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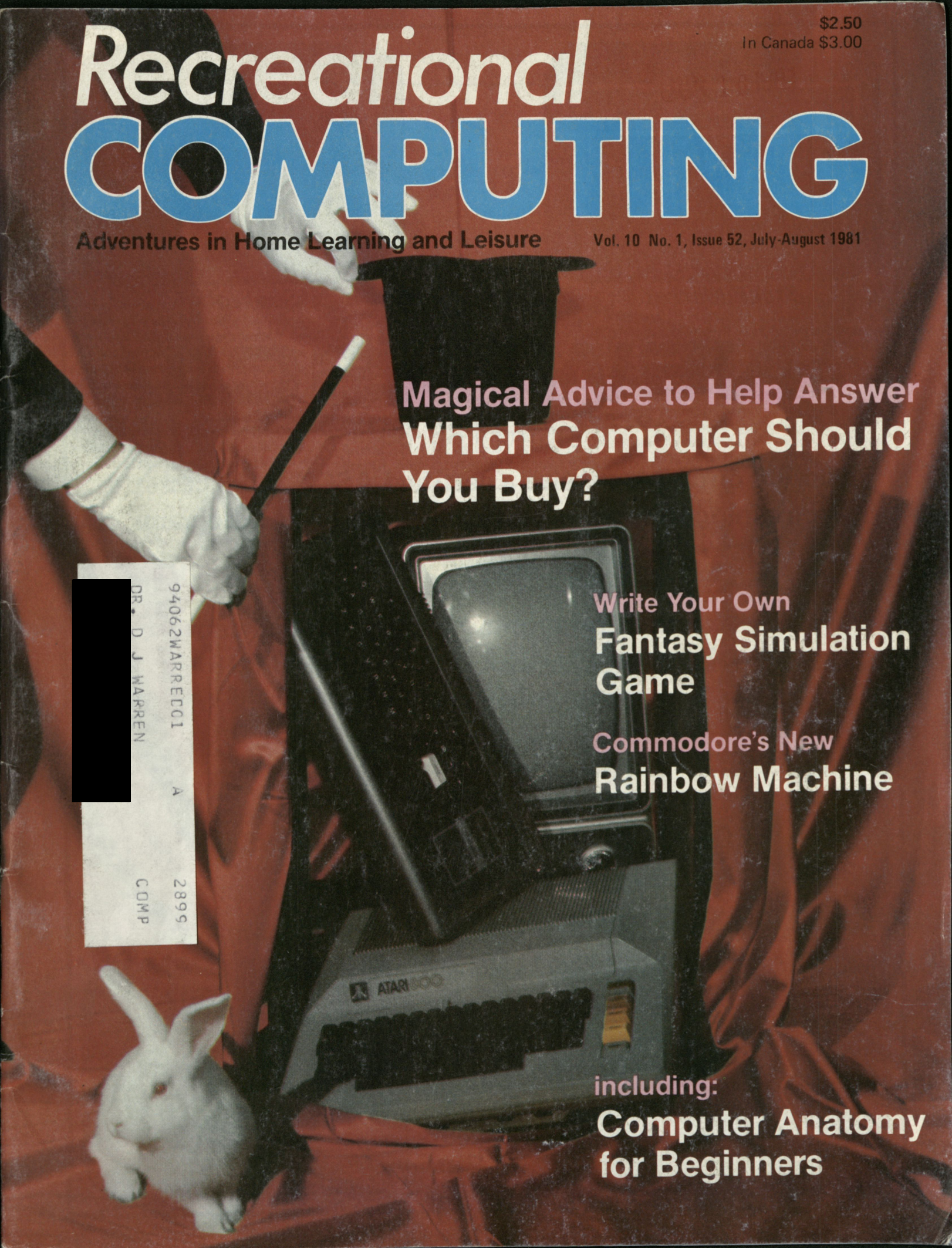
Recreational COMPUTING

Adventures in Home Learning and Leisure

Vol. 10 No. 1, Issue 52, July-August 1981



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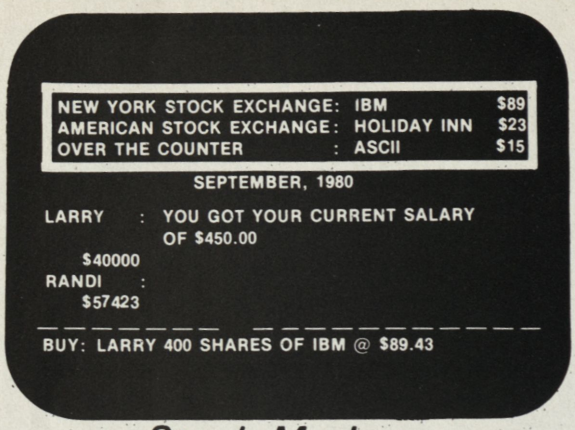

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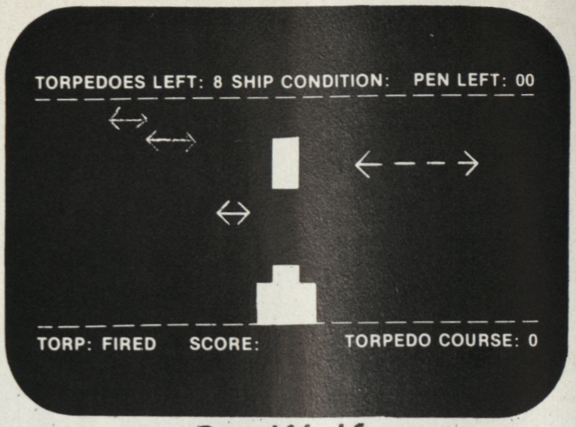

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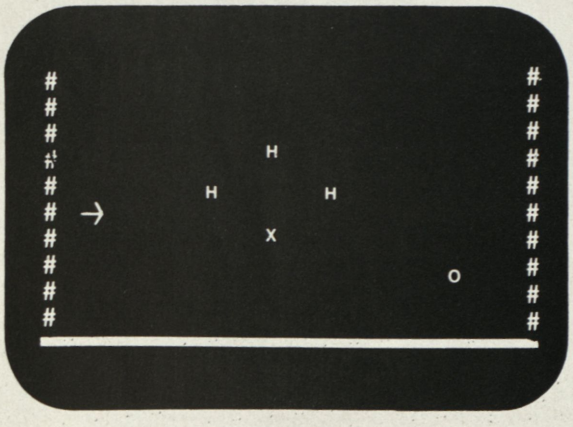

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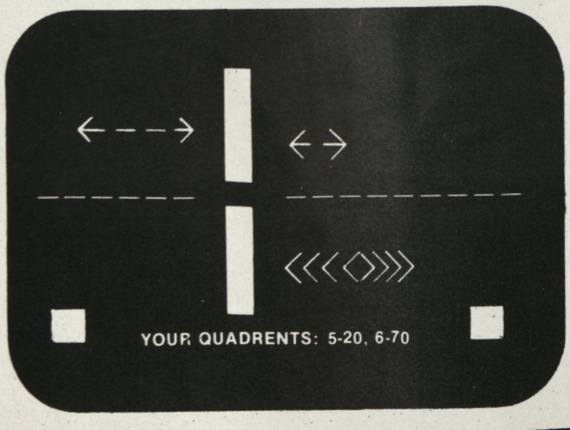

*TRS-80 is a product of Tandy Corp.

Appropriate Technology

It all began for me in the late sixties with George Leonard's *Education and Ecstacy*. In the "Future of Education" Leonard envisioned the computerized home environment where children teach themselves, motivated solely by their own interests. The learning environment became an informational network using computers in a marvelous blend of behavioral and humanistic psychology.

Ten years later, the concept of the "electronic cottage" has taken on reality: *TV Guide* writes regularly of the video revolution that may make traditional tube-watching a thing of the past; latest estimates claim around a million microcomputers at use in the home; Alvin Toffler's *The Third Wave* assumes this phenomenon as a basic part of a huge social restructuring that is leaving industrial civilization behind.

To paraphrase McLuhan, it is difficult to observe a social revolution while in its midst since media environments tend to be invisible. Like fish struggling to understand "water," it's nigh impossible to obtain the necessary outside perspective to view the whole process.

People's Computer Company doesn't pretend to any crystal ball gazing but we have been part of this process from the beginning. In fact, founder Bob Albrecht was alienating his colleagues and accepting the ridicule of his peers twenty years ago because he successfully taught programming to kids. Computing in those days was a sophisticated affair and one did not stoop to educate the masses. Much to his credit, and to our benefit, Albrecht thought differently.

Recreational Computing in particular is dedicated to reducing the confusion brought on by this "third wave" collision. Understanding the capability and very real limitation of small computers can do much to demystify and even to "treat" the symptoms of future shock.

The bottom line is learning to be self-reliant in a way that is harmonious with our natural environment but doesn't attempt to deny our technical heritage. Approached humanistically, writing computer programs requires a "holistic" approach. The computing process, with its inputs, outputs, and continual feedback loops can be seen as an ecological system.

If McLuhan is right and all media are extensions of some faculty, psychic or physical, then the informational environment created by the use of home computers is an outpicturing of our innate potential. It then seems reasonable to presume that mastering one tends to aid mastering the other, with self-reliance the result. If so, we can conclude that home computing is a technology appropriate to our changing times.

Michael Madaj

Michael Madaj
Publisher

Recreational COMPUTING

July/August 1981
Volume 10, Number 1
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Editorial

Through the Looking Glass

It's time the computer marketing people took a long coffee break. Better yet, an extended leave of absence. There is little wrong with the personal computers that are being sold, but what consumers believe they are buying is not what they are actually getting.

Each of the major manufacturers sells via the gift-wrap approach. It goes like this: they put all the components of a system into one box and label it "All-in-One." They declare it is the ultimate computer for *your own very special needs.* Ads and salesmen start chanting the phrase, "All-in-one, meets your needs . . . ." Pretty soon everyone, even you (the not-yet-consumer), is saying the same thing. So you buy the package.

There the marketing ends. Have you ever tried to get a service person to live up to promises made by the p.r. man? Good luck. And it can be pretty frustrating to re-read literature stating that a child could easily do what it has taken you three days to give up on.

The point is that for the first-time computer user, it is a foreign world. He has stepped through the looking glass and hears a new language of words like interface, load, run, floppy, RAM and chip. Often the new words are defined by even stranger ones like bit configuration and baud rate.

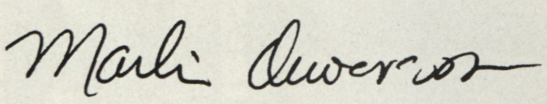
This issue of *Recreational Computing* will help any purchaser of a small computer. You can learn how to determine your actual needs, and how they will influence your decision. There is also a review of one new machine which will probably lead to higher standards in color computers. Our guest forum asks if there is a better approach to computers, and to computer games, than what we have seen to date. Another feature gives a glimpse of what is possible when two technologies – cable television and microprocessing – link up in the future.

We are providing this kind of information with the hope that it will dispel a few of the problems people have encountered. Whenever anyone attempts something new, he goes through a learning process. It is the same with home or small business computers. It takes time, persistence and some effort. These are wonderful machines whose potential has not yet been even slightly explored. But they are not magic.

Marketeers and manufacturers have fallen for their own sales pitch. They really do believe that all you have to do is plug in your computer and it will suddenly edit manuscripts, balance your ledgers, and instruct your children. Some of them even think it will take out the garbage – why else would they send pounds and pounds of incomprehensible manuals to beginning computerists who selected that particular computer because they wouldn't need to know all those things?

The people who make and sell computers should take a long, hard look at themselves. They should put themselves back into the shoes of the person who wants to figure out how to load that first tape, but nothing will happen. In turn, the person who wants to buy a computer must use his judgment and take the same precaution he would when buying a new car. Take a test drive, check the warranty, kick the tires.

Our pages will feature the latest makes and models, ways to increase the mileage you get from your computer, and great trips you can take on your keyboard. Stay with us, we'll keep you informed!



Marlin Ouverson
Editor

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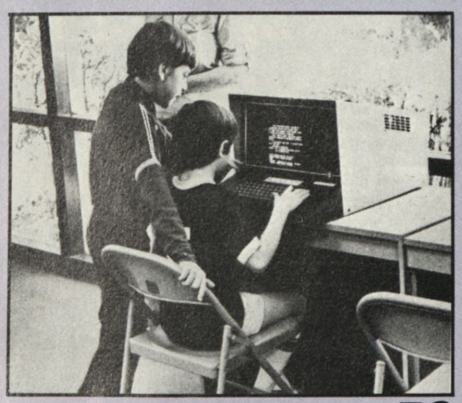

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Recreational COMPUTING

July/August 1981, Volume 10, Number 1, Issue 52

Learning About Computers

Games and Programs

Departments

Cover by Kent Safford.

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"Letters to the Editor" is not a simple two-way dialogue. This is a space for educators, games players, parents and students to come together. While editors meet and correspond with many subscribers, there is no substitute for putting people in contact with one another. A beneficial kind of volatility results when different personalities, technical/social outlooks and levels of computer knowledge or expertise make contact.

If you have questions of any nature, simple or complex, and wish to enter our open dialogue, then write to "Letters," c/o **Recreational Computing,** *1263 El Camino Real, Box E, Menlo Park, CA 94025.*

Hunt and Peck

Dear People:

I am writing a book for children on Tic Tac Toe and other three-in-a-row games, from ancient Egypt to the modern computer, to be published by T.Y. Crowell.

A friend reported having read about a chicken playing Tic Tac Toe with a human being, and almost invariably winning the game. As he recalls, this took place at a New Jersey gambling resort. Actually the chicken's Tic Tac Toe board, which was not visible to the human opponent, was guided by a computer to have the appropriate square light up; the chicken would peck at it, and be rewarded with corn. Since the details are not quite clear in my friend's recollection, I should like to learn more about the procedure from an authoritative source before using the material in my book. Can you suggest where I can find more on this subject?

Perhaps you have other suggestions that I can use in this book. I should appreciate any assistance you can give. Thank you very much.

Sincerely,
Claudia Zaslavsky
45 Fairview Avenue
New York, N.Y. 10040

Robotics

Dear Sir:

I am hoping to start a club in the Northern New Jersey/New York City/Long Island area for anyone interested in building or working with robots. I would like to get a list together of all the people interested in joining such a club or working with robots. Even if you are too far away to attend a meeting, keep in touch with me. I might hear of a local club in your area.

The meeting time and place have not been picked yet, but will probably be on a week night in New York City. If you have any questions or problems with robots, write me. I might be able to help.

Yours truly,
David Smith
4505 Kennedy Blvd.
North Bergen, N.J. 07047

Strike One!

Dear Sirs:

I've recently puchased the TRS-80 Model III microcomputer from Radio Shack along with your fine manual.

I'm a sports nut, especially baseball, and one of my initial programming projects was to design a "baseball game" – using stats of the major league season.

Do you have any BASIC game programs or suggestions? I'm looking first to just have a 9 inning – 3 outs per inning game – and adding more sophisticated strategies: stolen bases, sacrifice, bunting,

hit and run, etc. – appropriate graphics.

Any suggestions as far as programs you are aware of with a baseball game, please send to me. I certainly appreciate this information.

Thank you.

Tim Marcov
2890 Monterey Blvd.
Brookfield, WI 53005

D Basic Games

Gentlemen:

I recently purchased your book *What to Do After You Hit Return* and have enjoyed it very much.

Perhaps you will be able to tell me where I can purchase games already programmed for my D Basic Computer (which is a Durango DX-85) or some of the more sophisticated programs that I can program in myself.

I have the "Adventure" program and am looking for Dungeons & Dragons and programs of that type. I hope you can assist me in locating and purchasing them.

Sincerely,
Mort Goodman
934 W. Orange Rd.
Santa Ana, CA 92706

CAI for Mechanics

Dear *RC*,

I am an instructor in the auto mechanics program at the College of Alameda. Ours is a two-year, twenty-hour-per-week vocation program, preparing students for an apprenticeship in auto mechanics. We teach apprenticeship in auto mechanics, also evening and weekend classes for consumers, and updating classes for working mechanics.

The main thing I am after is a very simple micro-computer program which I can use to teach students how to read and use a ruler. I find two or three students each quarter who never learned, and would love to be able to send them up to our Learning Center to work on a microcomputer (TRS-80 Model I, 16 K) to pick up that sort of thing.

There are several other areas I am interested in:

- learning about the metric system,
- thread sizing, bolt types and tools,
- consumer-type, miles-per-gallon programs, where they can feed in their car type and driving habits and calculate miles per gallon,
- design factor automotive programs, where students can use engine displacement, axle ratio, auto weight, etc. to calculate miles per gallon.

The school owns one Apple II and one TRS 80 III, but the bulk of our operation centers around TRS-80 Model I with 16K capacities.

One thing I am *not* interested in, and that is writing or creating my own programs or modifying anyone else's. I'm far too busy at present to do anything but teach the students how to use the microcomputer and hand them a disc that someone else has programmed. (Cassette

(Continued on page 28)

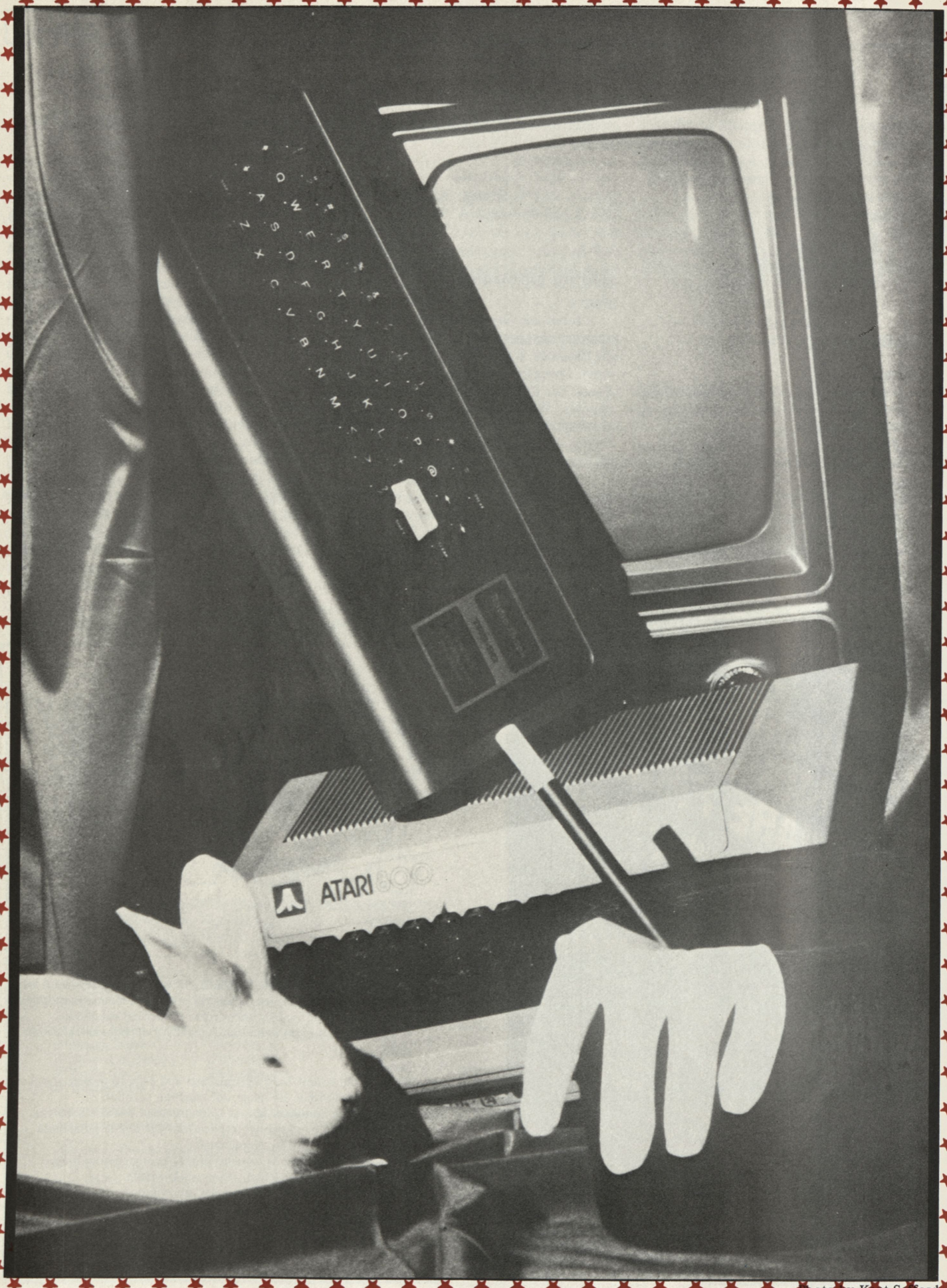


Photo by Kent Safford

HOW TO SELECT A PERSONAL COMPUTER

A GUIDE FOR THE COMPLEAT NOVICE

"Hey! You know a lot about personal computers; which one should I buy?"

IF I had a nickel for each time I've heard that question, I'd be able to buy another computer myself. As someone with access to almost every personal computer ever made, I guess this is a logical question to ask me. The problem is that my familiarity with so many computers has ended up making this a harder question to answer than it would be if I only had one computer at home.

And so, what started out as a simple question ends up as the kick-off point for a careful analysis of the needs and desires of the person who wants an answer.

This article gives a procedure to help find out which personal computer is just right for you. Instead of spending a lot of time talking about the specific computers which are on the market today, we will focus on *your* needs, and on showing how to translate those needs into a specification of the computer *you* want. With new computers being introduced on an almost monthly basis, any other approach to this problem would make this article obsolete by the time you read it. My hope is that you will find this article useful *anytime* you want to know what kind of computer to get, even if that question doesn't come up for a year or so.

Let's start out with a quick picture of just what it is you are thinking of buying. When you purchase your computer you will be getting two kinds of things – the computer itself (this is called the "hardware"), and the programs which run on your computer (this is called "software"). Does this sound familiar? When you buy a stereo system, you get the hardware (the turntable, receiver, amplifier, speakers, *etc.*) and some software (records and tapes). While your initial hardware expense for the computer (or stereo) will be larger than your initial software costs, you most likely will be spending money on software for as long as you own your equipment. As you can see, it is important that you carefully think about your long-term needs and interests before setting your money down for a computer system.

There is one major breakdown in the analogy between stereos and computers. Unlike a home stereo system, a given personal computer can only use software which was written for that specific machine! This may come as a surprise to you, but that fancy game you saw on your neighbor's Atari computer won't work on your machine if you buy an Apple. And, if that weren't enough, most programs for the Radio Shack Color computer will not work on the Radio Shack Model III.

Each computer needs its own tailor-made software. It is as if you needed to buy a Warner Brothers' phonograph to play records by Emmy Lou Harris, and a Philo phonograph to play records by Jim Ringer.

The reason for this is that each computer has special features which make it different from every other computer on the marketplace. You need to be aware of

BY DAVID D. THORNBURG

David D. Thornburg, c/o Innovision, P.O. Box 1317, Los Altos, CA 94022

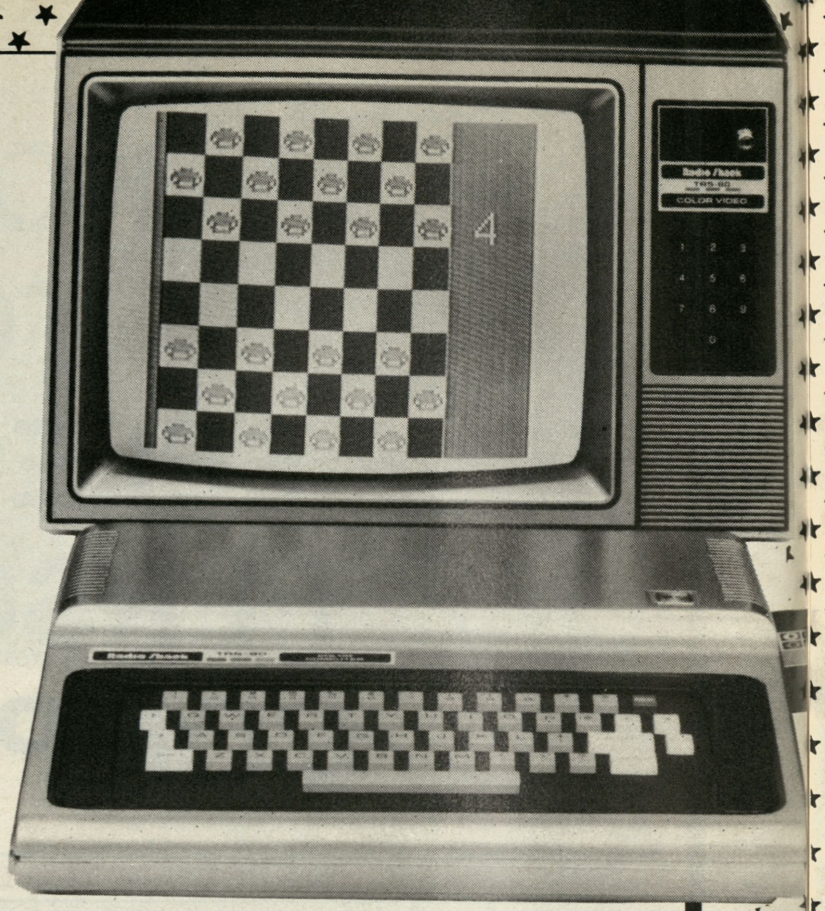
this so that, if you want a machine to play highly interactive color video games, you won't accidentally purchase a computer with a text-only black and white display.

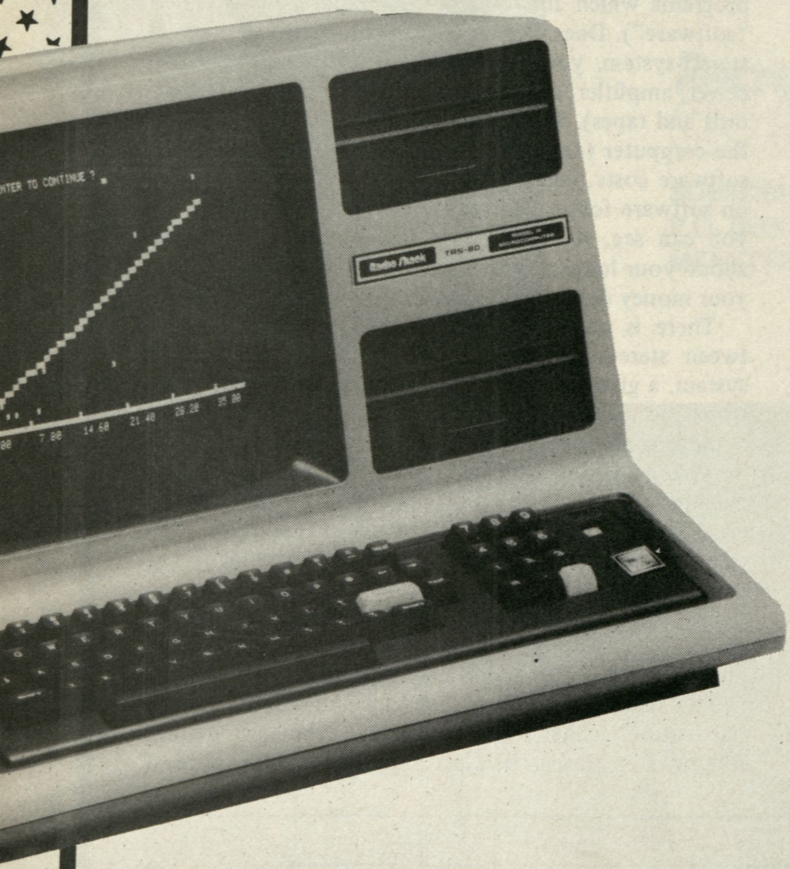
The reason there are so many different computers on the market is simply because the diversity of user needs is so great that each machine has its own following. Some users want the lowest-cost computer available, and others aren't happy with anything unless it is made by IBM.

