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# HOME COMPUTER® magazine

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Vol. 5 No. 5

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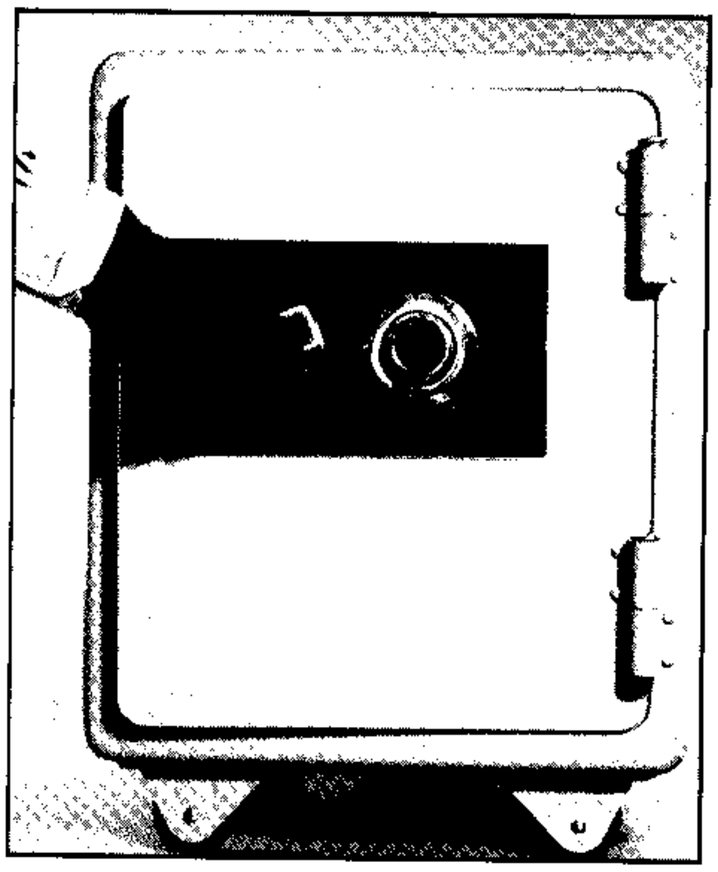

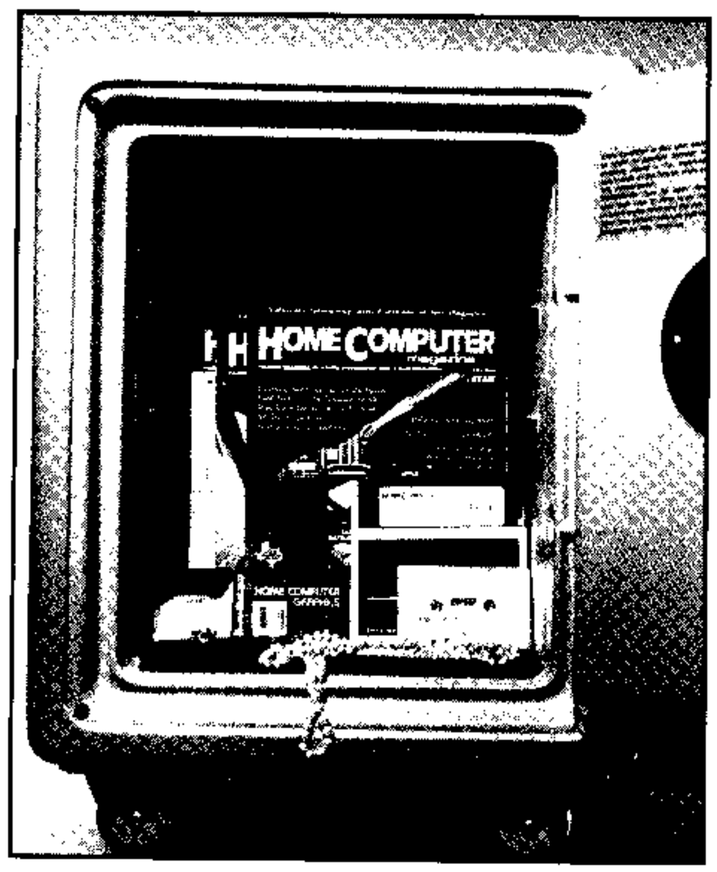


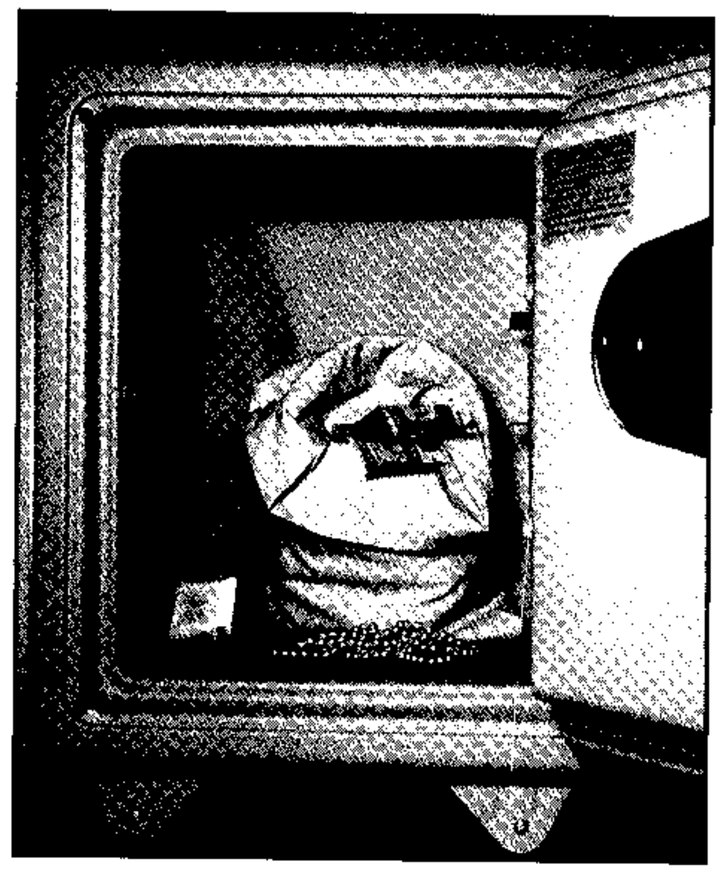

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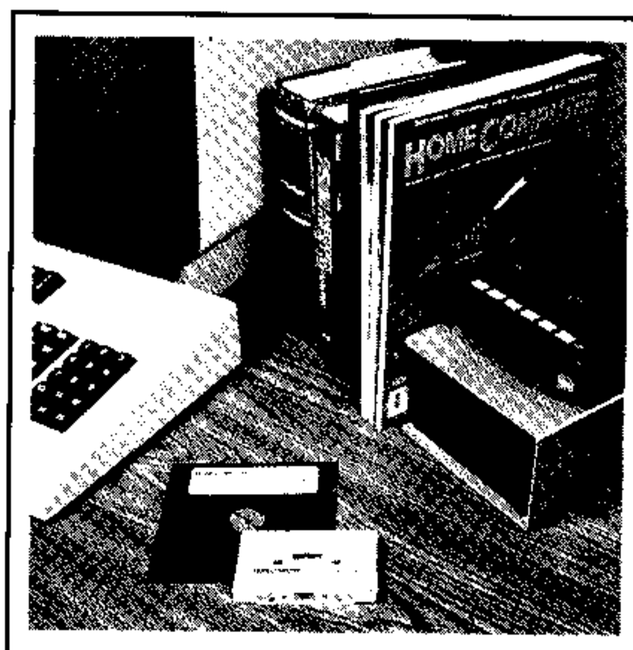

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| COMMODORE 64 (C) | ON DISK™/ON TAPE™ |
| IBM PC/PCjr (I) | ON DISK™ |
| TI-99/4A (T) | ON DISK™/ON TAPE™ |

*** = No ON TAPE™ available, even if normally supported**
**TX = Extended BASIC programs only**
**PCjr = Available for PCjr only**

**Apple owners:** Please note that ON DISK™ Media for *HCM* 4.1-4.3 is in DOS 3.3 format only, and all Apple programs beginning with *HCM* 4.4 are in ProDOS format. All programs will RUN on a 64K Apple II + (with Applesoft BASIC in ROM), an Apple *IIe*, or an Apple *IIc*.

**Apple & IBM "clone" owners:** Some *HCM* programs may not RUN (without modification) on your machines, because of differences in hardware and/or BASIC interpreters.

### Issue 4.1:

**Premier Issue** * Uncle Larry's Fiddle Tunes * Electronic Sheet Music * Music in Mini Memory * PCjr: A Look Inside the Peanut's Shell * 66 Keys to Graphics Success: A Primer for the Commodore 64 * Have No Fear: Assembly Language Won't Byte, Part 3 * Porsches and other Pipedreams: Computer Assisted Savings * 3DIIe: Apple Graphics in Three Dimensions, Part 1 * Biting Into Your Apple * Don't Be A SlowPOKE * Down Memory Lane: Don't let programmable characters gobble up your memory * Easy As Pie: Apple programming for intricate works of art * Microcomputer Accuracy * What is LOGO? * Lyrical LOGO * LOGO Shoots for the Moon: A lesson in structured problem-solving * Product Reviews * Flak Attack * Slots * Meltdown * Challenging the Tower of Hanoi * HCM TECH NOTES: Apple, C-64, IBM, and 99/4A * Product News * Group Grapevine, and much, much more!

**CONTENTS: ON TAPE™ & ON DISK™**

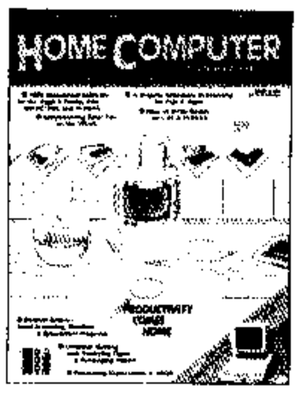
**Flak Attack** (A,C,I,T)
Air-to-ground battle game
**Applesoft 3D** (A)
Apple graphics in three dimensions
**Tower of Hanoi** (A,C,I,T)
An ancient brain teaser
**Saving** (A,C,I)
Computer-assisted savings plan
**LOGO Poet** (A,C*, I)
Recursion frees the poet in your console
**LOGO Apollo** (C*, T)
A lesson in structured problem-solving
**Slots** (T)
An intriguing Las Vegas simulation
**Uncle Larry's Fiddle Tunes** (C, I, T)
Play ten beloved fiddle tunes
**Music Magic** (TX)
"Joy to the World" in harmonious BASIC
**Music Assembler** (T)
Assembly language simplifies composition
**Autosprite** (C)
Routines to keep your graphics lively
**Meltdown** (TX)
Debug the reactor and save the world

### Issue 4.2:

Graphics * Sea of States * San Francisco Tourist * Building Your Character: A Graphics Editor for the VIC-20 * Quick Pixel Tricks: A Graphics Editor for the C-64 * Follow the Bouncing Ball: On the rebound with graphics fundamentals * 3DIIe: Apple Graphics in Three Dimensions, Part 2 * Double Your Color, Double Your Fun: Sprites try on a layered look * Musical Mystery Words * Matrix Muncher * Elementary Addition and Subtraction for the VIC-20 * IBM Animation: Controlling the pallet on the PCjr * Jr. Sounds Off: Access Jr's Special Sound Enhancements * The Electronic Home Secretary * Files in LOGO * LOGO Spans the Generation Gap: A review of Commodore LOGO * FROGO: LOGO Invades the Arcade * Product Reviews * Tablut * Cannibals * HCM TECH NOTES: Apple, C-64, IBM, and 99/4A * Product News * Group Grapevine, and much, much more!

**CONTENTS: ON TAPE™ & ON DISK™**

**Cannibals** (A, C, I, T)
Livingston Stew, I presume?
**FROGO** (T)
A logical LOGO learning lesson
**The Home Secretary** (A, C, I, T)
Address & inventory recordkeeping
**LOGOFILES** (A, C*, I, T)
Access your DATA files in LOGO
**Sea of States** (C, TX)
State Capitals and dive for booty
**Tablut** (C, I, TX)
14th-century strategy revisited
**Matrix Muncher** (C)
Solve unknowns simultaneously
**Graphic Editor** (C)
Pixel tricks create easeful graphics
**Mystery Words** (A, I)
Reading between the treble clefs
**PCjr Animation** (PCjr)
Exploring Junior's graphic modes
**Applesoft 3-D IIe** (A)
Edit your 3-D graphic shapes




### Issue 4.3:

Productivity * Snap-Calc: A Homespun ready-to-use spreadsheet * Bars and Plots: Create colorful graphic charts of your records * Elementary Addition and Subtraction for the 99/4A and C-64: A powerful children's learning tool * Spider Graphics: Spin a colorful web on screen * Convertible for Comfort: Automatically convert your machine-language programs to DATA statements * Programming: The Name of the Game: Designing your own game—a complete tutorial * Colorfun on your VIC-20 * Product Reviews * Binary Forest: Branching out with LOGO * LOGO Flakes: Creative explorations with snowflake designs * Robochase * Cyber-Cipher * Wild Kingdom * Speeder * Boolean Brain * Missile Math * HCM TECH NOTES: Apple, C-64, IBM, and 99/4A * Product News * Group Grapevine, and much, much more!

**CONTENTS: ON TAPE™ & ON DISK™**

**Snap-Calc** (A, C, I, TX)
Home sweet spreadsheet
**Robochase** (A, C, I)
Run from the rampaging robots
**Spider Graphics** (A, I)
Spin a myriad of rainbow filaments
**Boolean Brain** (A, I)
A graphic Adventure inside computers
**Wild Kingdom** (A, C, I, TX)
Flee ferocious felines
**Missile Math** (A, C, I, T)
Launching grade-school arithmetic
**Binary Forest** (A, C*, I)
Branching-out with leafy LOGO trees
**Bars & Plots** (T)
Color your chart factfully
**Cyber-Cipher** (T)
Decode correct color combinations
**Elem. Addition & Subtraction** (C, T)
BASIC preschool arithmetic skill-builder
**LOGO Flakes** (T)
Snowflakes in June? This must be LOGO
**Convertible for Comfort** (C)
Machine Language DATA auto-conversion

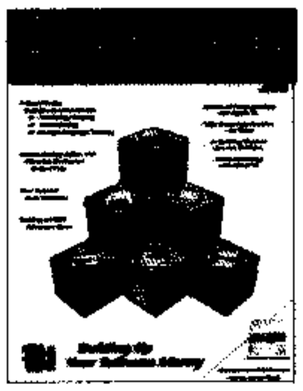
### Issue 4.4:

Computer Sports * IIc: The Core of a New Machine * On the Home Court: Computer Sports Simulation * Razzle Dazzle: Quick Graphics Magic for the 99/4A * Simon Sez: Plug in 114 new BASIC commands to the Commodore 64 * Tax Deduction Filer: A complete tax recordkeeping program convinces you that makes tracking of deductions a breeze * Kaleido Computer: Creating a myriad of mosaic designs on your home computer * Multiplan Medium, Part 8 * Have No Fear: Assembly Language Won't Byte, Part 4 * The RS-232 Interface: Understanding Your Link to the Periphery * One for the Money, Two for the Slow—Adding a Second Drive to the PCjr * Missionary Impossible: A Logic Puzzle in LOGO pits you against hungry Cannibals * Product Reviews * Boolean Brain * Stadium Jumping * Market Madness * Elementary Addition and Subtraction: An arithmetic tutor (for Apple and IBM PC and PCjr systems) * HCM TECH NOTES: Apple, C-64, IBM and 99/4A * Product News * Group Grapevine, and much, much more!

**CONTENTS: ON TAPE™ & ON DISK™**

**Boolean Brain** (C, TX)
A graphic Adventure inside computers
**Tax Deduction Filer** (A, C, I, TX)
SAVE-ing with your tax deductions
**Market Madness** (A, C, I, TX)
Exciting Stock market simulation
**Stadium Jumping** (A, C, I, T)
Horsing around an Olympic Stadium
**LOGO Spreadsheet** (A, C*, I, T)
And you thought LOGO was kidstuff
**Missionary Impossible** (A, C*, I, T)
Watch out for Cannibals with LOGO
**Elem. Addition & Subtraction** (A, I)
BASIC preschool arithmetic skill-builder

And There's More On The Next Page

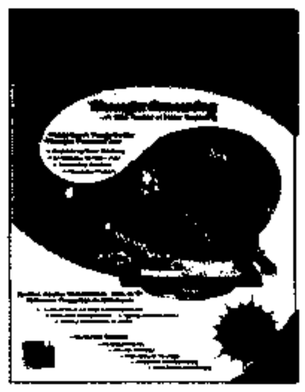


## Issue 4.5:

Building Up Your Software Library * Quiz Construction Set: Create a Quiz or Take a Quiz—a must for students and teachers * Personal Loan Calculator: Find out where your interest lies * Jumping Ahead With Game Programming: A complete game programming tutorial includes a program example * Sketch-64: Joystick graphics with just a flick of the wrist * Simon Sez: New string-related commands explained * Razzle Dazzle: Character manipulation on the 99/4A * Division Tutor: Teaching BASIC math learning skills * Putting The Puzzle All Together: Apple IIc Programming Considerations * Bird Brain * Slither * LOGO Clones: TI Graphics In a Turtle-Shell * Build A LOGO Adventure, Part 1 * Product Reviews * HCM One Liners * HCM TECH NOTES: Apple, C-64, IBM, and 99/4A * Product News * Group Grapevine, and much, much more!

### CONTENTS: ON TAPE™ & ON DISK™

**Bird Brain** (A, C, I, T)
Keep your fishing feathers dry
**Division Tutor** (A, C, I, TX)
Expand elementary math skills
**Personal Loan Calc** (A, C, I, T,)
Find out where your interest lies
**Sketch-64** (C)
Use a joystick to draw graphics
**Quiz Construction Set:**
**Quiz-Make/Quiz-Take** (A, C, I, T)
Complete tutorial with file examples
**Peg Jump** (A, C, I, T)
Learn BASIC game programming
**Slither** (A, C, I, T)
A maze of snake-like proportions
**LOGO Clones** (T)
TI-Graphics in a Turtle-Shell
**LOGO Adventure** (A, I, C*)
Pt. 1: Creating interactive fiction



## Issue 5.1:

Thought Processing: A New Frontier in Home Computing * The Organizer: Store and organize your thoughts * Orbital Defender * Quiz-Print/Quiz-Print Tutorial: This educational enhancement is a tool for use with your Quiz Construction Set (see *HCM* 4.5) * Electronic Backgammon: A modern version of an ancient game of skill * Razzle Dazzle: Screen patterns with graphics characters on the 99/4A * Kors-Elf: An Arcade Typing-Tutor Game * Personal Loan Calculator: Find out where your interest lies * Apple Seedlings: A ProDOS Date-Setting Utility * IBMpressions: Create a beautiful pie chart * Build A LOGO Adventure, Part 2 * LOGO Sailing: A Premier Yachting Event * Simon Sez: Composing music is simple * HCM TECH NOTES: Apple, C-64, IBM, and 99/4A * Product News * Group Grapevine, and much, much more!

### CONTENTS: ON TAPE™ & ON DISK™

**Orbital Defender** (A, C, I, T)
Split-second battle decisions
**Electronic Backgammon** (A, C, I, TX)
Pit your pips against the computer
**Kors-Elf** (A, C, I, TX)
An arcade typing adventure
**The Organizer** (A, C*, I, TX*)
A versatile Thought Processor
**Quiz-Print** (A, C, I, T)
Format printouts of your quizzes
**Apple Seedling** (A)
BASIC utility dates ProDOS files
**LOGO Adventure** (A, C*, I)
Pt. 2: Creating interactive fiction
**Merging Files** (C)
Experienced hackers only!
**Personal Loan Calc** (T)
Find out where your interest lies
**Razzle Dazzle** (T)
*Wormwood* your character graphics
**LOGO Sailing** (T)
Turtles race for the America's Cup
**IBMpressions** (I)
Create a beautiful pie chart

## Issue 5.2:

Number Crunching: The Building Blocks of All Computing * It Figures: An equation calculator that'll crunch your numbers accurately * Evacu-Pod: See if you can rescue all the miners in this challenging space game * Switch 'n' Spell: Electronic anagram brain teasers to puzzle over (for children, and adults) * Laserithmetic: Strut your math skill with this space fantasy edu-game * Organizer Reports: An enchancement to print-out your organized thoughts (see The Organizer *HCM* 5.1) * Razzle Dazzle: Tinker with musical sounds, or Play it Maestro! * What is CP/M?: Learn the Basics of Control Programming for Microcomputers * Apple Seedlings: Sorting out your ProDOS Catalog * Commodore Hornblower: Discover what's inside the Commodore 64's SID chip * IBMpressions: Create 3-D surface drawings in BASIC * Field & Screen: A tutorial for using a Data Base System—correctly * Product Reviews * HCM One Liners * HCM TECH NOTES: Apple, C-64, IBM, and 99/4A * Product News, and much, much more!

### CONTENTS: ON TAPE™ & ON DISK™

**Evacu-Pod** (A, C, I, TX)
Miner rescue in space
**It Figures!** (A, C, I, TX)
A mighty equation calculator
**Laserithmetic** (A, C, I, T)
Blast aliens with your math skills
**Organizer Reports** (A, C*, I, TX*)
Print your organized outlines
**Switch 'n' Spell** (A, C, I, T)
A spelling aid that's fun to boot
**Apple Seedlings** (A)
Sort your ProDOS catalogs
**Commodore Hornblower** (C)
Inside the SID chip
**IBMpressions** (I)
3-D surface drawing in BASIC

## Issue 5.3

Computerized Budgeting: Featuring a ready-to-use budget processor (Budgetron) * Honing your Geometry skills (Geometrix) * LOGO Adventuring (Build A LOGO Adventure, Pt. 3) * Survive a nuclear plant disaster (Over-Reaction) * Guard the seaways with nuclear submarines (Torpedo Alley) * Turtles race with Zeno's theory (Achilles and the Turtle) * Apple Seedlings: Character graphics on the hi-res screen * Commodore Hornblower: Select waveforms and envelopes from SID * Razzle Dazzle: Multi-layered animation with TI sprites * IBMpressions: Blending sign waves into complex patterns * MAC-ROs: Expanding BASIC on Macintosh * Speeding Up a BASIC Program * Product Reviews * HCM One Liners * Group Grapevine * Product News, * HCM TECH NOTES: Apple, C-64, IBM, and 99/4A, and much, much more!

### CONTENTS: ON TAPE™ & ON DISK™

**Budgetron** ( A, C, I, T )
Budget your income and expenses
**Geometrix** ( A, C, I, T )
Sharpen your geometry skills
**Over-Reaction** ( A, C, I, T )
You're at a nuclear plant's controls
**Torpedo Alley** ( A, C, I, T )
Keep the enemy's ships at bay
**Achilles & the Turtle** ( T )
A LOGO demonstration of Zeno's Theory
**LOGO Adventure, Pt. 3** ( A, C*, I )
**Apple Seedlings** ( A )
Character graphics in hi-res
**Commodore Hornblower** ( C )
Waveforms & envelopes from SID
**Apple Tech Note** ( A )
Key-in checking routine
**IBM Tech Note** ( I )
Selective keyboard input
**Commodore Tech Note** ( C )
Merging programs from disk
**TI Tech Note** ( T )
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## Issue 5.4

Time Management: Computer-Assisted Efficiency Comes Home * Run-Day-View: Let your computer streamline your day * Trig-Trix: Use the triangle as a measuring tool * Archeodroid: Participate in a future archeological dig * Mine Over Matter: Hone your business skills in this simulation of uranium mining operations * MAC-ROs: Create custom graphic shapes on Macintosh * IBMpressions: Create your own computer windows * Razzle Dazzle: Explore sound-on-sound recording with this 3-track recorder program * Apple Seedlings: Use a pie chart as a visual aid * Commodore Hornblower: Change filters on the SID chip * Algorithm-A-Tricks: Create invisible ripples * Speeding up a BASIC Program: Part 2 * Build a Logo Adventure: Part 4 * Product Reviews * HCM One Liners * Home Computer Industry Journal * Product News * HCM TECH NOTES: Apple, C-64, IBM, and 99/4A, and much, much more!

### CONTENTS: ON TAPE™ & ON DISK™

**Run-Day-View** (A, C, I, T)
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**Trig-Trix** (A, C, I, T)
The triangle makes measurement easy
**Archeodroid** (A, C, I, T)
Join a future archeological dig
**Mine Over Matter** (A, C, I, T)
Manage a uranium mine
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**Apple Seedlings** (A)
Creating pie charts
**Commodore Hornblower** (C)
Changing filters on the SID chip
**Apple Tech Note** (A)
Exiting error routines
**Commodore Tech Note** (C)
Merging programs from tape
**IBM Tech Note** (I)
Using special character graphics

**NOTE:**
Programs for the IBM PC/PCjr will run on the Tandy 1000 with modifications specified on page 130.

## This space reserved for Issue 5.5

**Atari** users please note that coverage in HCM didn't commence until Issue 5.5—the issue you are now viewing.

Also commencing with this issue, programs for the IBM PC/PCjr will run as is on the Tandy 1000.

## FOR NEW READERS

# The Plain & Simple Truth About HOME COMPUTER™ magazine

## Chock Full of Valuable Software & How-To Articles Without Filler

Every issue is a software "horn of plenty" with dozens of type-in-and-RUN programs printed in an easy-to-read listings format. Our programs are also available on inexpensive disks or cassettes for those who prefer the convenience of ready-to-RUN software. Step-by-step tutorials round out each issue, providing the solid facts you need without fluff or filler. Thus, each issue functions as an excellent reference work, as well as a valuable software source.

## No Outside Advertising

Freed from the pressures of servicing *advertisers*, we concentrate on serving our *readers*. Each issue provides uninterrupted editorial flow and graphic layouts for better comprehension—plus unbiased product reviews which focus on true strengths and weaknesses, wherever the chips may fall . . . And we don't have to worry about losing advertisers because of publishing software in the magazine that is "too good." Consequently, we can provide the best free software available anywhere.

## Focused on the 5 Hot Home Brands

We are 5 system-specific magazines under one wrapper—not a sprawling, "general interest" publication which attempts to cover too wide a field, only to spread itself too thin. The other side of the coin to this focused approach is the knowledge you gain from being exposed to the many tips, ideas, and techniques we provide for 4 of the 5 systems you may not even have. You'll learn more about your Apple, Atari, Commodore, IBM, or Texas Instruments home computer from this one magazine than from a host of more limited sources.

## A Balanced Mix For a Perfect Recipe

In each issue we strive for a perfect balance of productivity, entertainment, education, utilities, and computer literacy—serving the needs of novice and pro alike. Every issue is a full-course meal, with a smorgasboard of tasty dishes for all palates. Whereas other computer magazines may dish out lumps of "editorial indigestion," we serve up a satisfying blend—one digestible byte at a time.

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# Outside HCM

*What kind of contraption is this?* If you've seen our last few covers, you know by now that we like to transform old gizmos into new ideas—illustrating how your home computer can go way beyond the abilities of past, single-purpose machines. We've depicted an antique coffee grinder as a "number cruncher," a classic alarm clock as a computerized scheduler, and now, an ancient typewriter (circa 1905) as still another transfigured electronic tool—the "memoranda processor." What next? If our imaginations are not limited, neither are the uses of our amazing home computers.

# Inside HCM

*Memory . . .in a machine?* Remember the last time you sat in front of your computer. Was it like the time before? Or did your trusty machine show you an entirely different face? In fact, each time you boot up another piece of software, your computer seems to become almost a different machine.

In humans, such inconsistent behavior can either be sign of senility, or of acting ability. But your machine is not senile. Like the man of a thousand faces, the computer is a multi-faceted performer. Its versatility lies in its incredibly *flexible* memory. Software fills this memory with a *script*, telling the machine what to do, how to *act*.

In this issue of *HCM*, we give your computer many roles to play. Our software runs the gamut from memorable simulations to memory helpers. Take *Electronic Typewriter*, a simple tool for processing memos, letters, lists, and short schedules. This program has all the virtues of a memory typewriter—it combines quick and easy typing with line-by-line editing.

A computer's memory resides like a ghost in the machine. Hardware provides a storage place for memory; software provides memory-instructions which the computer must read and turn into action. Giving the computer a different set of instructions is a bit like changing its "face"—giving it a different appearance, and another purpose. *NanoProcessor* is a software simulation of the malleable machine on its most fundamental level. Learn how to enter simple instructions into this computer model *bit-by-bit*, creating programs (even music routines) in a language of ones and zeros.

From the heart of the machine, we move on to *Vital Signs*, a simulation of our own heart and respiratory system. If you can keep this heart model beating—as you respond *consciously* to the effects of exercise and changing air quality—you may learn how to prolong the beat of your own heart.

King Arthur has a place for the stout of heart on his final battlefield: *The Plains Of Salisbury*. One hint: In this strategic exercise—played out on a terrain much more complicated than a chessboard—the key to planning future moves is the ability to remember past ones.

And let us remind you: Each machine brand we cover gets its own quick and helpful program within a mini-tutorial column. In this issue, *Apple Seedlings* blends sine waves into vibrational applesauce; *Commodore Hornblower* sets sail with SID's special effects; *IBMpressions* casts 3-D shadow graphics; *Razzle Dazzle* calculates super-accurately on the 99/4A; and our new column, *Atari Atrium*, illuminates 4-channel sound-on-sound recording.

Can your computer become a source for print graphics? Discover the ins and outs of this new software genre in our comprehensive *Home Print Studio* review. Then examine several music and sound products, including *Music Construction Set*, *Music Video Kit*, *Music Synthesizer*, and *Mockingboard*, a sound board for the Apple II family. And , if you're in need of galactic guidance—and some cosmic humor, check out our review of the *Hitchhiker's Guide To the Galaxy*.

Fill your computer's memory with our software, and you can immediately see the variety of roles it can play in your life. Read our reviews, and find out what your machine *might* do with what's available in the commercial market.

*As* the machine remembers, it thinks about what to do next. *What* the machine remembers is what it *does*. So, go ahead—make use of *Home Computer Magazine* and give your computer some very useful memories. You're in for a "memorable" treat.

**Until next time, have fun reading, learning, and RUNing** HCM

# On Screen

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

***"Many people have been put off . . . by the term 'electronic music' which unfortunately invokes auditory images of spacey-sounding squeaks and squeals right out of some '50s sci-fi movie."***

This issue represents another milestone in the evolution of *Home Computer Magazine*. As we start mapping out the editorial content for our sixth publication year which commences this January, we do it as a larger magazine—expanded in size and content with coverage of a fifth major home-computer user base: the diverse family of Atari 800-compatible machines.

I would thus like to take this opportunity to welcome all our new Atari friends to the *HCM* fold. Many of our long-time readers may be wondering why we are adding this coverage now. For some time, we have been receiving a tremendous number of requests from the Atari community—coming in the form of letters, phone calls, and visits to our booth at Consumer Electronics Shows. The message to *HCM* is now crystal-clear: *Atari users want in*! It didn't take a proverbial "whack on the side of the head" for us to realize that a dual service and expansion opportunity now existed: We could provide new service to the large, active Atari user base; and we could foster additional cross-pollination of fresh ideas within a larger base of *HCM* readers. Before this expansion, however, we first wanted to put in place a series of format enhancements—including our Programmer's Windows, Glossary, Industry Journal, Counterpoints, sectional edge-tab IDs, and so on. You've seen all this implemented over the last several months.

