET statement on the Commodore is used to receive the player's input; the program then branches depending on which arrow is pressed. Any other key pressed should be ignored so your program doesn't crash with bad values. The following routine will draw a trail of asterisks as you press the arrow keys. Remember, you must consider the edges of the screen or you may get a BAD VALUE message. Lines 270-340 test for the edge values and will keep the asterisk at the edge position.

TI BASIC
```
100 REM MAKE-A-TRAIL
110 CALL CLEAR
120 X=12
130 Y=15
140 CALL HCHAR(12,15,42)
150 CALL KEY(O,K,S)
160 IF K<>69 THEN 190
170 X=X-1
180 GOTO 270
190 IF K<>68 THEN 220
200 Y=Y+1
210 GOTO 270
220 IF K<>88 THEN 250
230 X=X+1
240 GOTO 270
250 IF K<>83 THEN 150
260 Y=Y-1
270 IF X>=1 THEN 290
280 X=1
290 IF X<=24 THEN 310
300 X=24
310 IF Y>=1 THEN 330
320 Y=1
330 IF Y<=32 THEN 350
340 Y=32
350 CALL HCHAR(X,Y,42)
360 GOTO 150
```

C-64 and VIC-20 BASIC
**** See note about entering this program on the VIC-20.**
```
100 REM MAKE-A-TRAIL
110 PRINT CHR$(147)
120 X=12
130 Y=13
140 GOSUB 370
150 GET A$
160 IF A$<>"E" THEN 190
170 X=X-1
180 GOTO 270
190 IF A$<>"D" THEN 220
200 Y=Y+1
210 GOTO 270
220 IF A$<>"X" THEN 250
230 X=X+1
240 GOTO 270
250 IF A$<>"S" THEN 150
260 Y=Y-1
270 IF X<=0 THEN 290
280 X=0
290 IF X<=24 THEN 310
300 X=24
310 IF Y>=0 THEN 330
320 Y=0
330 IF Y<=39 THEN 350
340 Y=39
350 GOSUB 370
360 GOTO 150
370 POKE X*40+Y+1024,42:
    POKE X*40+Y+55296,1:
    RETURN
```

**** NOTE: Make the following changes if you enter this program on the VIC-20:**
```
290 IF X<=21 THEN 310
300 X=21
330 IF Y<=22 THEN 350
340 Y=22
370 POKE X*22+Y+7680,42:POKE X*22+Y+38400,1:RETURN
```

Remember, there are many ways of programming to get the same result, and the examples presented here are merely just that—*examples*. The following routine illustrates another way to use the arrow keys to move a character. This time the previous character is deleted. Also, lines 330-410 will make the asterisk scroll to the other side of the screen instead of staying at the edge.

TI BASIC

```
100 REM MOVE-A-STAR
110 CALL CLEAR
120 X=12
130 Y=15
140 CALL HCHAR(X,Y,42)
150 CALL KEY(0,K,S)
160 IF K<>69 THEN 200
170 DX=1
180 DY=0
190 GOTO 310
200 IF K<>68 THEN 240
210 DX=0
220 DY=1
230 GOTO 310
240 IF K<>88 THEN 280
250 DX=1
260 DY=0
270 GOTO 310
280 IF K<>83 THEN 150
290 DX=0
300 DY=-1
310 CALL HCHAR(X,Y,32)
320 X=X+DX
330 IF X>0 THEN 370
360 X=1
370 Y=Y+DY
380 IF Y>0 THEN 400
390 Y=32
400 IF Y<33 THEN 420
410 Y=1
420 CALL HCHAR(X,Y,42)
430 GOTO 150
```

C-64 and VIC-20 BASIC
**** See the note if you enter this program on the VIC-20.**

```
100 REM MOVE-A-STAR
110 PRINT CHR$(147)
120 X=12
130 Y=13
140 GOSUB 440
150 GET A$
160 IF A$<>"E" THEN 200
170 DX=-1
180 DY=0
190 GOTO 310
200 IF A$<>"D" THEN 240
210 DX=0
220 DY=1
230 GOTO 310
240 IF A$<>"X" THEN 280
250 DX=1
260 DY=0
270 GOTO 310
280 IF A$<>"S" THEN 150
290 DX=0
300 DY=-1
310 GOSUB 450
320 X=X+DX
330 IF X>=0 THEN 350
340 X=24
350 IF X<25 THEN 370
360 X=0
370 Y=Y+DY
380 IF Y>=0 THEN 400
390 Y=39
400 IF Y<40 THEN 420
410 Y=0
420 GOSUB 440
430 GOTO 150
440 POKE X*40+Y+1024,42:
    POKE X*40+Y+55296,1:
    RETURN
450 POKE X*40+Y+1024,32:
    RETURN
```

**** NOTE: If you enter this program on the VIC-20, then you will need to make the following changes to the above program:**

```
340 X=21
350 IF X<22 THEN 370
390 Y=22
400 IF Y<23 THEN 420
440 POKE X*22+Y+7680,42:POKE X*22+Y+38400,1:RETURN
450 POKE X*22+Y+7680,32
```

A more compact approach to automatic scrolling is to replace lines 330-360 and 380-410 with these two lines:

TI BASIC

```
330 X=INT(24*((X-1)/24-INT((X-1)/24)))+1
380 Y=INT(32*((Y-1)/32-INT((Y-1)/32)))+1
```

C-64 BASIC

```
330 X=INT(25*((X-1)/25-INT((X-1)/25)))
380 Y=INT(40*((Y-1)/40-INT((Y-1)/40)))
```

VIC-20 BASIC

```
330 X=INT(22*((X-1)/22-INT((X-1)/22)))
380 Y=INT(23*((Y-1)/23-INT((Y-1)/23)))
```

PART 3. DO IT!

We've presented some fundamental hints and ideas for programming; now it's your turn to put on your thinking cap, turn on the computer, and have fun writing your *own* games!