To start figuring out what kind of personal computer to get, you should first take out a sheet of paper and at the top of it write: "APPLICATIONS FOR MY DREAM MACHINE." Next, start listing how you would like to use your computer. Involve everyone in your household in this process, and don't worry about apparent conflicts. Put down anything that comes to your mind. Hang the list on a wall for a few days so you can add new applications as they come to you.

What did you put down? Games? Of course! Every computer user has *some* recreational software. How about education? Are there youngsters who will use the computer? Did you know that you can use a personal computer system to let you read the AP and UPI news wire services? Or that you can send "electronic mail" to other computer users? Add these applications to the list if they appeal to you.

How about personal finance management? Do you write a lot of letters? Perhaps you want a text editor program. Do you want to learn how to write your own programs? Are you a scientist who wants to do precise mathematical calculations at home? You do volunteer work? Maybe you'd like to maintain a mailing list for your service organization. Or perhaps you are interested in the computer as a hobby. Do you want to learn how computers work? Do you want to tinker around and have your computer control your lawn sprinkler?





How is your list coming? Do you have a few items listed? A dozen? More? I'll bet that you have figured out lots of ways that you might use a computer.

Now that you have gotten this far, the next step is to take a big sheet of paper and use it to help figure out what features your computer needs in order to be useful for each of the applications you have picked. You should list your applications down the left edge of this sheet, with the most important application at the top of the list, and with the rest of the list arranged in decreasing order of importance. Along the top of the sheet we will put some computer features against which we will compare the applications one-by-one. You might want to change the feature list I picked, but basically you should think about four kinds of things: communication from the computer to the user (the display), communication from the user to the computer (the keyboard, joysticks, *etc.*), accessories (sometimes called peripherals, *e.g.*, printers, telephone connections, *etc.*), and information storage requirements. There are several types of information storage your computer will use. At this point we will only make a distinction between the computer "memory" (its internal storage medium) and its access to external storage devices like cassette tape recorders (pretty much like the one on a stereo) and "floppy disk drives." A floppy disk is a much faster memory system than a tape cassette, but it costs more. Useful internal memory capacities range (depending on

Application	Display		Keyboard Quality		Joysticks, Etc.	Printer	Phone	Internal Memory			External Memory	
	B/W	Color	Low	High				Small	Med	Large	Cassette	Disk

Figure 1

the application) from 16 thousand characters to 64 thousand characters. External memories (tapes and disks) hold many times this amount.

While you probably don't need to know too much about computer information storage at this point, you should pay a lot of attention to the input and output capabilities of the computer, since these are the features you will be most aware of.

What sort of things should go on the list? Let's look at displays first to see some of the choices you have.

Possible Display Features:

- Black and white (or black and green)
- Color
- Upper-case letters only
- Upper- and lower-case letters
- Special graphics characters
- 22, 32, 40, 64 or 80 characters per line
- 16, 24 or 32 lines per screen
- Low resolution graphics (dots ½ character size)
- High resolution graphics (several hundred dots along each axis)
- 4, 8, 16 or more colors on the screen at one time
- Independent control of color and intensity

I could add more to this list, but you can see the kinds of things to think about when specifying a display. Next, let's look at another output medium – sound.

Possible Sound Characteristics:

- No sound at all
- One user-selectable musical tone
- Up to several simultaneous musical tones
- Up to several simultaneous sound effects
- Independent control of volume
- Speech synthesis

Now let's look at the input side of the picture.

Possible Keyboard Characteristics:

- Flat panel "touch" keyboard
- Medium travel "calculator" type keyboard
- Full stroke "typewriter" keyboard
- Separate numeric pad
- Upper-case only
- Full upper- and lower-case
- User-definable function keys
- Graphics and color keys

And finally, let's look at some other input devices.

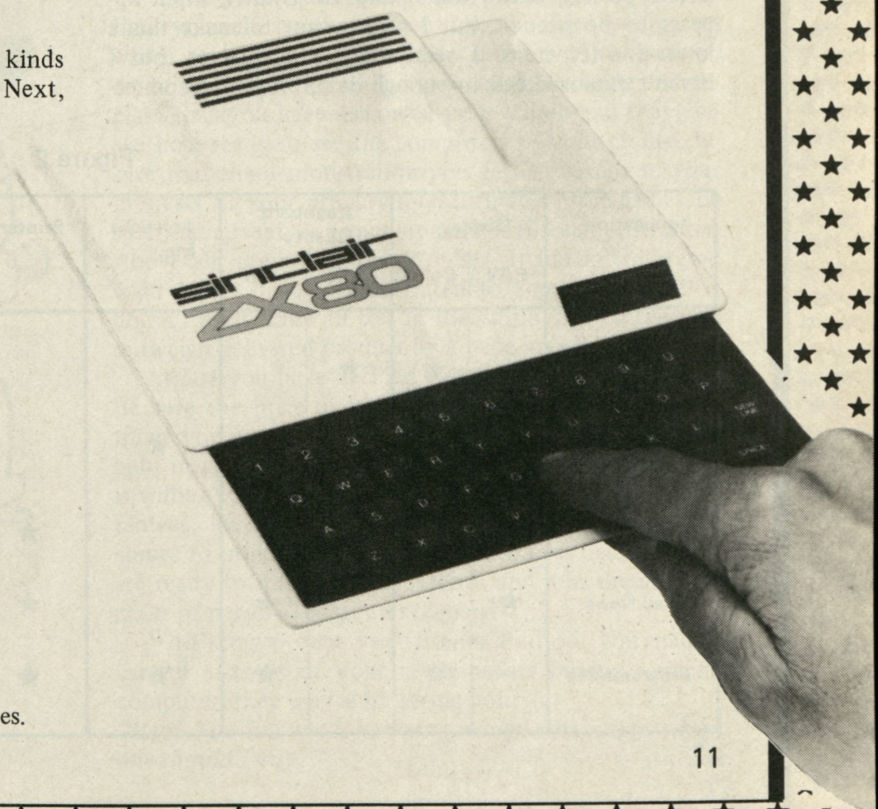
Other Input Device Options:

- None
- Joysticks
- Game paddles
- Light pen
- Graphics tablet
- Speech input
- Handwritten character input

As you can see, we have listed more than 30 separate criteria for you to think about, and we only touched on display, sound, and input criteria. Now you know why I suggested that you use a large sheet of paper!

To get started, you might want to use a shorter set of criteria. The top of your short list might look something like figure 1.

The next task is to start filling out this sheet by checking off the needs of each application against each of the criteria we put along the top. If you don't know the answer to a specific question (for example, how much computer memory do you need for adventure



games), then make a note of this so that you can ask this question specifically when you finally choose your computer. The function of this list is two-fold. First, you may start to see some specific requirements come out of the check list (do most of your applications require a good keyboard?). Second, your unanswered questions give you some specific issues to resolve when looking at different computers. Let's look at some specific applications and see how I would fill them out.

As you can see in figure 2, I listed three applications which require a color display. Since this would also be acceptable for other applications, I now know that I want a color display. Next, I had three applications which require a good keyboard. This suggests that I limit my search to computers with a full-stroke or calculator-type keyboard. Some kind of joystick input appears to be needed, but I might want to make this a lower-priority item. I seem to need a printer, but I haven't explored this in enough detail. A phone connection (called a modem) is essential for two of my applications. It appears that I need as much internal memory as I can get, and that a disk drive may be important.

Of course, we left out one very important factor – cost.

Features do not come free, and even with computer prices dropping to extremely low levels, the price of color televisions, printers and disk drives is still quite high. If you require lots of accessories, you might find that the computer itself is one of the lowest-cost components of your system!

Figure 2

Application	Display		Keyboard Quality		Joysticks Etc.	Printer	Phone	Internal Memory			External Memory	
	B/W	Color	Low	High				Small	Med	Large	Cassette	Disk
Adventure Games		★	★							★	★	
Action Games		★	★		★			★				
Text Edit	★			★		★				★		★
Read News	★			★		★	★		★			
Programming		★		★	★	★	★			★		★

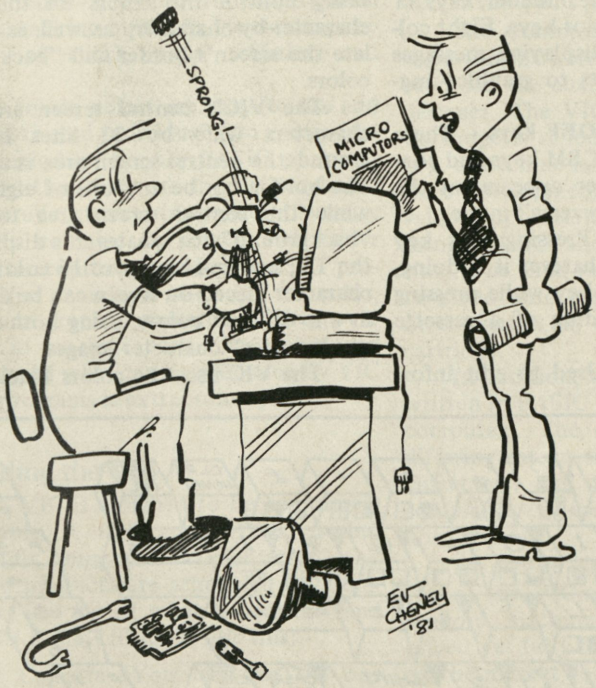
So the next thing for you to do is to decide how much you can afford to spend on your computer system. Can you afford $500, $1000, $2000 or more? Think about long term costs – software, upkeep, more accessories. I don't mean to alarm you; but it is possible that a $300 computer just won't do the things *you* want it to do, no matter how appealing the advertisements might be. Make no mistake about it. A low-cost computer that doesn't satisfy your needs is no bargain!

Well, we have made a lot of progress. By now you have two valuable things – a list of features you want your computer to have, and a budget. Now you are finally ready to see what the marketplace has to offer.

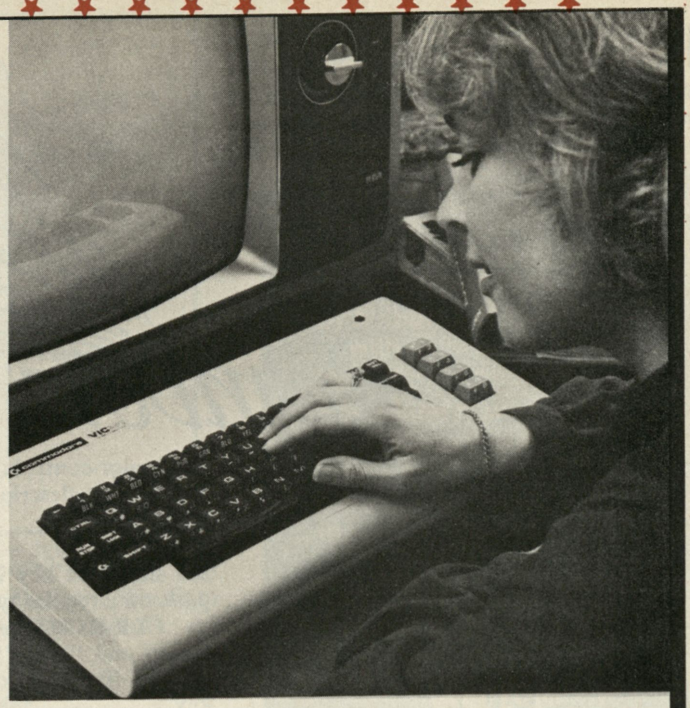
There are several ways to learn about specific computer systems:

- Drop in to a local resource such as ComputerTown USA! and use their computers for awhile.
- Attend local computer fairs and expositions.
- Read general interest computer magazines which show sensitivity to the needs of the neophyte, such as *Recreational Computing, Compute, Interface Age,* and *OnComputing.*
- Write to manufacturers for catalogs.
- Attend the local users' group meetings. These meetings are usually oriented to one specific computer, so you would have to attend several meetings to learn about different machines.
- Visit your local computer store.

You might be surprised by the fact that I listed the computer stores last, especially since you will most likely be buying your computer from one. My reason for this is that any given store will only carry a limited line of computers. As an extreme example, Radio Shack



"SAY... YOU SEEM TO KNOW A LOT ABOUT COMPUTERS...."



only carries the Radio Shack line. They don't even carry accessories for their computers made by anyone other than Radio Shack. While not so limited, most of the franchise computer stores (MicroAge, Computerland, Byte Shop, *etc.*) have a few different computers in stock.

You need to make your decision from a much broader base than the stock available in *any* given store. Once you have settled on a specific computer, the manufacturer will be more than pleased to send you a list of local dealers who carry their product.

Once your search has gotten to this point, you may find yourself homing in on two or three computers which each seem to be able to satisfy your objectives. At this point you should go to a reputable dealer and explain that you have narrowed your search and that you are now ready to see the computers of your choice. Be sure that the demonstration you get is relevant to your interests. If your primary interest is adventure games, be sure that adventure games are part of the demonstration. Above all, don't rely on promises. If the software you want is not being demonstrated to you, assume that it doesn't exist. Like all else in the world, good intentions outweigh delivered product by a wide margin.

At last you have decided to buy a specific computer. Be sure the price quotation you receive includes everything you want – software *and* hardware. Ask about help in getting the system set up. Make sure the dealer is willing to support your purchase. Find out about warrantees, local service charges, and anything else which comes to mind. Once you have made your decision, you are ready to make that big plunge and join the growing ranks of personal computer owners!

Who knows, once your friends find out you made a careful analysis of your needs before buying a microcomputer, they may start asking you:

"Hey! You know a lot about personal computers; which one should I buy?" ■

The Rainbow Machine

by Ramon Zamora

In January, 1981, Commodore introduced a low-priced ($300), full-featured microcomputer, the Video Interface Computer, or VIC. The VIC's capabilities equal or surpass those of the Sinclair ZX80 ($200), the Radio Shack Color Computer ($400), and the Atari 400 ($630). The VIC offers features that, in some cases, can only be found on machines selling for three to four times its price. Here is what the VIC brings to the market:

- Color
- Full Keyboard Graphics
- Full-Size Typewriter Keyboard
- Special Function Keys
- 5K Memory (1.5K used for screen display); Expandable to 32K
- Low-Priced Peripherals
- Sound
- PET BASIC
- Plug-in Program/Memory Cartridges
- Good Documentation
- Parts for Joysticks, Paddles and Lightpens
- Self-Teaching Modules

The VIC Keyboard

Much of the VIC's power and flexibility comes from the multi-function keyboard Commodore provides with the computer. Each VIC key performs double (and, sometimes, triple or quadruple) duties. Keys with letters on top can be made to display the upper and lower case letter plus the two graphics symbols on the face of the key. There are also cursor-control keys, programmable function keys, and color-control keys, programmable function keys, and color-control keys. Here is a short, key-by-key description of what the VIC keys do.

SHIFT keys – The two shift keys and the shift-lock key work like their counterparts on a regular typewriter.

CLR-HOME key – Used to CLeaR the screen and "home" the cursor, and works exactly like the corresponding PET/CBM key.

CRSR keys – Like on the PET/CBM, these keys control the movement and placement of the cursor. Unlike the PET/CBM machine, these keys have a "repeat" feature that keeps the cursor moving as long as the key is depressed.

RETURN key – Used to signal the end-of-line when you are typing.

CTRL key – Pressing this key and a COLOR key changes the color of the cursor and causes whatever is being displayed to appear in the color selected.

COLOR keys – The number keys (1 through 8) double as color keys. Eight colors are selectable for displaying messages and adding color accents to graphics images.

RVS ON and RVS OFF keys – These keys work like the PET/CBM keys and control whether a character appears on the screen in "normal" or "reverse" mode.

RUN-STOP key – Pressing this key tells the VIC to stop whatever it is doing, and holding the SHIFT key while pressing this key starts the loading of a cassette tape.

INST-DEL key – Used to edit information on the screen through the insertion and deletion of characters.

GRAPHICS keys – Each key with a letter on top has two graphics characters on the key face. The right-hand character is displayed by holding down the SHIFT key and pressing the key with the desired symbol. The left-hand character is obtained by holding down the COMMODORE key (the key with the Commodore symbol on top) and pressing the desired graphics key.

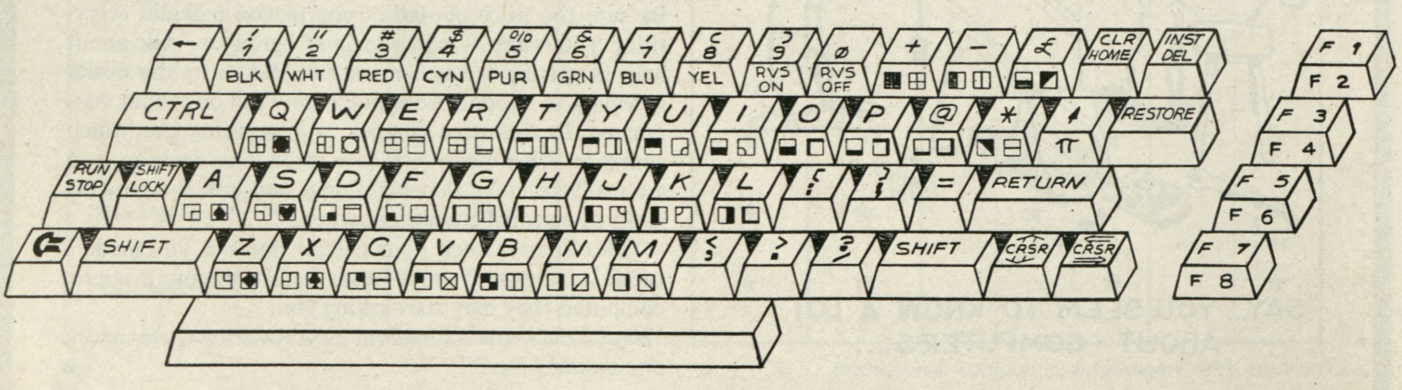
FUNCTION keys – The four keys on the keyboard's right side are assignable from within programs to perform user-defined tasks.

The Rainbow Colored Screen

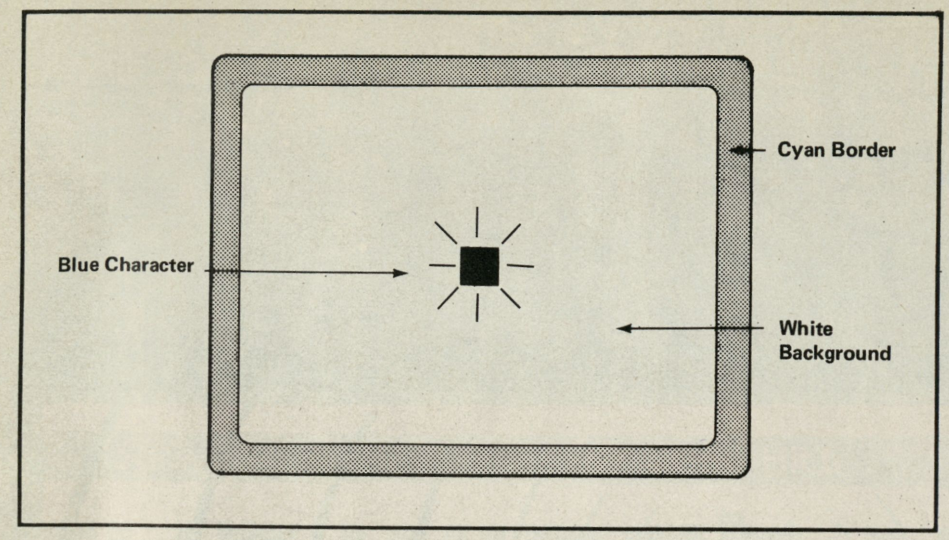
In addition to a powerful keyboard, the VIC brings to the user the ability to easily control the colors on the screen, character-by-character, as well as manipulate the screen's border and "background" colors.

The VIC's central screen area is 22 characters wide by 23 lines high and around the central screen area is a border. The border can be any one of eight colors while the central screen area forms the "background" for whatever is displayed on the TV, and can be any of 16 colors. Every character placed on screen can be displayed in one of eight colors, using both standard and "reverse" character images.

The VIC uses the colors Black, White,



The VIC Keyboard



Red, Cyan, Purple, Green, Blue, and Yellow for the border and the display of characters. The screen's background can be set to any one of the eight colors just mentioned plus Orange, Light Orange, Pink, Light Cyan, Light Purple, Light Green, Light Blue, and Light Yellow. By using different colors for the border, background, and the characters being displayed (in both normal and reverse modes), the VIC provides great flexibility and control of what appears on the screen.

Making Music and Other Noises

The VIC is both a "concert" instrument and a creator of photon laser sounds. The VIC has three music voices with an effective range of about five octaves, and a single "noise" generator for zapping alien invaders, making bird calls, or creating any number of clicks, pops, whistles, and beeps.

The music voices are easy to use and can be activated individually to create harmonic melodies. Simple BASIC porgrams can be written that turn the VIC keyboard into a crude musical instrument. Because the VIC contains a newer and faster 6502A microprocessor chip, BASIC programs that combine the use of color, sound, and graphics operate as if they were written in machine code. The speed and flexibility of what can be produced by VIC BASIC programs is extraordinary.

Expanding the VIC

The VIC is designed to be completely expandable. A full range of accessories, peripherals, support documentation, and software products are scheduled by Commodore. The list of what is available and planned for the VIC looks like this:

- Tape Cassette (You can use the one from your PET/CBM)
- Dot Matrix Printer (under $500)
- Master Control Panel (fits into cartridge slot)
- 8K and 16K Memory Cartridges
- RS232C Interface Cartridge
- SuperExpander (high resolution graphics, music, 3K memory)
- Self-teaching materials from the Commodore Learning Series (books and cartridges)
- Disk Drive
- 3K Memory Expander
- Joysticks, Lightpens, Paddles
- Game Controllers
- Telephone Modem
- Plug-in Program Cartridges
- Software Development Tools and Assistance

Every VIC component is being targeted to be price and performance competitive in the marketplace. The dot-matrix printer is planned to be a low-priced (under $500) unit that will produce high quality upper- and lower-case letters as well as the VIC's graphics characters.

The Commodore VIC team is out to solve the software crisis. They plan to give everyone the chance to become a software designer. The VIC Software Development Cartridge is scheduled to have extra memory, a machine-language monitor, and software development tools. The user can develop applications directly on the VIC using BASIC and machine-language routines. The final version of the program can be saved onto cassette tape that can then be converted, by Commodore, into a ROM cartridge.

In addition, the VIC will run programs written in BASIC for the PET and the CBM computers. The only restrictions are the differing screen sizes (23 versus 40 or 80 characters) and the use of PEEK/POKE commands where memory locations are not the same.

As can be gleaned from this brief survey of the VIC and its features, the Commodore machine is one of the lowest-priced yet fully functional microcomputers on the market today. It was planned to be cost competitive with other machines, completely functional for the user, and ultimately expandable for use in a variety of application areas. Yes, there is a $300 computer on the market that has color, sound and graphics. It is the Rainbow Machine and its name is VIC. ■

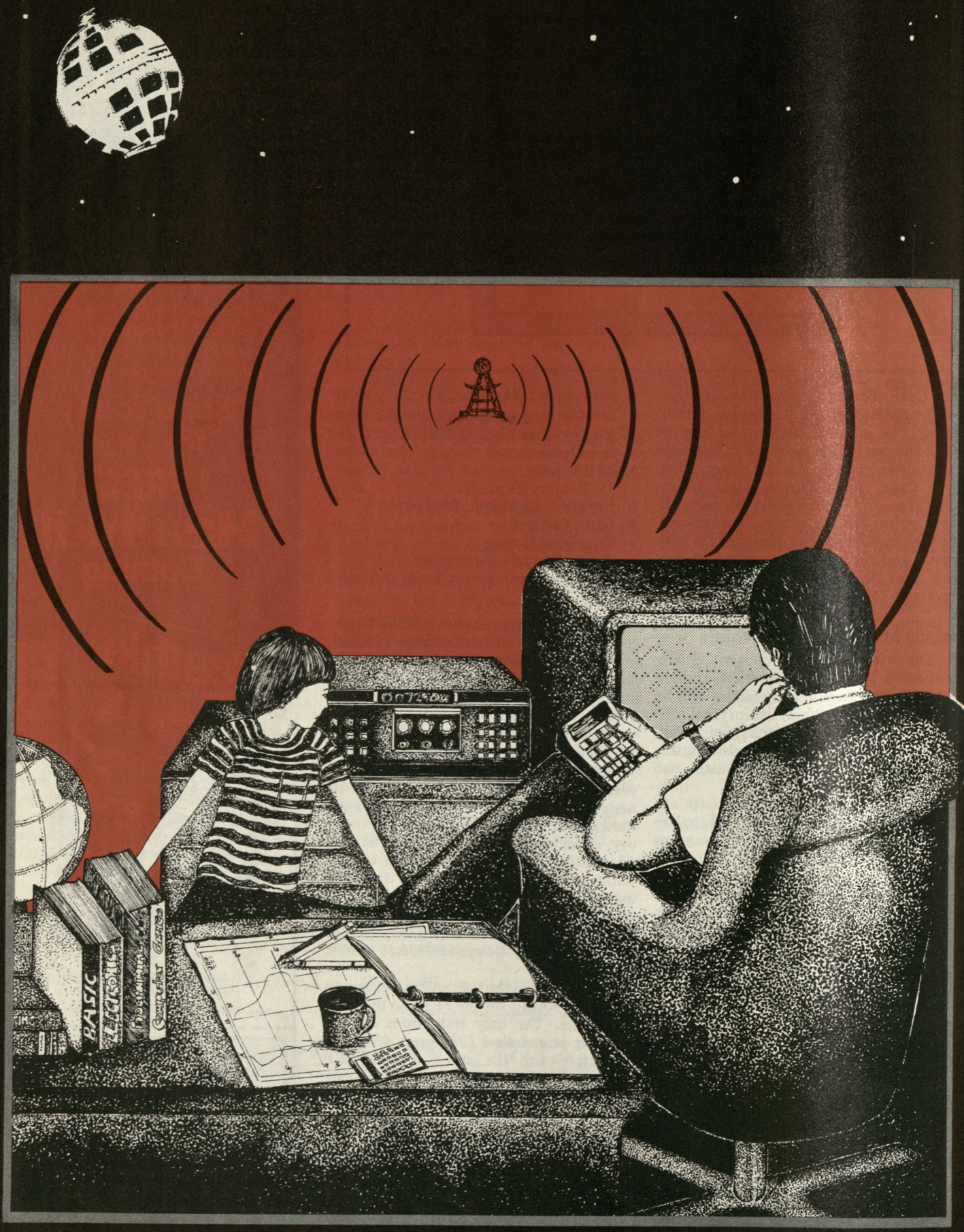


Illustration by Barbara Ruzgerian

BY GREG HILL

THE WIRED NATION

DO WE WANT IT?

