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Vol. 5 No. 4

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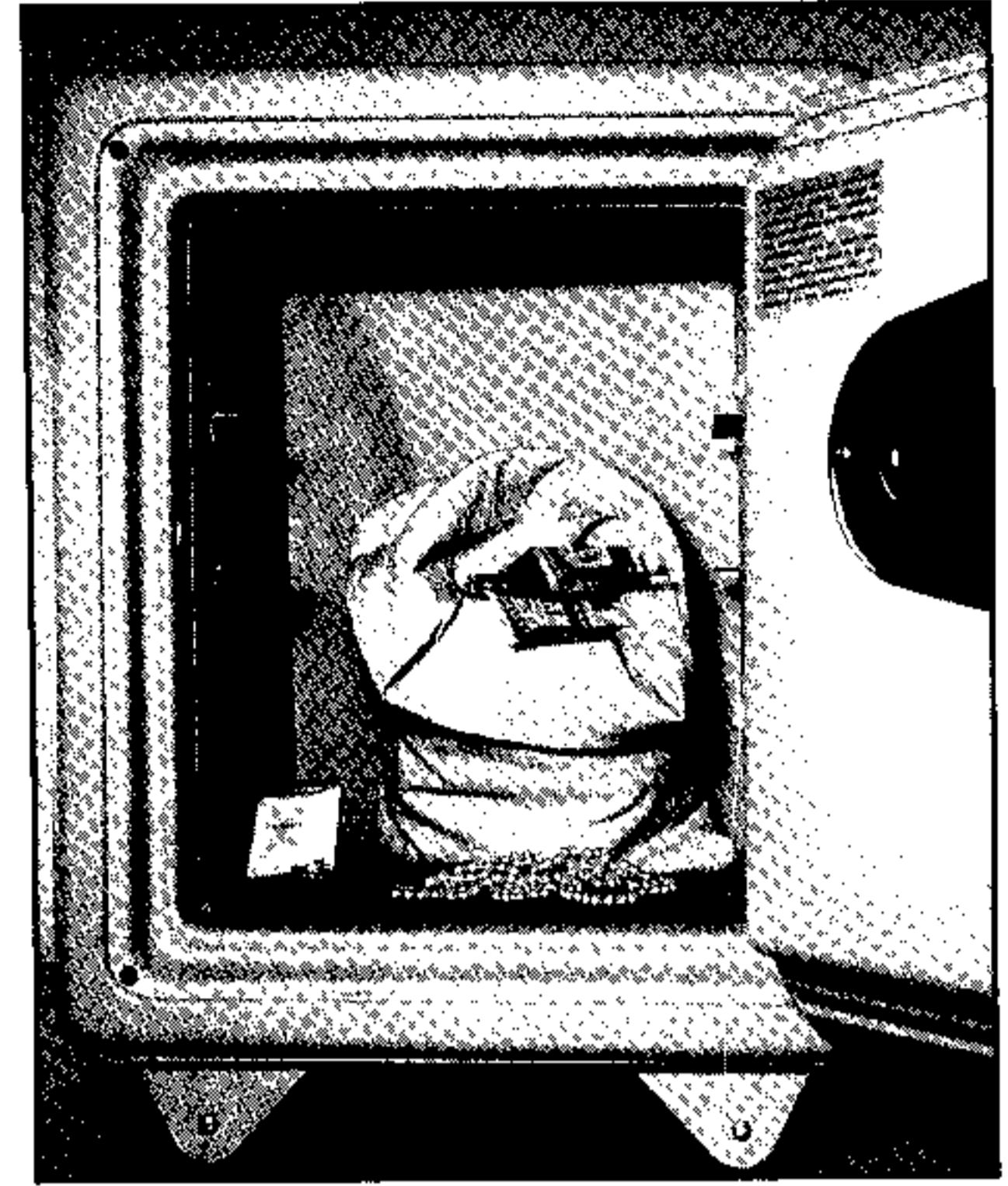
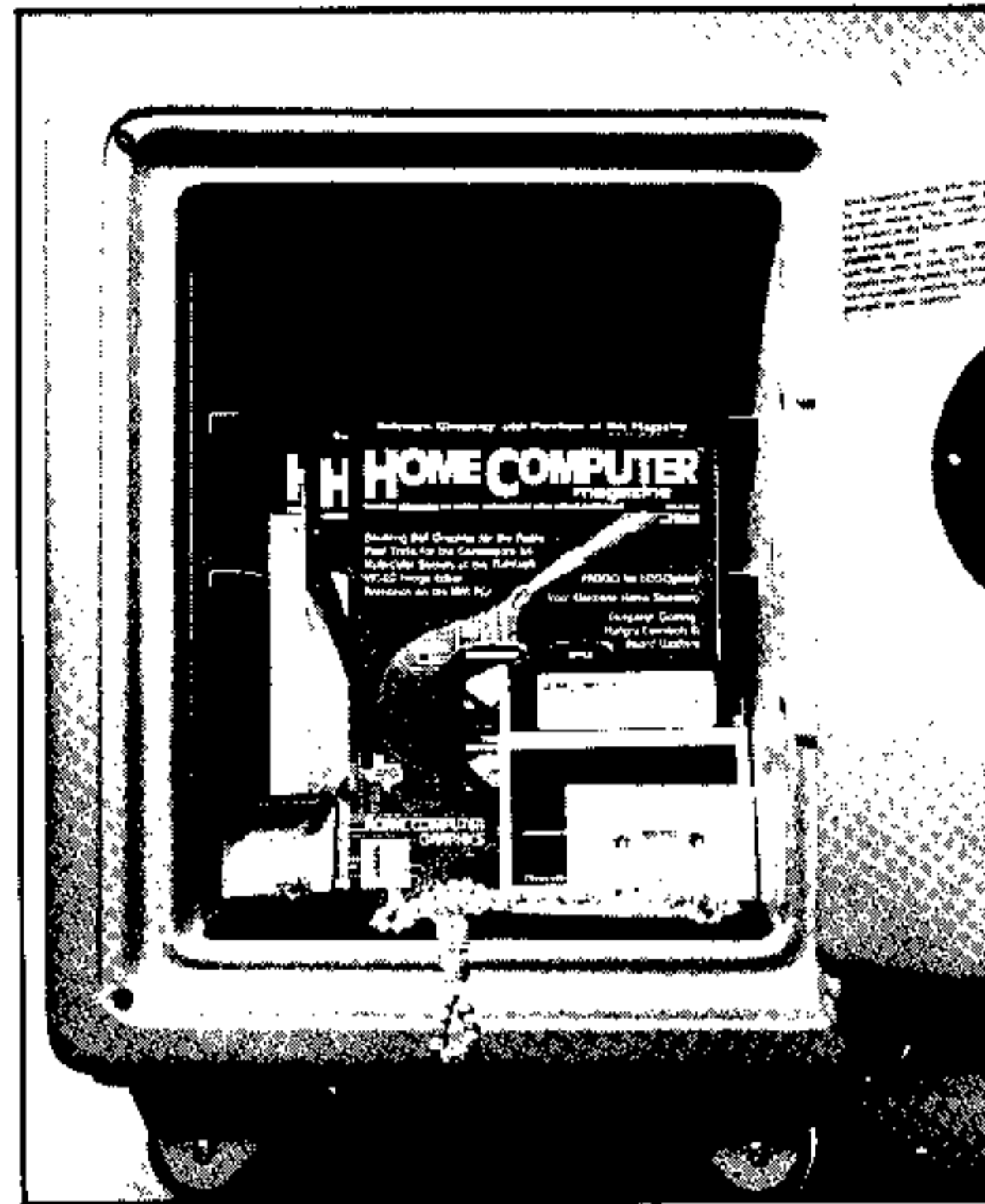
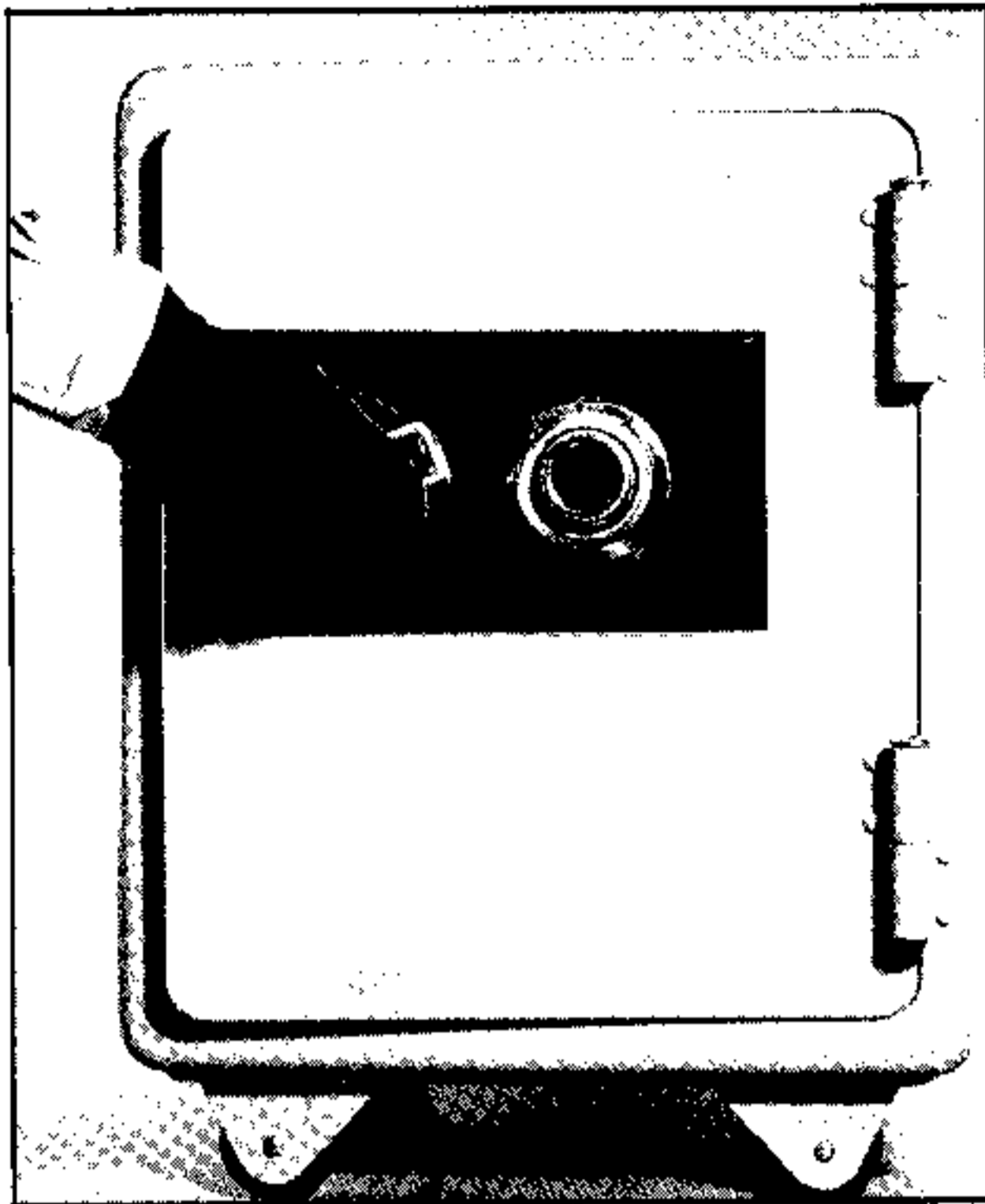


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See Page 130



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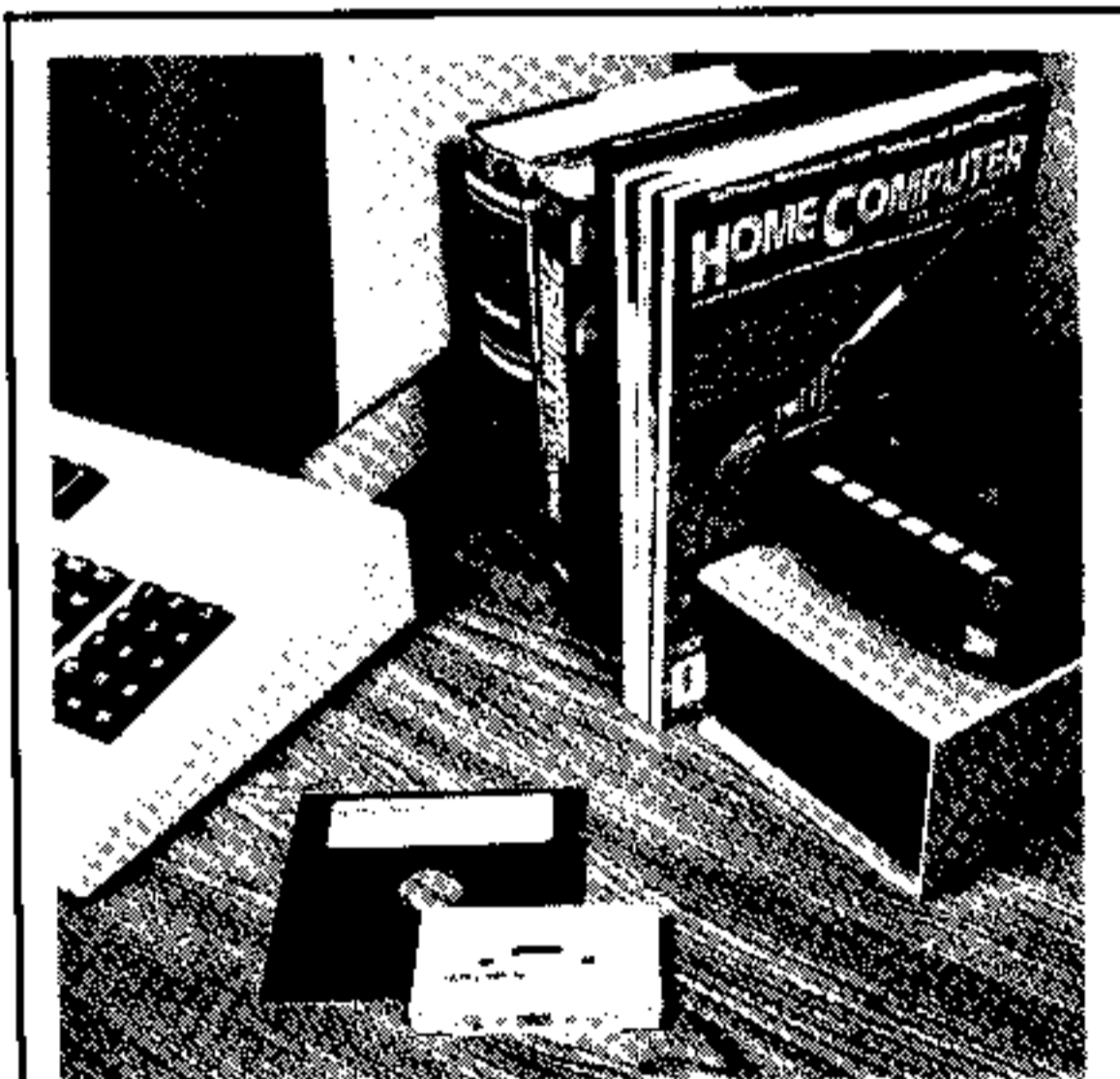
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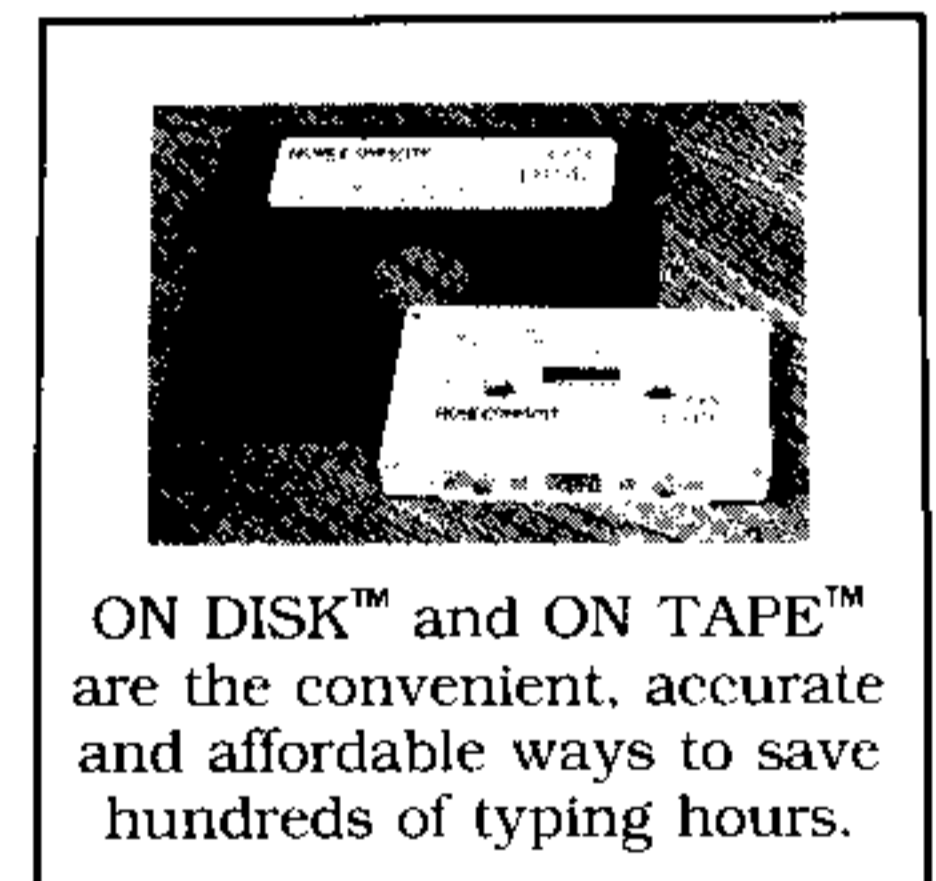
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TI-99/4A (T)	ON DISK™/ON TAPE™

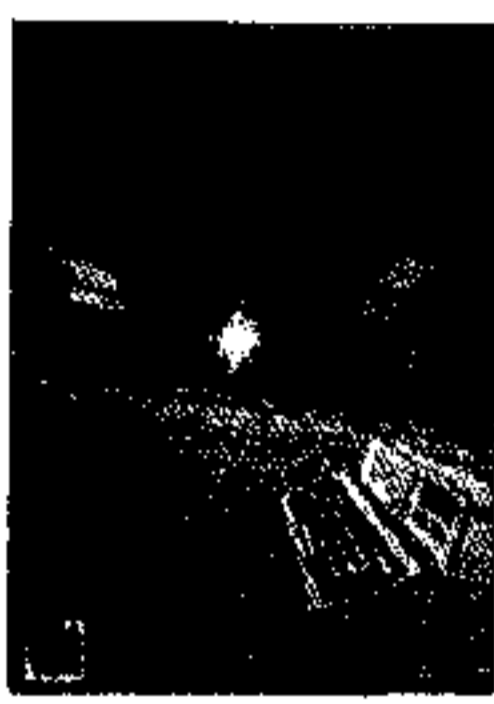
* = No ON TAPE™ available, even if normally supported

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: Please note that some HCM programs may not RUN 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 Pipe Dreams: Computer Assisted Savings * 3Dile: 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)	Slots (T)
Air-to-ground battle game	An intriguing Las Vegas simulation
Applesoft 3D (A)	Uncle Larry's Fiddle Tunes (C, I, T)
Apple graphics in three dimensions	Play ten beloved fiddle tunes
Tower of Hanoi (A,C,I,T)	Music Magic (TX)
An ancient brain teaser	"Joy to the World" in harmonious BASIC
Saving (A,C,I)	Music Assembler (T)
Computer-assisted savings plan	Assembly language simplifies composition
LOGO Poet (A,C*, I)	Autosprite (C)
Recursion frees the poet in your console	Routines to keep your graphics lively
LOGO Apollo (C*, T)	Meltdown (TX)
A lesson in structured problem-solving	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 * 3Dile: 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)	Matrix Muncher (C)
Livingston Stew, I presume?	Solve unknowns simultaneously
FROGO (T)	Graphic Editor (C)
A logical LOGO learning lesson	Pixel tricks create easeful graphics
The Home Secretary (A, C, I, T)	Mystery Words (A, I)
Address & inventory recordkeeping	Reading between the treble clefs
LOGOFILES (A, C*, I, T)	PCjr Animation (PCjr)
Access your DATA files in LOGO	Exploring Junior's graphic modes
Sea of States (C, TX)	Applesoft 3-D ile (A)
State Capitals and dive for booty	Edit your 3-D graphic shapes
Tablut (C, I, TX)	
14th-century strategy revisited	



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



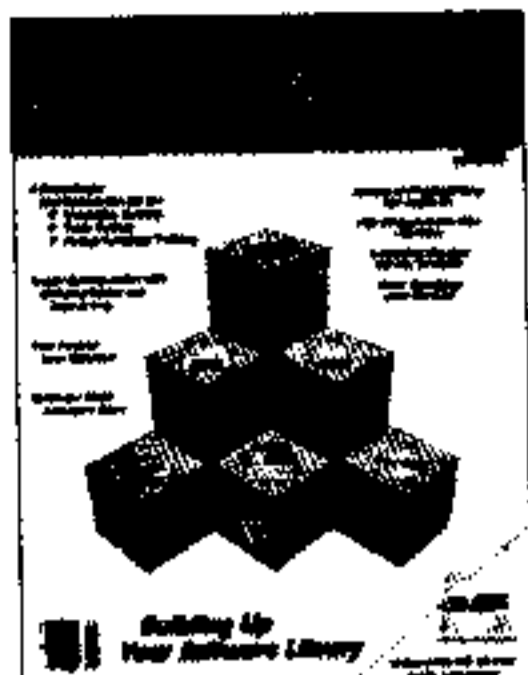
Issue 4.4:

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



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:

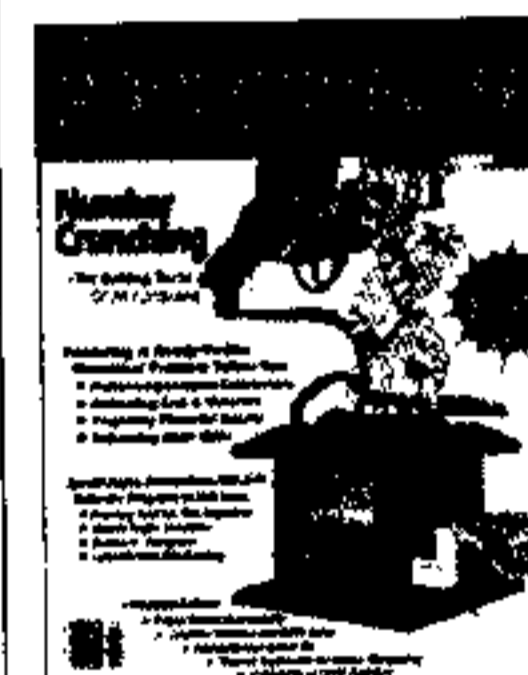
Thought Processing: A New Frontier in Home Computing * The Organizer: Store and organize your thoughts * Orbital Defender * Quiz-Print/Quiz-Print Tutorial: This educational enhancement is a tool for use with your Quiz Construction Set (see HCM 4.5) * Electronic Backgammon: A modern version of an ancient 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 * IBM-

Impressions: 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
IBM Impressions (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 enhancement 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 * IBM Impressions: 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
IBM Impressions (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 * IBM Impressions: Blending sign waves into complex pat-

terns * 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)
A full-screen editor

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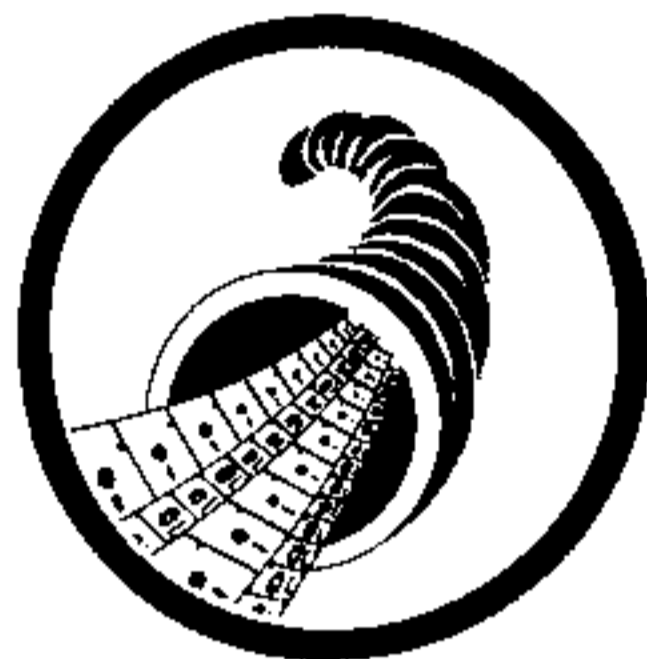
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FOR NEW READERS



The Plain & Simple Truth About **HOME COMPUTER**[™] magazine

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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.



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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 4 Hot Home Brands



We are 4 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 3 of the 4 systems you may not even have. You'll learn more about your Apple, 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.

—Welcome to Our World of Home Computing

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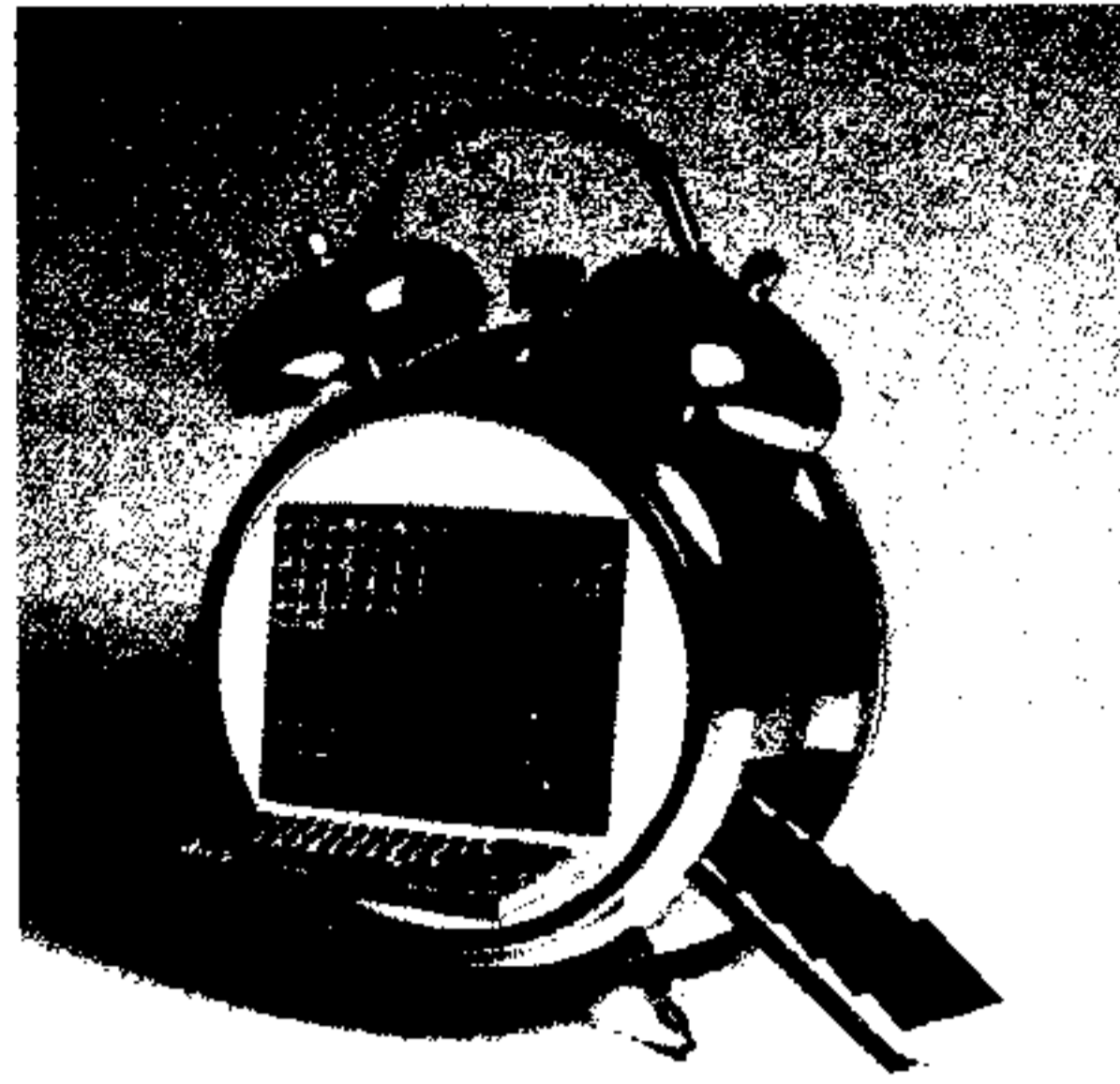
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Outside HCM

Once again, that amazing machine called the computer becomes many machines in one. Need an alarm clock that tells you why it's gone off? Need a calendar that highlights special days and appointments? How about a schedule that prints out in many forms, including a neat little appointment book? It might take a lot of time to gather all those things together—if you couldn't use a home computer. Your computer's adaptability is one reason why we at *Home Computer Magazine* keep coming up with so many good ways to use it.

Inside HCM

Time... is there ever enough? In this day and age, time may seem as precious as gold—which is another way of saying "time is money." One thing is sure: time is *relative* to the situation at hand. A bored young child on a long summer's day may think time will never pass. But to adults immersed in their workaday world, time is all too short—a day's activity just doesn't seem to fit into one earth revolution.

One solution is to manage our time before it manages us. But what is the best tool for taming time? Clipboard and stopwatch? Napkin notes and wake-up calls? Such a helter-skelter approach can create a very tedious mess. But computers—those masters of *tedium*—may also be the masters of *time*.

Inside this issue, we provide a program that can manage your time simply by dividing it into a workable schedule. Take your appointments for a day, week, or month and run them through *Run-Day-View*. Then call your schedule up on screen, or print out a pocket-sized appointment book, a weekly calendar, even a handy phone list. Sound simple? It is.

Always *in date*, and at the core of every computer, is the time-saving art of mathematics. Trigonometry, in particular, conserves both time and effort by using the triangle as an indirect measuring tool—letting us find, for example, the height of a mountain without going *to* the mountain. So, take the time to learn some *Trig-Trix*, a program (not a breakfast cereal) that complements last issue's *Geometrix* program as a practical exercise in another fundamental area of math.

Instant feedback from a program like *Trig-Trix* is a time-honored educational

technique. But mimicry—or nowadays, computer *simulation*—is another excellent teacher. This issue's *Mine Over Matter* program simulates a huge uranium mining operation (the first step in a fuel cycle leading to the nuclear power plant in last issue's *Over-Reaction*.)

Digging into a less serious vein, *Archaeodroid* plays out the future excavation of Planet Earth. And to complete our software digs, we continue to provide unique machine-specific applications in each of our regular columns. Dive in as *Apple Seedlings* bakes a pie chart; *Commodore Hornblower* sifts through SID's filters; *IBMpressions* looks in at windowing; *Razzle Dazzle* records sound-on-sound with the 99/4A; and the new *MAC-ROs* column draws pixel-by-pixel on the Macintosh.

There's a time for our software, and there's a time for our user-friendly reviews. This issue, we dig for the truth about a variety of products, all vying for your hard-won dollars. From a learn-it-yourself computer model of an *Injured Engine*, to build-it-yourself programs like *Adventure Master* and *Adventure Construction Set*; from the PC and PCjr's famous *Sidekick*, to Apple's friend *Jane*; and from a new expansion system for the PCjr, to a bevy of utilities for the C-64 and TI-99/4A—we look for the best, and help you avoid the worst.

To make your computer time even more valuable, we offer a wealth of regular features and tutorials, both old and new. Programmer's can trim run-time with Part 2 of *Speeding Up a BASIC Program*. And the final instalment of *Build a LOGO Adventure* will add hours of, well... *adventure*.

Is there ever enough time? Only time itself will tell. But, at *Home Computer Magazine*, our time is yours...

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

HCM

On Screen Feedback

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

A few months back, we began an ambitious project to fine-tune this magazine—tailoring it more precisely to the specific needs of our changing readership. When I asked for your written input, many of you responded magnificently. We received suggestions from virtually all 50 states, all provinces of Canada, and quite a few foreign countries. The age of respondents ranged from 10 to 85. An enlightening experience, indeed . . .

So, what is the result of this project? Well, as they say—"the proof of the pudding is in the eating." Examine this issue and you'll notice the new *Programmer's Window* pages, plus the *edge-tab markings* and the new *Listings Contents* page—making it easier to find the 3 separate-but-related program sections (i.e., Software Instructions, Programmer's Windows, and Program Listings).

Look for the *HCM Glossary Terms* line at the end of articles: it flags important words, and allows you easy "look-up" in our specially prepared *HCM Glossary* in the rear of the issue. As for our product reviews, many of them will now carry a *Counterpoint* box for added balance. And finally, the column *Algorithm-A-Tricks* brings a new level of understanding to readers who want to know the "tricks of the trade."