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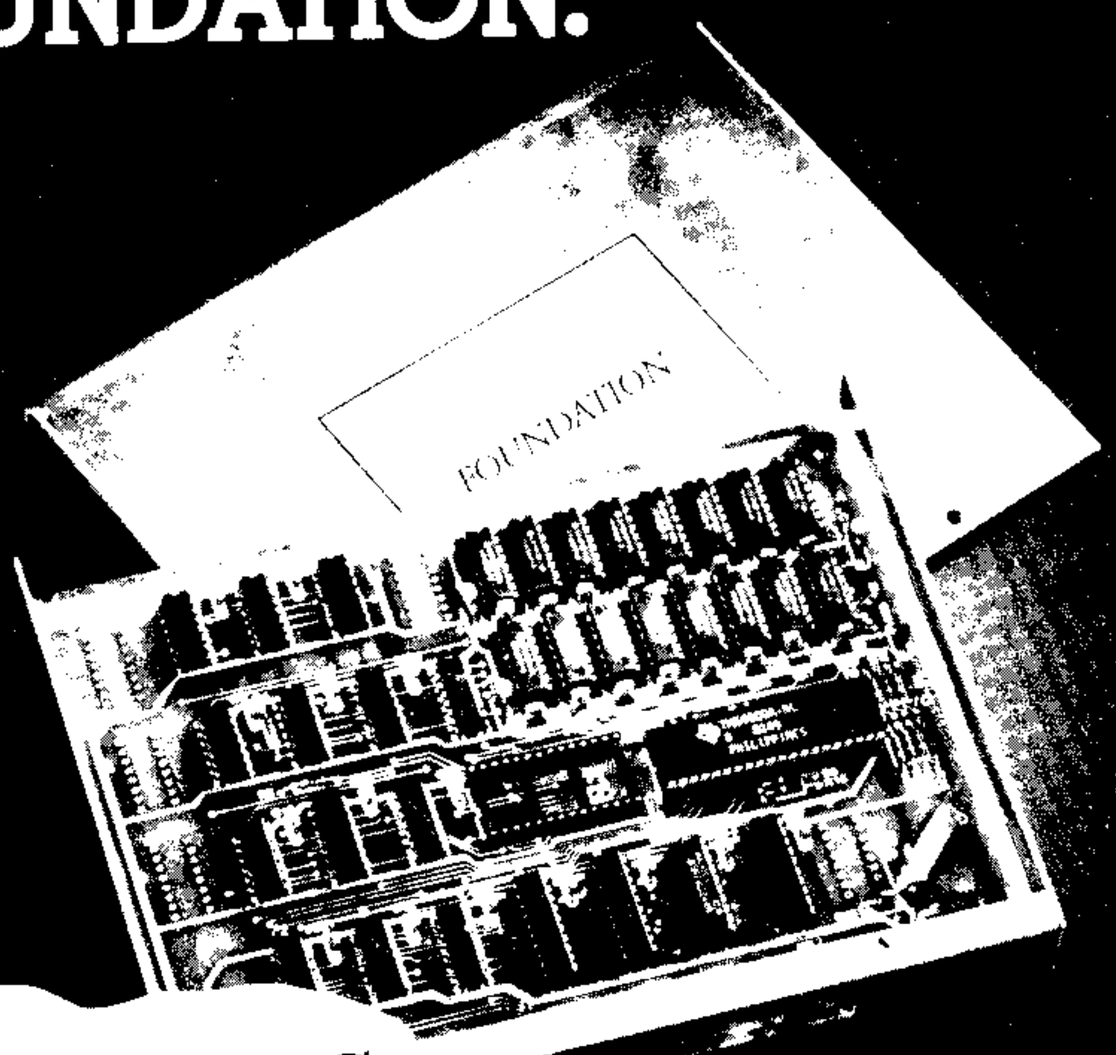

80 Columns on the 99!

Tiburon. June 29, 1984.

Home computing took another step closer to professional quality today as Foundation Computing unveiled a full-fledged intelligent terminal card that plugs into the TI 99/4 expansion box. Providing a 24x80 display with a 25th line of status information, the $249 card includes its own internal computer and provides features not available on many $1500 display terminals. Any combination of reverse video, half-intensity, double width, double height, and blinking characters can be shown. A complete set of display control codes and line drawing characters are provided. Contacted for comment, Foundation VP Kathy Hunter stated that the product was developed in direct response to customer requests. Expected uses include word processing, telecommunications, and report layout. She also stated that for many purposes, the card can replace the use of an RS232 card.

The Foundation 32K and 128K Memory Cards are designed from the beginning to be compatible with the TI99/4A Computer. The 128K Card comes with solid-state software that makes it easy to use the additional memory. Just write or call us and we'll send you a descriptive brochure.

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A Review

COMPANION

A review by Judy Sanoian
and the HCM Staff

The perfect word processor should free you to type in an article or story as it enters your head, without having to worry about carriage returns, word breaks, [ENTER] keys, page numbers, and all the other "secretarial" details that can muddle up the creative process. So claim the Intelpro people, designers of the *Companion* word processor. In developing their program, their goal was to help the writer create text on a "conceptual, rather than secretarial, basis."

Using *Companion* for the first time, this philosophy is apparent. There are literally no distractions from the writing process. The screen is noticeably free of line numbers and other clutter. Any clues that formatting will take place seem carefully hidden. Words break wherever they hit the end of the line. The margins are set automatically. Editing commands are easy to use. You are indeed free to type in exactly what enters your head—no carriage returns, margin-setting or other formatting chores are needed...not, at least, until you are ready to print out your copy.