Picture yourself in 1986, sitting before your cable TV set at home. Merely by punching buttons on a hand-held keypad, you could do the following:

- Peruse products in a shopping catalog displayed on the screen, order a product, be billed automatically, and pay by transference of funds from your bank account to the store's.
- "Tele-conference" with other individuals or organizations, near or far, thanks to satellite transmission. Any number could participate.
- Access 24-hour news on the screen – or a clipping service suited to your specific interests.
- Instead of dealing with crowded highways, pollution, and frayed nerves, you could do business from your home terminal – word processing, typesetting, computer programming, information-retrieval, document-searching, and database scanning. Your finished work would be sent to your office over the same cable your television uses.
- View portions of books, newspapers, and magazines from a local or distant library. A "frame-grabber" device prints hard-copy for you, or a "read/write" videodisk stores it on memory.
- Transfer funds electronically from your bank account to just about anywhere.
- Make hotel bookings, car-rental reservations, flight reservations, and travel itineraries.
- Get 24-hour weather reports, medical information, sales reports, consumer reports, sports news, entertainment listings, games, movies, personal mail (screen-displayed, mass-stored, or facsimile), and over a hundred TV channels from local and remote locations.
- Attach sensors from the TV set, allowing your physician to monitor your heartbeat, pulse, weight, body temperature, skin-color, etc.
- Listen to many, many radio stations in full stereo sound.
- Participate and vote at your local town meeting. Vote by the press of a button.

Futurists predict that by 1990, most cities and towns around the country will be interconnected, largely by satellite. Cable television will carry many of the signals, with hybrid telephone interfacing.

I suspect cable TV, along with the processing power of microcomputers, will be the prime generator of the above cornucopia. With its two-way, interactive capability and enormous (over 100) video channel capacity, cable TV is undergoing its last "gold rush." Cable companies are falling all over one another to obtain lucrative franchises in many cities. Such a system in Boston, for example, can expect to generate around $20 million in gross revenues per year. (I expect the personal microcomputer to be a part of any such system!)

Mayor Kevin H. White of Boston is faced now with one of the most significant social and political decisions in this city's recent history. That decision will be felt nationwide. Boston, according to the competing franchise applicants, will be the model system for the nation. How it evolves will shape the nature of cable TV in the rest of the country for the next ten to fifteen years.

Public access on a cable system can offer local residents more say in local communications. Access allows residents the chance to produce their own TV programs at local production facilities (or remote locations) and cable-cast the shows to interested viewers. It is local control of a local medium. This happens in some cities and towns equipped with cable TV, but such channels usually aren't equipped or staffed to compete with commercial fare.

Futurists also predict that the result of all this interconnectedness will be the "Wired Nation," giving us "pushbutton democracy." Information is power, they reason; if people have the information they need, certainly they can act upon it accordingly.

But the Wired Nation has a dark side to it. Even in present-day cable systems with two-way capacity, the company computer sweeps the whole system every few seconds to record *who's* watching *what*. At least one such system currently in place not only stores this data for billing purposes, but also for market research. Makers of products like to know what people's preferences are, and would pay plenty for such data. Such a practice is rife for abuse, and poses a grave threat to personal privacy, especially when people will be banking, shopping, retrieving, and viewing over the cable!

Government agencies have, in the past, been caught trading around information in their data-banks. The government has at times shown a penchant for looking into the lives of citizens. Credit companies likewise! And some social scientists, forever seeing the world in systems-analysis form, itch to know the social and economic preferences of people. A few years ago, there was an uproar when a major Boston-area university proposed to wire a nearby housing project with interactive cable so it could conduct experiments on the residents. To what ends would that data have been used? (See Ford Rowan's 1977 book, *Technospies*, for some chilling accounts of present technological surveillance.)

Ten-year-olds in school today are computer-literate. Growing up with microcomputers as a classroom tool, they program to create desired ends. Those of us in an earlier generation grew up with television. While one-way TV was magic to us, we couldn't program it. Seemingly, it programmed us! We weren't in control.

Potentially, with cable TV, the operator is in far greater control. But one can utilize the abundant services, and still have little say in system design and overall use. Public education about the technology and the services is a prerequisite to informed decision-making. Public education must happen at the onset of the franchising process if it is to have any value. As well, there must exist mechanisms to evaluate public opinion, guarantees that the public have direct input into decision-making if public interest is to be protected. Once decisions are made and the franchising process is ended – it's too late. You're stuck with the system and with the operator for ten to fifteen years.

Public access, if your cable system has it, lets you gain some control over this pervasive medium. But inadequate facilities, poor staffing, lack of funds, low-quality production equipment, and operator neglect have all combined to prevent public access from reaching its potential.

In response to Mayor White's 1979 decision to bring cable TV to Boston, some concerned residents formed the

Cable TV Access Coalition. This group has tried to insure that a Boston cable system will be responsive to the diverse needs of the community, particularly in terms of access. The coalition works to involve the public in system planning, and it monitors the franchising process. Our advocated positions can translate into fuller participation, and thus greater control, for residents. Briefly, these issues are:

- Ten or more neighborhood production centers in Boston, properly staffed, maintained, financed, and equipped to allow for commercial-quality community programming.
- All *access* channels should be citywide, not "ghettoized." Boston's neighborhoods are already isolated enough. And a channel shouldn't be labeled "minority," "handicapped," "elderly," and so forth. We should all see what we're about.
- There *should* be community programming, specific channels (aside from access ones) devoted just to local news, community-event coverage, specialized-audience programs, and programs about local jobs, health care, energy, and educational opportunities.
- Special programming for large but underserved audiences – foreign-born, minorities, the elderly, children, and women.
- On education channels hooked up to local schools and colleges, there should be foreign-language classes and continuing education classes.
- All existing area radio stations should also be transmitted over the cable, AM as well as FM. This would mean clear reception for all. And new radio stations can be created and carried over the cable – both leased and public access. All such radio services should be free in the basic subscriber package.
- Leased access channels afford local entrepreneurs, artists, merchants, musicians, etc., a chance to develop and market new commercial TV and radio programming. If you utilize the cable system with your own microcomputer and peripherals for word-processing, you can advertise your services over a leased channel.
- The system should have two-way, interactive capability for all subscribers, and appropriate measures to protect personal privacy.

Access Coalition's Dawson Johnson and Rob McCausland have submitted to the competing franchise applicants a design proposal for a "community television" system in place of typical public access. It is not "a simple dedication of channels and equipment (the mere *availability* of access)." It creates a whole solid basis for community-generated programming. Such a proposal may seem quite costly, but "if the community television system is generating high-quality and useful programming, the cable company will benefit from increased subscriptions."

Futurists also predict that the result of all this interconnectedness will be the "Wired Nation," giving us "pushbutton democracy."

Here the microcomputer comes into crucial play. Applicants have offered two-way capability in their proposals, and the Access Coalition has lobbied for such – but we also call for two-way public access channels. We propose a Data Networking System, giving local Neighborhood Production Centers (NPCs) a personal microcomputer (if they want one), data-base capability, and interconnection with other home computers on the subscriber data network channels.

This calls for the availability of a home converter for micro-interface with the cable TV system. It must convert the incoming TV signal to ASCII code. Attention must be given to the timing and voltage level of the cable TV signal. The converter must also receive, tune, and demodulate new radio channels, and deliver the FM radio band of 88 to 105 Mhz to antenna terminals of tuners and receivers.

NPCs and subscribers within their areas can create non-profit, public-access databases useful to the neighborhood. Accessing the mass storage of the minicomputer at the city's central support facility, each NPC can down-load needed programs and data to their own memories. This data can, in turn, be eventually displayed in appropriate form on the access channels, and made accessible to subscriber microcomputers. Each NPC can hook into computer bulletin-board systems around the country via (for example) the People's Computer Company PCNET protocol. A hybrid national, public-access network could grow from such efforts, along with a national public-access data base. Radio hams could also be part of such networking efforts.

Suppose you want to research the services of neighborhood health clinics around the country. When a nation-wide network of tens or hundreds of thousands of microcomputerists are communicating with one another, you could handle your project in a fast, efficient manner. Properly "flagged," you would send a query by using the PCNET protocol for eventual replies from other microcomputers. Meanwhile, your home computer is programmed to search the memory of public-access data bases. The appropriate data is automatically down-loaded to your own computer's memory.

Today, nearly everyone can afford a home computer. With the debut of micros like the Sinclair ZX80, costs have dropped drastically. The converter I spoke of before, with micro-interface, could be purchased for $50, if it were on the market. We will approach the Boston Computer Society about the real possibilities of this device. But most of all, a cheap, intelligent terminal with peripheral ports and mass-storage memory needs to be on the market, a terminal with cable TV interfacing capabilities.

For the home entrepreneur, via leased access data channels, a small-business data bank could be established. You could down-load business programs on accounting, inventory, word-processing, billing – much like Compu-Serve, but tailored to local small business needs.

Micros at each NPC can be time-shared to community groups for their particular needs for inventories, mailing-lists, accounting, word-processing, etc. Each micro can easily convert to internal, character-generation capability – a plug-in board is on the market which can give graphic resolution equal to commercial broadcast standards. Normally, character-generators of the type used in commercial TV stations cost around $10,000 apiece – but ours would come nowhere near that in price! And utilizing a digital slide-storage system, users can access character "fonts" on hard-disks, compose, then store the completed work until production time.

These micros can be used as videotape editing controllers. Soon, software for this function will be available for around $3000. Via "SMPTE" time-code generation, the computer's sync is "gen-locked" to a videotape editing system. Graphics and titles can be put on any videotape. And the micro can generate music scores for videotape soundtracks.

No doubt the Wired Nation will be upon us in a decade, or sooner. Those of us in our homes and communities have the power to educate ourselves to the implications of it all. The home computer can be one of the tools we know of that will help us keep communications technology serving us – and not the other way around. ■

There is a sneaking assumption on the part of many people that games are not as important, not as rewarding as "serious" matters. **Recreational Computing** *would like to enlist the aid of its readers to prove that idea wrong.*

We believe that both children and adults can learn faster and in greater volume when they are having a good time. And so our games section will be expanded beginning with the very next issue. We are in need of entertaining games for every type of personal computer, and tend to look for those with shorter listings, but not exclusively.

If you have short, interesting programs that can be typed in and run to show an interesting effect, or to "teach" an interesting principle, send it to us. We would like to publish it. Just include a short letter with it describing what the program does, ways it could be improved, or any other detail you would like to share.

We look forward to hearing from you – and to playing your games! ■

For the 8K PET

3-D Tic Tac Toe

by Larry Hatch

How to Play

When this game is first run, the computer takes the first move. It will put a diamond on the square of its choice. Then the player moves. He is prompted to put in a width coordinate (A, B, or C); then a depth coordinate (X, Y, or Z); and finally a level (1, 2, or 3); all of which define the particular square of his choice.

The screen display makes it clear how to choose these coordinates. After placing a reverse-field X on the player's square, the computer chooses its move, and so on. The play continues until either the player or the computer has three consecutive squares in any straight line in three dimensions (including corner-to-corner diagonals of all descriptions). There are no "cat's games" in which play is stalemated.

In the second game, the player is allowed to choose the first square. This privilege alternates between the computer and the player from then on. A running tally of the score is kept as long as the play continues.

A Challenge

This program is written for the 8K Pet, although it can be adapted (somewhat tediously) to other machines. Matrix P contains the screen locations where the X's and O's are placed. Matrix B contains the X's, diamond shapes that represent O's, and grey ("blank") spaces that will get poked into P.

I think it would be challenging for someone to write a four-dimensional version of this game that is no longer than three times the program length of this version. To do so, the section from lines 1000 to 1800 would have to be reduced to some sort of algorithm that loops back on itself thirteen times.

Larry Hatch
22 Coleman Place No. 14
Menlo Park, CA 94025

```
 1 " ■ "...RETURNS CURSOR TO HOME POSITION
 2 " □ "...CLEARS THE SCREEN + CURSOR HOME
 3 " ■ "...BEGIN PRINTING IN REVERSE FIELD
 4 " ■ "...ENDS REVERSE FIELD PRINTING
READY.
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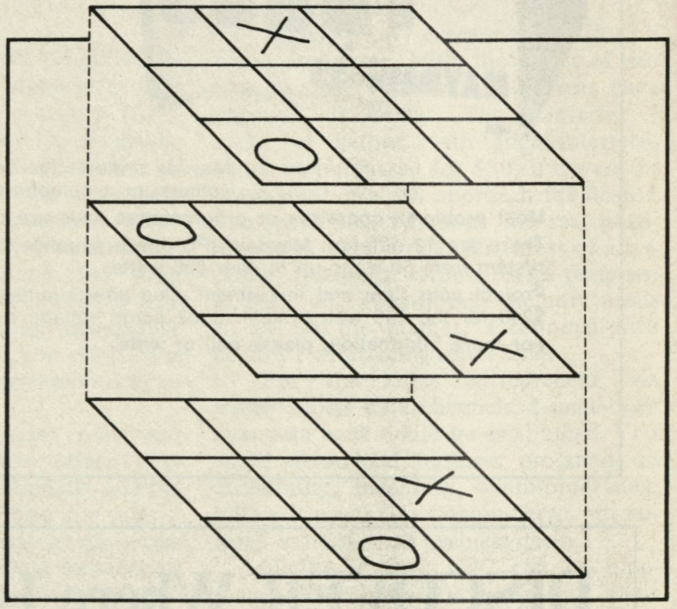


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READY.

 90 REM* 3D TICTACTOE BY LARRY HATCH
 100 POKE850,0:POKE851,0:POKE855,0
 110 PRINT"■■3-DIMENSIONAL":PRINT"■ TIC-TAC-TOE "
 120 DIM B(2,2,2),P(2,2,2):SC=32768
 130 P(0,0,0)=32874:P(1,0,0)=32876:P(2,0,0)=32878
 140 P(0,1,0)=32915:P(1,1,0)=32917:P(2,1,0)=32919
 150 P(0,2,0)=32956:P(1,2,0)=32958:P(2,2,0)=32960
 160 FORI=0TO2:FORJ=0TO2:FORK=1TO2
 170 P(I,J,K)=P(I,J,0)+200*(K):NEXTK,J,I:FORI=0TO2
 180 FORJ=0TO2:FORK=0TO2:B(I,J,K)=102:NEXTK,J,I
 190 GOSUB4000
 200 G=PEEK(855):IFG/2=INT(G/2)THEN800
 500 REM*PLAYERS MOVE
 520 P1=0:P2=0:GOSUB4500
 600 POKE 245,4:PRINT:PRINT"                    "
 610 GOSUB4300:POKE245,4:PRINT:PRINT"ENTER YOUR MOVE"
 620 PRINT"WIDTH (ABC)";:POKE525,0:WAIT525,1:GETW$
 630 D1=ASC(W$)-65:PRINTW$:IFW$="N"THEN710
 640 PRINT"DEPTH (XYZ)";:POKE525,0:WAIT525,1:GETD$
 650 D2=ASC(D$)-88:PRINTD$:IFD$="N"THEN620
 660 PRINT"LEVEL (123)";:POKE525,0:WAIT525,1:GETL$
 670 D3=VAL(L$)-1:PRINTL$:IFL$="N"THEN640
 680 IFD1<0ORD1>2ORD2<0ORD2>2ORD3<0ORD3>2THEN710
 690 IFB(D1,D2,D3)<>102THENPRINT"OCCUPIED":GOTO710
 700 B(D1,D2,D3)=214:GOSUB 4500:GOTO800
 710 GOSUB 4300:GOTO500
 800 REM*MACHINE MOVES
 810 GOSUB4300:POKE245,4:PRINT:PRINT"COMPUTER MOVE
 1000 REM* 49 TESTS
 1010 IF B(1,1,1)=102THENB(1,1,1)=90:GOSUB4500:GOTO500
 1020 P1=0:P2=0:FORK=0TO2:FORJ=0TO2:TS=0:FORI=0TO2
 1060 K(I)=K:J(I)=J:I(I)=I:TS=TS+B(I,J,K):NEXTI
 1070 GOSUB5000:NEXTJ:TS=0
 1100 D$="W":FORI=0TO2:TS=0:FORJ=0TO2
 1130 K(J)=K:J(J)=J:I(J)=I:TS=TS+B(I,J,K):NEXTJ
 1150 GOSUB5000:NEXTI:TS=0:J=0
 1180 TS=0:D$="SA":FORI=0TO2
 1190 K(I)=K:J(I)=I:I(I)=I:TS=TS+B(I,I,K):NEXTI
 1200 GOSUB5000:TS=0:D$="SB":FORI=0TO2
 1220 K(I)=K:J(I)=2-I:I(I)=I:TS=TS+B(I,2-I,K):NEXTI
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1240 GOSUB5000:NEXTK:REM*END FLAT TESTS
1260 D$="V ":FORI=0TO2:FORJ=0TO2:TS=0
1270 FORK=0TO2:I(K)=I:J(K)=J:K(K)=K:TS=TS+B(I,J,K)
1300 GOSUB5000:NEXTK,J,I:REM*END VERTICALS
1350 D$="SI":FORI=0TO2:TS=0
1360 FORJ=0TO2:I(J)=I:J(J)=J:K(J)=J:TS=TS+B(I,J,J)
1380 GOSUB5000:NEXTJ:TS=0:FORJ=0TO2
1390 I(J)=I:J(J)=2-J:K(J)=J:TS=TS+B(I,2-J,J)
1410 GOSUB5000:NEXTJ:NEXTI:TS=0
1450 D$="SJ":FORJ=0TO2:TS=0
1460 FORI=0TO2:TS=TS+B(I,J,I):I(I)=I:J(I)=J:K(I)=I
1480 GOSUB5000:NEXTI:TS=0:FORI=0TO2
1490 I(I)=2-I:J(I)=J:K(I)=I:TS=TS+B(2-I,J,I)
1510 GOSUB5000:NEXTI:NEXTJ:TS=0
1550 TS=0:D$="D1":FORI=0TO2
1560 I(I)=I:J(I)=I:K(I)=I:TS=TS+B(I,I,I):NEXT I
1580 GOSUB5000:TS=0:D$="D2":FORI=0TO2
1590 I(I)=I:J(I)=2-I:K(I)=I:TS=TS+B(I,2-I,I):NEXTI
1670 GOSUB5000:TS=0:D$="D3":FORI=0TO2
1680 I(I)=2-I:J(I)=2-I:K(I)=I:TS=TS+B(2-I,2-I,I):NEXTI
1700 GOSUB5000:TS=0:D$="D4":FORI=0TO2

1710 I(I)=2-I:J(I)=I:K(I)=I:TS=TS+B(2-I,I,I):NEXTI
1720 GOSUB5000:REM* END 49 TESTS
1750 IFP1=1THENB(A1,A2,A3)=90:GOSUB4500:TS=270:GOTO6020
1760 IFP2=1 THENB(B1,B2,B3)=90:GOSUB4500:GOTO500
1780 A1=INT(3*RND(1)):A2=INT(3*RND(2)):A3=INT(3*RND(3))
1790 A5=B(A1,A2,A3)
1800 IFA5<>102THEN1780
1810 B(A1,A2,A3)=90:GOSUB4500:GOSUB4300:GOTO500
4000 PRINT"■";:REM BLANK BOARD SETUP
4010 TB=23

4040 PRINTTAB(TB)"   A B C"
4050 PRINTTAB(TB)"  ┌─────┐"
4060 PRINTTAB(TB)"1)│■■■■■X"
4070 PRINTTAB(TB)"  │■■■■■Y"
4080 PRINTTAB(TB)"  │■■■■■Z"
4090 PRINTTAB(TB)"  │   ┌─┬─┐ "
4100 PRINTTAB(TB)"  ├─┬─┘   │"
4110 PRINTTAB(TB)"2)│■■■■■X"
4120 PRINTTAB(TB)"  │■■■■■Y"
4130 PRINTTAB(TB)"  │■■■■■Z"
4140 PRINTTAB(TB)"  │   ┌─┬─┐ "
4150 PRINTTAB(TB)"  ├─┬─┘   │ "
4160 PRINTTAB(TB)"3)│■■■■■X  "
4170 PRINTTAB(TB)"  │■■■■■Y "
4180 PRINTTAB(TB)"  │■■■■■Z"
4190 PRINTTAB(TB)"  └─────┘"
4200 PRINTTAB(TB)"    A B C "

4210 RETURN
4300 FORI=0TO10:POKE245,4+I:PRINT
4310 PRINT"                    ":NEXTI:RETURN
4500 REM*X/O UPODATE
4520 FORI=0TO2:FORJ=0TO2:FORK=0TO2
4530 POKE P(I,J,K),B(I,J,K):NEXTK,J,I:RETURN
5000 IFTS=270ORTS=282ORTS=530ORTS=642THENGOSUB6000

5010 RETURN
6000 YS=PEEK(850):MS=PEEK(851)
6010 IFTS=642THENPRINT"YOU WIN":POKE850,YS+1:GOTO6500
6020 IF TS=270THENPRINT"I WIN":POKE851,MS+1:GOTO6500
6030 IF TS<>530THEN6070
6040 P2=1:FORQ=0TO2
6050 IFB(I(Q),J(Q),K(Q))=102THENB1=I(Q):B2=J(Q):B3=K(Q)
6055 A$=CHR$(B1+65):B$=CHR$(B2+88):C$=STR$(B3+1)
6060 NEXTQ:POKE245,8:PRINT:PRINT"DEFENSE "A$" "B$;C$
6070 IF TS<>282THEN RETURN
6080 P1=1:FORQ=0TO2
6090 IFB(I(Q),J(Q),K(Q))=102THENA1=I(Q):A2=J(Q):A3=K(Q)
6095 A$=CHR$(A1+65):B$=CHR$(A2+88):C$=STR$(A3+1)
6100 NEXTQ:POKE245,8:PRINT:PRINT"OFFENSE "A$" "B$;C$

6110 RETURN
6500 YS=PEEK(850):MS=PEEK(851)
6510 PRINT"HUMANS"YS,"MACHINES"MS
6520 IF TS=642THEN6570
6530 Z=0:FORZ=0TO4:B(A1,A2,A3)=32:GOSUB4500
6540 GOSUB6600:B(A1,A2,A3)=90:GOSUB4500
6560 GOSUB6600:NEXTZ
6570 PRINT"NEW GAME?      ":POKE525,0
6580 WAIT525,1:CLR:PRINT"□":G=PEEK(855)+1
6590 POKE855,G:GOTO110
6600 Z1=1:Z1=0:Z1=1:Z1=0:Z1=1:Z1=0:Z1=1:Z1=0:RETURN
READY.
```

Number Crossword

by Jim Pisano

How to Play

This is a fine game which came to *Recreational Computing* compliments of one of our readers. It is a version for small computers of the number crossword game. The goal is to fill in the blanks with numbers so that when the rows and columns are added, their totals match the numbers shown along the edges.

The program listing as shown should run with few, if any, modifications on just about any personal computer using BASIC. Try it out on yours. When you get it running, be sure to save a couple of copies on tape or disk. Your friends will be certain to want to play it later!