In this issue we are presenting another major enhancement—our new debugging aid for readers who prefer to type in our program listings, rather than order them ready-to-run ON TAPE or ON DISK. We have optimized our Bug-Out Codes (BOCs) and checking utilities to make the job of catching typing errors as simple and painless as possible. And we've accomplished this without sacrificing any readability or clarity in *HCM*'s widely acclaimed listings format.

Long-term readers have witnessed a steady improvement in our published programs over the past year—demonstrating our commitment to excellence. Although we now craft *each* of our magazine programs with extra-special care and attention to detail, there is, on occasion a program that stands a little taller than the rest. A case in point is this issue's *NanoProcessor*. It artfully employs what a computer does best—dynamic simulation—to "demystify" the machine's own inner workings. In my opinion, this simulation is destined for the Software Hall of Fame. Though many have tried hard to *teach* the rudiments of machine language, most have only succeeded in *scaring off* the uninitiated. But, with *NanoProcessor*, even the meek can inherit this down-to-earth knowledge—*and have loads of fun doing it*! Next issue, we will follow with *NanoAssembler*, a tool for "playing" your way into the formerly esoteric realm of assembly language.

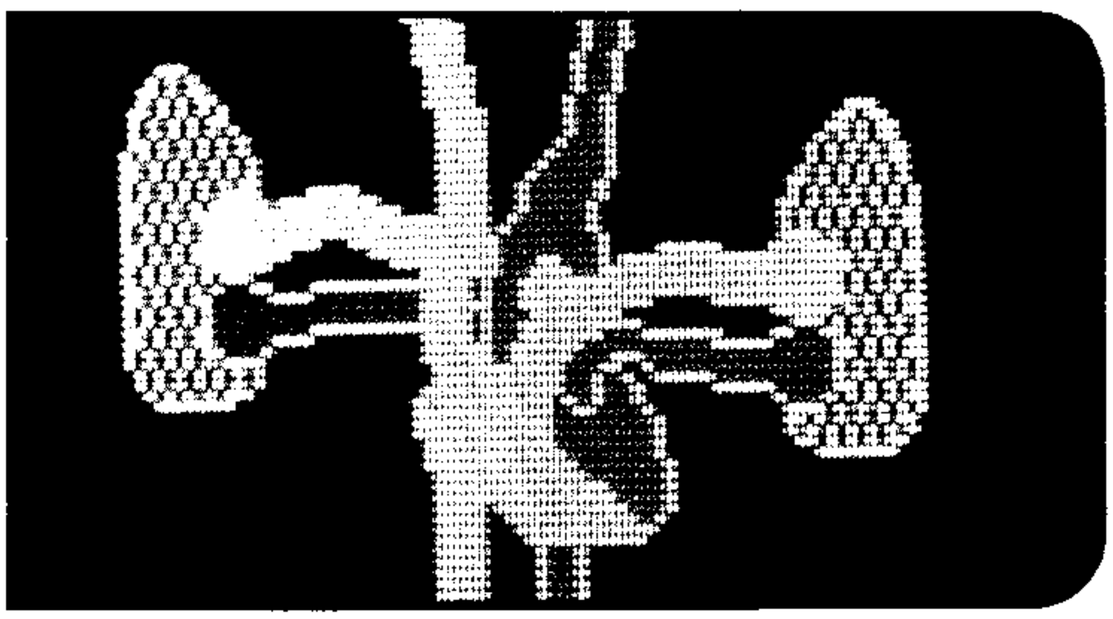
On another score, the hills around *HCM*'s Emerald Valley are alive with the sound of music, as we premiere "Soundbytes." This column bridges *HCM* to its new sister publication, *Music & Electronics*. I confess that we have somewhat of an ulterior motive for providing this bridge: We'd like to bring you all across! So, check out our two-page announcement following "Soundbytes" for details about the new magazine and how you can become a charter subscriber.

Preparing for the launch of *Music & Electronics* has, in fact, been a real "ear-opener" for me—providing a measure of excitement that I can only liken to the beginning of the home computer revolution. As I've discovered, the link-up with music synthesizers and other gadgets in the production of electronic music is truly a harmonious use for home computers. Many people have been put off, however, by the term "electronic music," which unfortunately invokes auditory images of spacey-sounding squeaks and squeals right out of some '50s sci-fi movie.

Let me assure all of you that both the sound quality and stylistic possiblilties of what is more aptly called "electronically produced music" must simply be heard to be believed. And what's even more amazing is that you don't have to be a *musician* to participate in all the creative fun. Even those of us who don't know the difference between treble and tribbles can produce musical recordings that are out of this world . . . Those of you who first want to "hear it with your own eyes" (or "see it with your own ears"), will get a small taste of all this sensory excitement in an upcoming issue of *HCM*—replete with some bound-in musical surprises.

In our next issue of *HCM*, we will have a new challenge for our readers as we launch the "Problems In Productivity" series. This first challenge requires the use of *HCM*'s *Snap-Calc* spreadsheet tool to analyze typical financial alternatives for a college education, and come up with a cost-effective solution. *Snap-Calc* was originally published in Volume 4, Number 3; so if you don't yet have the program, get ready by ordering the magazine and software ON DISK or ON TAPE now. And while you're at it, take the opportunity to fill in any other gaps in your *HCM* back-issue reference collection.

# HOME COMPUTER magazine



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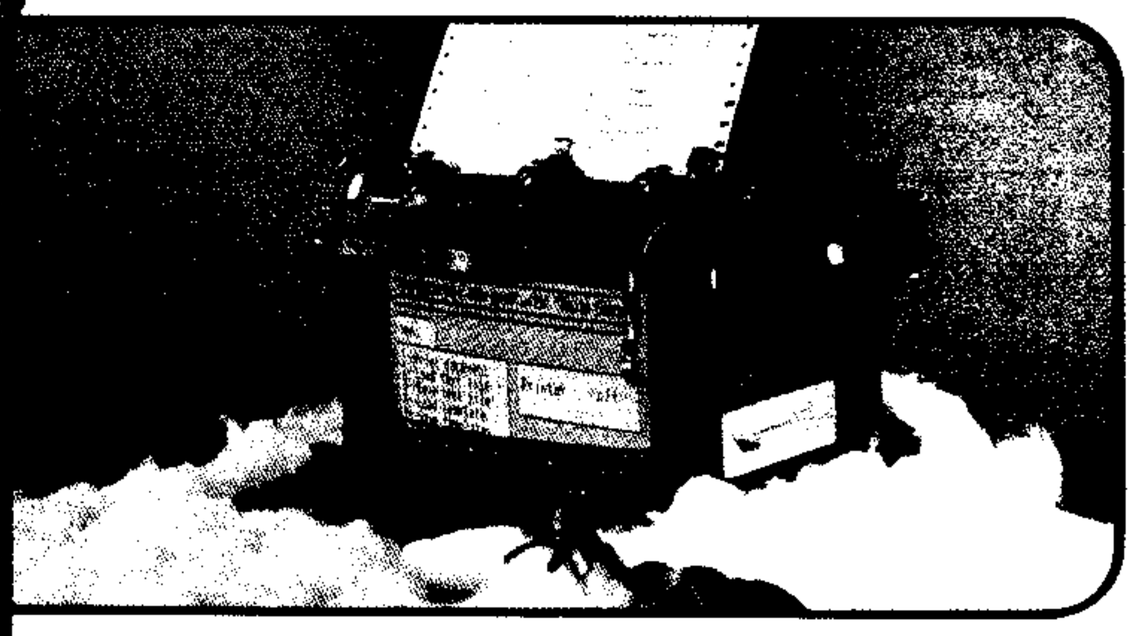

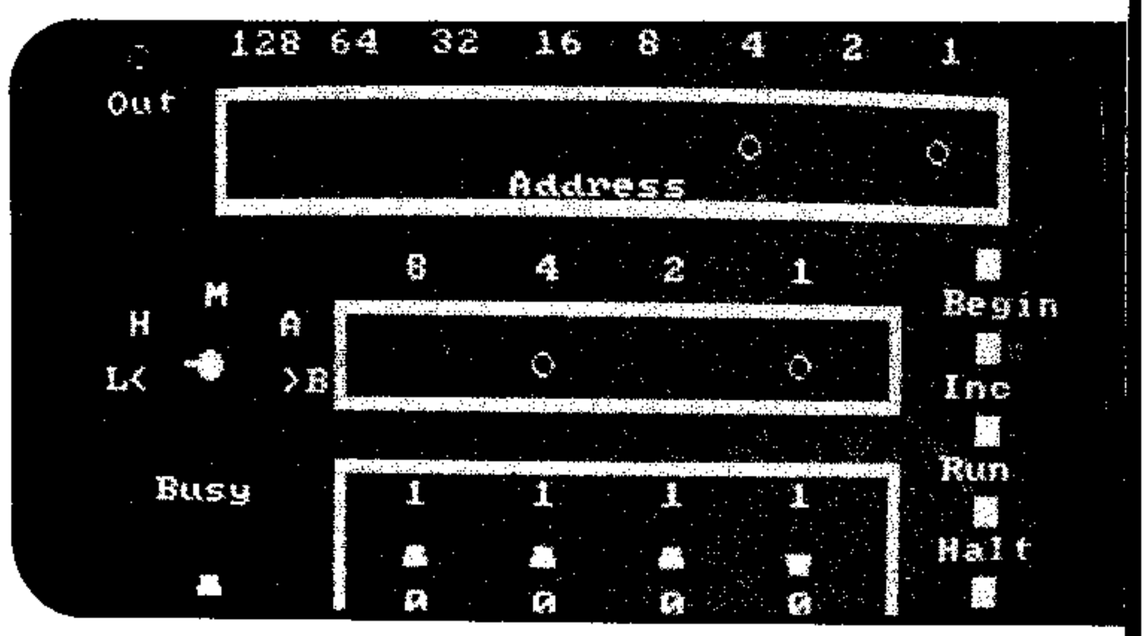



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## MACHINES SUPPORTED

| Machine | Requirements | Media |
|---|---|---|
| APPLE II family | At least 64K RAM & Applesoft BASIC | ON DISK |
| FRANKLIN ACE | At least 64K RAM | ON DISK |
| ATARI 800, 800XL, 130XE | -None- | ON DISK/ON TAPE |
| COMMODORE 64 | -None- | ON DISK/ON TAPE |
| COMMODORE 128 | Must be in 64 mode | ON DISK/ON TAPE |
| IBM PC | BASICA | ON DISK |
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| TANDY 1000 | GW-BASIC Version 2.02 | ON DISK |
| TI-99/4A | TI BASIC or Extended BASIC | ON DISK/ON TAPE |

## SPECIAL NOTES

**Apple Owners:** Apple ON DISK media for *HCM*, Vol.4, No.1-Vol.4, No.3 is in DOS 3.3 format only. Beginning with *HCM*, Vol.4, No.4, all Apple programs are in ProDOS format. All programs **RUN** on Apple II+, Apple *IIe*, or Apple *IIc* computers.

**Franklin Owners:** Beginning with *HCM*, Vol.4, No.4, all Apple ON DISK media is in ProDOS format only. Booting ProDOS on a Franklin requires the following steps:

1. Boot ProDOS. When the system hangs up, press [RESET].
2. Type 265B:EA EA and press [RETURN].
3. Type 2000G (insert no spaces between the last zero and the G) and press [RETURN].

See *HCM*, Vol. 5, No.4, page 13 for more information.

**Tandy 1000 Owners:** Starting with *HCM*, Vol.5, No.5, all of our IBM PC programs run on the Tandy 1000 without modifications. Programs prior to Vol.5, No.5 may need minor changes as explained on page 130 of *HCM*, Vol.5, No.4.

**Errata:** In Program Listing Contents on page 75, the Atari Tech Note is incorrectly shown as page 57. The correct location is page 52.

# Letters to the Editor

## Just In Atari Time

Dear Sir:

I would like to compliment you on your magazine. I find it to be one of the most useful and informative magazines I have read for home computers.

However, since subscribing to your magazine, I have sold my TI-99/4A and upgraded to an Atari 800 computer.

Frankly, I don't understand why you don't provide coverage for the Atari line of home computers.

Do you have plans to include them in your magazine now that Atari has introduced their new XE and ST lines?

Barry Gray
Sacramento, CA 95828

*A timely question, Barry. You are one of many Atari users who have written in the past several months to ask for Atari coverage. Well . . . Surprise! In this very issue, as you can see, we are premiering full coverage of the Atari 800 family and compatibles. Each issue will include Atari versions of all our major programs, as well as an Atari Tech Note and "Atari Atrium." Starting with this issue, Atari programs are also available ON DISK and ON TAPE. Letters to the Editor from other Atari users will be published in this column commencing with our next issue. So hurry and get them in to us! This seems like the right time to make the following announcement:*

### ATTENTION: ATARI USERS GROUPS

HCM periodically publishes Group Grapevine, a bulletin board of users group activities across the nation, and in other countries as well. Beginning in the next issue (Vol. 5, No. 6), Group Grapevine will cover Atari Users Groups in addition to our normal coverage of Apple II, Commodore 64, IBM PC & PCjr, and TI-99/4A users groups. We hereby issue an open invitation to Atari Users Groups everywhere to join our "grapevine" of computer enthusiasts. If you are an active member or officer of your local Atari Group, please write or call our office immediately to insure coverage of your organization. And if you have a message to put out to other groups, if you are starting a new group, or if you 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, Tel. (503) 485-8796.

## Great Julian Date Mixup Fixed

Dear Sir:

In regard to Max A. Shelhorse's letter in HCM Vol. 5, No. 3, page 11:

As an avid amateur astronomer for almost 15 years, I've had occasion to write a program which calculates the positions of the planets in their orbits for any date and time. This, of course, includes a routine to determine the Julian date.

Upon examining Mr. Shelhorse's Julian date algorithm, I recognized it as being correct and could not see how it would determine Jan. 1 to Mar. 1 as 65 days. Closer scrutiny of your listing, however, revealed that the error seems to stem from a possible quirk in the TI-99/4A's interpreter.

Note that in line 130 the second parenthesis is not closed in the calculation of DP. While this would result in a syntax error on my Spectravideo SV-328 computer (which uses the same BASICA & GWBASIC as the IBM), it apparently goes undetected on the TI-99/4A for which the routine was written. I was able to duplicate your erroneous value of 65 by writing the calculation as DP – INT(30.6001)*(MF). It appears that somehow the TIs interpret the typographical error in this way, rather than refusing it.

Simply closing the last parenthesis should resolve the "Great Julian Date Mix-Up." Following is a slightly modified, Microsoft BASIC, version which creates fewer "local" variables and makes the routine somewhat more universal by also allowing for BASICs which do not have the ELSE clause:

```
500 'Julian Date subroutine (enter with
    YR = year, M-month #, D = day)
510 F = YR :MF = M :IF M<3 THEN
    F = YR - 1 :MF = M + 12
520 IF YR< = 1582 AND M< = 10 AND
    D< = 15 THEN JD = 0 :GOTO 540
530 JD = INT(F/100)
    :JD = 2 - JD - INT(JD/4)
540 JD = JD + INT(365.25*F) + INT(30.60
    01*(MF + 1)) + D + 1720994.5
550 RETURN
```

Gregory S. Vigneault
Toronto, Ontario, Canada

*Gregory, you discovered a typo in our listing, not a bug in the TI BASIC interpreter—line 130 does require a closing parenthesis just as you have noted. With this corrected, the more important bug from the original letter of Max Shelhorse is still apparent when this program is run. Line 130 of the original listing starts like this:*

```
130 A = INT(F/100):: B = 2-A + INT(A/4) . . . .
```

*By comparing it with line 530 in your listing above, we discovered the real problem—the plus (+) should have been a minus (–). If you make these two fixes, Max Shelhorse's listing and yours give identical (and correct) Julian Dates. Thanks for helping us unravel this celestial mystery.*

## Commodoring In Argentina

Dear Sir:

I'm the happy owner of a Commodore 64 and I'm very interested in telecommunicating. I have several questions I'll be very happy if you could answer.

Could I telecommunicate if I have the Datasette or do I need the disk drive?

What things do I need to telecommunicate; is it enough only having the Vic-modem?

I'm also interested in making a RESET. How can I make it; can't a key be programmed for that?

Any assistance you can provide me will be greatly appreciated.

Ignacio Adrogue
Buenos Aires, Argentina

*You need only two things to make telecommunicating easy: one is a VicModem, or any other C-64 compatible modem unit; the other is software that can send, receive, and handle data via modem. Although you can write your own software, you may want to obtain some type of commercially-available "terminal-emulation" software package, such as VIP Terminal from Softlaw, or SKIWriter II from Prentice Hall (reviewed in HCM Vol. 5, No. 4). As for the RESET feature, see the Commodore Tech Note, "Installing a Reset Switch" in Vol. 4, No. 4.*

## Wants Apple Frequency Blender

Dear Sir:

I own an Apple *IIc* computer and find your magazine very helpful. In your last issue (Vol. 5, No. 3), there was an article for the IBM entitled "Frequency Blender" which interested me. I have been trying to find a program which extracts cycle frequency and amplitude from data using fast Fourier analysis and also would like an Apple program which could blend the cycles into a composite curve like the IBM program. Could your magazine and staff include a program in Home Computer Magazine or suggest a source to find a program which would do this? Thank you.

Richard L. Laughlin
Tulsa, OK 74105

*The answer to the second part of your request is right beneath your fingertips, Richard. In this issue, "Frequency Blender" for the Apple II family appears in our regular mini-tutorial, "Apple Seedlings." We have some doubt, however, that the 6502 processor in the Apple IIc is fast enough to do the kind of Fast Fourier Transformations (FFT's) you desire.*

## 2nd Disk Drive and PCjr Warranty

Dear Sir:

Having sought information about adding a second disk drive to my PCjr for almost four months now, I have found that the only thing that exceeds the amount of information available from sales reps, shop techs, and other "experts" is the amount of misinformation one acquires during the search. The most valuable piece of information I acquired was relevant to your fine, fine magazine. I latched onto Volume 5.2 and 5.3—straight scoop without the poop! Obviously I require Vol. 4, No. 4 which contains the original article. Check enclosed.

One of the criteria established (in consultation with the wife) was that the addition of a second drive could not result in our version of the national debt. That ruled out third-party manufacturers. Hello! Do it yourself! Your instructions and kit seem to offer the only hope. Thanks, HCM.

As the result of this letter to you, I called Randall Baxter, who lives in my area, about the procedures you published for adding the second drive. A point he made was that any modification to the disk drive controller card would probably invalidate the balance of the year's warranty on my machine. Ah, serious consideration time. It would be most advisable for me to wait until my warranty expires. Mind you, I'm not superstitious, but I don't take chances either.

In light of my decision to wait until the magic November 1985 date when my warranty expires, do you suppose that the kit and instructions you have so thoughtfully provided at an extraordinarily reasonable cost would be available until then? I could invest in it now, but the way the PC market is now, I might have already moved into an IBM PC by that time. (That statement resulted in some mention of a dead body by my wife—it wasn't clear whom she meant!)

Not intended to cause palpitations, but anything in the works about a do-it-yourself project for adding a hard disk (or did I miss that too)?

Anyway, thanks for having a fine magazine with great articles and even better programs.

F. E. DiGirolomo, Jr.
Duncanville, TX 75116

*Yes, Mr. DiGirolomo, installing the drive kit will indeed void your warranty, as we stated in the original article (Vol. 4, No. 4). However, we will continue to sell the kit as long as there is any demand for it—so if you want to wait, don't worry. We'll have it in November when you need it.*

## More SIDs for "Music of Sound"

Dear Sir:

Your reviews get better and better, and this two-part series on "The Music of Sound" for the C-64 is a prime example. Have you heard of anyone making a cartridge or interface to add more SID chips to the Commodore so more voices/tones could be created? The Commodore 64 Programmer's Reference Guide on the 6581 SID (sound interface device) chip suggests on page 460 that: "SID can process external audio signals, allowing multiple SID chips to be daisy-chained or mixed in complex polyphonic systems." Imagine, if you will, what such a successful addition would do to music—even speech synthesis! Can this not be done?

Souping-up the C-64 this way seems pretty cost-effective from this consumer's point-of-view. Can I make a general appeal to those IC wizards out there? Any word of this being attempted by anyone?

By the way, in hooking up your C-64 to a stereo amplifier any buzz produced from poor grounding can be stopped by reversing the outlet, or cables' plugs. Try 'em all until the buzzing quits or as in my case, make sure the entire setup is plugged into a grounded circuit.

Elizabeth Schelper
Ft. Myers, FL 33901

*Thanks, Elizabeth, for the compliment on our "Music of Sound" reviews. All the effort put into these articles seems to have been well worth it—judging by the favorable response from our readers. If the link between music and computing is one of your chief interests, you'll love our soon-to-be-released sister publication, Music & Electronics. We share your intrigue with the idea of daisy-chaining multiple SIDs together to—as the manual states—"create complex polyphonic systems." According to Commodore, there is no definite source for the SID chip apart from the C-64 itself. However, we do know of one supplier: The Jameco catalog (1355 Shoreway Rd, Belmont, CA 94002, Tel. 415-592-8097) offers the SID chip for $32.95. Perhaps some of our readers know of other sources. You might also contact local computer repair shops to see if they have a "junkpile" of otherwise unrepairable C-64s with intact SID chips that you can salvage. If any HCM readers attempt this project, we'd be interested in hearing about the results.*

## Expanding His TI-99/4A

Dear Sir:

Since I have become a TI-99/4A owner just seven months ago, I have become very involved with learning and enjoying all aspects of the computer.

I then discovered HCM on a newsstand and have purchased many back issues and software from your firm, enhancing my knowledge and enjoyment, but the software is on cassette tape.

I now want to add a disk drive, but do not have an expansion box. Please tell me how to add one in the most practical and inexpensive manner.

I now subscribe to HCM and look forward to each new issue. Keep up the good work!

Joseph A. Nicosia
Auburn, CA 95603

*We know of three disk drive expansion units currently marketed for the 99/4A: the Texas Instrument Peripheral Expansion Box (TI PEB), the Myarc Peripheral Expansion System, and the Corcomp 9900 Micro Expansion System. The TI PEB sells for about $300 and includes one single-sided/single-density disk drive, a disk controller card capable of handling up to three disk drives, and a 32K Memory Expansion Card. Myarc's system sells for about $600 and includes a double-sided/double-density disk drive, a double-density disk controller that can control up to 4 drives, and the 32K memory expansion. Corcomp's system sells for around $325 and comes with an RS232 port, a disk drive controller, and a disk-based disk manager—the disk drive is extra. All three systems are available through several major TI-related product catalogs (Triton, Unisource, TexComp, Tenex, etc.), although there may be other regional or local sources. Thanks for the good words, Joseph, and good luck!*

## A Better Way To Write Thank You?

Dear Sir:

I want to thank you for such a great magazine. I have a PCjr and find your magazine to give the best coverage for the PCjr. I also like your new coverage of the back issues of HCM Vol. 5, No. 3—I am ordering two more back issues to complete my total collection of HCM. I also want to thank you for your Tech Notes—especially Vol. 4, No. 3 on Format A:/S. This saves a lot of time and hassle and provides many hours of enjoyment with my PCjr. Would you run a program on some sort of word processing or something similar so that I can sit down and write a letter such as this without having to worry about margins or running out of screen room? At the present, I use the Function + Prtsc key to print a letter, but when my letter is of greater length than my screen allows, I lose part of my letter.

I am looking forward to each and every issue of HCM. Keep up the great work.

James R. Delaney
Tedxico, IL 62889

*With this issue, your wish is our command, James! The Electronic Typewriter (starting on page 19) will just fit the bill. It is ideal for letters, memos, or any other short correspondence.*

## What Am I Doing Wrong?

Dear Sir:

The purpose of this letter is twofold. First, my congratulations to you on a fine magazine written without the normal advertising. Prior to last month, I always purchased the magazine at a bookstore. I now have subscribed and will look forward to receiving it through the mail on a timely basis.

The second reason [for writing] is I am not a very experienced computer operator, and I am having trouble updating your programs when corrections are to be made. When I follow the sequence of commands as directed by the flyer included with the disk and try to save the merged version, I get a PATH NOT FOUND message. If I type the correction, I am able to merge the program with the correction. But being a hunt-and-peck typist you can see the problem this presents.

Can you tell me what I'm doing wrong? Thank you.

Dorsey Williams
St. Louis, MO 63116

*You do not say what brand of computer you own, Dorsey, but from the kind of error message you are receiving, we assume you have an Apple II operating under ProDOS. ProDOS (Apple's Professional Disk Operating System) is an improvement over all previous versions of DOS for the Apple—it Loads and Saves files more quickly and lacks several of the bugs that existed in the earlier operating systems. It does, however, contain a few new aspects which might cause trouble for the inexperienced, Dorsey. One thing that you're sure to encounter is Prefixing. Every disk formatted for ProDOS has a Volume Name which makes up the first part of the Prefix for any file you wish to access. All Apple HCM disks have the name ON.DISK followed by the volume and issue numbers that correspond to the issue of that software. For example, this issue's disk has the name /ON.DISK.5.5 (the slash is added by ProDOS as a delimiter). As ProDOS "boots-up" from our disks, the Prefix is set to the ON DISK volume name. If you wish to access a different disk, you must do one of two things: (1) null the Prefix, or (2) set the Prefix to a different disk. The easiest way to null the Prefix is to simply type* PREFIX */then press [RETURN]. To reset the Prefix, you must place the new disk in the drive and execute a* PREFIX *command. If you know the Volume Name, you can type* PREFIX /name, *where* name *is the Volume Name of the disk. An alternative way to reset the Prefix is to place the disk in drive one and type* PREFIX,D1. *The system will then check that drive and reset the Prefix. If you are swapping a number of disks in and out (say, you are Cataloging a number of disks just to see what is on them), nulling the Prefix is most convenient. If, however, you want to make sure that a file is written to or read from a particular disk, Prefixing that disk is an added safety measure. For more information about Prefixing see the "Home Computer Tech-Note for Apple" in HCM Vol. 4, No. 5.*

# Letters to the Editor CONTINUED

## The Elusive C-64 One-Liners

Dear Sir:

I think your magazine is the greatest! I work on a PCjr at school and have a Compaq and a TI-99/4A at home, so I get quite a lot of use out of each one of your magazines. My girlfriend, however, knows only four words for her Commodore 64 (LIST, RUN, LOAD, and PRINT). So, when she asked me to show her something that her C-64 could do, I got real excited! I figured I would type in one or two of your HCM one-liners and really impress her. First, I typed in your Graphics Spectacular (issue 4.5) and nothing happened. The computer simply responded with <READY>. Not too discouraged, I NEWed the first program (SYS64759) and typed in another (It's Alive!, issue 5.3). It flashed the bottom two rows of the screen in white for about half a second. Needless to say, she was real impressed. I checked what I typed in with what you printed twice for each program. What's the matter here? Is it simply my ineptitude on the Commodore computer?

Jason Harper
Fairfield, OH 45014

*Debugging typed-in software through the mail is just about impossible, Jason, but your difficulties probably stemmed from a lack of familiarity with the C-64. Because a line on the Commodore can contain no more than 80 characters, One-Liners make use of a number of abbreviations (such as F [SHIFT] O for FOR and N [SHIFT] E for NEXT). After you've keyed in such abbreviations, however, the Commodore expands them to full-size commands again. This means that if you make an error when entering the program, you will have to change all the expanded commands back to abbreviations when you edit the line so that it still fits within the 80 character maximum. We hope this gives you some idea of the nature of your errors.*

## 99/4A Disk Manager Available

Dear Sir:

Having read your Vol. 5, No. 3 issue of HCM, I decided to try and locate a TI Disk Manager II module. After only making two telephone calls, I found that the following business has these modules "sitting on their shelves." The cost is $19.95 plus $3.00 for S&H. Contact Altex Electronics, 10731 Gulfdale, San Antonio, TX 78216. You can even order via the telephone (1-800-531-5369).

Hope this will be of help to any other readers who are currently looking for the Disk Manager II. Evidently, Edward Stack didn't call or contact the right people.

Keep up the good work and thanks for not forgetting about all of us that have the TI-99/4A.

Jerry Petrel
Auburn, KS 66402

*Thank you, Jerry. We have verified your information by phone. It's good that we can rely on people like you to help keep track of TI peripherals—considering that specific items are often available only from regional or local sources.*

## New PCjr Owner Gets More Help

Dear Sir:

After haunting the magazine section of our local bookstore for the past five months looking for PCjr articles, suddenly your magazine appeared. Feeling like the proverbial Edsel owner, it was with humble gratitude that I carried HCM home. I was hoping for a few crumbs such as I had been finding in other computer magazines; but such a feast! Thank you. The same day that I purchased Vol. 5, No. 1, one check was written for the subscription and another for all of the back issues I had missed. When the back issues arrived it was interesting to see the evolution of your format. The present format is extremely readable and the type-in programs the most legible I have seen. Also, the Debugs on Display has gone from relatively indecipherable to very clear.

With the compliments comes a request for help or information as the case may be. I have typed in several short graphics programs (Ripples and HCM One Liner, Vol. 5, No. 2 and IBM Animation, Vol. 4, No. 2) with no results. I know it takes time for the calculations to occur, but how much time is reasonable? I have left the computer alone for up to an hour with nothing to show for it except a black screen and an irregularly blinking cursor in the upper left corner. I received Ripples ON DISK and tried that too with the same results. I'm willing to wait to see results, but not for hours. Is there something I am missing in trying to run these programs? In case it makes any difference, I have the enhanced PCjr with the Tecmar Captain board for 256K and use a memory configuration program worked out by IBM that frees up the memory in better fashion than the Tecmar software.

Thanks again for a very useful magazine. I really enjoy the productivity programs and the Tech Notes.

Lynn Cox
Kerrville, TX 78028

*We are always happy, Lynn, when readers applaud our efforts to constantly improve the quality of this magazine. As for the problem you are experiencing with running our software—it is probably due to the IBM software that reconfigures your memory for use with the Tecmar board. You can use such software when running applications (such as Lotus 1-2-3) which can employ more memory than the PCjr normally offers. IBM Cartridge BASIC can only access 64K of memory, however, so any extra memory will not be used. In addition, the reconfiguring software places memory into an arrangement that differs from what the BASIC interpreter expects to find. This can have disasterous results, especially with graphics routines. When you wish to work in BASIC, just boot up with a standard DOS 2.1 master disk, and you should have no trouble running our software. Of course, the Tecmar memory will not be active, but then, neither will it be necessary. In short, save the reconfiguration software for applications that can use it.*

## ProDOS For Franklin

Dear Sir:

I received your May edition (Vol. 5, No. 3) of HCM and started to read the "Letters to the Editor" column. I came to an article requesting information on how to boot ProDOS on a Franklin. I thought I might try to help a little considering that I also own a Franklin ACE 1200.

I had the same problem myself when I purchased an AppleMouse which included software written in ProDOS. I recently learned of how to permanently fix a disk so ProDOS will boot automatically on a Franklin.