Name:	**Companion**
Program Type:	**Word Processor**
Machine:	**TI-99/4A**
Distributor:	**Intelpro** **5825 Balliargeon Street** **Brossard, Quebec, Canada**
Price:	**$79.95, diskette**

System requirements: Disk drive, Extended BASIC, 32K memory expansion

	Poor	Fair	Good	Excellent
Performance				
Ease of Use				
Documentation				

Different Priorities

In reviewing *Companion*, it is inevitable that we compare it with *TI-WRITER*, probably the best-known word processor for the 99/4A. We found more similarities than contrasts between the two systems, but there are subtle differences—evidence that the programs were designed according to two different philosophies. For example, *TI-Writer* strives to depict the text on your screen as it will appear in the printout (if you use the PRINT FILE command in edit mode). Words are never broken at the end of the line. Tabulated material appears on screen exactly as you will see it in the printout. Copy that will be printed out in 80-character lines can be seen on screen in 80-character-wide format.

With *Companion*, on the other hand, you must take it on faith that your tabs, word breaks, and other formatting will appear correctly in the printout. Although words are kept intact on the printout, there is no on-screen word wrap. Its creators say that this is to permit every bit of the display space to be filled with text. So *Companion* lets you see a bit more text at one time than *TI-WRITER*. This does not, incidentally, have anything to do with the character capacity (the amount of text a file can hold) of either system. In fact, *TI-WRITER* (which does have on-screen word wrap) has a greater character capacity (23000) than *Companion* (18000), but these figures are irrelevant anyway since both systems let you link together files to allow virtually unlimited character capacity.

Similarly, *Companion* limits you to a 40-character-wide screen display but lets you print out your text with up to 132-character-wide margins. The manual touts this screen-wide margin limitation as the best compromise for clarity and efficient use of space. I can't quite go along with their logic, especially when I compare *Companion*'s capabilities with what *TI-WRITER* has to offer. *TI-WRITER* lets you see on the screen exactly how your text (up to 80 characters across of it, anyway) will be formatted. Since the 99/4A monitor displays only 40 characters across at a time, *TI-WRITER* uses a horizontal scrolling "window" to let you see the rest of the line. *Companion*'s designer is strong in his condemnation of horizontal scrolling. In the manual he characterizes it as fatiguing and confusing—a practice which should be "banned as a health hazard." While there may be some truth to his remarks, we must keep in mind that *TI-WRITER*'s horizontal scrolling option is just that—an option. You can always set your margins at 39 for viewing, then change to a wider margin before you print your copy.

I should also mention that the current version of *Companion* (2.0) offers no right margin justification. There are, however, parameter codes set aside for offering that capability on a future version of the program. This new version—which will offer several additional features—will be available for under $30 to owners of the present *Companion*.

Editing Ease

Companion's editing commands were also designed according to the "ease of use is paramount" philosophy. For example, when you use the INSERT command, it displays the inserted material and moves the rest of the text simultaneously. With *TI-WRITER* (in the edit mode) the line drops down when you insert the material, and you must press [CTRL][R] to close the line back up—a two-step procedure. In the fixed mode, you can insert material in one step, but only up to the end of the line. After that, your text will start dropping off the line, into the void. *Companion* also provides the usual word processing editing commands: delete, center, skip a line, midline (for letter salutations). It also has a REDO command that zips you to the last line of the text. This is very handy if you want to go back and view text, then return immediately to where you were writing. You can also do this with *TI-WRITER*, but it is a more lengthy (three-step) process.

While I'm on the subject of speed, I should mention *Companion*'s accelerating auto-repeat cursor motion. This means the longer you scroll, the faster your cursor goes. *TI-WRITER*, with its one-speed cursor (and its lack of an equivalent to the REDO command), must take second place to *Companion* in the "cursor cruise speed" competition.

Printout Parameters

Companion recognizes 11 "printout parameters" that determine the physical arrangement of the page. Among them are the following: form length and width, left and right margins, top and bottom margins, spacing between lines, tabs, and paragraph indentation. Each of these

Continued on page 160

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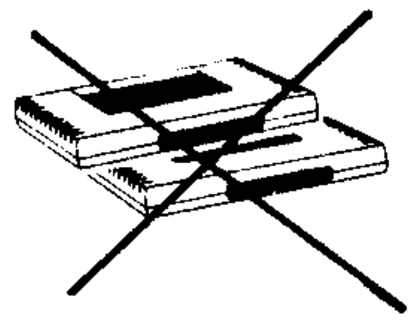

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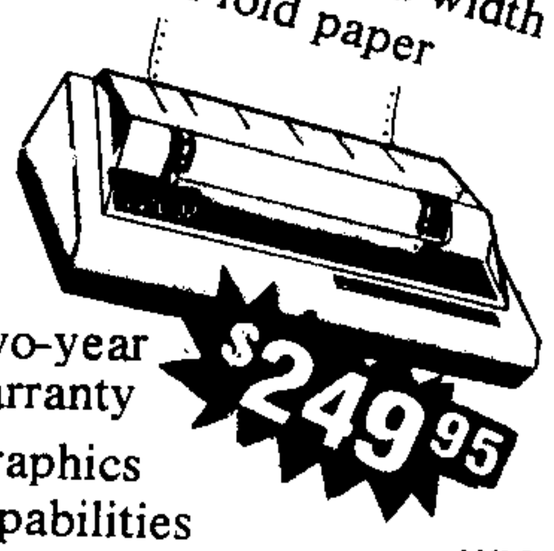

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Industry Watch

COMPATIBLE COMMODORE

A new 256K computer in the Commodore works—recently previewed in Europe—threatens to unseat other popular IBM compatibles. Lately the company has run a few products up the flagpole—only to pull them back down before anyone could salute—but initial reports from the Hanover Fair in Germany sound promising. Based on a design licensed from the Canadian firm BytecCommterm, this model is expected to be aggressively priced against the Compaq and the Columbia—as well as the IBM PC itself. Commodore has also reportedly leaked behind-the-scene previews of its new 16-bit Z8000-based computer. Rumored to be ready for shipment by the end of 1984, it is said to feature 256K RAM, two 1.3 megabyte disk-drives, a 15-inch color monitor with extremely high (640 x 400 dot) resolution, and sport a Commodore-specific version of Coherent (a Unix Version VII-compatible operating system from the Mark Williams Company). Meanwhile, Commodore is releasing its previously announced model 264 as the Commodore Plus/4 with integrated productivity software in ROM. Look for a retail price in the $300 range. A 16K machine—replacing the VIC-20—is also in the works, filling the $100 product needs of the mass merchandizers.