Jim Pisano
122 Myrtle Ave.
Cotati, CA 94928

```
10  REM  NUMBER CROSSWORD GAME
11  REM   WRITTEN BY JIM PISANO
12  REM   FEBRUARY 1981
20  DIM N(6,5),K(6,5),B$(6,5)
25  REM   INITIALIZE ARRAYS
30  FOR I=1 TO 6
40  FOR J=1 TO 5
50  B$(I,J)='F'
52  N(I,J) = 0
54  K(I,J) = 0
60  NEXT J
70  NEXT I

100  PRINT'Do YOU WANT INSTRUCTIONS';
110  INPUT A$
120  IF A$='YES' THEN GO SUB 4000
130  IF A$()'YES' AND A$()'NO' THEN 100
140  REM   FILL ARRAY N WITH RANDOM NUMBERS
145  RANDOMIZE
150  FOR R1=2 TO 5
160  FOR C1=1 TO 4
170  N(R1,C1)=INT(RND*8+.5)
175  IF N(R1,C1)=0 THEN LET N(R1,C1)=1
180  NEXT C1
190  NEXT R1
200  REM   ADD ROWS AND PLACE RESULT IN LAST COLUMN
210  FOR R1=2 TO 5
220  FOR C1=1 TO 4
230  N(R1,5)=N(R1,5)+N(R1,C1)
240  NEXT C1
250  NEXT R1
260  REM   ADD COLUMNS AND PLACE RESULT IN LAST ROW
270  FOR C1=1 TO 4
280  FOR R1=2 TO 5
290  N(6,C1)=N(6,C1)+N(R1,C1)
300  NEXT R1
310  NEXT C1
320  REM   DIAGONAL ADDITION, UPPER LEFT TO LOWER RIGHT
330  FOR I=2 TO 5
340  N(6,5)=N(6,5)+N(I,I-1)
350  NEXT I
360  REM   DIAGONAL ADDITION, LOWER LEFT TO UPPER RIGHT
370  FOR J=5 TO 2 STEP -1
380  N(1,5)=N(1,5)+N(J,6-J)
390  NEXT J
400  REM   MAP MATRIX N INTO MATRIX K, USER INTERACTS WITH MATRIX K
410  FOR J=1 TO 5
420  K(J,5)=N(J,5)
430  K(6,J)=N(6,J)
440  B$(J,5)='T'
450  B$(6,J)='T'
460  NEXT J
470  REM   ADD HELPING HINTS TO TABLE
```

```
480  K(2,1)=N(2,1)
490  K(3,3)=N(3,3)
500  K(4,4)=N(4,4)
510  K(5,2)=N(5,2)
520  B$(2,1)='T'
530  B$(3,3)='T'
540  B$(4,4)='T'
550  B$(5,2)='T'
560  GO SUB 2000
565  N1=3
566  T1=0

570  REM   USER FILLS TABLE BY ENTERING N1 NUMBERS IN A GROUP
580  PRINT'To ENTER A NUMBER, ENTER THE INDICIES OF THE ROW AND COLUMN, TH
EN THE
 NUMBER'
590  FOR M=1 TO N1
595  T1=T1+1
600  PRINT'Row          ';

610  INPUT R2
620  PRINT'Column       ';
630  INPUT C2
640  PRINT'Number       ';
650  INPUT N
651  IF B$(R2,C2)='T' THEN 663
660  K(R2,C2)=N
662  GO TO 670
663  PRINT'Do NOT CHANGE THAT NUMBER. It IS CORRECT!'
665  INPUT F$
670  IF K(R2,C2)=N(R2,C2) THEN B$(R2,C2)='T'
680  GO SUB 2000
685  GO SUB 5000
690  NEXT M
700  PRINT'Do you want to ENTER MORE NUMBERS';
710  INPUT A$
720  IF A$='NO' THEN 730

721  IF A$='YES' THEN PRINT'How MANY NUMBERS DO YOU WANT TO ENTER';
722  IF A$()'YES' AND A$()'NO' THEN 700
723  INPUT N1
724  GO TO 590
730  PRINT''
740  PRINT'Do you want ME TO HELP YOU A LITTLE';
750  INPUT P$
760  IF P$='YES' THEN GO SUB 3000
761  IF P$()'YES' AND P$()'NO' THEN 740
762  IF A$='NO' AND P$='NO' THEN 764
763  GO TO 769
764  PRINT'Do you want to QUIT';
765  INPUT Q$
766  IF Q$='YES' THEN 9999
768  IF Q$()'YES' AND A$()'NO' THEN 764
769  GO SUB 2000
770  GO TO 700

2000  REM   PRINT OUT TABLE USING MATRIX K
2010  PRINT CHR$(12)
2020  C2$='#!### !### !### !### !### !'
2025  PRINT'    1    2    3    4    5'
2030  FOR I=1% TO 7%


2040  PRINT'  ---- ---- ---- ---- ---- '
2050  IF I<7 THEN PRINT USING C2$,I;K(I,1);K(I,2);K(I,3);K(I,4);K(I,5)
2060  NEXT I
2070  RETURN
3000  REM   HELP USER THROUGH INTERACTION
3010  PRINT'How MANY OF THE NUMBERS YOU ENTERED DO YOU WANT TO KNOW ARE CO
RRECT'
;


3020  INPUT N
3030  PRINT'ENTER THE INDEX IN QUESTION'
3040  PRINT''
3050  FOR I=1 TO N


3060  PRINT'Row      ';
3070  INPUT R2
3080  PRINT'Column   ';
3090  INPUT C2
3100  IF B$(R2,C2)='T' THEN 3160
3110  PRINT'Sorry, THAT NUMBER IS WRONG. Do you WANT TO KNOW WHAT IT IS';
3120  INPUT A$
3130  IF A$='YES' THEN PRINT'The CORRECT NUMBER IS ';N(R2,C2)
3140  IF A$()'YES' AND A$()'NO' THEN 3110
3150  GO TO 3170
3160  PRINT'Very GOOD, THAT NUMBER IS CORRECT!'
3170  NEXT I
3171  REM   ASK USER IF SHE/HE WANTS TO QUIT
3172  IF (T1=10) OR (T1=15) OR (T1=20) OR(T1=25) THEN PRINT'Would you LIKE
 TO QU
IT';
3173  INPUT G$
3174  IF G$='YES' THEN GO SUB 6000
3175  IF G$='YES' THEN 9999
3180  RETURN
4000  REM   INSTRUCTIONS
4001  PRINT'A MATRIX OF SIX ROWS AND FIVE COLUMNS WILL SHOW UP ON THE
4002  PRINT'SCREEN. It WILL APPEAR LIKE THIS:

4003  PRINT'    1    2    3    4    5'
4004  PRINT'  ---- ---- ---- ---- ---- '
4005  PRINT'1! 0  ! 0  ! 0  ! 0  ! 16 !'
4006  PRINT'  ---- ---- ---- ---- ---- '
4007  PRINT'2! 4  ! 0  ! 0  ! 0  ! 10 !'
4008  PRINT'  ---- ---- ---- ---- ---- '
4009  PRINT'3! 0  ! 0  ! 2  ! 0  ! 20 !'
4010  PRINT'  ---- ---- ---- ---- ---- '
4011  PRINT'4! 0  ! 0  ! 0  ! 6  ! 18 !'
4012  PRINT'  ---- ---- ---- ---- ---- '
4013  PRINT'5! 0  ! 6  ! 0  ! 0  ! 23 !'
4014  PRINT'  ---- ---- ---- ---- ---- '
4015  PRINT'6! 22 ! 11 ! 17 ! 24 ! 19 !'
4016  PRINT'  ---- ---- ---- ---- ---- '
4017  PRINT''

4020  PRINT' I WILL ASK YOU TO ENTER THE NUMBERS INTO THE TABLE SUCH THAT
THE NU
MBERS ADD UP'
4021  PRINT'HORIZONTALLY, VERTICALLY, AND DIAGONALLY, TO EQUAL THE NUMBERS
 ON TH
E EDGES.'
4022  PRINT'The ZEROS COVER THE PLACES WHERE YOU MUST FILL IN THE NUMBERS.
  EVER
Y TIME'
4023  PRINT'YOU ENTER IN A NUMBER, I WILL PRINT YOU THE TABLE WITH THE CHA
NGE.
If YOU'
4024  PRINT'GET STUCK I CAN HELP YOU OUT A LITTLE (REMEMBER, I CREATED THE
 TABLE
 AND ITS'
4025  PRINT'NUMBERS, SO I KNOW WHAT EVERY NUMBER IS). FOR SIMPLICITY, NO N
UMBERS
 ON THE'
4026  PRINT'TABLE ARE EQUAL TO ZERO, I.E., THE MINIMUM VALUE FOR A NUMBER
IS ONE
.'
4027  PRINT''
4028  PRINT'                                        GOOD LUCK!'
4029  PRINT''
4030  PRINT' Hit CARRIAGE RETURN TO CONTINUE'
4031  INPUT F$
4040  RETURN
5000  REM   CHECK IF USER FINISHED WITH TABLE
5001  FOR J=2 TO 4
5002  FOR I=1 TO 5
5003  IF B$(J,I)='F' THEN 5010
5004  NEXT I
5005  NEXT J
5006  PRINT'                                  ****** CONGRAGULATIONS!!! ******
'

5007  GO TO 9999
5010  RETURN
6000  REM   USER WANTS TO QUIT
6001  REM   DISPLAY CORRECT NUMBERS IN TABLE
6002  FOR I=1 TO 6
6003  FOR J=1 TO 5
6004  K(I,J)=N(I,J)
6005  NEXT J
6006  NEXT I
6007  GO SUB 2000
6008  RETURN
9999  END
@
```

end

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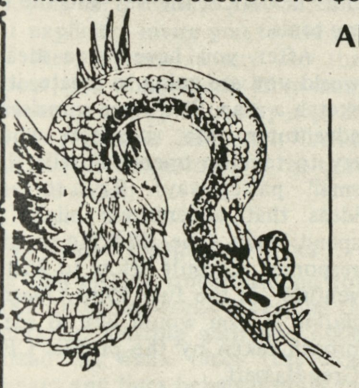

ALL TIME SUPER STAR BASEBALL & SUPER STAR BASEBALL

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J. DiMaggio	H. Greenberg	W. Mays	L. Brock
J. Jackson	R. Hornsby	P. Rose	R. Carew
G. Sisler	H. Wilson	O. Cepeda	H. Killebrew
S. Musial	B. Terry	C. Yazstremski	R. Allen
T. Cobb	M. Mantle	W. McCovey	R. Leflore
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		R. Guidry-P	T. Seaver-p

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For insight into some of the basic principles underlying **ISAAC NEWTON** see *Godel, Escher, Bach* by Douglas R. Hofstadter, Chapter XIX and Martin Gardner's "Mathematical Games" column in **Scientific American**, October, 1977 and June, 1959.

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Computerized Fantasy

WRITE YOUR OWN

by Furman Smith

A computerized fantasy simulation (CFS) allows a player to enter into a fantasy world. The computer program presents the player – called "the adventurer" – with a description of a situation; for example,

> You are in a room with a door to the north and stairs to the east. There is a sword on the floor.

The adventurer is to respond by keying in some action; perhaps the adventurer types GET THE SWORD. The program simulates the result of the adventurer's next action ("What do you intend to do now?"). This cycle is repeated until the adventurer or the program quits.

The adventurer is besieged by decisions. Will the sword help or hurt? It might be needed to cut the rope to open some other door, but there could be a doorman somewhere that would block the passage of any armed adventurer.

Some of the ways automobiles, television, hand-held calculators, and home computers have changed society are obvious but many of the changes are subtle and difficult to study. I think that CFS's will also change society. For years, children and adults have read of heroes – their actions, the consequences, their conquests and defeats. Now they can be the ones choosing the actions and reaping the consequences. The once-passive readers are now the ones who must get past the Fierce Green Snake in the Hall of the Mountain King (in the Crowther/Woods ORIGINAL ADVENTURE) or build a boat (in Scott Adam's PIRATE ADVENTURE). Surely this will change society – quite probably in a major way and for the better.

CAKE in Particular

CAKE is a nonviolent CFS that is simple enough to be completely solved in a fifty-minute elementary school period; my daughter's fourth grade class took twenty minutes. A few periods with a high school or college class which understands BASIC should suffice to give a good understanding of how a CFS could be programmed.

The first article of this series (found in the July-Aug. 1980 issue of *Recreational Computing)* has a program, NELLAN IS THIRSTY, which I thought met the criteria of the above paragraph. I later found out that NELLAN takes over an hour to solve and an explanation of the program can put an intelligent and enthusiastic class into a state of deep boredom in three minutes. In one meeting (two-and-a-half hours), my graduate microcomputer class solved CAKE and then studied the program with no more trouble than would be expected from any long program studied in a late evening class.

Most CFS's are designed to be attacked repeatedly. I have been playing with my Crowther-Woods ADVENTURE for over two years (averaging about an hour per month) and still haven't completely solved it. CAKE serves as a demonstration program and provides a template for learning to create simple CFS's. A short and simple CFS, such as CAKE, loses much – but not all – of the charm of CFS's. Playing CAKE will give one a taste of what CFS's are like, but CAKE does not provide a meal.

The CAKE program is formatted with no more than thirty-two characters to a listing line (I am distinguishing between a line of BASIC and a line in the listing; BASIC line 140 uses the down-arrow on the TRS-80 (c) to make three lines in the listing). The limit of 32 characters allows an attractive listing on a video monitor hooked to a TRS-80 in double-wide characters mode; thirty or forty people with normal sight can look at the program on the same screen. (Consult Samuel W. Spero's article in the Sept. '79 *Creative Computing* to see how to hook a video monitor up with a TRS-80 Model I.)

Unless you have lots of memory, you should key in only lines 10 through 945 – later lines are documentation. The working part of the program (lines 10-945) executes in a cassette-based Triss Three (= TRS-80 Model III with Model III BASIC) with the standard 16 computer-k of RAM memory; as you would expect, it also runs on a Triss One (= TRS-80 Model I with Level II BASIC) with 16 k. (Incidentally, the program NELLAN from the first article runs on a 16 k Triss One but not a 16 k Triss Three. The Triss Three's want about 258 more bytes of RAM than the Triss Ones; the third article in this series will show how to trim the NELLAN program without losing anything.)

How to Write and Implement a CFS

The first step is to mentally create the world that you will implement. CAKE involves a simple, nine-room clubhouse, with the mission of delivering the cake to the Party Room. Some CFS's involve treasures that are to be taken to some key location. I cannot imagine a CFS without tools and barriers. The locked door and Rain Room are barriers in CAKE; the key and the umbrella are tools.

After you have some idea of the world you are going to create, it helps to sketch a map. Plan some surprises (CAKE adventurers are surprised when they try to take an open umbrella through a small passageway). Try to anticipate ideas that adventurers might try and spend some time thinking of humorous responses. Consult "How to Write an Adventure" in the July 1980 *Creative Computing* if you would like to see the approach taken by the prolific CFS writer Greg Hassett.

Once you have a firm idea of your CFS world, list the verbs and nouns necessary for the adventurers to convey their intentions. Then write your program. If you would like to use the CAKE program as a model and just stick in your descriptions – great – that's what I wrote CAKE for. You might also look at the programs in the first and third parts of this series – they are more complicated but they might be easier to modify in the long run. If you do modify any of the programs, your program is yours to sell, swap, give away, or hoard.

After your CFS is implemented, take the time to watch several people play it. You might see the program misfunction in a situation you've not considered. An adventurer might key in a very logical intention which your program will not understand. I ran into that during one demonstration of CAKE. NELLAN, the CFS of the first article, has an old gum wrapper as a piece of trash; I included the wrapper in CAKE. The adventurer has to consider the wrapper as a possible tool, but I had included it only to distract the adventurer. One person found the wrapper, grabbed it, rushed to the Seating Room and tries 'WRAP CAKE'. That's logical; if I were intending CAKE for play rather than instruction, I would make the slight modifications necessary for the CAKE program to respond to

Simulation

'WRAP CAKE'.

If you understand BASIC and have patience, this article will tell you how you can write a simple CFS. You need not have read the earlier article and you can ignore references to the NELLAN program in its entirety. There are many other sources of CFS programming techniques (for example, Scott Adam's PIRATE'S ADVENTURE program in the Dec. 1980 *BYTE*). One advantage of first studying the programs provided here is that I explicitly invite you to use any parts of the programs in any way that you choose; you can get ideas from many printed sources and save time by copying lines of BASIC from NELLAN, CAKE, and CHAIR (CHAIR is to be in the third article in this series).

How the CAKE Program Works

The first step in understanding how the CAKE program works is reading the documentation starting with line 6000; Please read the 6xxx block (the 6xxx block means any lines between 6000 and 6999 inclusive) of the program now. The apostrophe (') works like a REM.

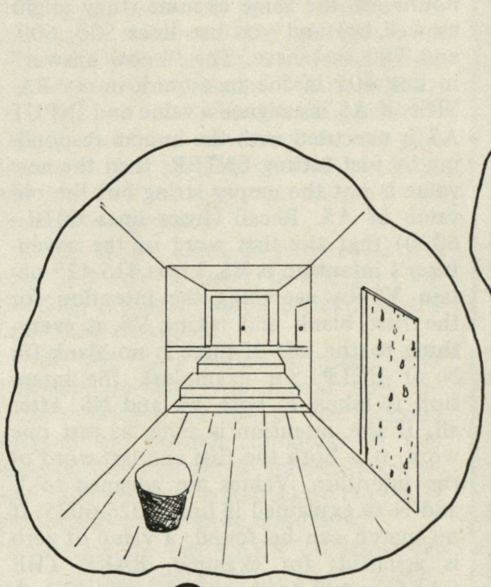
In the initializing block (lxx), we assign values to variables such as V9 (recall that V9 is the number of verbs). One reason for using the variable, V9, rather than its value, 18, is that it makes the program easier to modify; a new CFS could leave lines 130, 445, and 800 just as they are here. If your BASIC doesn't have DEFINT (line 115) or double wide letters (line 30), just skip those commands. If your BASIC handles strings well but doesn't have a CLEAR (line 105), skip that line too. Modify the RND on line 160 if you need to; Triss uses RND (0) and Heath uses RND(1). If your BASIC does not allow multiple commands on a BASIC line, then you will have to do a lot of revision. Parts of the 1xx block should be clearer after we have studied the rest of the program, so don't worry if you don't understand everything in the lxx box right now.

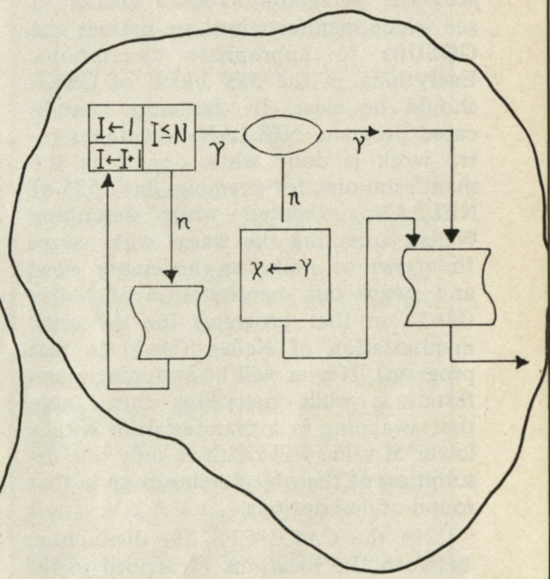
I have tried to leave some blanks in the listing lines to serve as punctuation. If you think of CAKE as a book, then the 1xx block is a chapter. Lines 130 and 135 fit together (introducing the verbs) as a paragraph; lines 140 and 145 (introducing the nouns) make the next paragraph. Lines 150-160 form a paragraph on values relating to manifestations. No paragraph is over 15 lines; thus, the program can be listed on the screen a paragraph at a time. If you want to use the down arrow right after a line number on the Triss, you have to include a colon; for example, line 105 was keyed in by:

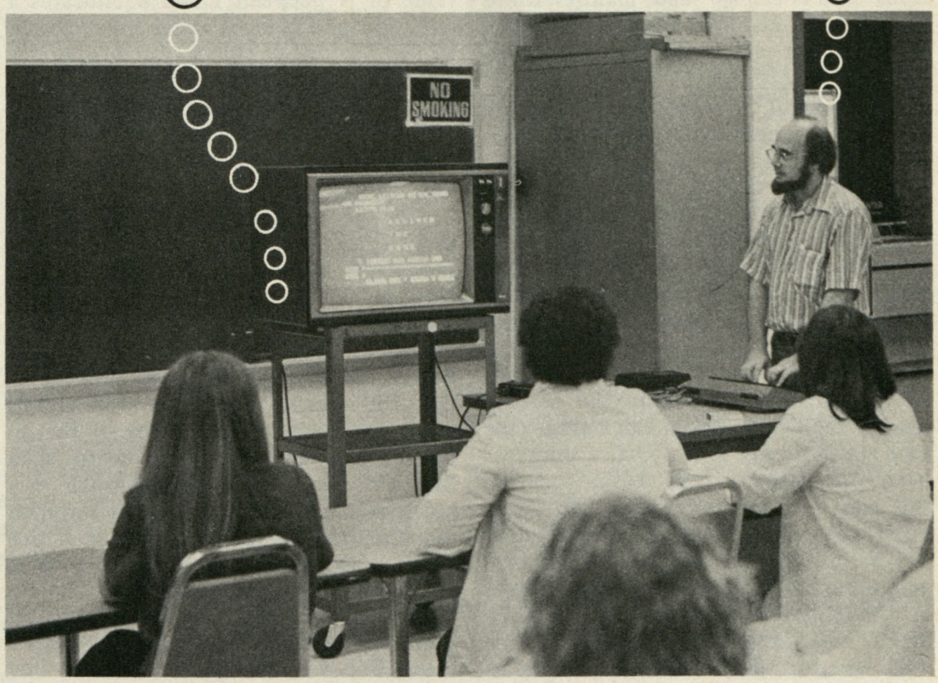
one zero five colon down arrow
blank blank blank blank C L E etc.

(We did not need to key in a blank after the "5"; the blank is automatically inserted when the program is listed. When keying-in, the down-arrow will appear to work right after the line number but listing the program would show that something else is needed – the colon works nicely. In the Heath version, the colon is not needed after the line number in order to make the at-sign, "@" work.)

The 2xx block describes locations.







We are in exactly one room at a time so we have an "ON R GOTO. . ." to jump to the description and a "GOTO 300" when the description is finished. The NELLAN program in the first article checks on some conditions and sometimes does some extra work while describing the room to the adventurer (for example, if the adventurer is carrying the rabbit in the Milk room, then line 2024 of NELLAN hops the rabbit out of the adventurer's arms and has the rabbit gobble up the thick growth of carrots found in that room). The programming logic of the 2xx block of CAKE is simple; you should stop and make sure that you understand everything in the 2xx block before you continue.

The 3xx block describes manifestations. In line 305, we check to see if we are in the Dark Room without the glowing globe; if we are, then no manifestations are described since it is too dark to see. The paragraph 310-320 checks to see which manifestations are present and GOSUBs to appropriate descriptions. Everything in the 3xx block of CAKE should be clear. In the more complicated program, NELLAN, sometimes extra work is done while describing the manifestations; for example, line 2525 of NELLAN, executed while describing Nellan accepting the warm milk, swaps the bowl of milk for the empty bowl and swaps this manifestation of Nellan (M=12 in that program) for the usual manifestation of Nellan (M=11 in that program). If you will be swapping manifestations while describing them, note that swapping in a manifestation with a lower M value will result in only one description of the object being given in that round of descriptions.

In the CAKE CFS, the distinctions between the locations (described in the 3xx block) are clear. In CAKE, locations don't change and manifestations are portable and can change (the open umbrella can change to the closed umbrella).

In general, however, the distinction between locations and manifestations is not clear. It may simply be convenience which decides whether an object is a location or a manifestation. Manifestations need not be portable; in the NELLAN program, Nellan (the cat) was a manifestation since she was changeable (asking for cold milk, drinking warm milk, drinking cold milk, napping) but Nellan was definitely too large to be carried. In the NELLAN program, the description of the Green Room can change (the sign appears only if the Office door has been tried); there is no reason to make the sign into a manifestation. Mr. Klinkoyn (the banker) is a manifestation not because he changes, but for our programming ease – if the adventurer keys in CONSULT THE BANKER or CONSULT NELLAN or CONSULT CHULA, it is easier to check that the creature to be consulted is in the same room as the adventurer if all of the consultable creatures are manifestations.

"After you have some idea of the world you are going to create, it helps to sketch a map. Plan some surprises. . ."

The 4xx block of CAKE determines the intentions of the adventurer. You can just keep lines 400-460 intact for your CFS provided your first eight verbs and nouns are the same as mine (they might as well be) and you use lines 500, 600, and 700 as I have. The "know answer" in line 405 is due to a quirk in my BASICs; if A$ is assigned a value and INPUT A$ is executed with the human responding by just hitting ENTER, then the new value is not the empty string but the old value of A$. Recall (from lines 6010 - 6020) that the first word of the adventurer's intention is V$. Lines 415-425 obtain V$ by searching the intention for the first blank and taking V$ as everything to the left. If there is no blank (in N or HELP, for examples), the intention is taken as both V$ and N$; after all, if the intention is given as just one word, it is both the first and last word of the intention. Values are assigned to V and N as explained in lines 6025-6035. If no match can be found, a value of zero is assigned; for example, BAKE THE CAKE would produce V=0 and N=13. A value of N between 1 and 8 indicates a direction and control passes immediately to the 5xx block (block for moving). A value of V between 1 and 8 indicates getting or cropping and moves us to block 600 provided N>0 (we cannot get or drop something that the computer does not recognize).

If the program recognizes both V$ and N$ then we do not reach line 465. If the player types in INVENTORY, then V=0 and N=9; line 465 passes control to line 868 (which starts the INVENTORY block). If the player types HELP or RELOOK, then line 470 passes control to the 700 block where line 708 stands ready to handle various verbs. If the intention is some other single word, then line 475 lets control pass through to a block which announces that the program did not understand the intention. If this block is reached, there is one chance in twenty that the adventurer will be reminded of the HELP-option. If the intention did not fit any of the above cases, line 475 will send control to line 892 for the default response. Do you see why an intention of BAKE THE CAKE produces a response of "The CAKE is hard to BAKE."?

The 5xx block handles ordinary moving. In CAKE, all movement is ordinary; in NELLAN we have non-ordinary moving by magic (SIT IN THE CHAIR) and in the CHAIR program we have UP and DOWN options. We could easily modify the CAKE program to allow UP and DOWN by extending the D(I,J) array; line 167 would have N S E W U D.

We will not reach line 506 unless N$ indicates a direction. The response to N$ = 'SOUTH' (N=6) should be exactly the same as the response to N$ = 'S' (N=2). In mathematics, when we put something in a standard form we often say that it is "in cannonical form"; it seems reasonable to say that line 506 gives N its cannonical value.

Recall from lines 6135-6150 that if we are in room R and go in direction I, we wind up in a new room D(R,I) provided the array element D(R,I) is positive. If D(R,I) > 0, then line 509 hops the adventurer to the new room and passes control back to block 2xx which describes the new location. If D(R,I) = 0, then no passage is ever possible in direction I when in room R; line 512 sends control to the bump-into-wall block that explains the situation and that block sends control to the block that solicits the adventurer's intention.

If D(R,I) is negative, we must check to see if the adventurer meets the conditions for passage. If we are on Stage (R=1), then the only condition that must be met for a conditional passage is the key for passage through the locked door; if R=1, then line 518 sends control to the block that deals with the locked door. Whatever the conditions of passage are, lines 515-521 will send us to the appropriate block.

Consider the block for the small passageway (lines 539-542). If the adventurer has the open umbrella, then L(1)=−1 and the adventurer is told that she or he cannot take an open umbrella through a small passageway and control is passed to the block that solicits the adventurer's intention. If the adventurer does not have the open umbrella, then the passage is made (the new R is −D (old R,I)) control is sent to the block that describes the new location.

The bump-into-wall block (545-581) involves a lot of formatting detail. If you are not interested in formatting detail but would like to use this feature in your CFS, then just copy the block. Unless you are allowing the UP and DOWN options, there shouldn't be any problems.

The 6xx block involves getting and dropping. Line 610 gives V its cannonical value; DROP (V=5), GIVE (V=6), LEAVE (V=7), and DELIVER (V=8) all yield a cannonical value of V=5.

The 615-635 block determines the

manifestation value M. If N$ does not determine anything in our manifestation list, then M=0; unless N=9 (as from TAKE INVENTORY), the adventurer is told that the intention cannot be carried out and control is passed to the block which solicits the intention. If the block seems unduly complicated, consider that the message PICK UP THE UMBRELLA can be speaking of either the open umbrella (M=1) or the closed umbrella (M=2). If a nonzero value of M is obtained, line 635 either sends control to the dropping block or drops control down to the getting block.

The getting block (640-660) allows the object to be gotten only if

- the adventurer does not already have it and
- the object is present in the room and
- the adventurer has a free hand to carry the object with.

Notice that getting a manifestation involves increasing C, the number of objects being carried, by one and assigning the new value of the location, L(M), of the manifestation to be −1 (for being carried).

In most CFS's, the adventurers can carry quite a few objects – say a half dozen, or a dozen or so. Since this CFS is so tiny, the adventurer is only allowed to carry two objects at a time. The adventurer is allowed to get objects from the Dark Room even if the glowing globe is not present; one justification of this is that we can often find things in dark rooms if we try.

The dropping block (665-680) also checks for the end of game – if the cake is dropped in the Party Room, the game ends. The principle that we should leave the computer in a standard state says that we should have CLEAR 50 before the END in line 680; otherwise, the next program loaded might expect a string space of 50 and not run.

The otherwise-responding block (700-896) handles all other responses. Line 716 looks at the value of V and shuttles control to the appropriate block.

If V$ is EAT or TASTE then the V value of 17 or 18 causes line 708 to send control to the EAT–&–TASTE block. If N$ ='CAKE' (N=13), then the adventurer is reminded that she or he is to deliver – not eat – the cake. If N$ is anything else, then control is passed to our handy default line. An intention of EAT THE UMBRELLA would produce a response of "THE UMBRELLA is hard to EAT".

The CLOSE block deals with closing doors (automatic) and closing umbrellas. The umbrella cannot be closed unless it is open and in the same room with the adventurer (including being carried by the adventurer).

We can consult the wrapper, the globe, and the map. The CONSULT block (744-776) first checks to make sure that the adventurer has the object in her or his hands. The NELLAN program involves a magic map that draws itself as the adventurer explores; unexplored rooms are marked with "?" and passages are indicated as untried, clear, or blocked (according to the state last encountered by the adventurer). In order to more easily keep up with the most recently encountered states of the passages, the NELLAN program uses a more complicated movement scheme than D(R,I); however, we can keep the simplicity of D(R,I) and have the map indicate the rooms as they are encountered, if we do not attempt to show the most recent state of the passages.