You need to use a program such as Copy ][+, Nibbles Away, Bag of Tricks, or Byte Zap (found on Apple Mechanics) with a "Sector Editor" option to change the data on a ProDOS disk. For ProDOS version 1.0.1, you need to alter two locations on Track 01, Sector 09 of the disk: locations 5B, and 5C hexadecimal. These two locations will contain a D0 and a 03 respectively. Change both of these to EA and your Disk will now boot on a Franklin without a hitch.

I hope I could be of some help to any other computer enthusiasts who own a Franklin.

I am 15 years old and I enjoy reading your magazine!

Henry James Curry
Hope Mills, NC 28348

*Thanks, Henry, for the Franklin Disk modification. We checked out this ProDOS/Franklin fix and found that it works great and does not affect the disk's ability to run on Apple computers. Although any modification like this entails a certain amount of danger (you could "blow up" your disk if you made a mistake), Franklin owners may find it convenient to modify ProDOS startup disks this way.*

## Converts Father To TI-99/4A

Dear Sir:

Please enter this gift subscription as soon as possible. My father spent most of his life as an electronics engineer and later was chief test director for a large aerospace company which is part of the giant Textron conglomerate. He purchased a TI-99/4A for me about two years ago, and I was immediately hooked. Last year, over his protests, I bought him a TI and an Extended BASIC cartridge, and now he is equally addicted. Up until that point he had never used a computer and was afraid that he was too old to learn and enjoy the world of computing. Now, after less than a year, his acute mathematical and engineering abilities have made him a veritable whiz!

He inspected several issues of your fine magazine when he visited last time, and he is now writing an article for submission to you, dealing with the graphic representation of simple and complex mathematical equations, a task which he feels the TI-99/4A is over-qualified to perform. He also feels, after looking at the publications available, that your magazine is the only choice he would make as far as submitting an article.

One closing note. I have been computing about two years and I also feel that your magazine is the finest available and that your program listings are far and away the finest published anywhere.

Thanks for great entertainment and instruction. I'll be reading you faithfully.

Robert P. Marsh
Greensboro, NC 27407

*We thank you for the encouraging words, Robert, and look forward to hearing from your father!*

## Response to Quadram Review

Dear Sir:

The content of HCM has been able to shake up my grey matter with bits and pieces of information. These pieces come from all parts of the magazine. It appears that IBM has inadvertently placed in the hands of six or seven hundred thousand people a rather remarkable machine. That is, of course, if we can figure out just what it is that we have in our hands.

Contrary to your review, I claim that the Quadram equipment that I have attached to my IBM PCjr will operate other programs while outputting to the printer from QSPOOL buffer.

Software used:

1. Quadram QuadMaster jr Version 1.03 of 2/01/85.
2. IBM Writing Assistant Version 1.01
3. IBM DOS 2.10

In Quadram CONFIG.SYS, it is absolutely essential that JRVIDEO.SYS be placed first for configuration. The configuration that works for me is as follows:

```
DEVICE = JRVIDEO.SYS
DEVICE = QUADCLOK.SYS
DEVICE = QSPOOL1.SYS 48 48
DEVICE = RAMDRIVE.SYS 295
```

When booting up with the above, I was able to make all features of Writing Assistant work perfectly, including the QSPOOL print buffer. I have to believe that there must be others experimenting as I do. BBS is OK. Media does what it can. As I have heard, "what the mind can conceive, machines can do." HCM just may be on the right track as an information dispenser for the Orphans of the computer society.

I am told that Racore Corporation, 10 Victor Square, Scotts Valley, CA 95066, (408) 438-7255 is the designer and producer of the hardware and software that I have described in this letter.

Lloyd E. Howard
Chelsea, MI 48118

*Thank you, Lloyd, for the information. You say you use version 1.03 of the Quadram software. When we reviewed the product, we had version 1.02, and this apparently made all the difference between your experience and ours. We received the updated version shortly after your letter arrived, and we found that many of the functions that we reported as faulty, such as the QSPOOL, did indeed work great with the new software. In fact, the batch files that we reported having trouble with worked just fine once we used the new version of the software. Thanks for putting us on the right track. Your note about Racore also proves correct. Racore was the original manufacturer of the Quadram, and now also markets the enhancement unit described in the review. In addition, the company recently released a 10 MB harddisk (they quoted a $1299 price when we called them), and will soon release a DMA controller for the PCjr ($149). Racore claims that its software is entirely different from Quadram's. We found it to be quite similar, however, except that no QSPOOL is available. Racore also informed us that the printer buffer option will now come as part of the DMA board.*

## Two Commodore Questions

Dear Sir:

I have two questions about the Commodore 64. First, I would like to know if there is a company somewhere that sells programs that will change the C-64 to run Assembler programs. Second, I would like to know if there are any bulletin boards for Commodore in my area. Thanks for your time.

Tim Gitchel
Irving, TX 75060

*Tim, any C-64 can run assembler programs. There are many assembler programs available for the C-64 that allow you to write routines in assembly language and then convert that code into machine language. Here are three such assembler packages: Assembler Development System from Commodore, Merlin-64 from Roger Wagner Publishing Co., and the MAE Assembler from Eastern House. It is very likely that most of the programs you are using are already in machine language. Such programs can be identified by the LOAD"name",8,1 format used to load them from disk. As for your second question, we suggest you call Bill Marshall of the Irving Commodore Users Group (214-256-1402). He will probably be happy to hook you up to the local BBS scene.*

## TI To Okidata—Come In, Please

Dear Sir:

In Home Computer Magazine Vol. 4, No. 4, a letter from Mr. Nisius states that one can hook the parallel output of the TI-99/4A to an Okidata with a cable where one wires:

| TI-99/4A | | OKIDATA | |
|---|---|---|---|
| **Term.** | **Description** | **Term.** | **Description** |
| 1 | Handshake Out | 1 | Data Strobe |
| 2-9 | Data | 2-9 | Data |
| 270K-ohm resistor in series with: | | | |
| 10 | Handshake In | 11 | Busy |
| 11 | Logic Ground | 10-30 | Data Return |

Does this mean 10-30 on one side, the Okidata side, is all run to 11 on the TI side? Or does it mean the only other change is to cross 10 and 11 and add a resistor? I'd like to make my own cable. Please advise.

Stanley Page
Vancouver, BC, Canada

*According to Tom Nisius, his solution is sufficient for his printer, Stanley. He placed a 270K-ohm resister in series with pin 10 of the TI and pin 11 of his Okidata, and connected pin 11 of the TI directly to pins 10-30 of the Okidata. It is important that you realize that this procedure is not for the novice and that it might not work on your printer. We did a little checking with two companies that market cables necessary for the interface (Tenex, P. O. Box 6578, South Bend, IN 46660; and Innovative Electronics and Computing, 4150 Fox Street, A-5, Denver, CO 80216). They verified that the 270K-Ohm resistor solution will probably not work on many models of Okidata printers. Technicians at both these companies stated that, apart from the pin differences you've recanted above, the timing of the Handshake In and Busy signals is not compatible between the TI and Okidata printers. Both companies' cables contain capacitors and even have active circuitry to put the two units in sync with each other.*

## Junior Graphics Dump

Dear Sir:

First, I would like to congratulate you on your fine magazine and wish you continued success. HCM is the only magazine that is really a voice of the users—especially PCjr users. While all the "PC" magazines take their monthly shot at the PCjr, you tell everyone the many things it does very well. Some magazines can't seem to understand that they are comparing a $799.00 machine with a $2900.00 machine.

I recently had a problem that perhaps other IBM users can benefit from. I have a Star Gemini 10x printer that normally works fine. When I run GRAPHICS.COM on the DOS disk, however, and then do graphics screen dumps to the printer, the line spacing is incorrect (leaving 10/144 of an inch between lines). Using Debug, I located the line feed spacing and corrected it. Now the program works fine. The procedure is listed below:

```
A>debug graphics.com
-a0168
0905:0168 mov ax,000e
0905:016B <return>
-ngrprint.com
-w
Writing 0315 bytes
-q
A>
```

Now simply use GRPRINT.COM instead of GRAPHICS.COM> The 0e in 016a controls the line feed size.

Keep up the good magazine! PCjr owners need you!

Todd Vernon
Warrensburg, MO 64093

*Many thanks, Tom, both for your encouragement, and for your helpful update. We discussed the problem in the "Home Computer Tech Note for IBM" in Vol. 5, No. 1 and presented a solution in BASIC. Using DEBUG.COM to actually alter the GRAPHICS.COM routine is a very interesting solution. We did find that in completing the process with our Gemini 10, the number 0008 worked better than 000E, so anyone who tries this fix might want to experiment a bit.*

## Trouble In ProDOS

Dear Sir:

My computer is a 64K Apple IIe and I have only one disk drive. Your notes with "ON DISK" say that I need not buy anything to use these disks, however I am having far too much trouble with ProDOS. I hope that you can help me.

I learned for the first time of Prefix,D1 from your Tech Note in Vol. 4, No. 5. After formatting a disk I have typed Prefix,D1 then saved programs to my disk but I can't get it to boot up. I get the message "UNABLE TO LOAD PRODOS."

Several weeks ago I called your Customer Relations and it was suggested to me that I try loading and saving Startup—that did not work either. I tried to run it and got "HAS TO BE BOOTED." Well, I got back the "UNABLE" message again.

# Letters to the Editor CONTINUED

I listed and read your "input.namefile" and saw in line 360 "link to disk access routine." It would seem that access routine is what I need. Could you get this routine to me in the simplest of terms (as I am a novice) before I pull my hair out!

If the "fixes" for the programs can't be made without booting up each time, I will never get them right. I love the type of programs that are offered—just what I need. The magazine is excellent, but personally I could use some simple "type this and that" sort of thing. I will be subscribing to the magazine soon as it is hard to find around my home. I will be waiting for your help anxiously.

Mrs. E. O. Coldiron
Bridgeview, IL 60455

*No, Mrs. Coldiron, you don't need to re-boot every time you want to make a change. You normally need to boot up only when starting a session. To start a session, boot up with the ON DISK original disk, select Exit To Applesoft BASIC, and then place the disk with the files you wish to work with in the disk drive. Then type PREFIX,D1and you're ready to LOAD, RUN, or modify any programs on that disk. Each time you change disks, you should change the Prefix. For more tips on Prefixing, see our answer to the letter from Dorsey Williams ("What Am I Doing Wrong") in this section.*

*If, however, you re-boot the system either by turning the power off and on or by pressing [CONTROL] [OPEN-APPLE] [RESET] then you will need to put a disk in the drive that contains two very important files: PRODOS and BASIC.SYSTEM. If these files are not on the disk when you re-boot, then you will indeed get the UNABLE TO LOAD PRODOS message. Simply formatting a ProDOS disk does not add these files to the disk, and therefore the disk is not a "boot disk." All of our Apple ON DISK products since Vol 4, No. 4 contain these two startup files and are thus boot disks. If you wish to make additional startup disks, you will need a ProDOS filer utility available from Apple.*

## MissingLink Inventor Comments

Dear Sir:

Thank you for your request for response to a review by Pat Swift of the Missing Link in Vol. 5, No. 3 of HCM. I cannot thank you enough for alerting TI owners of its existence as it has been an uphill battle, and I think Pat did a good review of it. I sent Pat some thoughts separately and do agree that the package was disorganized and have added additional sheets to help people find their way around (enclosed).

I think Pat may have emphasized one or two things too much and may have missed one or two things that deserve emphasis. If you left planet Earth three years ago with prices on the TI home computer, you would have realized that it took $500 to do word processing on a printer. If someone brought you back and told you that for $70 you could also do word processing on a printer, you might have trouble believing it. I've been living under that scourge for three years. MissingLink has worked flawlessly for me for three years and I have tested it to at least an error rate of 1 in a billion. Pat seemed to emphasize the problem with VPLinK too much (her OKI possesses different control codes from my Epson based printer) and I think some people would think (1) it doesn't convey information accurately, or (2) it's too complicated to use. The title "The Zero Bug" also was used; if I were skimming, I would think it meant that the device doesn't work reliably.

I also think many PES owners would like an inexpensive backup to their RS232 cards. A guy who owns the PES and RS232 almost surely has to own the 32K, hence for only $30 he can have a backup for his system if it ever fails. People who buy it like that feature.

George A. Bowman
Midwest Engineering Consultants
Vernon Hills, IL

*Thanks, George, for the feedback on our review. We're glad to hear about the continuing demand for the Missing Link. Your added documentation does answer many of Pat Swift's concerns with the previously incomplete and disorganized documentation. We're glad that our reviewer's input has helped you to improve your package.*

## Some Copyright Considerations

Dear Sir:

I wish to compliment you on your fine magazine. After buying three issues from the supermarket stand, I have recently called in my subscription. I am most enthusiastic about the programs you provide at such modest cost! It has long been my opinion that software is almost always overpriced in comparison to say a fine technical manual. Your magazine offers some relief from this situation.

It is exactly this enthusiasm and respect that causes me to write at this time. What is the exact legal obligation connected with the copyright laws? I ask this question because several of my computer friends have asked me for copies of the programs. In addition, my "friends" on the lines of our local user's group have also been interested. I can see two concerns for this situation. The first being that the programs may be ripped off and in some manner commercially sold. That, of course, is always a possibility but your registration would be at the beginning of each program so that the thieves would have to make a conscious effort to do so. Secondly, I realize that you are in the business of selling magazines. I might point out that with the acknowledgement of your magazine as the source, these few programs would introduce and sell more subscriptions. In short, I am asking if it would be possible to share this program amongst these interested parties? What are the acceptable parameters to be used?

I do appreciate your work and especially the programming for the PCjr . . . an unfortunate orphan before its time. Keep up the good work and let me know about the copyright thing.

Adelia Ramey
South Bend, IN 46637

*As much as we appreciate your glowing compliments, Adelia, we cannot permit you to give our software away. As stated on page 6 of this issue, "EVP [Emerald Valley Publishing—that's us!] grants to such purchaser only [that's you only!], the limited license to enter these program's into the purchaser's computer, and to place such programs on a diskette or cassette for the purchaser's personal use." In short, our licensing agreement doesn't allow you to copy these programs for a friend.*

*As you well know, HCM does not receive any revenues from outside advertising—as does virtually every other computer magazine—and is therefore largely supported by the revenue generated from its sale of media and back issues. Because this revenue is so crucial to our existence, we must take a firm stand on this copyright issue, and we request that our readers do the same to safeguard our (and your) material.*

*This, of course, does not prevent you from showing the software to your friends and letting them know where they can buy HCM and ON TAPE or ON DISK. We believe that the price of back issues and their ON DISK contents is so very reasonable that your friends should take advantage of the legitimate media availability. We also ask that our readers please report to us any observed copyright violations so that we can take appropriate action.*

## How About The TI Pro?

Dear Sir:

I will not bore you or insult your intelligence by arguing the merits of the Texas Instruments Professional compared with the IBM PC.

Neither can I blame you for your choice in publishing programs targeted to this (IBM) market. I am certain there are infinitely more IBM users out there than we fewer, but more discriminating TI owners.

As an architect, I use a TI Pro with AutoCad at the office and also have another unit at my home. My 15-year-old son is able to rewrite most IBM programs to run on the TI. I can't!

My question is this: Since most algorithms are so similar for both machines, why can't you list both in your programs? There are several hundred thousand TI Pro owners who would welcome any sort of entertainment programs. There is only one periodical devoted exclusively to the TIP and it is so business oriented that it is no fun at all.

Please give us a break. I would subscribe in a minute if there were programs I can use and enjoy.

John Vaden
Ft. Worth, TX 76107

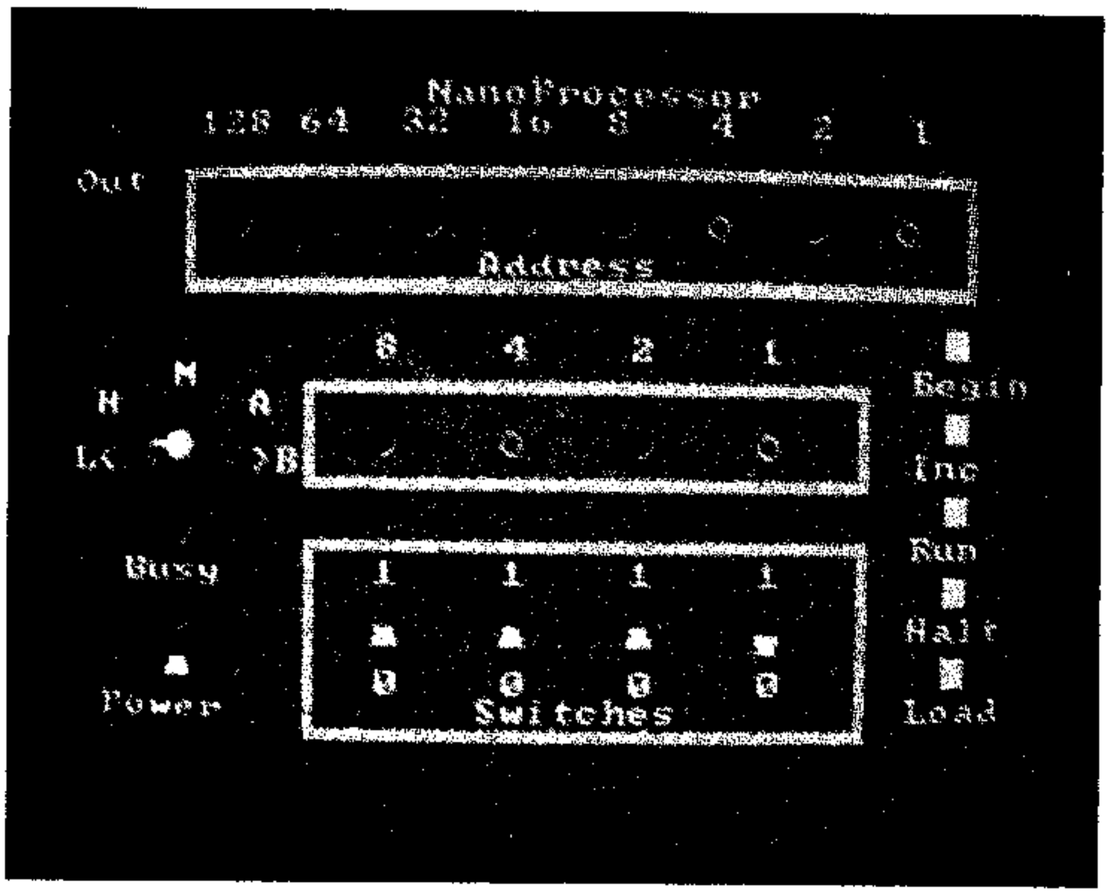
*John, we agree that the TI-Pro is a fine machine—we use several in our offices. But, unfortunately, the machine does not run IBM BASICA, which is the language our IBM programs are written in. This makes it virtually impossible to convert our software to the TI-Pro without major changes to the IBM code. On the other hand, the Tandy 1000's BASIC is nearly identical to IBM's, and thus we have extended coverage to this machine. We would have to provide a complete new program listing for each TI-Pro version; at this time, we simply do not have the space in the magazine to provide that level of coverage. Not to be facetious, but perhaps your son could perform this conversion service for you when you become a subscriber.*

**HCM**

# The NanoProcessor

**by Roger Wood**
**and**
**Wayne Koberstein**
*HCM Staff*

***With this simple simulation of the machine's inner workings, you can discover how easy (and fun!) it is to communicate with computers in their own language.***




Since the premiere of the movie *Tron*—in which the hero has to fight his way out of a computer's microcircuits—many people have held a fascination for the inner workings of this "thinking machine." Are you one of them? Perhaps your interest has always been there, but you have not yet "taken the plunge" into machine-level programming. Or perhaps you know a great deal about this subject already, but would appreciate a very clear and simple demonstration of how computers "think." If so, you're ready for *NanoProcessor*—a program that emulates the computer at its most fundamental level.

At the heart of a computer, there is nothing but an immense set of on and off switches. But how can such a simple foundation foster such a complex information-handling system? In short, how are all these switches organized? A "real" computer, such as the one you have at home, is such a large system that it would be difficult to see the forest for the trees. But, with *NanoProcessor*, you have a chance to operate and see a much-simplified model of how a computer performs its tasks.

## Brain Central

All computers—including the *NanoProcessor*—have a central "brain." It's called the CPU (Central Processing Unit). This brain recognizes and responds to different sets of numbers as instructions. These instructions direct the CPU to carry out certain operations—much as our brains store, handle, and act on information encoded in switch-like neurons. In a computer, information travels along parallel paths of wires and printed circuits called "buses."

As humans, we may think in English, Spanish, or any other language—some subtle, some exact. Computers also "think" in languages—such as BASIC and LOGO. CPU's like our own brains, must translate these high-level languages into encoded information. In computers, this information takes the form of machine language—a set of codes and numerical values expressed as binary numbers. Binary means "two," and implies two choices: on or off; or, in purely numerical terms, 1 or 0.

People tend to think in terms of a ten-based number system because they have ten fingers—but a switch has only two "fingers." (For a detailed look at converting between these number systems see the sidebar "Numbers To Bits And Back.") When you **RUN** *NanoProcessor* you will notice the row of switches at the bottom of the screen—your only means of shuttling information through this simulated computer (See Photos 1, 2, 3). Each switch only has two positions—up for *on* (1), or down for *off* (0). A switch is therefore the perfect means for conveying binary information.

## Banking on Memory

Every computer has a memory area, called "Random Access Memory" (RAM), and a Central Processing Unit (CPU). Memory is the computer's capacity to store information, and is measured in terms of "bytes." A byte generally consists of 8 *bits* of information—where a bit is one binary (on or off) condition.

A CPU performs all the arithmetic that manipulates the numerically-encoded data—the ones and zeros—stored in a computer's RAM. This memory is made up of discrete "locations" in the machine, each of which has an "address." It helps to think of each memory location as a mailbox that not only has an address attached to it, but also a place to put the mail. This mail is the data stored at that location. Each "mailbox" has a limited amount of space that depends on the machine design. Because each of *NanoProcessor*'s memory locations can only store 4 bits, (one nibble), we say it is "nibble-addressable." By simply requesting a particular address, the CPU can immediately find what is contained at that address. This direct addressability of memory by the CPU is what gives a computer the power of *random access*.

The CPU and RAM are connected by three buses: the address bus (8 parallel wires), the data bus (4 parallel wires), and the control bus (See Figure 2). The first provides *access* to each memory location; the second simply moves data to and from each location; and the third carries control signals which control the flow of data between the CPU and memory. Furthermore, the CPU is organized into a system of discrete "registers" that serve as temporary stations for storing and shuffling data.

Look at the *NanoProcessor* front panel. On the middle-left side of the screen is a "rotary switch" with various letters positioned around it. The letters on the right-hand side of this switch—A and B—stand for the A and B registers in the CPU. It is between these two registers that the actual "arithmetic" and logic operations take place. The A register is also called the Accumulator because this is where the answers to many of the commands end up—or *accumulate*.

## NUMBERS TO BITS AND BACK

One of the most important aspects of machine language programming (but sometimes most confusing for the novice) is converting digital numbers to binary and vice versa. To make this as easy as possible, we have employed two aids: 1) Whenever we list a *binary* number, we precede it with a percent (%) sign; and 2) *NanoProcessor* displays the decimal equivalent of each bit above the address and data windows of the front panel (see diagram below). We refer to these decimal equivalents as the "weight" of the bits.

To quickly convert a binary number to a decimal number, simply add up the weights of the "1" (on) bits. For example, to convert %1111 1010, refer to the following diagram:

| | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|
| | * | * | * | * | * | * | * | * |
| % | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |

Then add 128 + 64 + 32 + 16 + 8 + 2 and you can easily arrive at the correct decimal equivalent: 250. (Also, see Figure 1 for converting the numbers 0—15 to binary.)

**Figure 1**

| Decimal | Binary |
|---|---|
| 0 | %0000 |
| 1 | %0001 |
| 2 | %0010 |
| 3 | %0011 |
| 4 | %0100 |
| 5 | %0101 |
| 6 | %0110 |
| 7 | %0111 |
| 8 | %1000 |
| 9 | %1001 |
| 10 | %1010 |
| 11 | %1011 |
| 12 | %1100 |
| 13 | %1101 |
| 14 | %1110 |
| 15 | %1111 |

SOFTWARE INSTRUCTIONS

### Turning On

First, press **P** to turn on the **P**ower to your *NanoProcessor*. Make sure the rotary switch is pointing to the letter M, for Memory. You move this switch left (counter-clockwise)with the < (less than) key, and right (clockwise) with the > (greater than) key.

At the top of the screen, you should see an address box containing a long row of "lights" with numbers across the top. This is the "location counter" shown inside the CPU of Figure 2. It displays the 8-bit address of the location currently being interrogated by the CPU. Notice the vertical row of buttons at the right side of the screen. These buttons represent *NanoProcessor's* functions. Press the **B** (for **B**egin) key on your keyboard. This effectively turns off all the lights in the address box, indicating that you have returned to the first address in memory: the 0 (zero) location. Now press the **I** key, for **I**ncrement. This moves you to the next address: location 1. If you repeatedly press **I**, you will continue to step through successive locations.

Notice that, as you step through each location, the row of 8 lights in the address box changes. These lights display the *address* of the "mailbox." To view the *contents* of this mailbox, look at the row of 4 lights directly above the toggle switches. This shows the value stored at the current location. If you were to move the rotary switch pointer to A, you would see the contents of the A register. To examine the B register, point the switch to the letter B. Now, move the pointer to the letters H or L at left. These access the "high nibble" (the first or left-most 4 bits) and the "low nibble" (the last or right-most 4 bits) in the 8-bit address.

### Entering Data

The next step is to "fill" these locations so that the processor has something to process. With the rotary switch in the M position, try toggling the switches in the switch box. Nothing happens? Don't worry; turn some of these switches "up" and then press **L**, for **L**oad. Now you have something. Any switch that is *on* has a corresponding light glowing just above it.

You have just entered your first "data" into the *NanoProcessor*. Now move the rotary switch to the H position and try the same exercise. This time, when you press **L**, lights not only come on in the "contents" box, but the same pattern of lights appears in the high (left-most) nibble of the address box. Moving the rotary switch to L (for Low nibble) and loading a value affects the low nibble (right-most) half of the 8-bit address in the same way. Once you have thus designated a full 8-bit address, move the pointer to the M position again to view the contents of *that same address*. By doing this, you have, in effect, moved to this address location, and can enter data there.

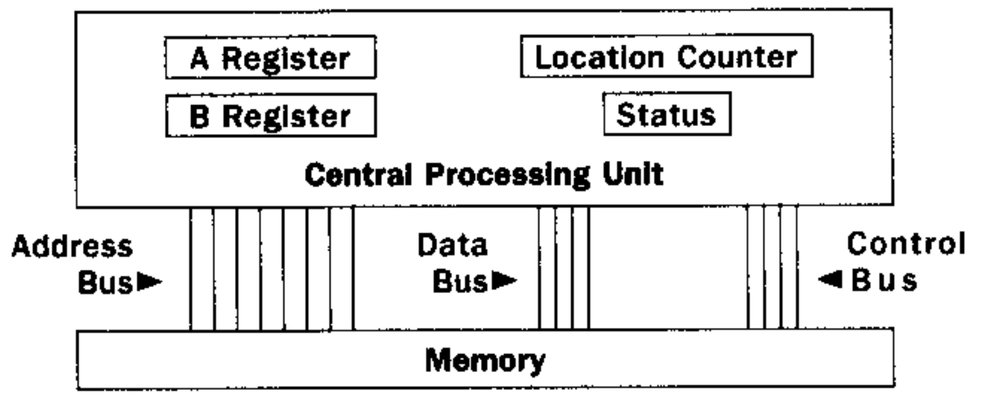
If you next move the rotary switch pointer to the A or B position and try to enter data, you will not be able to—because whatever goes in or out of these registers has to do so while the *NanoProcessor* is running instructions encoded into memory. You will also notice a small Output light (labeled "Out") at the upper left of the screen. We will explain the use of this in the *NanoAssembler* program next issue.

Your next job is to enter your first machine-language program on the *NanoProcessor*.

### Programming The Machine

A CPU executes commands *sequentially*. As it runs a program, it steps through this sequence in much the same way you "incremented" through each memory location. However, the program may instruct the CPU to take other paths—"branching" to many different locations before completing its task. You are able to program this processor by entering three different kinds of data: 1) encoded commands; 2) pure numbers; and 3) addresses. As with any program, it is the *logic* of this sequence that determines what the processor will do.

**Figure 2**
**Simplified Block Diagram of the NanoProcessor**




*NanoProcessor* understands 16 different commands—its "instruction set." Although initially expressed in one nibble, some commands require additional memory locations to hold the data necessary to execute the command. Figure 3 lists these 16 commands, showing each corresponding binary code; how many nibbles in a program the instruction requires; its "mnemonic"; which (if any) flags in the status register the instruction affects; and a brief explanation of the command function. As you develop more complicated programs, you will have to understand and use more of these commands. But, for now, try a very short routine—one that simply adds two small numbers together.