HOME COMPUTER U.

Although there is a great deal of educational software for the home computer, none of it will get you a degree—or even academic credit. Now, a new system links established educational institutions with the home-bound student. TeleLearning Systems Inc. has teamed up with a half-dozen schools—including Ohio State University and the University of Nebraska—to offer some of the world's first for-credit computer correspondence courses. With the basic set-up retailing for $99, and courses priced between $45 and $125, many who are limited in either finances or mobility may soon take part in this new form of higher education. An increase in the number of teaching positions, and, of course, more demand for home computers may result. Several universities are jumping on the electronic band-wagon with their own experiments in this field. With TeleLearning, students study at their own pace, take exams, and hold conferences with professors—all by a time- and cost-cutting method of batched data transmission over existing telephone lines.

IBM LOWERS PRICES TO MEET IIc CHALLENGE

Can the Apple IIc knock out the PCjr? Apple's new machine has apparently captured the first few sales rounds with its wealth of existing software and relatively low price. IBM has counter-punched by dropping prices on their entire line of personal computers and add-ons. The unexpanded PCjr is now under $600 and the enhanced version (128K of memory and one 360K disk-drive) is less than $1000—undercutting the IIc's $1295 suggested retail. IBM has also introduced a PC with 256K of memory and one disk drive for under $2000. Big Blue has also hinted that it will upgrade PCjr to be able to run more software designed for the PC, and equip it with a better keyboard. Apple, on the other hand, may be somewhat trapped by its large software inventory—an illusory asset that could be made obsolete by any major technical improvements in the Apple II family.

NEW RAM CHIPS PROMISE MORE MEMORY FOR HOME MARKET

Until recently, it took 32 chips to obtain 256K of RAM—soon it will only take 8. U.S. chip manufacturers are readying volume shipments of the new 256K dynamic random-access memory chips for delivery by the last half of 1984. Although this won't have an immediate effect upon the home market, it does promise "more memory for less money" in the not too distant future. Volume production of the new chips is already under way in Japan, and American companies are hurrying to keep pace. While no American firms are close to matching the Japanese output at present, Motorola is hoping to be in full production by fall. Texas Instruments reportedly has its Miho, Japan plant already producing 100,000 chips per month, with a target of over 600,000 by the end of the third quarter. Meanwhile, IBM may be a jump ahead as they recently announced the development of a 1000K chip that was (according to an IBM spokesman) "fabricated on the same manufacturing line that produces . . . other chips, so no additional technology was necessary."

Continued next page

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Industry Watch

EIA TO DEVELOP STANDARD HOME BUS

The Electronic Industries Association (EIA)—the people who brought us the RS232-C standard for serial communications—is hoping to develop a standard interface bus for home electronics products. If you want to hook-up your computer to your VCR, or your robot, you don't want to spend weeks looking for the proper cables and interface boards. The EIA hopes that a standard bus will make such operations much easier. Of course, developing any sort of standard may be nearly impossible. Considering the number of consumer electronic products coming from Japan these days, the EIA might be well advised to consult with Tokyo on interface protocols. Any standard bus might require a Japanese "driver" if it doesn't want to get lost.

THIRD-PARTY HARDWARE HELPS jr GROW

Thanks to third-party developers, it appears that the PCjr can be made virtually as powerful as the PC—at a lower cost. Legacy Technologies of Lincoln, Nebraska made an early entrance with its Legacy expansion unit, giving the PCjr a second disk drive, up to 512K of memory, and an 80-pin expansion bus for future development. Falcon Industries (Kent, WA.) is now introducing a "jr Extender System" which it boasts gives the PCjr near-PC capability for $634 less than the PC. Meanwhile, Tecmar of Cleveland, Ohio is marketing a package that is the same physical size as the IBM-parallel printer port, but includes 128K extra memory (expandable to 512K), a battery-backup date-time clock, a parallel port, as well as an easy-to-use full software-support package.

VISICALC EXPANDS MARKET TARGETS

Determined to shed the market perception that they are a single-product company, VisiCorp has introduced **FlashCalc**, a high-performance spreadsheet program that is expected to lead a string of VisiCorp products into the low-end market tier. Though the program features enough power to attract business users searching for a single application package, **FlashCalc** is directed toward middle-market home users. The spreadsheet will run on the Apple IIc and other Apple II family systems, and is compatible with ProDOS. VisiCorp officials said the introduction of this $99 program (and a corresponding price cut on the Visi series), positions their product line at lower price points —offering more performance for middle-range products.

ALL ABOARD FOR COMPU-CRUISE

For those who find the hustle-and-bustle atmosphere of traditional computer shows and seminars a bit unnerving, consider this alternative: a leisurely computer conference and seminar conducted during a seven-day Carribean cruise to exotic ports. Sponsored by Compu-Cruise, Inc. of Eugene, Oregon, the seminars are directed toward (1) those who use or purchase personal computer products, and (2) those involved in the marketing and sales of personal computer products. The first trip is scheduled to set sail in mid-December—with plenty of computers and computer products on board, as well as notable speakers from the computer industry. Compu-Cruise will be producing shipboard conferences four to six times a year, with other destinations including the Mexican Riviera and Alaska.

COMMODORE AND IBM TO MAKE INTEL'S 8088 CHIP

Both Commodore International Ltd. and International Business Machines Corp. have signed agreements with Intel Corp. to produce the high-in-demand, short-in-supply 8088 microprocessor. Industry analysts say the license will give IBM more control over production of this chip—a component used in the IBM PC and by some 60 competitors that make similar machines to run PC software. The Intel agreements will significantly increase production of the 16-bit 8088 microprocessor, but will have little effect on quantities of chips going to makers of IBM compatibles. An Intel spokesman said that Commodore is expected to make the chip for its own use, while IBM will be able to triple shipments of its popular personal computers.