Each issue in the next several months will introduce more enhancements, suggested by your ideas. One forthcoming feature is particularly exciting: *Problems in Productivity* will center on real-world problems and tasks to which we'll apply our own *HCM* productivity programs—software such as *Snap-Calc*, *The Organizer*, and *It Figures!* So if you don't have these back issues (see back-issue pages inside the front cover), now's the time to get them along with their corresponding *ON DISK* or *ON TAPE* media.

I want to personally thank each one of you who has taken the time to submit your "On Screen Feedback." The feedback that *HCM* is still receiving is so valuable that it would be unfair to select a winner of the free trip to Eugene, Oregon at this time. There have been, however, many of you who intended to write but "just never got around to it . . ." So, please continue sending your one-page letters with suggestions and constructive criticism to: On Screen Feedback, Home Computer Magazine, P.O. Box 70288, Eugene, OR 97401. (For guidelines, see this column in Vol. 5, No. 2.) And just so you have no excuses this time, I've included an essential memory aid, shown here:



As I write these words, my thoughts wander to last week's Consumer Electronics Show in Chicago. As expected, Big Blue and Big Red didn't exhibit at the show. The Commodore floor area featured its 128K machine, originally unveiled in January, while the new Atari Corporation again demonstrated its XE and ST series. Many software publishers were conspicuously absent. The mood at the computer portion of the show was rather quiet and subdued—mirroring the present plateau-state of the industry.

"From media pundits we hear about an outbreak of 'closeting' that is running rampant . . ."

Although the show reflected a natural period of maturation and consolidation within an industry—any industry—it's unfortunate that this greatly shrunken exhibition has already started to fuel more articles in the popular press about the "death" of the home computer market. From media pundits continually looking for that "big story," we hear about an outbreak of "closeting" that is running rampant, decimating the ranks of home computer users everywhere. We're told of millions of home machines that are now "old technology" and therefore "obsolete."

What we *don't* hear—because it doesn't make a good "story"—is that most of these machines have *not* as yet been pushed to their limits. It's just *not* fashionable anymore to report on the millions of smart consumers who continue to benefit from being "early innovators." And with a new generation of software and peripherals just now starting to appear, even greater utility, learning, and enjoyment is "in the cards" for present computer users.

Furthermore, as the "newer technology" machines (such as the Macintosh, Atari ST series, and Commodore Amiga) become available and more affordable, we can expect to see more of the new features—such as, "iconoclastic" mouse environments, CD ROM mass-storage devices, and inexpensive hard-disk drives—filter down to our older machines.

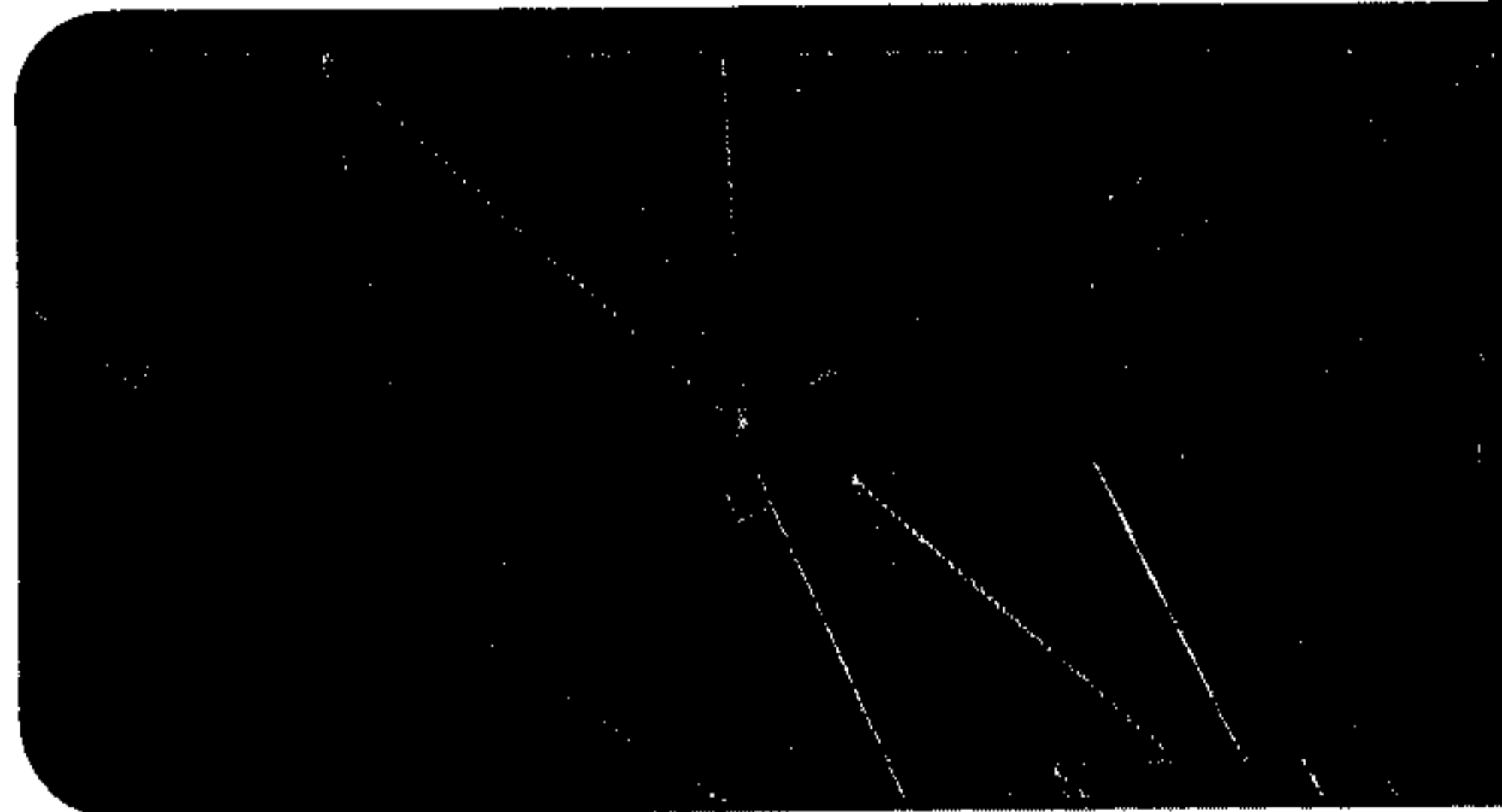
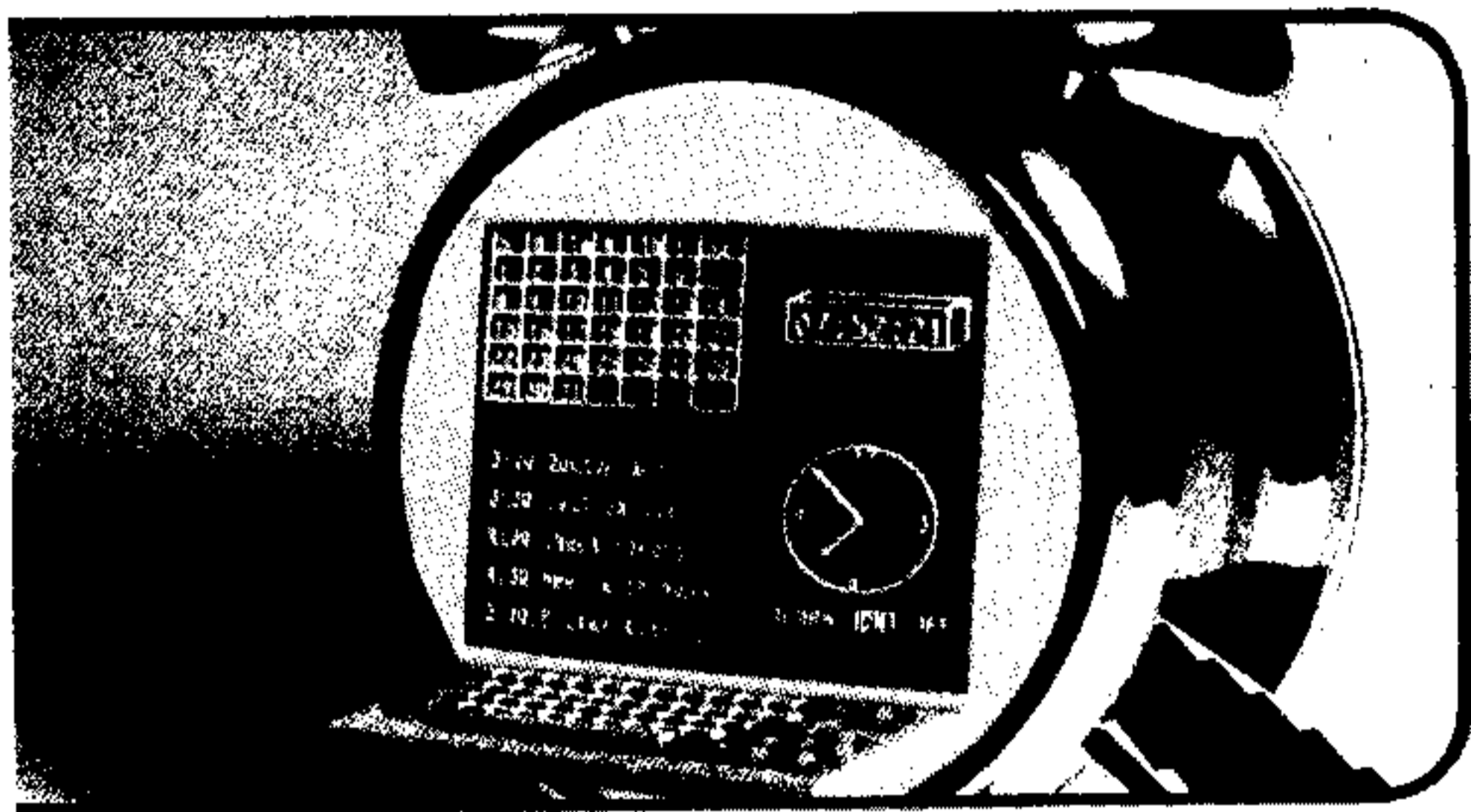
Although time is on our side, we cannot afford to just sit and wait for the industry to eventually recover its past vitality. It's up to us—active computer users—to keep as many machines out of America's closets as possible. For if people "give up" on computers, it hurts all of us who remain; industry growth and innovation slows as a result.

But it's no good just harping on the problem; we need a well-defined plan of attack if we're going to pull this industry out of its present doldrums. We here at *HCM* can offer you the ammunition: *our magazine*, the best "closet fighter" we know. *HCM* gives home-computer owners a reason to be active users; it provides inexpensive software, activities, and a learning environment that keeps those wonderful machines out of the dreaded closets.













So, if you believe in getting as much as you can from this important industry, we ask you now to become a *Home Computer Evangelist*. Go forth and show your favorite magazine at user groups, offices, friend's homes, scout troop meetings, PTA get-togethers, etc. Let 'em know that home computing with *HCM* is a worthwhile and enjoyable pursuit. And above all, stay with us—there are definitely interesting times ahead . . .

HOME COMPUTER™

magazine



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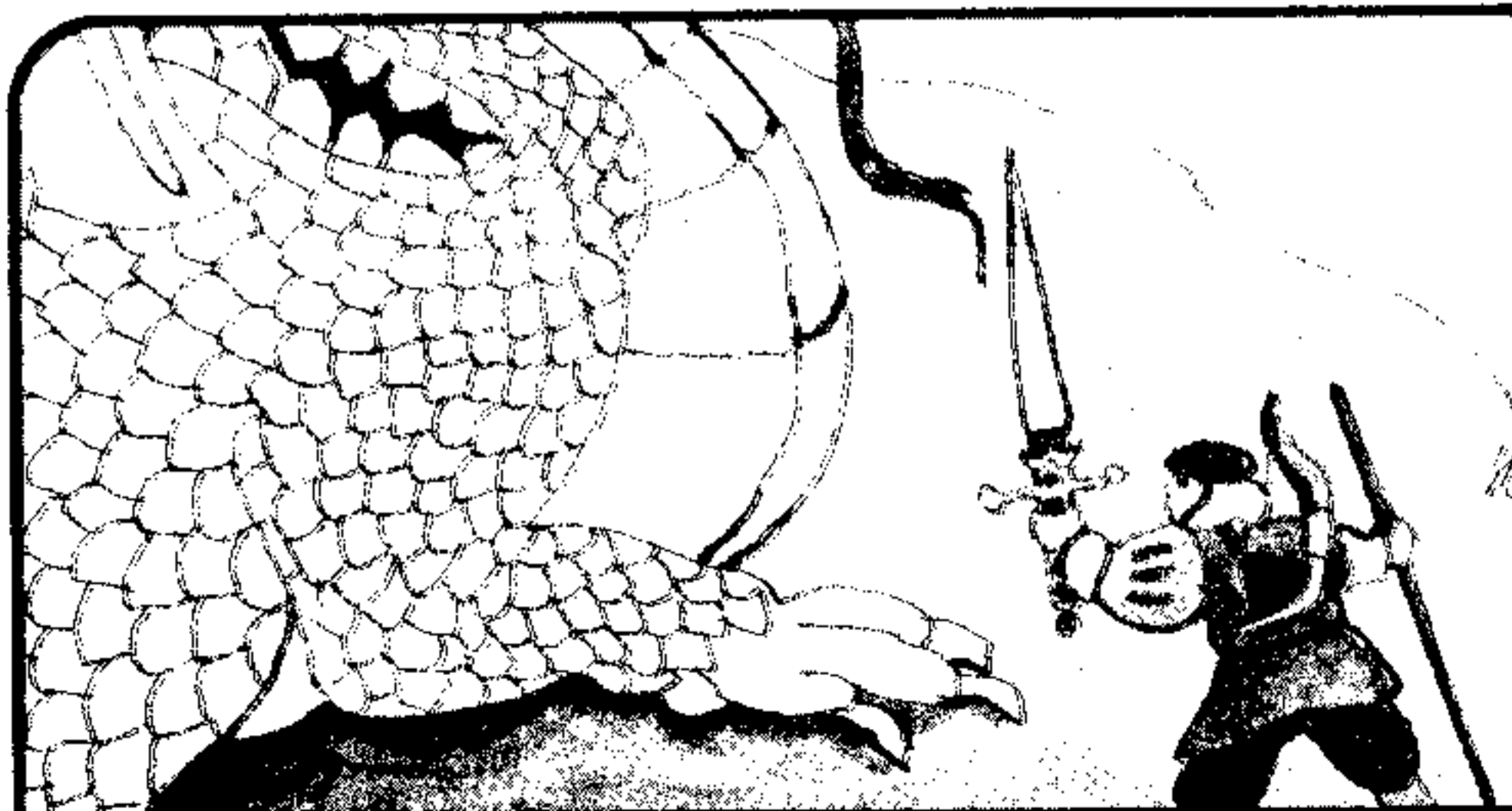
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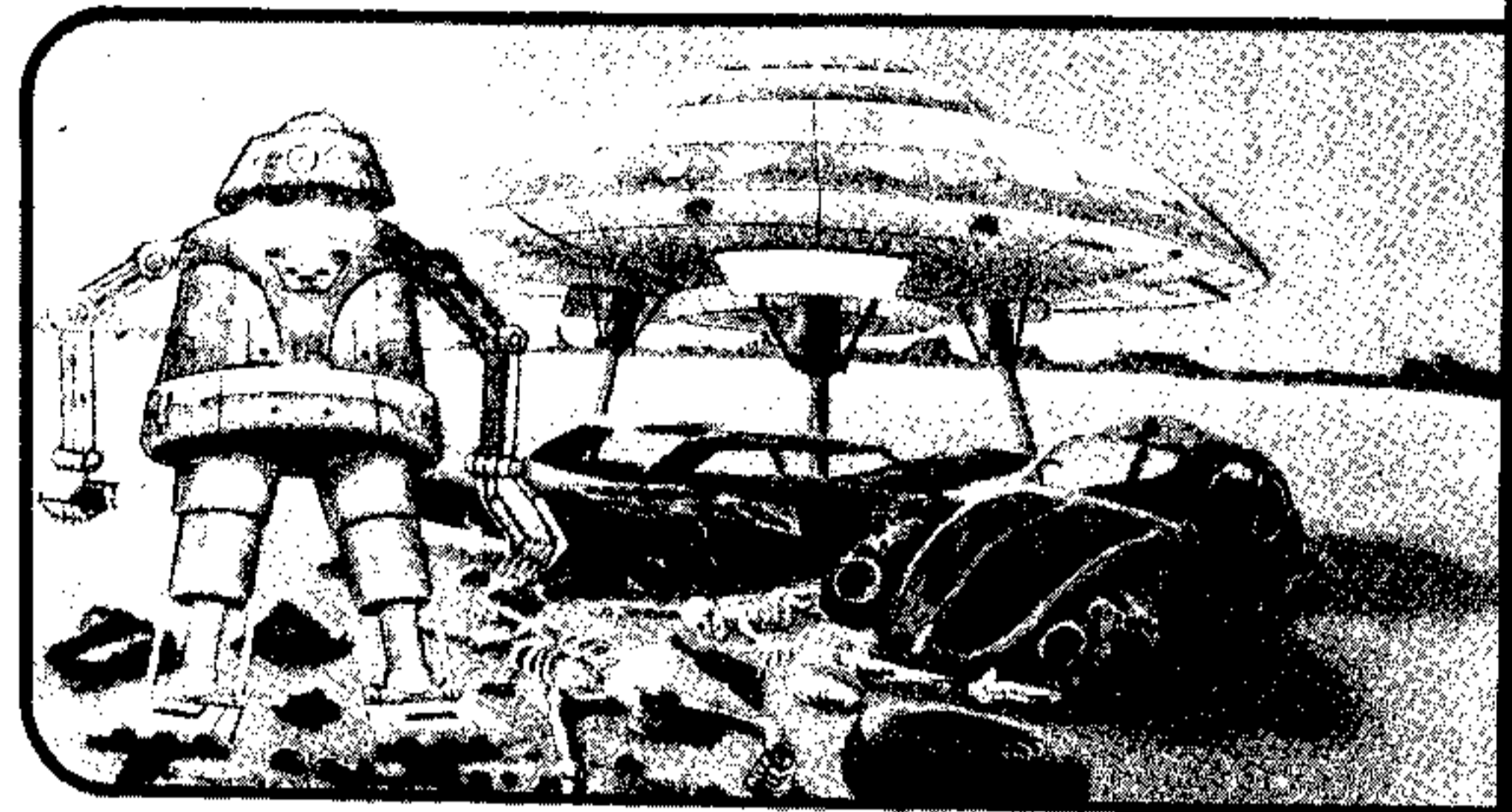
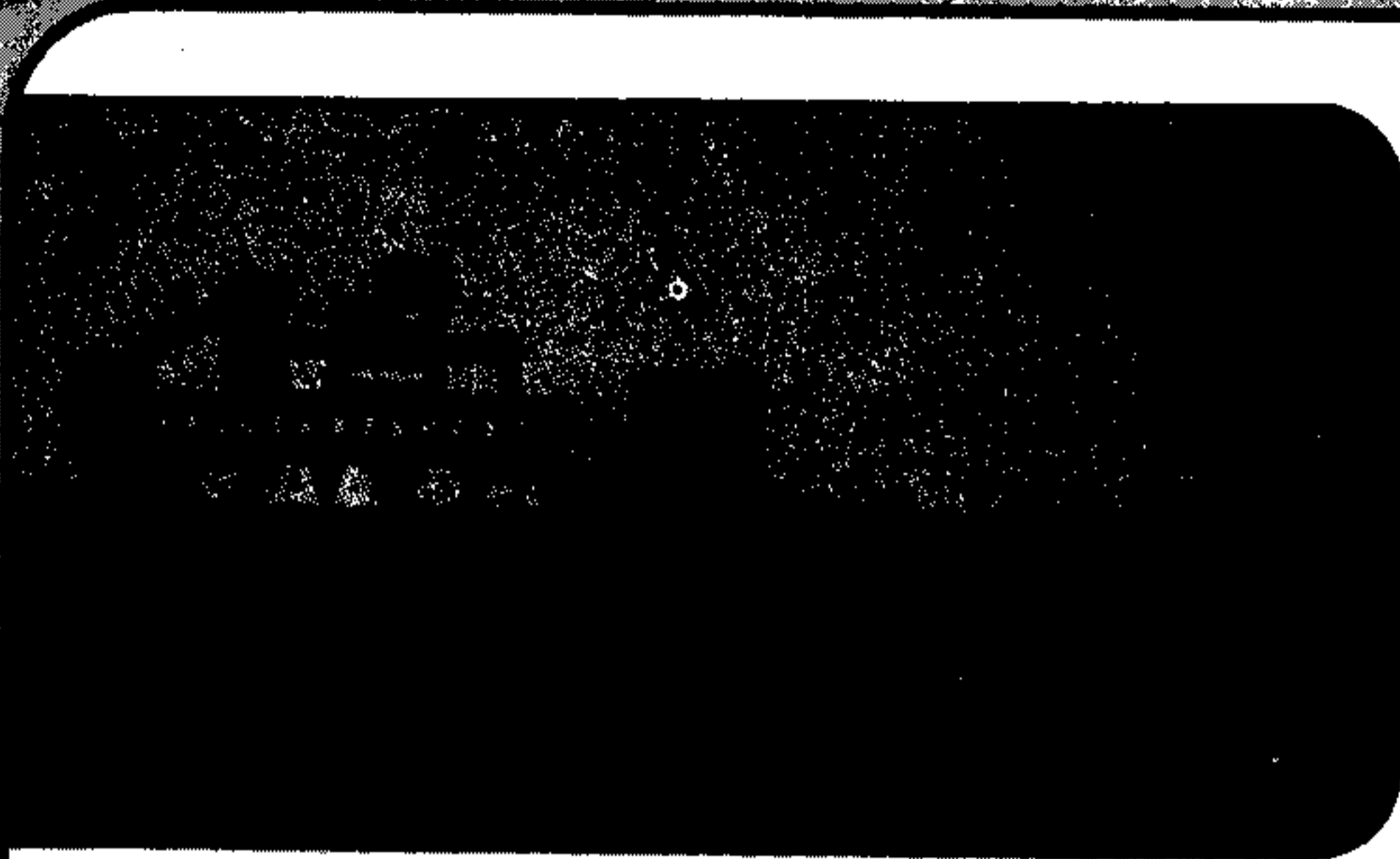
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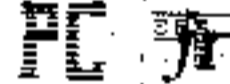








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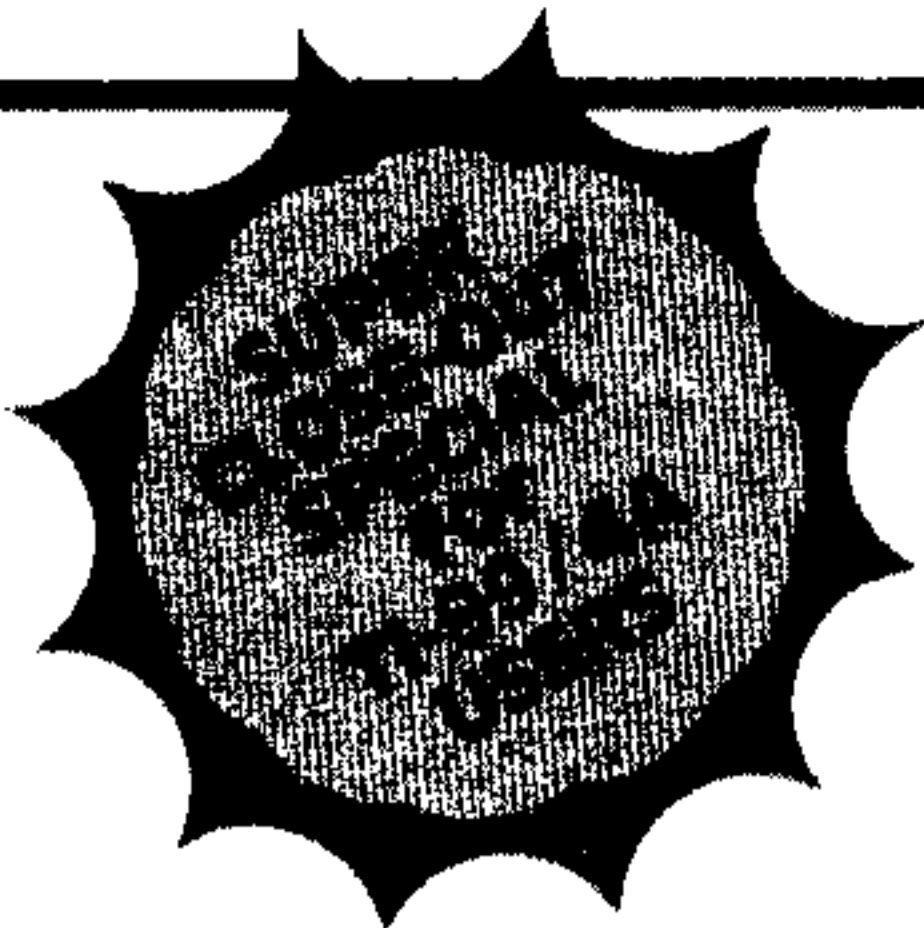
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Tricks

— ATTENTION TANDY 1000 OWNERS —
See the special instructions on page 130
that allow you to RUN the program listings
of this issue.

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

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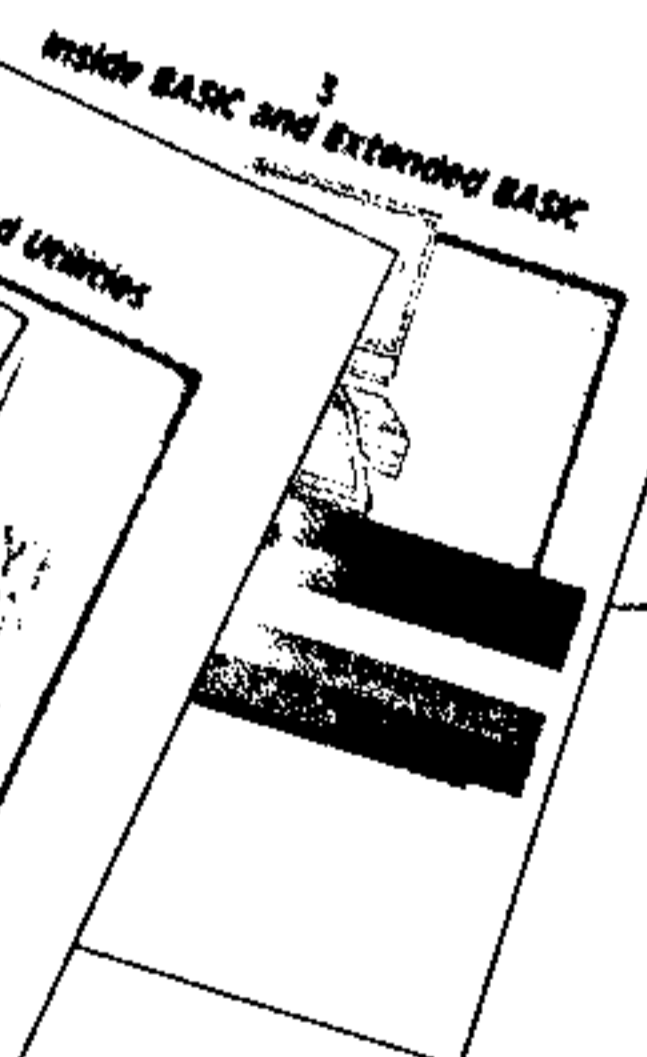
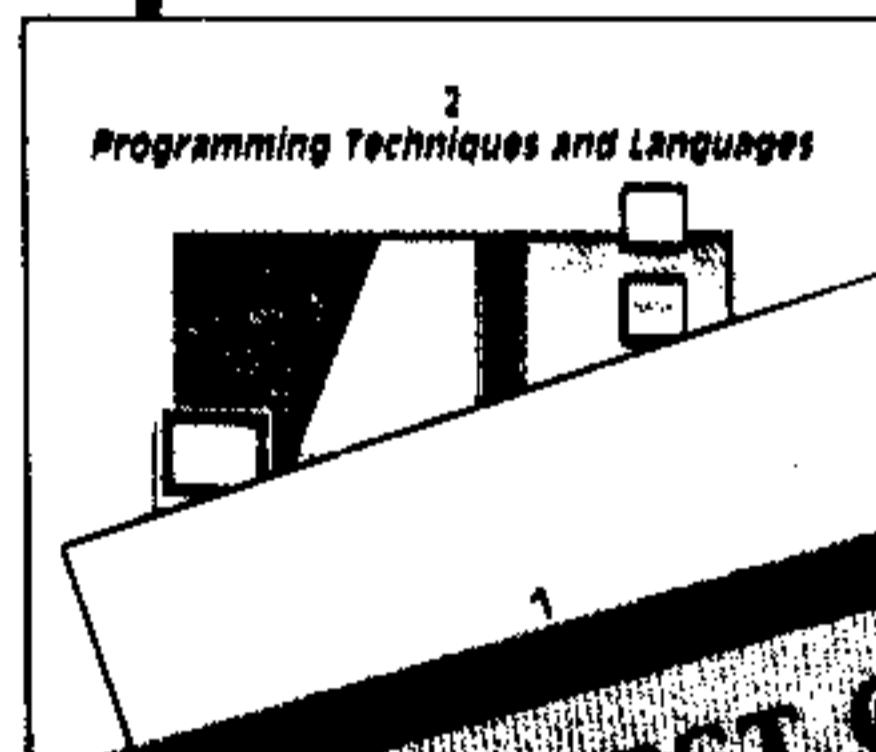
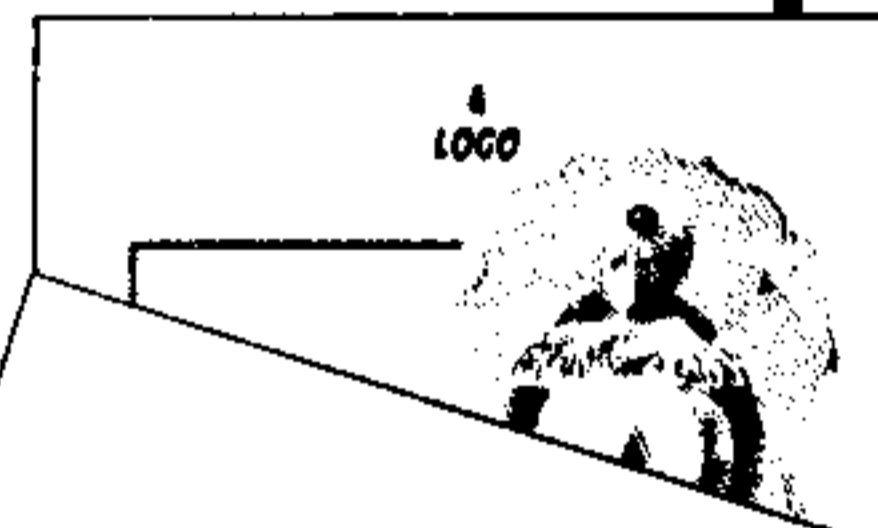


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Letters

TO THE EDITOR

Tandy is Dandy

Dear Sir:

I thought that I should write and let you know that the program listings in HCM for the IBM PC and IBM PCjr will run on the Tandy 1000 home computer. I have been buying your magazine for 5 months now and have copied several of the programs listed with hardly any problems at all.

The MICROSOFT GWBASIC used by Tandy is virtually identical to IBM's BASICA. The only difference that I have been able to find is that you must put a space before and after the equals sign. Also, until Tandy releases the updated version of GWBASIC, you cannot use the tiling option in the PAINT statement.

I have enjoyed HCM very much and look forward to each issue. I hope that more Tandy 1000 owners discover the treasure of quality program listings in your magazine.

Robert Eastman
Chandler, AZ 85224

Well, Robert, as you can see from the cover, great minds think alike. We also discovered that the Tandy 1000 will run most of the PC/PCjr software that we publish. And, indeed, we've noticed the problem that you mentioned about the tiling option in the PAINT statement. In fact, we have made a change to one of the programs this month to accommodate this, so that it will run without any problems. Tandy 1000 owners will also notice that there is a section of the DeBugs page that talks about the differences between the listings as printed for IBM, and the changes necessary to make them function with the Tandy 1000.

Music to Our Ears

Dear Sir:

I am looking for music software. I own a Commodore 64 computer with a Datasette, which I run through an ordinary television. I do not own a disk drive or printer and do not know when I can afford one. All music software that I've seen requires one or both.

I've managed to program a crude synthesizer and music editor. What I'd like to be able to program is a synthesizer that will allow me to play something and print the notes to the screen (my synthesizer program does this crudely) and allow me to save it, play it back, edit it, and do it with all three voices at once.

My crude knowledge of programming allows me to adapt programs, somewhat. What I'd like to know is which of your back issues contained music programs, as I may want to order those back issues or tapes.

I appreciate any help you can offer.

Marino Mangini
Naples, NY 14512

Marino, your timing is a little bit off, but close! Starting with Home Computer Magazine, Vol. 5, No. 2, there was a two-part article titled "The Music of Sound" which talked about software that will run on your C-64—strictly musical, of course. For some HCM software, check out our "Commodore Hornblower" column which, starting in Vol. 5, No. 2, began the complete description of a full-up synthesizer making use of all of the capabilities in the SID chip. Once this software

is completed in a future issue, it will be offered on Commodore cassette tape and will allow you to store and save your music via your Datasette recorder. By the way, we have had such a favorable response to our music-related articles that the publisher of Home Computer Magazine (Emerald Valley Publishing Co.) has announced a new magazine devoted to this area. The magazine, called Music & Electronics, will promote "creative discovery through sound technology," and is targeted to readers of all ages and backgrounds—with or without home computers—interested in learning more about musical composition, performance and education through the magic of electronics.