## Figure 3: Instructions Set

| Dec. | Binary | Nibbles per instr. | Mnemonic | Flags* affected C Z | Function |
|---|---|---|---|---|---|
| 0 | %0000 | 1 | ADD | Y Y | Add the contents of B register to the contents of A register—result in A. |
| 1 | %0001 | 2 | LDA # | N Y | Load A with number following instruction. |
| 2 | %0010 | 3 | LDA *addr* | N Y | Load A with number at location specified by *addr*. |
| 3 | %0011 | 3 | STA *addr* | N N | Store the contents of A at location specified by *addr*. |
| 4 | %0100 | 1 | TAB | N N | Transfer contents of A to B. |
| 5 | %0101 | 1 | TBA | N Y | Transfer contents of B to A. |
| 6 | %0110 | 1 | RRC | Y Y | Rotate A right one bit through carry. |
| 7 | %0111 | 1 | RLC | Y Y | Rotate A left one bit through carry. |
| 8 | %1000 | 1 | AND | Y Y | Logically AND A and B—Result in A. |
| 9 | %1001 | 1 | OR | Y Y | Logically OR A and B—Result in A. |
| 10 | %1010 | 1 | XOR | Y Y | Logically XOR A and B—Result in A. |
| 11 | %1011 | 3 | BZ *addr* | N N | Branch to *addr* if Zero flag is set. |
| 12 | %1100 | 3 | BNZ *addr* | N N | Branch to *addr* if Zero flag is not set. |
| 13 | %1101 | 3 | BCS *addr* | N N | Branch to *addr* if Carry flag is set. |
| 14 | %1110 | 3 | BCC *addr* | N N | Branch to *addr* if Carry flag is not set. |
| 15 | %1111 | 3 | JMP *addr* | N N | Branch to *addr* unconditionally. |

***Flags affected refers to whether or not the instruction has any effect on the flags in the status register. The C column stands for the Carry flag (did the operation result in a carry being generated?), and the Z stands for the Zero flag (did the operation result in a zero?). A Y appears in the column if the flag is affected by the instruction. An N indicates the flag is not changed by the instruction.***

## Sample Program 1

| Addr | Code | Mnemonic | Remark |
|---|---|---|---|
| 0 | %0001 | LDA #3 | ;Get first number |
| 1 | %0011 | | |
| 2 | %0100 | TAB | ;Move to B |
| 3 | %0001 | LDA #7 | ;Get second number |
| 4 | %0111 | | |
| 5 | %0000 | ADD | ;Figure sum |
| 6 | %1111 | JMP 6 | ;Jump self to stop |
| 7 | %0110 | | |
| 8 | %0000 | | |

## Sample Program 2

| Addr | Code | Mnemonic | Remark |
|---|---|---|---|
| 0 | %0010 | LDA 240 | ;Get first number |
| 1 | %0000 | | |
| 2 | %1111 | | |
| 3 | %0100 | TAB | ;Move to B |
| 4 | %0010 | LDA 241 | ;Get second number |
| 5 | %0001 | | |
| 6 | %1111 | | |
| 7 | %0000 | ADD | ;Figure sum |
| 8 | %0011 | STA 248 | ;Put low nibble in memory |
| 9 | %1000 | | |
| 10 | %1111 | | |
| 11 | %1110 | BCC 19 | ;Only one nibble answer |
| 12 | %0011 | | |
| 13 | %0001 | | |
| 14 | %0001 | LDA #1 | |
| 15 | %0001 | | |
| 16 | %1111 | JMP 21 | ;All done |
| 17 | %0101 | | |
| 18 | %0001 | | |
| 19 | %0001 | LDA #0 | ;Zero A |
| 20 | %0000 | | |
| 21 | %0011 | STA 249 | ;Put high nibble in memory |
| 22 | %1001 | | |
| 23 | %1111 | | |
| 24 | %1111 | JMP 24 | ;Jump self to terminate |
| 25 | %1000 | | |
| 26 | %0001 | | |

## Sample Program 3

| Addr | Code | Mnemonic |
|---|---|---|
| 0 | %0001 | LDA #2 |
| 1 | %0010 | |
| 2 | %0100 | TAB |
| 3 | %1000 | AND |
| 4 | %0110 | RRC |
| 5 | %0011 | STA 254 |
| 6 | %1110 | |
| 7 | %1111 | |
| 8 | %0000 | ADD |
| 9 | %0011 | STA 254 |
| 10 | %1110 | |
| 11 | %1111 | |
| 12 | %0000 | ADD |
| 13 | %0011 | STA 254 |
| 14 | %1110 | |
| 15 | %1111 | |
| 16 | %0001 | LDA #6 |
| 17 | %0110 | |
| 18 | %0011 | STA 254 |
| 19 | %1110 | |
| 20 | %1111 | |
| 21 | %0000 | ADD |
| 22 | %0011 | STA 254 |
| 23 | %1110 | |
| 24 | %1111 | |
| 25 | %0000 | ADD |
| 26 | %0011 | STA 254 |
| 27 | %1110 | |
| 28 | %1111 | |
| 29 | %0000 | ADD |
| 30 | %0011 | STA 254 |
| 31 | %1110 | |
| 32 | %1111 | |
| 33 | %0001 | LDA #13 |
| 34 | %1101 | |
| 35 | %0011 | STA 254 |
| 36 | %1110 | |
| 37 | %1111 | |
| 38 | %1111 | JMP 38 |
| 39 | %0110 | |
| 40 | %0010 | |

## Roundabout Addition

Sample Program 1 will add the numbers 7 and 3, and the answer will end up in the Accumulator. If you haven't already, turn on the power by pressing **P**. Now, press **B** for **B**egin, and confirm that the rotary is pointing at M (Memory). Now "key-in" this program with the following procedure:

1. Toggle the switches to the on and off positions corresponding to the bits of the number identified as Code in the program—up (or on) for 1, and down (or off) for 0. Notice that each binary code is preceded by a % (percent) sign to make it easy to distinguish binary numbers from decimal quantities (See "Numbers To Bits And Back" for details).
2. Check that the address indicated by the location counter is the correct one for that Code, and then Press **L** for **L**oad.
3. Press **I** for **I**ncrement. This will take you to the next address.
4. Repeat steps 1 through 3, loading the correct nibble into each address, and move on to the next set until you've loaded all the nibbles in the proper order.
5. Once you have completed loading the program, press **B** again to return to address 0. Then step through each memory location with the **I** key to be certain the program is entered properly.
6. Now press **B** for **B**egin once more, then **R** for **R**un. Note that you may **H**alt the program at any time (by pressing **H**) and continue again by pressing **R**.

Let's go over Sample Program 1 step-by-step to see exactly what it does when **L**oaded and **R**un. First it uses the "LoaD Accumulator immediate" instruction (abbreviated LDA #) to load the number stored at the address immediately following the instruction code (address 1) into the Accumulator. This number (in this case a %0011 or decimal 3) is one of the two to be added. At address 2 is an instruction to Transfer the number from the Accumulator into register B (TAB). Address

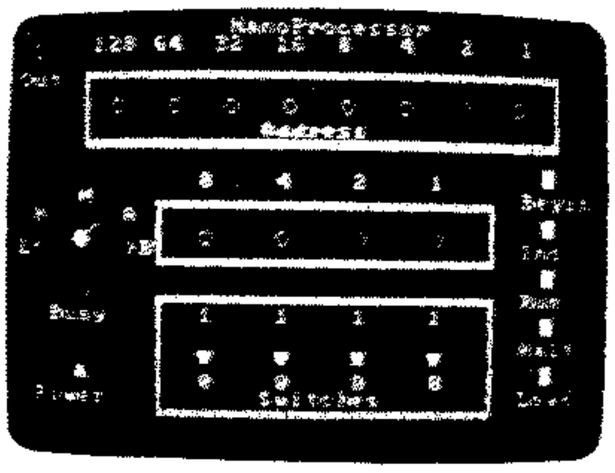


*Photo 1: This shows the contents of the A register in the initial step of Sample Program 1. First, the program moves one number (3 or %0011) of an addition problem into A.*

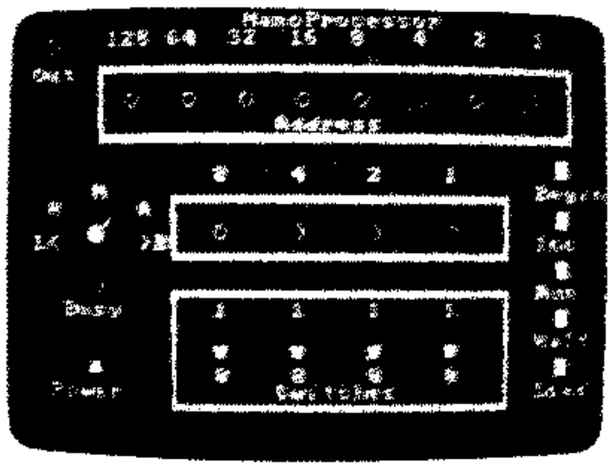


*Photo 2: Next, after the first number moves to the B register, the second number (7 or %0111) is loaded in A.*

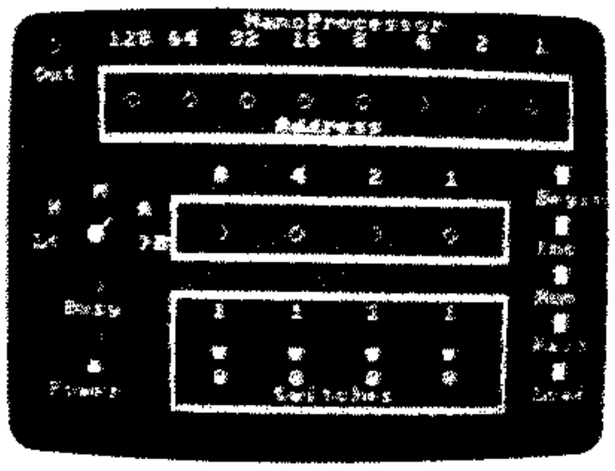


*Photo 3. The A register now shows the result (10 or %1010) after the contents of A and B have been added together.*

3 contains another LDA# instruction to Load a %0111 (7 decimal) from address 4 into register A. The instruction at address 5 actually ADDs the number in register B to the number in A, and places the answer in A. Address 6 contains a JuMP instruction (JMP *addr*), that tells the machine to jump to the address specified at the next two memory locations—7 and 8. All addresses are two nibbles, and the *NanoProcessor* follows a procedure standard to many microprocessors where the low nibble of the address is in the next location (7 in this case) and the high nibble in the following one (8). We call this a "jump self" because we specify address 6 (%0000 0110) as the place to jump to.

When you **R**un this program, the "busy light" remains on and both rows of lights flash different patterns as the CPU steps through the program. The *Nanoprocessor* has been made to **R**un slowly so that you can track each instruction as it is executing. When the program "hangs-up" at location 6, press **H** (for **H**alt) to make the busy light go off. Now turn the rotary switch to point at A. Here you find the answer to the addition problem: %1010 or 10 decimal. Keep the pointer in this position and run the program again, after pressing **B**egin. Watch the A register change values—first 3 (%0011), then 7 (%0111), then the answer, 10 (%1010). Photos 1 through 3 show this sequence.

## Moving On

In Sample Program 1, the machine added two numbers and got an answer that it could express in one 4-bit nibble. But, what if this answer had been larger than one 4-bit nibble—say, a number like 23 (%0001 0111)? Fifteen (%1111) is the largest number that one nibble can express. When a processor adds two numbers together whose answer is bigger than its registers can hold, the answer "overflows" the register. When this happens in *NanoProcessor*, a "carry flag" is set to 1 in a special Status register of the CPU. (This register is not directly accessible to the user.) The program has to contain commands that recognize the condition of this flag (either 1 when an overflow has occurred, or 0 when there is no overflow) and take appropriate action. You can determine which instructions cause changes in the carry flag by studying the C column (under "Flags affected") of Figure 3. If there is a Y in the C column, the instruction will affect the carry flag —i.e., set it to 1 if an overflow occurs, or reset it to 0 if no overflow occurs.

Sample Program 2 adds the numbers 11 (%1011) and 12 (%1100) to arrive at 23 (%0001 0111). Not only does the program have to check the carry flag, but because the answer doesn't fit in one register, it has to place the answer someplace else. The solution is to designate certain memory locations as data areas—two for input and two for output. Program 2 fetches the two numbers to be added from memory locations 240 (%1111 0000) and 241 (%1111 0001). These addresses are input areas. This means that before you **R**un the program, you must manually **L**oad the numbers to be added at these locations—place 11 at address 240, and 12 at address 241.

Similarly, the output area is at locations 248 (%1111 1000) and 249 (%1111 1001). The low nibble of the answer (%0111 in our example above) appears at 248, and the high nibble (%0001) at address 249.

This program also handles the overflow condition described above. If the answer does overflow a nibble, the program places a 1 in the accumulator and stores it as the answer's high nibble. If, however, the answer is less than 15 (and fits into one nibble), the program branches to another address, where it loads a 0 into A and stores that instead. This introduces one of 4 "conditional jump commands," which we will explore more fully in next issue's companion "utility," *NanoAssembler*.

Program 3 is a "mystery program" that actually accesses the "sound chip" we've built into the *NanoProcessor*. Watch next issue for an explanation of how this program works. Or perhaps, in the meantime, you will learn enough by playing with *NanoProcessor* to figure this one out yourself. The best way to learn the details of operating the the *NanoProcessor* is to use it and experiment by creating your own machine-language programs.

## Saving and Loading

With *NanoProcessor*, you can Save and Load the entire 256 memory locations (%0000 0000 through %1111 1111) to disk (and/or tape on The C-64, Atari, and TI-99/4A). Use the Save command listed in your Control Capsule and type in a file name in response to the prompt. To Load, use the Load command and type in the name of the file you wish to load.

**HCM Glossary terms:** CPU, bus, machine language, binary numbers, Random Access Memory (RAM), byte, address, nibble, location counter, accumulator, register, instruction set, mnemonic, branch, jump, conditional jump, status register, zero flag, carry flag, overflow, weight (of bits).

**HCM**

**For your key-in listings, see HCM PROGRAM LISTINGS Contents.**

**CONTROL CAPSULE**
***NanoProcessor***

| Key | Function |
|---|---|
| B | Set address to zero. |
| I | Increment address by 1. |
| R | Run program. |
| H | Halt program. |
| L | Load location. |
| < | Move rotary switch counter-clockwise. |
| > | Move rotary switch clockwise. |
| P | Toggle Power switch. |
| E | End program (only when Power is off) |
| 1-4 | Toggle panel switch 1 = left-most bit, 4 = right-most bit. |

**CONTROL CAPSULE**
***NanoProcessor***

| Key | Function |
|---|---|
| CONTROL W | Save file. |
| CONTROL Q | Load file. |

**CONTROL CAPSULE**
***NanoProcessor***

| Key | Function |
|---|---|
| OPTION | Save file. |
| SELECT | Load file. |

**CONTROL CAPSULE**
***NanoProcessor***

| Key | Function |
|---|---|
| F1 | Save file. |
| F3 | Load file. |

**CONTROL CAPSULE**
***NanoProcessor***

| Key | Function |
|---|---|
| FN 6 | Save file. |
| FN 7 | Load file. |

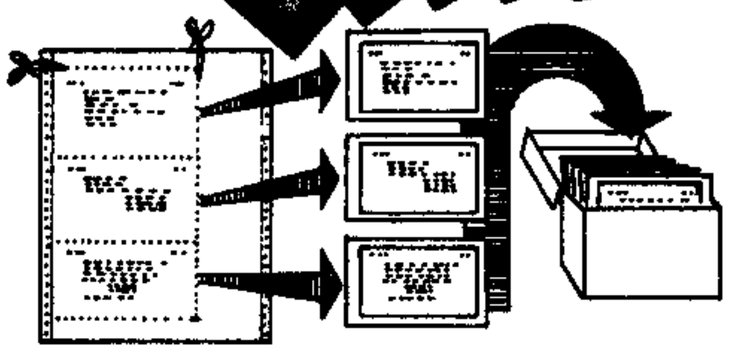
**CONTROL CAPSULE**
***NanoProcessor***

| Key | Function |
|---|---|
| FCTN 6 | Save file. |
| FCTN 8 | Load file. |

# TI Card-Trix

## Part 1

by Randy Thompson



***Here's a real trick you can do with TI Card-Trix:***

1. After you've created your electronic file cards on the computer, print them out on printer stock; then cut out each file as shown.
2. Tape or paste each file onto regular file card stock.
3. Store all cards in a file box.
4. You now can have *many* information "windows" opened up *simultaneously* on your *real* desk top for ease of use—a feat not practical even on a computer monitor.

In the next issue, Part 2 of this program will allow you to shuffle your file cards on the computer between many different cross-referenced file folders.

*TI Card-Trix* allows you to organize thoughts, book references, personal inventory—anything—on 3" by 5" cards. Such features as copy, search, and sort make creating the "cards" easy. And after editing a set (folder) of cards, you can print them out and/or save them to disk—your filebox for several folders of cards.

*TI Card-Trix* has seven main menu options:

1) Edit Cards
2) Search
3) Sort
4) Print
5) Save
6) Load
7) Exit Program

### Edit Cards

Edit Cards immediately calls up the editing screen, which divides into four main fields: Index, Subject, Text, and Card number (represented by the # sign). Information for the Index can be both numbers and letters, but it is limited to 8 characters. If you wish to date your cards, or give them some other kind of identifying character sequence, the Index field is an ideal location. The Subject field can hold up to 28 characters, and may serve as a title for each of your cards. Most of your information will be placed in the Text field, where you have 9 lines, 28 characters wide. To move from one line to another within the text field, use [FCTN] E (↑) and [FCTN] X (↓).

The # field tells you on which of a maximum of 25 cards you are working. Every time you create a new card, the computer assigns it a number in this field. By changing this number, you change which card is currently on screen. For instance, changing the # field to a 15 is like putting the current card back into the folder and pulling out the 15th card so that you may work on it. You can edit cards in any order.

From the editing screen, you can Erase, Copy, and Paste cards. To flip through the cards one at a time, use the Forward and Backward functions. To access any of these features, simply enter the first character of the desired function at the CHOOSE ONE: prompt. For instance, to Copy the card that you are currently working on, enter a C. That card will now be copied into the hold buffer—a temporary storage location. Now, to Paste what you copied into the hold buffer onto another card, advance to the desired card and select P. The current card will now become identical to the card previously copied.

### Search

This option allows you to search through your cards for any sequence of letters and/or numbers. You can search by Index, Subject, or Text. If the search yields a card with a corresponding character sequence, you are given the option to edit it, continue the search, or quit.

### Sort

Here, you can have the computer sort your cards alphabetically by Index, Subject, or Text. Thus, you may save your folder of cards in a variety of different sequences. One folder might have cards sorted by Index, while another may be left in the order that was entered.

### Print

To print out your cards, select this option. You can print out as many cards as you wish. When you enter the Print option, the computer asks you for the first and last card number of the cards to be printed. After you enter these numbers, a prompt will appear asking you to position the paper and press [ENTER]. Once you do this, the specified cards will print out.

### Save

Here you can save your folder of cards. Saving different folders under unique names makes the cards easy to access and search through. This program stores in memory up to 25 cards per folder (or 15 completely filled cards). However, with memory expansion, this number can be raised. To do so, two numbers in line 210 have to be changed. To set the number of cards to 50, for example, change MX = 25 to MX = 50 and DIM C$(3,25) to DIM C$(3,50).

### Load

This option loads a previously saved card folder.

### Exit Program

Selecting this option allows you to quit the program. A prompt will ask whether you really want to exit. If you indicate No, the program will resume. Before indicating Yes, you should first save your folder of cards. All card data will be lost if you end the program before saving.

**CONTROL CAPSULE**

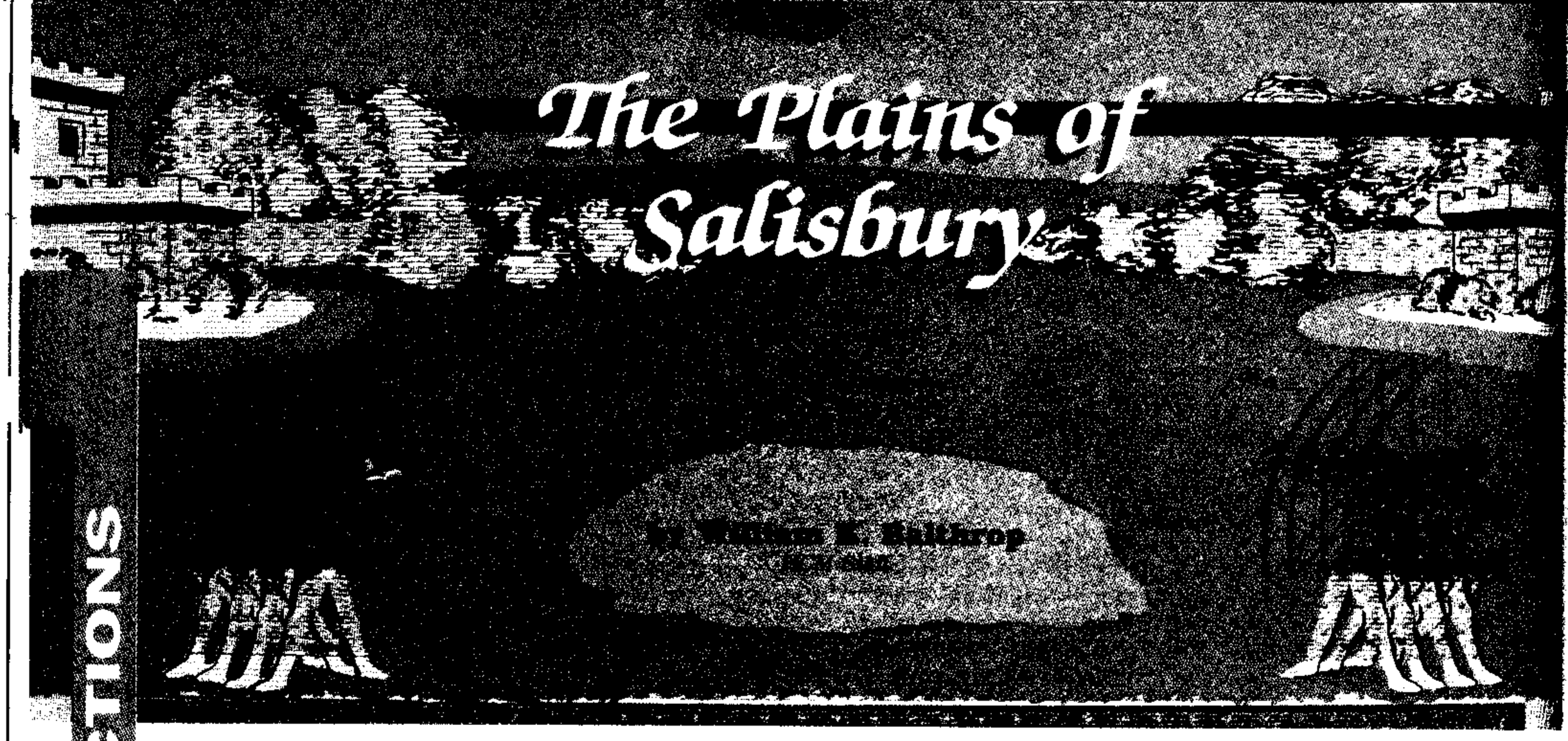
***TI Card-Trix***

| KEY | FUNCTION |
|---|---|
| *Edit Mode*: | |
| I | Edit Index field. |
| S | Edit Subject field. |
| T | Edit Text field. |
| # | Move to another card. |
| E | Erase current card. |
| C | Copy current card to buffer. |
| P | Paste buffer contents to current card. |
| F | Skip Forward to next card. |
| B | Go Back to previous card. |
| R | Return to main menu. |
| *Edit Text field*: | |
| [FCTN] E | Move up a line. |
| [FCTN] X | Move down a line. |

**For your key-in listings, see HCM PROGRAM LISTINGS Contents.**

HCM

# The Plains of Salisbury



***All is not well in Camelot. The kingdom is in chaos as King Arthur prepares his gallant knights for his final battle with his arch-enemy (and son) Mordred.***

*Arthur sits alone at his dimly lit table, a large map spread before him. As he struggles to concentrate on tomorrow's coming battle at Salisbury, time weighs heavily on his mind. So many years have passed since he first drew the sword from the stone. At dawn, he will make a last valiant stand against his evil son. With Merlin gone, who will come to Arthur's aid? Will it be someone from the distant future? Could it be you?*

This program is an exciting simulation of King Arthur's last battle on *The Plains of Salisbury*. The game requires two players, each controlling an army of gallant knights. Players move the knights and engage in combat until one player defeats all of the opposing player's troops.

## The Playing Screens

Three maps of terrain comprise the battleground for this mini-war. Each map lies adjacent to the others. (Moving off the right edge of the first map brings you to the left edge of the middle map, and so on.) You may not move off the left edge of the first map or the right edge of the last map—or off the top or bottom of any map.

The program will ask you to designate a map layout. You can enter any ordered combination of the three maps to indicate the layout sequence: e.g., 123, 321, 213, 232, etc.

Each map contains 6 types of terrain that affect movement and troop defense. You may move your knights into all terrains except water. Each type of terrain has a different movement/defense factor—the higher the number, the more strength it takes for your knight to travel. The 6 terrain types are:

| TERRAIN | MOVEMENT/DEFENSE UNITS |
|---|---|
| Roads | 1 |
| Open grasslands | 2 |
| Forest | 3 |
| Buildings | 4 |
| Forts | 5 |
| Water | No movement allowed. |

Obviously, roads offer the least resistance to movement and the least protection from attack. On the other hand, a fort is the most difficult to move through, but it offers the highest level of protection. Forts also possess an endless supply of arrows. Each knight, however, is capable of carrying no more than 4 arrows at a time. When these are used up, the knight must return to a fort to get more before he can participate in the combat phase. A knight who remains in a fort will always have a supply of 4 arrows.

## Movement Phase

Two phases make up each player's turn: movement and combat. During the movement phase, a player is given an opportunity to move his or her knights, starting with knight number 1 and continuing through knight number 6.

Every knight can travel up to 9 movement units each turn. You may move your knights either left, right, up, or down by using the 4 keys indicated in your machine's Control Capsule. If you don't wish to move, or if you wish to stop moving a knight before all of his movement units are gone, then press [ENTER] or [RETURN]. This will start the next knight's turn; or, if he's the last knight, this will start the combat phase.

The number of movement units expended when entering a terrain type can be seen in Chart 1. If you stick to the roads, you could move your knight up to 9 squares at a time (a square is one character on the screen). Traveling through open grasslands, knights can move only 4 squares in one turn. Moving in the open grasslands requires 2 movement units for each of the 4 squares; so if your knight has only 1 movement unit left, he cannot continue. At this point, press [ENTER] or [RETURN] to begin the next knight's turn. When a knight's movement factor is exhausted, you will be prompted to move the next knight.

Every time a knight moves, he expends strength (.1 strength units per movement unit). Each knight starts the game with 9.9 units of strength, shown simply as a 9 on the screen (a strength of .9 will show up as 0). If a knight's strength level drops below zero for any reason, the knight cannot do battle. Each knight will automatically receive .5 units of strength every turn. If a knight stays away from battle, and only moves 5 movement units per turn, then his strength level will stay even. Not moving will increase his strength by .5 every turn. Marching at full speed (using all 9 movement units) will drain .4 strength units per turn.

## Hand-to-Hand

A knight entering a square occupied by an enemy knight will automatically initiate hand-to-hand combat. This is a fight to the death, eliminating the losing knight from play.

Once hand-to-hand combat begins, your knight's strength level determines how much strength you can drain from the enemy; thus, the stronger your knight, the better his odds are of winning. If the strength for both knights drops below 0 at the same time, both knights will be eliminated.

If a knight has engaged in hand-to-hand combat and wins, he may not move until his next turn. The losing knight, obviously, may never move again.

After a knight has moved into a new square, the program updates and displays the number of movement units remaining and the knight's strength level. If a knight runs out of strength while moving, he is out of the game. The vanquished knight, however, will remain on the map until the map has been updated.

## Combat Phase

After completing the movement phase, the combat phase starts. If any of your knights are adjacent to an enemy knight (horizontally or vertically, *not diagonally*), you can now attack that knight with bow and arrow. The enemy will not be able to fire back at you until your turn is over, so you have nothing to lose except one arrow. Every knight may fire one arrow per turn in the combat phase.

Select the knight that is to fire an arrow by pressing the number corresponding to that knight. Then indicate the direction of fire by pressing the key indicated in the Control Capsule for your machine. After a knight fires an arrow, that knight may not attack again until your next turn. Hitting an enemy lowers strength by a factor based on a random number and the attacking knight's strength level.

Every knight begins with only 4 arrows. If a knight uses all 4 arrows without replenishing them, that knight will not be allowed to initiate combat. A knight can replenish his supply of arrows at one of the forts.

You can terminate a knight's combat phase at any time by pressing [ENTER] or [RETURN].

## Save Exit Return

Pressing the appropriate Exit/Save option key (designated in your system's Control Capsule) calls up a short submenu. When you reach this menu, you can either save your game to disk (or cassette on the TI-99/4A, Commodore, and Atari machines), or exit without saving. After saving, you can also quit the game or return to where you left off.

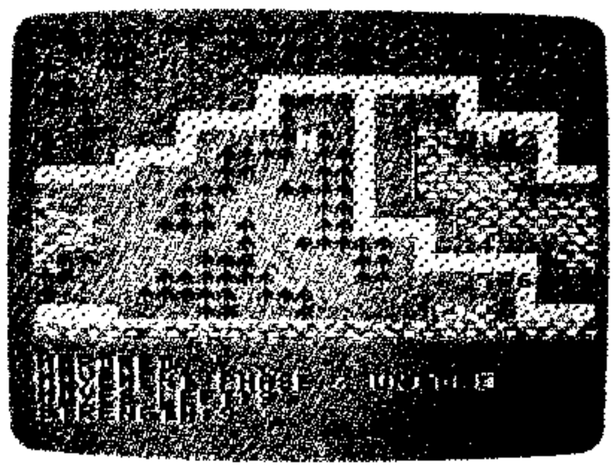
When you exit the game you are informed of the winner at that time. If you've saved a game where each player has at least one knight left, the game can be continued later—but, as you exit, the computer tells you the winner *as if the game were over*. The winner is determined by the following scoring rules: 50 points for each enemy knight defeated, and 10 points for each arrow that hits an enemy.

## Load a Game

After the title screen, the program will ask whether you want to load an old game. If you reply with a Y for Yes, then it will ask for the file name. The old game will load and commence where it left off at the time it was saved.