"...perhaps the adventurer types* Get the Sword. *The program simulates the result of the next action..."

The HELP block is included in this tiny CFS only by habit. In a larger CFS, the help provided would depend on the task being attempted.

If you have followed what we've discussed so far, you should have no trouble reading the rest of the program without any further comments. If you skipped the 1xx block (initializing) before, don't forget to go back to read it. It should make a lot more sense now.

I hope to put CAKE on MicroNet (c), free for everyone to copy. BASIC lines 10-3000 will be CAKE/BAS and the rest will be CAKE/DOC. There will also be a Heath (c) MBASIC (c) version. If you convert CAKE for another system and also use some computer network, please place your implementation on your network.

There are many articles and advertisements for CFS's. Three major magazines have had special issues which are particularly good sources of information:

July-Aug. '80 *Recreational Computing*
the July '80 *Creative Computing*
the Dec. '80 *Byte*

The delight I experience in sharing my CFS's more than makes up for the distress and dismay I experience in writing them. I hope the case is the same with your CFS. ■

LISTING ON PAGE 30

(Author's Biography on page 28)

Deliver the Cake

Some simulation games last for days, even months or years, and present various solutions. Here is how one adventurer started the simpler CAKE simulation.

When you have read the message above, please press the ENTER key.

You are about to be placed (let's pretend) in an Enchanted House.

It is always raining in one of the rooms in this house (the Rain Room). You cannot enter the Rain Room without an UMBRELLA but you have to find the UMBRELLA first.

When you have read the message above, please press the ENTER key.

You should use short messages to tell me what you want to do.

Typical messages are:
TIPTOE NORTH, GET UMBRELLA, TAKE THE OLD BRASS KEY, UNLOCK THE DOOR, GO EAST, DROP THE MAP, W ('W' is the same as 'GO WEST' or 'WEST')

When you have read the message above, please press the ENTER key.

Your mission is to find the CAKE and deliver it to the Party Room.

When you are in the house, you can type << HELP >> for more information. You are about to be placed in a room called the Foyer.

When you have read the message above, please press the ENTER key.

You are in a room called the Foyer.
There is a small doorway to the east and a large doorway to the north.
What do you intend to do now
GO EAST

This room is so dark that it is called the Dark Room. You can see light coming from the west doorway.

It's too dark to see anything else in here.
What do you intend to do now
GO BACK WEST

(Continued)

You are in a room called the Foyer. There is a small doorway to the east and a large doorway to the north.
What do you intend to do now
HEAD NORTH

You are in the Seating Room of an auditorium. You can see the Stage to the north, a doorway to the south, and a doorway to the east. You notice that it's raining in the room to the east.

Ah, here is the CAKE which you are to deliver to the Party Room.
What do you intend to do now
NORTH

You are now on the Stage. The Seating Room is to the South. There is a door to the east.

There is a GLOBE in the center of the room and it is softly glowing.
What do you intend to do now
GET THE GLOBE

You have it now.
What do you intend to do now
EAST

You need the KEY to get through the locked DOOR.
What do you intend to do now
SOUTH

You are in the Seating Room of an auditorium. You can see the Stage to the north, a doorway to the south, and a doorway to the east. You notice that it's raining in the room to the east.

Ah, here is the CAKE which you are to deliver to the Party Room.
What do you intend to do now
TRY THE EAST DOORWAY

The DOORWAY is hard to TRY.
What do you intend to do now
GET THE UMBRELLA

There's no UMBRELLA here.
What do you intend to do now
SOUTH

You are in a room called the Foyer. There is a small doorway to the east and a large doorway to the north.
What do you intend to do now
EAST

This room is so dark that it is called the Dark Room. You can see light coming from the west doorway.

There is a closed UMBRELLA in the corner.
What do you intend to do now
GET THE UMBRELLA

You have it now.
What do you intend to do now
WEST

You are in a room called the Foyer. There is a small doorway to the east and a large doorway to the north.
What do you intend to do now
NORTH

You are in the Seating Room of an auditorium. You can see the Stage to the north, a doorway to the south, and a doorway to the east. You notice that it's raining in the room to the east.

Ah, here is the CAKE which you are to deliver to the Party Room.
What do you intend to do now
EAST

No one can enter the Rain Room without an open UMBRELLA.
What do you intend to do now
OPEN THE UMBRELLA

Ok; done.
What do you intend to do now
EAST

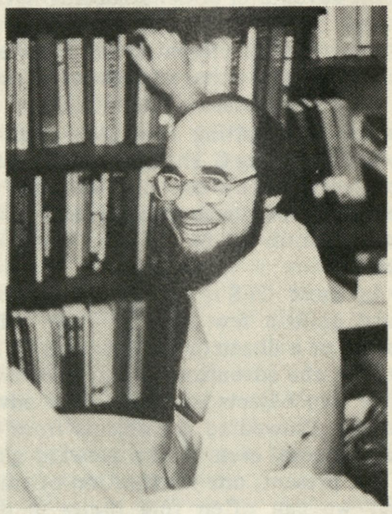
The ceiling of this room really needs fixing. Rain is falling through the ceiling and running through tiny holes in the floor.
What do you intend to do now
EAST

Welcome to the Party Room. There are doorways to the north and west. The east wall has a giant picture of an elephant. The south wall has a small curtain made out of bright green beads.
What do you intend to do now
NORTH

This is the Kitchen, but nothing is happening in here right now.

There is an old gum WRAPPER in this room.
What do you intend to do now

Furman Smith received a Ph.D. in Probability and Statistics from Florida State University in 1972, taught three years at the University of Kentucky, and has since been at the University of Houston Victoria Campus. He is currently an Associate Professor of Mathematical Sciences, teaching four courses, Chairperson of the UHUC Faculty Council, and a member of numerous committees including an eight faculty member group that is advisory to the President of the University of Houston System. He has a marvelous wife, two marvelous kids, one good home computer, a garden, and backlog of work.



Furman Smith

Letters

(Continued from page 7)

programs will work in our machines, but we really need discs.)

What I would like from you is a list of programs that you think might meet my needs, including costs and some sort of comments on how effective the program actually has been in classroom use. What would really sell me is if you would include the name of an instructor who actually is using the program, so that I could write to that instructor for some sort of evaluation.

Once again, I'm *not* interested in low-level introductory math (addition, subtraction) programs. I'm not interested in geometry programs or algebra programs. And I'm not interested in write-your-own-programs. Somewhere out there is a software supplier which is beginning to get into programs applicable to introductory auto mechanics and introductory machine-shop courses, and that is the supplier I am after.

Thanks very much in advance for your kind attention to this request.

Sincerely,

Rick Greenspan
Auto Mechanics Instructor
College of Alameda
555 Atlantic Ave.
Alameda, CA 94501 ■

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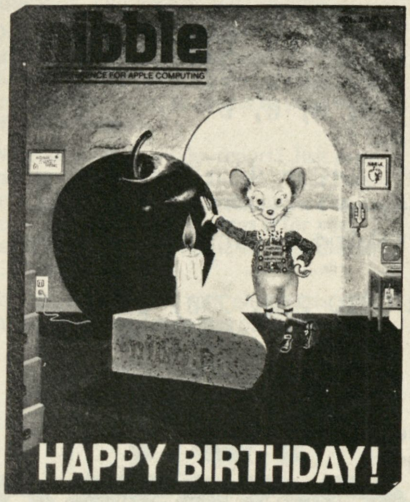

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```
10 ' CAKE by Furman Smith, UHVC.
15 ' doc. in a  1981  REC. COMP.
20 '---------------------------
30 PRINT CHR$(23) 'for double
   wide letters on the Triss
40 PRINT :PRINT :PRINT "
   Let's play

           D e l i v e r

           t h e

           C A K E

   " :GOSUB 860 :GOSUB 940
100 '---------------------------
*   initializing --------------
105 :
    CLEAR 250 ' extra $ space
110 GOSUB 900 ' welcome player
115 DEFINT A-Z ' save some time
120 :
    V9=18 :N9=17 :M9=7 :R9=9
125 DIM V$(V9), N$(N9), L(M9),
    N1(M9), D(R9,4)
130 :
    FOR I = 1 TO V9 :
    READ V$(I)    :NEXT I
135 DATA TAKE, GET, GRAB, PICK,
    DROP, GIVE, LEAVE, DELIVER,
    OPEN, UNLOCK, LIST, HELP,
    GO, RELOOK, CONSULT, CLOSE,
    EAT, TASTE
140 :
    FOR I = 1 TO N9 :
    READ N$(I)    :NEXT I
145 DATA N, S, E, W,
    NORTH, SOUTH, EAST, WEST,
    INVENTORY, WORDS, DOOR,
    UMBRELLA, CAKE, KEY, MAP,
    GLOBE, WRAPPER
150 :
    FOR I=1 TO M9 :
    READ L(I), N1(I) :NEXT I
155 DATA 0,12, 8,12, 4,13,
    9,14, 2,15, 1,16, 0,17
160 IF RND(0) > .75
    THEN L(7)=6 ELSE L(7)=3 '
    randomize WRAPPER placement
165 :
    FOR I = 1 TO R9 :
    FOR J = 1 TO 4  :
    READ D( I, J )  :
    NEXT J  :NEXT I
167 '
            N  S  E  W
170 DATA  0, 4,-2, 0,
          0, 0, 3,-1,
          0, 6, 0, 2,
          1, 7,-5, 0,
          0, 0, 6, 4,
          3,-9, 0,-5,
          4, 0,-8, 0,
          0, 0, 0,-7,
         -6, 0, 0, 0
175 :
    C9 = 2  :C = 0  :R = 7
200 '---------------------------
*   describing locations -------
205 :
    ON R GOTO 210, 220, 230,
              240, 250, 260,
              270, 280, 290
210 ':
    Stage                 R = 1
215 PRINT "
    You are now on the Stage.
    The Seating Room is to the
    South.  There is a door to
    the east." :GOTO 300
220 '
    Pantry                R = 2
225 PRINT "
    You are in the Pantry.
    There is a door to the west
    and an open passageway to
    the east."  :GOTO 300
230 '
    Kitchen               R = 3
235 PRINT "
    This is the Kitchen but
    nothing is happening in
    here right now." :GOTO 300
240 '
    Seating Room          R = 4
245 PRINT "
    You are in the Seating Room
    of an auditorium. You can
    see the Stage to the north,
    a doorway to the south, and
    a doorway to the east. You
    notice that its raining in
    the room to the east.":
    GOTO 300
250 '
    Rain Room             R = 5
255 PRINT "
    The ceiling of this room
    really needs fixing.  Rain
    is falling through the
```

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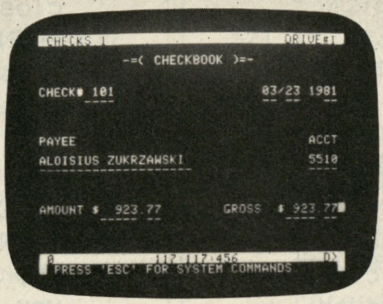

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```
    ceiling and running through
    tiny holes in the floor.":
    GOTO 300
260 '
    Party Room          R = 6

265 PRINT "
    Welcome to the Party Room.
    There are doorways to the
    north and west.  The east
    wall has a giant picture of
    an elephant.  The south
    wall has a small curtain
    made out of bright green
    beads." :GOTO 300
270 '
    Foyer               R = 7
275 PRINT "
    You are in a room called
    the Foyer.  There is a
    small doorway to the east
    and a large doorway to the
    north." :GOTO 300
280 '
    Dark Room           R = 8
285 PRINT "
    This room is so dark that
    it is called the Dark Room.
    You can see light coming
    from the west doorway." :
    GOTO 300
290 '
    Office              R = 9
295 PRINT "
    You are now in the Office."
    :GOTO 300
300 '-------------------------
*   describing manifestations --
305 :
    IF R = 8 THEN
    IF L(6) <> -1 AND L(6) <> R
    THEN PRINT "
    Its too dark to see
    anything else in here.":
    GOTO 400
310 :
    FOR M = 1 TO M9
315 IF L(M) = R THEN
    ON M GOSUB 325, 335, 345,
    355, 365, 375, 385
320 NEXT M   :GOTO 400
325 '
    open UMBRELLA       M = 1
330 PRINT "
    There is an open UMBRELLA
    here." :RETURN
335 '
    closed UMBRELLA     M = 2
340 PRINT "
    There is a closed UMBRELLA
    in the corner." :RETURN
345 '

    CAKE                M = 3
350 PRINT "
    Ah, here is the CAKE which
    you are to deliver to the
    Party Room." :RETURN
355 '
    KEY                 M = 4
360 PRINT "
    There is an old brass KEY
    on the floor." :RETURN
365 '
    MAP                 M = 5
370 PRINT "
    Here's a MAP of this
    crazy place." :RETURN
375 '
    GLOBE               M = 6
380 PRINT "
    There is a GLOBE in the
    center of the room and it
    is softly glowing." :RETURN
385 '
    WRAPPER             M = 7
390 PRINT "
    There is an old gum WRAPPER
    in this room."  :RETURN
400 '-------------------------
*   determining intention ------
405 :
    A$ = "know answer":PRINT"
    What do you intend to do";
410 PRINT " now"   :INPUT A$ :
    PRINT STRING$(31,"-")
415 :
    I9=LEN(A$) :J=I9
420 FOR I = 1 TO I9 :
    IF MID$(A$,I,1) <> " "
    THEN J = J-1   :NEXT I
425 IF J <> 0
    THEN V$ = LEFT$(A$,I-1)
    ELSE V$=A$ :N$=A$ :GOTO 440
430 FOR J = I9 TO I STEP -1 :
    IF MID$(A$,J,1) <> " "
    THEN NEXT J
435 N$ = RIGHT$( A$, I9-J )
440 :
    V = 0   :N = 0
```

```
445 FOR I=1 TO V9 :IF V$(I)=V$
    THEN V = I  :GOTO 450
    ELSE NEXT I
450 FOR I=1 TO N9 :IF N$(I)=N$
    THEN N = I  :GOTO 455
    ELSE NEXT I ' A zero value
    for V or N indicates that
    the word was not
    understood; otherwise, the

    values are as in block 62xx.
455 :
    IF 0<N AND N <= 8 THEN 500
    ' direction indicated
460 :
    IF V * N > 0 THEN
    IF V <= 8 THEN 600
             ELSE 700 '
    If both words understood,
    hop to the 6xx block or
    7xx block depending on V.
465 :
    IF V = 0 THEN
    IF N = 9 THEN 868
470 IF N = C THEN
    IF V = 12 OR V =14 THEN 700
475 IF V$ <> N$ THEN 892
480 :
    PRINT "
    I don't understand " :
    PRINT TAB(4)"<<"; A$; ">>."
485 PRINT "Perhaps you should"
490 PRINT "type <<LIST WORDS>>."
495 IF RND(0) < .95
    THEN 400 ELSE PRINT"
    A voice says << Type
    << HELP >> if you need
    a little help >>." :GOTO 400
500 '-------------------------
*   moving --------------------
503 '
    To reach line 506,
    we must have 0 < N <= 8.
506 :
    IF N <= 4
    THEN I = N
    ELSE I = N-4 '
    gives cannonical value
509 :
    IF D(R,I) > 0 THEN
    R = D(R,I)  :GOTO 200 '
    move to new room
512 :
    IF D(R,I) = 0 THEN 545
515 '
*   --- determining conditions
518 ON R GOTO 524,524,780,
    530,780,521,539,539,539
521 IF I=2 THEN 539 ELSE 530 '
    R=6 has two special passages
524 '
*   --- locked door
527 IF L(4) = -1
    THEN GOTO 832
    ELSE PRINT "
    You need the KEY to get
    through the locked DOOR.":
    GOTO 400
530 '
*   --- rain barrier
533 IF L(3) = -1 THEN PRINT "
    The UMBRELLA can protect
    you from the falling rain
    but nothing can protect
    the CAKE from the water";
534 IF L(3) = -1 THEN PRINT "
    that spatters up from the
    floor.  You must find
    some other way to deliver
    the CAKE to the Party
    Room."  :GOTO 400
536 IF L(1) = -1
    THEN R = -D(R,I) :GOTO 200
    ELSE PRINT "
    No one can enter the Rain
    Room without an open
    UMBRELLA."  :GOTO 400
539 '
*   --- small passageway
542 IF L(1) <> -1
    THEN R = -D(R,I) :GOTO 200
    ELSE PRINT "
    You cannot take an open
    UMBRELLA through that
    small passageway." :GOTO 400
545 '
*   --- bump into wall
548 PRINT "
    You cannot walk through
    walls."
551 :
    A$ = ""
554 IF D(R,1)=0 THEN A$=A$+"N, "
557 IF D(R,2)=0 THEN A$=A$+"S, "
560 IF D(R,3)=0 THEN A$=A$+"E, "
563 IF D(R,4)=0 THEN A$=A$+"W, "
566 IF A$="" THEN PRINT"
    POSSIBLE PASSAGES ABOUND."
    : GOTO 400
569 :
```

```
    A$ = LEFT$( A$, LEN(A$)-2 )
572 PRINT TAB(4)"There";TAB(10);
575 IF LEN(A$) = 1
    THEN PRINT "is a wall ";
    ELSE PRINT "are walls ";
578 PRINT "to the"
581 PRINT TAB(4) A$; "."  :
    GOTO 400
600 '-------------------------
*   getting & dropping ---------
605 '
    To reach line 610,
    we must have 0 < V <= 8.
610 :
    IF V <= 4 THEN V=1 ELSE V=5
    ' gives cannonical value
615 '
*   --- determine M
620 M = 0  :FOR I = 1 TO M9
625 IF N = N1(I) AND L(I) <> 0
    THEN M = I  ELSE NEXT I
630 :
    IF M = 0 THEN
    IF N=9 THEN 868 ELSE PRINT"
    That is not possible now."
    :GOTO 400
635 IF V = 5 THEN 665
640 '
*   --- getting
645 :
    IF L(M) = -1 THEN PRINT "
    You still have it.":GOTO 400
650 :
    IF L(M) <> R THEN PRINT "
    There's no "; N$( N1(M) );
    " here." :GOTO 400
655 :
    IF C < C9 THEN L(M) = -1 :
    C = C + 1  : PRINT "
    You have it now." :GOTO 400
660 :
    PRINT "
    You can only carry "; C9;
    "objects.";  :PRINT "
    Type << INVENTORY >> to
    see what you can drop." :
    GOTO 400
665 '
*   --- dropping
670 :
    IF L(M) <> -1 THEN PRINT "
    You cannot DROP what you
    do not have."  :GOTO 868
675 :
    L(M)=R :C=C-1
680 :
    IF L(3)<>6
    THEN 300
    ELSE CLEAR 50   :PRINT "
    Y o u   w o n   !
    Congratulations.":PRINT :END
700 '-------------------------
*   otherwise responding -------
704
    ' To reach line 708,
      we must have V > 8 .
708 :
    ON V-8 GOTO 840, 820, 788,

    780, 490, 200, 744, 720,
    712, 712
712 '
*   --- for EAT & TASTE
716 IF N=13 THEN PRINT "
    You are supposed to deliver
    the CAKE -- not EAT it."
    :GOTO 400
    ELSE 892
720 '
*   --- for CLOSE
724 :
    IF N = 11 THEN PRINT "
    The DOOR automatically
    CLOSEs and relocks itself."
    :GOTO 400
728 IF N<>12 THEN 892
732 :
    IF L(1)=0 THEN PRINT "
    The UMBRELLA is still ";
    "CLOSED."  :GOTO 400
736 IF L(1)=R OR L(1)=-1 THEN
    L(2)=L(1) :L(1)=0 :PRINT"
    Ok; done."  :GOTO 400
740 PRINT "
    You cannot close it unless
    you are in the same room as
    it is."  :GOTO 400
744 '
*   --- for CONSULT
748 IF N<15 THEN 892 ELSE
    IF L(N-10) <> -1 THEN
    PRINT "
    You don't have the "; N$
    :PRINT TAB(4)"in your ";
    "hands."  :GOTO 400
752 :
    IF N=17 THEN PRINT "
    The WRAPPER does not have
    anything important written
    on it.  Nice try." :GOTO 400
```

```
756 IF N=16 THEN PRINT "
    The GLOBE just softly
    glows and glows."  :GOTO 400
760 IF N <> 15 THEN 892
764 :
    PRINT "
    +-+-+-+-+-+-+-+-+-+-+-+-+-+
    + Stage / Pantry/ Kitch +
    +                       +
    +       /       /       +
    +-+/ /+-+-+-+-+-+-+/ /+-+"
768 PRINT TAB(4);
   "+A      / Rain  /      P+
    +u                     a+
    +d      /       /      r+
    +-+/ /+-+-+-+-+-+-+/ /+-+"
772 PRINT TAB(4);
   "+       /       +       +
    +               +       +
    + Foyer / Dark  + Office+
    +-+-+-+-+-+-+-+-+-+-+-+-+"
776 GOTO 400
780 '
*   --- for HELP
784 PRINT "
    You are to find the CAKE
    and deliver it to the
    Party Room.  "; :GOSUB 860
    :PRINT "
    Type << LIST WORDS >> to
    see how you may make me
    understand."  :GOTO 400
788 '
*   --- for LIST
792 IF N <> 10 THEN 892
796 PRINT "
    I know these verbs:"
800 FOR I=1 TO V9 :PRINT TAB(9)
    V$(I)      :GOSUB 860 :NEXT I
804 PRINT TAB(4);"I know ";
    "these nouns:"
808 FOR I=1 TO N9 :PRINT TAB(9)
    N$(I)      :GOSUB 860 :NEXT I
812 :

    PRINT "
    I just look at the first
    and last words of your
    intention;  for example,
    saying << TAKE KEY >> does
    just as much as
    << TAKE THE OLD BRASS KEY >>
816 GOSUB 860 :GOTO 400
820 '
*   --- for UNLOCK
824 IF N <> 11 THEN 892
828 IF L(4) <> -1 THEN PRINT"
    You need to be holding the
    KEY in order to UNLOCK the
    door."  :GOTO 400
832 PRINT "
    You UNLOCKed the door,";:
    GOSUB 860 :PRINT "
    passed through it,";:
    GOSUB 860 :PRINT "
    and it shut behind you."
836 GOSUB 860 :R = 3-R :GOTO 200
840 '
*   --- for OPEN
844 IF N=11 THEN 820 ELSE
    IF N<> 12 THEN 892
848 IF L(2) = 0 THEN PRINT "

    The UMBRELLA is still ";
    "open." :GOTO 400
852 IF L(2) = -1 OR L(2) = R
    THEN L(1) = L(2) :L(2) = 0
    :PRINT TAB(4) "Ok; done." :
    GOTO 400
856 PRINT "
    You cannot OPEN the
    UMBRELLA if its not ";
    "around."    :GOTO 400
860 :
    'just to pause a bit
864 FOR J=1 TO 300 :NEXT J :
    RETURN
868 '
*   --- for INVENTORY
872 IF C = 0 THEN PRINT "
    Your hands are empty."
876 IF C = 1 THEN PRINT "
    One hand is empty and the
    other has the "
880 IF C = 2 THEN PRINT "
    Both hands have something;
    here's what you have:
884 FOR M = 1 TO M9 :
    IF L(M) = -1
    THEN PRINT TAB(10) N$(N1(M))
888 NEXT M :GOTO 400
892 '
*   --- for defaulting
896 PRINT "
    The "; N$; " is hard to ";
    V$; "."    :GOTO 400
900 '-------------------------
*   instructing player ---------
905 :
    PRINT "
```

```
    You are about to be placed
    (let's pretend) in an
    Enchanted House." :GOSUB 860
910 PRINT "
    It is always raining in
    one of the rooms in this
    house (the Rain Room).
    You cannot enter the Rain
    Room without an UMBRELLA
    but you have to find the
    UMBRELLA first." :GOSUB 940
915 :
    GOSUB 860 :PRINT "
    You should use short
    messages to tell me what
    you want to do." :GOSUB 860
920 PRINT "
    Typical messages are:
    TIPTOE NORTH, GET UMBRELLA,


    TAKE THE OLD BRASS KEY,
    UNLOCK THE DOOR , GO EAST,
    DROP THE MAP, W (`W' is the
    same as `GO WEST' or ";
925 PRINT "`WEST')" :GOSUB 940
930 :
    PRINT "
    Your mission is to find
    the CAKE and deliver it to
    the Party Room." :GOSUB 860
935 PRINT "
    When you are in the house,
    you can type << HELP >> for
    more information.  You are
    about to be placed in a
    room called the Foyer.":
    GOSUB 860
940 :
    GOSUB 860 :PRINT "
    When you have read the
    message above, please
    press the ENTER key.    "; :
    INPUT A$ :PRINT
    STRING$(31,"-") :RETURN
945 RETURN
3000 '-- end of 16 k version --'
3010 ' The program above will  '
3020 ' run on a Triss Three ( ='
3030 ' TRS-80 (c) Model III    '
3040 ' with Model III BASIC)   '
3050 ' with 16 computer-k of   '
3060 ' RAM.  It will also work '
3070 ' with Level II BASIC on  '
3080 ' a TRS-80 Model I with   '
3090 ' 16 computer-k of RAM.   '
3100 ' Triss's with > 16 k can '
3110 ' store the the following '
6000 ' d o c u m e n t a t i o n
6001 '-------------------------
* * listing variables ---------
6005 '
    junk var. = I,J,A$,I9, etc
6010 '
    V$ = first word of the
    adventurer's message
    (`V' for `Verb')
6015 '
    N$ = last word of the
    adventurer's message
    (`N' for `Noun')
6020 '
    ex: "GRAB THAT BIG CAKE"
    yields
    V$ = "GRAB" & N$ = "CAKE"
6025 '
    The 62xx block lists the

    numbers associated with
    the verbs and nouns.
    Consult that part of the
    listing to understand the
    following:

6030 '
    V = # for verb of command
    ( V$ = "GRAB"  =>  V = 3 )
6035 '
    N = # for noun of command
    ( N$ = "CAKE"  =>  N = 13 )
6040 '
    V9 = # of verbs that the
    program understands =
    the limit on V  ( V9 = 18 )
6045 '
    N9 = # of nouns that the
    program understands =
    the limit on N  ( N9 = 17 )
6050 '
    The 63xx block describes
    the manifestations;  look
    there to verify that the
    CAKE is manifestation
    number 3.
6055 '
    M = # of the manifestation
    N1(M) = number of noun
            going with M
6060 '
    N1(3) = 13 means that the
```

```
      3 rd manifestation is
      described by the 13 th noun
6065 '
      Note that manifestations
      1 (open umbrella) and
      2 (closed umbrella) are
      both described by noun 12

6070 '
      M9 = limit on M =
      number of manifestations

6075 '
      The 64xx block lists the
      rooms.  Look there to
      verify the next example.

6080 '
      R = # of room    for ex,
      room 9 is the Office

6085 '
      R9 = # of rooms in the
      house  = limit on R (R9=9)

6090 '
      L(M) = location of
      manifestation M where

6095 '
      in general,
      L(M) = -1 means that the
      adventurer is carrying
      manifestation M      and
      L(M) = 0 means that the
      manifestation doesn't exist

6100 '
      L(M) = R means that
      manifestation M is
      in room R

6105 '
      L(3) = 9 means that the
      CAKE (M=3) is in
      the Office (R=9)

6110 '
      L(3) = -1 means that the
      CAKE is being carried by
      the adventurer

6115 '
      L(3) = 0 does not occur
      but would mean that the
      cake no longer exists
      (perhaps eaten by a
      CAKE GOBBLER)

6120 '
      L(1) = 0 means that the
      open umbrella no longer
      exists
      (This is used when the
      umbrella is closed.)

6125 '
      C = # objects being carried

6130 '
      C9 = # maximum number of
      objects that can be
      carried at one time
      =  limit on C      ( C9=2 )

6135 '
      D( R, I ) indicates the
      destination if direction
      I is taken when in room R

6140 '
      D(6,2) = 9 means that we
      hop to room 9 if we go
      south from room 6
      (see block 63xx for map)

6145 '
      If D(R,I) is positive, it
      gives the destination.
      If D(R,I) is zero, no
      passage is possible;  ex,
      D(6,3) = 0 since the east
      side of room 6 is pure
      wall.

6150 '
      If D(R,I) is negative, it
      indicates the conditional
      passage;  ex: D(1,3) = -2
      since we can pass from
      room 1 to room 2 only if
      we have the KEY.
```

```
6199'
6200 '-------------------------
* * listing verbs and nouns ---
6205 '
     V$(I)          I  N$(I)
6210 '---------- --  ----------
6215 '
     TAKE           1  N
     GET            2  S
     GRAB           3  E
     PICK           4  W
6220 '
     DROP           5  NORTH
     GIVE           6  SOUTH

     LEAVE          7  EAST
     DELIVER        8  WEST
6225 '
     OPEN           9  INVENTORY
     UNLOCK        10  WORDS
     LIST          11  DOOR
     HELP          12  UMBRELLA
6230 '
     GO            13  CAKE
     RELOOK        14  KEY
     CONSULT       15  MAP
     CLOSE         16  GLOBE

6235 '
     EAT           17  WRAPPER
     TASTE         18
6299'
6300 '-------------------------
* * listing manifestations ----
6305 '
     M  manifestation       N1(M)
6310 '  -------------         -----
6315 '
     1  open UMBRELLA         12
     2  closed UMBRELLA       12
     3  CAKE                  13
     4  KEY                   14
6320 '
     5  MAP                   15
     6  glowing GLOBE         16
     7  old gum WRAPPER       17
6399'
6400 '
------- listing rooms ----------
6410 '  R    name of room
        1    Stage
        2    Pantry
        3    Kitchen
6420 '  4    Seating Room
        5    Rain Room
        6    Party Room
6425 '  7    Foyer
        8    Dark Room
        9    Office
6430 '
     layout of rooms :
6435 '
          1  2  3
          6  7  8
          7  8  9
6499 '
6500 '-------------------------
* * crediting -----------------
6505'
     written Feb-Mar 1981 by
6510'
     Furman Smith at the
6515'
     Univ of Houston
     Victoria Campus
     2302-C Red River
     Victoria, Tx   77901
6525'
     Feel free to sell, swap,
     give away, or hoard any
     version of this program.
6530 '
     This program appears in a
     1981 issue of
6535 '
        RECREATIONAL
        COMPUTING
6540 '
     and is the second part of a
     series of three articles.
6545 '
     Please see the Jul-80 issue
     of RECREATIONAL COMPUTING
     for the first article.
6599'
6600 '-------------------------
6615 'titleing in block.....0xx
      initializing in block.1xx
      describing locations..2xx
       "    manifestations..3xx
      determining intention.4xx
6620 'moving................5xx
      getting & dropping....6xx
      other responding.7xx, 8xx
      instructing player....9xx
      documenting.....6xxx
6789 '--- end of program -------
```