Figuring on the IIc

Dear Sir:

Well, you finally did it. After four straight monthly newsstand purchases with two back issues ordered, I subscribed. Your number-crunching program, "It Figures!" (Vol. 5, No. 2), is what really did it. If someone is interested in physics and mathematics, how could they resist? Already I am planning on adding separate data bases for the hundreds of physical variables and equations.

By coincidence, this same issue evaluated a Microsoft version of CP/M. The only fault of my Apple IIc is that it does not run CP/M. Now a new product promises to turn the IIc into a CP/M machine plus add more RAM memory. Applied Engineering of Carrollton, Texas has a new Z-RAM for the IIc (yes, the IIc). Up to 512K plus CP/M is available for a machine which was not manufactured as "expandable." Could you evaluate this system?

Of the many interesting CP/M programs, "MU-Math" by Microsoft is the one I want most. The program solves equations the same way an algebra student does. It works on symbols, not just numbers, to factor, differentiate, integrate, etc. The final answer does not have to be a number. The program runs on IBM and, until recently, on CP/M. I said "until recently" because Microsoft has withdrawn the CP/M version.

Harold A. Lamkin
Mt. Clemens, MI 48043

We're glad you appreciated our efforts in "It Figures!," Harold. The CP/M add-on product for the IIc that you mention sounds interesting and we'll try to schedule it for review in a future issue. Just a note to all readers: it's a great help when you do let us know what products you would like to see reviewed in Home Computer Magazine. Due to our finite editorial space and the fact that we do reviews in great depth, it's important for us to select products that our readers are interested in seeing reviewed—not just ones which receive a lot of hype.

Using RAM Disk on the IBM PC

Dear Sir:

I have accidentally discovered a method to greatly increase the execution speed of many (protected) disk-based programs. One drawback is that not all protected programs will work this way. As an example, I use the "IBM Writing Assistant" for long reports, and the spell-check speed is greatly increased, as is the access time of switching modes.

My PC has 640K in this example:

1. On boot-up, I auto-configure a 360K RAM disk called drive C. The reason I use 360K, leaving 278K free, is that I can always copy a full disk, but this large RAM disk is not always needed.

2. Insert your working program disk in drive A. In this case it would be "IBM Writing Assistant." (Be sure to remove the write-protect tab.)

3. Enter

```
COPY CON:G.BAT (PRESS ENTER)
COPYA:*. * C: (PRESS ENTER)
C: (PRESS ENTER)
WRITE (PRESS ENTER)
```

Press F6. This will copy a file called G.BAT on your work disk.

*IMPORTANT - DO NOT TRY TO USE DISKCOPY. For some unknown reason, it does not work on some protected disks.

4. From now on, all you must do is put your program disk in drive A and press G.

At this time, the programs will automatically copy one by one onto your RAM disk. Then it will load and run the program. You may remove your work disk if you wish, as it will not be used. Be sure to place a formatted disk in either drive to save any file you may create.

The speed and time saved is just amazing, and it's faster than using a hard disk.

Robert T. Collina
Lake Hopotcong, NJ 07849

Yes, indeed, Robert, that is a great way to run the "IBM Writing Assistant" with the spelling checker. In fact, if you look at the Quadjr Expansion System review in this issue, you will find that the same technique works with an expanded PCjr (with only some problems).

Play TI Again, Sam

Dear Sir:

I have a TI-99/4A, and an Apple IIe, and a Korg-Ply-800 synthesizer. I have seen MIDI interfaces in other magazines for the Apple, but I was wondering if they had any for my TI or if any people who have TI's know how to make them. If not a MIDI interface, how about some software or plug-in keyboard that will turn my TI into a synthesizer. It would also be nice if there was a TI Hornblower.

George Tsihlas
Norristown, PA 19403

The Roland Company makes a device known as the MPU401 which contains MIDI interfaces, allowing up to four devices—such as keyboard synthesizers—to be connected to a computer. The interface to the MPU401 is through an 8-bit parallel port. This device looks like a good interface for the TI-99/4A equipped with a parallel port, although at this time we are uncertain as to whether a special cable adapter will be required between the two units, or whether software exists that will run on the TI machine to support the MPU401. By the way, take a look at this month's "Razzle Dazzle" column for a great TI sound utility.

Likes TI Tech Notes

Dear Sir:

I was wondering if the Apple I is compatible with the Apple programs in your issues? I really enjoy William K. Balthrop's Tech Notes on

Letters

to the Editor CONTINUED

"Doing Without Extended BASIC."

One more thing. I received an ON TAPE issue (Vol. 4, No. 4) with "Stadium Jumping" on it. What is the game based on and how do you play?

Jeff Noble
Evanston, IL 60202

Jeff, in order to run Apple programs that are supplied to you ON DISK from HCM, you need to have at least 64K of memory and have Applesoft BASIC resident in Read Only Memory—precluding the somewhat-antique Apple I. A note to readers buying ON TAPE and ON DISK products: Make sure that you also have (or order) the corresponding volume and issue number of Home Computer Magazine. The magazine contains all the information about every program contained on your magnetic media. It's impractical for us—a waste of both computer memory and magazine paper—to imbed all the program instructions into the listings. All of the information you seek for "Stadium Jumping" is contained in the Vol. 4, No. 4 issue of HCM.

No-Advertising Policy Hailed!

Dear Editor:

Being involved in marketing of computer software programs for 3 years, I have become disgusted with the procedures of many computer magazines.

I have found that many magazines will not review a particular computer software program unless the company who published it is actively advertising in the magazine. The reason they resist reviewing programs from nonadvertisers is because of the pressure they get from companies who do advertise. I can empathize with those companies—but, as an end-user, I want to know which programs are the best, and what their outstanding features are. I'm not interested in a manufacturers' advertising program—I just want the best program available!

It is refreshing to find that Home Computer Magazine is interested in reviewing computer software programs based on the program's merits. The result is that readers of Home Computer Magazine benefit in the fact that reviews are not biased.

Wade E. Gefre
Marketing Manager
Solidus International Corp.
Bellingham, WA 98225

Thank you, Wade, for your kind comments. The response to our no-advertising policy has been very positive. We're grateful that a good number of hardware and software producers like yourself (Sysres for the C-64 reviewed in Vol. 5, No. 3) also see the wisdom of this policy.

Switch Printer

Dear Sir:

I have an Apple IIc computer and a TI-99/4A system with a TI impact printer (Epson MX-80) with serial and parallel ports. How can I use the TI printer with my Apple IIc? What modifications must be made to the printer? Also, can I run the TI printer with the Apple IIc and the TI-99/4A with an external switch?

Alan Gellerstein
Spring Valley, NY 10977

Basically, the answer to your question, Alan, is yes. There are boxes that will allow serial devices to be switched, but you may not want to spend the money required for such a box (they are fairly expensive). You can manually plug and unplug the two cables at the back of your common printer. The big problem involves finding out which internal printer DIP switch settings will match both the IIc and the TI. For instance, if you have a setup of 9600 baud, 8 bits with no parity, and an automatic line feed, will this produce the same results from either machine? In addition, you may have to spend a little time with the "RS232." port statement used with your TI machine, making sure that it produces the same results as the PR# statement in your Applesoft program, but certainly it can be done. Good luck and have fun.

Accessing MouseText

Dear Sir:

I am 14 years old and own an Apple IIc (as well as a TI-99/4A and a VIC-20), but that's not why I'm writing. I was working on a bar graph program over the past week. I got the program to make some nice graphs (3-D and all that), but I wanted to make a nice title page with orderly menus. Let me get off the track a second. A while back I was turning off the 80-column card and I accidentally hit [ESC] [CONTROL] 4 (I found out later that you don't have to hit control and that [CONTROL] 8 turns off the 80-column card). This neat little solid-white cursor appeared. The menu options were printed in 40-column MouseText.

After awhile I found that it could only be turned on (in 40 columns) from outside a BASIC program (disappointment and anger—does this have too many brackets or are those braces?). At any rate, I found a way to turn on MouseText and I wondered if you could help me do it from inside a program.

Congratulations! Your magazine is the best.

Don Scott
Buffalo, NY 14207

MouseText is really fairly easy, Don. Essentially, all you have to do is first turn on 80-column mode with a PR#3 command, do an INVERSE command, and then print the ESCape character, CHR\$(27) in your program. Now the regular capital letters will all be MouseText instead. To get back to regular text, just print a CHR\$(24) and do a NORMAL command. Here's a 4-line program that PRINTs the whole set:

```
100 PRINT CHR$(4); "PR#3"  
110 INVERSE  
120 PRINT CHR$(27)  
130 FOR CH = 64 TO 95: PRINT  
CHR$(CH); " "; NEXT  
140 PRINT CHR$(24); NORMAL
```

Of course this program only works on an Apple IIc—but it should provide you with the means needed to put MouseText into your program. For a more complete discussion of the subject, see Home Computer Magazine Vol. 4, No. 5, page 63.

Responds to HCM Review

Dear Sir:

Legacy Technologies was aware of your product review in issue 5.2 of HCM.

Our general reaction was favorable towards
Volume 5, No. 4

the review. We felt that Mr. Brader did in fact use the product, and give accurate information regarding its operation and design.

There is a lot of power packed into the Legacy product and we apologize for not allowing better clearance on the memory cards, although to date no one has caused any damage to any L-Bus card. The sound he refers to signifies to our staff—a well-built U.S. product.

In fact, the review could have been improved if we had provided another memory card and our CPS card, and I apologize for that.

Since the announcement from IBM regarding the PCjr, we have witnessed a change in dealer support for the PCjr: hence, Legacy now will offer our product directly to the consumer at a discount.

Legacy will also be offering a 256K RAM memory card that should be available this summer. The card will be a 256/512K RAM memory card, allowing the Legacy owner to expand to a system total of 640K all on one memory card (presently you must purchase 2 EXP 256 cards).

There is one simple rule of thumb for utilizing software on the Legacy/PCjr—Is the program written through DOS and BIOS constraints? Legacy changes neither of these, so a PC program written within these will run on an expanded PCjr with a Legacy.

Thank you for considering the Legacy II for the PCjr as a product for your magazine's review.

Greg Brehm
Vice President of Marketing
Legacy Technologies
Lincoln, NE 68504

Thank you, Greg, for your update on the Legacy product line.

FORTH On the TI Computer

Dear Sir:

I am writing this in reference to the continuing saga of the "TI Forth" vs. "Wycove Forth" controversy.

I have been an owner of the Wycove Forth system for just about a year now and I am thoroughly satisfied with its operation. I have found it to be a much easier version to program in and much more versatile in application.

As you know, the TI version of Forth was released in an "unfinished" state due to the untimely pullout of Texas Instruments from the home computer market. Several of the screens have errors in them as they were published, and the system does not utilize the capabilities of the 99/4A as the system was initially developed. In addition, the TI system is a "hybrid" Forth in that for most (in fact, almost all) of the options to be loaded, the assembly-language screens must be loaded first. The result is a trade-off between speed (our benchmarks gave the TI version a slight edge in speed) and ease of programming.

I have found the Wycove version to be a much easier system to develop and program, and it is much more of a true Forth language. I very much prefer the ease of programming to the very slight loss of speed.

The Wycove system contains full speech and sound capabilities as well as a "nifty" little clock screen. The standard features delivered with the

Wycove system make the TI version pale by comparison.

Incidentally, Wycove makes Forth available to cassette-based TI-99/4A systems and it runs on Extended BASIC, Mini-Memory, or Editor/Assembler. In my view, it is one of the best software packages offered for the TI-99/4A.

Robert Carmany
Greensboro, NC 27407

Your comments about TI Forth and its shortcomings, Robert, lead to a question for our readers: Since Texas Instruments put TI Forth in the public domain, has any individual or group made significant improvements to the language? Has anyone solved the problems that Robert addresses? And does anyone have a dynamite Forth application to share in our pages?

More Jr Expansion

Dear Sir:

I have just finished reading your article in Vol. 5, No. 2 on the Legacy II expansion unit for the PCjr and I am delighted that I chose the Quadram Expansion Chassis instead. The Quadram Expansion Chassis was a breeze to install, even for an electronic idiot like me and it looks a whole lot better sitting on my junior than the pictures of the Legacy II in your article. And, with the Quadram, I not only got the second disk drive, but also an internal battery clock and a printer port for a graphics printer.

I have seen the Quadram Expansion Chassis advertised for \$540, and the additional memory board with 128K for \$215. Additional memory can be added in 64K increments at about \$25 per chip. Clearly, more expansion for the money!

I get a lot of computer publications, but you're the best! Keep up the excellent work. How about an article on the Quadram Expansion Chassis in a future issue?

Royce R. Logan
North East, MD 21901

We were certainly happy to see that you are satisfied with your Quadram Expansion Chassis, the Quadjr, and yes—we thought we should review this device. As you can see, our review appears in this issue.

Commodore Plus 4 with ON DISK

Dear Sir:

I have recently "upgraded" from a TI-99/4A to a Commodore Plus 4. My question is: will ON DISK programs for the Commodore 64 run on the Plus 4? If so, I plan to order several of the back issues.

I am having trouble typing in some of the programs and making them work properly. I got "Loan Calc" to work okay, but thus far I have been unsuccessful with "Quiz-Make." Of course, this could be a bug of my own making.

I am a long-time subscriber and I have never failed to make a program work on the TI (including "Quiz-Make"). If there are slight differences in the Commodore 64 and the Plus 4, how about publishing the differences for us nonprogrammers?

SAVE FOR REFERENCE

Franklin Owners Rejoice!

Dear Sir:

First, good news for owners of Apple clones like Robert Hose (whose letter appeared in Vol. 5, No. 3 of HCM) and me. I give the credit for finding this patch, which lets clones run ProDOS, to someone known only as "The Shadow" (draw your own conclusions).

The problem is that the ProDOS loader looks for specific values in ROM which are different on the Franklin. If none are found, the computer freezes up. The following steps will make your ProDOS disk bootable:

1. Boot ProDOS. When the system hangs up, press RESET.
2. Type 2647:EA EA(ProDOS 1.0) or 265B:EA EA (all other versions).
3. Type 2000G (no space between the last zero and the G).

Congratulations! But the change is not permanent; to make it permanent, you must modify the ProDOS file (Hope you haven't erased that disk yet, Mr. Hose!). The following BASIC program will do just that.

```
10 ONERR GOTO
20 D$ = CHR$(4):REM
30 INPUT "INSERT DISK TO BE
PATCHED AND PRESS RETURN":RS
40 PRINT D$:
"BLOADPRODOS,TSYS,A$2000"
50 POKE 9819,234:POKE 9820,234
60 PRINT D$:"BSAVE
PRODOS,TSYS,A$2000":END
70 ER = PEEK(222):IF ER < > 6 AND
ER < > 8 THEN PRINT "ERROR":
ER:END
80 IF ER = 8 THEN PRINT
"I/O ERROR":END
90 PRINT CHR$(7):"PRODOS FILE
ISN'T ON THIS DISK!": GOTO 30
```

For ProDOS 1.0 change line 50 to:

```
50 POKE 9799,234:POKE 9800,234
```

Keep up the good work!

Steve Sobol
Beachwood, OH 44122

Steve, that is indeed great news to potential ON DISK subscribers who are Franklin owners. Thanks for the information.

I enjoy your magazine immensely and look forward to each issue.

William Moon
Booneville, AR 72927

No, William, in most cases our ON DISK programs designed for the Commodore 64 will not operate without alteration on the Commodore Plus 4. Because "Loan Calc" is a text-only program, without sound or graphics, it is a notable exception. Many hardware and software differences exist between the two machines. Commodore 64 BASIC programs rely heavily upon POKES for simple functions, such as changing screen color, where the Plus 4 has many built-in BASIC commands to handle the same functions. Thus, a careful study of the 2 BASICs is required before translations could be accomplished.

Writing Assistant Does Long Letters

Dear Sir:

I am a brand-new subscriber to your magazine who checked out almost every computer magazine I could find before subscribing to Home Computer. It is undoubtedly the best!

I am writing in regard to a letter from James McCloskey on page 9 of Vol. 5, No. 1.

I believe you have neglected to tell him the easiest way to write long documents using the "IBM Writing Assistant" (which I am using at this time). The best way to write these long documents is to write them in pieces of about four pages, and then use the "JOIN" command, which is described in the "Writing Assistant" manual, to join them together for printing. This has solved the problem for me and for my boys who must write term papers and other long documents for school. They have written 20-page long documents using this method.

I use an IBM PCjr, and now that IBM has seen fit to discontinue manufacturing it, I

hope that Home Computer Magazine will not abandon it too.

Stuart A. Sylvester
Wantagh, NY 11793

Thanks for the tip, Stuart, on the JOIN command in "IBM Writing Assistant." This certainly will allow you to write longer documents on your printer, but it still does not provide the complete flexibility one would hope for in being able to move text around within a large document. On your concern, don't worry—HCM will keep supporting PCjr. It is a fine machine with many capabilities. And now that its price has been officially cut on remaining inventory, the PCjr is an excellent buy. The rate of new subscriptions coming to HCM from the PCjr user base is very much on the increase as other folks discover just what a great value Home Computer Magazine really is.

C-64 MERGE Program Used with BBS

Dear Sir:

Although I have owned a home computer for several years now, I only recently decided to expand with a disk drive and a modem, so I am very new to the areas of disk file handling and telecommunications. When trying to download files from one of the local BBSs, I became very frustrated because the terminal program I have will only transmit and receive sequential files. That meant that I could download a program and store it on disk, but since it was stored as a sequential file and I didn't know how to convert it back to a program file, I could not use it.

Well, HCM came to my rescue with the "Merge" program for the C-64 in the Tech Notes section of Vol. 5, No. 1. I simply loaded and ran the "Merge" program and entered the name of the file I wanted to convert, and I had a usable program that I could run to my heart's content. I don't know if you

had this application in mind when you published the program, but it works beautifully.

Thanks. You have a great magazine. Keep up the good work.

Mike Poole
Topeka, KS 66603

How about that, Mike. You found a use that our staff hadn't considered. We wonder how many other people have discovered that the MERGE program can be used for this purpose. Of course, another more popular use is to generate your BASIC program with a word processor, save it as a sequential file, and then use the MERGE program to "load" it into the BASIC interpreter. Often using a good word processor will make it easier to find statements in your program, do block moves, etc.

MIDI and the TI

Dear Sir:

First, thank you for your very excellent magazine. Do you know of any MIDI (Musical Instruments Digital Interface) and software for the TI-99/4A? I would appreciate it very much if you would let me know of any distributor who sells things like that.

Walid El-Azem
Holbark, Denmark

Walid, we are currently searching for such devices ourselves to be covered in Home Computer Magazine and our new sister publication Music & Electronics magazine. We are even considering producing a do-it-yourself TI-to-MIDI kit to give the TI-99/4A some of the same capabilities as the new Yamaha CX5M MSX music computer. As we learn more about products in this area, we will be sure to pass word along to you through these pages.

Double-Spaced Printer Listings & More

Dear Sir:

A really great magazine (in its new format). I'm into my second copy purchased for cash at the local Walden's and B. Dalton stores (Vol. 5, Nos. 1 and 2). However, I'm probably one of the very last VIC-20 owners! I'll reserve my decision on a subscription for a while yet.

An addendum to Jack Ryan's letter in Vol. 5, No. 1, concerning double-spaced listings: Using the Cardco interface you can get double-spaced listings by using a file number of 128 or greater, i.e.,

OPEN 128,4,(SA): CMD 128: LIST

Use whatever secondary address (SA) you need for a particular print option. This should work on most Commodore-emulate interfaces, or you can do like I did and cut a small opening into the cover-case of the interface to expose the DIP switches and make any changes at will.

Another tip: On Commodore 64 and VIC-20 units, the following one-liner will make an excellent screen dump when used at a high number GOSUB:

```
63000 OPEN4,4,(SA):OPEN3,3,(SA):
PRINT"(HOME)";FOR I=0TO999:
GET#3,A$:PRINT#4,A$;NEXT:
CLOSE3:CLOSE4:RETURN
```

(Use 505 vs 999 on a VIC and abbreviate all key words to get it all on one line.)

Automatic Typo-Finder Wanted

Dear Sir:

I just recently discovered Home Computer Magazine, and I am very impressed. In fact, I have already sent in my subscription application, along with an order for some back issues. I would like to make one suggestion. It would be very nice for your readers who type in your programs themselves to be able to validate their typing. While I realize that this would take up valuable space, I think that the time saved by avoiding typing errors would be worth it. My idea is to publish short programs with each issue which could be used to validate the typing of each of your programs. The reader could type in the short checksum program (it should not be more than about 20 lines) and then use it to validate the typing of larger programs. The following is a very simple program to do the checksum calculation for the IBM PC. To use the program, type-in the program to be checked, and save it as an ASCII file (save "file",A). Then run the checksum program on the ASCII file. Here is the program (with checksums):

```
10=00J4 10 DEF FNMD(A,B)=INT(A-INT(A/B)*B)
20=0U1Z 20 INPUT"FILE NAME TO CHECK: ",FILES$
30=0T8P 30 OPEN"1",1,FILES$
40=003K 40 IF EOF(1) THEN END
50=0H#8 50 LINE INPUT#1,LN$
60=0L@A 60 CODE=0
70=0M13 70 FOR I=1 TO LEN(LN$)
80=0Wft 80 CODE=CODE+(I*ASC(MID$(LN$,I,1)))
90=00jc 90 NEXT I
100=0RPr 100 DG$=""
110=0QPC 110 FOR I=1 TO 4
120=0MYJ 120 CONVERT TO BASE 64
130=0UnZ 130 CODE=INT(CODE/64)
140=1PUu 140 DG$=MID$("0123456789ABCDEFGHIJKL
LMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz@#".DG$+1,1)+DG$
150=0SG2 150 NEXT I
160=0W3i 160 PRINT USING"###=#\ \":VAL(LN$);D
170=0Pza 170 GOTO 40
keep going til EOF
```

Be assured, Robert, that we are working on methods that can be used to ease the key-in error frustration that some of our readers experience. Certainly checksum-type programs are high on our list. If other readers have other ideas on solving this problem, we'd like to hear from them, too.

Finally, I think I'll try to transpose "The Organizer" to run on my VIC—then perhaps a subscription. Keep up the good work and maybe some other mags will get the idea!

Jim Rudd
Miami, FL 33186

We thank you very much, Jim, for your compact screen dump. We found, however, that it did not accurately duplicate our screen. Perhaps one of our readers has an idea of how to get this routine to do an undistorted screen dump. Considering the VIC-20's memory limitations, it will be a neat trick if you really can transpose "The Organizer" Program (which first appeared in Vol. 5 No. 1, and continued in Vol. 5 No. 2) to that machine.

The program simply computes a checksum for each line of the program, and prints the line number and checksum for each line. While there are probably many better methods of computing checksums, the method used here should suffice. It will result in a 24-bit integer which is then printed out in base 64. Using this somewhat-cumbersome method allows the line to be up to 256 characters long, and any character from 0 to 255 can be used. The maximum checksum would occur for a line of 256 characters, each having a value of 255. The checksum would be:

$$1*255 + 2*255 + 3*255 + \dots + 256*255 = 8388480$$

Note that this number can be expressed as a 24-bit binary number, which means that all possible checksums can be represented by a single 4-place base-64 number. Please feel free to use this program or some adaptation of it if you decide to implement some sort of checksum with your programs.

Robert R. Sloane
Lawrence, KS 66045

Memory Full in One Line?

Dear Sir:

I typed your one line arcade game on my TI-99/4A in Extended BASIC. This was from Vol. 4, No. 5.

When I try to run it, I get the message "Memory Full in 1." What can I do to use this program?

Kristin Chotzinoff
Denver, CO 80218

We have tried to duplicate your problem, Kristin, but each time we key-in that one-liner it works just fine. Perhaps when keying it in, you struck a wrong key, making an error in the one-line program. As a possible aid to you, and for current readers who may not have that back

issue, we have repeated it below in a slightly different type font.

```
1 N = 28 :: FOR X = 4 TO N ::  
CALL SPRITE(#X,60 + X,X/2,N,N,X,M) ::  
FOR Y = 5 TO X ::  
CALL COINC(#Y,#4,N + M,C) ::  
M = M - C :: DISPLAY AT(4,9):M ::  
CALL JOYST(1,E,F) ::  
CALL MOTION(#4,-2*F,2*E) ::  
NEXT Y :: NEXT X
```

A Convincing Quiz

Dear Sir:

Congratulations for publishing a truly useful magazine. I own a C-64 and I am tired of magazines that focus on programming utilities and games. I have so many programming utilities that I don't even remember what half of them are for. And, if I wanted a game machine, I could have bought an Atari 2600. Give me useful software!

Don't get me wrong, utilities and games are important (I own many games, also). But it seems that most magazines have forgotten why computers are here—to make our lives easier. You folks hit the spot with "Quiz Construction Set" (that was my first issue, by the way). Finally—an educational program that utilizes a printer. I am studying electronics and this makes it easy to create hard-copy tests for myself. And my wife, who works with the retarded population, can create simple worksheets for her clients. She can't take our C-64 to work, so up till now educational programs were of no use to her.

Way to go! You've got my subscription to both magazine and disk with this letter. Keep it up!

Dan Braasch
Rolling Meadows, IL 60008

Dan, as you see with each of the issues that we produce, we try to balance coverage. Where as you appreciate productivity-type educational software, others still appreciate gaming software, and others are still looking for the ultimate software tool in a utility. We have great fun trying to balance every issue to give everybody something that they really want. Our goal is to make every issue of Home Computer Magazine so valuable that our readers save them as reference works.

IBM CONFIG.SYS vs HCM Dual Disk

Dear Sir:

I was very pleased with the recent article on adding a second disk drive to PCjr, and am happily computing with dual disks now. I have several hints I would like to share and some questions you may be able to answer. First the hints.

There was a slight problem utilizing the setup software published in the article when I installed my Microsoft Junior Booster with mouse and 128K memory expansion using DOS 2.1. The only way to install the extra memory is by adding the Microsoft memory device drive "MEMORY.SYS" to a "CONFIG.SYS" file. However, for reasons unclear to me, if a "CONFIG.SYS" file exists prior to the execution of the "AUTOEXEC.BAT" file listed in the article, the added memory on the Junior Booster sidecar is not installed. This problem

was solved by initially naming the "CONFIG.SYS" file "SWITCH.BAT" and replacing the "OFF.BAT" program-placekeeper file with another "dummy" file, the "CONFIG.SYS" file. Then, on initial power-up the system sees no "CONFIG.SYS" file until the "SWITCH.BAT" file is renamed "CONFIG.SYS". When "BOOT.BAT" is executed, "CONFIG.SYS" is now executed, and it does not interfere with the installation of the second drive. The resultant working "AUTOEXEC.BAT" file is below:

```
IF EXIST switch.bat GOTO first  
GOTO last  
:first  
RENAME switch.bat config.sys  
BOOT  
:last  
RENAME config.sys switch.bat
```

The "SWITCH.BAT" file, which is really the configuration file in disguise, then contains the following to load the new memory and clock-calendar:

```
DEVICE = MEMORY.SYS S/:nn V/:nn  
DEVICE = CLOCK.SYS  
(and any other configuration statement desired).
```

Charles R. Garcia
Sepulveda, CA 91343

Well, Charles, we really have to hand it to you for figuring out how to configure a system when using the dual-disk software described in "One for the Money, Two for the Slow" published in Vol. 4, No. 4 of Home Computer Magazine. Here's why your solution works. A CONFIG.SYS file is a batch-type file that installs certain machine-language driver programs. These programs allow for the recognition of extra memory, etc. When initially booting the system, CONFIG.SYS is always searched for first, so the drivers are installed before the AUTOEXEC.BAT file is run. The problem occurs when the dual-disk software from that article reboots the system after the CONFIG.SYS has done its installations. The MODBOOT.BAT routine uses its own hardware addresses for rebooting, which very likely overwrite some of the machine language installed by the CONFIG.SYS file. Therefore, this reboot could easily undo the work done by CONFIG.SYS the first time by overwriting the driver software. Again, congratulations on a great solution to a tricky problem.

Apple-to-IBM Data Moves

Dear Sir:

I previously owned an Apple IIe and have a large number of data files which were created on that machine. I sold the "II" and purchased an IBM PC/XT onto which I wish to transfer these same data files.

Please inform me if there is any hardware available that I can install in my PC/XT which will enable it to read from my Apple floppies and transfer the data to my Winchester.

If the above is not possible, please tell me how to go about transferring data directly from computer to computer (Apple II to IBM), since I have access to a colleague's Apple, and tell me exactly what equipment I would need to carry out such a transfer. I wish to accomplish

this transfer directly without using telephone/modem, if possible, since the telephone service in this part of the world is not exactly reliable.

I look forward to hearing from you.

S. P. Crow
Bombay, India

What you are going to require is a serial interface cable that will connect the IBM and Apple II computers. This cable will require an RS232 interface for each computer (even if you don't use a modem). The IBM will probably have one built-in, but the Apple (unless it is a IIc) will require some sort of serial interface card (such as the Super Serial card from Apple). Then you'll need to have a terminal emulator software package that operates on the IBM (such as "Personal Communications Manager" from IBM) and a terminal emulator software package that runs on the Apple (such as "Apple Access II" from Apple). With this combination, you can transfer any data files that are in normal ASCII code (text-type files). If any readers have done this sort of Apple-to-IBM transfer, let us know. Also, look to future "Home Computer Tech Notes" for more information.

Announcing . . .

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Emerald Valley Publishing Co., publisher of Home Computer Magazine, is introducing a new magazine devoted to "the musician in all of us." Each bimonthly issue of Music & Electronics explores the many facets of personal music composition, performance, and education through the magic of computers and electronics. Editorial content spans a full range of subjects—from introductory music theory, to audio and digital recording techniques, to interfacing with home computers and home entertainment systems. The magazine offers abundant reviews on the latest electronic music products, as well as a bound-in demonstration record that allows listeners to actually hear the reviewed products and instructional examples. Music & Electronics is written for all ages and levels of musical expertise—from the novice to the professional.

Note: HCM readers may obtain subscription information by mailing a postcard to:

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1500 Valley River Drive, Suite 250
Eugene, OR 97401



Run-Day-View™

by Randy Thompson
HCM Staff

Working parents, students, executives, and active citizens: Get a *View* of how your *Day* will *Run*, and let the computer help you manage your precious time.

So, there it sits—the family computer. What was intended to be an “investment into the future” has somehow become a weapon to be used against invading aliens. Now, as the kids grow tired of defending Earth, the investment just seems to “sit” more often. So, why not put that computer to work for you? With the program *Run-Day View*, you can do just that.

Run-Day-View is an electronic date book. Ideally suited for the working parent, or anyone with a busy schedule, this program will help you keep track of important times and dates. By entering information about your own personal schedule, you may create memos, date books, and weekly summaries. In addition to keeping track of important dates, you may also keep a list of 18 phone numbers for each month of appointments. Best of all, you may even print out a folding appointment book small enough to fit in your pocket.

When you first RUN *Run-Day-View*, you will be presented with a main menu containing these 6 options:

- 1) Edit appointments
- 2) Edit phone numbers
- 3) Print routines
- 4) Load appointment file
- 5) Save appointment file
- 6) Exit program

Edit Appointments

This option allows you to create a new appointment file, or edit one that is already in memory. When you choose this option, you will get another menu. It consists of these 3 choices:

- 1) Set date and time
- 2) Edit appointment book
- 3) Return to main menu

This shows the Edit Appointment Book screen from the IBM version.

1) Set date and time

You must choose this option before you can create an appointment file. Here, you are asked to input the month, year, and starting time for your date book. The starting time will determine the time at which each day of appointments will begin. In the sample printout in

Figure 1, we set the date to May, 1985 and used a starting time of 8:00.

If you attempt to set the date more than once, you will be given the option to erase your current appointment data. This feature was included because appointments for one month will not usually coincide with appointments for another. If you answer *No* while in this mode, you will be returned to the Edit Appointments menu.

2) Edit appointment book

Here's where you'll spend most of your time. This option is for actually entering data. The editing screen is easy to use. It is set up just like a page from an appointment book, with the date at the top and the time displayed in half-hour increments along the side. From this screen you may enter appointments, input phone numbers, turn pages, and set markers (markers are explained next). Have a PTA meeting on the 7th? Put it in. Afraid you'll forget to visit Barb at the hospital on Sunday? Just type it in and make the computer remember for you. Turning the page will bring you to a new day in the book. The current day on which you are working will always be displayed at the top of the screen.

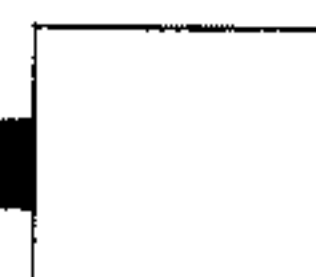
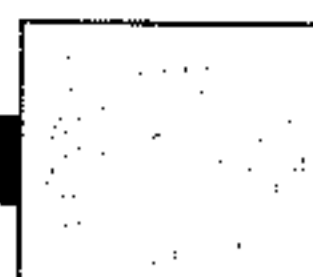
One of the most useful features of this program is its ability to set markers. Markers are used for accenting certain appointments. When a marker is set, a little flag appears next to that appointment when you list it on the computer screen. Markers also determine which appointments are included in a weekly summary (see the Print Routines menu). For instance, to help make sure that you don't forget that meeting with your department

head, you can place a marker next to that appointment. Four markers may be used per day.