**HCM**

**For your key-in listings, see HCM PROGRAM LISTINGS Contents.**



*This screen, from the TI-99/4A version shows a typical arrangement of knights moving across the landscape*

### CONTROL CAPSULE

#### *The Plains of Salisbury*

| KEY | FUNCTION |
|---|---|
| Movement Phase | |
| I,J,K,M | Move up, left, right, down. |
| SPACEBAR | Enable screen scroll. |
| 1 | Screen 1. |
| 2 | Screen 2. |
| 3 | Screen 3. |
| RETURN | Terminate movement. |
| ESC | Exit/Save option. |
| Combat Phase | |
| 1-6 | Select unit to fire. |
| I,J,K,M | Fire up, left, right, down. |
| RETURN | Terminate combat. |

### CONTROL CAPSULE

#### *The Plains of Salisbury*

| KEY | FUNCTION |
|---|---|
| Movement Phase | |
| Arrow keys | Move up, left, right, down. |
| A | Screen 1. |
| B | Screen 2. |
| C | Screen 3. |
| RETURN | Terminate movement. |
| ESC | Exit/Save option. |
| Combat Phase | |
| 1-6 | Select unit to fire. |
| Arrow keys | Fire up, left, right, down. |
| RETURN | Terminate combat. |

### CONTROL CAPSULE

#### *The Plains of Salisbury*

| KEY | FUNCTION |
|---|---|
| Movement Phase | |
| Cursor keys | Move up, left, right, down. |
| F1 | Screen 1. |
| F3 | Screen 2. |
| F5 | Screen 3. |
| RETURN | Terminate movement. |
| F7 | Exit/Save option. |
| Combat Phase | |
| 1-6 | Select unit to fire. |
| Cursor keys | Fire up, left, right, down. |
| RETURN | Terminate combat. |

### CONTROL CAPSULE

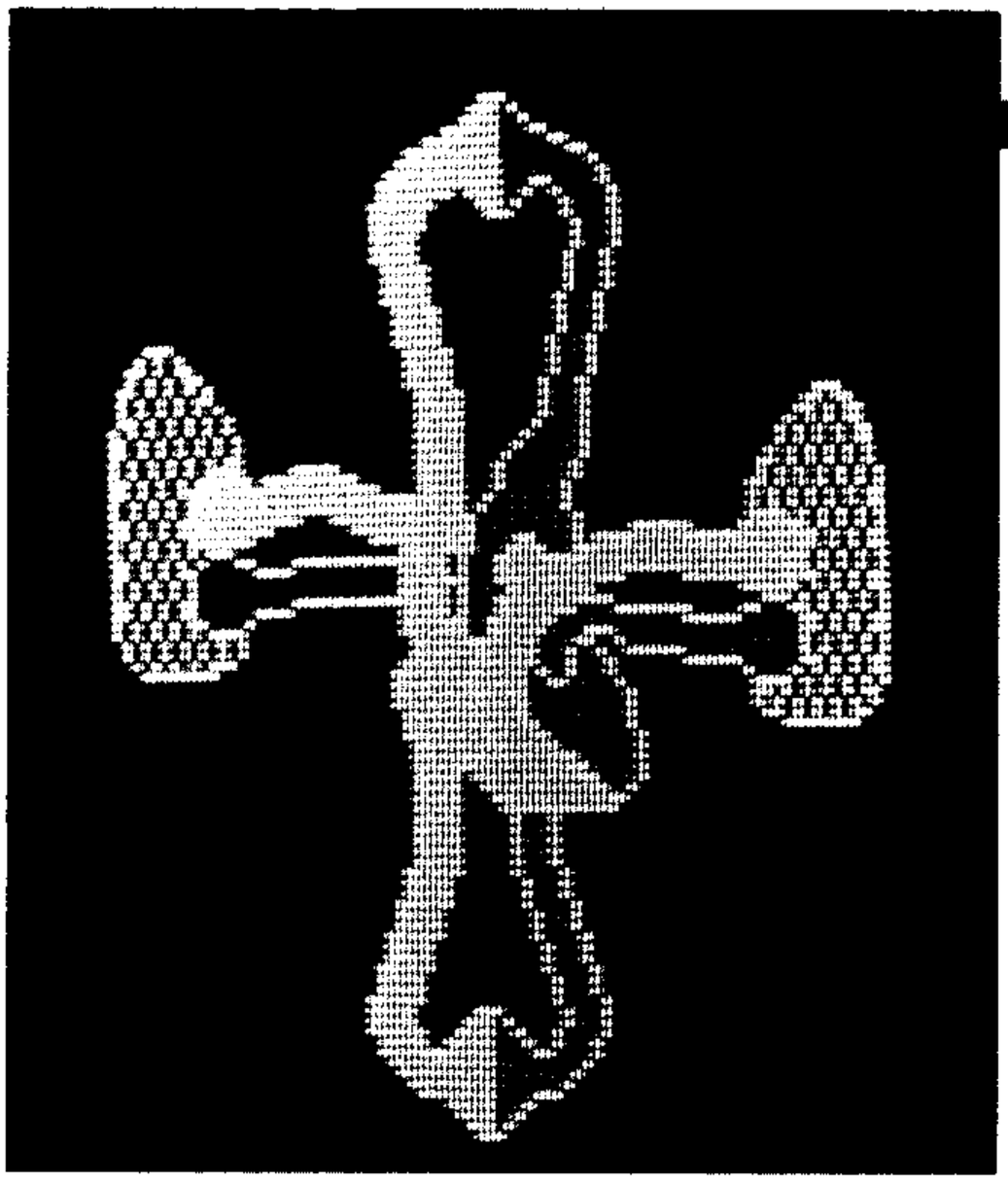
#### *The Plains of Salisbury*

| KEY | FUNCTION |
|---|---|
| Movement Phase | |
| Cursor keys | Move up, left, right, down. |
| Fn 1 | Screen 1. |
| Fn 2 | Screen 2. |
| Fn 3 | Screen 3. |
| ENTER | Terminate movement. |
| ESC | Exit/Save option. |
| Combat Phase | |
| 1-6 | Select unit to fire. |
| Cursor keys | Fire up, left, right, down. |
| ENTER | Terminate combat. |

### CONTROL CAPSULE

#### *The Plains of Salisbury*

| KEY | FUNCTION |
|---|---|
| Movement Phase | |
| E,S,D,X | Cursor up, left, right, down. |
| CTRL 1 | Screen 1. |
| CTRL 2 | Screen 2. |
| CTRL 3 | Screen 3. |
| ENTER | Terminate movement. |
| F9 | Exit/Save option. |
| Combat Phase | |
| 1-6 | Select unit to fire. |
| E,S,D,X | Fire up, left, right, down. |
| ENTER | Terminate combat. |



# VITAL SIGNS

**by William K. Balthrop**
*HCM Staff*

***Do you take your cardiovascular system for granted? With this simulation, you'll start paying attention to every breath you take and every beat of your heart.***

An ambulance flashes a thick, red light. Another heart patient, with lungs nearly exhausted, exits the dense smog for the cool, conditioned air of the emergency room. Here, Intensive Care attempts to rescue this victim of long neglect—like restarting an engine that is terribly out of tune. But no amount of repair can make up for a lifetime's lack of care. For this person, it may be too late to start heeding those *Vital Signs*.

The heart and lungs play an extremely vital role in human existence: they supply life-giving oxygen to body tissues. If these two organs do not perform their job properly, you may end up looking at the clouds from the other side. Sometimes, to appreciate just how important this system is, we have to stop and attend to how it works.

*Vital Signs* is a program that provides a simplified simulation of the circulatory system. The many processes that occur in a living human body are far too complex for a computer program to handle (and remain small enough to publish in one issue of this magazine). For this reason, we have concentrated on a few key biological factors.

## The Heart

The heart is responsible for pumping blood through the body. The blood carries—among other things—life-giving oxygen. The heart is really just a very complex pump. If we were to follow the path of a single blood cell through the body, the trip might go like this:

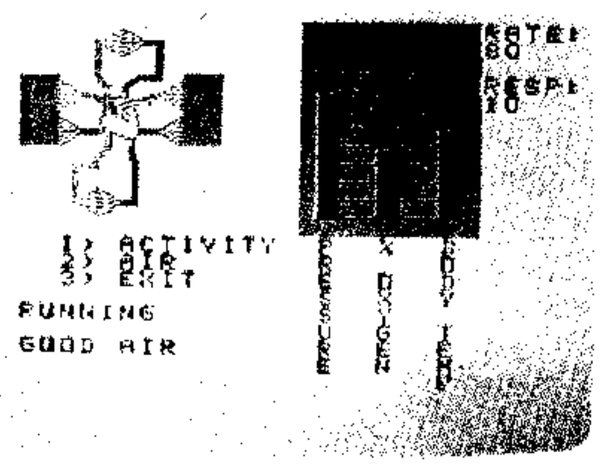
The blood cell's journey starts in the Right Atrium—one of four chambers in the heart. From here, the blood cell moves to the Right Ventricle (the second chamber), which then pumps the cell out of the heart and into a network of tiny capillaries in the lungs.

In the lungs, the blood cell picks up new oxygen and passes its load of carbon dioxide back into the small air sacs surrounded by the network of capillaries. From the lungs, the cell returns to the heart again, this time entering the Left Atrium (the third chamber). The Left Atrium sends the cell into the Left Ventricle (the fourth and last chamber), which is responsible for pumping fresh oxygenated blood cells to all organs and tissues. From here, the cell either goes through the upper circulatory system (arms and head), or through the lower circulatory system (abdomen and legs). After its journey through the body's tissues, the blood cell returns to the heart's Right Atrium for another trip.

If you listen to your heart, you will hear a short, hard "lub," then a long, soft "dub." The first sound is the heart contracting, pushing the blood out to the lungs and the rest of the body. The "dub," or second beat, is the heart relaxing, filling with blood for the next cycle.

The rate at which the heart beats is controlled by a natural pacemaker (or an artificial pacemaker surgically installed in people with heart problems).

In this program, *you* are the pacemaker. You can vary the heart rate from 0 to a maximum of 200 by using four keys on the keyboard. (See the Control Capsule for your machine.) Two keys increase or decrease the heart rate by one, while two other keys increase or decrease the heart rate by five.




*This screen photo from the C-64 version of Vital Signs shows the program in a Running mode—in which the player must adjust Heart and Respiration rates to compensate for the higher Activity level.*

## The Lungs

The lungs are less complex than the heart, although they perform an equally essential role in the circulatory system. When you breathe in, your lungs fill with air. As blood circulates through the lungs, it picks up oxygen and gives off carbon dioxide, which you exhale.

Two major factors determine how much oxygen is transferred to the blood from the lungs: Respiration Rate and Air Quality (how much oxygen is in the air in proportion to other gases and pollutants).

The Respiration Rate is the speed at which you breathe—the number of breaths per minute. As you

breathe faster, more oxygen is placed in your lungs to be absorbed by the blood. Using two keys on the keyboard, you can increase or decrease the Respiration Rate from 0 to 30 breaths per minute.

### Body Temperature

The amount of oxygen that the blood supplies to cell tissue determines the amount of energy available in the cell tissue. As you may know, this process of receiving and expending energy creates heat. This is why our bodies are warm. The more energy we expend, the more heat we generate (although our bodies usually regulate this temperature within a certain range). If the blood does not supply enough oxygen to the body tissues, then we create less heat, sometimes lowering the body's temperature below a tolerable level. If we have too much oxygen in our blood, then the body tries to burn it off, creating more heat and raising the body's temperature. The body automatically regulates its temperature by controlling the heart rate and respiration. In this progam, *you* are in charge of this process.

Body temperature can also be directly affected by the amount of blood flowing through our veins. The blood acts as a coolant, the capillaries in and near our skin as a radiator. The body can be cooled off by an increase in the flow of blood through these capillaries, or warmed up by a decrease in the flow of blood.

When the body starts to overheat due to exertion or a high external temperature, sweat cools the surface of the skin (the radiator for the blood). While the degree of sweating is not a direct factor in this program, it does have a limited influence on body temperature. When you choose either the Running or Swimming activities, the program simulates the heating of the body as energy is expended, and then the cooling of the body as the sweat glands start doing their job. You can see this process on the control-panel bar graph labeled BODY TEMP. The temperature increases for a little while, then it decreases as the sweat glands start working. The temperature graph ranges from 90 degrees to 107 degrees Fahrenheit.

***"Sometimes, to appreciate just how important this system is, we have to stop and attend to how it works."***

### Percentage of Oxygen in the Blood

As mentioned earlier, the heart rate and the quality of the air (amount of oxygen available) control the amount of oxygen in the blood.

Another factor that determines the amount of oxygen in the blood is blood pressure. One method to increase blood *oxygen* is to increase the blood *pressure*. The higher the blood pressure, the more quickly blood flows. Consequently, higher blood pressure causes blood to receive oxygen from the lungs at a quicker rate. This program performs this function automatically. If the oxygen level drops below 50 percent, the blood pressure automatically increases to compensate. If the oxygen level exceeds 50 percent, the blood pressure drops.

If the blood pressure gets too high or too low, you will need to increase or decrease the oxygen level through the heart rate, the respiration level, or both to prevent the blood pressure from reaching more dangerous levels.

The oxygen level in the blood also has an effect on the body's temperature. A *high* oxygen level *increases* temperature, while a *low* oxygen level *decreases* temperature.

### Blood Pressure

Blood pressure is the amount of force applied to the blood to push it through veins and arteries. High blood pressure can be quite serious if it persists over prolonged periods, and fatal if it's high enough over a short period. Although low blood pressure is not considered detrimental (it simply means the heart has to work less), extremely low pressure can be a problem.

As mentioned earlier, the oxygen level in the blood can affect blood pressure. The heart rate and the level of activity also affect blood pressure. Strenuous activities such as running or swimming increase blood pressure. Other factors affecting blood pressure—such as tension and disease—are not included in this program.

You can control your blood pressure directly by changing your heart rate, or indirectly by altering your respiration to change your blood oxygen level. The bar graph on the screen depicts a blood pressure range from 75 to 175. This value reflects the *systolic* pressure (or the pressure resulting as the heart contracts). This could be expressed, for example, as120/xx or 120 over xx, where xx is the *diastolic* pressure (the pressure from the expansion phase of the heartbeat). For simplicity, the program displays only the first number.

### Using the Simulation

After the title screen, you see a control panel. The control panel is divided into several sections. In the upper-left corner is a graphics representation of the circulatory system. Below that are your Activity, Air, and Exit options. The area below these options is used to display the Activity and Air menus.

The bar graph in the center of the screen displays the body's blood pressure, the percent of oxygen in the blood, and the body's temperature. The height of these bars indicates their current level.

**Pressure**—Range is 75 to 175 (125 is normal).
**% Oxygen**—Range is 25% to 75% (50% is normal).
**Body temp.**—Range is 90 to 107 (98.6 is normal).

To the right of the bar graph are the Heart Rate (Rate) and Respiration Rate (Resp) indicators. These numeric readouts indicate beats-per-minute for the heart and breaths-per-minute for the lungs.

### Options

You can select two options from the control panel. With the first option, you can alter the Activity level, thereby changing the demand for oxygen and affecting the body temperature. You can also select an Air Quality, which determines how much oxygen is in the air you breathe.

**Activity**—Your body's level of activity determines the amount of oxygen it actually uses. As you increase your

activity, your body burns more oxygen. This means that you need to breathe faster to get more oxygen to the lungs, or increase the heart rate to get more oxygen-carrying blood to your tissues, or both. You can select the activity level for the simulation with the Activity option (1) from the on-screen control panel:

A) Sleeping
B) Resting
C) Normal
D) Walking
E) Running
F) Swimming
G) Random

Option G causes the program to randomly change both the Activity level and the Air Quality. Your task is to regulate the Heart Rate and Respiration Rate to maintain a balanced system. If you are not careful, you might encounter a "blood clot," which will send your blood pressure soaring, or "lung cancer," which will reduce the amount of oxygen that your lungs are capable of supplying to the blood. The blood clot will be cured after a random amount of time, while lung cancer will be corrected after 50 cycles (beats of the heart simulator) through a lung transplant.

In *Vital Signs*, it is possible to get (simulated) lung cancer if you are using the Random option from the Activity menu. As established by research, the chance of getting lung cancer increases with a decrease in Air Quality.

***"Vital Signs provides a hint of what it would be like if we had to control this process consciously, every minute of our lives."***

**Air Quality**—the amount of oxygen in the air determines the amount of oxygen placed in your lungs with each breath. Four types of Air Quality are available:

A) Good air
B) Smoggy air
C) Smoking a cigarette
D) Smoking a cigarette with smoggy air

You can select the Air Quality with the Air option (2) from the control panel.

## Keeping Score

As long as you maintain the system in a healthy condition (no warning lights), your score increases at a rate relative to your level of Activity and the Air Quality. Each healthy beat of the heart can add between 0 and 5 points to the score. The higher the level of Activity, and the worse the Air Quality, the more your score will increase. (When you are sleeping in good air, the score remains constant.) If, however, a warning light flashes in one of the three bar graphs, your score will decrement 40 points with each flash. You receive a final score display at the end of the game.

## Staying Alive

Most of the time, if all goes well, our bodies take care of themselves—automatically regulating the entire cardiovascular system. *Vital Signs* provides a hint of what it would be like if we had to control this process *consciously*, every minute of our lives. So take advantage of this "lifelike" simulation to learn more about a system that most healthy people take completely for granted.

### CONTROL CAPSULE
### *Vital Signs*

| KEY | FUNCTION |
|---|---|
| E | Increase respiration by 1. |
| X | Decrease respiration by1. |
| A | Decrease heart rate by 5. |
| S | Decrease heart rate by 1. |
| D | Increase heart rate by 1. |
| F | Increase heart rate by 5. |
| 1 | Select Activity option menu. |
| 2 | Select Air Quality menu. |
| 3 | Exit the program. |

## EXERCISE FOR HEALTHY HEART AND LUNGS

Heart disease is still the leading cause of death in the United States—killing almost a million people in 1982 alone. Cancer in its various forms, including lung cancer, comes in second—taking about half the number of lives attributed to heart disease. In many cases, the root causes of heart disease are not clear; but statistical evidence suggests that the risk of disease or death can be much lower for those that follow a low-fat diet and get adequate amounts of exercise.

Although fitness exists in various forms, the type that is important for the heart, lungs, and circulatory system is called *cardiovascular fitness*. Cardiovascular exercise improves the ability of the heart and blood vessels to supply oxygen to the entire body. It also enhances the body's capacity to utilize the oxygen in order to perform the work vital to the proper functioning of all organ systems. Oxygen is essential for the production of energy in every cell in the body. We rely on this energy for body maintenance, growth, and repair. The more oxygen that is supplied to and utilized by your cells, the greater your total work potential and cardiovascular capacity.

Five basic factors must be considered in developing a safe and effective cardiovascular conditioning exercise program: frequency, duration, intensity, type of exercise, and warm-up and cool-down periods.

[This material was condensed, by permission, from a reprint—entitled "The Principles of Conditioning"—of "Heart Briefs" (Spring, 1979), a publication of the American Heart Association, Alameda County Chapter, 11200 Golf Links Road, Oakland, CA 94605. "Heart Briefs" is copyright, 1979, American heart association. For more information on all aspects of the cardiovascular system and exercise, write or call the division headquarters of the American Heart Association in your area.]

**For your key-in listings, see HCM PROGRAM LISTINGS Contents.**

**HCM**

**Thinking of Subscribing?**
**Remember these time-worn truths:**

**"A watched pot never boils."**

**"Patience is a virtue."**

**"Good things come to those who wait."**

**"Allow 6-8 weeks for delivery of your first issue."**

HOME COMPUTER™ magazine

# HCM Review Criteria

Each month, *Home Computer Magazine* (*HCM*) reviews products designed for the Apple II family, Atari 800 family and compatibles, Commodore 64, IBM PC and PCjr, and Texas Instruments 99/4A computers. *HCM* reviews take a detailed look at the quality, utility, and value of commercially available packages for these machines. Because our publishing charter forbids accepting outside advertising, we strive to make the scope and content of our review pages shine with a unique blend of humanistic frankness and objectivity.

Not only will you find all relevant information for making a wise purchase decision, but in some special cases we also provide nuggets of compu-prestidigitation.* For example, we frequently include essential documentation not furnished by the manufacturer. Additionally, each issue of *HCM* tries to review at least one outstanding product—a "Diamond in the Rough"—which, because of company size, marketing clout, or for some other reason, has not received the attention it deserves.

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

**HCM Review**

**Name:** Old Art
**Program Type:** Recycled Graphics
**Machine:** Apple II family, Atari 800XL, C-64 IBM PC & PCjr, TI-99/4A
**Distributor:** Hit 'n' RUN Software, Inc.
**Price:** $99.99 (or trade for '72 Pinto)

**System Requirements:**
Disk Drive, Joystick, Trash Can optional

| | Poor | Fair | Good | Excellent |
|---|---|---|---|---|
| **Performance:** | | | | |
| **Engrossment:** | | | | |
| **Documentation:** | | | | |

**Products may also be evaluated in the following areas:**

*** Flexibility—**
Can the product be adapted to the specific needs of the users?

*** Cost/Benefit—**
Is the product worth the user's investment in time and money?

*** Necessity—**
Is the product a solution for which a problem already exists?

*** Originality—**
Is it unique in concept, or simply a "me too" product?

*** Longevity—**
The "Boredom Factor." Does the program sustain interest?

*** Rewards—**
Are the audio-visual rewards motivating and appropriate?

*** Concept Presentation—**
Are the concepts presented clearly, logically, and in depth?

*** Special Effects—**
How does quality of sound and visual effects rate? Do they enhance or detract from the product or learning process?

*** Performance—**
How well the product performs as intended, how well it takes advantage of a specific machine's capabilities, how well it responds to the user's commands, how effectively the graphics, sound effects, music, or speech are integrated with the software.

*** Engrossment—**
Whether the game or activity has that intangible quality that holds players on the edge of their seats while the hours tick by unnoticed.

**OR**

*** Ease of Use—**
The degree to which a user can interact with the product 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.

**OR**

*** Ease of Set-up—**
How well the product design facilitates easy installation.

*** Documentation—**
The quality of the printed matter that comes with the product, whether the instructions are clear and comprehensive, whether the machine configuration requirements are spelled out. Information such as how to load a program, use the keyboard, and restart an activity contributes to the documentation rating, as do tips on performance peculiarities.

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## Attention Software Authors & Peripheral Inventors:

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We are looking for home computer products that have not received the attention they deserve. Each month, we will be singling out one such package for special review. If you have a unique commercial product of exceptional quality—but your advertising and promotion budget has not allowed you to capture major media attention—we want to see it. We will consider reviewing any product that meets our high standards.

We are an Equal Opportunity Reviewer!

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In order to qualify for possible review, your product must:

1. Currently be available for purchase to readers of this magazine.
2. Make a unique and important contribution to the home computer industry.
3. Be of outstanding merit, quality, and value.
4. Be consistent with the type of machines and products we normally cover.

If you feel that your product qualifies, mail it to:

Home Computer Magazine
Attn: Editorial Submissions
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Eugene, OR. 97401

We reserve the right *not* to reply to each inquiry, so please do *not* contact us except to request return of your product. If you want your product to be returned, please include sufficient return postage.

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***Compu-prestidigitation** (kŏm´•pū•prĕs´•teh•dĭ•jeh•tā´•shŭn) —*n* 1. The magical quality of unexpected comprehension that results from presenting technical information about computers in a lively, entertaining, visually attractive and easy-to-understand format. 2. The magical tricks that make a computer sing, dance, and do all sorts of wonderfully useful things.

# Home Print Studio

**by the HCM Staff**

***With just a little imagination, a simple home computer, and one of these new type/graphic design programs, you can start up your own print studio at home.***

## PRINTING SOFTWARE—A NEW VALUE?

### An Overview

PRODUCT REVIEWS

In the heightened competitiveness of today's software market, many developers are seeking new ways of using the computer to perform tasks traditionally done outside the home. This movement has spawned such valuable program genres as music performance and home accounting. It has also fostered applications of more questionable value—everything from biofeedback to personality analysis. Right now one of the most rapidly growing genres is what we call "home print studio" software. But, even though this new application promises much, the major question still to be resolved is, on which side of the fence does it fall? Do these programs replace traditional print and graphic sources, thereby adding great value to home computers? Or, do they fall alongside those of questionable utility?

***Do these programs replace traditional print and graphic sources, thereby adding great value to home computers? Or, do they fall alongside those of questionable utility?***

In a limited way, several of these programs *can* fill the order of a traditional print store. Print-studio aficionados have found that they can now use their computer to make cards, newsletters, posters, resumes, letterheads, charts, certificates, graphs, announcements, fancy memos, advertisements, invitations, banners, floor plans, needlework designs, and more. Of course, a computer printout may suffice for memos and posters—but those who prefer embossed, pastel-colored greeting cards with gold lettering face a tradeoff in quality for the convenience and freedom of creating their own print products at home.

For one thing, *freedom* to create near-professional-quality print products with a home computer will remain limited until color is more readily available. Currently, there are three ways to print in color: 1) Use a color printer with a program that has a color option; 2) interchange color printer ribbons while running out your document several times (once for red borders, again for blue text, again for green graphics, etc.); or 3) use colored paper (which is also possible together with the other two options). At this time, only two of the nine programs we review here accommodate color.

The *convenience* afforded by these programs really depends on how well they fulfill their claims of being quick and easy to use. And that hinges on two major conditions: the compatibility of a print program with a given printer, and the compatibility of the print program with other software used to create text and graphics.

Basically, these programs print in various type styles either by: 1) sending the printer certain codes that cause the printer to change the form in which it prints its normal character set—i.e., changing it to boldface, italic, expanded type, etc.; or 2) using bit-mapped graphics with the graphics options of some printers to create much more extravagant fonts. The first method actually just reconfigures the printer with codes for options that most printers (or word processors) provide anyway; so this type of program is not providing users with any added advantage. The second method, on the other hand, allows you to easily access a printer's bit-map graphics capabilities and print out your own files using the fanciest of fonts imaginable.

Our biggest problem in researching this review turned out to be making the programs work with supposedly compatible printers. Difficulties ranged from printer-switch settings that needed to be adjusted, to programs that used improper codes to access a printer's bit-map capabilities. These codes are so printer-specific that what works on one printer does not always work on another. Even though a program may list several printers as "compatible," minor differences can cause big headaches. In some cases, it is apparent that the developer neglected to adequately test for these differences before releasing a product. In others, the program simply had been released before some of our newer printers hit the market.

Software compatibility problems occur when, for example, you must use a program like a word processor to create a file, and a separate print program to produce the hard copy. If a file from the word processor is not compatible with your print program, you may end up with a garbled mess. And if you must reboot the word processor after running the print program, you lose your previously specified printing parameters.

We also found that, because the packaging and documentation of some of these programs used such phrases as "Epson-compatible" and "works with most word processors" rather carelessly, the documentation can't always be trusted. It is beyond the scope of this article to specify the multitude of possible printer, system, software, and interface compatibilities for the nine products reviewed here—so be sure that the print program you select works on your system before you buy it. If possible, test it on a system setup identical to your own at the store or at a user-group meeting to avoid disappointment.

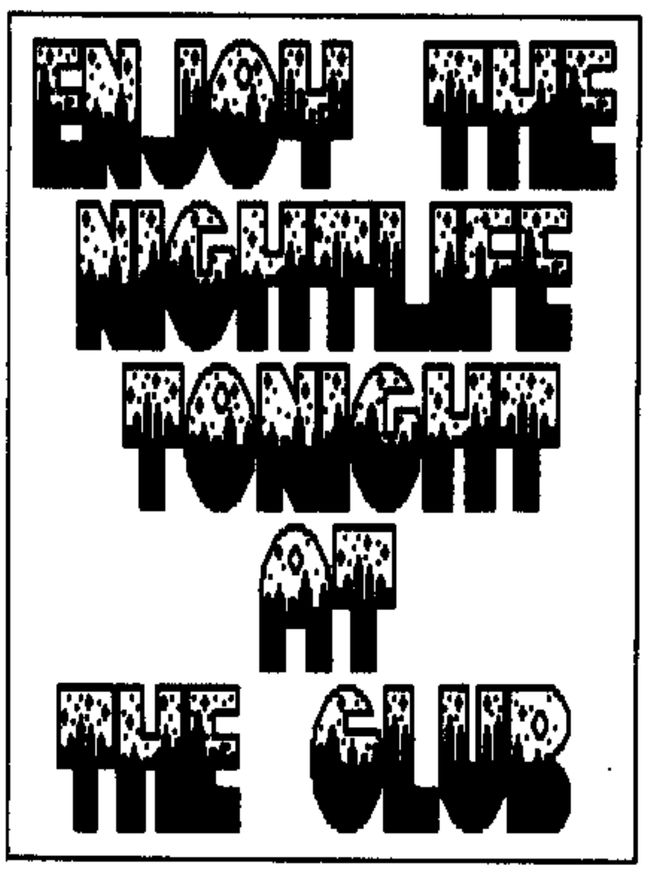
One other note: Many of these programs have a font-editor option that allows you to design your own character set pixel by pixel. However, you should be aware that there is no one-to-one correspondence between pixels on the screen and dots on a dot matrix printer. These relationships change due to varying screen resolutions and the way that systems make these pixel-to-dot translations. Although the representation is close, you won't get a one-to-one dot correspondence.

**FEATURED PRINTERS**

For this print studio review, in addition to the regular printer workhorses that we keep around the editorial department, we also tried out some new models provided for this review. The printers we used here include: the Apple Imagewriter, $595, $795 wide carriage (Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014); the Texas Instruments 99/4A Impact Printer which is an Epson MX-80 (no longer being produced); the Epson HomeWriter 10, $269 and PIC interfaces, $60 each, tractor feeder $39.95, cut-sheet feeder $99.95; the Epson Spectrum LX-80, $299 (Epson America, Inc., 2780 Lomita Blvd., Torrance, CA 90505); and Okidata's Okimate 20, $268 (Okidata, Mt. Laurel, NJ 08054).

## FONTRIX

*Fontrix*, by Data Transforms, is clearly the most sophisticated of the print-studio programs reviewed here, allowing you the greatest amount of freedom to design fonts, graphics, and entire pages. It brings the power of Macintosh's *MacWrite* and *MacPaint* programs to users of IBM computers and Apple II family machines, with just a little more work on the user's part. In fact, the manual and the program's capabilities are so overwhelming, it's easy to become intimidated by it all until you've had a chance to spend a good deal of time experimenting with it.




Fortunately, this is easy to do. A rather lengthy yet enjoyable tutorial in the manual guides you through each of the program's options as you create a birthday card and an invitation containing a map. You can take your pick from 12 fonts, 98 foreground and background colors and patterns, and a wide variety of drawing options. Commands such as Line, Box, Ellipse, and Airbrush (spray can) are highly reminiscent of *MacPaint*—minus the icons.

Two elements (at least) help make this program a typesetting/graphics standout: the additional font sets available separately (called *Fontpaks*), and a graphics option called Graffiles.

Although fonts are included with the program, they are limited to the all-too-common Roman, Script, and News style. *Fontpaks*, however, contain some of the most original fonts ever produced. The Skyline font from the *Incredible Novelty Fonts Fontpak* used in the printout here is just one example. Each package has ten complete character sets, most based on a certain theme—music, electronics, foreign alphabets, architecture symbols, and more. They are released periodically, and many are from *Fontrix* users who created them using *Fontrix*'s character editor.

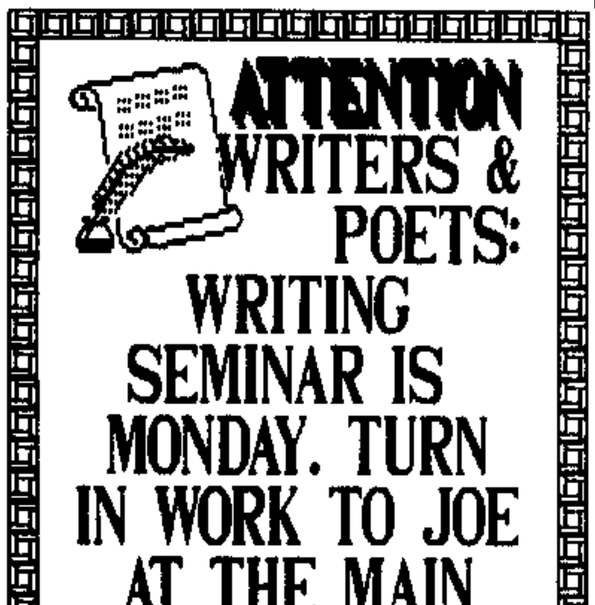
It's easy and fun to start with some of these sets and use the editor to alter them to your own taste. Like most other character editors, this one works by turning on and off screen dots that you specify by hitting a key. By changing the size of the cell, you can create different character sizes (maximum size is 32 x 32 screen dots). Each character set may have as many as 94 characters.

The Graffile concept is based on sectors. The high-resolution screen is about 5 x 6 *Fontrix* sectors, but you can create and scroll around on a Graffile that is *80 x 96* sectors. This allows you to create extremely intricate graphic and font designs—or combine them to, for example, throw together a newsletter with professional-looking headlines, charts, graphics, and justified columns of text. You can create these elements within the *Fontrix* program, or import text or graphics from outside programs and integrate it all on a Graffile, which can then be saved and printed out on your printer.

The only problem we had with this fine program occurred when we attempted to make a backup of the IBM version of *Fontrix as instructed*. After formatting a disk with the /s option (making the disk an MS-DOS startup), trying to copy the master provoked a message saying that there was insufficient space on the disk. Of the 24 files—only 20 would fit, leaving out 4 files. To use any of these missing fonts, you would have to delete some files from the backup and copy the desired files from the master copy.

## THE PRINT SHOP

*The Print Shop* by Broderbund Software is the epitome of easy operation in a print program. Here, visually pleasing and informative menus rule, making the fine manual unnecessary. When the program encounters an illegal entry, it simply ignores it and returns you to the menu you were working from. Change your mind about something? Just back up through the menus and make your change, keeping the choices you've already selected, if you desire. You may also pause or stop printing at any time.