end

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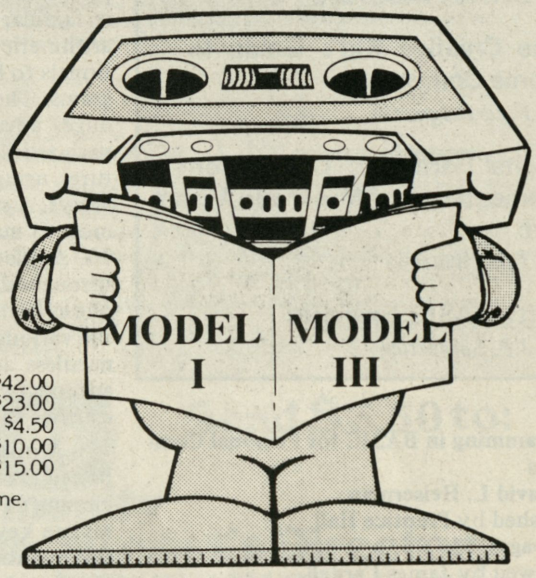

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Book Reviews

Books reviewed for this issue:

Programming in BASIC for Personal Computers
By David L. Heiserman

The Creative Kid's Guide to Home Computers
by Fred D'Ignazio

Digital Harmony: On the Complementarity of Music and Visual Art
by John Whitney

Fifty BASIC Exercises
by J.P. Lamoitier

Programming in BASIC for Personal Computers
By **David L. Heiserman**
Published by **Prentice Hall**
331 pages, $17.95,
Reviewed by **James Cardell**

There is a traditional approach to writing introductory programming texts. Before addressing the subject at hand, chapters are spent giving historical background, explaining flowcharts and presenting simplified models of computers. No doubt, there is a feeling among authors that abacuses and punched paper tape will somehow inspire students to become programmers. Most hobby computerists have been exposed to this information through periodicals and other books with similar chapters.

Another characteristic of many introductory programming texts is that they present a version of the language being taught which either runs on a specific computer, or on no computer. This presumes that the book is being used as a course textbook, that there are instructors and consultants available to help with the actual programming.

Unfortunately these resources are not available to most hobby computerists.

Programming in BASIC for Personal Computers takes a different approach which will appeal to the hobbyist whose curiosity probably plays a significant role in his interest in computers. Heiserman introduces the reader to BASIC in a way which seems to be mere tinkering with the commands. The first statements learned are entered for direct execution from the keyboard. The interest that is sparked by this experimentation involves the reader sufficiently through the introductory material that by the time he asks himself when he will start programming, he already has.

While novel in approach, the material covered in this book is standard fare for an introductory programming text. BASIC statements are introduced a few per chapter with plenty of easily reproduced examples. Midway through the book the reader is familiar enough with I/O statements, arithmetic expressions and simple conditionals to be able to construct actual programs. The remainder of the book introduces advanced programming constructs such as subroutines and simple data structures using single and multidimensional arrays. A subset of Microsoft BASIC common to many microcomputers (i.e. TRS-80, Apple II, Commodore PET) is used throughout the text with most of the emphasis on the TRS-80. Differences between the various versions are noted without the needless ado sometimes spent by other authors (which usually clouds rather than clarifies the differences).

A nice feature of the book's format is boxed text sections which appear at the beginning of each chapter. These boxes summarize keyboard commands and program statements introduced in the current chapter, thereby highlighting the chapter's contents. Other forms of these boxes which appear throughout the book are the "principle" and the "note" boxes. These are used to clarify the material being presented.

As mentioned previously, the book contains many well-presented programming examples. Some of the complete programs developed are statistical analysis, new home feasibility study and checkbook transaction. In addition to text examples, chapter end exercises with selected answers give the reader ample opportunity to practice the material and techniques presented.

Heiserman's approach to programming technique which is stressed throughout is as pragmatic as his overall presentation. Generally this is fine, since after the fundamentals are covered, he demonstrates top-down problem analysis using subroutines to break the solution into small units. The only criticism is that he overemphasizes flowcharting and throughout the book one finds flowcharts that border on spaghetti diagrams. His motivation is to develop good documentation habits, a worthy goal, but many better ways are available.

Personal computerists who want to become programmers rather than just users are faced with a difficult task. How does the average person learn programming skills? Is it possible to teach yourself this subject? Given the availability of a computer, motivation to stick with an instructional method, a healthy curiosity and a straightforward text such as *Programming in BASIC for Personal Computers*, the foundations necessary to attain this goal may be developed with a minimum of frustration.

The Creative Kid's Guide to Home Computers
By **Fred D'Ignazio**
Published by **Doubleday**
130 pages, $9.95
Reviewed by **Susan Bowers**

The Creative Kid's Guide to Home Computers is not a "how-to" book, not a "what-equipment-to-buy" book; it is an idea book. It presents ideas for computer projects that creative kids could do, with just enough explanation to spark an interest and start them working on their own. There are several valuable appendices, especially the bibliographies of home-computer books, magazines and catalogs. The glossary is very useful and the book has a good index. However, there is a major flaw.

The projects discussed are obviously quite advanced, which would indicate that it is aimed at junior high or high school kids. The flaw is that there are several places where the book "talks down" to the reader. It is unfortunate that one of those spots is the introductory section. My favorite sixteen-year-old thought it promised to be a great book but was "turned off" by that beginning section which seemed aimed at a much lower age group, and could not bring himself to read on. This is really too bad since some of the project ideas are especially interesting. The section on robots is fascinating, and the one on games is very good.

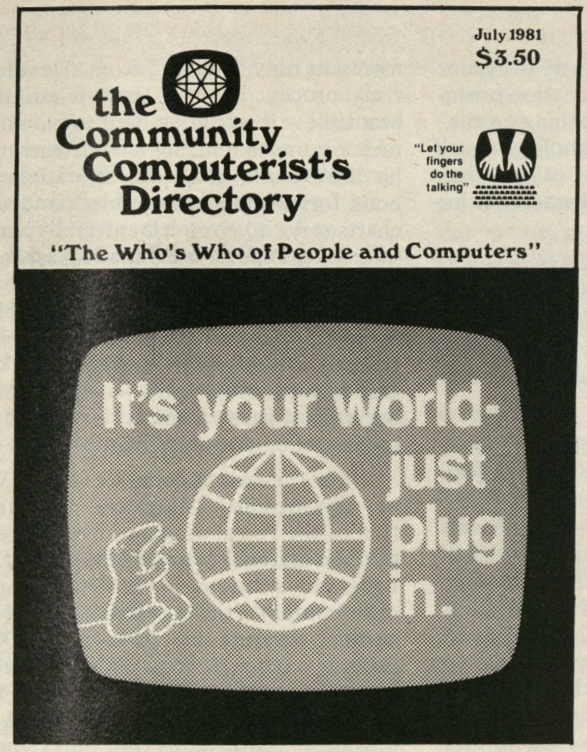
On the whole, this book provides a good overview of some stimulating project ideas. In spite of the flaw, *The Creative Kid's Guide to Home Computers* could be very valuable in home, schoolroom or library as a resource book of ideas for what can be done with a minicomputer.

Digital Harmony: On the Complementarity of Music and Visual Art
By **John Whitney**
Published by **Byte Books Division/McGraw Hill**
235 pages, $21.95
Reviewed by **Joseph B. Rothstein**

An extra-terrestrial intelligence, browsing through a library card catalog here on Earth for entries relating to computers, could be forgiven for concluding that Earthlings are a people of some intelligence and technical skill, but sorely lacking in refined sensibilities and aesthetic development.

For a perusal of such a card catalog reveals a great many volumes and periodicals

This is not another computer magazine



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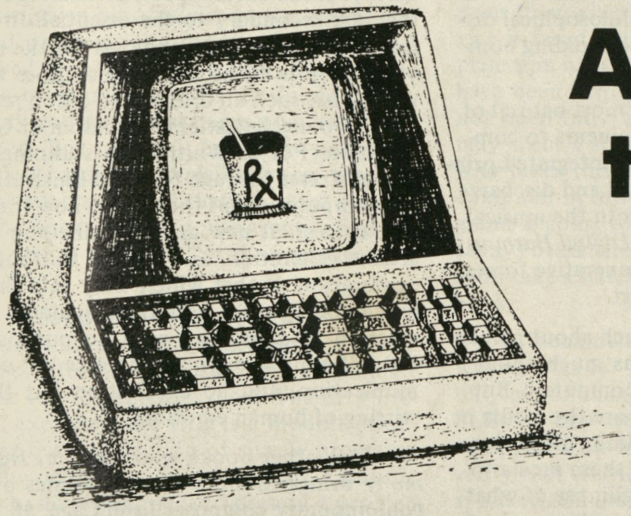

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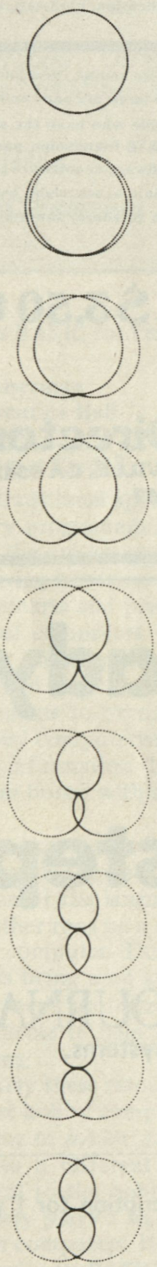


From the flip-book on the corner of the pages of *Digital Harmony*.

covering computer architecture, programming languages, telecommunication protocols and such, but next to nothing on the application of computer technology to self-expression through music, art or the other impractical pursuits which characterize humanity.

This circumstance alone would be adequate reason to greet John Whitney's book *Digital Harmony* with enthusiasm, and the fact that it does such a good job with such a difficult topic makes its publication even more of a delight.

John Whitney is an artist and filmmaker of long standing and considerable reknown, held in high esteem by many of those artists who have labored in the vineyards so that Hollywood could have a fertile source of unpaid research and development. If you were among the many millions who saw and enjoyed *2001: A Space Odyssey*, *Star Wars* or *Superman*, then you must give some measure of thanks to Whitney, for he pioneered some of the techniques which contributed to their cinematic virtuosity.

A considerable portion of the book is devoted to the process by which Whitney came to embrace the emerging medium of video, and it is a credit to his skill as a writer that such a personal, philosophical discourse is so readable, while avoiding bombast and self-congratulation.

He makes it seem the most natural of progressions from film to cinema to computer graphics, and his well-integrated principles of movement, tension and discharge, harmony and color – in both the musical and visual realms – make *Digital Harmony* a first-rate primer of the generative forces behind much of modern art.

For this book is as much about perception as it is about video, as much about imagination as it is about computers. But computers and video discs are the media he has chosen, and while he limits discussion of the technical aspects of these media to the minimum, he offers a glimpse of what the near future may be like, when each of us has access to these tools of the artist's trade.

More than that, however, this is an exposition of theory in the context of a new reality, and Whitney moves skillfully from the causes and progression of his own development as an artist, through a statement of the problem facing contemporary artists as he sees it, to a discussion of the instrument he uses, the principles which govern his work, and a detailed analysis of one of his compositions.

There are numerous illustrations in color, presented with the caveat that they represent only "frames" from an evolving visual process. Even so, they are strikingly beautiful – it would be hard to manufacture a more tantalizing advertisement for his life's work, given the limitations of book format. In addition, black-and-white charts serve to complement and enhance some of the more problematical aspects of his theories. It is unfortunate that a demonstration disc of musical examples could not have also been included, since there is considerable emphasis, in the text as in the title, on the co-equal and co-generative place of music in Whitney's schema of creative organization.

For the serious computer artist, Whitney has included listings and documentation of the Pascal programs used to generate the material from which some of the book's illustrations are excerpted. Appendices contain articles and speeches by the author, covering the years 1944-1977, offering a range of commentaries from different perspectives of time, intended audience, and technical sophistication. A bibliography, filmography and index further flesh out this portrait of the artist as a technological humanist.

In the final analysis, this is not a technical treatise, nor is it a work of art/music theory. It has these aspects of course, but they are secondary to the essential direction of the book – an apologia for the use of computers in the arts, against those who whine that such an orientation is too technical, too mechanistic, too random or too inhuman. For as Whitney so stunningly demonstrates through text and illustration, the computer opens the way to new theories, consistent new guiding principles of artistic generation, and a more thorough exploration of that which truly sets the human being apart from the machine – the creation of a product with no purpose but self-expression, no commerce but communication, and no application but the stirring of human emotions.

Two other books which *Digital Harmony* brings to mind are the classics by contemporary composer John Cage, *M*, and *A Year from Monday*. Those ranged far afield to all manner of endeavors and disciplines to form an exposition of the principles guiding Cage's art and philosophy. Like them, *Digital Harmony* offers far more than a way of art; it offers a way of mind. And as the mind sees, the person lives. Such a book is an education in itself, and a psychographic guide to the organizing principles of an age. As John Cage made some sense of the 1950's and 1960's by attempting to understand his art and himself, so *Digital Harmony* may help us come to terms with the subconscious interplay of technology, organization and ex-

pression which will go far in shaping the 1980's and beyond.

Only the best attempts to explain an art form after the fact are even tolerably readable; John Whitney is to be congratulated for offering a concise, penetrating and ultimately exciting vision of an art form which, though clearly formed in his own mind, is still on the horizon of popular culture. Beyond congratulations, he deserves a far wider audience for his work than has been the case. If the text and examples from *Digital Harmony* are any indication, we will surely be seeing and hearing more from John Whitney.

Fifty Basic Exercises
By J. P. Lamoitier
Published by **Sybex**
253 pages, $12.95
Reviewed by **Paul Gans**

Fifty Basic Exercises by J. P. Lamoitier is a book for the multitudes who know BASIC and who would now like to learn to program. The difference between knowing BASIC and knowing how to program lies primarily in the ability to *use* the language to solve problems. This is something many computer novices never really learn. One often given bit of advice to the novice is: read programs and see how others have solved problems. This is fine advice. Suitable programs can often be found in the many computer magazines now being published. But programs are rarely published with a road map explaining how the author analyzed the situation, what needed to be done, or why it was eventually done the way it was done. So the beginner is stuck.

What is needed is a collection of programs, fully motivated, explained, and discussed. Jean-Pierre Lamoitier has come close to providing this ideal. The fifty BASIC exercises (the title is a modest pun) comprise a collection of simple programs well worth study by the student. Lamoitier's basic technique is to present a problem clearly, then to discuss one or more possible solutions. These solutions are often accompanied by flowcharts and, on occasion, by programs. Then a final approach is selected and a full program is presented, along with input data and a reproduction of an actual run of the program. Lastly there is often a discussion of any programming oddities required by BASIC in the previous program, dialectical differences required by different BASIC's, and suggestions for further development of the program.

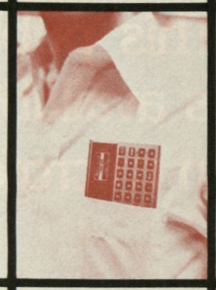
The serious student might take each of the exercises in turn, read the statement of the problem, and try to develop his or her own solution. This can be compared to Lamoitier's and the differences considered. It is important, as the author stresses, for the student to do this, or the ability to analyze a problem will never be developed. Lamoitier then suggests translating the analysis to a flowchart; indeed, a good chapter on simple flowcharting is placed early in the book. Lastly, the student is to convert the flowchart into a working program.

The fifty exercises start with simple examples and become more complex as the book progresses. They provide not only practice problems, but are often useful in themselves. For example, exercises include the Shell sort, several financial calculations, an algorithm for calculating the day of the week given the date, and some simple statistics.

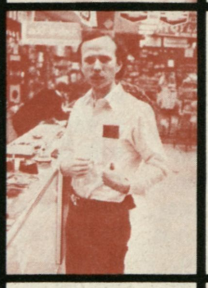
Unfortunately, there are some problems, not big enough to change my opinion of the book's basic worth, but problems nonetheless. The level of the various sections varies, ranging from a discussion of methods for the numerical evaluation of integrals to some standard, but dense, geometry. These are the exception, though. Further, some of the problem statements are too terse, as are several of the discussions themselves, just the problem any novice is faced with overcoming. More explanation of some of the reasoning would have been helpful. Lastly, the book will not open fully and lie flat. Though that may seem a strange complaint, the user who takes this book to his or her microcomputer in order to try some of the programs is going to have problems. You can always break the spine . . . but I'd just as soon take a hatchet to my micro as kill a book.

It is claimed that all of the programs will run "as is" on a TRS-80, and with only minor changes, on a "PET/CBM, APPLE, or any other popular computer equipped with Microsoft BASIC." I can verify that all the examples I tried worked as advertised on my machine under Microsoft BASIC 5.2. There seemed to be no real errors, I would quibble only with the value of an integral "known from theory to be 0.95" (page 108, bottom) but which is really 0.94881226 approximately, resulting in Lamoitier's numerical integration routines being slightly *better* than he claims.

A final note: the English version of *Fifty Basic Exercises* is credited to Dr. Rudolph S. Langer who is to be congratulated for producing a work without a hint in language of its French origin. One wonders what other surprises SYBEX (the publisher) may be hiding overseas. ■



Random Numbers for the Pocket Computer



by
Jim
Conlan

Photos by Kent Safford

If you want to play games you will need some dice, or maybe a coin or two. A roulette wheel might be nice. The TRS-80 Pocket Computer, alas, has no RND function. Sad, but true! This is only a small tragedy and easily repaired. Luckily, the Pocket Computer has continuous memory. This allows you to maintain a library of useful subroutines in memory. A random number subroutine is one you will certainly want to keep on hand.

The problem with random numbers is that they are disorderly. That's too bad, because computers are completely orderly. Computers hate disorder. What's to be done? The best we can do is generate some numbers with such complex order that they appear disorderly. The heart of the method for generating numbers that appear random is to use each "random" number to generate another "random" number. To make the problem more precise, what we want to do is find a method which changes any four digit number into a new four digit number, in a way that appears random. We don't have much to work with. The only thing computers really do is addition and multiplication. We can also throw away the decimal part of a number using the integer part function INT. These will be sufficient.

Here is the recipe we will use to change any four digit number into another four digit number in a "random" manner:

> STRETCH IT BY MULTIPLYING BY 221
> SHIFT IT BY ADDING 2113
> REDUCE IT BY MULTIPLES OF 1000

The number that comes out will be another four digit number that seems completely unrelated to the original number. You can repeat this process to get as many four digit random numbers as you like. You will need to enter a starting number. There is no way around that. Think of the original number as the page you open to in a table of random numbers.

Since this will be an often-used program, it is written in such a way that it can be easily used in other programs. The subroutine starts on line 500, which has the label "RND". The lines 10-50 are typical of the way the top part of the program might look.

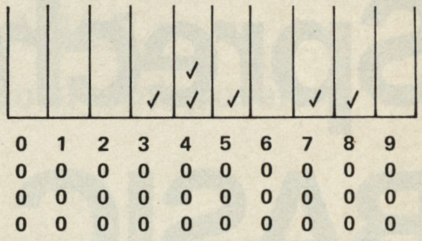
```
10 REM RANDOM NUMBER
   GENERATOR
11 REM ADAPTED FROM
   KNUTH'S ART
12 REM OF COMPUTER PRO-
   GRAMMING
13 REM VOL. 2, PAGE 155

20 REM INPUT AN INITIAL VAL-
   UE FOR R
30 INPUT R

40 REM GO GET A RANDOM
   NUMBER R
50 GOSUB "RND"

60 PRINT R

70 REM GO DO IT AGAIN
80 GOTO 50

90 END

500 "RND": REM RANDOM GENE-
    RATOR

510 R=221*R + 2113: REM
    STRETCH, SHIFT
520 R=R-INT(R/10000)*10000:
    REM REDUCE

530 REM RETURN WITH R
540 RETURN
```

We can shorten this considerably by focusing on the essentials:

```
500 "RND"
510 R=221*R+2113
520 R=R-INT(R/10000)*10000
530 RETURN
```

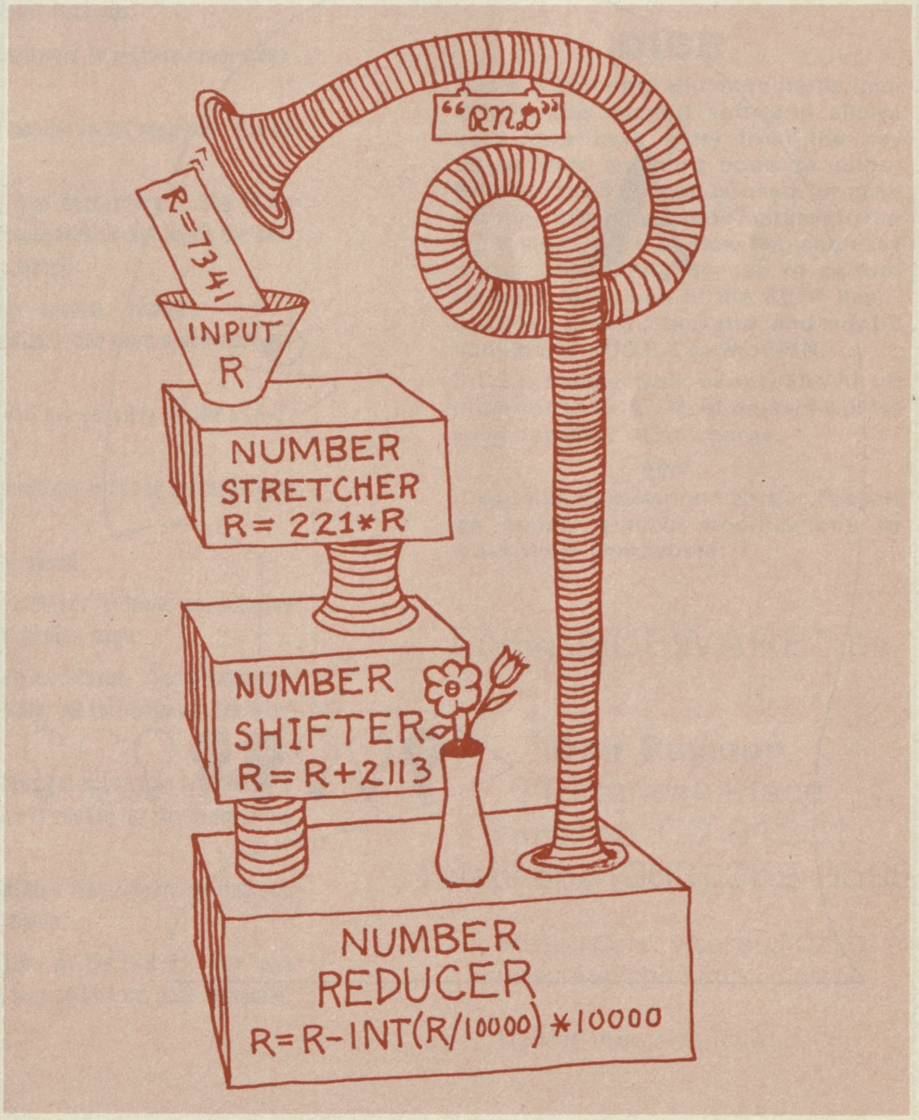
These few lines are the heart of the matter.