Each machine will have its own method of accessing these different functions. Refer to the proper Control Capsule for your computer.

3) Return to main menu

This option does just what it says.



"You may even print out a folding appointment book small enough to fit in your pocket."

Edit Phone Numbers

Choosing this option will bring up the phone-list screen. Here you can enter and edit up to 18 phone numbers. This is a good place to put the phone numbers of people with whom you have appointments. For instance, if you're supposed to pick up some contact lenses on Tuesday, you would probably want to keep a record of the optometrist's phone number. Phone number lists are automatically sorted alphabetically.

Print Routines

Once you choose this option, another menu will appear. It is the heart of the program. With this menu you can create a variety of printouts that will display and organize your appointments in a variety of formats. The menu options are:

- 1) Print one page of appointments
- 2) Print the whole appointment book
- 3) Print a weekly summary
- 4) Print the current list of phone numbers
- 5) Return to the main menu.

1) Print page of appointments

This is an alternative to printing the whole appointment book. With this option you can print out just two days of appointments at a time (see Figure 1). If you make any changes to your appointments after printing the whole book, you may use this option to create a replacement page.

2) Print appointment book

Here you can print your own custom date books. An appointment book consists of one month of appointments. Each sheet of printer paper will have two days of appointments on it—thus two pages of the appointment book. (See Figure 3 for an explanation on converting your printout into a convenient pocket-sized book.)

3) Print weekly summary

A weekly summary is simply a calendar showing only 7 days (see Figure 2). You can begin this calendar on any day of the week you wish. If an appointment has its marker set (see Edit appointment book), it will appear as an asterisk followed by a number. To discover

Figure 1

APPOINTMENTS FOR: MAY
1, WEDNESDAY

8:00 Call Dr Bill for Jake
8:30 Drop off laundry

9:00 Work
9:30

10:00
10:30

11:00
11:30

12:00 Lunch w/disk salesperson
12:30

1:00
1:30 Meet w/ User Group Pres

2:00
2:30 Jake to Dr Bill

3:00 Grocery shopping
3:30

4:00 Pick up Jake
4:30 Pick up laundry

APPOINTMENTS FOR: MAY
2, THURSDAY

8:00 Chamber Commerce Brkfst
8:30

9:00 Work
9:30

10:00 Meet w/ General Manager
10:30

11:00 Meet w/ department heads
11:30

12:00 Lunch with Josephine
12:30

1:00 Appt w/ optometrist
1:30

2:00 Pick up cleaning/shoes
2:30 Shop for bday-Ian

3:00 Pick up Jake at school
3:30 Drop Jake at pool

4:00
4:30 Pick up Jake/groc store

Figure 2

WEEKLY SUMMARY STARTING
1, MAY 1985

WEDNESDAY 1
* 1 * 2

THURSDAY 2
* 3 * 4
* 5 * 6

FRIDAY 3
* 7 * 8
* 9

SATURDAY 4
* 10 * 11
* 12

SUNDAY 5
* 13 * 14
* 15

MONDAY 6
* 16 * 17

TUESDAY 7
* 18 * 19
* 20

*APPOINTMENTS FOR WEEK STARTING
1, MAY 1985

* 1 Meet w/ User Group Pres
* 2 Jake to Dr Bill
* 3 Chamber Commerce Brkfst
* 4 Meet w/ General Manager
* 5 Meet w/ department heads
* 6 Appt w/ optometrist
* 7 PTA Committee meeting
* 8 Sky diving lesson
* 9 Pick up Shari at school
* 10 User Group meeting
* 11 Pick up beer/wine
* 12 Picnic at Skinner's
* 13 Ian's first communion
* 14 First communion lunch
* 15 Visit Barb at hospital
* 16 Sky diving lesson
* 17 Tanning session
* 18 Data Processing meeting
* 19 Meet w/ Hilton Sales Mgr
* 20 PTA committee meeting

the appointment to which a particular number refers, look at the cross-reference list that is always provided below the weekly summary.

4) Print phone numbers

To get a printout of the phone-number list, choose this option. Each month's phone numbers are printed alphabetically, with the corresponding month listed at the top. You can carry this list with you, or simply set it by your phone.

Continued on next page

5) Return to the main menu

If you don't want to print anything, here's your panic button. This option will return you safely to the main menu.

Load Appointment File

Choose this option to load a previously created appointment file. Files consist of one month of appointments and phone numbers.

CONTROL CAPSULE <i>Run-Day-View</i>	
KEY	FUNCTION
<i>Edit Modes:</i>	
—	Exit editing screen.
SHIFT INSERT	Insert character.
DEL	Delete (backspace).
Cursor down or Return	Next item.
Cursor up	Previous item.
Cursor left	Cursor left.
Cursor right	Cursor right.
<i>Edit Appointments Mode:</i>	
F1	Turn forward a page—increment screen by a day.
F2	Turn back a page—decrement screen by a day.
F3	Set markers.
F5	Input phone number.
F7	Jump a page.

CONTROL CAPSULE <i>Run-Day-View</i>	
KEY	FUNCTION
<i>Edit Modes:</i>	
Esc	Exit editing screen.
Backspace	Backspace.
Del	Delete character at cursor.
↑	Previous item.
↓	Next item.
←	Cursor left.
→	Cursor right.
<i>Edit Appointments Mode:</i>	
F _n 1	Turn back a page—decrement screen by a day.
F _n 2	Turn forward a page—increment screen by a day.
F _n 3	Jump a page.
F _n 4	Set markers.
F _n 5	input a phone number.

CONTROL CAPSULE <i>Run-Day-View</i>	
KEY	FUNCTION
<i>Edit Appointments Mode:</i>	
1	Jump a page.
2	Set markers.
3	Enter an appointment.
4	Input a phone number.
5	Exit editing screen.
<i>Edit Phone Numbers Mode:</i>	
1	Input a phone number.
2	Exit editing screen.

Save Appointment File

This allows you to save a month of appointments. You must have a file in memory before choosing this option.

HCM

CONTROL CAPSULE <i>Run-Day-View</i>	
KEY	FUNCTION
<i>Edit Modes:</i>	
Esc	Exit editing screen.
↑	Previous item.*
↓	Next item.*
←	Cursor left.*
→	Cursor right.*
<i>Edit Appointments Mode:</i>	
Control D	Turn back a page—decrement screen by a day.
Control F	Turn forward a page—increment screen by a day.
Control P	Jump a page.
Control Q	Set markers.
Control Z	Input phone number.
<i>*SPECIAL FOR II+ USERS:</i>	
Control J	Previous item.
Control K	Next item.
Control H	Cursor left.
Control U	Cursor right.

Figure 3
Converting The Printout Into A Book

Neatly fold the paper back into a stack (along the horizontal perforations).

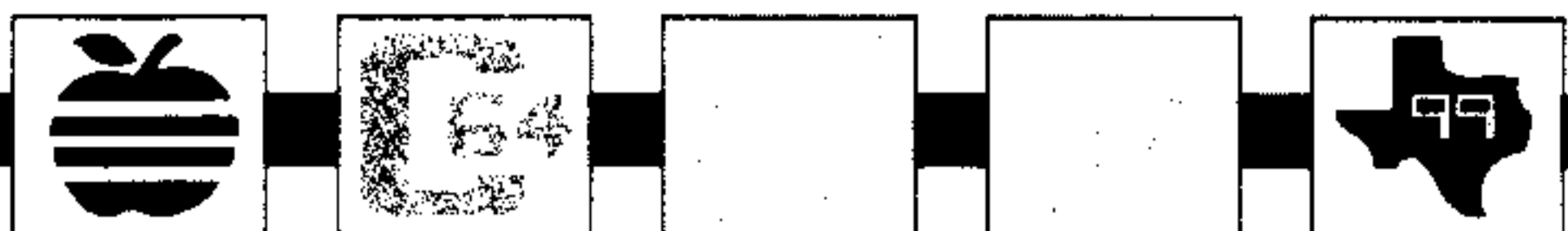
Cut along the vertical line down the center of the paper.

Keep excess paper for notes.

Fold top portion back (away from you) on horizontal line.

Fold forward (toward you) along fanfold crease.

Continue folding each page until a small (approximately 3" x 5") book is formed. Bind at the top with a clip or staples.



TRIG-TRIX

Trigonometry can help you calculate the unreachable heights and complex forces in nature. This program will help you fathom the depths of this eternal triangle of mathematics

by **Roger Wood**
HCM Staff

Have you ever wondered how surveyors figure out the height of a mountain peak? Do they climb up to the top, drill a hole to the bottom, and drop a tape down the hole? How silly, you say. But by what mysterious calculations do they arrive at a true figure without direct measurement? *Trig-Trix* will help make this measuring process no longer seem so mysterious. This program exercises the fundamentals of trigonometry, a form of mathematics that uses the triangle as a basis for measuring distances—either in the abstract, or in the physical world.

A major cornerstone in trigonometry is the relationship of a right triangle's sides to its angles. These boil down to three basic relationships: Sine, Cosine, and Tangent. *Trig-Trix* is designed to administer problems dealing with these basic line and angle relationships by addressing right triangles, the Law of Sines, and the Law of Cosines. When you run the program, you are presented with this menu:

- 1.) RIGHT TRIANGLES
- 2.) LAW OF SINES
- 3.) LAW OF COSINES
- 4.) END PROGRAM

1) RIGHT TRIANGLES

When you select option 1, you will see this submenu:

1. DETERMINE SIDES
2. DETERMINE ANGLES
3. RETURN TO MAIN MENU

The triangle in Figure 1 is for reference when using either of the Right Triangle options.

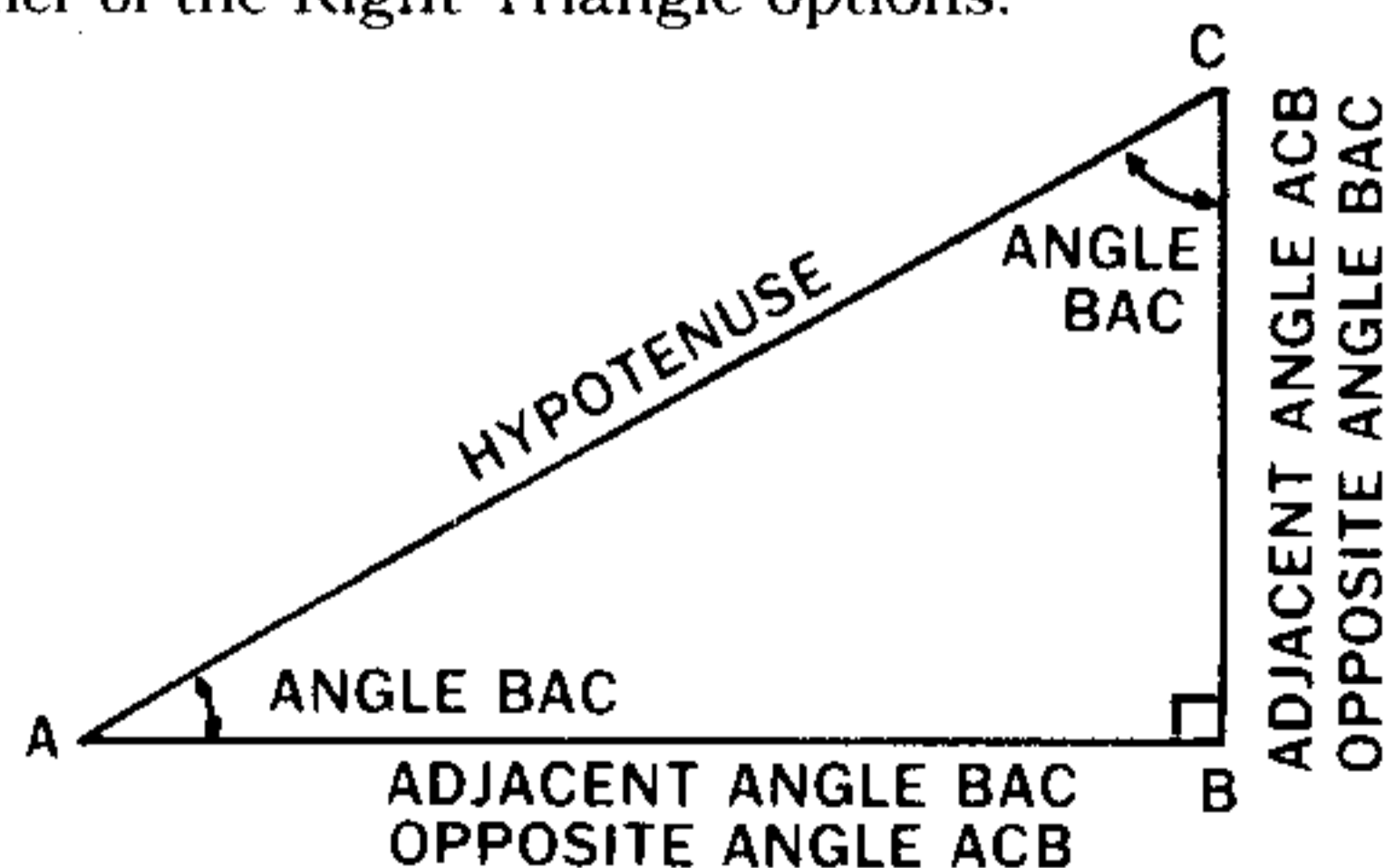


Figure 1

The Sine (SIN) of an angle can be defined as the ratio between the side opposite an angle and the hypotenuse of the right triangle. (The hypotenuse is the angle opposite the right angle—line segment AC in Figure 1). For example, the Sine of the angle defined by points BAC

is the length of line segment BC divided by the length of line segment AC.

Likewise, the Cosine (COS) of an angle is the relationship between the side adjacent to the angle and the hypotenuse. The Cosine of angle BAC is AB divided by AC. Finally, the Tangent (TAN) of an angle is the opposite side over its adjacent side. BC divided by AB is the Tangent of angle BAC. Here is a complete list of these relationships for the triangle in Figure 1:

SIN of angle BAC = BC/AC	SIN of angle ACB = AB/AC
COS of angle BAC = AB/AC	COS of angle ACB = BC/AC
TAN of angle BAC = BC/AB	TAN of angle ACB = AB/BC

Whether you choose to Determine Sides or Determine Angles, the program randomly selects one of the two non-right angles, and two of the sides. It then randomly selects appropriate values for the two "known" parts, and prompts the user for the unknown. For example: to determine a side, AC, you may be given another side, BC, and angle BAC. A typical formula for solving this problem would be:

$$AC = (BC/\text{SIN}(\text{angle BAC}))$$

If BC = 17, and angle BAC = 5 degrees, the proper expression would be:

$$AC = (17/\text{SIN}(5)) \text{ or } AC = 195.05$$

Enter Answer As Numbers Or Expressions

All options give you chances to enter the value that you think is the answer (rounded to two decimal places), or an expression which would result in the correct value. For example, if the answer is 20, you could enter 20, 10*2, or $\text{SQR}(400)$.

The point here is not to test your arithmetic, but to exercise your ability to logically think through a problem. Once you have arrived at a logical expression, you may even use a hand-held calculator to determine a value—but you can also use the computer as a calculator

by entering the expression instead of a final answer. At that time, the computer will follow your expression, arrive at a figure, and check it against the correct value.

The algorithm used by the program to evaluate your input is a modified version of the one employed in *It Figures!*, which appeared in *HCM* Vol. 5, No. 2. To fit this format, you must enter each expression using the following guides: Your expression can include any numeric value within the range of your machine's BASIC, including decimal numbers—but you cannot use scientific-notation format (e.g., 10000 is OK, but 10 E3 will provoke a **SYNTAX ERROR** message). You can include any of five different operators: +, -, *, /, or ^ (| | on the Commodore 64). You may also use parentheses. The expression you enter can include several functions:

- (1) The three trig functions: **SIN**, **COS**, and **TAN**;
- (2) The three corresponding inverse functions: **ASN** (Arcsine), **ACS** (Arcosine), and **ATN** (Arctangent); or
- (3) The **SQR** (square root) function.

Each of these functions will operate on the value immediately following the parenthesis. Attempts to type-in any other letters to an expression, or to use a value that is illegal in a function (such as trying to get the square root of a negative number), will result in an error message.

One major difference between the expressions you enter in this program, and those of a similar BASIC language expression is that there is no "precedence of operators" as there is in BASIC—the value is determined in a left-to-right fashion. The program lets you use parentheses, however, so you can force the precedence of operators. That is, if you want to add 6 plus 3 and multiply the sum by 4, any of these would work:

$$(6 + 3) * 4, \text{ or } 4 * (6 + 3), \text{ or } 6 + 3 * 4$$

In a BASIC program, only the first two would give the same answer that *Trig-Trix* would give. The third would result in an answer of 72 if entered in a BASIC program, instead of 36, which would result from our program.

Other Options

If you enter the correct answer to a problem, the computer will display the final numeric answer. If you are unable to give the correct answer in three tries, the computer will then display the correct answer. You will then be given these choices:

1. DO A PROBLEM OF THIS TYPE
2. ENTER VALUES
3. EXIT

If you select 1, you will be given another problem like the one you just finished. For example, if you just completed a problem determining angles, you would be given another determining angles. It may, however, be a different angle, and the sides you are given as "knowns" may be different, thus forcing you to employ a different function. In any case, the values will be a different set of random choices.

If you choose 2, Enter Values, then you will be presented with a problem identical to the one you just did, only now you can ask the computer to figure it out for you. By entering several different values in a given problem and noting the answers, you can gain insight into how the various functions operate. After each of these "Enter Value" problems, you will be returned to the same menu to either do another problem of the same

type, take another opportunity to Enter Values on this problem, or Exit. This menu is always presented after you have completed a problem on any level.

One more note on entering values: Because each exercise uses a specific figure, there will be a certain range of legal values. Entering an illegal value—say, one that would produce a triangle that couldn't be drawn on paper—will cause illogical results, error messages, or have other unexpected effects on the program. Part of the exercise entails figuring out what the legal range should be in advance of actually entering a value.

Higher Levels—The Two Laws

After you have honed your skills using the lowest level, you can work on two other important laws in trigonometry: the Law of Sines and the Law of Cosines. These two laws greatly increase the power of trigonometry to overcome the problems of physical measurement—whether on land, at sea, in the air, or

in outer space. See the sidebar "Trig-Trix in the Real World" for some ideas on how such problems can yield to a trigonometric solution.

2) LAW OF SINES

The Law of Sines works for any triangle, not just right triangles. Stated simply, the Law of Sines

decrees that the Sine of an angle in a triangle is to its opposite side, as the Sine of any other angle is to its opposite side. This allows for a much more indirect method of finding unknown values. For example, in Figure 2 the following relationship holds:

$$\frac{\text{SIN angle } ABC}{AC} = \frac{\text{SIN angle } BAC}{BC} = \frac{\text{SIN angle } ACB}{AB}$$

If angle $ABC = 60$, and sides $AC = 10$ and $BC = 5$, then it is a simple matter of using the following equation to determine angle BAC .

$$\begin{aligned} BAC &= \text{ASN}(5 * \text{SIN}(60)/10) \\ BAC &= 25.66 \text{ degrees} \end{aligned}$$

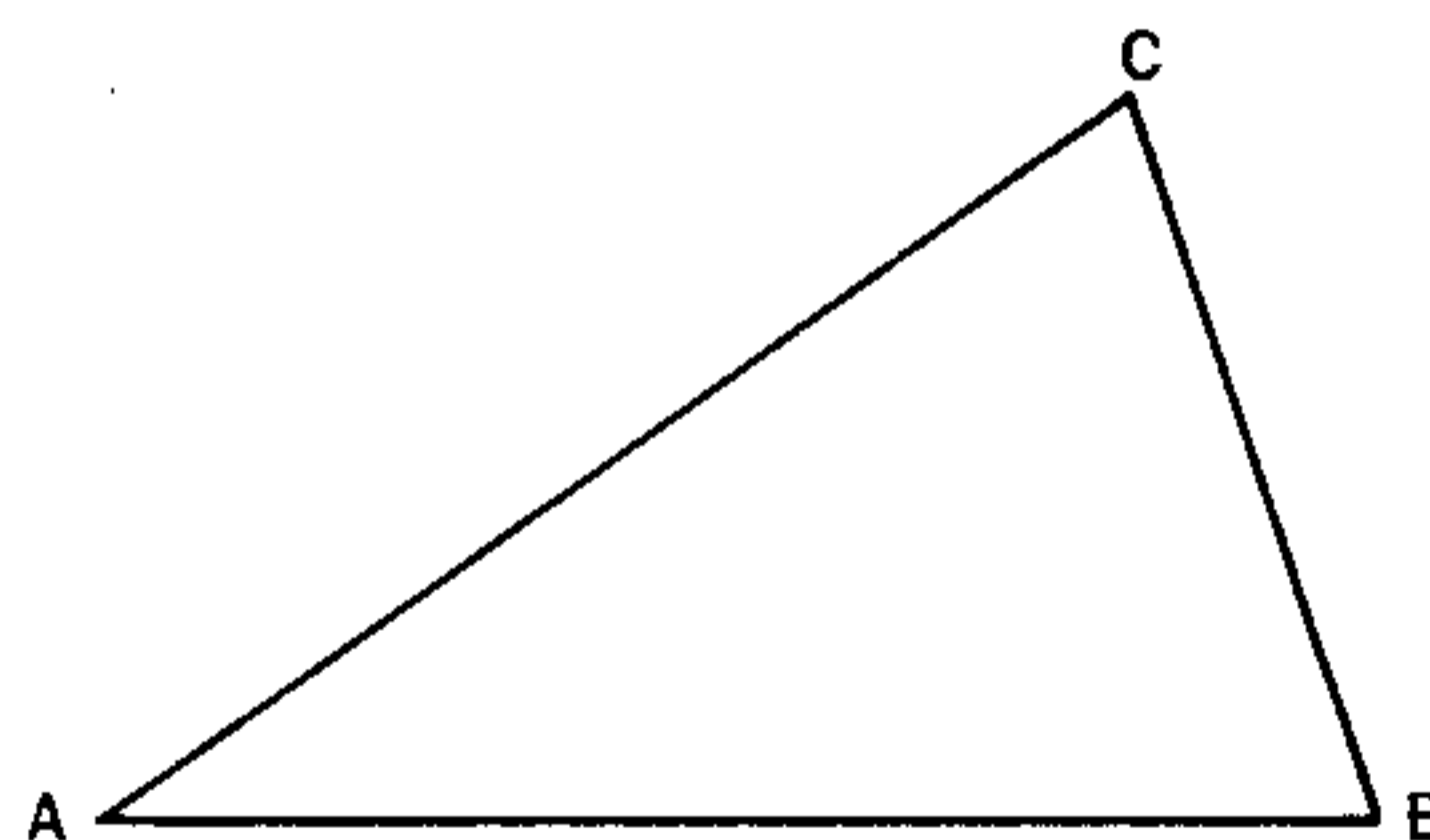


Figure 2

When you select either the Law of Sines or Law of Cosines options, you are presented with this menu:

1. DRILL
2. CHALLENGE
3. RETURN TO MAIN MENU

If you select 1, you will be presented with a problem similar to the one shown above, and will be given three chances to solve it, just as in the earlier option. You will also be asked whether you wish to continue with another problem, or Enter Values when the problem is solved.

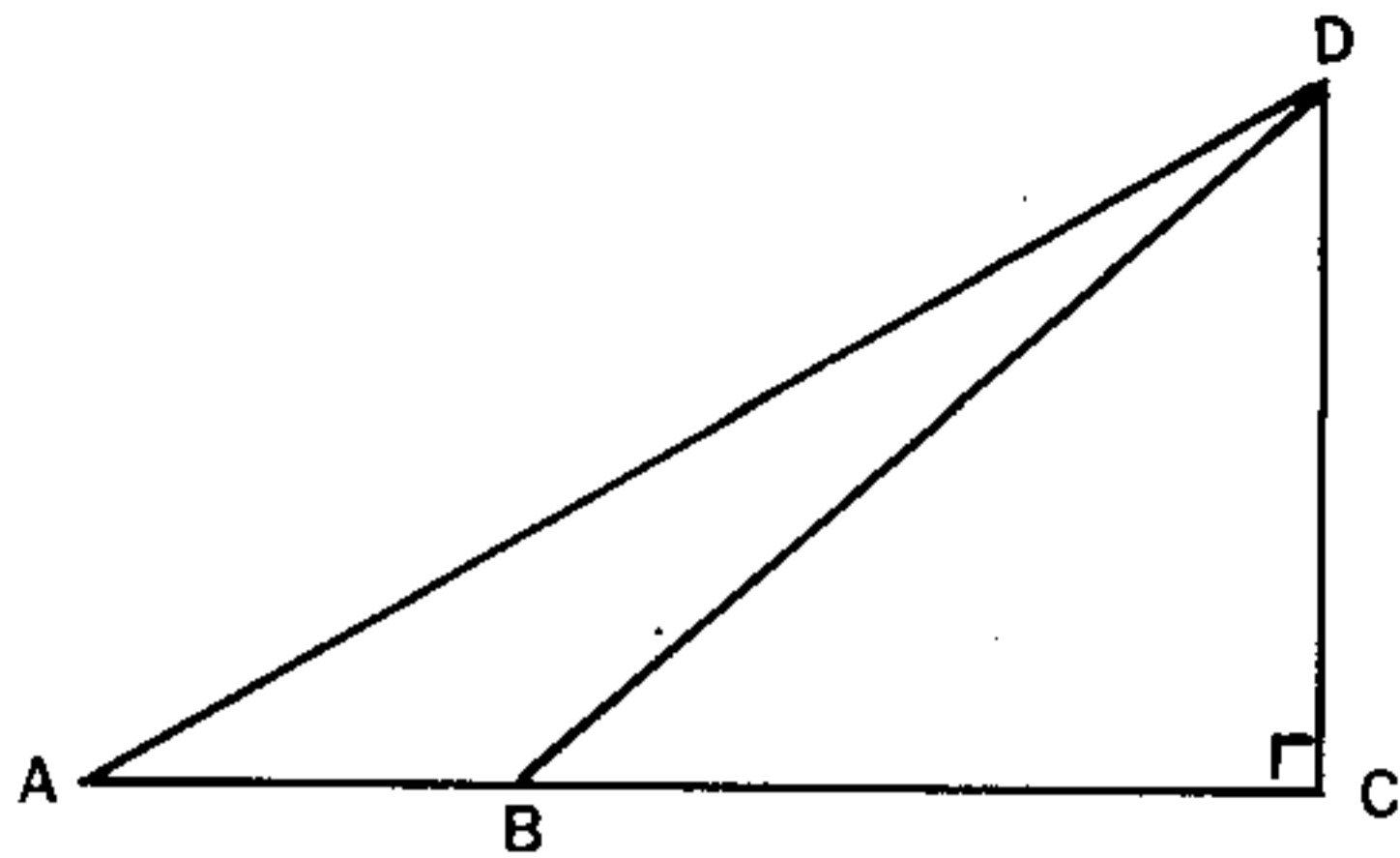


Figure 3

When you select 2, Challenge, you will be given a problem that will tax your ingenuity in using the Law of Sines. This problem centers on Figure 3, which appears as a double right-triangle, one inside the other. Your challenge is to find the common height (CD) of both triangles, given AB, angle BAD, and angle CBD. To do this, you must put together what you've learned from the lower-level problems and enter the correct expression or final answer.

3) LAW OF COSINES

The Law of Cosines option works very similarly to the Law of Sines option. You will once again be asked whether you wish to Drill or do the Challenge. (Drill uses a diagram like Figure 2.) The major difference between the two laws is that the Law of Cosines allows you to determine a side if you know the other two sides and their included angle. For example, if you know AB, AC, and angle BAC, you can find BC. Here's the Law of Cosines formula as applied to this problem:

$$BC = \text{SQR}((AB^2) + (AC^2) - (2 * AB * AC * \text{COS}(\text{angle BAC})))$$

For example, if you are presented with: AB = 10, AC = 5, and angle BAC = 30 degrees, then you can get the correct answer by entering:

$$\text{SQR}((10^2) + (5^2) - (2 * 10 * 5 * \text{COS}(30)))$$

which equals 6.20 when rounded to two decimal places. You may also Enter Values to quiz the computer on any problem you wish.

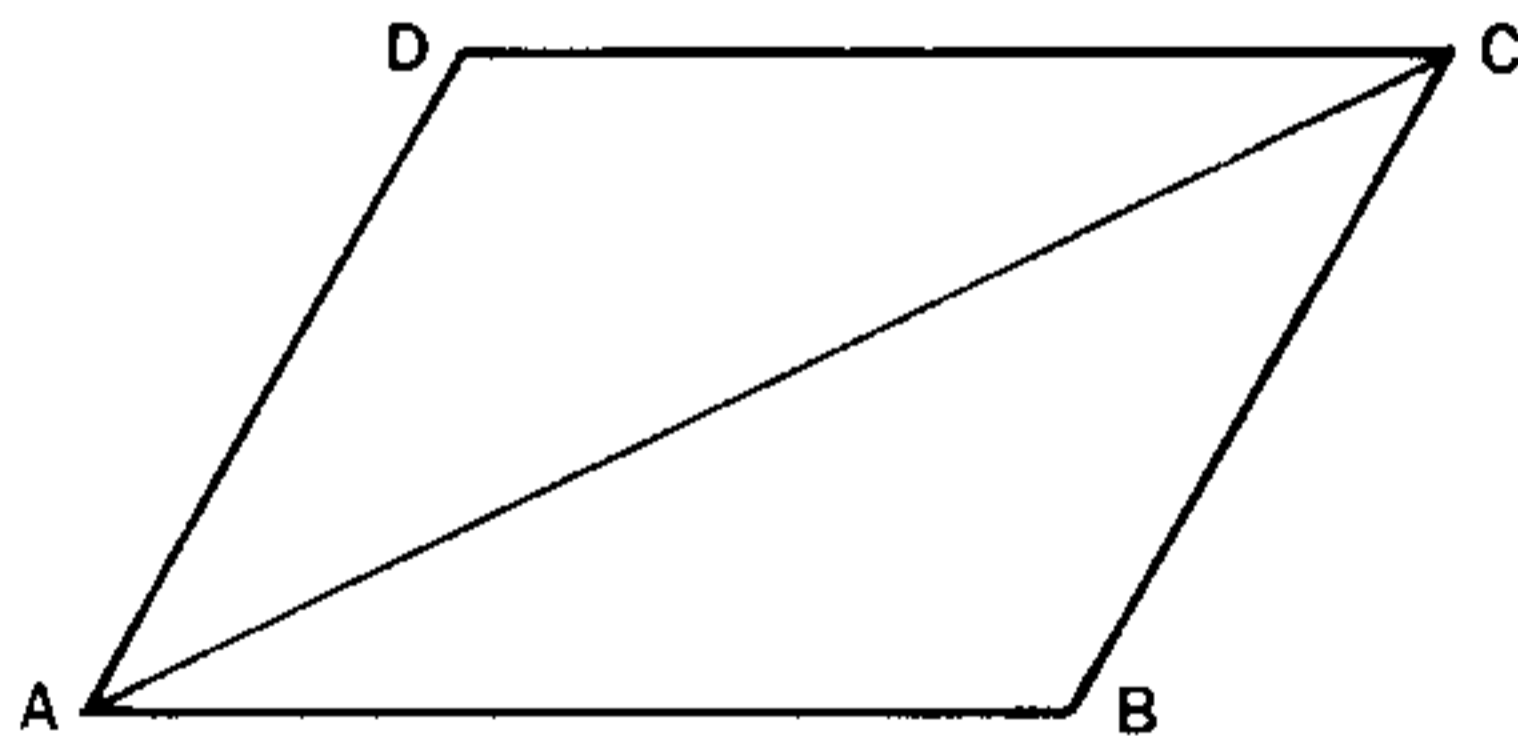


Figure 4

In addition, the Challenge option is available if you wish to try a more difficult problem. In this option, the problem presented centers on Figure 4, a parallelogram bisected by a diagonal line. You must find the length of this diagonal (AC), given AD, AB, and angle ABC. Remember that, in a parallelogram, opposite sides are equal in length.

HCM

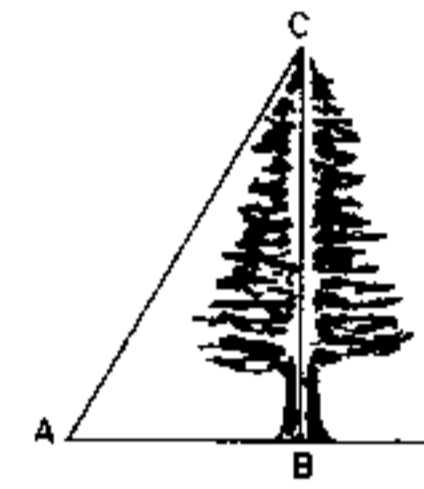
HCM Glossary terms: expression (mathematical), vector (physics), hypotenuse, algorithm.