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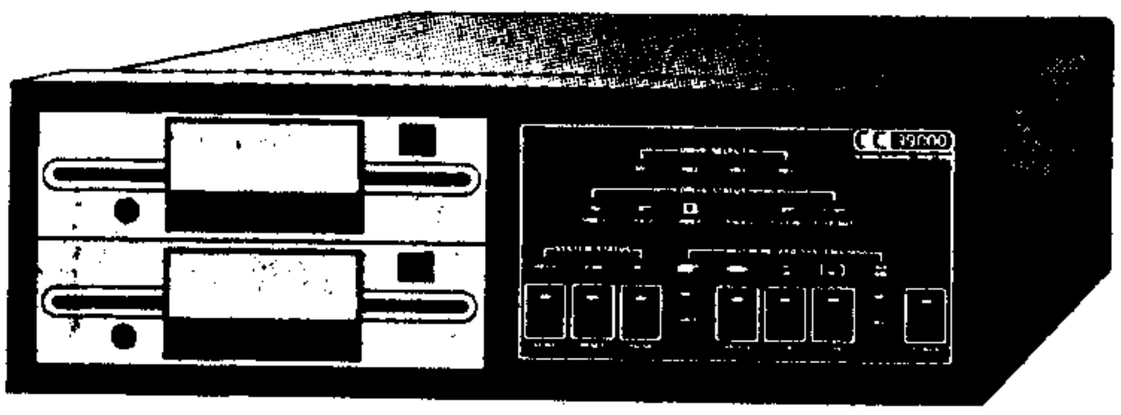

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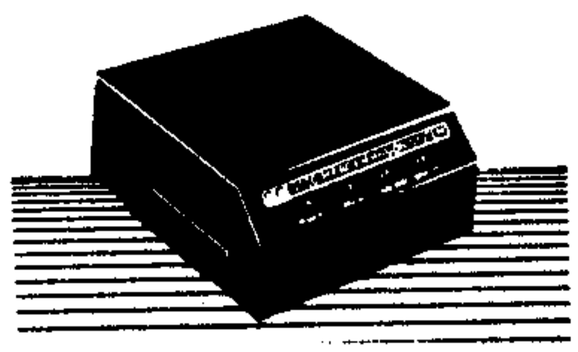

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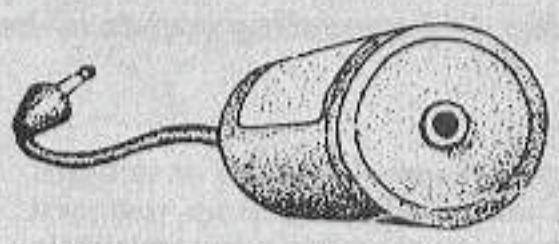

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Looking to join a users group, exchange newsletters or software, increase your users group's membership or pep up your next meeting's agenda? For the latest users group news, put your ear to the Group Grapevine. And if you have a message to put out to other groups, if you are starting a new group, or have an interesting item to share, send a note or picture—or better yet, a group newsletter—to the Users Group Editor, Home Computer Magazine, 1500 Valley River Drive, Suite 250, Eugene, OR 97401, (503) 485-8796.

John Wardrop of the large **Cleveland Area 99/4A Computer User Group** has informed us that they have split into four groups ranging in size from 50 to 70 members each: **Northcoast 99 Users,** Jim Cline, 23200 Gay Street, Euclid, OH 44123, (216) 261-2463; **Cleveland Area 99 Users,** Jon Lucas, 10204 Russell Avenue, Garfield Heights, OH 44125, (216) 441-6256; **Golden Crescent 99 Users,** Charles Mareno, 42920 Haven Drive,Elyria, OH 44035, (216) 324-4388; and **Cleveland-West 99 Users,** Mark Vantaggi, 3302 Hearthstone Road, Parma, OH (216) 886-5332. When the four work together as a "super group" it becomes possible to purchase cassette tapes and diskettes in bulk, resulting in great savings for the members of each of these groups. Recently a disk library exchange was initated with a group out of the Toledo area, bringing the total number of programs in the library to 328. If you are a TI-99/4A user and live near one of these groups, drop in and see what's happening! They sound like solid 99'ers with a lot going on!

In North Carolina, providing help for gifted children or those with learning disorders is the objective of the **Charlotte 99/4A Users.** They are working with the local school system, social service, the Foster Parent Association, and others to accomplish this worthwhile goal. According to Ken Graf, president, the 55 members of this group are proud of their library of 350 titles. The group library is available to anyone. Programs are regularly lent to shut-ins and heart patients, but they especially need someone to help with a blind owner of a 99/4A. If you are interested in joining a group that is oriented toward helping others as well as themselves, contact Ken Graf, 2637 Connemara Drive, Mathews, NC 28105,(704) 847-4224

An Executive Council has been formed for the New Jersey and New York area TI-99/4A users groups, according to Stephen Tanzer, publicity chairman for the council. The purpose of this council will be to function as a central point for user group activities and information dissemination. The council is comprised of delegates representing user groups in the New Jersey and New York area. The long-term aim of the council is to expand to support any user group needing help. Short-term plans of the council include a family picnic in the spring, and hosting an all-day fest devoted to TMS9900-based systems (such as the TI-99/4A). If any user group wishes more information about the Executive Council, they can write to the following address: **Executive Council of Home Computer User Groups,** P.O. Box 84, Dumont, NJ 07621.