You might like to test this random number generator by sorting some numbers out into boxes to see how they stack up. Here are some boxes. The first few numbers that arise when the generator is started with R=1234 are: 4827, 8880, 4593, 7166, 5799, 3692. The boxes have been marked with a check corresponding to each of these numbers. How will the numbers stack up in the long run? ■



0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

This discussion is adapted from Solving Problems on the TRS-80 Pocket Computer, *by Don Inman and Jim Conlan, Wiley, Summer of 1981.*



Languages: Sprechen-sie BASIC?

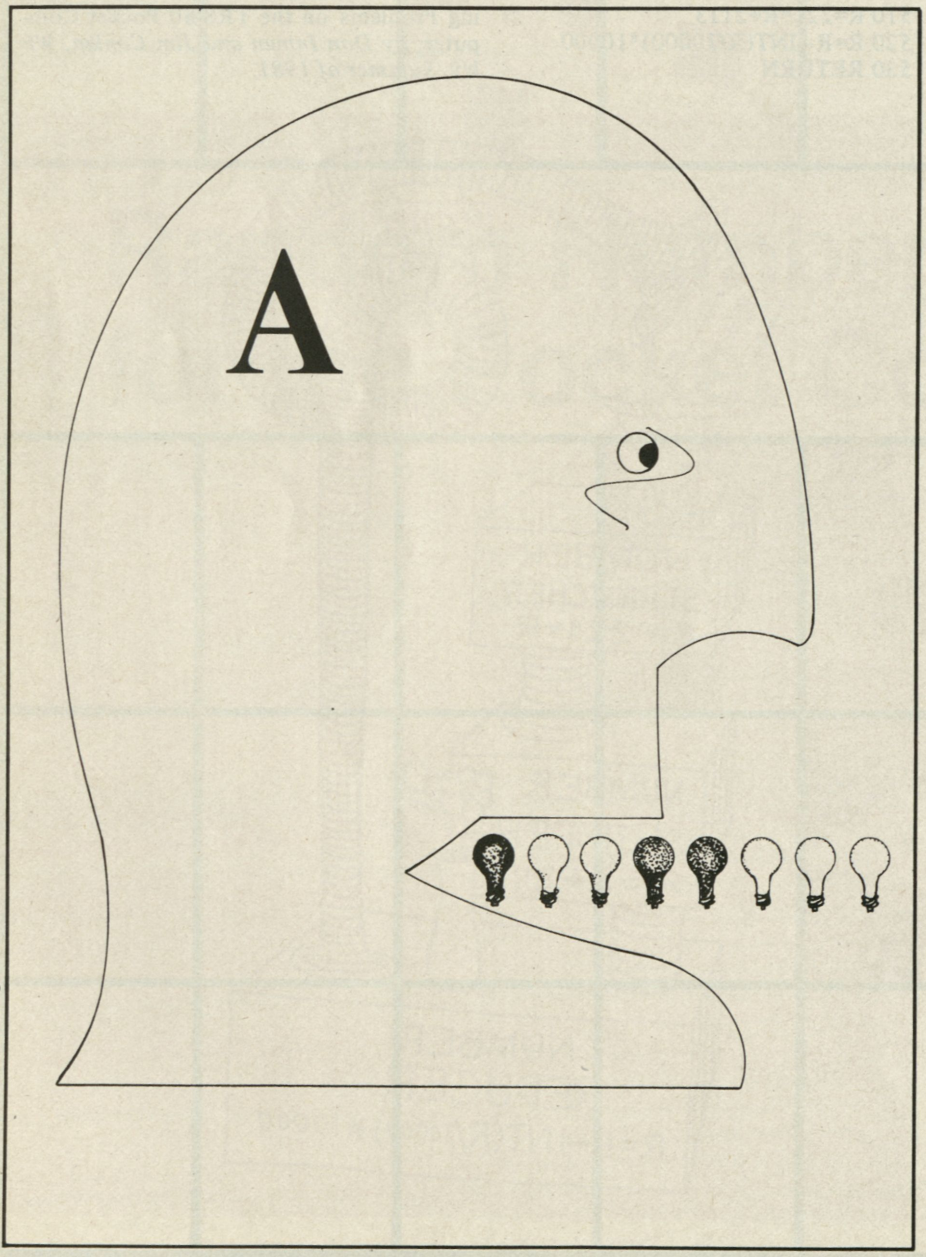


Illustration by Barbara Ruzgerian

Have you ever visited a foreign country? When you are trying to communicate with someone who hasn't the slightest knowledge of your language, you come up with some fairly ingenious hand signs, gestures, noises and postures. And you usually get your meal, or find out which door is his and which is hers. That's because humans are adaptable and will try to figure out what you mean (except in Paris, where – but that is another story).

It's a similar situation with computers. Imagine for a moment that you are sitting at a large desk, confronted by a tiny little wafer with thousands of even tinier lines etched into its various layers. The whole thing is about as big as your little fingernail, yet it is the main component of a computer. You *know* it has a tremendous potential, but how can you use it? How can you put information into it and, more importantly, get meaningful information out of it?

This is even more complicated than the example of being in another country, because that little piece of electronics isn't at all cooperative. It won't try to understand you, as would a Dutch waiter. No, you have to communicate entirely in its own language. What if you make a mistake, even if it's a tiny one? Sorry, you have to start all over, and get it right this time!

You do have one advantage in this situation. The computer will never get impatient. At least, personal computers don't. Sometimes very large ones will rudely cut you off with some message like, "See the system operator."

The language computers speak (might as well call it "machine language") is pretty hard to understand. Morse code is much easier. Computers need eight "bits" of information per character. That means every letter, number or symbol needs a special symbol (called a "byte") for the computer to recognize its meaning. If you think of it as eight little lights which can be turned on or off, you can get a picture of what this means. Each light can either be ON or OFF. So you could get:

0000 0001
or 1001 0110
or 1110 0010
or any combination you can think of!

Remember, each one of those patterns stands for only a single letter or number – not an entire word! How tiring it would be if we had to speak to our PET'S and Atari's and TRS-80's in that kind of jargon. How bothersome it would

(Continued on page 54)

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DICE

Dan's I/O Control Enhancements (machine code support software) allows easy lower-case entry from the key board with machine code or either BASIC. The ESC key is used for case shifting. DICE also adds features to the I/O system, such as slow list, and easy cursor positioning by use of control keys (allowing use of the REPT key). DICE is a DOS 3.2 diskette, and may be updated to DOS 3.3 by MUFFIN.

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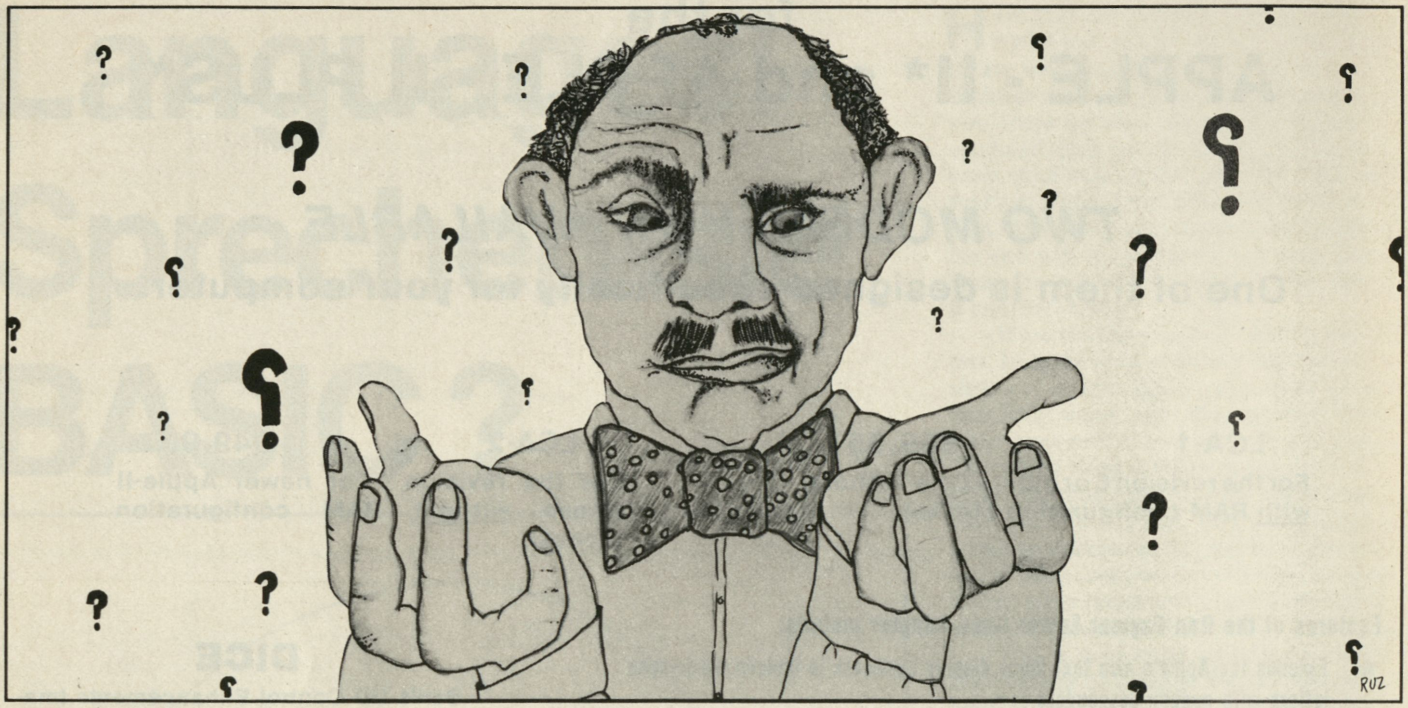


Illustrations by Barbara Ruzgerian

Reverse Play

Thromburton is a truly creative programmer. None can match his quickness, nor the simplicity of his style. There is one small problem. Thromburton never learned to tell his left hand from his right. That can cause a bit of trouble in the output of his programs. But, since he is such a fine person and excellent in all other respects, everyone tolerates his small deficiency. What is sorely needed is a program to turn the output of his programs around. The program should take as input any string of 20 characters, and then print out the same string in reverse order.

Hint to Reverse Play

The first decision that needs to be made is where to store that string when it comes in. How about A$. That seems as good as any. Don't forget to declare the dimension of A$ if your form of BASIC requires it. Will you need another string to store the output? There is more than one way to approach this problem.

Continuing the Fraction

Remember the good old days when Pi was equal to 3 1/7? That's not exactly the truth of course, but it is simple. The scandalous truth is that Pi is not equal to any fraction. In spite of this, we do know a great deal about Pi. It can be represented by a non-ending, non-repeating, decimal number whose first few digits are given by

Pi=3.1415926535897932384 . . .

We can find fractions which are very close to the true value of Pi. The fraction 3 1/7 = 3.143 is a very good approximation. Where did it come from? The answer is surprising.

In school we learned that 3.1 equals 3 + 1/10. This gives a fraction which approximates Pi, but it is not as good as the classical answer 3 1/7. Let's try again using 3.14 = 3 + 14/100 = 3 + 7/50. Not Not bad, but still not as good as the classical answer 3 1/7. Where did 3 1/7 come from? How does one find a good fractional approximation to a decimal number?

The answer is surprisingly simple. We wish to find a fraction which approximates the decimal part of D = .14159 . . . Here's one way to write D as a "fraction." D = 1 / (1/D) works. This might seem like idle trickery, but watch what happens.

1/(1/D) = 1/(1/.14159) = 1/(7.0625)

Success! The classical fraction 1/7 magically appears in the denominator.

We have two options. We can throw away the pesky extra decimal part .0625, or we can continue using the fraction trick. Let's see what happens if we continue.

.0625 = 1/(1/.0625) = 1/15.9965

We have two options. First of all, we can stop here and throw away the decimal part .9965. In this case we get the approximation

$$D = \frac{1}{7 + \frac{1}{15}} = \frac{15}{113}$$

This fraction yields a remarkably close approximation to Pi.

3 + 15/106 = 3.14151

Pi = 3.14159

The error is only .0008.

Our second option is to continue the fraction trickery and write .9965 = 1/1 (1/.9965) = 1/(1.0034). If we stop here, we get the extraordinary approximation

$$D = \frac{1}{7 + \frac{1}{15 + \frac{1}{1}}} = \frac{16}{113}$$

This is extremely accurate since 16/113 = .1415929. The error of this approximation is only .0000003.

We could continue on in this way to get better and better fractional approximations to Pi. Since the expression for

D consumes so much space, it is useful to adopt a more efficient notation and write D = [7, 15, 1, . . .]. You might like to check that
D = [7, 15, 1, 292, 1, 1, 1, 2, 1, 3, . . .]

This is called the continued fraction representation of D. The representation of Pi in this continued faction notation is Pi = [3;7,15,1,292, . . .]. Notice that the integer part is separated from the fractional part by a semicolon.

Problem — Continuing the Fraction

Write a program which takes as input any decimal number and prints our the first five numbers of its continued-fraction representation.

Here are some continued fraction representations which you may use to check your program.

SQR(2) = 1,4142135 . . .
= [1;2,2,2,2, . . .]
SQR(3) = 1.7320508 . . .
= [1;1,2,1,2, . . .]
EXP(1) = 2.7182818 . . .
= [2;1,2,1,1, . . .]

Here are some questions to consider: What property is shared by the continued fraction representation of the square roots of integers. What about the square roots of fractions? What is the continued fraction representation of a fraction? What sort of numbers have continued-fraction representations which are 0 from some point onward?

Hint to Continuing the Fraction

Let's consider how we would compute the continued fraction expansion of the number N = EXP(1) = 2.71828 . . . . We can break N into two parts, an integer part N(1) and a decimal part D.

N = 2 + .71828 . . .
↑ ↑
N(1) D

Here is how the computer finds N(1) and D:

N(1) = INT(N) = 2

D = N – N(1) = .71828

Now we do the trick. Let I =1/D= 1.39921.

D = 1/(1/D) = 1/I = 1/(1.39221 . . .)

This allows us to write N in the form:

$$N = 2 + \cfrac{1}{1.39221\ldots}$$

N(1) I=1/D

$$N = 2 + \cfrac{1}{1 + .39221\ldots}$$

N(1) N(2) D

Shall we do the trick again? Why not. We'll get N(3) and a new decimal part D.

Clip Clock

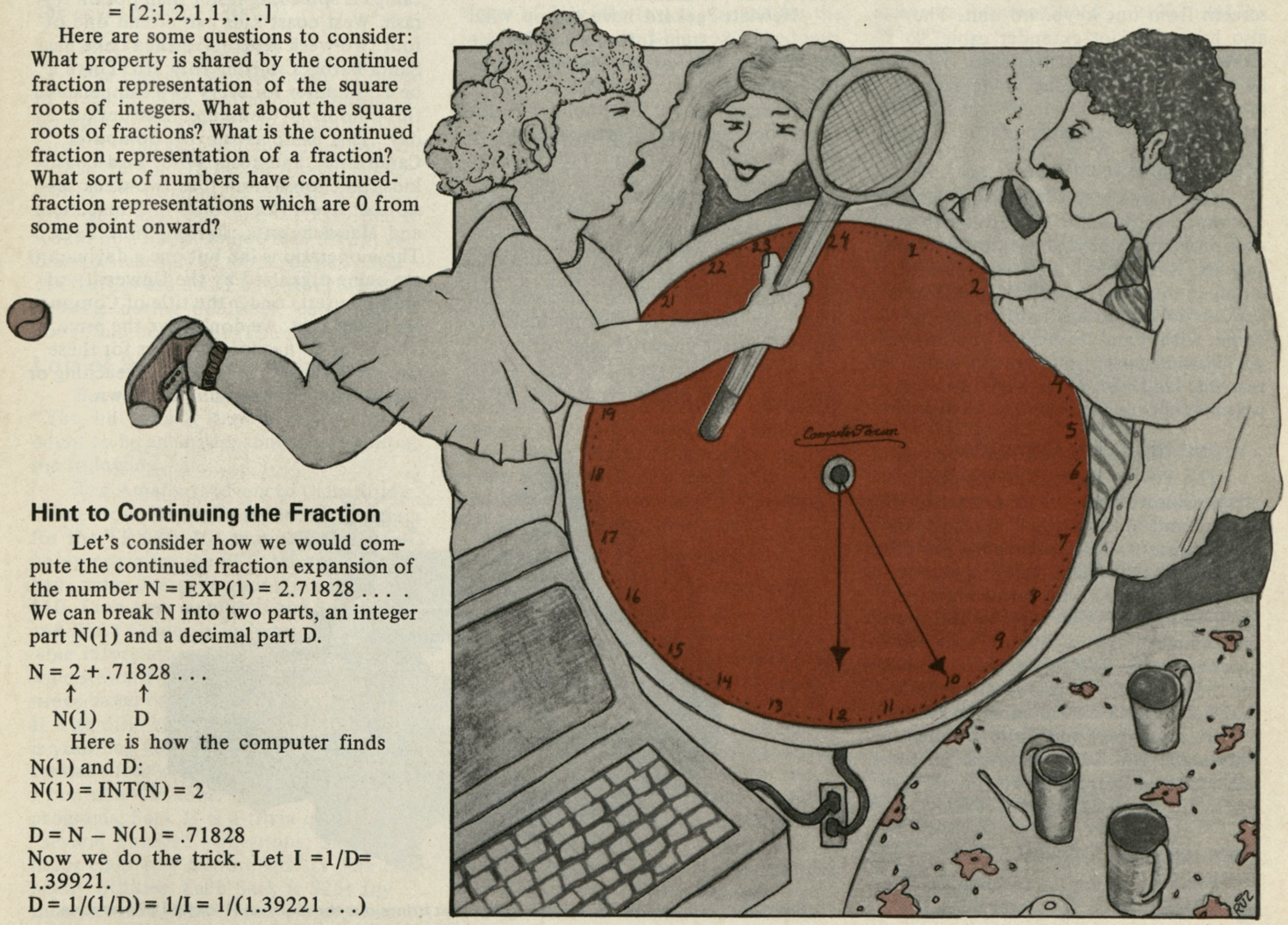
The ComputerTown Engine Company has a large, round, 24-hour clock on the wall which everyone uses to synchronize their watches before important events. The last event led to the problem which follows.

It was almost midnight and the stalwart crew loaded up a long program to run while they rested. Big George observed that the program they were about to run consisted of a single subroutine which was called exactly 1001 times. Each call of the subroutine took exactly 1 hour. The obvious question is what time will the program finish, as measured by the 24-hour clock?

Since this problem may recur, a program is needed which takes as input the number of times the 1 hour subroutine is called, and then prints out the time of day the program will finish. You should know the truth about the Computer-Town Engine Company. They drink coffee, play tennis, talk, and generally carry on until late in the evening. They always start running their programs at midnight.

■

Solutions to Programming Problems on page 58.



Hardware: The Bell & Howell Apple

Bell & Howell have been supplying audio-visual equipment to schools for a long time. Now they've applied that experience to making a durable piece of classroom equipment of the Apple, and have incidentally given micro makers a needed lesson in how to package a computer for school use. The repackaged Apple has: a built-in carrying handle that also stores the attached line cord, external jacks for paddle controllers, BNC connectors for two video monitors, a tamper-proof screw lock on the cover, three power sockets for peripherals, audio mixing of computer sound and two other sources, and an earphone jack for quiet use. Despite the improvements the price is little higher at $1700 for the 48K model.

Bell & Howell's Apple: how to package a computer for classroom duty.

A Two-headed TRS-80 . . .

EBG & Associates have discovered that rarest of things, a TRS-80 add-on product that nobody else has thought of. It's a Y-connector that lets you run two screens from one keyboard unit. They also have a 6-foot extender cable, so either screen can be placed away from the keyboard. Just the thing for far-sighted programmers, and for classrooms ($19.95 and $23.95, respectively).

More Smarts for Atari . . .

The Atari Video Computer System is a computer under the skin, but not a user-programmable one. **Computer Magic, Inc.** aim to fix that with their Magicard, a plug-in module that adds a simple monitor and 1K of storage to the game machine. With it and its manual you can begin learning programming (in 6502 machine language, we gather), ultimately writing your own games.

. . . and the Color Computer

The Power Pack gives the Radio Shack Color Computer an extra 6K of storage and an additional machine-language monitor. **Computerware's** $160 cartridge plugs into the interface slot; once in, it provides 33 "powerful machine level commands" for "the sophisticated programmer." The Computerware employees clearly had themselves in mind, for they're also selling cassette software that relies on the Power Pack: an editor, a 6809 assembler, and Color Invaders. They claim that the Power Pack lets them sell better software at lower prices than Radio Shack's ROM cartridges allow.

Manufacturers' Moves

Personal computer companies, like all manufacturers, are engaged in the great marketing game. Far from being pawns, we consumers are the umpires that decide the value of each play. Four companies announced new moves recently. Radio Shack's was an agreement with **QSP, Inc.**, a magazine subscription sales organization that operates through school fund-raising programs. Schools that deal with QSP will now be able to earn TRS-80s as sales premiums.

Hewlett-Packard have set up what they call a System Information Service for owners of Series 80 personal computers; it costs upwards of $25 a month. The primary benefit is a phone-in consulting service; a quarterly magazine and updates to manuals completes the package. H-P guarantee that when a customer phones in a problem, "an experienced systems engineer will respond within four hours." We can't help wondering what their response time is to a customer who hasn't bought the Service, and how that poor shmuck gets his manuals updated. Contact your H-P sales office.

Software entrepreneurs have a new friend in **Atari.** Bruce Irvine, their VP for software, says "We recognize that . . . software is a critical key to the consumer market. No one company can create the amount of material needed . . . so we are going to do our best to encourage our users and software vendors to create programs." Atari's best includes a quarterly catalog of outside software to be mailed to all registered owners, technical seminars, regional centers where authors can get technical assistance, and a $100K contest for the best programs.

Texas Instruments started a similar program a few months ago, and it is bearing fruit. They sent us their first hefty catalog of home software for the 99/4, a list of authors who've won $18,000 among them, and a photo that's so adorably camp we had to run it. They're also proud of the rapid growth of 99/4 user's groups, both regional ones and the national **99/4 Home Computer Users Group.**

Welcome to Camp RUNamuk

The notion of computer summer camps is spreading faster than poison ivy rash. West coast kids can attend one of four two-week sessions at Zaca Lake near Santa Barbara starting July 5th. There'll be a computer for every two campers and three hours of computer instruction a day. This camp is run by **Computer Camp, Inc.**, and costs $795. East coast kids can choose from four two-week sessions at five different sites in Connecticut and Massachusetts, starting June 29th. These operations (all but one a day camp) are being organized by the University of Massachusetts under the title of **Computer Camp East**; we don't have the price. The U. of M. needs instructors for these camps; if you are interested in teaching or supervising, call the number shown.

The Texas Instruments 99/4, a computer that brings out the Norman Rockwell in everyone.

NOTE: RC and ComputerTown USA! are both very interested in first-person accounts of computer summer camps. We'd like to hear from campers, instructors and organizers alike. Please drop us a line as soon as you're home!

Three Software Catalogs . . .

Last issue we mentioned several catalogs of personal computer software; this issue we have word of more. **Queue, Inc.** have two catalogs of educational software. Their catalog IVa covers Apple, Atari and Compucolor; IVb lists programs for Pet and TRS-80. Each costs $8.95. An organization called **WIDL Video** publishes three directories of software for the Apple. Volume 1 lists business programs, Volume 2 lists recreational programs, and Volume 3 lists software for education and school administration. They didn't give a price; the directories are supposed to be available from Apple dealers. Finally, **Dresden Associates** are ready to deliver *School Microware Reviews,* a collection of user reviews of educational software. If you fill out and return one of their program review forms you can get 50% off the cover price of $30.

. . . and a Bibliography

The University of Colorado's College of Business Administration publishes a **Computing Newsletter.** It's mainly of interest to college instructors. However, the Newsletter undertakes an *Annual Bibliography of Computer-Oriented Books.* They sent us a copy, and we'd say that it would be a useful source tool for any librarian, teacher, or book dealer. Over 1000 titles are listed by author within subject, noting publisher, date, page count and book type. The price is $4.

Lots of Software for Home Use

Been asked, of your home computer, "Yes, but what's it *good* for?" There ought to be an answer somewhere among the following . . .

The Amateur Advanced Class Study Guide from **Instant Software** is a program for the TRS-80. It's supposed to help you prepare for the FCC Advanced Class ham radio license examination; it costs $10. **Cine-Aero** publishes the Super Bar and Wine Guide. It includes a bunch of wine information and a "computerized wine steward" that will select from 200 wines based on your menu. For the Apple II with disk, the cost is $25. If the Apple is your bag you can choose from **ComputerMat's** four different Apple Sacks. Sack I contains 40 home and recreational programs; Sack II is a trivia quiz with "several hundred" questions; Sack III holds eight role games; Sack IV has 20 handy utilities. Each Sack is $25; any three are $50. The Video Librarian is another Apple II disk program. It's designed to catalog your library of home video tapes and list them by 15 different variables, as well as helping you distribute programs to different cassettes based on program length. **Softronix** makes it for $20.

Word Processing for All . . .

For all, that is, who have Apples or Atari 800s. Apple II users are blessed with two new word processing packages. The one from **Rainbow Computing** specializes in form letters, mailing labels, and the like; it allows the merging of records from data files into text files, plus keyboard entry of variable data during printing. The price is $150; the company expect to have an Apple III version soon.

Meanwhile, **LJK Enterprises** have introduced Letter Perfect (good name, guys) for the Apple II. It, too, costs $150. Its editor has full cursor control and supports 40- or 80-character screens; its print formatter handles a variety of printers. It has all the page-formatting features a word processor should have. Merge of data into text is planned for the future, but isn't available now. The same company has enhanced the Atari version of the program to handle proportional spacing.

. . . Even for the Very Rich

You just don't know what you're missing, having nothing but a cheap little home computer. Just to let you know, we'll pass on an announcement from the Digital Equipment Corporation, maker of *real* computers. They've produced a word processing package for their small business computer, the DECsystem 300. Its features sound very similar to those of the two above, except that the release doesn't say anything about proportional spacing, or data file merging. The software costs a mere $3,500. All you need to run it is 128KB of storage and two hard disk drives. Now, aren't you sorry you don't have a *real* computer?

Programs for Programmers

Vigil stands for Video Interactive Game Interpretive Language, which would describe the program if it made any sense. The program itself makes pretty good sense; it's an interpreter for a special game-writing language for any 40-column PET. VIGIL supports 60-odd commands for manipulating images in an 80 by 50 graphics grid, provides two event timers and a tone generator, and can save and load games on cassette. Get it from **Abacus Software** for $35.

The Alternate Source makes machine language aids for TRS-80 hackers. They have TASMON, a monitor that "will aid the serious Z80 programmer." It contains program tracing tools, a disassembler, and a program relocater. Their KBE program allows any of 191 different keystrokes to be programmed to generate strings of up to 255 characters; the strings can contain returns so that each "softkey" can represent a whole sequence of commands to DOS, BASIC or EDTASM. KBE is said to be compatible with most TRS-80 DOS's and with double-density disks.

Contact Points

Abacus Software, P.O.B. 7211, Grand Rapids, MI 49510.

The Alternate Source, 1806 Ada Street, Lansing, MI 48910; (517) 487-3358.

Atari Inc., Software Acquisition Program, P.O.B. 427, 1265 Borregas Avenue, Sunnyvale, CA 94086.