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

TRIG-TRIX IN THE REAL WORLD

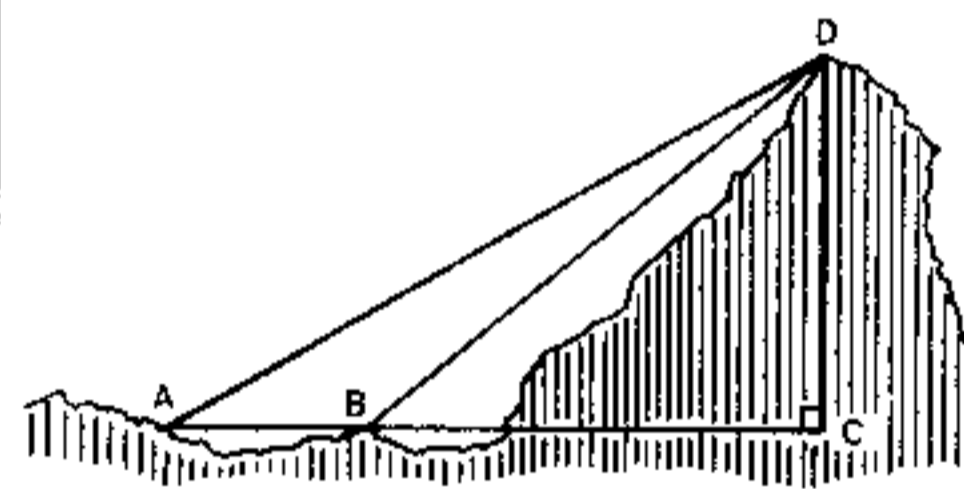
Trigonometry has a very practical purpose in the real world. Abstract calculations based on the triangle can help us measure many things that are difficult or impossible to gauge directly. Here we show you just a few examples of everyday trig tricks:

1. How high is that tree?



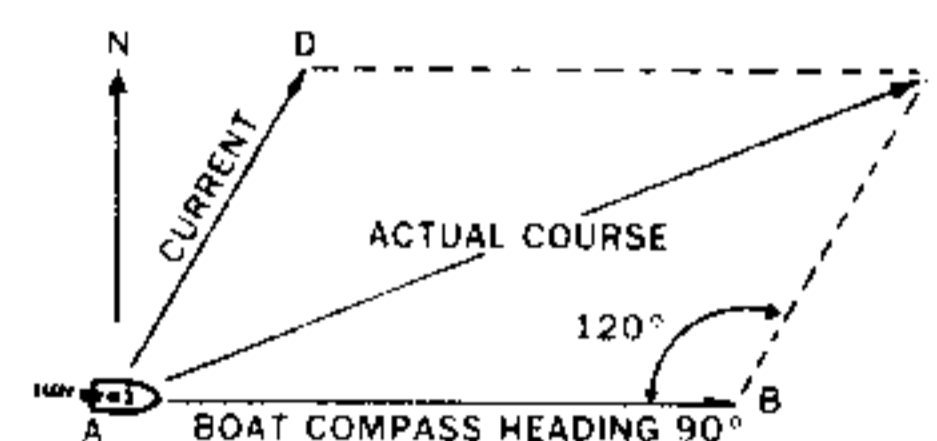
To find the height of any tree, simply regard the tree as the vertical line of a right triangle—line BC in this drawing. Now pick a spot well out from the tree base and measure that distance (try to make it in a whole number of feet). Take a simple protractor, hold it on a level plane on the spot you've picked (point A) and use a straight-edge to sight a line from the center of the protractor to the top of the tree. Measure the angle along the straight edge with the protractor. You now have your two givens, line AB and angle BAC. To find BC, use a formula based on the right triangle problems in the Trig-Trix program, such as: $AB = BC / \text{SIN}(\text{angle BAC})$

2. How high is that mountain?



If you worked through the Challenge option in the Law of Sines portion of Trig-Trix, you will probably recognize the drawing shown here. Finding the height of a mountain peak is an excellent example of an abstract formulation leading to a practical solution. In this scenario, we need only know two angles, BAD and CBD, and the distance AB. We won't give you a formula in this case, because it would spoil all the fun of the Challenge. However, once you master this program, you will uncover the mystery of how a surveyor measures the mountain without even climbing it. You could even do it yourself!

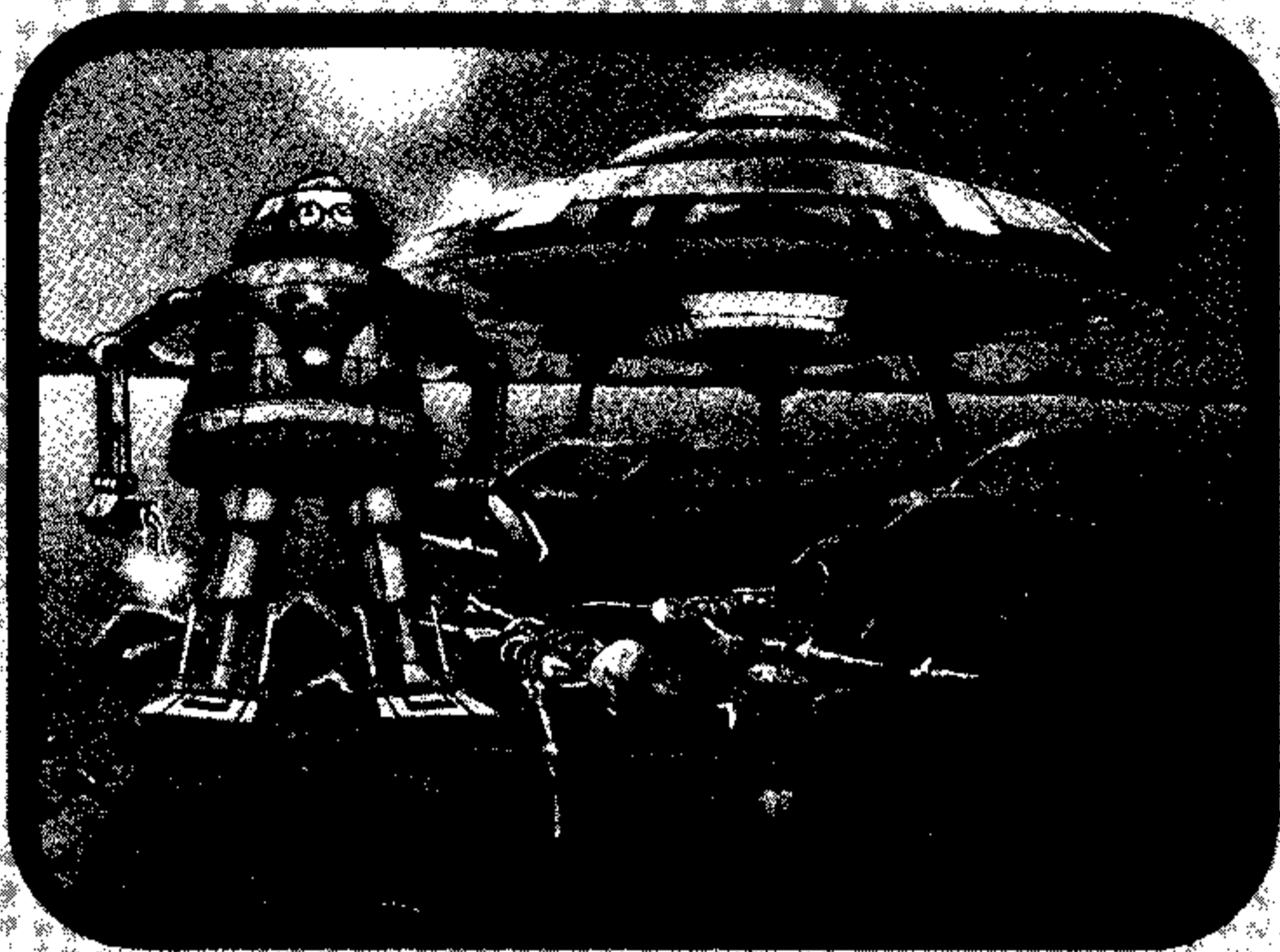
3. With my ship pointed one direction at a certain speed, and a current dragging it off its heading, what's my actual speed and course direction?



This is a common problem on the water. If you know the speed and direction of the current, as well as the heading and speed, you can calculate the actual speed and course using the Law of Cosines. The solution to this problem is an application of what is known in physics as vectors. The current's direction (angle NAD) and speed (AD in miles per hour) form one vector component, and the ship's heading (angle NAB) and speed (AB in miles per hour) form the other. The actual speed is found by determining the length of the diagonal of the parallelogram (AC) formed by these two components. The actual direction of travel is determined by the angle NAC.

This problem is very similar to the Challenge for the Law of Cosines in Trig-Trix; by stretching the logic of that exercise a little further, you should be able to navigate this problem as well.

HCM



This game is based on an old favorite—*Lost Ruins*—originally published in HCM's forerunner, *99'er Magazine*. Enhanced by added sound and colorful graphics, even our long-time fans will greatly enjoy this much-improved version.

What is this planet, Earth? To this lonely blue pearl we now return as strangers. We have literally searched the heavens for a world only our distant ancestors have seen. And now this same Earth hides the very key to unlocking our past: *garbage!*

Looking Back

Despite fantastic technological achievements, the human race has lost track of its origins. Even the location of the home planet, referred to in ancient space legends as "Earth," has been lost to antiquity.

Archeological expeditions are currently combing the heavens for the lost planet. Fame and fortune await the lucky explorer who brings back convincing evidence that the location of mankind's birthplace has been found.

You might be that lucky explorer—as commander of a computer-guided spaceship sent to explore a distant part of the galaxy. After a long, uneventful search, you have finally landed on a planet that fits the description of the ancient legends and songs. Could this be the planet of your ancestors? The answer lies beneath the surface.

With you are three huge archeological-exploration androids, known as Archeodroids, who do the dangerous and difficult excavation work; but you must direct their search. Your robots have been programmed to gather up the twisted remains of Chevies, junk piles, and fossilized skeletal remains, but they must return them to the ship, or all of the work will be in vain.

The lure of unearthing just a few more treasures keeps urging you onward. Suddenly, one of your three robots becomes trapped in a cave-in as your lucky streak abruptly ends. You immediately send down another of your precious Archeodroids to salvage what it can—only this time you make a solemn space-vow to be more careful with your two remaining links to fame and fortune.

At The Site

The ruins that your robots will be rummaging through are a tangled mess of debris bordered by a hard-rock containment wall, which was built around the site by

Archeodroid

by **B. J. Bruns**
and the HCM Staff

The year is 9999. Interstellar travel is now commonplace. Civilizations have risen and fallen through the millenia as human beings have ventured into the distant galaxies. But what of mankind's past?

fanatical natives who feared technology. You have a straight-on, cut-away view of the site that allows you to see where the artifacts are positioned. You must maneuver your Archeodroids toward deposits of artifacts by blasting tunnels through the ruins. The deeper you excavate, the more difficult it is to climb back out, due to the constant cave-ins brought on by your blasting. Thus, you must make your robots position their blast charges very carefully, or the artifacts that you seek will be damaged during the digging.

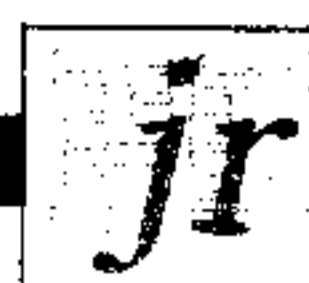
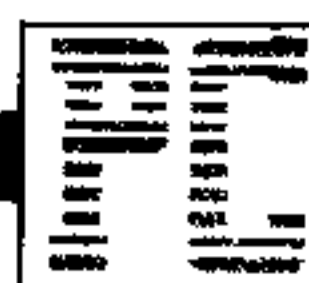
Starting To Dig

As the game begins, you have just touched down on the planet and dispatched your three Archeodroids to the surface. You may use either the keyboard or the joystick to guide one robot at a time. Check your system's Control Capsule for the keys that fire the excavating blaster and move the robots up, down, left, and right.

Each robot can carry up to 10 charges in the blaster at a time. After all 10 charges have been used, they can be replaced by returning the robot to the mother ship. The number of charges remaining at any point in time is displayed in the lower-right corner of the screen.

The blaster is your only tool for digging new tunnels. Each blaster charge clears five squares of earth in the direction that the robot was moving when you gave the order to set off a charge. As your Archeodroid digs deeper and deeper into the planet's surface, the danger from cave-ins becomes more serious. Each charge you detonate causes the layers of rock and garbage above you to shift. It's easy to become trapped, so watch your escape route as you tunnel.

The blaster will not detonate if the charge would destroy an edge-piece of the excavation area. You must move out of range of the wall. Edge-pieces correspond to the hard-rock containment wall that was built around the site in ancient times. The only exceptions to this rule are the five edge-squares in the top-center of the screen; these are your only entry and exit points from the tunnels you create.



Charging Up

The charges are not only used for blasting tunnels—they also provide the robots with power for movement and the means for gathering artifacts. When a robot runs out of charges, a small amount of residual energy enables it to return to the ship. If, however, it does not return fast enough, the robot's internal circuitry decays, and it ceases to function. Also, the more blasting the robots do, the greater their danger of being buried by a cave-in. On the loss of an Archeodroid, its last known position is marked with a cross, and any artifacts it has collected remain below. They can only be retrieved by another robot that reaches the location of the cross and brings the artifacts to the mother ship.

The Archeodroids can move freely through any tunnels already excavated, or through areas where artifacts are buried. Artifacts may be picked up from the ground or from inoperative robots by moving an active robot into the squares containing the items.

When an Archeodroid returns to the ship, you will receive points for what it has collected. If part of an object is destroyed by an explosion, you will still get partial credit for successfully retrieving what is left of it.

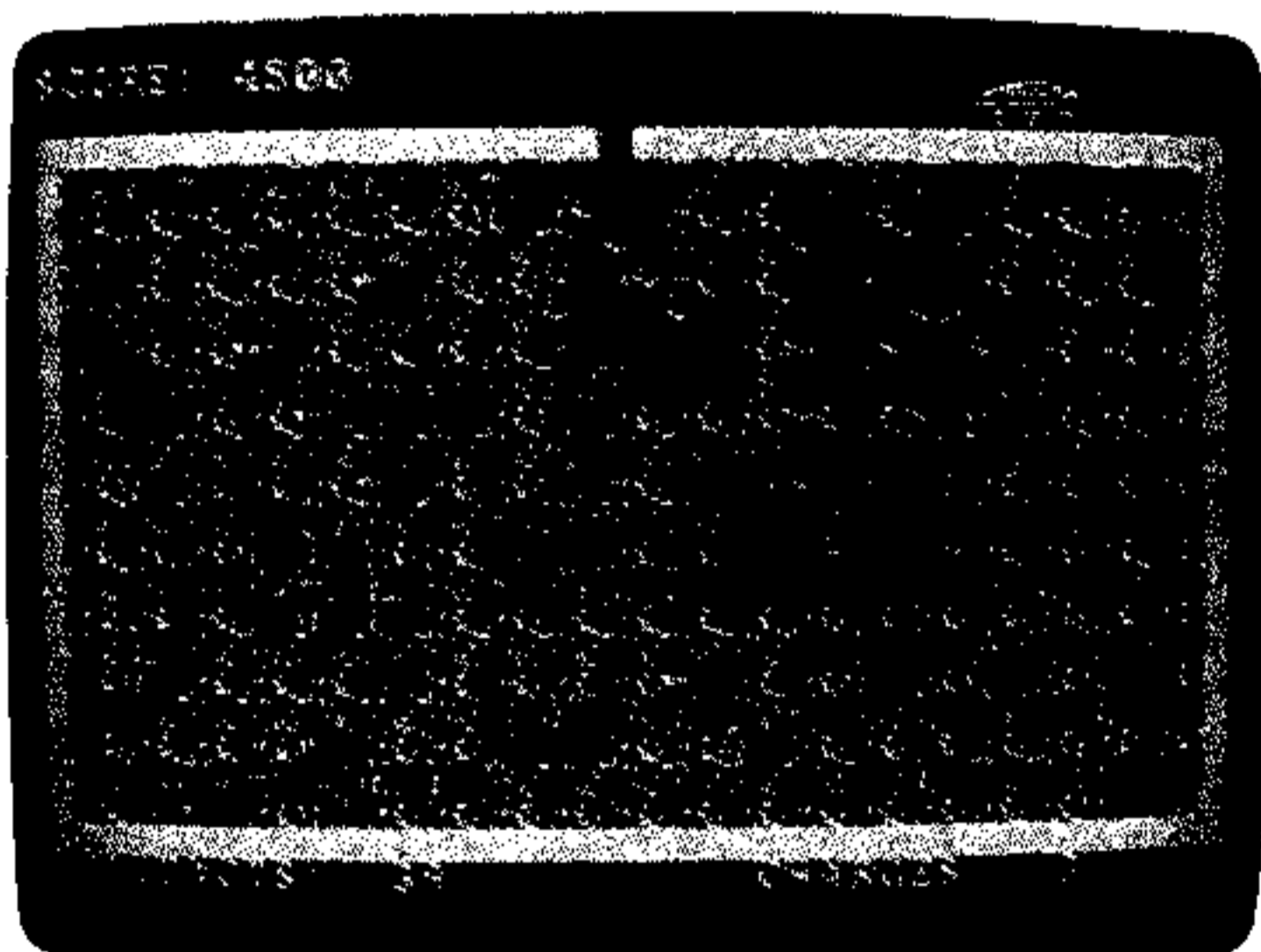
The values of the three types of artifacts depend on their archeological significance:

TYPE	VALUE
Skeleton	10
Car	6
Junk Pile	2

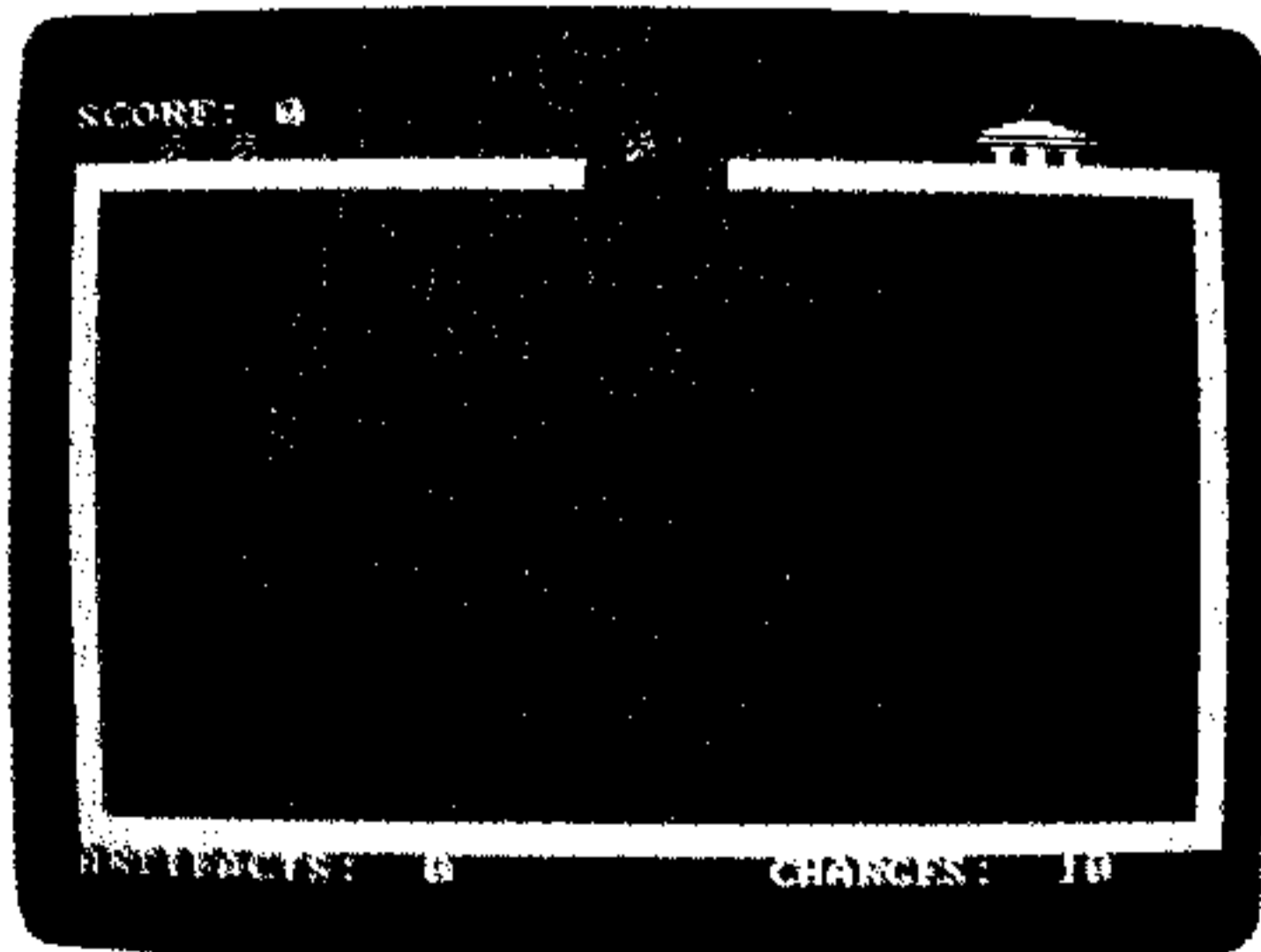
A running total of these values is displayed in the lower-left corner of the screen.

The more charges remaining in the robot, the more points you receive for its artifacts. You can return an Archeodroid to the mother ship at any time and deposit artifacts—but you can only get a new set of charges when your Archeodroid has used all of its previous charges. So, as you run low on charges, be sure to plan an escape route to prevent a cave-in from trapping your robot below ground.

When you've made a clean sweep of one area (one screen), you are transported to another unexplored region and challenged to unearth more evidence that you have found mankind's ancient birthplace.




This photo from the IBM version shows an Archeodroid in the center of the site, and gives you an indication of how much excavation is necessary to retrieve the artifacts.



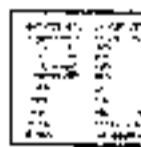
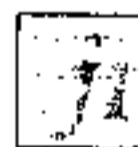
This photo shows the site after all of the debris and artifacts have been removed. At the top of the screen you can see the 5 squares that are your only entry and exit points. Around the perimeter are the indestructible edge-pieces that form the site's containment wall.

“With you are three huge archeological-exploration androids, known as Archeodroids, who do the dangerous and difficult excavation work; but you must direct their search.”




**CONTROL CAPSULE
ARCHEODROID**

KEY	FUNCTION
I	up
J	left
K	right
M	down
space bar	blaster


**CONTROL CAPSULE
ARCHEODROID**

KEY	FUNCTION
↑	up
←	left
→	right
↓	down
space bar	blaster



**CONTROL CAPSULE
ARCHEODROID**

KEY	FUNCTION
V	up
G	left
H	right
B	down
K	blaster



**CONTROL CAPSULE
ARCHEODROID**

KEY	FUNCTION
E	up
S	left
D	right
X	down
Y	blaster



By William K. Balkering
Author of *MINE OVER MATTER*

Modern mining has left behind the sieves and picks that were the trade of 19th-century gold miners. Today, good business skills, timely reclamation, and megabucks are the tools for success.

Most folks would call the area desolate, barren—a few dry shrubs here, a jackrabbit there, some foothills in the distance. But you thought the area was perfect, and after doing some survey work, found that you were right. Now your new mill is constantly chug-chugging away—the only sound to be heard for miles except for those coming from the adjoining deep pit being mined of its modern-day treasure: uranium. You knew when you started that you couldn't lose—the ore was high quality and close to the surface, and the environmental impact of mining the area was so little that the overall cost was too low not to invest. So you did.

Mine Over Matter simulates uranium mining operations for up to 4 people. Each player can have up to 5 uranium mines at one time in the survey, construction, and production phases. If you close one or more of the five, you may then open others. The object of the game is to make money from your mines, beat your opponents, and keep from contaminating the land.

This program's playing time can range from 20 years (a turn represents 1 year) to 140 years. As in real life, your mine will have a life cycle of 4 phases: (1) a survey of the land, (2) construction of the mill to process the ore, (3) ore production (the longest phase of a mine's life), and (4) closing the mine and reclaiming the land. No further mining operation may ever take place on a site after this last phase is complete. Each phase takes a minimum of 1 year.

Surveying Phase

You start off with a cash reserve of \$2,500,000. A survey's cost depends on how deep the drill sample has to go. The maximum depth for any mine is 299 feet, and it will cost \$35,385—the minimum survey cost is \$1000, even if the uranium is at the surface. You will not know the depth until the survey has been taken. In addition to the depth of the uranium, a survey will tell you the purity of the ore, and the environmental impact of mining at the selected location.

The ore purity ranges from 0 percent (no ore found) to 99 percent. The purer the ore, the easier (cheaper) it will be to extract the uranium.

The environmental impact of setting up a mining operation is crucial to your mine's success. The environmental factors also range from 0 to 99—the higher the factor, the worse a mine would affect the environmental situation. Due to mining and environmental laws, higher factors mean higher reclamation costs.

The Main Menu:

1. SURVEY
2. PRODUCTION
3. REPORT
4. NEXT TURN

To do surveys of the area on the screen, select option 1 from the main menu. Your current CASH balance, the survey COST, ore QUALITY and DEPTH, and the ENVIRONMENTAL impact factor will be displayed in addition to brief instructions on how to use this section. Move a cursor around the screen to select a location for your survey. Once in position, press the spacebar to do a survey. If you do not wish to set up a mining operation on this site, then simply move the cursor off the location. A flag will be left behind indicating that a survey has been taken there. For a \$1000 fee, you may resurvey an area that has already been surveyed.

If you would like to stake a claim after surveying, press [ENTER] or [RETURN]. The program will then return to the main menu, and a marker identifying the mine as yours will be placed on the screen.

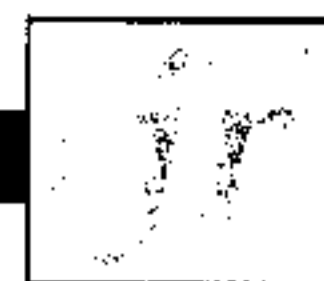
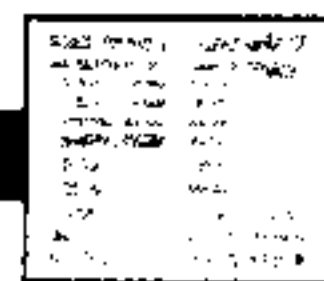
Mill Construction

Before you can produce ore, you must construct a refining mill to convert the raw ore from the mine into "Yellow Cake." You may only select a mine for construction if the mine either has a *completed* survey, is in the middle of or has just completed construction, or is in production. You may not start construction on a mine which either has a survey in progress, is in the middle of its reclamation phase, is out of ore, is already closed, or is closed due to contamination. Therefore, you may only start construction at least one year after the survey.

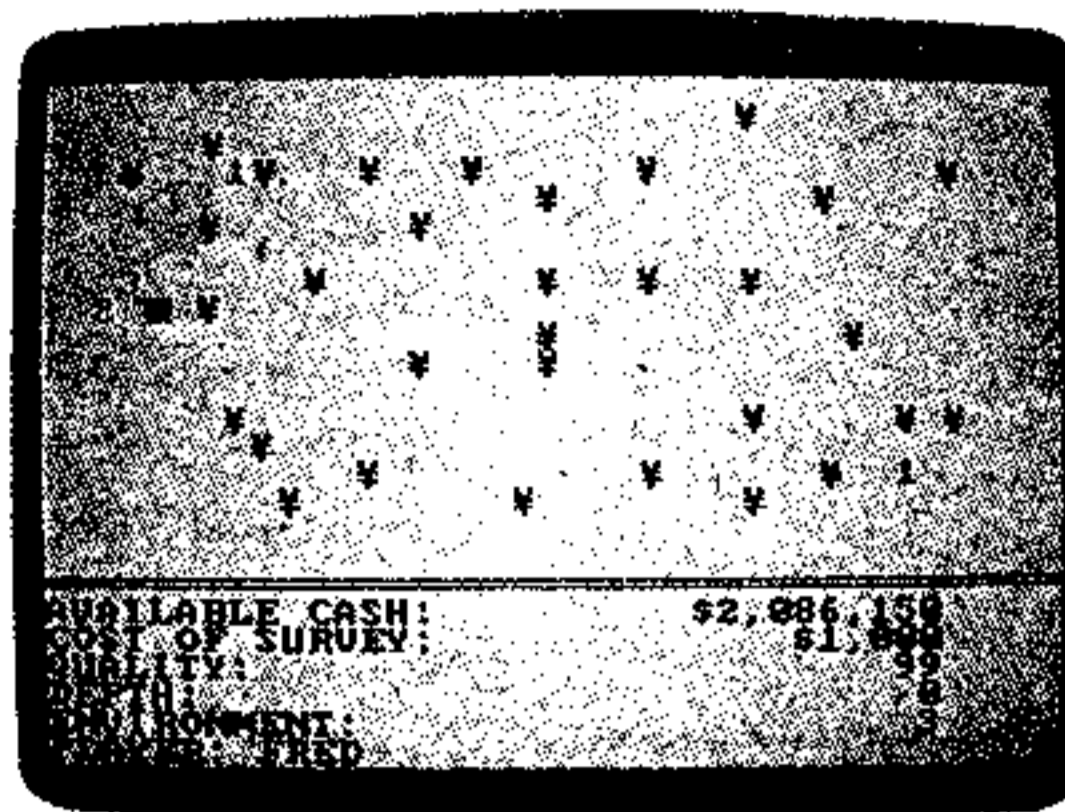
To select this option, first choose PRODUCTION from the main menu. The Production menu asks you to select one of the following:

1. SET PRODUCTION RATE
2. START RECLAMATION
3. EXPAND MILL
4. EXIT

Special thanks for technical advice goes to E. Frank Schnitzer, environmental specialist for the Oregon Department of Geology and Mineral Industries Mine Reclamation Program.



The survey screen from the IBM PCjr version of *Mine Over Matter*. The flags mark spots where previous surveys have been taken, and the numbered boxes represent mining sites, which are color-coded by player. The statistics for a survey's site are listed below the map when one is chosen.



Select option 3, **EXPAND MILL**. You will be asked to choose the mine where you would like to construct the mill. After indicating your choice, you will be shown some of the vital statistics on the mine:

CASH:
MILL SIZE:
MAX. PROD.:
QUALITY:
DEPTH:
ENVIRONMENT:
INCREASE CONSTRUCTION:

These figures will help you in determining how much money to spend on construction. The size of your mill (shown in dollar values) will determine how much ore can be processed. If your mine creates more ore than the mill can safely handle, you may end up with a contamination problem—resulting in the shutdown of your mine and the loss of your reclamation bond.

You can come back to this section at any time to increase the size of your mill, even after the mill is in production. However, *every time you do construction on a mine, you will not be able to produce any ore there for the rest of the year* (until your next turn).

You can find out the status of any of your mines by choosing the **REPORT** option from the main menu. It will list the numbers of your mines and their operating status: **NO MORE PRESENT**, **SURVEY IN PROGRESS**, **SURVEY COMPLETE**, **UNDER CONSTRUCTION**, **CONSTRUCTION COMPLETE**, **IN PRODUCTION**, **OUT OF ORE**, **RECLAMATION STARTED**, **RECLAMATION DONE**, **MINE CLOSED** or **CLOSED FOR CONTAMINATION**. Choosing one of your active mines will take you to this checklist:

MILL:
BOND:
BARRELS PRODUCED:
GROSS:
NET:
QUALITY:
DEPTH:
ENVIRONMENT:

When you start construction, the state government will assess the estimated cost of reclaiming the land (the cost of returning the area to its original condition). The mining company (the player) will have to put up a bond for this value. If the mining company should fail to reclaim the land, then the state will use the money from the bond to do so. If the mining company does reclaim the land, then the company (player) will get its bond money back as soon as the reclamation is complete (on the next turn for the purpose of the game.) However, in reality (depending on the state) the mining company probably would not get its bond back until vegetation returned to the area.

Production Phase

On the turn after you've constructed or expanded a mine, you should set the mine's production rate. To get a mine into production, or to change the mine's current production, select the **PRODUCTION** option from the main menu; and then **SET PRODUCTION RATE**, option 1, from the production menu.

You will be asked to select a mine. It must be in production already, or have completed construction of the mill. A mine cannot produce while it's being reclaimed or closed, or after it has been closed for contamination.

After selecting a mine for production, a list of the mine's vital statistics will be displayed:

PRODUCTION FOR:
CURRENT PRODUCTION:
BARRELS/YEAR:
VALUE/BARREL:
GROSS:
NET:
MAXIMUM PRODUCTION:
NEW PRODUCTION:

You will be asked to indicate how much money you want to spend (your operating overhead) on production. The more you spend on production, the more ore you will take from the ground, up to the limit established by the size of your mill. It takes a lot of trial-and-error to determine the best production rate. You should pay close attention to the *maximum production* rate, for if you *match or exceed* this value with the amount of ore you are extracting, you could easily end up with a contamination problem. (In addition, the program may generate a contamination problem at any mine at random, just to keep the game from becoming too controlled and/or predictable.)

The ratio of dollars to barrels of "Yellow Cake" per year is based on the depth of the mine, the environmental impact on the area, the ore quality, and the quantity of ore remaining in the ground. The quantity of ore left in the mine will offset production because as the quantity gets lower, it will cost you more money to get it out of the ground (the mine may be deeper, or the ore may be more widely dispersed).