But what does *The Print Shop* offer? Its myriad options allow you to put together hundreds of combinations of ready-made graphics, fonts, and border designs for greeting cards, signs, letterheads, and banners. The package includes 50 pictures (like a birthday cake, Santa Claus, animals, hearts, etc.), 8 fonts (that can be set centered, left, or right, in solid, outline, or 3-dimensional letters), 9 border designs, and 10 background patterns, as well as colored pin-feed paper and envelopes. A separate package, *The Print Shop Graphics Library*, provides 120 more graphics pictures.

If you're the do-it-yourself type, the Graphic Editor option lets you make your own graphics from scratch, or alter *The Print Shop*'s graphics, through the use of the keyboard, a joystick, or a KoalaPad. Although you can't import graphics created in other programs, you *can* draw and erase, with the cursor as your guide and its X and Y coordinates displayed at the screen's bottom to aid in more precise drawing.

Screen Magic mode presents a series of constantly changing kaleidoscope and geometric patterns that may be "frozen," saved, and printed—with or without a text message and border. This mode can't be used with the others, and vice versa, because it functions in a lower-resolution mode.

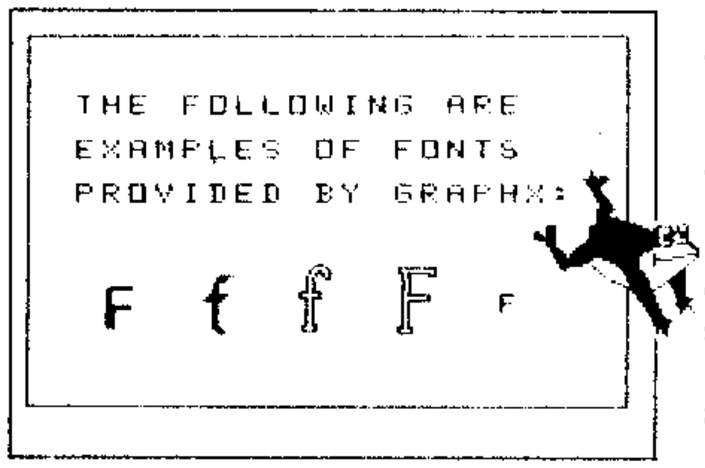
The Atari version of *The Print Shop* provides a pleasant surprise not found in many of the other programs here—it checks to see whether the printer supplies an automatic line feed. If it does, the progam accommodates it when setting up the disk. You don't even have to think about it.

Our biggest complaint with the program is that the actual printing takes *so long*. If you need multiple copies, you might consider using your *Print Shop* printout as a master and visiting a real print shop or a simple photocopy machine. Another disappointment is that you can only use one font and one picture in a document. You can repeat your graphic all over the page or pick one good spot for it, but you can use only one, until next time.

The best thing about this program? It's easy to use and the results look great.

## GRAPHX

In the prolific outflow of printer programs for other home computers, the TI-99/4A has so far been largely ignored. The programs that *are* written for the TI machine are scant and few—often they neglect to make full use of the computer's considerable abilities. Fortunately, there are always exceptions, and TI-99/4A users need not feel slighted in the case of one such program. *Graphx*, a software package by R.L. and C.P. Davis, two talented "blokes" from Sydney, has made its way from Down Under. It is a program that will fill you once again with the excitement of owning a home computer.




*Graphx* has, as its name implies, a somewhat different focus than the other programs featured in this review. It is, above all, a screen-graphics program, yet it also provides most of the font and printing options offered by the best printing programs reviewed here.

*Graphx* is amazingly easy to use for a program that offers so many features. This ease-of-use is mainly due to concise help lines that appear at the top of each screen, logical menus, and a function-key overlay strip that identifies the keys used in the program. Freehand drawing and editing with either a joystick or the keyboard make creating graphics natural and comfortable. Additional program features include a multiple-speed option; an easy-erasing mode; a zoom function that magnifies portions of the screen for easy editing; circle, ellipse, and line functions; and copy and move functions that duplicate and shift images on the screen. A typewriter mode allows you to use the keyboard to add text and labels to your graphics.

The program includes an optional checkerboard pattern that you can temporarily substitute for the background. This pattern makes full-color drawing hassle-free by identifying eight-pixel cells that are limited to no more than two colors. Another function allows you to fill entire shapes with color rather than coloring one pixel at a time. As an added benefit to all of you assembly-language programmers, pictures may be saved and used as colorful and intricate backgrounds.

The program provides several printing options to be used on *Epson MX-80* or compatible printers. Four printing formats allow you to produce prints of two densities (single density and double density) and two sizes. The small-sized double-density option produces near-letter-quality print on the *Epson MX-80*.

The most useful aspect of the program is the Clipboard. It allows you to save and run sequenced images for an animated effect. It also provides four fonts: computer style, gothic, hollow lower-case, and hollow upper-case. These fonts may be edited to serve your particular needs—you may add new characters, alter characters, or fill in the hollow fonts. *Graphx* is a joy to use. Its multiple applications range from game programming and font and graphics production, to providing interactive, captivating entertainment. With its low cost and numerous features, *Graphx* deserves serious consideration.

## FONTMASTER

*Fontmaster* is a unique entry among the other programs here because its creators have included a complete word-processing program on the disk. You may also convert outside word-processor files for use with this program.

*Fontmaster*'s embedded-style typesetting commands allow you to: alternate among 8 fonts you've loaded in memory (from 16 that are on the disk); print in boldface, italic, inverse, expanded, or compressed type; print with sub- or superscripts; and format at 6 or 8 lines per inch. This program is very flexible, allowing you to change to several fonts within one word if you like. Although you can't change the size of the type, you can use the Fonteditor program and a little effort to change an existing font or create your own. Here, as in *Fontrix*, you get a grid in which you turn pixels on and off to design each character.

The program and the manual are presented in a straightforward manner—using this program involves little more than getting acquainted with the many varied word-processing commands summarized in a chart on the back cover of the manual. Unfortunately, a few are missing, such as the print commands. The rest of the manual also has a few problems, including grammatical errors. A "Figure 1" showing the word-processor screen is referred to early in the text, but it is buried way in the back of the book and is not listed in the Contents. In addition, the word processor's commands are listed according to command, not function, so it's tough to find what you want if you're in a hurry. It's actually more useful to stick to the nearly complete chart on the back cover.

Once you're in the word processor, you'll find that screen prompts appear whenever you choose an option, and a full screen of formatting parameters for your text is available by toggling the [←] key. Because this is an assembly-language program, you cannot just exit to BASIC to load another program (as with the Fonteditor) when you've finished with the word processor.

We found one flaw that seems to be a hardware problem: We could not get our text to print out on an *Epson MX-80* (the *TI-99/4A Impact Printer*) nor on the *Epson Spectrum LX-90*. According to a very helpful technical representative at Xetec, there are slight differences in Epson printers made for other companies, such as Texas Instruments. It seems that the *TI-99/4A Impact Printer* ignores a code sent to the printer that changes the line feed to its proper spacing. The technical representative was not sure whether Xetec's program is compatible with the Commodore interface on the new LX-90. He added that if one of *Fontmaster*'s print parameters is set at 80 columns, you'll get an extra line feed. It's therefore safer to change it to 81.

Shortly after this issue of *HCM* goes to press, a new version of *Fontmaster* is due to be released. Xetec said that its biggest change will be in accommodating newer printers and printer interfaces. It will also supposedly have an option to enter your own configuration codes if necessary; this would solve our problem with the line-feed code.

If the new version of *Fontmaster* performs as promised, its full-capability word processor, font sets, and font editor will offer much more than some programs that are priced $100 higher. Potential buyers should, however, be cautious and make sure that they first verify printer compatibility.

## THE PRINTOGRAPHER

Although *The Printographer* does provide 9 font sets, it is chiefly a graphics dump that allows you to import or create a picture on the high- or low-resolution screen, add text, crop it, and easily print it all out. Images may be printed horizontally or vertically; in normal, inverse, or color mode; and from within your own program. You may also convert additional outside character

PRODUCT REVIEWS

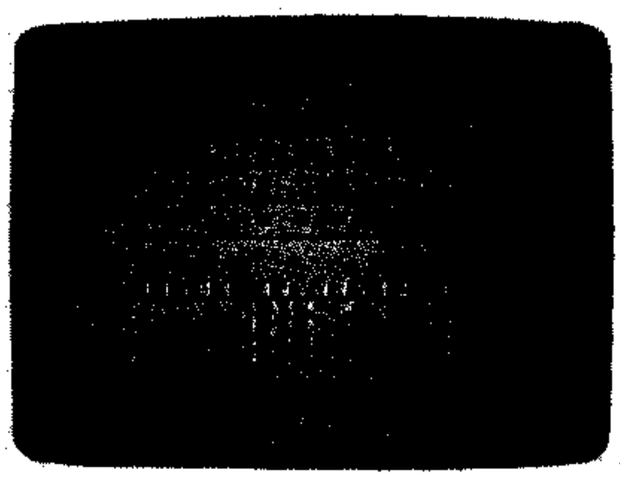
| NAME | MACHINES | DISTRIBUTOR | PRICE | SYSTEM REQUIREMENTS | POOR FAIR GOOD EXCELLENT |
|---|---|---|---|---|---|
| Fontrix | Apple II family, IBM PC & PCjr, Tandy 1000 | Data Transforms, Inc. 616 Washington St. Suite 106, Denver, CO 80203, (303) 832-1501 | $75 Apple: $125 IBM | Apple: 48K, printer and interface. IBM: 256K, MS DOS 2.0 or later, color-graphics card, printer. | P: EU: D: CB: |
| The Print Shop | Apple II family, Atari, Commodore 64 | Broderbund Software, 17 Paul Dr., San Rafael, CA 94903, (415) 479-1170 | $49.95 Apple; $44.95 Atari & Commodore 64; $24.95 Graphics Library | Disk drive, printer. Also, printer interface for Apple & Atari. | P: EU: D: CB: |
| Graphx | TI-99/4A | Graphx, P.O. Box C568 Clarence St., Sydney, NSW Australia 2000 | $50 | Disk drive; joystick; RS-232 interface; printer; Mini Memory, Editor Assembler, or Extended BASIC cartridge. | P: EU: D: CB: |
| Fontmaster | Commodore 64 | Xetec, Inc., 30100 Arnold Rd., Salina, KS 67401, (913) 827-0685 | $39.95 | Disk drive, printer. | P: EU: D: CB: |
| The Printographer | Apple II family | Roger Wagner Publishing, Inc., 10761 Woodside Ave. Suite E, Santee, CA 92071, (619) 592-3670 | $39.95 | 48K, printer and interface. | P: EU: D: CB: |
| Printworks | IBM PC & PCjr, Tandy 1000 | SoftStyle, 7192 Kalanianaole Hwy. Suite 205, Honolulu, HA 96825, (808) 396-6368 | $69.95 | 128K, printer. | P: EU: D: CB: |
| Fancy Font | IBM PC & PCjr | Softcraft Inc., 222 State St., Madison, WI 53703 | $180 | 128K, printer. | P: EU: D: CB: |
| Facelift | Apple II family, Commodore 64, IBM PC | Companion Software, Inc., P.O. Box 480741, Los Angeles, CA 90048 | $29.95 | Printer and interface, compatible word-processing program. | P: EU: D: CB: |
| Select-A-Font | IBM PC & PCjr | IBM Corp., Boca Raton, FL 33432 | $19.95 | 128K, disk drive, printer. | P: EU: D: CB: |

KEY: P: = Performance, EU: = Ease of Use, D: = Documentation, CB: = Cost/Benefit.

# MUSIC SYNTHESIZER

**A Review by**
**Laile L. Di Silvestro**
*HCM Staff*

**HCM Review**



| | |
|---|---|
| Name: | Music Synthesizer |
| Program Type: | Music composition |
| Machine: | TI-99/4A |
| Distributor: | Asgard Software<br>P.O. Box 10306<br>Rockville, MD 20850 |
| Price: | $22.95 (disk), $19.95 (tape) |

System Requirements: Disk drive, 32K memory expansion, Extended BASIC cartridge.

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

*Is this the program that will finally reveal the wonders of the TI music chip?*

Recently, the world of music has been opening up to home computers. Imaginative music construction, composition, and player programs have transformed computer consoles into a melodious realm of endless possibilities. Now Asgard has created *Music Synthesizer*, a program that seemingly promises to introduce TI-99/4A users to this realm. But is this program really a music synthesizer?

## Creating Music

*Music Synthesizer* is a simple music composition program. Its screen-oriented editor enables you to place notes on a staff by choosing commands from concise menus. The songs thus created can have as many as three voices, and may be played and saved in whole or in part.

The program was intended for the musically inexperienced. Indeed, its stark simplicity implies ease of use. The black and white graphics on the screen contain nothing to confuse or distract. You have only to consider five horizontal lines (a musical staff), a menu, and a number indicating the note being worked on. The first menu enables you to place a note on the staff, play, edit, and view the screens. In addition, it provides save, new, and load functions.

Placing notes on the staff is, of course, the main purpose of the program. Logical commands make it easy but time-consuming, as several steps are necessary. For each note, you must enter L (for Leave note); you must maneuver the note using the E, S, D, and X keys; you must choose between whole, half, quarter, eighth notes, or a rest (if you choose rest, the process is one step longer); and, finally, you must press [ENTER]. If you want two or three voices to play simultaneously, these notes must be placed in a vertical row known as a "note column."

Contrary to the program's intentions, a fundamental knowledge of music *is* necessary to place notes on the staff. If you are truly inexperienced in music composition, you might find it more gratifying to just enter notes at random, play them, and smile in surprise.

## Dismaying Flaws

Upon receiving *Music Synthesizer*, I eagerly sampled the music provided. I found myself dismayed at its limited nature. *Music Synthesizer* produces notes of three voices over a limited range of one-and-a-half octaves. It produces only one instrument sound and lacks the option of sharps and flats. It does not allow variations in tempo or volume. *Music Synthesizer* is not actually a synthesizer, as it does not *manipulate* sounds. Rather, it is an unsophisticated program that enables the TI-99/4A to generate simple *tones*.

One would expect more from a music program created for the TI machine. The 99/4A contains a well-contrived music chip that generates three tones and one noise simultaneously. The tones can be varied according to duration (1 millisecond to 4.25 seconds), frequency (110 to 44733 hertz), and volume (0 to 30). The noise may be one of eight provided—four white noises and four periodic noises. Of these noises, the frequencies of one white and one periodic noise may be altered. Thus, the TI-99/4A is capable of generating a great variety of sounds. It is a shame that *Music Synthesizer* does not make full use of these extensive capabilities.

The program has more problems: because it is written in Extended BASIC, the program is slow. For example, from the time the PLAY command is entered, to the moment when the song begins, there is at least a 30-second interval. During this wait, I found myself wishing for more stimulating graphics—perhaps some color or some movement to engage my interest. A more serious flaw is the program's inability to scroll while songs are playing.

> ***"One would expect more from a music program created for the TI machine."***

Poorly written instructions containing grammar and spelling errors add to the already numerous faults. It is rather surprising, therefore, that *Music Synthesizer* is one of the most highly priced programs of its kind. Its $22.95 price is at least $10 higher than comparable programs with greater application. (Watch for reviews in coming issues.)

Unfortunately, programs like *Music Synthesizer* by Asgard allow users to catch only a glimpse of the infinite potential and startling variety inherent to computerized music. As seen through *Music Synthesizer*, the musical world of computers appears quite barren and small.

**HCM Glossary terms:** frequency, periodic noise, synthesizer, white noise.

**HCM**

# HITCHHIKER'S GUIDE TO THE GALAXY

**A Review by Scott Darroch**

*You won't make it through this trip with just your thumb—you'll need the Guide and more, to survive this sardonically humorous galactic adventure . . .*

What an excellent idea! Take a first-rate, out-of-this-world (and several other worlds as well) adventure filled with exotic locales and bizarre aliens, and create an interactive adventure game. This was the challenge undertaken by Infocom Systems when they translated *Hitchhiker's Guide to the Galaxy*, a popular book and PBS/BBC series, into an interactive text-adventure game. As in any attempt to transfer works of entertainment from one medium to another, there are inevitable tradeoffs and losses in translation—but also valuable gains. In this respect, *Hitchhiker's Guide to the Galaxy*, as adapted by author Douglas Adams and game designer Steven Meretzky, is something of a mixed bag.

For those of you who are unfamiliar with the adventure, a brief description is due: The place is Earth. The setting is a day—any day—in the present. Arthur Dent wakes up one morning to find that his house sits in the path of a proposed freeway, and is doomed to destruction. In the course of the day, as he battles the inevitable demolition of his house, Arthur discovers that the entire Earth is to be destroyed to make way for an intergalactic freeway being built by the Vogons. Arthur escapes the Earth's destruction and becomes a Galactic Hitchhiker. He explores the universe with Ford Prefect as a companion, destined for adventures that sparkle with sardonic humor.

*Hitchhiker*, the game, conforms closely to the book—with one important exception. *You* are Arthur Dent, Galactic Hitchhiker. A word of advice—don't panic!

***". . . an astounding, exciting, and above all, humorous universe —where your most casual words might well instigate interstellar conflict . . ."***

## Playing Ease

*Hitchhiker* is offered in various levels of difficulty for players aged 9 and up: junior, standard, advanced, and expert. We tried the standard level and found it to be all the challenge a presumably sound-minded adult would desire. It is an intricate, detailed, and demanding game—one in which nearly every conceivable avenue of action has been foreseen, and every consequence described in colorful, descriptive prose.

Your progress in the game is assessed according to points and rounds. Points are scored by actions such as picking up an object or swallowing a tablet. A round consists of one action, command, or question.

As a text-adventure system, *Hitchhiker* operates well. It is equipped with a wide variety of recognized verbs and the ability to accept simple commands, direct requests to other characters, and understand multipart, complex sentences. If the program cannot understand an entry, it specifies whether it does not understand the entire statement, does not recognize a word, or does not understand a word as it has been used in the command—thereby prompting a revision. If you direct a useless or ridiculous action, the system displays a wide variety of droll, smart, and sometimes deadly, responses.

*Hitchhiker* also boasts a variety of features that simplify the game. Unless you ask *who*, *what*, or *where*, the system automatically prefaces each command sentence with "I want to . . ." to save time in entering commands. Articles (a, the, etc.) need not be entered. Game play is facilitated by the abbreviation of commonly used commands (Wait, Again, and Look are Z, G, and L respectively), and by special purpose commands including Inventory, Diagnose, Save, Restore, and Restart.

The only drawback to the address and command system is that you are not allowed to ask direct questions of Ford Prefect or to make inquiries using the future tense. This requires you to operate with direct commands, or to use one of the three standard question forms. Even a query such as "What happens now?" will be rejected. But, for the most part, the game moves along with few of the frustrating "I don't understand that" replies that can kill a text adventure quicker than an industrial-strength sleeping potion.

The commands Save and Restore come under heavy use, as the game is fatal in many situations—most of them unexpected. At certain points, you will be summarily executed if you have not found the solution to

a particular puzzle. If you save your positions and character as you move through the game, the Restore command will return you to the last-saved position, even if you have been killed or otherwise hopelessly mucked up.

Because the Restore command is limited to returning you to the last-saved position, the Script and Unscript commands are a welcome option. These commands direct your printer to start and stop printing a transcript of your adventure. For most of the situations that you will encounter, a transcript of previous actions and results will prove to be a pearl beyond price.

## Some Words of Advice

When playing the game, you must understand its limits and operate within its constraints. It is very important to *look* at everything in the surrounding environment in order to fortify your character with knowledge of the specific details that you encounter. In addition to looking about, you may garner information by smelling, touching, speaking, tasting, and a variety of other actions. The system provides the information through entertaining descriptions and direct responses that both enlighten and challenge the player.

An important maxim to remember is "all things come to he who waits." At many points in the game, all you can do is pass time and try to fathom your latest situation. Many times, repeated use of a command will achieve the desired response, whereas one try will yield only gibberish or a frustrating reply. It also helps to take advantage of commands that produce diagnoses of your physical condition and inventories of your possessions. These checkups help to prompt actions you might never have considered (or been desperate enough to try) before.

*Hitchhiker*, even at the standard difficulty level, is a challenging series of mental mazes which may require many attempts to navigate—or even to proceed beyond a specific point. In fact, the single major flaw in the system is that the master map and line-by-line hint book (an ingenious device which reveals only one hint at a time) are aftermarket items not included in the software package. The *Hitchhiker* manual says that solving the game will probably take several days. We found that, without using the hint book, it took several days just to escape the earth's destruction (the real beginning of the adventure).

A more-than-passing familiarity with other Infocom games is also valuable. In fact, *HCM*'s most experienced Infocom gamer is the one who unearthed the most important solutions without reference to the hint book (see Counterpoint).

We have an additional hint for Commodore 64 owners. The documentation we received for the C-64 disk incorrectly directs users to load the game by entering `LOAD "GAME",8`. The manual should have stated `LOAD "STORY",8`. [According to Infocom, newly issued packages correct this mistake—Ed.] The documentation for all the other versions appears to be fine. Each version is remarkably similar, and equally humorous.

## Don't Panic!

*Hitchhiker's Guide to the Galaxy* comes in an attractive package, complete with a sales brochure, peril-sensitive sunglasses, pocket fluff, a microscopic space fleet, destruction orders for both your house and Earth, but no tea. Also included is the essential "Don't Panic!" button—required equipment for this adventure.

The hand of *Hitchhiker*'s creator, Douglas Adams, is easily recognizable in the text descriptions and pro-

| | |
|---|---|
| Name: | Hitchhiker's Guide To The Galaxy |
| Program Type: | Text adventure game |
| Machines: | Apple II Family, Atari, Commodore 64, IBM PC, PCjr, TI-99/4A |
| Distributor: | Infocom, Inc.<br>55 Wheeler St.<br>Cambridge, MA 02138 |
| Price: | $33.95 |
| System Requirements: | Disk drive. |

| | Poor | Fair | Good | Excellent |
|---|---|---|---|---|
| Performance: | | | | |
| Engrossment: | | | | |
| Documentation: | | | | |

grammed responses. His imaginative and witty approach helps to make even unsuccessful forays into this beautiful and deadly universe an exhilarating and enlightening experience.

## Can You Take It?

Anyone willing to withstand the rigors of matter transference and the near inevitability of being tortured by a Vogon poetry reading, will find in *Hitchhiker* an astounding, exciting, and above all, humorous universe. Here your most casual words might well instigate interstellar conflict between the V1'Hurg and G'Gugvunt peoples, laying waste to over 250,000 solar systems, and destroying one-quarter of a small galaxy. "Please choose your words more carefully."

Once beyond the confines of Earth, you will be able to hobnob with Trillian and Zaphod Beeblebrox (erstwhile President of the Galaxy), attempt to escape the Bugblatter Beast of Traal (the most ravenous creature in the universe), ponder the mysteries of the Physics of Infinite Improbability, and otherwise have the time of your life—or several lives. So, if you are ready for really high adventure, put on your gown, save your character often, stick out your thumb on the Interstellar Interchange—and don't forget your towel!

### ☞ COUNTERPOINT ☜

*Hitchhiker's Guide to the Galaxy* was the perfect book to integrate into Infocom's computer-adventure format. After spending many hours of my life playing Infocom's *Zork* series and reading all four books of Douglas Adams' *Galaxy* "trilogy" (sic), playing this adventure game was quite a pleasure. The humor portrayed in the book is certainly not lost in the game. The authors succeeded in keeping the computer program faithful to the book.

One thing *did* disappoint me—inflexibility. This program is very linear in its play. In order to advance in score and position, things must be done in the proper sequence at the proper time. After playing many of Infocom's other adventures, I found this program to be a bit too limiting in that aspect. I suppose that since books are linear by nature, this hardwired chain of events is unavoidable. In order to live through this galactic adventure, knowledge of the *Hitchhiker's Guide to the Galaxy* book is very helpful.

Overall, this program is very well done. When the second book of the *Hitchhiker* "trilogy" comes out in adventure form, you can be sure that I'll be playing it.

*—Randy Thompson*

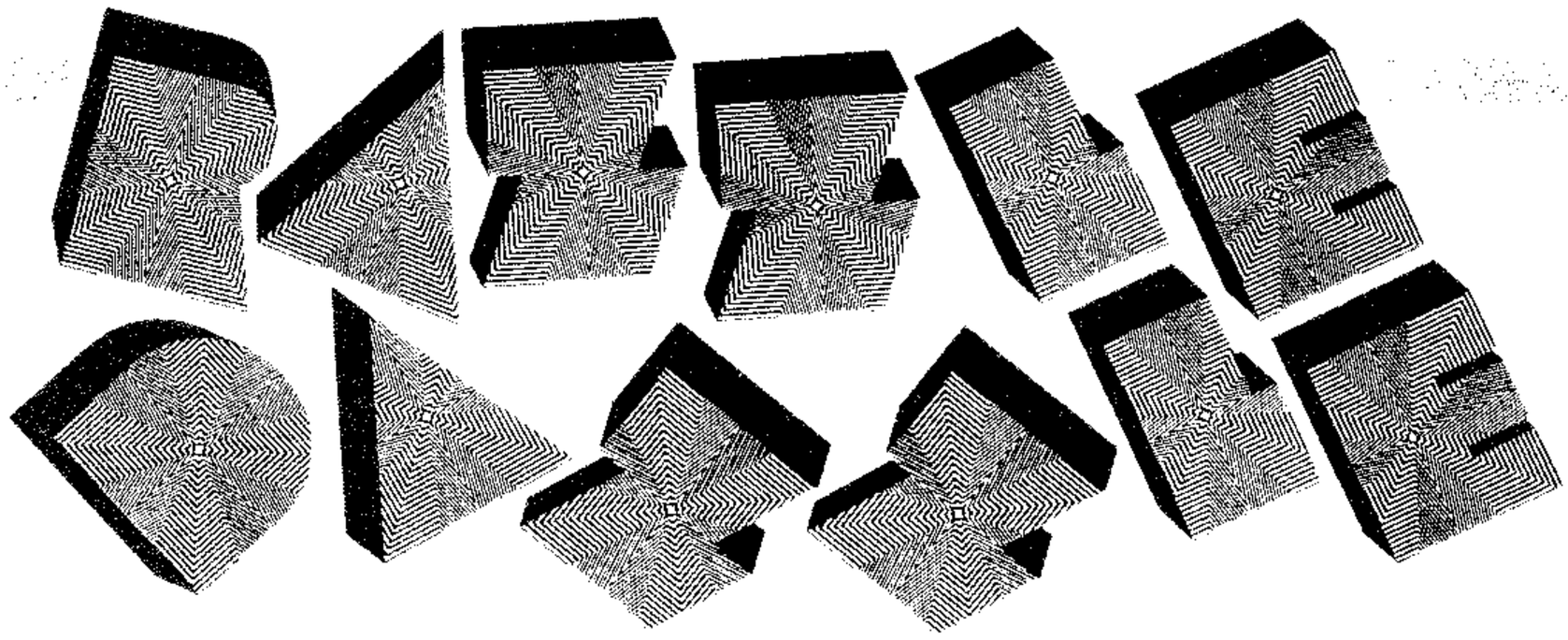
**HCM**

# TECH NOTES

## Popping The Return Stack

TI Extended BASIC gives you the option of including your own error-handling routines in your programs. A common problem that you may encounter when doing so involves the pending of several **RETURN**s. When your BASIC program branches to a subroutine from a **GOSUB**, it places the return address in a buffer called the stack. The number of return addresses that can be placed in the stack is limited—if you place too many return addresses in the stack, you will get a **MEMORY FULL** error. To avoid this error, you must have the program **RETURN** from any subroutine called with a **GOSUB**.

```
100 !!!!
```



# Cyber-Abacus

**by Scott Williams**
*HCM Staff*

## *Produce dazzling results with this computer-age number cruncher*

The computer is a multi-talented machine. It helps us write, it organizes our activities, it educates and amuses. When face-to-face with such versatility, however, we sometimes forget that the computer is foremost a number-cruncher. *Cyber-Abacus* is dedicated to this primary function—it might even replace that extra appendage on your desk: the calculator. As a simple utility program, *Cyber-Abacus* performs almost all the operations that are found on a standard calculator, as well as many that are not.

### Getting Started

To begin crunching numbers, simply RUN the program and press [ENTER] when the title screen appears. The screen now displays printing instructions and prompts you to enter the printer device parameters. (Enter parameters according to your printer manual's specifications.) If you don't have a printer, or simply don't want a printout, press [ENTER].

After the program initializes, the computer displays the *Cyber-Abacus* screen—a calculator consisting of 5 fields. Enter the first value of your mathematical problem (the number to be operated on) into Field 1, located at the top of the screen. This field displays all results from a calculation or function after the operation is completed.

**Sample Printout**

```
F
VALUE OF PI
3.141592654
M
3.141592654
MOVE FIELD 1 TO MEMORY
C

CLEAR

3963
^
3
6.22404E+10
*M
1.95534E+11
MULTIPLY MEMORY
*
4
7.82136E+11
/
3
2.60712E+11
```

Directly below Field 1 lies the Operator field. The characters that you enter here determine the type of operation to be performed on the number in Field 1. Refer to Figure 1 for a list of characters that can be entered into this field and the functions that they perform. If you select an illegal operation, *Cyber-Abacus* displays a list of the possible legal operations in the lower part of the screen.

Below the Operator you find Field 2. Here, enter the second numeric value in your problem—the number that works with the Operator to act on the value in Field 1.

The fourth field displays printer status. If you have indicated a valid device name and parameter list, the field should display PRINTER ON. With this status, the program outputs any operation to the printer as it is performed (see Sample Printout). If you don't want a printout, switch to PRINTER OFF. You can toggle the printer status by entering P into the Operation field.

Field 5 displays the contents of memory. *Cyber-Abacus* memory works just like the memory on most calculators—it remembers any value placed into it, allowing you to perform other operations without losing the value. You can use many of the operators in Figure 1 to manipulate memory.

### Functional Power

You can perform a number of functions on the value in Field 1 by selecting F at the Operator field. The program then displays a list of the 12 available functions at the bottom of the screen. To select a function, enter the letter located beside the function you desire. See Figure 2 for a list of the available functions and the keys used to select them.