The **Greater Rhode Island IBM Users Group** is a relatively new kid on the block, and the fact that they've acquired 100 members in just seven months shows that they are a serious group as well. They are affiliated with the Boston Computer Society, which gives them more depth and also more exposure, since they can put their group news in the BCS newsletter. They already have a library of 15 double-sided disks and will continue to add new programs. According to member Michael Mahoney, they have had an IBM representative demonstrate the PCjr, although no one in the group is a Peanut owner as yet. They have also sponsored demonstrations of the IBM PC XT and DOS, and IBM PC compatibles. If you are interested in this group and would like more information contact Michael Mahoney, Bryer Avenue, Jamestown, RI 02835, (401) 423-2253.

After talking with Brian Wagner of the **Tucson IBM-PC User's Group,** we learned that this band of enthusiasts, 175 strong, is in the process of merging with the much larger Institute of Electronics and Electrical Engineering which will make them an even more attractive and informative group to be associated with. So far there is only one PCjr owner in the group. Brian said sales of the PCjr have been pretty slow in the Tucson area. The group produces a newsletter called "Bits and PCs" and also has two electronic bulletin boards—one at Entre' and a second at Software Land. If you're interested in a special interest group, this is the place to go. They have Special Interest Groups for BASIC, word processing (PMATE—an early word processing program used by programmers), data base, investments, and communications. For more information contact Brian Wagner, 2330 East Edison Street, Tucson, AZ 85719, (602) 795-9437.

David Nussbaum is one busy fellow! His first group, **San Fernando Valley IBM PC Users Group,** swelled to over 250 members, causing a problem in finding space to hold such large meetings. So, what did he do? He opened a new club for all those owners of IBM compatibles and called it **Studio City IBM PC and C-O-M-P-A-T-I-B-L-E-S Computer Club!** The Studio City group serves owners of the IBM PCjr, Corona, Compaq, Eagle, Columbia and other compatibles. As a result of David's "vehement" cry for help, several SIG groups are being formed within the San Fernando Valley group. SIGs such as WORDSTAR, electronic spread sheets, word

processing, accounting, database, Pascal and BASIC, and a beginners group have surfaced. Dynamic speakers with programs relevant to what's happening in the world of the PC seem to be the rule rather than the exception at these monthly meetings. For more information, contact David Nussbaum, 11558 Riverside Drive, #207, (213) 985-8337.

Before you can have apple cores, apple pies, and apple worms, you have to have an apple tree, right? Well, Group Grapevine has heard from our first apple tree—**Suncoast Apple Tree** (SCAT)—a users group from Clearwater, Florida. Some of its members, such as Chuck Quenzler, have taken a unique approach to the multitude of everyday questions that crop up among new and experienced computer users: They invite small groups into their homes for informal "classes." The group library is so extensive that an exact count was difficult, but they have enough titles to fill four large notebooks, including titles from Washington Apple Pi and the International Apple Corps. Members are encouraged to bring in their own disks and duplicate the group catalogs. Special Interest Groups include telecommunications, bulletin boards, VISICALC, investments (they have their own in-house stockbroker), and general information. SCAT has two electronic bulletin boards which operate 24 hours a day and average 1000 calls per month. SCAT has also been working with other users groups in the area as well as the Computer Talk Show (on television station WPLP), to organize a swap meet for the near future. For more information on this group and their swap meet, contact Chuck Quenzler, 2038 Temple Terrace, Clearwater, FL 33546, (813) 531-7190.

According to Stuart Greenfield of the Austin, Texas-based **River City Apple Corps,** "He **WOZ** here!" Yes, Steve Wozniak visited the March 19 meeting and gave a presentation which included the real, complete Apple Story. "I really didn't expect him to be so honest and down-to-earth. Once again Apple computer has demonstrated its concern for its owners and its image as a family," Greenfield said. The WOZ also mentioned new products, one of which (the Apple IIc) was unveiled on April 24 in San Francisco. SIGs include Game Interest Group (GIG), MAC interest group (MACig), Investors Interest Group ($IG), and Kids Interested in Koalas (KIK). We don't know whether KIK is for kids (the smaller under 18 version) or kids (the larger version of a more advanced age)! River City Apple Corps members number 289, so if you'd like to help them reach the big 300, contact: Barry Wulfe (512) 474-1393.

The year was 1978 when five Apple "worms" first met in a garage. Since then, they have multiplied over the years to 283 members! This bit of user group trivia comes from G. F. Rowe, an original member of the **Tidewater Apple Worms** in Norfolk, Virginia. Mr. Rowe's love affair with the Apple is representative of many Apple users. It's the "do anything" machine. "You can get all the time, entertainment, and education you want from it and you can take the whole thing apart and put it back together with little bother!" Mr. Rowe feels that the Macintosh is fast, that the graphics can't be beat, and that in the not too distant future it will be more popular than the IBM PC for business uses. The Tidewater Apple Worms have several SIGs, including Green Apples (newcomers), VISICALC, word processing, simulation, and games. They will also have an exhibit at a computer show held in the Southeast in May. If you'd like to "wiggle" into this apple, contact G.F. Rowe, 3025 Vendome Terrace, Norfolk, VA (804) 625-0133.

VIC 64

You Commodore users in the Newark, Delaware area now have a users group of your very own. The **Newark Commodore Users Group (NCUG)** has been meeting on a regular basis since October 1983. At the present they have 30 plus members (mainly VIC—20 and C-64 owners) attending meetings, and they are growing each month. If you are interested in more information on this group, contact Bob Black, 210 Durso Drive, Newark, DE 19711, (302) 737-4686.

8 ^ 2 (Eight Squared), a computer club for Central Pennsylvania Commodore 64 users, has incorporated a club store into their monthly meetings. The store offers software, books and blank disks, as well as a Program of the Month, on a first-come, first-served basis. 8 ^ 2's Special Interest Groups include beginners, business/spreadsheet, alternate programming languages, modem/telecommunications, and adventurers. Besides SIG's, this Central Pennsylvania group offers classes in Beginning BASIC, Intermediate BASIC Programming, and Introductory Machine Language. The Introductory Machine Language class covers memory registers, 6510/6502 microprocessor instructions, and memory addressing modes. Programs will be written using Supermon. For more information, contact Andy Skelton (717) 486-3274.