Reclamation And Closed Phase

If a mine has run out of ore, it will automatically shut down. The mine's owner has 3 years (3 turns) in which to return the mined land back to its original state. Heavy metals and the radioactive sludge pond from the mill will be buried, and grass and trees will be planted. This phase takes one year (one player turn) to complete. Once this phase is complete, the mill will be closed forever, and the player will get back his or her reclamation bond from the state.

Place a mine into the reclamation phase by first selecting the **PRODUCTION** option from the main menu. Then select **START RECLAMATION** from the production menu. You will be asked to select a mine. After choosing a mine, you will be notified of its reclamation cost based on the environmental impact factor. If you do not have enough money for the reclamation, the mine will not start this phase.

MINE OVER MATTER SCORECARD

Player:	Starting Cash:
Year:	Ending Cash:
	Total Profit (Loss):
	Mine #
Mine Cost: \$	Quality:
Bond: \$	Depth:
Bar. Prod.:	Environment:
Gross: \$	Bar/Year:
Net: \$	Value/Bar.: \$
Max. Prod.:	Curr. Prod.:

CONTROL CAPSULE
Mine Over Matter

KEY	FUNCTION
I or up	Move survey cursor up.
J or left	Move survey cursor left.
K or right	Move survey cursor right.
M or down	Move survey cursor down.
SPACEBAR	Select location for a survey.
RETURN	Lay a claim on the location.
ESC	Exit from current operation.

CONTROL CAPSULE
Mine Over Matter

KEY	FUNCTION
E	Move survey cursor up.
S	Move survey cursor left.
D	Move survey cursor right.
X	Move survey cursor down.
SPACEBAR	Select location for a survey.
RETURN	Lay a claim on the location.
-	Exit from current operation.

CONTROL CAPSULE
Mine Over Matter

KEY	FUNCTION
UP	Move survey cursor up.
LEFT	Move survey cursor left.
RIGHT	Move survey cursor right.
DOWN	Move survey cursor down.
SPACEBAR	Select a location for a survey.
RETURN	Lay a claim on the location.
ESC	Exit from current operation.

CONTROL CAPSULE
Mine Over Matter

KEY	FUNCTION
E	Move survey cursor up.
S	Move survey cursor left.
D	Move survey cursor right.
X	Move survey cursor down.
SPACEBAR	Select location for a survey.
ENTER	Lay a claim on the location.
FCTN 9	Exit from current operation.

The reclamation cost will be only about 40 percent of the cost you put up for the state reclamation bond. After one turn in reclamation has passed, you will get your bond back—so, there is a great benefit in reclaiming the land. The amount of money you get back from the state on your bond can run anywhere from \$50,000 up to double the amount of money you have invested in your mill (potentially millions).

If you believe a mine is not worth keeping open, even if there is ore remaining, you may reclaim and close the mine at any time using the above procedure.

General Operating Tips

There is one factor involved that the survey does not tell you; how much uranium is really down there. You may locate an ideal mining site, build a mill, and start production to find that you have exhausted all of the ore in the first 2 or 3 years of operation. A typical mine may hold out for 20 to 40 years, depending on how much ore is in the mine, and how fast you take it out.

In determining a location for a mine, you will want to choose an area where you will get the most for the least amount of money. Choosing a location with a high quality of ore and a shallow depth is very critical. Just as important is the environmental impact factor—it could make a major difference in your cash reserves at the beginning of a mine's life, during construction, and near the end during reclamation. It also affects the cost of mining the ore (the production overhead).

To assist you in keeping track of all of the factors involved in your mining business, you may want to write down or photocopy the above scorecard so that you have enough for each player's mines. Use a pencil—you'll need to change your cash and other figures with every turn. You might also consider using a new scorecard for every mine for every turn. Of course, each player will not need to keep the information on the top half of the card on every card.

And if you're really engrossed in a long-playing, competitive game but you've got to leave for awhile, you can stop and save the game and return to exactly the same spot later. (Sorry, the TI-99/4A has too little memory to accommodate this option.) Between player turns, simply press the exit key appropriate for your system. Before the program leaves, it will first ask whether you want to save the game, and then whether you want to exit the program. If you say NO to the latter, it will ask whether you want to continue the current game or start a new one. If you say YES to exiting, the program will stop.

HCM

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

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Here they are . . . the best of the one-line programs that we have received since printing the third "HCM One-Liners" column in *Home Computer Magazine* Vol. 5, No. 3. Although many interesting programs were submitted, we have selected what we felt were the best four (one for each brand of computer covered in our magazine) of those that arrived prior to this issue's press date. 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 \$50 check for sharing their ideas with our readers.

A Colorful Bar Graph

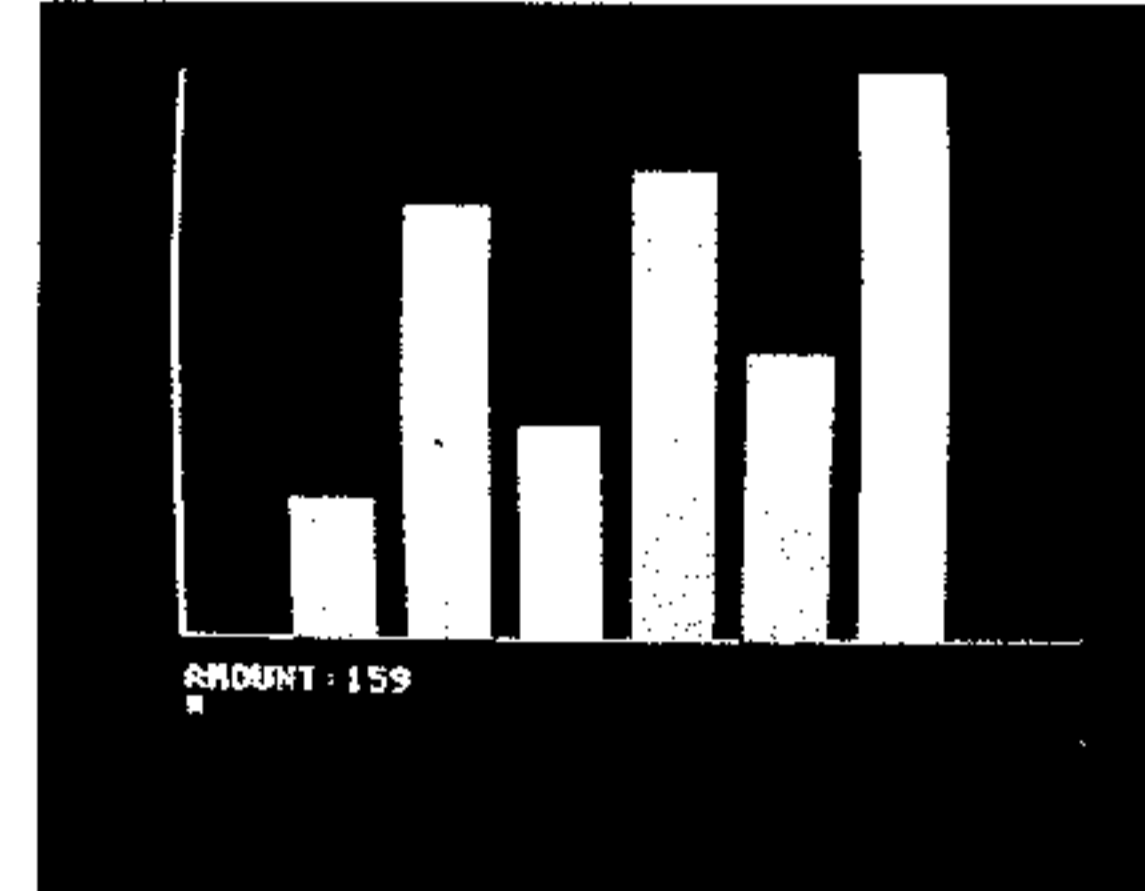
[Applesoft BASIC on the Apple IIe, IIc]
Dear HCM:

This is my HCM One-Liner. It makes multi-colored bar graphs using only one line of code. The maximum number that can be entered is 159. The program displays a prompt to signify that it is finished. An "R" or "r" in response to this prompt will erase the current graph and start another. Any other character entered will end the program. The graph can be BSAVED by entering:

BSAVE [GRAPH.NAME].A8192.E16383.
The program should be entered without spaces.

Donald W. Scott, Jr.
Buffalo, NY 14207

```
1:HOME:HGR:HCOLR=H3:HPL
0:FORI=0:159:TO6:279:
159:FORI=0:159:TO6:279:
UCT:AMOUNT:35:25:HPLOT:
*35:TOI*35+25:HPLOT:
160:-(I)TO:1:2:3:160:6:
I:DATE:1:2:3:160:6:
TORE:GET:Y$:I:FY$:R:
Y$="r"THEN:1
```



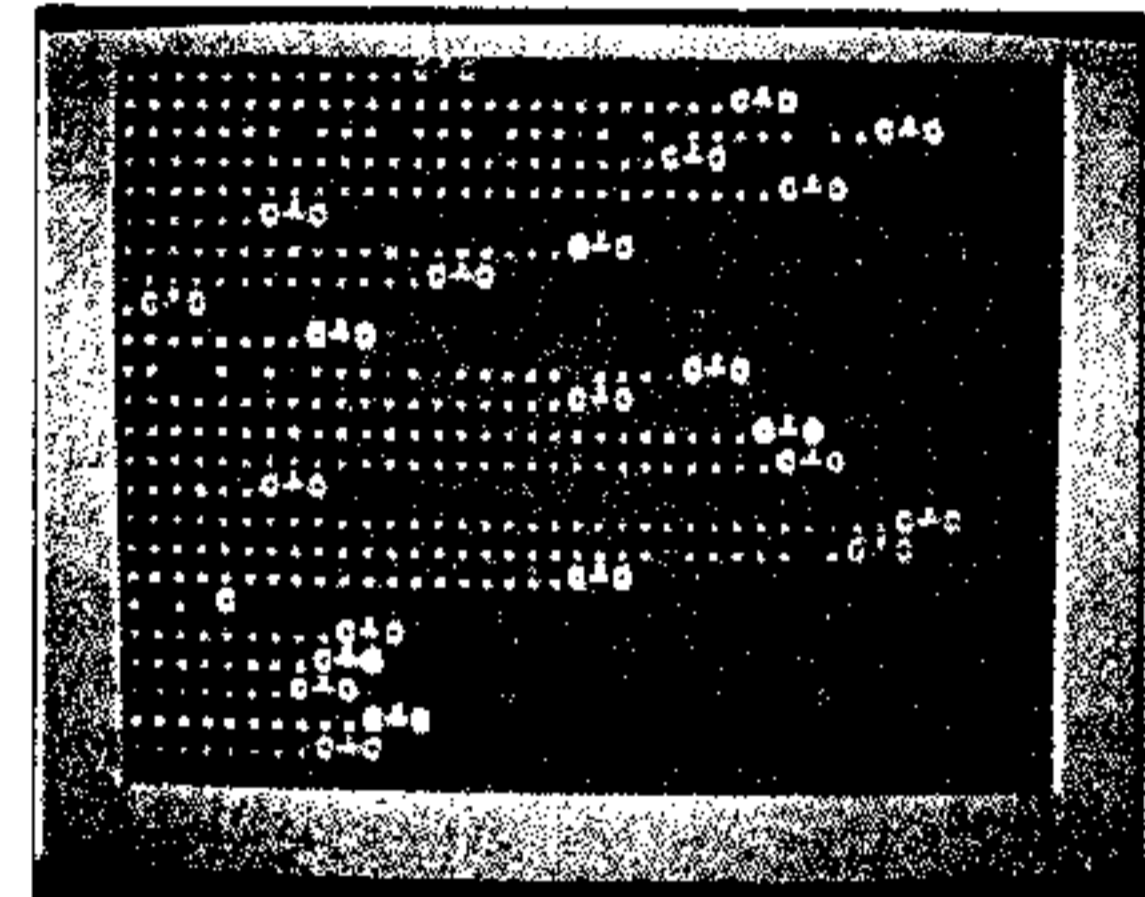
An Eight-Car Race

[Commodore 64 BASIC on the C-64]
Dear Sir:

This program races eight cars across the screen. The one traveling the greatest distance wins. Press the (RETURN) key to race again. Because the C-64 accepts only two program lines, there wasn't enough room for handling the scores for the winning cars. You'll have to keep track of the scores yourself. [NOTE: The graphic symbols are in the

order of their appearance: Shift W, Commodore E, Shift W, Cursor Up.]
Joseph Potter
Leicester, MA 01524

```
1:AS="."SHIF:FTW:CM:DR:EF
SHIF:FTW:CM:DR:EF
ORT=1TORND(1)*35:CHR$(
X+148)AS"SHIF:FTW:CM:DR:EF
FTW:CM:DR:EF
I:FTW:CM:DR:EF
R:SHIF:FTW:CM:DR:EF
```



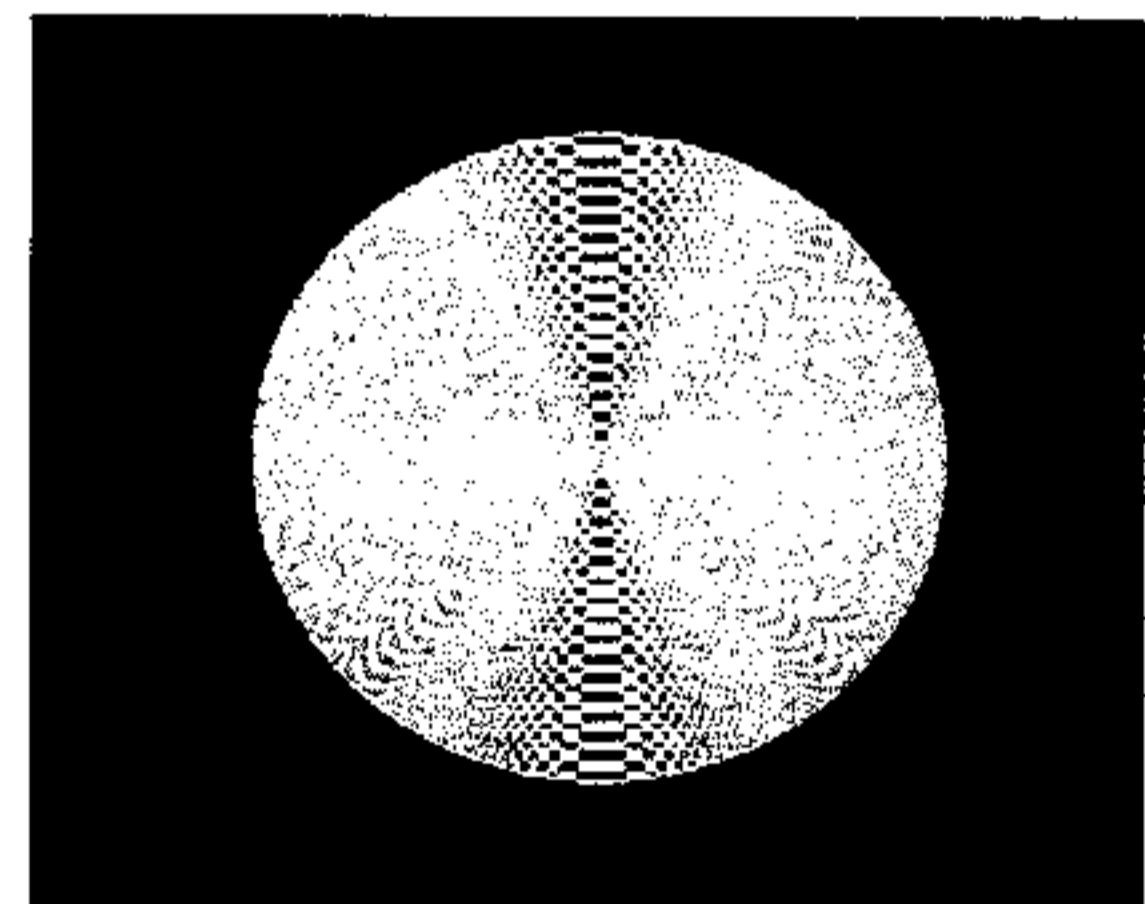
A Cosmic Egg

[BASICA on the IBM PC,
Cartridge BASIC on the IBM PCjr]
Dear Sirs:

This one-line program draws a circular design in screen 2 on the IBM PC, then BSAVES the image to a file in drive B named "DESIGN.PIC." It continues to clear the screen, BLOAD the file, and wait for a key to be pressed. Once a key is pressed, it goes back to screen 0 (text mode), clears the screen, and sets the width to 80.

Frank Swenton
Columbus, OH 43220

```
1:KEY=OFF:SCREEN=2:CLS:IN
(N/2)=(N/2):CIRCLE(31
999):N,C:NEXT:DEFSEG=
&HB800:BSAVE"DESIGN.PIC":
PIC:DESIGN:PIC:WHILE
INKEY$:WIDTH=80:COLOR
CLS
```



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

A Math Game Brain Teaser

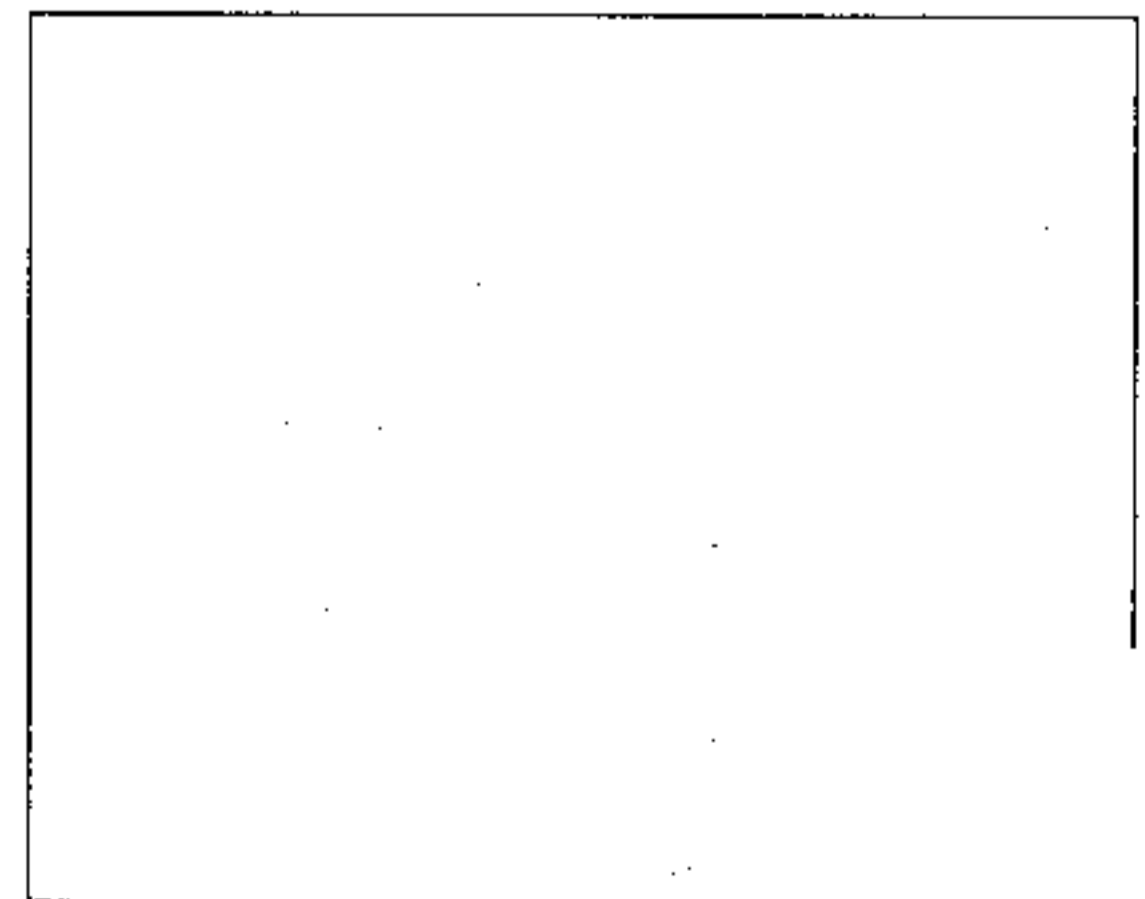
[TI Extended BASIC on the TI-99/4A]
Dear Sir:

This program plays a little mathematical game. It displays a sequence of five numbers, which are generated by an equation using random number coefficients. You are supposed to calculate what the next number in this series should be, and type it in. The computer

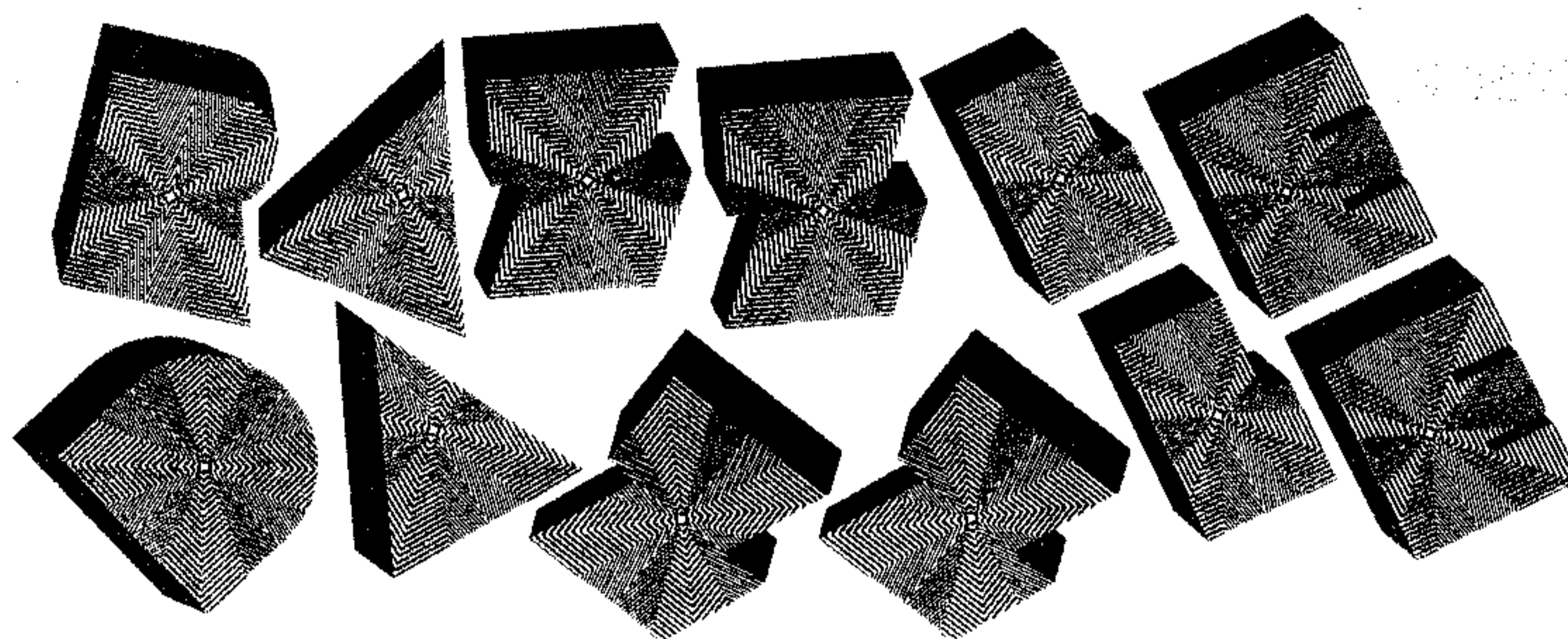
will tell you if you're right—and if you're not, it will display the correct answer, and another series will be displayed.

Edward Andrelos
Lefrak City, NY 11368

```
1:RANDOMIZE:PRINT:7)
:B=INT(RND*9+1):FOR
X=1:TO5:Y=A*X^2-B*X+C
X+B:PRINT:Y:PRINT:
PRINT:Y:PRINT:INPUT:GUESS
NEXT:NUMBER:PRINT:IF
GOTO1:ELSE:PRINT:
ORRECT:IS:Y:GOTO
```



All One-Liner submissions are subject to the same publishing criteria as Letters to the Editor (explained in 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 may win a cash prize and be immortalized in print!



SOUND-ON-SOUND

by William K. Balthrop
HCM Staff

Frustrated musicians rejoice!

Create musical compositions with the press of a button. Explore the principles of sound-on-sound recording with this simple 3-track recorder program.

Music is both a powerful and an everyday part of our lives. It's hard to imagine what the world would be like without it. Perhaps you have always had a secret fantasy that you could compose great musical works, letting all of that bottled-up creativity flow out into a musical instrument.

Someone once said that the best things come in small packages, and so it may be true with the short program listed here. With *Composer* you can compose and record music, play it back, and save it to disk or tape.

Three voices are available on the TI-99/4A. This means that the computer can produce up to three different tones at the same time. This ability allows you to produce some amazing musical results.

Getting Started

When you run this program, you will be presented with a menu containing five options:

- 1) RECORD
- 2) PLAY BACK
- 3) LOAD FILE
- 4) SAVE FILE
- 5) EXIT

Record

This option will allow you to record up to 200 notes on each of the three voices, one voice at a time. After selecting this option you will be asked to enter the voice number with which you wish to work. Enter a number from 1 to 3.

You will then be given two choices for the method of recording: **PLAY**, and **STEP**. If you select **PLAY** then you will be able to play along with the other two voices (providing there is something recorded on them) as you record this voice. If at any time you wish to terminate music entry to this voice, press the period key; or, if you have a 99/4, press the [ENTER] key.

In **STEP** mode you can get picky about which notes go where. In this mode each beat is single-stepped—when you press a new note, that note is played along with the other two voices (if they contain notes). The program will wait for you to press another note before continuing.

Two octaves of notes are available, starting with middle C. Figure 1 gives you the details for each key, the note it represents, and the frequency produced.

FIGURE 1

Key	Note	Frequency
1	C	262
2	D	294
3	E	330
4	F	349
5	G	392
6	A	440
7	B	494
Q	C	523
W	D	587
E	E	659
R	F	698
T	G	784
Y	A	880
U	B	988

(period) Press to exit before entering 200 notes.

Note: All keys which do not produce a note will insert a blank—a pause in the music.

Play Back

When you select this option, all that you need to do is sit back and listen. If you have a tune in memory, it will now play back for you all three voices. A counter at the bottom of the screen tells you the number of notes that have played. The sequence will stop when the counter reaches 200.

Load And Save Files

These two options work identically, except that option 3 will **LOAD** a previously saved music file into memory for more work, or simply to be played back. Option 4 will **SAVE** your work so that you may continue later, or so that your friends can enjoy your compositions with you at a later time. If you are using a tape drive to save the music, enter **CS1** at the prompt for the file name. Otherwise, if you are saving or loading to a disk, enter the device name and file name; e.g. **DSK1.MUSIC**.

Exit

When you attempt to exit, or if you press option 5 from the main menu by accident, you will be asked to indicate that you're sure you want to exit. If exiting was an acci-


HCM Review Criteria

Each month, *Home Computer Magazine (HCM)* reviews products designed for the Apple II Family, Commodore 64 and VIC-20, 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.

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, C-64 & VIC-20, 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

Performance:
Engrossment:
Documentation:

Poor Fair Good Excellent

*** 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.

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?

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.

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

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4. Be consistent with the type of machines and products we normally cover.

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

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 Attn: Editorial Submissions
 1500 Valley River Drive, Suite 250
 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.

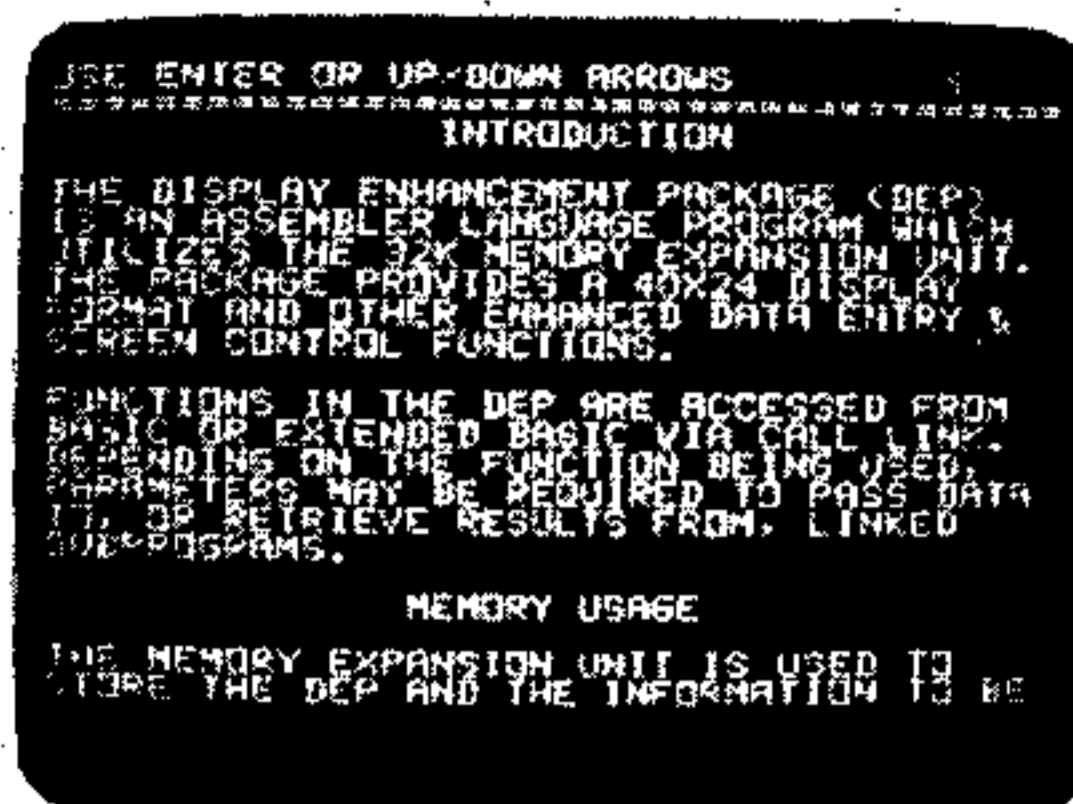
*Compu-prestidigitation

(kóm•pū•prēs•teh•dī•jeh•tā•shūn) —*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.

THE DISPLAY ENHANCEMENT PACKAGE

A Review by David Reese

HCM Review



Name: Display Enhancement Package
 Program Type: Utility
 Machines: TI-99/4 and 4/A
 Distributor: Oak Tree Systems
 3922 Valentine Rd.
 Whitmore Lake, MI 48189
 Price: \$29.95
 System Requirements: 32K expansion,
 and one of the following configurations:
 Mini Memory, cassette recorder and cable;
 Mini Memory & disk drive; Extended BASIC &
 disk drive; Editor/Assembler and disk drive.

Performance:

Poor	Fair	Good	Excellent
_____	_____	_____	_____

 Ease of Use: _____
 Documentation: _____
 Cost/Benefit: _____

*A display that seems as big as Texas
when you're squeezed for space under normal 28-column mode.*

I was beginning to get tired of all those snickers from salespeople and friends with so-called "legitimate" computers. You've heard the remarks. "You use a TI? When are you going to get a computer with some real features?"

About one feature, I knew they were right—the screen display. The 99/4A's 28 columns of text is simply not a feature, it's a handicap. Luckily, however, I found Oak Tree Systems' 40-column *Display Enhancement Package* (or *DEP*).

The *Display Enhancement Package* requires the 32K memory expansion. It is available in three different versions: Editor/Assembler, Extended BASIC, or Mini Memory. Each version is provided on diskette, with the exception of Mini Memory—it comes on tape.

"Real Features"

I use the Extended BASIC version, and swear by it. I must admit, however, that when I received the program, I was a little disappointed. I thought that I would be able to insert the disk, press a few keys, and be in 40-column Extended BASIC! In fact, what I found was a very powerful series of assembly-language subroutines.

These routines include not only a 40-column display, but also a four-page "data storage area" that may be filled with information, then moved up and down either a line at a time, or a page at a time. Additional options include the ability to set up a fixed area at the top of the screen that displays information while "working" data is scrolled up and down behind it, and a number of data-entry features that surpass even Extended BASIC!

The *DEP* is more than a program, it's a programming language—an "Extended Extended BASIC." After all, one of the things that makes TI's version of BASIC so powerful is the number of assembly-language subroutines available with *CALL-CLEAR*, *HCHAR*, etc—and this package adds even more by using the *CALL LINK* statement.

These extensions don't come without a price, however. Many of the statements available in Extended BASIC may not be used when in *DEP*'s 40-column mode. These statements are *INPUT*, *PRINT*, *ACCEPT*, *CALL COLOR*, *CALL SCREEN*, *CALL HCHAR*, *CALL VCHAR*, *CALL GCHAR*, *CALL CHAR*, *ON ERROR*, *TRACE*, and *BREAK*. The *DEP* provides equivalent statements for all of these commands except for the latter four. In addition, sprites

are not available because the Video Display Processor must be set to Text mode to use the 40-column capabilities of the computer. You can switch back into 28-column mode with a *CALL LINK("MODE28")* at any time, whether in program or command mode, and all the normal commands and features are again available.