**HCM Glossary terms:** device parameters, number crunching.

**FIGURE 1**

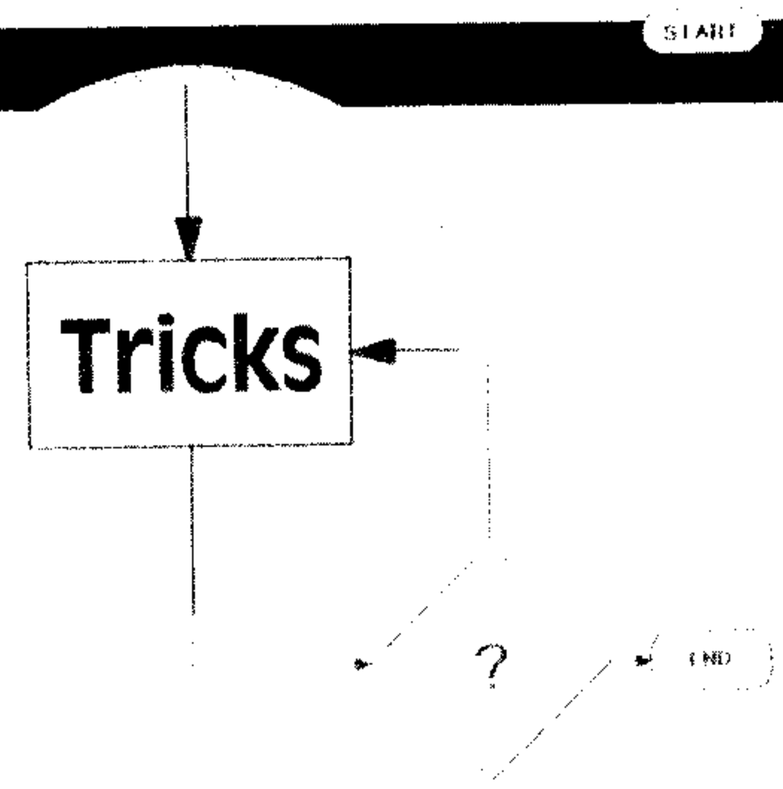
| Operation | Function |
|---|---|
| + | Add Field 2 to Field 1 |
| – | Subtract Field 2 from Field 1 |
| * | Multiply Field 1 by Field 2 |
| / | Divide Field 1 by Field 2 |
| ^ | Raise Field 1 to the power of Field 2 |
| C | Clear Field 1 |
| Q | Quit. Exit the program |
| F | Select a function to perform on Field 1 |
| M | Move Field 1 to memory |
| CM | Clear memory |
| +M | Add memory to Field 1 |
| –M | Subtract memory from Field 1 |
| *M | Multiply memory times Field 1 |
| /M | Divide Field 1 by memory |
| R | Recall. Move memory to Field 1 |
| P | Toggle printer ON/OFF switch |

**FIGURE 2**

| Key | Function | Result |
|---|---|---|
| A | NEG | Negative value |
| B | ATN | Arctangent (inverse of tangent) |
| C | COS | Cosine (in radians) |
| D | EXP | Exponential value |
| E | INT | Integer |
| F | LOG | Natural logarithm |
| G | PI | Places PI into Field 1 |
| H | SIN | Sine (in radians) |
| I | SQR | Square root |
| J | TAN | Tangent (in radians) |
| K | ASN | Arcsine (inverse of sine) |
| L | ACS | Arccosine (inverse of cosine) |

**KEY VARIABLES**

**NUM$** is used to contain the numeric string in the numeric display routine. **P$** contains text to be sent to the printer. **CF** is a flag that indicates a clear-memory operation. **F1** contains the value of Field 1. **F2** contains the value of Field 2. **L** indicates the screen row for display. **MEM** contains the value of the memory field. **OP** contains the selected operation from the Operator field. **P** contains the status of the printer option ON/OFF switch.




Algorithm . . .

# ORGAN-IZING VITAL SIGNS

**by the HCM Staff**

## WHAT IS AN ALGORITHM?

An algorithm is simply a procedure—one that a program uses to complete a task or solve a problem. Flow diagrams and flow charts are handy tools for representing the steps in this procedure. Any program can be viewed as a collection of separate procedures. In this column, we focus on and explain one unusual or interesting algorithm that is found in one of the programs we publish each issue.

***Here are the mathematical secrets behind the Vital Signs simulation of the circulatory and respiratory systems.***

The circulatory and respiratory systems are the most complex facets of the human body—with the exception of the brain. Designing the algorithm that mimics these two important systems in *Vital Signs* was a challenging task (and one that took full advantage of all our brains' intricate construction).

Our goal was to design a simulation/game in which the user controls these normally-automatic functions of the body. To have both educational and strategic value, the simulation had to display a relatively accurate representation of circulatory and respiratory functions, incorporating realistic processes as well as variable parameters.

There are so many factors involved in the control of even the simplest circulatory or respiratory process, we might need a super computer with 100 megabytes of memory to take them all into consideration. We therefore focus on only the most critical of the functions which affect the circulatory and respiratory systems.

Thus, there are three functions in the simulation to be maintained. These are blood pressure, oxygen level in the blood, and body temperature. These functions affect each other and are additionally affected by 4 parameters, which the user can manipulate directly: heart rate, respiration rate, activity, and air quality.

Before we get into the details of how these parameters affect each of the three functions, take a look at Figure 1. This flow diagram gives a general picture of how heart rate and respiration rate are associated with the three functions. It also demonstrates how the three functions actually alter each other. It is important to note that, although respiration has no direct effect upon either blood pressure or body temperature in the algorithm, it has an *indirect* effect as shown.

## Blood Pressure Algorithm

The algorithm that controls blood pressure is the simplest that we employ in *Vital Signs*. The heart rate obviously affects blood pressure because a faster heart rate pushes more blood through the circulatory system, thereby raising the blood pressure. The body's activity directly influences the heart rate's effect on blood pressure: Blood pressure increases with higher activity levels. We can therefore use the heart rate to offset the activity level in order to maintain pressure. (See Figure 2.)

To make the program more interesting, we add the possibility of a blood clot. Notice in the equation below that we add 1 to this factor before multiplying it in, so it has no effect when BC = 0.

Finally, we add the oxygen level to the other factors affecting blood pressure. If the oxygen level falls below normal, the blood pressure automatically starts to increase, supplying blood to the tissues at a faster rate. As the blood pressure increases, the oxygen level goes back up. (See the Oxygen Level Algorithm section below.)

We use the following primary equation (depicted in Figure 2) to calculate the blood pressure. The other numeric factors scale the various factors relative to one another.

```
P = SQR(A*HR)*1.3485*(1 + BC*.5) + OX
```

## Oxygen Level Algorithm

The oxygen level algorithm is by far the most complex because of the number of factors that affect it. Both the amount of blood that the heart pumps to the lungs and the amount of oxygen available in the lungs control the oxygen level in the blood. These in turn are influenced by several parameters.

The oxygen level is the only algorithm that respiration rate and air quality affect directly. These two factors determine the amount of oxygen present in the lungs for the blood to pick up. Thus, air quality and respiration rate combine at the lower left in Figure 3. Because poor air quality increases the chance of lung cancer, this factor is also multiplied into the equation.

Heart rate and blood pressure determine how much blood is available to the lungs. Both higher heart rate and higher blood pressure increase the flow of blood, thereby raising the oxygen level. Increasing the heart rate has a twofold effect on the oxygen level: It influences the oxygen level directly; and, as it raises the blood pressure, it again increases the oxygen level. Notice that the heart rate adds to the blood pressure in Figure 2, and that it combines with the blood pressure in Figure 3.

These factors thus determine the oxygen level of the blood and the amount of blood being pumped to the

lungs. We also must consider how much of the available oxygen is actually used. It is important that there be a balance between the amount of oxygen supplied and the amount used. We therefore subtract the activity level value because higher activity levels cause more oxygen to be used. (See Figure 3.)

The equation we use to calculate the oxygen level is as follows:

```
CO = (SQR((RS*8*AIR*(1 - LC*.4))*SQR(HR ^2 + P ^2)) - A)*.02
```

## Body Temperature Algorithm

The temperature algorithm actually changes slightly depending on the activity selected. If the activity is set to running or swimming we take a "sweat factor" into account. (See Figure 4.) Otherwise, the activity level directly increments the body temperature.

The inclusion of a perspiration factor adds realism to the simulation. The body relies heavily on the sweat glands to cool the outer layers of the skin when other methods of cooling the body are insufficient. This process in turn cools off the blood when it is near the skin.

Activity level always affects the body temperature. The more active the body is, the more energy must be expended, causing heat. The sweat counter (above the activity box in Figure 4) keeps track of the how long an activity level has continued. As the sweat counter increases, the body temperature drops. The counter increases over time, so its effect gradually increases as the activity continues. If the activity persists too long, the body eventually dehydrates (runs out of water), and body temperature starts to rise again.

The heart rate also directly controls the body's temperature. When the heart rate increases, the resulting increase in blood that reaches the skin tends to lower the temperature. The box at the top of Figure 4 represents this part of the algorithm. Conversely, lowering the heart rate increases the temperature.

In addition, oxygen level (as depicted in Figure 3) indirectly controls the body temperature. When the oxygen level decreases, the body cannot expend as much energy. Therefore, the body temperature decreases. (See the oxygen level algorithm section for details on how it is regulated).

Here are the equations (depicted in Figure 4) we use to calculate the body temperature:

```
CNT = CNT + 1
IF (CNT < = 40 OR CNT > = 100) AND A > 4 THEN
  T = SQR((250 - HR) ^2 + (OX * 3) ^2) * .07588 + 81.4
  + ((A*(CNT + 1)*.001)*((CNT > 100)*1.1 + 1))
ELSE
  T = SQR((250 - HR) ^2 + (OX*3) ^2)*.07588 + 81.4 - A*.0001
```

**Variables used in equations:**

| | |
|---|---|
| P | is the blood pressure. |
| A | is the level of activity. |
| HR | is the heart rate. |
| BC | is the flag which indicates a blood clot. |
| OX | is the deviation in oxygen level from optimum. |
| RS | is the respiration rate. |
| CO | is the change in oxygen level. |
| AIR | is the air quality. |
| LC | is a flag which indicates lung cancer. |
| HR | is the heart rate. |
| CNT | is the sweat counter. |

**HCM Glossary terms:** algorithm, automatic function, parameter, scale.

**HCM**

**Figure 1.**
**Effect Of Body Functions On Other Functions**

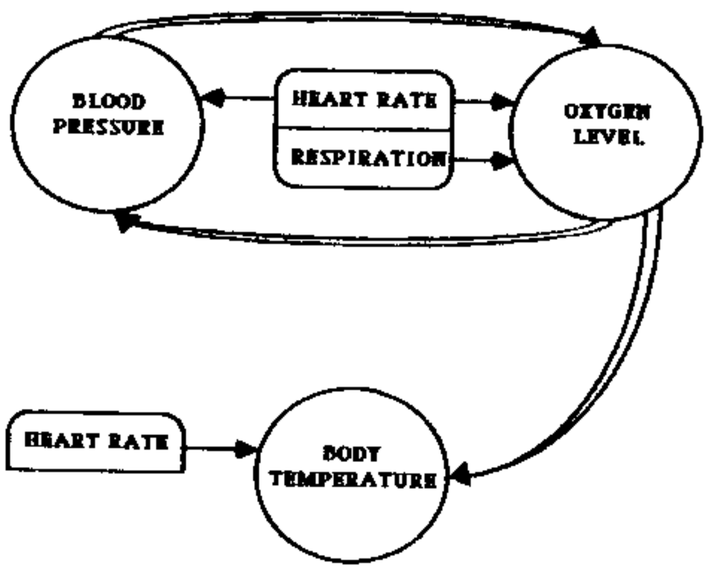



**Figure 2.**
**Control Algorithm For Blood Pressure**

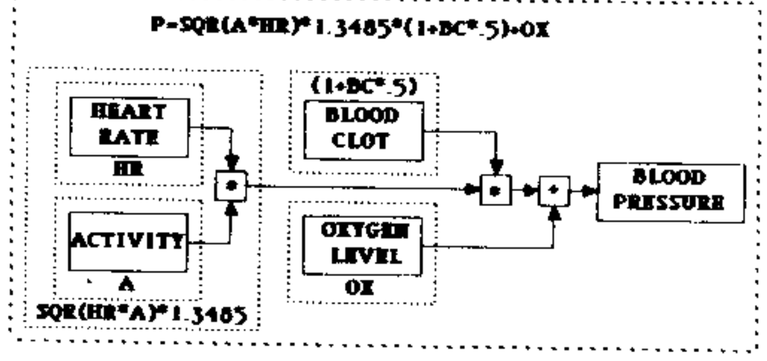



**Figure 3.**
**Control Algorithm For Oxygen Level**

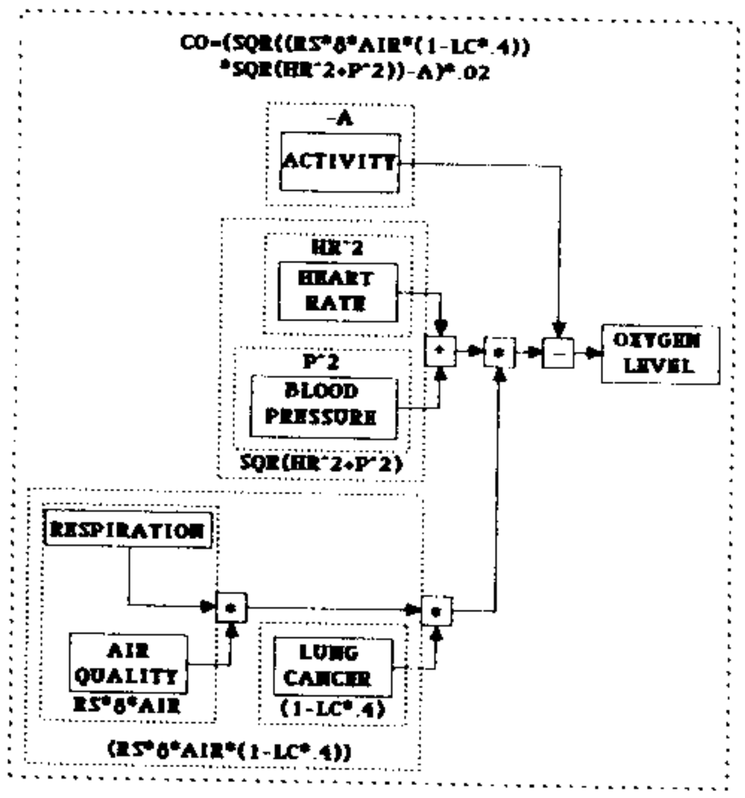
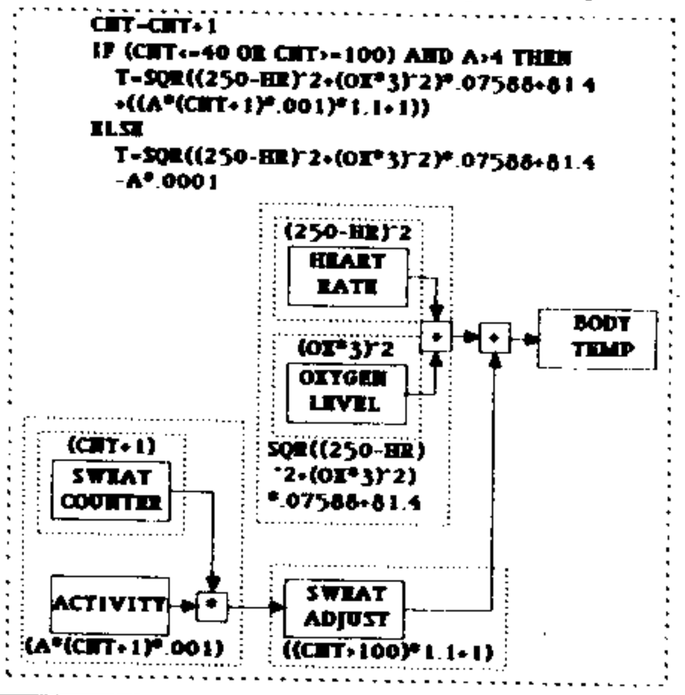



**Figure 4.**
**Control Algorithm For Body Temperature**



# soundbytes

## The New Age of Music-Making

**by Andy Widders-Ellis**
*HCM Staff*

***The electronic revolution brings musical power to the people. Today's beginning composer can use his or her computer to conduct an electronic orchestra or band—at a cost starting under $500.***

Music and computers—what is the connection? In the past decade, as computers have established themselves in millions of homes, they have also emerged as a major force in music. Computers are removing the years of physical training that formerly stood between the average person and the act of making music. If you have an interest in music but have hesitated to get involved because of this perceived "physical barrier," your time has come. Computer-assisted composing, recording, and synthesizer sound creation is a reality. Today, the world of music is opening to people who may not yet even realize that they, too, can work and play with sound.

### Synthesizers Get Smart

Until recently, the synthesizer—fast becoming the dominant instrument in contemporary music—has served as an excellent sound-generating machine, but has required a skilled performer to play it. Computers, on the other hand, have developed into useful tools for creating musical compositions, but generally have *not* been very sophisticated sound-generating devices. As prices fall for these two forms of electronic instruments, new ways are evolving to create potent music-making *systems* that combine the strengths of both synthesizers and computers.

### The Electronic Orchestra

Musical Instrument Digital Interface (MIDI) is a method of transmitting data from one computer or synthesizer to another. Through MIDI, a computer can memorize performances or store compositions produced by electronic instruments. A user can then arrange and edit this data with special software. Other programs can turn these computer-assisted compositions into printed scores. Finally, MIDI can link several electronic instruments to the computer to perform numerous parts. Today's beginning composer can thus use his or her computer to conduct an electronic orchestra or band—at a cost starting under $500.

### The Music Computer

In addition to MIDI, another new trend is to combine the computer and synthesizer into one package. The Yamaha CX5M, for example, places an 8-voice, polyphonic, multi-timbral FM digital tone generator under the control of a 48K under-$500 MSX computer. With this machine, you can record and perform your compositions (in stereo), and create and store custom voices. You can also generate hardcopy printouts of music and voice data on standard paper.

### The "Sound Camera"

One of the most exciting and controversial developments in electronic music—resulting from recent advances in digital recording—is sound-sampling. A sound (such as a bowed violin string) can be translated into binary code and stored in a microchip or on floppy disk. This technique has led to keyboards and drum machines that can either re-create the sound of traditional instruments very accurately—or use virtually *any* sampled sound as a new "instrument." Even trained ears sometimes cannot distinguish between these re-created sounds and the "real thing." Sound-sampling is now beginning to find its way into the home computer field. An example of this technology is the Decillionix DX-1. This under-$400 hardware/software package for the Apple II family allows digital recording and playback of any sound.

### The New Folk Instrument

Computers have created an interesting situation for music makers. Do we seek the experience of producing music physically? Or do we simply "dream it up" and program electronic instruments to perform for us? Neither choice precludes the other. But the second option promises to have an impact not unlike the invention of other "folk instruments" of the past—such as the autoharp, the accordian, and the electric organ. It means that music is now more *accessible* to more people. This new music medium based on computers and electronics is indeed the folk instrument of our time.

All indications are that the computer is emerging as the ideal means of expressing the musical *vox populi*. The rules may have changed, but the game remains the same—human communication. Man's most universal language can now benefit from man's most powerful electronic tool.

Home computer owners can participate in this music revolution in many ways: Are you a budding musician? With your computer you can study sight-reading, theory, ear training, and composition, by tapping the wealth of music instruction software currently available. How about a musical "pen-pal" network, employing computers and modems? (Imagine "playing" your music for some friends who are sitting in their livingroom, thousands of miles away.) You can learn the rudiments of keyboard, guitar, or several other instruments from your friendly computer-tutor. Study the masters by entering their compositions part-by-part into computer memory. Experiment, orchestrating these parts with a synthesizer through MIDI. Re-arrange Beethoven! Digitally record environmental sounds, edit, and arrange them into sonic events and tone poems. The possibilities are almost endless, yet as near as your computer keyboard.

For in-depth information and recorded examples of the changing face of music, read our new sister publication *Music & Electronics: The Magazine of Creative Discovery Through Sound Technology*.*

**HCM Glossary terms: MIDI, modem, MSX, polyphonic, multi-timbral, FM digital tone generator, voice, synthesizer, digital sound-sampling.**

***See sample contents & order form on pages 63 & 64.**

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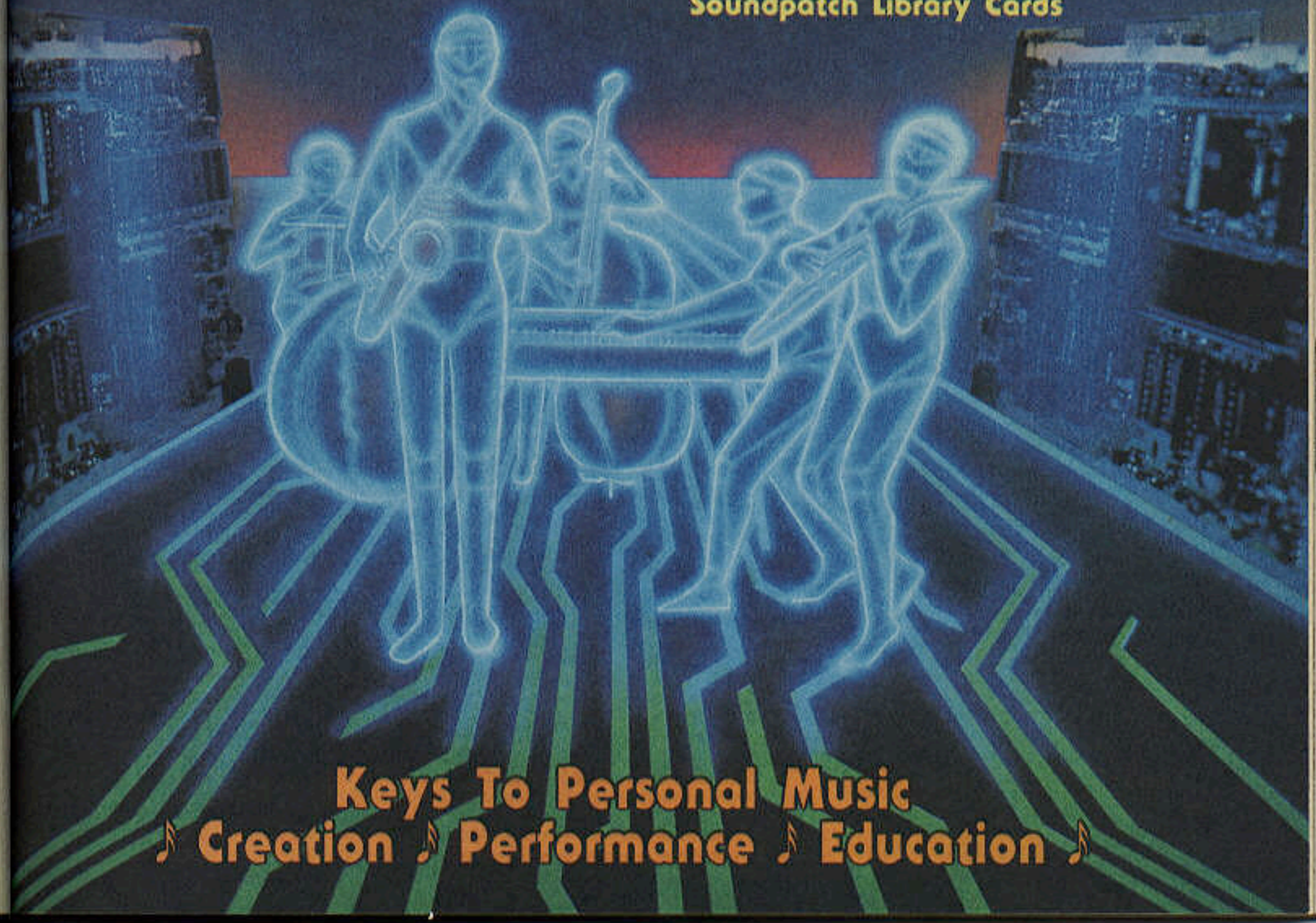

**Keys To Personal Music**
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# HCM Glossary

VOLUME 5 NUMBER 5

**accumulator** – The A register where, in most processors, the solutions to math and logic operations are placed.

**address** – The label referring to the hardware location of a piece of data.

**algorithm** – A set of rules or procedures used to solve a problem.

**ampersand (&) command** – An Applesoft BASIC extension command.

**animate** – To create the illusion of motion.

**application** – A program which performs one or more specific tasks.

**ASCII** – (American Standard Code for Information Interchange) The computer code most commonly used to represent upper- and lower-case letters, numbers, symbols, and punctuation marks.

**automatic function** – A function or operation that the computer carries out automatically and over which the user has no control.

**BASIC loader** – A BASIC program that stores, or "loads," a machine language program into memory.

**binary numbers** – A base-2 numbering system in which the only symbols used are 0 and 1.

**bit** – (binary digit) The most basic unit of information that the computer uses. Each bit is an electronic impulse, that, combined with other such impulses fed into the computer's circuitry, forms letters and numbers.

**branch** – A departure from the sequential execution of program instruction—usually due to the test of a condition.

**bus** – A set of wires or traces on a printed circuit board that that carry signals.

**byte** – A sequence of 8 bits used to represent one character.

**carry flag** – A flag in the status register that is set to one when an operation results in an overflow or carry.

**character set** – The set of characters that a computer can display on a screen.

**conditional jump** – A departure from the sequential execution of program instructions, due to the outcome of a test of a condition. (See "branch.")

**CPU** – (Central Processing Unit) The central brain and controller of the microcomputer.

**device parameters** – Instructions that tell the computer which output device to send information to and how to send that information.

**digital sound sampling** – A method of recording sound by translating it into binary code using computers. This data is stored in microchips or on disk for use in electronic instruments.

**display value** – The number that represents a character in the Apple computer's screen memory.

**driver** – The software that allows communication between a computer and a peripheral.

**element** – A specific item in an array.

**error routine** – A segment of a BASIC program that is designed to handle user-initiated problems that the programmer has predicted might occur in a program, so that the program will not stop running (causing data in memory to be lost).

**field** – A specified area for a particular category of data.

**flag** – A variable or a memory location that contains a value that represents a condition that the program needs to test.

**flicker** – The oscillation of a screen or an object on a screen at a speed visible to the human eye.

**FM digital tone generator** – A device that uses frequency-modulated (FM) sine waves to produce sound.

**frequency** – The rate of repetition of a waveform. It is perceived as pitch in the audio range.

**frequency modulation** – (FM) A technique of varying the frequency of a waveform (carrier) with the frequency of another waveform (modulator).

**frequency offsetting** – (detuning) Changing the frequency of an oscillator in relation to that of another oscillator, within a synthesizer patch.

**fundamental** – The principal frequency of a waveform. In the audio range, it is the perceived pitch.

**garbage collection** – A process used by many computers to clear out old or unused variables to make room for new ones.

**graphics image file** – A file that contains a bit-for-bit image of a screen or a section of a screen.

**graphics mode** – An optional mode, usually selected through software, that determines what parameters the computer uses when sending data to the screen.

**harmonic** – A frequency that is an integer multiple of the fundamental.

**hexadecimal numbers** – A base-16 numbering system using decimal digits 0 through 9 and the letters A through F.

**high bit** – The left-most bit of a binary number; e.g., the eighth bit of a byte.

**high resolution graphics page** – An area of memory that has been reserved for the display of graphics.

**instruction set** – The full complement of encoded instructions that a CPU can directly implement.

**integer array** – An array of integer numbers.

**interrupt request** – A signal that directs the computer away from the program sequence.

**jump** – A departure from the sequential execution of program instructions.

**limit checking** – A test, performed by programs, that prevents the program or the user from exceeding predefined boundaries, limits, or rules.

**location counter** – A register in the CPU which points to an address in memory where the next instruction or piece of data will be accessed.

**loop** – A sequence of instructions, in a program, that repeats until a set of conditions is satisfied.

**loop counter** –a variable used to count the number of iterations in a loop

**machine language** – The native language of the microprocessor in a computer expressed in terms of binary ones and zeros.

**MIDI** – (Musical Instrument Digital Interface) Specified protocols for transmitting digital information from one synthesizer, sequencer, computer, signal processor, etc., to another.

**mnemonic** – A code or symbol that helps people remember something specific, often made up of letters from the word or phrases it represents.

**modem** – (MODulator/DEModulator) This device converts digital information into analog information so that it can be sent across telephone lines.

**modem port** – A serial (RS-232C) port on the Apple *IIc*, specifically set up for intercomputer communications, but often used for interfacing peripherals.

**MSX** – A Z-80 based computer produced by several Japanese manufacturers according to agreed-upon standards.

**multi-timbral** – An instrument capable of producing two or more musical timbres (tone colors) simultaneously.

**multi-track recording** – A method of using a recorder with many synchronized channels to record and play back sounds, either individually or together.

**nibble** – 4 binary digits (bits) of data—a half byte.

**number crunching** – Processing data through the use of multiple complex operations.

**offset** – A value that locates a particular character in a string by determining a certain number of characters from the base character.

**overflow** – A situation in which the results of an operation cannot be expressed in the number of bits in a register.

**overtone** – A frequency component of a waveform, that is higher than the fundamental.

**palette** – The determinant of the colors available for a graphics display screen.

**parameter** – A variable used to control a particular process.

**periodic noise** – One of 4 pulse waves produced by the TI-99/4A sound chip.

**perspective** – The true relative position of an object perceived by the viewer.

**pixel** – The smallest dot that a computer is capable of generating on a display. The number of pixels your computer generates on the screen determines the video resolution. The more pixels packed onto one screen, the higher the resolution.

**pointer** – An address that gives the location of the next item of data to be accessed.

**polyphonic** – Music that contains two or more independent voices sounded simultaneously.

**program flow** – The order in which a program executes—not necessarily the way it appears when listed.

**RAM** – See Random Access Memory.

**Random Access Memory (RAM)** – The set of hardware locations in a computer where programs and data are stored.

**real time recording** – a method of recording musical data into a sequencer or computer precisely as it occurs.

**redefined graphics character** – A character whose shape has been changed by a program that rearranges the pixels which make up the character.

**register** – A small computer storage location in an integrated circuit.

**resequence** – To alter the line numbers of a BASIC program listing so that they are spaced equally.

**reset** – in binary, to zero a bit or memory location.

**ring modulation** – Mathematically combining two frequencies by outputting their sum and difference and suppressing the original frequencies. Most frequencies created through ring modulation are nonharmonic.

**scale** – To adjust a series of values so that they are in a predetermined proportion to one another.

**screen code** – The number that represents a character in the Commodore's screen memory.

**screen memory** – The memory locations in a computer that hold the data for the current screen display.

**shading** – Providing a two-dimensional object on the screen with a shadow so that a third dimension can be visualized.

**SID** – Sound Interface Device chip in the Commodore 64.

**sine wave** – A single frequency oscillation which produces a pure, fundamental tone without harmonics.

**sound chip** – An integrated circuit used to create sound.

**sound sampling** – See digital sound sampling.

**split screen** – A screen that has two or more areas isolated by either software or hardware.

**stack** – An area of memory reserved for the temporary storage of data in a linear fashion, in which items are added or retrieved off of one end.

**status register** – One of the internal registers in the CPU where certain conditions are recorded.

**string** – A consecutive set of similar data items—usually bits or characters.

**string array** – An arrangement of strings that the computer can easily search through.

**subprogram** – A self-contained routine used from within another program.

**subroutine** – A routine that is part of a larger program. In a BASIC program it is called by a GOSUB.

**synchronization** – The linking of two oscillators such that the start of the cycle of one oscillator triggers the start of the second oscillator's cycle. One oscillator acts as the master to which the other oscillator is slaved.

**syntax error** – An incorrect command that the computer rejects as unrecognizable.

**synthesizer** – An electronic musical instrument designed to generate, modify, and control the waveforms used to create sound.

**template** – In file management programs, a file used to define a format for other files.

**token** – An abbreviation of a basic statement, function, or (on the Atari computer) variable.

**track** – An independent storage area for recorded signals which can be monitored individually or in synchronization with other tracks. On magnetic recording tape, a track is assigned its own linear path. In a sequencer, a track occupies its own set of memory locations.