The **Rockville VIC/64 Users Group** of Rockville, Maryland makes it possible for the whole family to attend their meetings. While the adults are having their meetings, the kids can see demonstrations of games such as Invaders, Jupiter Lander, Nite Rider, Centipede, Frogger, etc. Also, the Kid's Corner will be trying out a new idea. The club will give them disk mailers that will make it possible to swap programs by mail with their friends. If you are interested in the Kid's Corner, contact Patrick pounds, P.O. Box 8805, Rockville, MD. 20856, (301) 231-7823.

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Companion ... from p. 145

parameters can be revised within specified minimum and maximum limitations. These commands can also be set retroactively. If you decide, halfway through your article, that you want it double-spaced, you simply go back to the beginning of the text and insert a parameter revision command. The printout parameter changes are carried out on the line following the command. A REVISE IMMEDIATE command lets you make printout parameter changes on the line of text in which the command is made, and a TOGGLE REVISION command is useful when a parameter must be repetitively alternated between two particular values.

Companion includes commands that allow it to print in fancier modes, such as double or compressed mode, or emphasized mode. There is also a text blocking command to prevent certain passages of text from being split between two pages. And *Companion*'s formatting commands are always within one or two keystrokes' reach—not in separate routines that must be reloaded from diskette. This is yet another case where *Companion* is more convenient to use than *TI-WRITER*, which requires you to reload the diskette to access formatting commands.

While I'm hopping in and out of modes and menus, I should mention one aspect of *Companion* that is baffling to the uninitiated, but quite useful if used correctly. If you work on a file, go back to the menu, and then reload it, *Companion* will load the file starting wherever you left your cursor. Those foolhardy individuals who use *Companion* without first reading the manual will find themselves floundering in confusion, try-

Home Budget,jr ... from p. 152

program by pressing the [ESC] key. If you choose to change the account, a screen comes into view with instructions on using the editing commands. From this point on, editing the items is a simple task. You can even insert new items into the account with this option, although the manual suggests that you use only the Enter Expenses or Income option from the master menu rather than the account editor.

None of this information is of any use unless it is totaled and listed in the form of a report. Account Listing, option 4 from the main menu, does just this. You can elect to report on a single account or on all accounts. You can also select entries for one month or for the whole data base (generally you will keep one year in a single data base). This option lists all of the entries for the account with a total of expenses or income at the bottom of the report.

Now you will probably want to find out just how well you have been sticking to your budget. Option 6, Examine Budget, posts all of the accounts by comparing the amount provided for in the budget with the actual amount spent. You can elect to examine one account or the whole budget. If you examine one account, the report will include the budget amount (the amount you expected to spend in this account), the actual amount spent, and the balance. These figures are reported for month-to-date, and also for year-to-date, so that you can see not only how you are doing for the current month, but also for the whole year, at the same time.

The display for charge accounts is slightly different. The Charge Account option will show you how much you have spent as well as your year-to-date balance.

You can also get a month-to-date, or year-to-date total for all accounts. Here you see all of your accounts listed with the same values displayed as those shown with each single account. After viewing all of the accounts' values, you are guided to the totals screen, where you will see just how well you have been doing. The program will show how much you allowed for in your budget, how much you spent, and how much is left over. In addition, you will be shown your total income, and the difference between your total income and the amount you budgeted.

NOTE:

When selecting software of this nature you should keep in mind one important thing: With many programs there is a trade-off between program power and ease of use. Programs are available which are so easy to use they don't even require that you open the manual. These programs generally don't allow for much detail, and are designed for very small applications. An example of this might be *Home Budget Manager*, made for the TI-99/4A home computer. On the other hand, you have programs like *Home Budget,jr* which require some instruction, but only because of their increased complexities.

You should also consider this when purchasing any financial software: Will the program fulfill your needs now and in the near future, or is it "over-qualified" for the job presently at hand?

Ease of Use

Once you have gone through the manual and learned what each option does and how it affects the budget, you will have no trouble using and updating your budget records. I have seen easier programs to use, but they had a lot less to them. The *Home Budget,jr's* numerous options and attention to detail make it a bit more difficult to use than some of these. However, if you take the time to sit down at the computer and follow the tutorial format of the manual, you will have no problems. To assist the beginner, IBM has placed a number of options throughout the program which direct the user to HELP screens for crucial information and instructions. This is a feature that every program should have.

The entire program is menu-driven, making operation a snap. At any point in the program you can press the [ESC] key and go back to the previous menu to abort your present operation. All of the prompts are easy to understand and are sequenced in logical order. I cannot imagine any home budget being too big or too complicated for *Home Budget,jr*. Yet, the program has retained the operator friendliness of a less-comprehensive program. Clear, easy-to-read error messages let you know when you make a mistake. Any time you enter data into the system, you are asked whether the data you just entered is correct, and are given the option to re-enter it.

Documentation

A 98-page manual comes with *Home Budget,jr*. Set-up instructions are included, as well as a description of the account structure and how it works. The bulk of the manual is a "Do As You Read" tutorial which guides you through every aspect of a demonstration budget. The best way to understand a program is to sit down and use it, and that is just what the manual makes you do. You are carefully guided through every keystroke to build a budget, to add to it, to maintain it by correcting entries, and finally, to get reports from it.

Good programs provide some indication when an error has occurred. Unfortunately, most of them give you cryptic messages which can only be understood by programmers. *Home Budget,jr*, however, provides error messages that are easy to understand. And just in case, there are descriptions of each error message in the documentation, along with helpful hints as to what caused the problem and how you can avoid it. This is an area in which most other programs and documentation fall far short.

Saving Money

If you are constantly trying to put yourself on a budget—only to find that you can't maintain it—*Home Budget,jr* may be just the answer to your prayers. With this program you will be better able to track your budget's progress, and to pinpoint those trouble areas. And, if used regularly, it should be able to straighten out anyone's budget—probably saving them money in the process.