Here are some examples of added features:

- CALL LINK("MODE40")*
sets the screen in 40-column mode.
- CALL LINK("MODE28")*
returns the screen to 28-column mode.
- CALL LINK("SCRLDN")*
scrolls the screen down one line.
- CALL LINK("LOCK",10)*
keeps the first ten lines on the screen from scrolling.

Limitations

In order to display numeric data with this program, it must first be converted to string data using the *STR\$* function. Also, the *ON ERROR* statement is not available in 40-column mode—only 28-column. Programming allowances must therefore be made to allow for potential operator-input errors (like nonexistent file names) while in 28-column mode.

ALWAYS SAVE YOUR PROGRAM PRIOR TO TESTING!!
Program crashes can be fatal if they occur when you're in

40-column mode. In many instances, if an error occurs, the screen turns strange colors, and the console may "lock-up." It is possible that you will need to turn the computer off and on, losing hours of programming effort. Another point worth mentioning is that *DEP*'s programs are not portable. That is, any program created with *DEP* must also run with *DEP*.

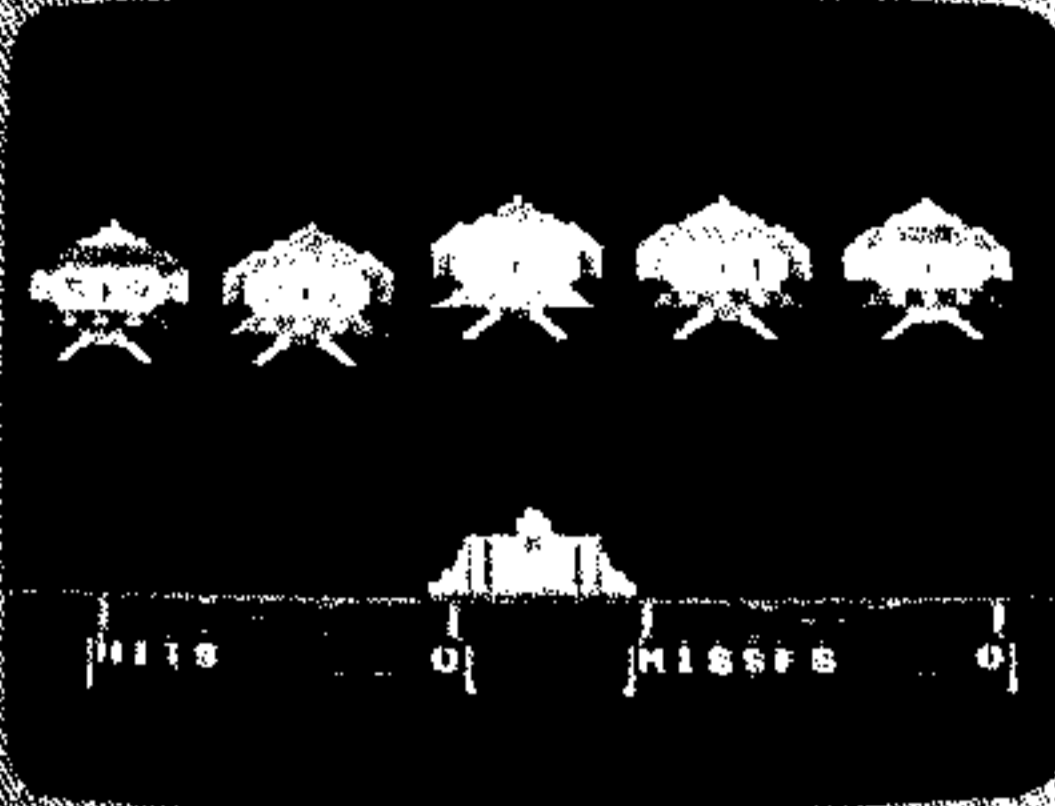
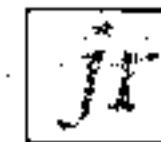
A Good Buy

Even with the above limitations, *DEP* is a good buy. For the game programmer, such a product would be a waste of money. But, for productivity applications, *DEP* is a real plus. This product can be a useful tool for unleashing the capabilities in the computer that you and I know is one of the best around. If you find yourself squeezed by a 28-column screen, Oak Tree Systems' *Display Enhancement Package* is your answer.

HCM

HCM Glossary terms: assembly language, display, sprite.

*"The 99/4A's 28 columns of text
is simply not a feature,
it's a handicap."*



Name: Alien Addition
Program Type: Educational game
Machine: TI-99/4A
Distributor: For TI-99/4A
 Triton Products, TexComp,
 and Unisource catalogs.
Price: \$5.95 to \$10.95 TI
 Cartridge
System Requirements: TI-99/4A console, monitor
Performance:

Poor	Fair	Good	Excellent
=====	=====	=====	=====

Engrossment:

=====

Documentation:

=====

Name: Alien Addition
Program Type: Educational game
Machines: Apple II Family,* C-64,*
 and IBM PC & PCjr*
Distributor: For Apple II Family,
 * IBM PC & PCjr,* C-64*:
 Developmental Learning
 Materials
 DLM Teaching Resources
 1 DLM Park
 Allen, TX 75002
Price: \$44 diskette
 *We were unable to obtain these newly-
 published versions in time for review.

ALIEN ADDITION

A Review by Tom Green
HCM Staff

*Is the arcade-style edu-game out of date?
 Reaching for a futuristic theme, this program now
 seems a bit old-fashioned.*

To succeed in arcade game playing, you must draw on certain natural reserves, such as raw determination, the ability to concentrate, coordination, and quick-reflexes. Above all, you must *pay attention*. Naturally, educational programmers have realized that this same level of attention is also desirable in a *learning* situation—so many teaching games use arcade-type action to grab a youngster's attention, and create a focal point for learning. *Alien Addition* is a typical example of this popular method. Planting you smack in the middle of a futuristic nuclear war, it thoughtfully provides you with one defense—the right answers.

Alien Addition is one of six programs in a series of educational packages offered by Developmental Learning Materials designed to teach the basics of math—addition, subtraction, multiplication, and division. *Alien Addition* instructs the player on the summing of numbers between zero and nine. We tested the version available for the TI-99/4A. Newly-published versions for the Apple II Family, Commodore 64, and IBM PC and PCjr were not yet available to us in time for this review.

Time Is Of The Essence

The scenario of play is familiar—defender versus attackers. Five alien ships, each displaying an addition problem, are lined up across the top of the screen. Each problem consists of two numbers. The ships descend from left to right, one at a time. Positioned under the ships is a cursor-controlled "laser" cannon that displays the player's numeral input. The player must move the cannon right or left so that it is under the lowest ship, enter a number representing the answer to the ship-displayed problem, and "fire" away. A correct answer destroys the ship, and a new one replaces it at the top of the screen. An incorrect entry causes the aircraft to descend more quickly. If a ship descends to the last level, the cannon is vaporized into a mushroom cloud, and play starts anew.

lowest and highest scores.

Three options change the complexity of play: (1) the skill level may be set on a scale of one to nine, to control the speed of the ship's descent; (2) the range of whole numbers used for addition problems may be set to limits of 3, 6, or 9; and (3) the time of game play may range from one to five minutes.

Alien Addition's graphics make full use of the 99/4A's color palette—bright ships illuminate from a starry background, and red flashes signify a victorious shot. Sound enhancements are limited to a few beeps as the ships attack or as an object is destroyed.

Food For Thought

A few years ago, *Alien Addition* was considered innovative. But, since this and many other similar "edu-games" have been released, the arcade format has been shot down with its own ammo. One obvious objection you could raise against this game's format is that it uses a laser defense/nuclear war context to teach children mathematics. Another, less-obvious objection maintains that this concept has been used so often it is simply boring.

However, *Alien Addition* proves to be a fast and effective drill (and its low selling price for TI-users is an "additional" selling point). If you don't want to become so much atomic fluff, you'd better know the right answers. In reality, knowing the correct answers may avoid destruction (sometimes by *causing* destruction)—but this knowledge can also build, promote growth, and lead down other enlightening paths.

Newer educational programs are emerging which use the computer's "modeling" abilities to create computer simulations—software that mimics real-life situations, and helps answer "what-if" questions. Perhaps this new direction in software will stimulate the imaginations of some in the computer/teaching field to bring us more original educational games for students of all ages.

*"Planting you smack
 in the middle of a
 futuristic nuclear war,
 it thoughtfully provides
 you with one defense
 —the right answers."*

TECH NOTES



Making Your Own Tex-Sette™ Adapter

Does your TI-99/4A fail to control your cassette recorder through the remote jack? One possible solution for this is not difficult at all. If you can solder two wires together, then it is likely that you can solve this problem yourself.

The remote plug on the 99/4A cassette interface cable contains two wires—the ground and the lead. The lead is located on the tip of the plug, while the ground is the shaft. It is possible for the remote jack on a recorder to have these two wires switched—thus making it incompatible with the cassette-interface cable. [Note: In very rare cases, the recorder remote signal circuit may be incompatible—Ed.] Fixing this is simply a matter of switching the two wires so that the recorder's ground is the same as the cable's ground. So that we don't have to modify the recorder itself, we've come up with a gadget called the Tex-Sette adapter. Here's how to build your own:

First, you'll need to collect everything that is shown in the parts list. Two holes will have to be made in the enclosure—one for the jack, and the other for the plug. Solder one end of your two-conductor wire to the jack. Mark the strand that is soldered to the lead connection of the plug. Then take the marked wire and solder it to the ground connector of the jack. The ground on a jack is the outside rim. Now solder the remaining wire to the jack's lead connector. Finally, carefully slip all the wires into the enclosure, making sure that no bare connections are touching, and close it all up. Your finished product should look somewhat like the picture below.

Testing your adapter is fairly simple. Using an ohm meter, or some other kind of continuity tester, check the connection between the tip of the plug and the rim of the jack. If they are connected, you have correctly built the adapter. If not, carefully read the instructions again to see what went wrong.

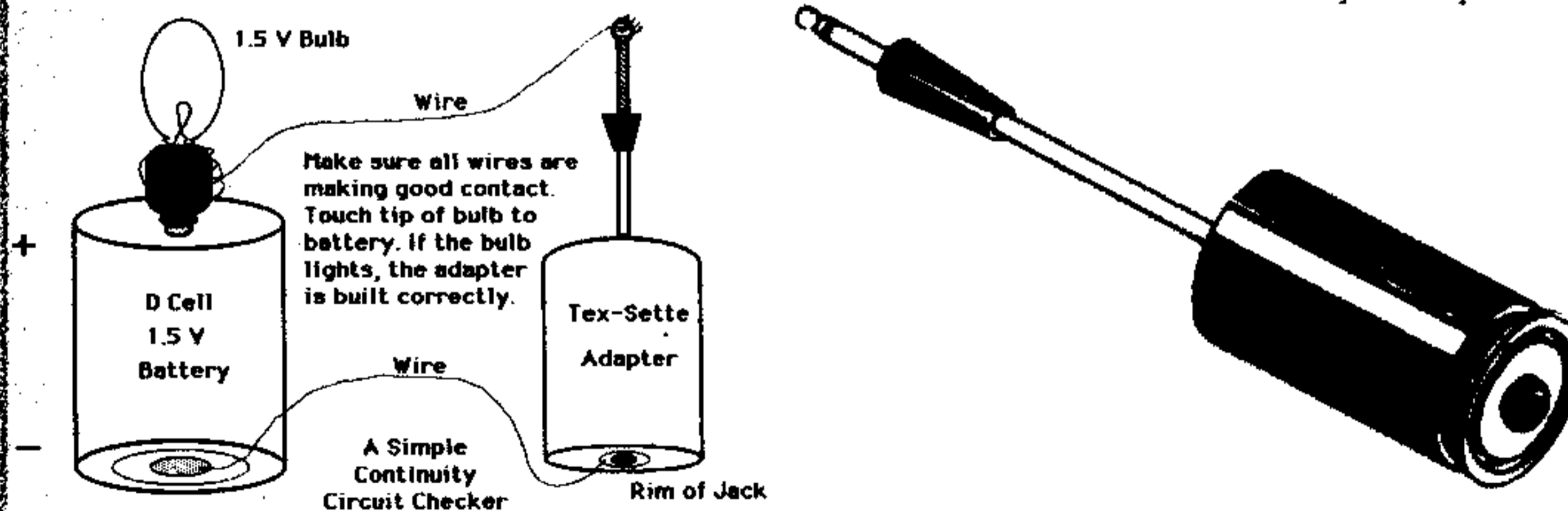
To use your latest creation, insert the remote control plug (the black one) of the 99/4A cassette interface cable into the Tex-Sette's jack, and put the plug from the Tex-Sette adapter into the cassette recorder's remote jack. The remote feature on your recorder should now be working in conjunction with your TI-99/4A. Besides making cassette operation more convenient and "foolproof," you will now be able to load data files under program control—expanding the usefulness of your home computer.

PARTS LIST

- 1 3/32" submini phone plug Radio Shack Part 274-289 or equivalent
- 1 3/32" submini phone jack Radio Shack Part 274-292 or equivalent
- Enclosure—35mm film canister, or similar container
- 5" two-conductor wire

[Home Computer Magazine, the publisher, and the author shall not be held liable for unsuccessful project completion. Proceed at your own risk.]

—Randy Thompson



Speeding Up A BASIC Program

PART TWO

by John P. Russo
and the HCM Staff

Adding snap to BASIC requires strategy and efficient coding. Here are some snappy new ways to RUN your program in the fast lane . . .

Have you grown impatient with slow-running BASIC programs? Perhaps you've imagined pouring a bit of jet fuel into your computer to get it moving. Relax! Before you do something that drastic, remember: Some programs run much faster than others. Even though interpreted BASIC is inherently slower than compiled languages, an efficient use of code will often greatly enhance the running speed of any program.

In Part 1 of this 2-part series (see Vol. 5, No. 3), we gave you 8 rules for speeding up BASIC. We also used benchmarking as a tool for comparing the "before and after" effects of certain rules. Now, we continue with 6 more speed-enhancing guidelines. These rules apply to almost any version of BASIC. However, the examples discussed here deal with Apple II (Applesoft) BASIC, IBM PC DOS 2.0 BASIC (Disk), Commodore 64 BASIC, and TI-99/4A Extended BASIC. We chose TI Extended BASIC to maintain maximum compatibility between the different BASICs.

RULE 9 shows how to use conditional (IF-THEN) statements efficiently. Many versions of BASIC (including Applesoft and Commodore) lack IF-THEN-ELSE statements, so programmers improvise in various ways to approximate these commands. Suppose, for example, that we wish to test a number, A, to see whether it is positive and then print a message about the result. If we could, we would use:

```
IF A > 0 THEN PRINT "A IS POSITIVE"  
ELSE PRINT "A IS NOT POSITIVE"
```

In fact, the line above is a legal statement in IBM BASIC and TI Extended BASIC. However, if an IF-THEN-ELSE statement is not available, we probably would write one of the three following segments:

```
SEGMENT A  
10 IF A > 0 THEN PRINT "A IS POSITIVE"  
20 IF A <= 0 THEN PRINT "A IS NOT POSITIVE"  
30
```

```
SEGMENT B  
10 IF A > 0 THEN 40  
20 PRINT "A IS NOT POSITIVE"  
30 GOTO 50  
40 PRINT "A IS POSITIVE"  
50
```

```
SEGMENT C  
10 IF A > 0 THEN PRINT "A IS POSITIVE": GOTO 30  
20 PRINT "A IS NOT POSITIVE"  
30
```

Normally, I prefer SEGMENT A, because it's the easiest to read. Unfortunately, it is also the slowest of the three segments. SEGMENT B executes more rapidly, but is also more difficult to read. SEGMENT C is more readable than SEGMENT B, because it does less

"hop-scotching." It turns out that SEGMENT C is also the quickest of the three segments. The built-in IF-THEN-ELSE statement available in IBM BASIC and TI Extended BASIC is the quickest for those systems; but on Apple and Commodore computers, RULE 9 provides reasonable savings.

RULE 9: The fastest way of implementing the statement:

```
IF CONDITION THEN STATEMENT 1 ELSE STATEMENT 2  
is
```

```
IF CONDITION THEN STATEMENT 1: GOTO XX STATEMENT 2  
where XX is the next line number.
```

The situation is somewhat more complex if there are more than two possible conditional outcomes. Suppose, for example, that we wish to optimize a section of code which keeps track of the number of positive, negative, or zero numbers. Consider the next segment:

```
SEGMENT D  
10 IF A = 0 THEN ZEROS = ZEROS + 1: GOTO 40  
20 IF A < 0 THEN NEG = NEG + 1: GOTO 40  
30 POS = POS + 1  
40
```

Now, if it is known that most of the numbers will be positive and that very few will be zero, it would be better to reorder SEGMENT D to obtain:

```
SEGMENT E  
10 IF A > 0 THEN POS = POS + 1: GOTO 40  
20 IF A < 0 THEN NEG = NEG + 1: GOTO 40  
30 ZEROS = ZEROS + 1  
40
```

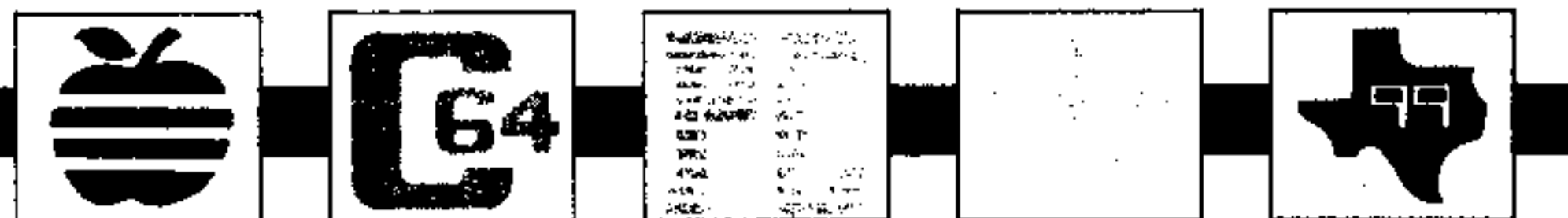
In SEGMENT E, very little time will be wasted in applying tests which have no chance of success. In an actual RUN, SEGMENT E will RUN as much as 25 percent faster than SEGMENT D. In general, we can state:

RULE 10: Order IF-THEN statements in such a way that those likely to be successful come first.

Closely related to RULE 10, and unfortunately sometimes at odds with it, is the following rule:

RULE 11: Order IF-THEN statements in such a way that the least time-consuming tests come first.

As an example of an application of RULE 11, suppose we are writing a program which tallies the number of "illegal" strings in a long list. For this example, let's suppose that a string will be deemed illegal if it fails either TEST A or TEST B, defined as follows:



TEST A: The string only contains upper-case alphabetical letters.

TEST B: The length of the string is less than 9 characters.

Note that TEST A will require a loop and the MID\$ function, while TEST B will require only the very fast LEN function. All other things being equal, it makes more sense to try TEST B first. If TEST B fails, there is no need to apply the very time-consuming TEST A.

To set the stage for our next rule, assume that you've been fine-tuning a program and have determined that most of the execution time cost is connected with a certain loop. Within that loop, a variable is subjected to a number of tests. For an easy way to improve the speed of the loop, merely initialize the variable very early in the program. This early initialization will cause the variable to be entered at the beginning of the symbol table which is set up during program execution. Each time a variable is referenced, this table is searched, and entries located near the beginning will be found more quickly.

As an example of how well this can improve performance, consider the next program segment, which gets single characters from some source, say, a file, and counts the number of vowels and consonants. For this illustration, assume that ten string variables are used in lines 10-90 (thus introducing ten entries into the variable table). By adding 5 LET A\$ = "A" and thus placing A\$ first in the symbol table, as much as two seconds can be shaved off the execution time of the loop. This is a good place to recall that RULE 3 suggested that NEXT should be used with FOR loops instead of NEXT N. If NEXT N is used and N is located at the end of a long variable table, the search for N can waste considerably more time. (TI users note: RULE 3 does not apply to TI BASICs.)

```
10 REM ASSUME THAT 10 VARIABLES ARE INTRODUCED IN
LINES 10-90
```

```
100 FOR N = 1 TO 1000
110 REM ASSUME A$ IS OBTAINED IN SOME WAY BY THIS LINE
120 IF A$ = "A" OR A$ = "E" OR A$ = "I" OR A$ = "O"
OR A$ = "U" THEN VOWELCOUNT = VOWELCOUNT + 1:
GOTO 140
130 CONSCOUNT = CONSCOUNT + 1
140 NEXT
```

To summarize:

RULE 12: The most frequently referenced variables should be initialized early in the program.

It is inevitable that a long program will require the use of subroutines. If the same lines are used several times in a program, then it makes sense to have the lines included only once as a subroutine. The next rule deals with the physical location of subroutines.

RULE 13: Always give subroutines line numbers that will be searched for first.

This rule's application varies somewhat from system to system. When the Apple or IBM interpreter encounters a command such as GOSUB 1000, the line numbers in the program are scanned—starting with the lowest in the program. If the program must check many line numbers before reaching the desired number, then execution time will be increased. This means that a frequently called

subroutine placed at the end of a very long program could require a significant amount of extra time.

The TI-99/4A, however, uses the opposite rule: The most frequently used subroutines should have the *highest* line numbers—because the TI machine starts its search from the last line number and works backward.

Commodore computers use a different method. They conduct a *logical* search for subroutines. Depending on the subroutine's line number, a search may start from the beginning of a program, or from the location of the current program line. Thus, there are two good places to put your subroutines—the beginning of a program or right after the GOSUB statement.

Our final rule also involves subroutines. Clearly, a subroutine call involves some overhead, since at least two jumps must be made—one to the subroutine and the other back to the main program. If one is willing to give up the space savings of a subroutine, and perhaps lose some readability, then putting the subroutine "in-line" can be an effective way to increase execution speed.

RULE 14: Time can be saved by eliminating the overhead of a subroutine call and replacing the call with in-line code.

As a simple example, compare the execution times of the program segments below. (Each segment checks the first character of A\$ and increments a counter if the character is equal to Z.)

BEFORE RULE 14:

```
10 FOR N = 1 TO 1000
15 REM ASSUME THAT A$ IS OBTAINED BY THIS LINE
20 GOSUB 50
30 NEXT
40 END
50 IF LEFT$(A$, 1) = "Z" THEN ZCOUNT = ZCOUNT + 1
60 RETURN
```

AFTER RULE 14:

```
10 FOR N = 1 TO 1000
15 REM ASSUME THAT A$ IS OBTAINED BY THIS
20 IF LEFT$(A$, 1) = "Z" THEN ZCOUNT = ZCOUNT
```

FIGURE 1

Execution Times Before and After RULE 14

	Apple II	Commodore	IBM	TI-EX
Before	7.4	5.8	7.4	34.93
After	5.8	4.8	6.1	32.60

Summing Up

Although we have focused on speeding up existing programs, it is clear that the rules above can help if you keep them in mind when constructing new programs. A "good" program usually has to strike a balance between efficiency and structure, but a number of the ideas given here do not involve space-time tradeoffs or compromises in good program structure.

The rules presented here do not, by any means, provide the only methods available of increasing execution speed. In particular, we have not dealt with I/O considerations, largely because they are usually so machine-dependent. However, we have covered most of the efficiency rules which are reasonably broad. Additional rules which are less general or perhaps even machine-specific might be found by carefully reading your computer's reference manual.

HCM

HCM Glossary terms: benchmarking, compiled language, initialization, interpreted language, string.

HOME COMPUTER I

VOL. V NO. 4 ★★★★★

INTERNATIONAL EDITION

Mergers Multiply

Tight Industry Spawns Co-Ventures and Coups

Blue Chips Scrutinize Apple, Lotus Reels-In VisiCalc Makers

Are mergers made in heaven? Or are they spawned in desperation? In the stagnant waters of today's computer industry, the truth is that companies are coming together out of a sheer sense of survival.

Case in Point: Apple Computer Corp. may soon announce several joint ventures with other companies, including corporate monolith AT&T. These moves reflect Apple's concern that if it doesn't play hardball in the big business world, there will be no minor league to return to. Slow home sales may mandate success in the business field to survive.

Speculation about the new Apple/AT&T combination focuses on the Macintosh as office machine. Rumor has it that AT&T will begin marketing the Mac through its nationwide chain of phone centers, perhaps bundled with a phone. Future Mac models may even include a built-in phone—turning the Mac into a sophisticated voice/data workstation. Others, including General Electric and Xerox, are also rumored to be interested in acquiring Big Red—the ultimate joint venture.

Several other upstarts have also felt the pinch of the present market; some are even fleeing Chapter 11 by merging with long-time rivals. This includes Software Arts, creator of VisiCalc, who is now letting itself be absorbed by Lotus Corp., of 1-2-3 fame. Besides this outright takeover, Lotus has joined with Intel—bundling Intel's Above Board (a memory expander for the IBM PC that provides up to 4 megabytes of RAM) with an updated version of 1-2-3. More co-ventures include the acquisition of Software Distribution Services by Ingram Corp., a video and book distributor; a deal between Xidex and Dysan, floppy disk suppliers to Kodak; and an alliance between Borland and AST Research Inc., bundling Borland's Sidekick with AST's multifunction board for the IBM PC.

“QUOTABLES”

“You'll have to convince me that the voracious little s.o.b. won't eat my copy.”

—ABC Anchorman Ted Koppel,
a typewriter advocate, referring to computers.

What's News—

Texas Instruments representatives said they preferred to use TI's marketing resources to appear at more than 100 “vertical market” tradeshows this year, rather than to attend COMDEX and the National Computer Conference this summer.

Later this year TV manufacturer Zenith plans to introduce a TV that uses the digital technology of computers. Viewers may eventually be able to watch 2 channels at once, as well as use their TV as an intelligent terminal.

The business market may take another look at Apple's Macintosh when MacCharlie begins shipping. MacCharlie will make the Mac fully IBM-compatible, allowing it to run 10,000 more programs and perform all networking capabilities of the IBM PC.

Though Japan's MSX computers still have not hit the U.S. in force as predicted, 15 Japanese firms are working on Version II models. The Japanese may enter the U.S. low-end market if Atari and Commodore seek the high end with their new computers.

Panasonic's new photocopier system allows copies to be edited electronically without altering the original. In seconds, information and graphics may be moved, centered, deleted, enlarged, or reduced.

After 10 years of seeing the world run with its inventions, Xerox has introduced a new batch of office products that include 3 personal computers, 3 laser printers, 2 word processors, and network applications. Xerox's 4,000 member direct-sales force will be touting “solutions for specific jobs.”

Mac Battleground

Apple Strategy Hinges On Third-Party Development

Chairman Jobs Goads On Lotus and Microsoft

Swirling around Apple's Macintosh-led journey into the business market is a pitched battle between rivals for Mac's software crown. Both Microsoft and Lotus are rushing to complete their integrated office packages for the Macintosh, Apple's featured product.

Apple is anxiously awaiting Microsoft's Excel and Lotus' Jazz, hoping that one or both will ensure Mac's place in the PC-dominated office market. Chairman Jobs may even be playing one against the other. Both Microsoft and Lotus, however, are behind schedule—even though an early summer release seems essential in capturing a respectable share of this growing market before IBM grabs the spotlight with its soon-to-be-introduced PC2.

After a slow quarter, resulting in plant closures and threats of more lay-offs, Apple's Mac strategy may be a case of do-or-die. The company recently announced the demise of its Macintosh XL—formerly, the Lisa. And, with the inevitable shift away from the Apple II series (and the home market in general) everything seems to depend on third-party development of businessware for the Mac.

In The Wake of Junior

Big Blue Concentrates On Its XT and PC2 Computers

Publishers Puzzled Over Bundling, PC Future

Software publishers don't seem to be too worried over the death of IBM's PCjr, and are releasing a substantial number of new programs—caught in the pipeline—this quarter. Although publishers aren't seeking new PCjr products, they are continuing to produce and distribute current PCjr products. Considering that there are 300,000 PCjrs already sold and possibly 200,000 warehoused, and that much of this inventory is compatible also with the PC, publishers are optimistic about the future—especially since IBM has recently cut the retail price of the PCjr by 27%.

Meanwhile, IBM has launched a new promotion which “bundles” business software with their PC XT in shipments to dealers. Even though IBM calls it “business as usual,” retailers aren't so sure. Some think it's an attempt by IBM to dump existing PCs, making room for their expected new PC2 while lowering prices for existing PCs. IBM isn't advertising this promotion, leaving it up to its dealers to determine whether to pass-on the free programs as a buying incentive or sell them for added profit.

INDUSTRY JOURNAL™

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Commodore Sales Drop

Publishers Ignore C-64 For Apple, IBM Aftermarket

Is The C-128 Only A Stopgap For Coming Amiga?

Software sales for the Commodore 64 are dwindling as the machine ages and as software makers continue to narrow their focus to programs for Apple and IBM machines. To increase their sales volume and overall profits, Electronic Arts, CBS, and other companies have cut 15 to 40% off prices on older Commodore (and Atari) programs, and have cut dealer costs on newer titles about 16%. A boost in educational program sales may come from Commodore's efforts to capitalize on the school market with its C-64 and new 128 computers. The company has doubled the size of its educational marketing division and is going after volume local and state school contracts.

The Commodore 128, with C-64 and CP/M compatibility, was to start shipping in May. However, some market analysts have said that it may be a short-lived machine, released as "a stop-gap" product until Commodore can release its much-talked-about Amiga computer this summer. Another short-lived product, the Commodore Executive portable computer with 64K and 5-inch screen, is being advertised for under \$400 by a national liquidator.

New Atari Maneuvers

ST Delayed Once More Until Mid-Summer Heat

European Release Precedes American Debut

Atari's new 512K Macintosh-like ST, originally scheduled for release in April, will not be sold in the U.S. until July, according to Atari officials. The company has recently reversed several other earlier decisions regarding the ST computer. For instance, it is now shipping the ST to Europe to capture that market first before trying the U.S.. Atari also pulled out of the June Consumer Electronics Show, and has decided to sell the machine through computer specialty stores (where it will directly compete with the Macintosh) rather than through mass merchandisers.

IBM Printer Wars

Big Blue Goes Up Against Dominant Japanese Units

Epson and NEC Lower Prices To Counter IBM Move

IBM may crack the hold that Japanese printer makers have on the U.S. market by releasing printers of its own. The first is a \$549, high-speed (200 cps) graphics printer. It replaces the slower Epson printer that IBM sold under its own name, and is expected to add fire to the "printer wars." Meanwhile, printer market leaders Epson and NEC of Japan cut up to 20% off the prices of their printers, and plan to release ink-jet and laser printers this year. Adding fuel to the fire is Hewlett-Packard, which released a laser printer with many of the capabilities of Apple's LaserWriter—for half its price.

Tandy Price Cuts

Aggressive Plan Puts Computers In Low Range

Company Claims Model 1000 Better than PC, PCjr

Tandy's inflexibility on prices became history when it cut the price of its IBM XT-compatible Model 1200 computer 33% in April. Tandy chairman John Roach has also hinted that the Model 1000's \$1,199 price may be cut below the \$1,000 mark this year. Industry analysts predict that the 128K machine's price will drop 25%. But aggressive pricing is only one of Tandy's strategies for gaining market share for the 1000. Proclaiming that the Tandy 1000 is what the PCjr and PC should have been, Roach has said that it may start selling the 1000 through its Home Education System—called by others, "Tandy Tupperware."

THROUGH THE LOOKING GLASS

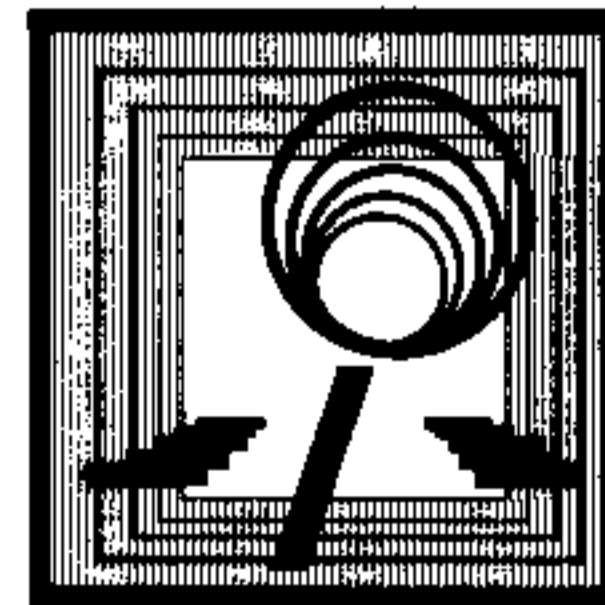
Chips With Built-in Sensors May Lead To More Human-Like Machines and Computers

A new factor has entered the cybernetic scene: the "smart" sensor. This latest technological marvel is designed to give machines the ability to see, hear, touch, even smell the environment and react appropriately.