**trap** – The trapping of a specific event that causes the program to branch to a specific routine.

**variable cross-reference** – An indexed list of variables and their locations in a program.

**variable-length element string array** – A string array that contains lists of ASCII characters. These lists can be any length up to the maximum designed into the software (BASIC, etc.). All of the memory is not reserved for the array until that memory is required when more characters or lists are placed into the array.

**voice** – 1. An independent audio signal produced by a synthesizer, that can be simultaneously sounded with other voices: e.g., "My JX-8P is a 6-*voice* synthesizer." 2. A specific timbre, or "patch," created by programming a synthesizer: e.g., "*Voice* #22 is a bamboo flute."

**waveform** – A signal with periodic fluctuations, created by an oscillator.

**weight** (of bits) – In the binary number system, each bit's decimal equivalent.

**white noise** – Random frequencies dispersed uniformly across the audio spectrum.

**zero flag** – A flag in the status register that is set to one when an operation results in a zero.

# HOME COMPUTER® product news

*Each month we publish items of interest and news of recently or soon-to-be released computer products. Our publication of information from manufacturers of computers, peripherals, software, and accessories is not to be construed as product endorsement. Prices quoted are the manufacturers' suggested retail prices and are subject to change.*

*Send press releases to:*

**Product News Editor**
**Home Computer Magazine**
**1500 Valley River Drive., Suite 250**
**Eugene, OR 97401**

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## Cassettes for Computer Literacy

Audio Tape as a Computer Education Tool

FlipTrack has released a "How to Operate" series of audio cassette courses designed to teach anyone to operate a home computer. The cassettes are available for the Commodore 64, VIC-20, TI-99/4A, and Atari 600XL/800XL computers. The tutorials start with instructions on setting up the computer system and then progress into programming commands; calculations; and use of color, graphics, and sound. At various stages in the lesson the tape may be flipped over for an excursion into optional activities that provide more practice and instruction. The Commodore 64 version

retails for $29.95, the Atari and VIC-20 versions for $19.95, and the TI-99/4A version for $16.95.

**FlipTrack Learning Systems**
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**Glen Ellyn, IL 60137**
**(312) 790-1117**

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## Saving Real Time

High-Speed Indexing for dBASE Users

Fox & Geller has announced the release of Quickindex, a program that provides high-speed indexing to dBASE users. It is available for IBM computers and operates in conjunction with Ashton-Tate's dBASE-II and dBASE-III programs. Utilization of an advanced algorithm for indexing and memory management enables Quickindex to produce index files at speeds up to 10 times that of dBASE alone. A copy-protected version retails for $69. A nonprotected version costs $99.

**Fox & Geller, Inc.**
**604 Market St.**
**Elmwood Park, NJ 07407**
**(201) 794-8883**

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## In Perspective: Stretching The Image

Graphic Distortion on the Mac

T/Maker Company has announced the release of Click Art: Effects, a graphics tool package for the Apple Macintosh. It operates as a desk accessory within MacPaint, making it possible to rotate, slant, distort or add perspective to MacPaint images. A selected image or portion of an image may be rotated one degree at a time or slanted backward, forward, up, or down. The distortion function makes an image pliable, allowing

the user to pull portions of it in any direction. The perspective function reduces an image's size with respect to a vanishing point. Click Art: Effects is available for $49.95.

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**(415) 962-0195**

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## Ed-Time For Gonzo

And Help for Students Taking the SAT

Simon & Schuster has introduced the second program in its Muppet Institute of Technology series, as well as a program aid for the college entrance exam. The Great Gonzo in Wordrider, like other programs in the MIT series, is an educational game for children. It is a strategy adventure game that aids the development of reading, vocabulary, and word-usage skills. In this program, children combine adjectives and nouns to help the Great Gonzo rescue his love, Camilla the Chicken, from the Swedish Chef. The Great Gonzo in Wordrider is available for the Commodore 64 ($29.95) and the Apple II family of computers ($34.95).

Simon & Schuster has also released Lovejoy's Preparation for the SAT—a comprehensive package offering information and drills that help students prepare for college. The program includes tutorials, tips, practice tests, techniques for test taking, and a copy of Lovejoy's Concise College Guide book. Versions are available for the IBM PC and PCjr, Commodore 64, and Apple II family of computers for $69.95.

**Simon & Schuster**
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**HISTORICAL NOTE**
99'er Magazine (founded in December, 1980) was the forerunner of Home Computer Magazine.

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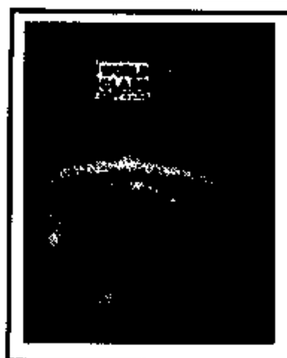

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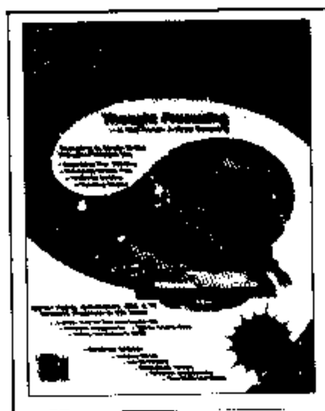

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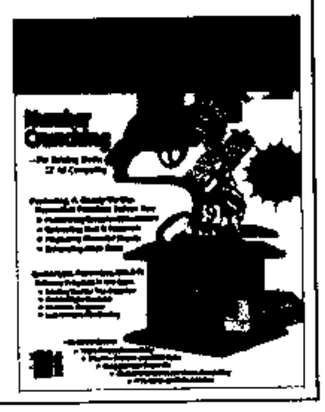

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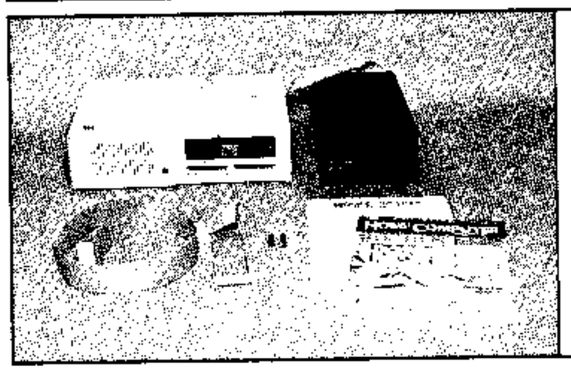

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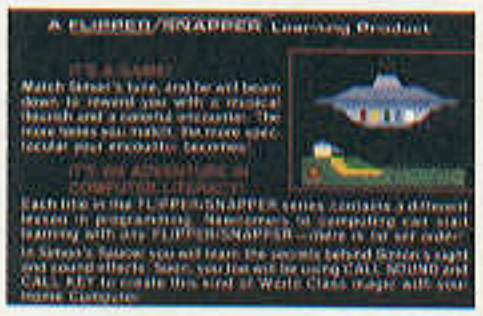


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# HOME COMPUTER® product news

## Encore On the Mac

Music Construction for Macintosh

A state-of-the-art music composition program is now available for musically-inclined Apple Macintosh users. Deluxe Music Construction Set, produced by Electronic Arts, is an advanced version of Music Construction Set. With it, beginners can learn standard notation and basic composition skills. For the expert, the set provides professional composition capabilities, enabling users to compose music, view it on the screen, listen to it, and print it as sheet music. The set includes musical notation tools, playback equipment, and printing controls. It is $50.

Electronic Arts
2755 Campus Dr.
San Mateo, CA 94403
(415) 571-7171

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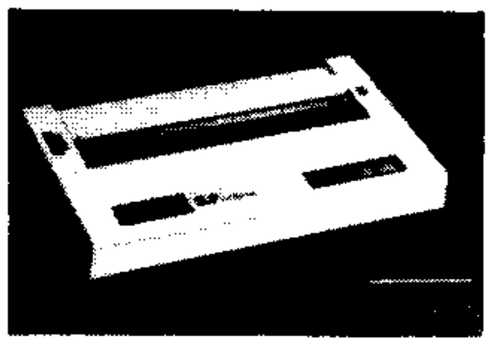
## Super Printer

It Fits in a Briefcase or a Desk Drawer

Model SLP (Super Little Printer) is the latest release from Axiom Corporation. This compact printer measures 13.1 inches wide by 7.5 inches deep by 2.8 inches high and tips the scale at 6.6 pounds. It offers near-letter-quality printing and features higher draft speed mode, superscript, subscript, underlining, dot-addressable and IBM PC-compatible graphics, and



detachable tractors. A choice of parallel, serial, or Commodore direct-connect interfaces is available. Model SLP costs $299.

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

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## Passport To Commodore MIDI

Program Links With Music Keyboards

Passport Designs has developed a MIDI version of Broderbund's The Music Shop for the Commodore 64. The program is designed to benefit both the accomplished musician and the user who has never before played a note. The program allows you to compose, store, edit, and print sheet music in piano or single-staff formats. Its composing and editing features are enhanced by eight voices that can be assigned to four different MIDI channels or keyboards. The Music Shop includes: a user interface with pull-down menus; windows and dialog boxes controlled by a joystick and the MIDI keyboard; legible on-screen notation; easy editing with cut, paste and copy features; and broad music capabilities. It retails for $99.95.

Passport Designs, Inc.
625 Miramontes St.
Half Moon Bay, CA 94109
(415) 726-0280

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## What You See is What You Get

Atari Opens its Eyes.

Digital Vision has introduced Computereyes, a video-acquisition system for Atari computers. The system incorporates a peripheral scanning device and a software program that allow users to employ video cameras to transfer real-world images onto Atari's high-resolution graphics display. The package includes an interface module, software support on disk,

and an owner's manual, retailing for $129.95. A package that also includes a video camera is available for $399.95.

Digital Vision, Inc.
14 Oak St., Suite 2
Needham, MA 02192
(617) 444-9040

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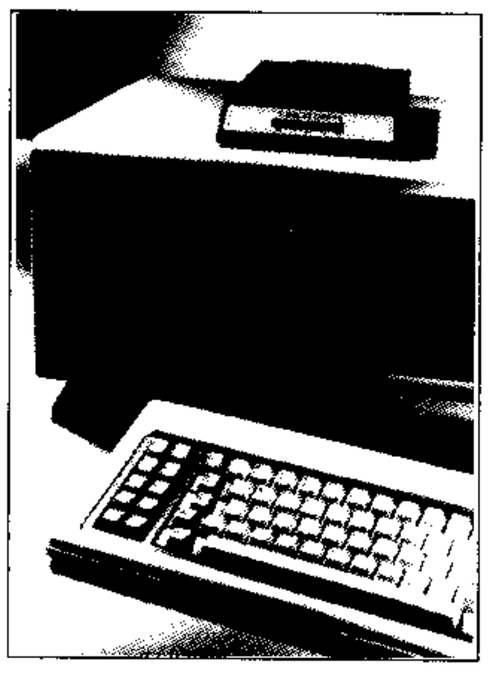
## Get More For Your Modem

Economical Access To Modem Net

A complete modem system that includes modem, software, and cables is now available. The Smart Communications System from 1-800-FLOPPYS is compatible with most personal computers. The system provides a 30-day trial period, a one-year warranty, a toll-free technical support line, a user manual, Newsnet time, and membership to the Delphi on-line data base. Apple computer users also receive an Apple Bulletin Board System. The Smart Communications System retails for $99.



1-800-FLOPPYS
Southfield, MI
(800) 356-7796

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## Software For Kids

Bundle of Programs for C-64, 99/4A

KIDware has introduced a bundle of educational programs for children. More than 33 TI-99/4A programs and 60 Commodore 64 programs are now available to educate and amuse children from 1 to 16 years old. Each program makes full use of the graphics and music capabilities of both computers. The programs are available on cassette tape for the TI-99/4A, and on both tape and disk for the Commodore 64. All are packaged in sets of two, which sell for $9.95 (tape) and $11.95 (disk).

KIDware
P.O. Box 9762
Moscow, Idaho 83843
(208) 882-3830

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# HOME COMPUTER® product news

## Two For TI One

Special Deal for TI-Runner Owners

EB Software has announced a special software offer for TI-99/4A owners. For a limited time, purchasers of the award-winning TI-Runner game will receive two additional games for the same price. A free disk will contain Galactic Battle, an exploration/battle game in which up to 9 players compete for universal superiority, and Spy Adventure, an adventure game involving the intrigues of secret agents. Editor/Assembler and 32K memory expansion are required for these programs. The three-game package retails for $24.95.

**EB Software**
**12912 Villa Rose**
**Santa Ana, CA 92705**

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## Speaking In Foreign Tongues

C-64 and Atari Links To Languages

Artworx has announced the release of Linkword, a series of programs designed to facilitate the learning of foreign languages. Four packages cover Spanish, French, German, and Italian. Each includes a program disk and an audio tape to teach grammar and accurate pronunciation of a 400-word basic vocabulary. Linkwork employs a memory technique that associates foreign words with acoustically-similar English words. This system enables users to learn the basics of a language in 10 hours. Linkword is available for Apple, IBM PC, Commodore, and Atari computers. The Apple and IBM versions retail for $29.95. The Commodore and Atari versions are priced at $24.95.

**Artworx Software Company, Inc.**
**150 North Main St.**
**Fairport, NY 14450**
**(800) 828-6573**

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## Speaking of Voices . . .

Music and Speech for Apple, Atari, Commodore

Covox has announced the release of its Voice Master speech system. The system provides digital speech, voice recognition and music synthesis capabilities to Commodore 64/128, Atari, and Apple II family computers. It consists of a hardware module, a headset/microphone, system software on disk, user's manual, and accessory cables. The system enables users to record their own voices as digital information. Storage and playback features provide endless possibilities, such as voice-controlled blackjack games and talking alarm clocks. The system sells for $89.95.

**Covox, Inc.**
**675-D Conger St.**
**Eugene, OR 97402**
**(503) 342-1271**

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## Getting Ahead to BASIC

BASIC for the Atari

Optimized Systems Software has released the first programming language designed specifically for the Atari 130 XE, allowing programmers to take advantage of all of the XE's 128K of memory. BASIC XE can provide a programming space of over 62,000 bytes and a storage field of over 35,000 bytes. Although extended memory can be accessed only on the Atari130 XE, BASIC XE runs on any Atari XL or XE computer. Atari BASIC and BASIC XL are upward-compatible with BASIC XE. The package includes reference manual, OSS SuperCartridge, and extension disk, and retails for $79.

**Optimized Systems Software, Inc.**
**1221B Kentwood Ave.**
**San Jose, CA 95129**
**(408) 446-3099**

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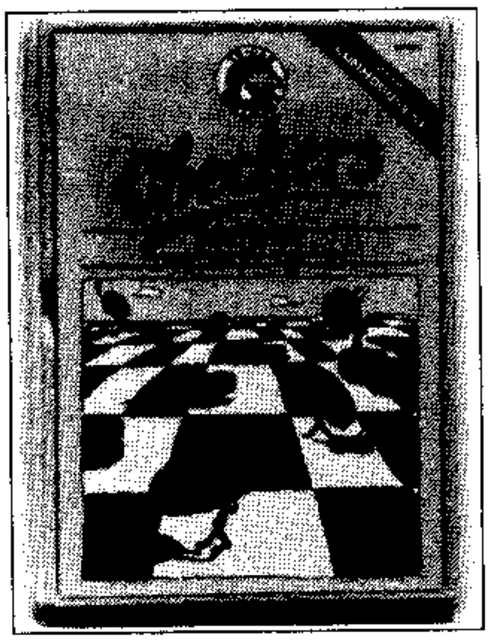
## A New Mode for an Old Classic

Checkers Enters the Computer Age

Checkers is now available in cartridge format for Commodore 64 users. Yu-Can Software has released a checkers program offering 4 levels of skill to challenge both novices and experts. Users play against the computer. The program provides beginners with on-screen instructions at the start of each game. Checkers can be played using either joystick or keyboard. It retails for $29.95.



**Yu-Can Software**
**34 Maple Ave.**
**Armonk, NY 10504**
**(914) 273-6480**

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## Learning at Play, the Muppet Way

A Playful Approach to Education

Sunburst Communications has released two additions to its line of "learn-as-you-play" games. Getting Ready to Read & Add and Teddy's Playground, which run on Apple II family computers, are compatible with Muppet Learning Keys: Kid's Computer Keyboard. Both programs are designed to enhance understanding of shapes and colors, as well as to improve letter and number recognition. The programs incorporate varying levels of challenge that allow parents or teachers to set a pace appropriate to each child's skill level. The program packages, which include backup disk and teacher's guide, retail for $55.

**Sunburst Communications, Inc.**
**29 Washington Ave.**
**Pleasantville, NY 10570**
**(914) 769-5030**

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## A New Tongue for Atari

Pascal on the Atari XL, XE

Kyan Software has introduced Kyan Pascal, a programming package for the Atari XL and XE computers. The package includes a comprehensive tutorial manual and features a HELP screen, command menus, and a library of compiler error messages—all designed to assist the beginning programmer. Additional features include a 6502 machine-code compiler, a full-screen text editor, full-pass error detection, built-in assembler, and DOS 2.5 operating system. The package costs $69.95.

**Kyan Software**
**1850 Union St. #183**
**San Francisco, CA 94123**
**(415) 775-2923**

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## Electronic Adventure By The Book

Interactive Fiction

Synapse Software has announced the release of Essex, the second in its Electronic Novels series. Essex, like all programs in the series, is published as a hard-cover book that introduces the characters and sets the scene. A software disk then hurls the player into deep space to conduct an intergalactic search-and-rescue mission. Confined on a spaceship, surrounded by a crew of unlikely characters, the player must find a scientist capable of preventing the destruction of the universe. The Apple and IBM versions sell for $44.95, and Commodore and Atari versions are priced at $39.95.

**Synapse Software**
**17 Paul Dr.**
**San Rafael, CA 94903**
**(415) 479-1170**

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## New Theories Mean New Education

Research Develops Active Learning Aids

Compu-Teach has introduced a new line of educational software for use on IBM PC, PCjr, and Apple computers. The 12 programs, for use by 4- to 10-year-olds, are based on research completed at Yale University on learning theory and artificial intelligence. They are highly interactive programs that teach basic educational skills—reading, arthmetic and spelling. Each program features several skill levels or changeable parameters

that tailor the game to a child's learning level, simple commands, color graphics, and active participation by the child.

**Compu-Teach, Inc.**
**240 Bradley St.**
**New Haven, CT 06511**
**(800) 44TEACH**

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## Why Pay a Stockbroker?

Wall Street Wiz On a Disk

Synapse has released Synstock, a program for the IBM PC that analyzes stock portfolio information, stock patterns and market trends. With a modem, the program can automatically log-on and download stock data from Compuserve, Dow Jones News/Retrieval, and Warner Computers. The data can be displayed in four-color charts and graphics in different formats, including averages, relative strengths, and volume indicators. Synstock supports portfolios of up to 52 stocks each; and each stock's database can hold up to 550 days of trading information. It is now available for the IBM PC, PC XT, PC compatibles with a minimum of 192K of memory, and the PCjr (128K minimum). DOS 2.0 or later version and a Graphics Adapter Card are required. Suggested retail for the IBM version is $99.95.

**Broderbund Software**
**17 Paul Dr.**
**San Rafael, CA 94903**
**(415) 47901170**

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## Paint It, Then Print It

New Graphics for the TI Machine

Navarone Industries has introduced Paint 'N Print, a new graphics cartridge for the TI-99/4A computer. By manipulating a joystick or a trackball, the user can create, save and print complex images. A magnification feature permits precise control over each pixel for fine resolution work. The program will print in full color or shaded black and white on the Axiom GP-100 printer. Paint 'N Print is $39.95.

**Navarone Industries, Inc.**
**19968 El Ray Ln.**
**Sonora, CA 95370**
**(209) 533-8349**

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## Interfacing Breadboard

Constructing Control Circuits

Group Technology has unveiled the BG-Board Interface Breadboard, a versatile interface that teaches the skills of interfacing by enabling the user to construct circuits and control the flow of information between the computer and external devices. Through BASIC programs, the user can employ IBM PC, Commodore 64, and VIC-20 computers in controlling and monitoring home appliances, analytical instruments, temperature control systems, security systems, and voice synthesizers. Texts and experiments provide instruction and guidance, and can be adapted to individual or classroom use. The IBM version retails for $355 (assembled) or $280 (kit). The Commodore 64 and VIC-20 versions retail for $334.95 (assembled) or $259.95 (kit).

**Group Technology, Ltd.**
**P.O. Box 87**
**Check, VA 24072**
**(703) 651-3153**

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## From Sensing To Controlling

Environmental Monitoring & Control

Data World Products has introduced Sensatrol, a sensor/controller interface for environmental sensing and energy control. It allows users to measure weather conditions, control thermostats and monitor many types of environmental conditions on any computer. It has an easy-to-understand command structure in ASCII and communicates in any computer language. Extensive instructions and suggested applications are included in the package, which retails for $385.

**Data World Products**
**P.O. Box 33**
**Francestown, NH 03043**
**(603) 588-3746**

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## Mastering Musical Instructions

C-64, Apple II Teach How To Play

MasterSoft has released two more programs in its Mastery in Music series. Trumpet Master and Clarinet Master convert the Commodore 64 into a generator of random music. Users may play along with millions of random exercises, or they may alter them by changing the tempos, manipulating the beat, or substituting the notes. Exercises include scales, thirds, and intervals in every major key. Trumpet Master and Clarinet Master will soon be available for Apple II family computers. It retails for $49.95.

**MasterSoft**
**P.O. Box 1027**
**Bend, OR 97709**
**(503) 388-7654**

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## It's a Matter of Time

Educational Time Travel for Kids

Learning Well has announced the release of a new addition to its educational software for the Apple II family of computers. Time Capsule is a game designed to enhance reading skills by whisking players through 10 time periods in the past, the present, and the future. Adventures in each time period are described in colorful narratives. By answering related questions that test reading skills, the players control the motion of their capsule. Time Capsule is available in three reading levels, each retailing for $49.95.

**Learning Well**
**200 South Service Rd.**
**Roslyn Heights, NY 11577**
**(516) 621-1540**

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## Body Cycles By Computer

Charting Biorhythms On The 99/4A

A new program from Custom Computer Programming converts your TI-99/4A into a biorhythm analyzer. The Biorhythm program computes and graphs monthly biorhythm charts based on birthdates. The program package includes a brief description of the theories behind biorhythm analysis. It is available directly from the producer for $12.95.

**Custom Computer Programming**
**Suite 165**
**99 Tidemill Lane**
**Hampton, VA 23666**

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## All That Desktop Jazz

Jazz Program Integrates Office Functions

Lotus Development Corporation has introduced Jazz, a multi-function business software package for Apple's Macintosh 512K personal computer. The package incorporates five functions: worksheet, graphics, word processing, data base, and communications. HotView, a feature associated with the word processing function, allows integration with the worksheet, data base, and graphics functions. The program is easy to operate and is suitable for both the novice and the experienced user. Jazz has a retail price of $595.

**Lotus Development Corp.**
**55 Cambridge Parkway**
**Cambridge, MA 02142**
**(617) 577-8500**

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## High-Tech Armchair Quarterbacks

Predict Your Favorite NFL Winners with IBM PC

A new prediction program for NFL football fans has hit the software market. Scorecast from Tradewind is a database program with a 5-window format and "Z-bar" cursor control. Users have access to a database preload of over 20,000 statistics, including final scores, rushing, first downs, turnovers, penalties, punts, passes, and returns. Also provided are current season schedules, on-screen graphics, and forecasting formulas. 23 on-screen bar charts analyze every game before and after it has been played. Users can pick their own favorites or let the program select a choice from formulas and calculations based on comparisons between any two teams. First National 800 Data Bank, an on-line data retrieval system, updates Scorecast files on Tuesday nights. Scorecast operates on the IBM PC, PCjr, and compatibles (Compaq, Tandy 1000/1200, and AT&T 6300). The program retails for $49.95 (the unprotected version is $69.95).

**Tradewind Software**
**P.O. Box 26165**
**Honolulu, HI 96825**
**(808) 395-6700**

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# HCM ONE-LINERS

Here they are . . . the best of the one-line programs that we have received since printing the fourth "HCM One-Liners" column in *Home Computer Magazine* Vol. 5, No. 4. Although many interesting programs were submitted, we have selected what we felt were the best 6 of those that arrived prior to this issue's press date (one for each brand of computer covered in our magazine, including a TI BASIC "10-Liner"). If you have not yet submitted your masterpiece, it is not too late! As long as we keep getting great one-liners written in any computer language, we'll keep filling this page for you. Our prize winners this issue will each receive a check for $50 for sharing their ideas with our readers.

## Shape-Make an Apple
**[Applesoft BASIC on the Apple *IIe*, *IIc*]**

Dear Sir:

The *Shape Maker* draws a variety of colorful geometric shapes and designs on your screen with the touch of a key. After the program has finished drawing an image, press any key, and it will automatically draw a new shape within seconds. Remember to type in the program without using spaces.

Kevin Cooney
Middleton, MA

```
1 L=80:FORI=0TO1STEPD:H
GR:HCOLORP=3:HPLOT(1)*(L
TO5)*160,JTO80,160:VTAB2
K=160-JTO80,JTO80,160:VTA
O80,LTO80,160:VTAB23:GETA
$:NEXTX:TEXT
```

## A Spritely Design
**[TI Extended BASIC on the TI-99/4A]**

Dear Sir:

This program is called *MoTIon Art*. It creates a moving pattern of 26 sprites on your screen—a string of multi-colored squares swirl from the edge of the screen into its center. Type in the program until you hear the Input beep, press [ENTER], then [FCTN] 8, and finish typing the program in. You can change the vertical and horizontal motion of the sprites while the pattern is in motion—just type in new sets of numbers after each beep.

Bob Munro
Exton, PA

```
1 CALL CHAR(43,"FV"&RPT$(
"F",16)):CALL HCHAR(1,1,4
3,768):CALL VCHAR(1,1,43,
24):CALL HCHAR(24,1,43,76
8):CALL VCHAR(1,32,43,24)
:X=1:Y=1:XV=1:YV=1:CALL HC
HAR(1,1,43):CALL VCHAR(1,
1,43):CALL HCHAR(24,1,43)
:CALL VCHAR(1,32,43):CALL
HCHAR(Y,X,43)
2 CALL HCHAR(Y,X,32):X=X+
XV:Y=Y+YV:IF X<2 OR X>31
THEN XV=-XV
3 IF Y<2 OR Y>23 THEN YV=
-YV
4 CALL HCHAR(Y,X,43):CALL
KEY(0,K,S):IF S=0 THEN 2
ELSE CALL KEY(0,K,S):IF S
=0 THEN 4 ELSE 2
```

## Tune Up Your Keyboard
**[Commodore 64 BASIC on the C-64]**

Dear Sir:

By pressing different keys, you can play your own musical phrases and tunes with this program. Try this sequence of keys to play "Twinkle Twinkle:" **RRGGHHG XXTT66R.**

With this sequence, play "Reveille":

**UU+ U+(CLR) U+(CLR) U+(CLR)**
**U+(CLR) +(CLR)Q(CLR)+U UU+**

Fred McGorsky
Randville, MA

```
1 S=542720:X=P■SHIFT E■(
197):P■SHIFT O■S,240:P■
SHIFT O■S+24,15*-(X<>64)
:P■SHIFT O■S+6,255:P■SHI
FT O■1
```

## A Three-Voice Tune
**[TI BASIC for TI-99/4A]**

Dear Sir:

This program plays a short musical tune on the TI-99/4A. Input a numerical value to tell the computer how fast to play the tune. Smaller numbers play the tune faster.

Scott Williams
Marimont, CT.

```
1 INPUT"":T
2 A$="DABCDCBCDABCDCBCD
ABCDCBCDABCDCBCDABCDCBC
DABCDCBCDABCDCBCDACEACE
BEABDABDCDACFAEA
DCAAAAAA"
3 B$="IIIIIIIIHHHHHHHHG
GGGGGGGFFFFFFFIIIIIIIH
HHHHHHHGGGGGGGFFFFFFFF
FIIKKKKIIIIKKKKIIIIKKKK
KKBBCCCCD"
4 C$="KKKKKKKKKKKKKKKK
KKKKKKKKKKKKKKKKKKKKKK
KKKKKKKKKKKKKKKKKKKKKK
KIIKKKKIIIIKKKKIIIIKKK
KKDDFFEEI"
5 DIMN(11)
6 READN(0),N(1),N(2),N
(3),N(4),N(5),N(6),N(7)
,N(8),N(9),N(10),N(11)
7 DATA 110,262,311,349,
392,415,440,466,494,523
,659,698,784,880,988
8 FORZ=1TOLEN(A$)
9 C=ASC(A$,Z,1)-64:D=ASC
(SEG$(A$,Z,1))-64:FORT=1
TOD:SOUNDN(C),B$,Z,1):NE
XTT
10 NEXTZ
```

**[NOTE: Because of built-in line length limitations in TI BASIC, we are now accepting "Ten-Liners" as entries for this column—Ed.]**

## Drawing With the PC Pen
**[BASICA on the IBM PC, Cartridge BASIC on the IBM PCjr]**

Dear Sir:

I call this one *PC Pen*. It brings a new dimension to on-screen drawing with the IBM PC. You can make line drawings with this program using the rubberband technique to place lines on the screen. Press C to change the color of the lines, and O to reset their origin. To exit the program, press X.

Bob Langill
Hillsboro, OR

```
1 SCREEN,1:CLS:C=1:WHILE
A$<>"X":WHILE A$="":A$=IN
KEY$:C=(C+1)AND3:WHILE A$
="":A$=INKEY$:WEND:WEND
2 X=X+(A$="K")-(A$="M"):
Y=Y+(A$="H")-(A$="P"):IF
A$="C"THEN PSET(X,Y),C
3 IF A$="O"THEN X=160:Y=
100
4 IF X<0 THEN X=0
5 IF X>319 THEN X=319
6 IF Y<0 THEN Y=0
7 IF Y>199 THEN Y=199
8 WEND
```

## Shape Up Your Atari
**[Atari BASIC on the Atari 800, 800 XL, and 130 XE]**

Until this issue, *HCM* didn't cover Atari Computers. Therefore, we had no Atari One-Liner entries at press time. However, our staff has generated an Atari program that might help you get started producing your own Atari One-Liners. This program draws a variety of random geometric shapes on your screen. To type in this line, use command abbreviations and don't include spaces, otherwise the line will be too long. Double-check the line before pressing [RETURN]—which translates the shorthand commands back to their normal size (making the line longer than usually allowed).

```
1 GRAPHICS 24:A=159:C=3:
B=0TO9STEP9:FORZ=ATOA+A/B
:COLORZ:PLOTC,0:DRAWTO159
,ZSINZ:C=C+3:NEXTZ:NEXTB
```

All One-Liner submissions are subject to the same publishing criteria as Letters to the Editor (explained in the magazine's masthead, page 6). If you have written a great One-Liner in any language on any computer covered by *HCM*, send it addressed to: Letters to the Editor, 1500 Valley River Drive, Ste. 250, Eugene, OR 97401. You too may win a cash prize and be immortalized in print!

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