The details that this program is capable of retaining for each item makes it perfect not only for budgeting, but for a number of other uses. For instance, the information included in the records is adequate for most tax record-keeping purposes, or to see if you can afford a new car or home. The only feature missing in *Home Budget,jr* is a graphics option to plot the budget on the screen. The excellent graphics capabilities of the PCjr would have made this a valuable part of the program. Despite this lack of graphics output, *Home Budget,jr* is well worth the asking price, and a valuable addition to anyone's software library.

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ing to figure out why their file is suddenly too large to load or their introduction is inserted in the middle of the bibliography. This problem is easily solved by purging your file before you load it. On the plus side, this makes it extremely easy to work with "boilerplate" documents—loading chunks from other files at specified points within a form file.

Search and Destroy Missions

Companion also features the popular and useful search commands. These let you locate a specified word or phrase everywhere it appears in the text. There are four of these: FIND lets you locate the specified word or phrase each time it occurs. COUNT tells you how many times the specified sequence occurs (useful for linguistic analyses of one's prose). REPLACE lets you exchange the specified item with another by entering the word to be replaced and its replacement between slashes (e.g., /scum/undesirable element/). DELETE simply removes the not-so-bon mot wherever it appears.

Commands for moving, deleting and copying blocks of copy are the heart of a word processor's real value. *Companion*'s copy-moving functions are very convenient to use. Instead of hassling with line numbers or other representations, you simply put the copy to be moved within heavy brackets, then position your cursor where it is to go. The brackets will not print out, so you have the option of leaving them in, should you want to leave behind a history of your editing process for literary scholars studying your work.

Documentation Debatable

Companion's documentation gets a mixed review. As a "how-to" manual, it is excellent—clear and easy to understand. I especially like the way the first chapter lets you jump right in and use the system immediately, without first wading through pages of dull procedural descriptions. A short, step-by-step script explains how to load the diskette, enter text, and print out your file.

On the minus side, it is not designed for use as a reference tool. It has no index. It does have a fairly detailed table of contents, but the items are not arranged alphabetically or according to any easily understood logic. So you have to read through the entire table of contents to find each item. And individual commands are not necessarily listed there at all. This can be very irritating if, for example, you have made a colossal error and are frantically searching for the "I-take-back-what-I-just-did" command.

This brings up another problem: *Companion* has no "oops" command. This is a provision found in *TI-WRITER* and many other word processors that lets you cancel any mistaken command you have just made. So if you accidentally delete the dynamite ending you wrote at the terminal, it is not lost forever. Actually, I never thought the oops key was very important until I was using *Companion* and accidentally pressed [FCTN][3]. The entire screen (the entire file!) filled with dots between every word. Dismayed at the thought of having to go through and space between each word in a 1000-word text, I flipped through the manual, searching in vain for a handy reference chart of commands. A complete list of commands should be a requirement for any word processing manual. And a removable reference card—such as you get with *TI-WRITER*—is even better. (Incidentally, you can cancel the polka-dot effect with another [FCTN][3].)

The Final Verdict

Companion certainly ranks among the best word processors for the 99/4A. It contains all the most important editing, text-moving and formatting functions and is exceptionally easy to use. Whether it is the best system for *you* depends on three factors: 1) your particular word processing needs, 2) whether or not you have or want *Extended BASIC*, (required for *Companion*), and 3) the availability and prices for both *Extended BASIC* and *TI-Writer*. Keep in mind that both systems also require a 32K memory expansion device. [For availability and prices, see ads in this issue.—Ed.]

For serious word processing, *TI-WRITER* will probably perform best—especially if you need to see your text formatted on screen and utilize formatting features not found in *Companion* (on-screen word wrap, 40+ screen margins, and mailing list options). Also, because *TI-WRITER* is the de facto standard in the 99/4A world, there remains a good possibility for third-party enhancement products that link to *TI-WRITER* files. [TI has generously provided the "hooks" for these add-ons. At the time this issue is going to press, we've already heard of a spelling-checker enhancement that may shortly be available.—Ed.]

But if you already own (or want to own and can find) *Extended BASIC*, and desire a word procesor for the ultimate in writing ease, you should check out Intelpro's product. For just writing (as opposed to formatting), I found it faster and easier to use than *TI-WRITER*. Writing is, after all, a lonely business; a helpful *Companion* at your side could ease that burden. HCM

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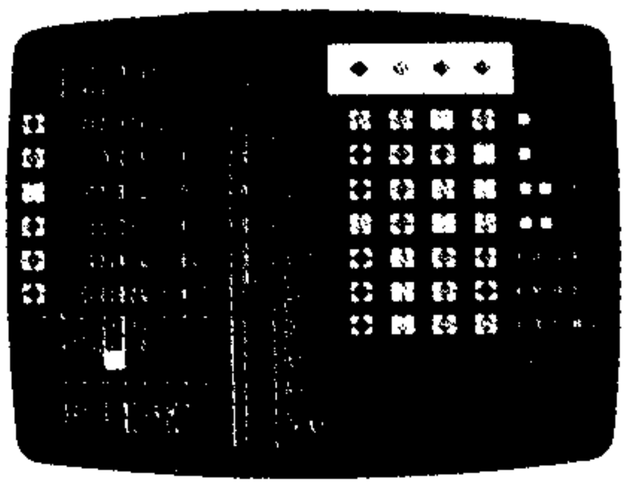

An incorrect screen photo for Cyber-Cipher was inadvertently printed on page 113 of this issue. The above screen photo is correct.

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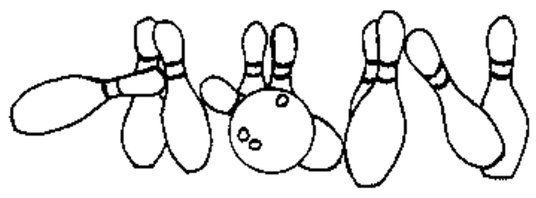

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