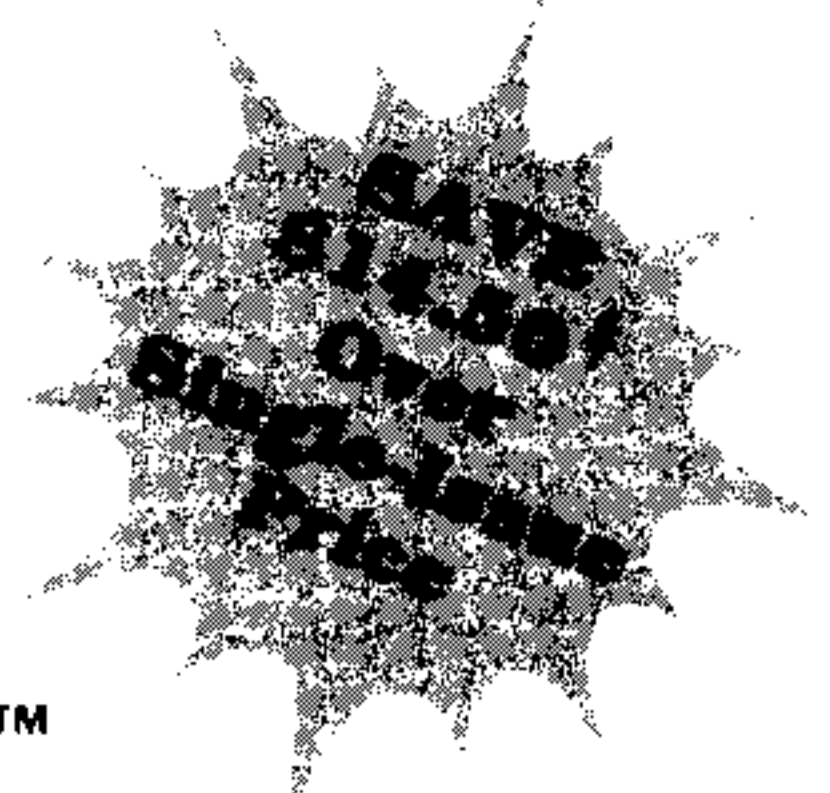
One of the first of these devices is a small, saucer-shaped apparatus designed to sniff out deadly gases. What makes it different from older industrial sensors—which are much like simple thermostats hooked to expensive computers—is its ability to discern within the device itself one stimulus (in this case, a specific gas) among many, and then to initiate the right series of responses. This is possible because the device combines a computer chip containing the necessary "firmware" with the detector itself. Although most of the attention is now directed at its industrial and military applications, the smart sensor will inevitably show up in the home environments.

Some of the immediate uses for these sensors include blood testing, monitoring toxic substances (both in and out of the body), even detecting diseases, such as cancer. We may soon see small micromachines that can monitor blood-sugar levels in diabetics and internally administer insulin. Dentists are talking about toothbrushes that detect tooth decay and gum disease. Car-makers are dreaming of very automatic assembly lines. But the real impact may be far more sweeping—changing the very nature of machines and their relationship to humankind.

Smart sensors may finally bring many science-fiction dreams to life, including humanoid robots and the ultimate user-friendly computer. Computers, for example, now depend mostly on keyboard input to detect our wants and desires. But many other forms of interaction are possible, as millions of the so-called handicapped are beginning to discover. And the new microchip-sensing devices can only help advance this quest for a more adaptable and human computer interface. Star Wars applications aside, this technology could do much to enhance and protect life right at home.



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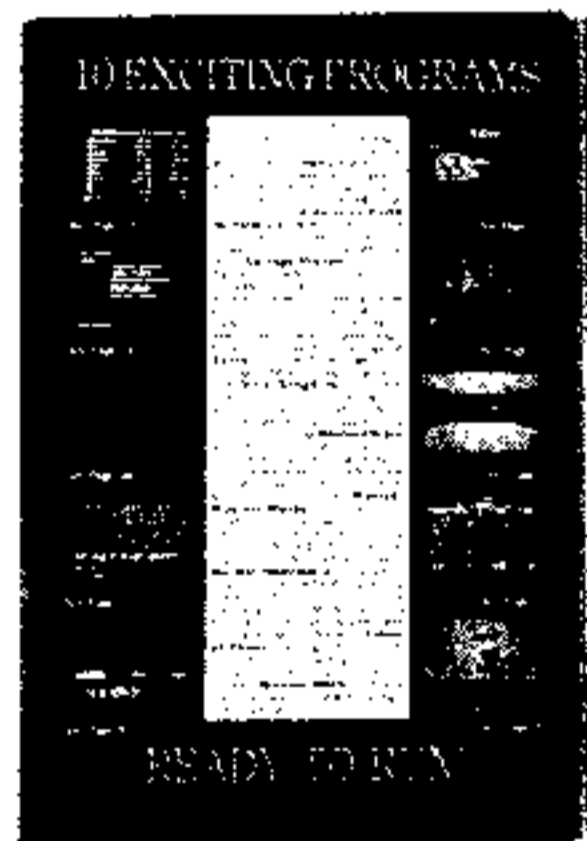
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[‡]For editorial and program information, refer to the inside back cover of this magazine.

Canada add \$5 for software subscription.

Software subscription not available in other countries at this time.

HOME COMPUTER™

product news

TI-Writer Lives On

Second Generation Released For 99/4A

Tex-Comp has taken the original TI-Writer word-processing program, added new character sets, lowercase letters, and all of Texas Instruments' upgrades, and released 99-Writer II for the TI-99/4A. A new user's manual has been developed

to accompany the disk, which is compatible with Dragon Slayer Software's Auto Spell-Check program. The \$19.95 program loads with Extended BASIC, Editor Assembler, or Mini Memory, and requires a disk drive and 32K memory expansion.

Tex-Comp
P.O. Box 33084
Granada Hills, CA 91344
(818) 363-7331



Brown-Bagging Words

Word Processing for Apple II

Software Resource Group has introduced Brown Bag Software, an integrated data-base management system and word processor for the Apple II Family. Claiming its product is "software for the proletariat," Brown Bag Software offers on-line help at all times, data and text-merging between modules, and search and replace functions. It is designed so that persons with very little actual com-



puter experience will be able to use it. Brown Bag Software retails for \$49.95.

Software Resource Group Inc.
1095 Airport Road
Minden, Nevada 89423
(702) 782-9731



Some New Sights & Sounds

Music Programs Enhanced

Sight & Sound Music Software has made price cuts and enhancements to its line of music software for the Commodore 64. Sight & Sound has added recording and note displays and more preset instrument sounds and background accompaniments to their Incredible Musical Keyboard package. The Kawasaki Rhythm Rocker now offers more

extensive recording capabilities, music printouts, note displays, and a new program—Magical Musiquill—on the flip side of the disk. Music Processor now features music printouts, music editing, and easier recording capabilities. Along with these enhancements, Sight & Sound has reduced prices on these programs by \$10.

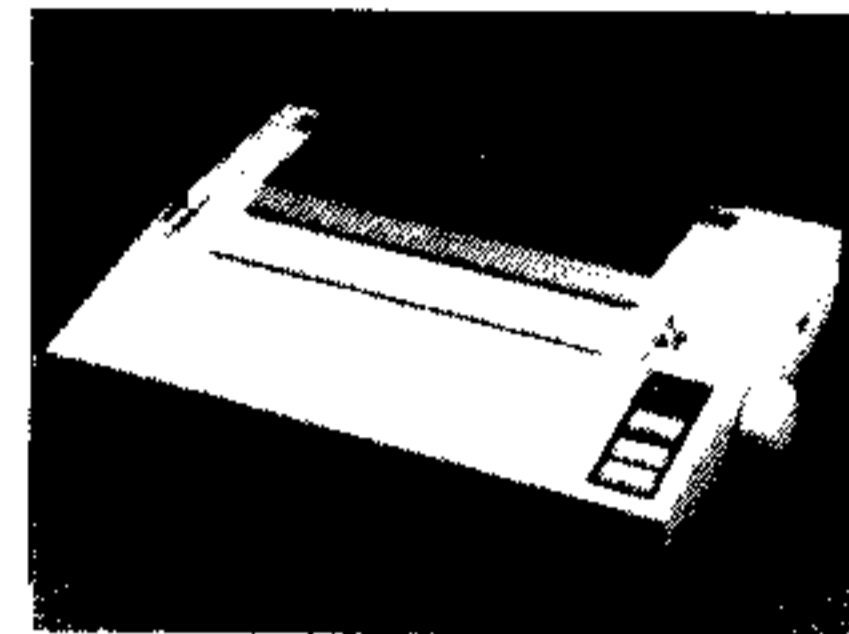
Sight & Sound Music Software Inc.
P.O. Box 27
New Berlin, WI 53151
(414) 784-5850



Covering The Printer Spectrum

A Printer For Both IBM and Apple

Epson America has released the Spectrum LX-80, a new dual-mode, dot-matrix printer featuring plug-in compatibility with the IBM PC, PCjr, and the Apple IIc. It offers fast draft copy and near-letter-quality capabilities, and prints in 80-column mode. The Spectrum LX-80 prints at 100 characters per second (draft), and 16 characters per second (NLQ). It comes with tractor and friction paper feed and offers a cut-sheet feeder as an option.



The Spectrum LX-80 prints in a variety of timesteps, and is available with a generic parallel printer interface cartridge. It retails for \$389.

Epson America Inc.
2780 Lomita Blvd.
Torrance, CA 90505
(800) 421-5426



C Is For Commodore

A C-Language Compiler for C-64, 128

Abacus Software is releasing a C-language compiler for the Commodore 64 & 128. Priced at \$79.95 Super C-language compiler is the first full C compiler to work on the C-64. Super C is a complete development system with an editor

capable of handling source files up to 41K in length. The compiler produces 6510 machine code. Super C's library supports standard and Commodore-oriented functions and conforms to the Kernighan & Ritchie standard.

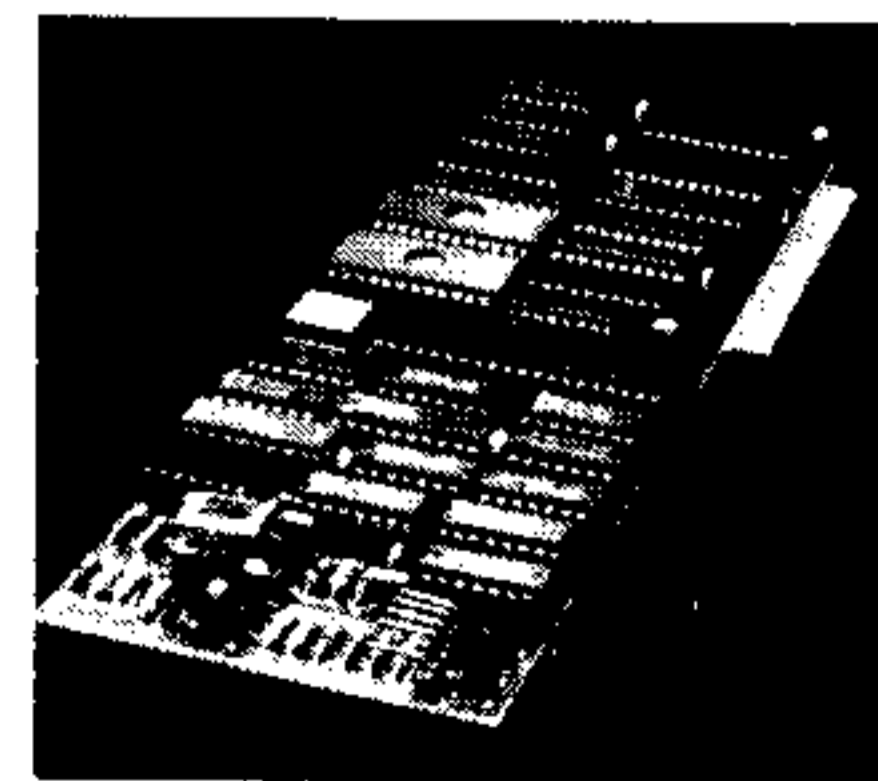
Abacus Software Inc.
P.O. Box 7211
Grand Rapids, MI 49510
(616) 241-5510



Popular Program Runs On All Apples

AppleWorks on the II+

Videx Inc. has announced a new product that enables AppleWorks to be used on any Apple II+ that has a Videoterm 80-column card, and the one-wire shift modification. The program replaces the special keys of the Apple IIe with commands available on the Apple II+ keyboard. Called the AppleWorks Modifier, the program requires 64K of RAM, and provides 10K of



editing memory. AppleWorks Modifier is \$49.

Videx Inc.
1105 N.E. Circle Blvd
Corvallis, OR 97330
(503) 758-0521



Are 2 Drives Better Than 1?

Increase Juniors Memory

Racore Corporation is introducing a new product in its line of companion peripherals for the IBM PCjr. The Drive Two Enhancement Package allows users to increase memory up to 512K and operates in DOS 2.0, DOS 2.1, or DOS 3.0. Other features include a parallel printer port, clock calendar, memory-expansion slot, and side-bus expansion.

The package fits snugly on top of Junior, and can be installed in less than 10 minutes using just a flat-head screwdriver. The Drive Two Enhancement Package retails for \$675. Racore is planning to market a Direct Memory Access product for the PCjr in mid-June.

Racore Corporation
10 Victor Square
Scotts Valley, CA 95066
(408) 438-7255



Decoder Ring Grows Up

Solve Cryptic Messages With Computer

Arden Enterprises has released CryptoCompute for the TI-99/4A allowing users to decode cryptograms using their computer rather than penciling guesses into the newspaper. The program is available in two versions: Version 1, requiring a disk drive and Extended BASIC; and Version 2, requiring a disk drive, Extended BASIC, and

32K memory expansion. CryptoCompute comes with 47 original cryptic messages from assorted subjects, or you can key-in cryptograms from other sources. A subscription service is available that provides new data disks each month containing an original set of cryptic messages. Both versions are \$19.95.

Arden Enterprises
P.O. Box 89
Walkersville, MD 21793
(301) 845-6024

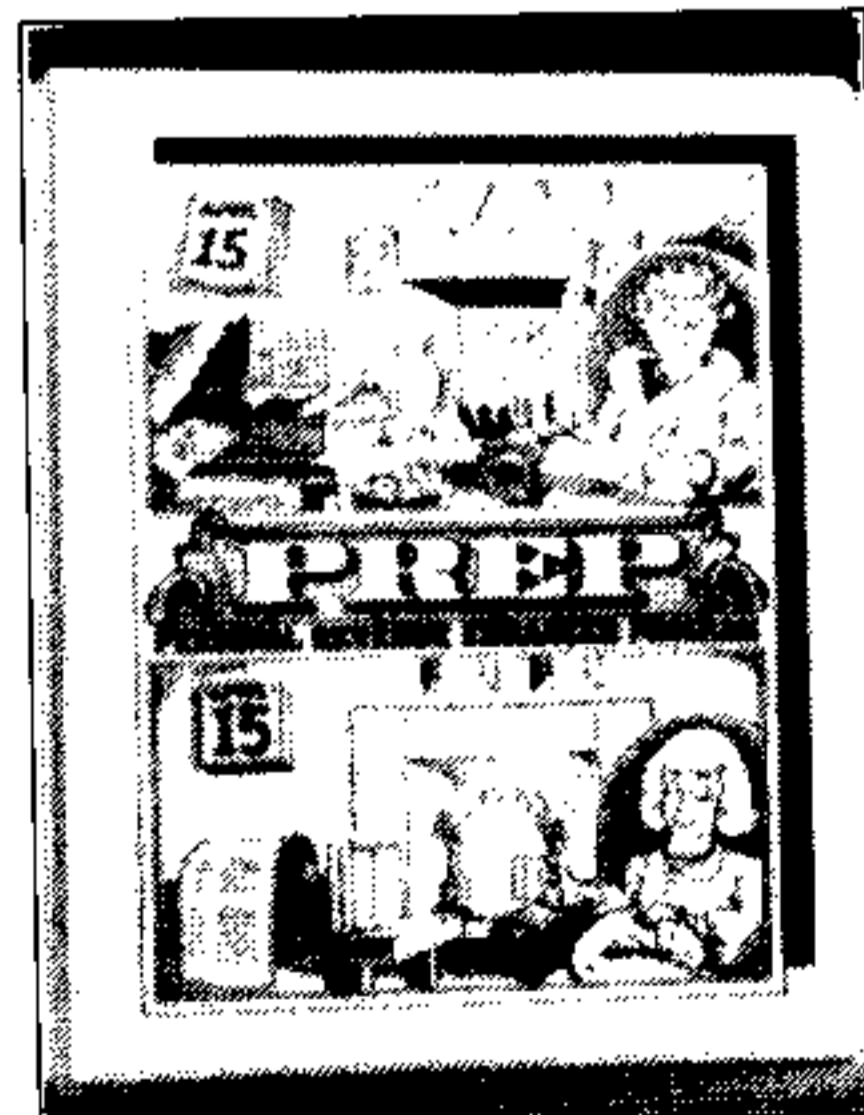


Balancing The Books

Program Helps Manage Money

A Personal Revenue Enhancement Program (PREP), for managing expenses, checking accounts, taxes, credit-card expenditures, and cash has been released by U.S. Digital. PREP lets the user define up to 250 spending and income categories. The program is MS DOS- and PC DOS-compatible and is currently available for the IBM PC for \$59.95.

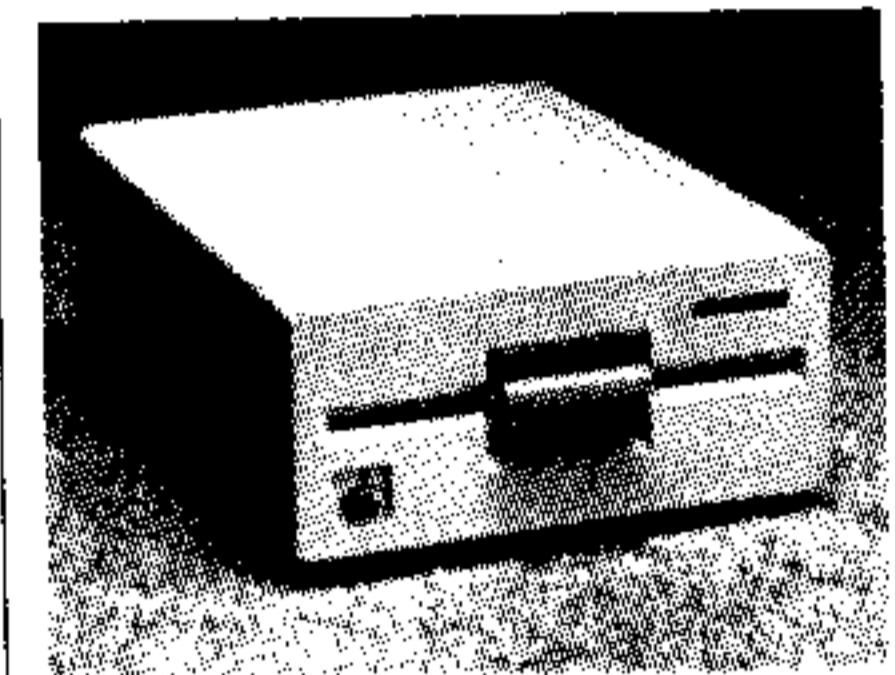
U.S. Digital Corporation
5687 S.E. International Way
Portland, OR 97222
(503) 654-0668



Designer Disk Drives From Apple

Disk Driving in Style

Apple Computer has released a new compact, single, half-height, floppy-disk drive for the Apple II, II+, and the Apple IIe. Called the UniDisk, it is fully compatible with the more than 10,000 software programs available for the Apple II Family. The new drive provides 143K of storage capacity, and is functionally identical to Apple's Disk II drive, which it replaces. UniDisk may be purchased with or without a controller card, however, the first UniDisk purchased needs the card in order to be connected to the computer. Subsequent disk drives can be plugged into the back



of the first disk drive. UniDisk's control card is not compatible with the controller card shipped with the Disk II, so users who have a Disk II connected to their system must purchase a UniDisk with a controller card. UniDisk retails for \$429 with controller card, and \$329 without.

Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010



Go For The Gold . . . Again

Epyx Sequel has 8 New Events

Epyx has released a sequel to its program Summer Games, called Summer Games II. It contains 8 new ways to compete for Olympic gold: cycling, kayaking, fencing, equestrian competition, and several new track and field events. Summer Games II's graphics and animation include colorful opening and closing ceremonies complete with doves, and a sound track of 18 national anthems. Summer Games II runs on Apple II Family and C-64 systems, and retails for \$40.

Epyx Inc.
1043 Kiel Court
Sunnyvale, CA 94089
(408) 745-0700



Cramming In More Memory

Apple Add-on Adds Extra Muscle

BFM Products has announced a new plug-in memory expansion board for Apple II, II+, and IIe computers. Called the Cramapple, it's available in either 128K or 512K versions. Cramapple can be accessed as a single large disk

of memory, or as distinct banks of memory equal to 3, 35-track floppy disks. Depending on the applications, Cramapple can speed processing time by up to 50 percent. It is priced at \$149 for the 128K board, and \$349 for the 512K board.

BFM Products
P.O. Box 942
Felton, CA 95018
(408) 263-9378



algorithm – A set of rules or procedures used to solve a problem. (See the Algorithm-A-Tricks column in this issue.)

application program – A software program that is not a necessary part of the computer's environment (like the Disk Operating System software or BASIC Input/Output System software) but is applied to the solution of a user's problem. Examples are word processing, spreadsheet, and data-base programs.

array – A collection of items (data), identified by a common variable name and arranged in such a way that the computer can search via the array's subscript to find and retrieve specific items. (See "subscript.")

ASCII – Stands for American Standard Code for Information Interchange. ASCII is the computer code most commonly used to represent upper- and lower-case letters, numbers, symbols, and punctuation marks.

aspect ratio – The ratio between the width of a pixel and the height of a pixel on the screen.

assembly language – A programming language that is one step up from machine language. Instead of using numbers—as in machine language—short combinations of letters, called mnemonics, are used to code programs.

auto-boot – A program that will automatically run when loaded.

BASIC loader – A BASIC program that loads a machine-language routine into memory.

baud – A unit of speed in data transmission, usually indicating the number of bits per second.

benchmarking – A program that compares the capabilities of 2 or more systems or programs relative to each other—i.e., for processing speed.

binary-coded decimal arithmetic – Arithmetic using a 4-bit representation of a decimal number.

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

bit – Contraction of Binary digit. It is 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.

boot disk – A diskette that has a special recording in a certain spot that is searched for and used by a computer system to initialize its environment and Disk Operating System.

buffer – A temporary storage area for data.

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

compiled language – Any computer language where the source code is translated into machine language before the program is run.

concatenate – To link together, as in appending one file to another.

CONFIG.SYS file – When an IBM PC or PCjr that has just been "booted" from a PC-DOS boot disk, the DOS immediately searches the disk for this file. If it is there and has coded instructions following the correct syntax, the system will activate other software referenced in these lines to reconfigure the system.

constant – A value which remains unchanged throughout a program's operation.

control character – A character that is not intended to be printed, but which has special meaning to peripheral devices or as a delimiter in data transmission.

counter – A control variable used in a loop to step sequentially through a process.

data segment – A portion of memory indexed for data rather than code.

default – Some programs or systems allow you a choice of several options. If you do not pick one, one is automatically assigned, by default.

device drivers – Software programs that enable the Disk Operating System to interface with nonstandard input/output devices and even "fool" the system into treating part of memory as an input/output device. (See RAM Disk.)

dialogue box – On the Macintosh, a special window that appears on screen to inform the user of present options.

dimension – In an array, a section identified by a particular subscript.

display – Data shown on a video screen or monitor.

DOS – An acronym for Disk Operating System.

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).

expression (mathematical) – A group of mathematical terms that express a value.

file – A collection of related records (data items), treated as a unit—i.e., an address list may compose one file, a writing project another, etc.

flag – A variable that signals a specific occurrence in a program's execution, which can be tested later for program control.

flow chart – A chart which presents a graphic representation of a program's or algorithm's flow of control.

frequency – The rate at which a sound wave moves—directly related to pitch.

garbage collection – A pause in normal program operation when the system frees up memory space by deleting un-needed variable storage and scratch-pad memory.

hard-coded – When values of variables or constants are specified within the program code itself and not subject to change by user input.

heap – On the Macintosh, a general RAM memory area used for programs and data on demand.

hertz – A unit of frequency that is equal to one cycle per second.

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

hypotenuse – In a right triangle, the side opposite the right angle.

initialization – The setting of program counters, addresses, and switches to starting values at specific points in a routine.

input buffer – An area of memory reserved to store input data until the program can process it.

integer array – An array of integer numbers. (See "array" above.)

interpreted language – Any computer language whose source code executes one instruction at a time, as opposed to a compiled language.

interrupt – A break in a program's execution, caused by either an external source or a signal that directs the computer away from the program sequence.

legal input – Data entered into the computer in a format acceptable for the program being used.

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

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

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

multi-dimensional array – An array with more than one subscript, such that the data is arranged in a matrix.

page zero – The lowest 256 (\$100 hexadecimal) locations in the 6502 microprocessor's memory, the processor used in Apple computers. Due to special addressing modes that use the area, it is often used by interpreters and operating systems for storing special codes and pointer addresses.

parallel port – The connector on a computing device that transmits and receives data over several wires (usually 8 paths) simultaneously or in "parallel." This port is most often used to connect a printer to a computer.

parameter – A variable used to control a particular process.

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.

printer buffer – An area of Random Access Memory in the computer used to temporarily store information that is awaiting transmission to a printer while the main portion of the computer is used for some other function. (See "spooler.")

program file – As opposed to a data file, a file containing program code that can be stored and retrieved.

radian – A unit of measure in an angle. Computers use radians instead of degrees to measure angles. There are 6.28318530718 ($2 \cdot \pi$) radians in a circle (360 degrees).

RAM – Random Access Memory. It can be programmed, erased, or altered by users.

RAM disk drive – An area of Random Access Memory set aside for use, through a "device driver," with the Disk Operating System as a floppy disk drive. This has the great advantage of speed and the drawback of forgetting everything when the power is turned off.

ROM – Read Only Memory. The fixed, permanent memory bank of a computer inaccessible to users.

sector – Circular sections on a floppy disk, similar to grooves on a record.

sequential text file – A disk file of ASCII characters arranged sequentially.

SID – Sound Interface Device chip in the Commodore 64.

spooler – A "device driver" program that intercepts data inbound from an input device or outbound to an output device (such as a printer) and temporarily stores it in memory set aside to free up the computer's time for handling other functions. This type of software only works on computers with certain hardware features.

spreadsheet – A program for manipulating numbers in tabular form. A grid is displayed, and users may put numbers into the cells of the grid and specify relationships between rows and columns. A change in one cell may affect the entire grid.

sprite – A user-defined moveable graphic character.

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.

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

string array – An array of strings. (See "array" and "string.")

subscript – An index for an array that indicates a specific element or identifies a dimension. (See "element" and "dimension.")

tokenize – The process in which a BASIC command or function is abbreviated into one character.

track – Cross-sections of a disk. Similar to slices in a pie.

transient code segment – Code brought into memory from disk because the entire interpreter cannot reside in memory at one time.

vector – A pointer or passageway to important routines in the computer's memory.

vector (physics) – A quantity which not only has magnitude, but also direction.

video buffer – Also known as screen memory, an area of Random Access Memory that is used to store the current image data used to produce the display that is seen on the monitor or TV.

window – An area of the screen reserved for output. Other parts of the screen outside the current window will not be affected by output from the computer.

WOM – Write-Only Memory.

word wrap – A feature of some word-processing programs that will automatically move a word to the next line if it cannot fit in its entirety at the end of the line being worked on.



During the production of every issue, corrections and/or enhancements to our programs are completed and tested in our programming laboratory. As the new version of a program is compared to the *last published version* by our "cross-checking" computer, a listing of all the differences is produced, transmitted to the computerized typesetter, and formatted in the same fashion as our standard listings.

This procedure for "DeBugs on Display" offers two advantages: (1) a standard presentation for updating your HCM programs that is clear and straightforward, and (2) inclusion of all published changes in "update files" which are placed ON DISK(TM) at the same time that the corrections appear in print. This is of special significance to ON DISK(TM) subscribers, because the correction file can be directly "merged" with the original file—automatically updating it! The procedures for accomplishing this are included with the appropriate media. [TI users take note—the merge command is available in Extended BASIC only.—Ed.]

Good news for Commodore 64 users with Datasets! The utility program for merging files from tape is now available (see the Commodore Tech Note on page 55 of this issue for details).

If you are going to type the corrections from "DeBugs on Display" directly into the original program, follow these steps:

- 1.) Load the original program into your computer's memory.
- 2.) Key-in the corrections as directed in the "Program Typing Guide" at the beginning of the Listings section.
- 3.) Any lines in the listing of corrections that state "****DELETED LINE," are to be deleted from the original program by entering the line number only and pressing either the (ENTER) or (RETURN) key (depending on your computer).

Each set of program corrections is prefaced by an identification bar that tells you: (1) the program name, (2) the volume and number of HCM in which the program was first published, (3) the number of the *last published version*, and (4) the computer brand to which the correction applies. Make sure that you are working with the right listing to ensure satisfactory results.

THE ORGANIZER FILE MANAGER (HCM Vol. 5, No. 1)

The last level of DeBugs published in HCM Vol. 5, No. 2 as version .2

APPLE // Family

```

180 REM VERSION 5.1.3
730 FO = 1: GOSUB 1650: GOSUB 1740
940 IF IN$ = ESC$ OR FL$ = " THEN RE
TURN
955 V = 1: GOSUB 3030
1160 GOSUB 1740: GOSUB 1780
1170 IF IN$ = ESC$ OR FL$ = " THEN RE
TURN
1185 V = 2: GOSUB 3030
1186 ONERR GOTO 2630
1270 IF IN$ = ESC$ OR FL$ = " THEN RE
TURN
1285 GOSUB 3030
2025 IF FL$ = " THEN RETURN
2450 HTAB 1: VTAB 23: PRINT "PLACE DISK:
IN DRIVE": DR$: " AND PRESS RETURN":
2470 HTAB 1: VTAB 23: CALL 868: GOSUB
1740
3030 ONERR GOTO 3100
3040 PRINT CHR$(4) "VERIFY": FL$
3050 IF V < 1 THEN 3070
3060 HTAB 5: VTAB 20: CALL 868
3061 PRINT "DO YOU WANT TO REPLACE: " : PR
INT FL$: " (Y/N)": GOSUB 3200
3062 IF KB = 217 THEN 960
3064 IF KB = 206 THEN RUN
3070 IF V < 2 THEN 3090
3080 HTAB 5: VTAB 20: CALL 868
3081 PRINT "ARE YOU SURE YOU WANT TO DEL
ETE": PRINT FL$: " (Y/N)": GOSUB 32
00
3082 IF KB = 217 THEN RETURN
3085 IF KB = 206 THEN RUN
3090 RETURN
3100 X = PEEK(222)

```

```

3110 IF X < 6 AND X > 7 THEN GOTO
2650
3120 IF V = 1 THEN 960
3130 HTAB 5: VTAB 20: CALL 868
3131 PRINT "FILE DOES NOT EXIST. PRESS R
ETURN TO CONTINUE."
3140 GOSUB 2500: IF KB < 141 AND KB >
155 THEN 3140
3150 RUN
3200 GOSUB 2500: IF (KB < 217) AND (K
B > 155) AND (KB < 206) THEN
3200
3205 IF KB = 155 THEN RUN
3210 RETURN

```

MARKET MADNESS (HCM Vol. 4, No. 4)

The last level of DeBugs published in HCM Vol. 5, No. 2 as version .3

IBM PC & IBM PCjr

```

160 VERSION 4.4.4
270 LOCATE 23,1: INPUT "HOW MANY WEEKS (
AT LEAST 2)": AS: GOSUB 1690: IF STA
T=1 THEN 270 ELSE NW=VAL(AS): IF NW<
2 THEN 270
1600 NEXT: LOCATE 15,1: PRINT "THE WINNER
IS": NAM$(WIN): FOR Z=1 TO NP: IF Z=
WIN THEN 1610 ELSE IF NET(Z)=NET(WI
N) THEN PRINT " AND ": NAM$(Z):

```

Program Alterations for the Tandy 1000

Users of the Tandy 1000, a PC-compatible computer, have written to inform us that many of the IBM PC and PCjr programs published in HCM run without problems on the Tandy machine. We did discover one consistent program change that must be made in order for our programs to run on this PC-compatible. It is listed below. In each forthcoming issue, we will publish a list of line numbers for each program where alterations should be made. Please let us know if you discover any other problems in running our software on your Tandy 1000.

Unlike IBM BASICs, Tandy BASIC's CLS (CLear Screen) does not recognize screen line 25. Thus, the CLS command clears up to and including line 24, leaving line 25 unaltered. To counter this effect, replace each CLS command with this code:

```
CLS:LOCATE 25,1:PRINT SPACE$(40)
```

In addition, trying to access line 25 before a KEY OFF statement has been executed causes an illegal function call, so precede the *first* LOCATE 25,1 command with a KEY OFF statement like this:

```
CLS:KEY OFF:LOCATE 25,1:PRINT SPACE$(40)
```

Programs and line numbers to be altered in this issue are as follows:

ARCHEODROID

250, 270, 370, 380, 390, 400, 410, 450, 1440

TRIG-TRIX

250, 750, 830, 850, 860, 870, 880, 1660

MINE OVER MATTER

240, 310, 340, 360, 390, 430, 800, 880, 1060, 1160, 1410, 1590, 1610, 1640

RUN-DAY-VIEW

270, 290, 350, 420, 490, 880, 980, 1460, 1650, 1710, 1750, 1940, 2130, 2210, 2320, 2340, 2470, 2490

EGGS (IBMpressions)

240

CHARACTER GRAPHICS (IBM Tech Note)

260, 270, 310

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