Bell & Howell A-V Products Div., 7100 N. McCormick Road, Chicago, Ill. 60645; (312) 262-1600.

Cine-Aero, 1821 N. Frederic St., Burbank, CA 91505.

Computer Camp East, Prof. H. A. Peele Director, School of Education, University of Massachusetts, Amherst, MA 01002; (413) 545-0496.

Computer Camp, Inc., 1235 Coast Village Road, Suite G, Santa Barbara, CA 93108; (805) 965-7777.

Computer Magic, Inc., P.O.B. 3383P, Fox Valley Center, Aurora, IL 60505.

ComputerMat, P.O.B. 1664F, Lake Havasu City, AZ 86403; (602) 855-3357.

Computerware, P.O.B. 668, 1512 Encinitas Blvd., Encinitas, CA 92024; (714) 436-3512.

Computing Newsletter, P.O.B. 7345, Colorado Springs, CO 80933.

Dresden Associates, P.O.B. 246, Dresden, ME 04342; (207) 737-4466.

EBC & Associates, 203 N. Wabash Suite 1510, Chicago, IL 60610; (312) 782-9750.

Golden Braid Software, P.O.B. 2934, Sarasota, FL 33578; (813) 371-0388.

Instant Software, Peterborough, NH 03458; 800-258-5473.

LJK Enterprises, P.O.B. 10827, St. Louis, MO 63129.

QSP, Inc., A Subsidiary of the Readers Digest Association, Box 2003, Ridgefield, CT 06877.

Queue, Inc., 5 Chapel Hill Drive, Fairfield, CT 06432.

Rainbow Computing, 9719 Reseda Blvd., Northridge, CA 91324; (213) 349-0300.

Softronix, Suite 1000, 4600 Park Road, Charlotte, NC 28211; (704) 334-1958.

Texas Instruments, Consumer Relations, P.O.B. 53, Lubbock, TX 79408; 800-858-4565 (toll free, 8 to 4:30 CST).

99/4 Home Computer Users Group, P.O.B. 95148, Oklahoma City, OK 73143; (405) 787-8521.

WIDL Video, 5245 West Diversey, Chicago, IL 60639; (312) 622-9606. ■

Computers at the Junior Museum

by Liza Loop

How can we make computer awareness a reality for most people? Create a low-budget exhibit at the local, city-sponsored museum! We tried it during March and April at the "Junior Museum" in Palo Alto, California and the response was fantastic. One mother wrote, "We have spent many, many hours at the museum since the computer exhibit opened. The children beg to come and hate to leave. We believe this is a good learning experience for them, as well as being lots of fun. We would be pleased to have the computers available on a regular basis."

What kind of machines produced such enthusiasm? Nothing fancy – strictly off-the-shelf computers with readily available software. For little ones, there were three learning games from the local Texas Instruments store, as well as a TI 99/4 personal computer. Two other retailers provided a Commodore Series 2001 Business Computer and an Atari 800. The stores were happy to have their equipment so well displayed and felt amply rewarded when we offered to make their advertising brochures available to our visitors.

Manufacturers (Hewlett-Packard, Radio Shack, and Atari, Inc.) were also willing to arrange short-term loans of their equipment, provided we showed their "educational materials" and not just "games." Frankly, the kids didn't know that the "education" items weren't games, and no one found it necessary to tell them. The Palo Alto Unified School District loaned us a terminal and set up an account to their time-share system account so we could run educational simulations, and drill and practice. Our local college (San Jose State MESA Project) found a PET that wouldn't be missed for a short while. We also had compatible software from three software houses who were glad to have the public exposed to their products.

What software was the most successful? That depends on your definition of success. We had to ban the "Rally" car racing game on the Commodore because a group of about ten pre-teen boys turned it into their private club. Atari's Video Easel was interesting to many people. The grid game "Fire" from Creative Publications made the

Photos by Steve Smith

There is a nation-wide need for opportunities to learn what computers are, what they can and cannot do, and how to operate them. Exhibits like this one provide a valuable step toward "computer literacy."

TRS-80 fun for elementary school kids. Complete beginners felt very comfortable with Texas Instruments' Math and Grammar games on the TI 99/4. More sophisticated users were able to follow the written instructions for graphing, which we provided with the HP85.

How did museum visitors learn to use the machines? For some it was tough – adequate written instructions only evolved slowly during the month, and most of the museum staff knew nothing about computers when we started. However, a volunteer staff developed rather quickly and visitors were happy to teach one another. Many local children had some computer exposure from school; they loaded tapes and typed RUN with confidence. Some people did go away angry because they could not figure out how to work all the machines. But almost everyone could use the cartridge-based software from Atari and Texas Instruments. They stood back and watched enviously while their more experienced neighbors loaded tapes or entered short, original BASIC programs.

Special events were held each Saturday. Control Data's PLATO system gave visitors a taste of what education can be like when you have a huge computer at your disposal. A demonstration of the Alpha Syntauri Music System proved to many music lovers that they, too, could relate to computers. Movies and video tapes from the County Schools Resource Center broadened the picture beyond the machines that were actually available on site.

Could you have a computer exhibit in your town? Sure! It takes two or three dedicated volunteers, at least one of whom must have a good working knowledge of the equipment you plan to display. It takes a commitment not to be fancy – to resist the urge to write new software or to borrow the latest gadget for a month. If you need help, call or write to LO*OP Center, Inc., 3781 Starr King Circle, Palo Alto, CA 94306, (415) 858-2034. Keep it simple, short, spacious and low key. You, too, can have them saying, "We wish the computer exhibit could stay forever." Who knows, maybe next year it will! ■

(Continued from page 46)

be to carry on an entire conversation! But thanks to some very bright computer scientists, there is a much easier way.

What we have just discussed, machine language, is a very low-level language. It is "low" because we have to sink down to the computer's level and speak in its own language. That is also why it is so hard for us to use.

Let's imagine once more that we are world travellers. We are studying a tribe of warriors which speaks only Swahili, whose clicking noises might remind you of machine language, and which is certainly as difficult to understand! (Even so, it's not a low-level language, by a long shot.) Well, you don't speak Swahili but you want to learn something from the warriors – their weaponry methods, for example. So you make some spear-throwing motions in the air and then gesture toward yourself to let them know you want to learn how they do it. The problem is that they think you just challenged them and they accept the challenge by coming toward you with their weapons held high!

What would you wish for right them? They are swift-footed, so running away isn't an answer. Instead, you would look for an *interpreter,* someone who speaks your language. You would give your message to the interpreter, who would then render that into Swahili. Those meaningless (to you!) sounds would not only save your life, but also get you all the information on spear throwing that you could ever want.

Computer scientists recognized a long time ago that if very many people were going to use those machines, they would need some kind of interpreter. Instead of using a person, they cleverly designed some electronics to do the job. Not only would a human get bored, he would also be slow and probably make a lot of mistakes. The electronic interpreters are fast, reliable, and don't even know what boredom means.

Now, there is an interesting thing about the languages we use. Some of them are better for certain types of things. French has been called the language of diplomacy. English is pretty good for technical things, while Portugese makes for great poetry. Now, the natives are getting restless again, so let's go back to that tribe one more time.

You are in a desperate situation. You found out that your interpreter knows plenty of Swahili, but only a little English. What do you do while your time is running out? You don't waste time using words that your interpreter doesn't understand! So you use only those words he knows. It might cramp your style a little, but if he can't translate the words, then you may as well leave them out of the conversation.

That is pretty much the way computers handle languages. They have an interpreter built into them which understands a relatively High Level Language. That means the words it knows are close to the kinds of words we humans use. The interpreter then takes those instructions which you have given it (of course, you remembered not to waste your time with words the interpreter doesn't know) and translates them into a language the computer can deal with. Pretty soon you and the computer are on speaking terms, and you are able to use it for all sorts of useful things. So you see, it's handy to have an interpreter around. You don't have to worry much about making mistakes, because if what you say doesn't make sense, it will simply tell you so and you can try again.

If you have ever had the need to talk with someone through a translator, then you know that your conversations were slowed down, even if your interpreter was very good. First you say a sentence to the interpreter, who then translates it. The reply is given to the interpreter, who translates it into your own language. And so on. There is even another catch: you don't know if the person who interprets is saying it *exactly* the way you want your message communicated. So people who are that particular usually end up learning the foreign language themselves.

The analogy is still true as far as computers are concerned. When you use an interpreter in a computer, things slow down. It is convenient, but slower. If that tribe of warriors were charging at you at a dead run, then speed would be of the essence. You would want action, and fast.

If you ever get to the point where you need speed with your computer (that is, more speed than you are getting), then you are no longer a beginner and won't be reading this kind of material any longer. But in the meantime, if someone throws a bunch of words at you like "compiler", "hexadecimal", and "assembly language", don't let it concern you. If it is going to be useful to you, you can learn about it then. There is no reason to make things difficult right at the start. Anyone can get a lot of good uses from computers without getting complicated.

By now you may be wondering, exactly what are these computer languages? The most common one, which you may already know about, is BASIC. The reason it is so well known is that it is really ideal for persons who are new to computer languages. It was designed to be simple to learn. The name BASIC means *B*eginners' *A*ll-purpose *S*ymbolic *I*nstruction *C*ode. Most personal computers today (like the PET and TRS-80) come with this language already inside – they already know how to communicate with you in BASIC. Some keep their language in a handy, plug-in cartridge.

Another good language for beginners is PILOT. It is nice because it is even easier to understand in many respects than BASIC. Atari's version of PILOT includes nice graphics commands which allow you to see exactly what the computer is doing at your direction.

Just like human languages, some computer languages are better at some things than others. While BASIC is good for learning how to communicate with a computer, COBOL is better for businesses that require a lot of accounting work from their machine.

Learning a computer language is not as difficult as it sounds. Not only can you keep a "dictionary" at your side, you also have a built-in interpreter working for you inside your computer. So, if anyone asks if you speak a foreign language, just tell them, "I speak BASIC. My interpreter takes care of the rest." ■

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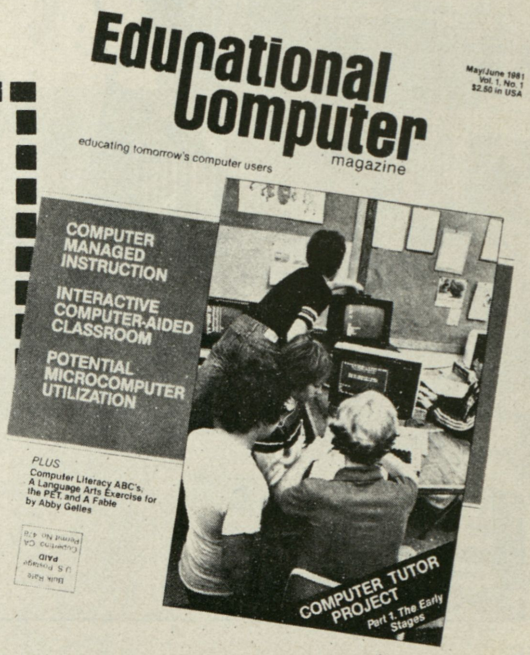

The New Wave

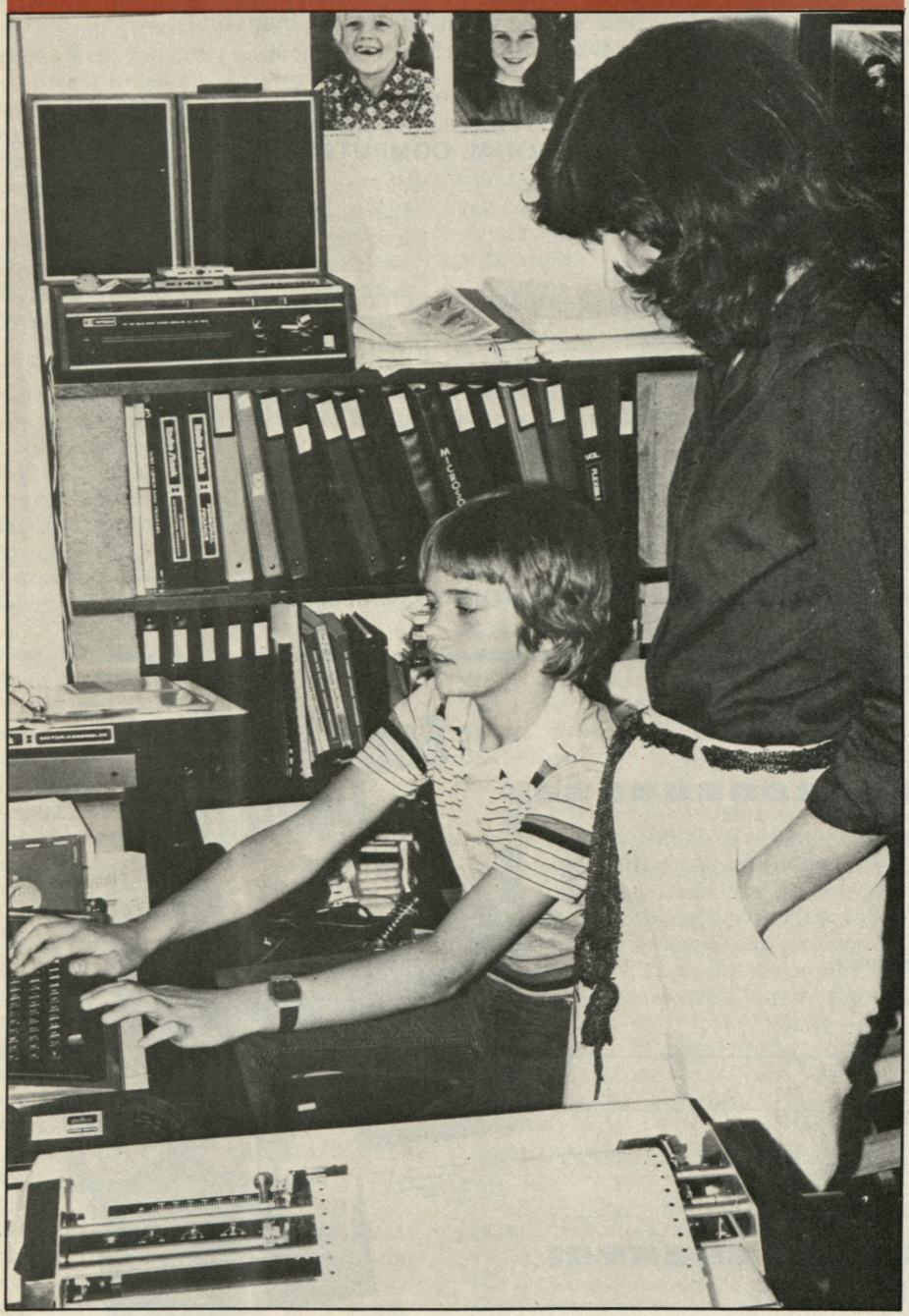

Photo by Kent Safford

ComputerTown, USA! is coming of age. Two years after its humble beginnings as a gleam in the eyes of a few volunteers, *ComputerTown*'s simple concept of introducing a community to the world of microcomputers has blossomed into a full-fledged operation with worldwide interest. Project facilitator Pat Cleland's telephone bears witness to the boom. Each week brings calls from Hong Kong, Hawaii, Canada, Australia, England, and all over the United States. A teacher in Alaska, a librarian in the midwest, a reporter from a major magazine . . . everyone wants to know about *ComputerTown, USA!* for one very good reason: the computer is here to stay, and it's time we learned to use it.*

Fourteen-year-old Niels Mortensen spends a lot of time at the Menlo Park library, where *ComputerTown* has placed several computers. But he is not one who goes there to learn the basics. Niels goes to help other people learn, with the aid of software he has designed and perfected himself. An adult volunteer invited me to meet with Niels – but he warned me not to expect a lot of chat. Niels isn't much for talking when there is a terminal at hand. In hopes of getting his full attention, I opted for an informal interview on the wizard's home turf.

I pulled up in front of the comfortable suburban house Niels shares with his family. Buzz words like "Boy Wonder", "Whiz Kid", and "Genius" were floating through my head. To me, a Boy Wonder wears a red cape and tights. A Genius is someone like Leonardo da Vinci. And a Whiz Kid? Little horn-rimmed glasses and a cut-down three-piece suit, quoting Dow Jones Averages as he rifles through a miniature attache.

I suppose I expected some bizarre combination of the three, but the teenager who bounded from the porch in time to save me from a threatening sprinkler, and who offered a friendly hand up the steps looked refreshingly like your basic kid. Neither cape nor horn-rims, just a shock of blond hair, shirt-tail, and dungarees.

He introduced me to his Mom, his dog, and his computer, in that order. The crowded computer area, walled off from the family-room, was a cornucopia of hardware and software. Complete with voice-recognition capabilities, a TRS-80 held center stage, surrounded by a printer, auto-answer modem, and a staggering

*Most callers can save a toll by sending a large, self-addressed, stamped envelope to: ComputerTown, USA! Bulletin, P.O. Box E, Menlo Park, CA 94025 for schedules of events, current information, and tips on facilitating similar programs.

collection of discs, fully catalogued.

"What do you do with all this, Niels?" I asked, impressed.

He smiled. "Well, I spend a lot of time down here. When you work with computers, you lose track of time. Sometimes I come home and work till six o' clock, break for dinner, and go right back on. My Mom caught me still going at 4:30 one morning with a friend. You get into a program and you just forget the time."

"I understand you have your own business," I prompted.

"Yes. I write a lot of games and software. The main thing I'm working on right now is a bulletin board for the modem. My friend Edward and I have been working on it for a real long time now. It's called 'DataNet'. I'm going to leave messages on other bulletin boards to let them know I exist, and then see if anything happens."

"Tell how you met Edward . . ." Niels' mom coached.

"Well, I have another friend named Mark, who I met at the Menlo Park library. Edward knows Mark, and that's how we met."

"Edward is handicapped with speech and hearing problems," Shirley Mortensen added. "The two are very close, and the modem plays a special role in their friendship, because they can converse so freely."

I wondered what other uses the modem served for Niels.

"Oh, you leave messages for your friends, or you leave 'for sale' messages . . . stuff like that . . ." he explained. "A lot of messages I leave nowadays are Graphics 80 stuff. Edward was just about to buy High Res 80, so I would leave him messages about how good it was, how it worked and everything."

To my shock, I learned that this young man who was in the process of undertaking the sophisticated business of his own bulletin board was entirely self-taught, and had only been at it for a little over two years. In addition to the bulletin board project, Niels has his own software business, which he calls "MicroMort." "I started running programs under my business name a real long time ago," he told me. "But I really haven't got my programs perfect yet, and I want them *all to be perfect* before I put them on the market."

"How many programs have you done in the last couple of years?" I asked.

"About a hundred. Maybe more. I write little programs for different things that I'm trying to get going, like for this bulletin board I have to write a lower-case drive. I'm using the High Res 80 graphics. You can have it descended to lower-case, which you could never do on the regular graphics, so I'm writing that because it would suit me perfectly. Once you run the program, all the lower-case comes up in upper-case, and all the upper-case comes in lower-case. So what I'm doing right now is writing a program to take the programs off disk and change the cases all to the opposite, and that'll solve the problems."

I went to another library nearby and asked, 'Where are the computers?' They told me that would be the* next *thing . . .

I assumed Niels had his start with computers in school, but he was quick to tell me differently. When his dad purchased the TRS-80 a few years back, Niels wanted to know how it worked. "I asked my dad how to do different stuff and he showed me in the manual where it told all about it. And from the manual I found out how to do what.

"They don't have computer classes in my school," he went on, "but I think they should. The closest you can come is the *ComputerTown* group at the library. It's really great to have it there. I went to another library nearby and asked, 'Where are the computers?' They told me that would be the *next* thing, but I think they should hurry up."

"Niels," I said, "You've got a reputation among the *ComputerTown* staff for being quite a Whiz Kid. How do you feel about that?"

He shrugged. "I don't know. I take some of my programs to the library, and they like them. I modified a Space Invaders program from French. I got my little French dictionary out and changed it all. I also changed what the Space Invaders looked like and how the whole game worked. I brought it down to the library and everybody liked it. My latest one is the Asteroids program. I didn't write that one, of course, but I'm going to modify it. We have one particular thing that Programma offers: the High Res 80 board, which gives you high-resolution graphics. Right now I'm trying to write the Asteroids program for the High Res 80.

"But the bulletin board is my main thing, right now," he repeated eagerly. "That's my latest project, and it will take a good couple more weeks. It's really big. You have to program 48,000 letters, little numbers and letter codes . . . and right now I'm learning assembly language. It's faster than BASIC."

I asked Niels if he had any other interests besides computers. "Once I took piano lessons," he said without the slightest sign of interest.

"How about girls?"

"Sure. I like girls."

"Girls who like computers?"

"No. Just girls."

I remarked that it was good to keep a balance in these things, and asked if his passion for computers ever interfered with school.

"I think in computer languages a lot," he told me. "Last Friday I was having a spelling test, and here I am getting ready for the test and numbering my paper: 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, 10, 11 . . . . All of a sudden I realize I'm numbering my test in hexadecimal. I fixed it by putting the regular number base right next to it. Then I got so I'd use 3/4 of the paper on my tests to put all the numbers in all the number bases."

"How did you do on the test?"

"I think I got an A. I'm good at remembering things."

I should say so . . . not everyone knows the entire ASCII code by heart. Niels finds it easier not to stop to look it up when he's busy programming Super Zap.

Earl Mortensen, Niels' father, is a Systems Analyst with Hewlett-Packard. I asked him what he thought of his son. "I'm proud of him," he said. "I think he's doing a very good job. But then I'm biased, being his father . . . I would like to see him do more book reports, sometimes spend a little less time on the computer. But it's too bad there isn't more emphasis on computers in school," he added. "They should take real hotshots like Niels and his friends, and work with them through high school and college."

In spite of his lack of formal training, Niels Mortensen, and others like him, have a practical kind of genius, sustained and encouraged by a ready technology. And for that, they should thank not only encouraging parents and the natural gifts of sharp mental abilities, but the technology itself.

In the same way, members of the computer profession are justified in looking forward to the day when Niels and his peers come to enter their ranks. For they will come bearing the fruits of a new kind of genius: practical, natural, and highly-seasoned through growing up with microtechnology. ■

Programing Problems and Solutions

(Continued from page 48)

Solutions to Reverse Play

This problem has quite different solutions depending on the kind of computer you are using and the form of BASIC that runs on your machine. Strings are handled in very different ways by different forms of BASIC.

Solution 1

```
100 REM REVERSE PLAY

110 REM SAVE SOME SPACE
120 DIM A$(20), B$(20) [See note]

130 REM ACCEPT 20 CHARACTERS
140 FOR I=1 to 20
150     INPUT A$(I,I) [See note]
160 NEXT I

170 REM THE FIRST CHARACTERS
    OF B$ ARE THE LAST CHAR-
    ACTERS OF A$
180 FOR F=1 to 10
190     L=21-F
200     B$(F,F)=A$(L,L)
210 NEXT F

220 PRINT B$
```

Solution 2

The last solution uses more string storage space than is necessary. Here is another version that uses the long string A$ as before, but uses only a single character for working space.

```
100 REM REVERSE PLAY

110 REM SAVE SOME SPACE
120 DIM A$(20), B$(1)

130 REM ACCEPT 20 CHARACTERS
140 FOR I=1 TO 20
150     INPUT A$(I,I)
160 NEXT I


170 REM SWITCH THE FIRST CHAR-
    ACTERS OF A$ WITH THE LAST
    CHARACTERS OF A$. SAVE A
    SPARE CHARACTER IN B$.
180 FOR F=1 to 10.
180 FOR F=1 to 20
190     B$ = A$(F,F)
200     L = 21-F
210     A$(F,F)=A$(L,L)
220 NEXT F

230 PRINT A$
```

[NOTE] This is the note you may be looking for. There are two common ways of handling strings. The first way is the way the Dartmouth, Hewlett-Packard, and Atari BASIC handle strings. The declaration of the dimension of a string tells how many characters long the string may be. For example, DIM A$(20) means that enough memory space is set aside to store a string of up to 20 characters. In this version of BASIC, the expression A$(3,7) refers to the 3rd to the 7th characters in the string. A$(3,3) refers to the 3rd to the 3rd character(s) in the string (that's just the 3rd character). The solutions shown here follow this convention.

The second way of handling strings is that used by the Microsoft BASIC common to the TRS-80, the Pet, and the Apple. The declaration of dimension tells how many indexed strings may be used. For example, DIM A$(20) means that 20 strings, each of 256 characters may be used. A$(3) refers to the third string in the list of strings. The expression MID$ (A$,3,4) refers to the substring starting at position 3 and having 4 characters. If your computer uses this convention, then you will not need the DIM statements, but will need to change line 150 and 200. Line 150 will look like this:

```
150 INPUT MID$(A$,I,1)
```

Solution to Continuing the Fraction

The first crude attempt at a program looks like this.

```
10 N=EXP(1)
20 N(1)=INT(N)

30 D=N-N(1)
40 I=1/D
50 N(2)=INT(I)

60 D=I-N(2)
70 I=1/D
80 N(3)=INT(I)

90 D=I-N(3)
100 I=1/D
110 N(4)=INT(I)

120 D=1-N(4)
130 I=1/D
140 N(5)=INT(I)
```

Being observant, we notice that a certain task is being repeated. Lines 30-50, 60-80, 90-110, and 120-140 look very similar. We can take advantage of this to write our program in a more elegant form.

```
10 I=EXP(1)

20 N(1)=INT(I)

30 FOR K=1 TO 4
40     D=1-N(K)
50     I=1/D
60     N(K+1)=INT(I)
70 NEXT K

80 PRINT N(1),N(2),N(3),N(4),N(5)
```

There is one important test we need to consider. Notice the D in the denominator in line 50. Could this ever equal 0? It might. To avoid an error we ought to test to see if D equals 0. To do this, add line 45.

```
45 If D = 0 THEN 80.
```

Solutions to Clip Clock

Solution 1

The obvious thing to do is start subtracting 24 from 1001 until we can't go any further. Here is a program which keeps subtracting 24 and testing to see if fewer than 24 hours remain.

```
10 T=1001
20 If T<24 THEN PRINT T:END
30 T=T-24
40 GOTO 20
```

Solution 2

There is a small problem with the previous approach. It takes a generous amount of time to do all those subtractions in line 30. How many times can 24 be subtracted from 1001? If we divide 1001 by 24 we find that 1001/24=41.7. INT(1001/24)= 41. We can subtract 41 copies of 24 from 1001 and leave just a twee left over. To find out how much is left over we subtract 41*24 from 1001. 1001-INT(1001/24)*24 = 17. Our program might have been written this way:

```
10 T=1001
20 PRINT T-INT(T/24)*24
30 END
```

We could easily make this a more general routine as follows:

```
10 REM ROUTINE TO COMPUTE
   THE REMAINDER WHEN T IS
   DIVIDED BY Q.
20 INPUT T,Q
30 PRINT T-INT(T/Q)*Q
40 END
```

Do you have other ways of doing these problems? Do you have problems that you think other problem solvers might enjoy? Do you have suggestions or criticisms of methods, style, and such? Write!
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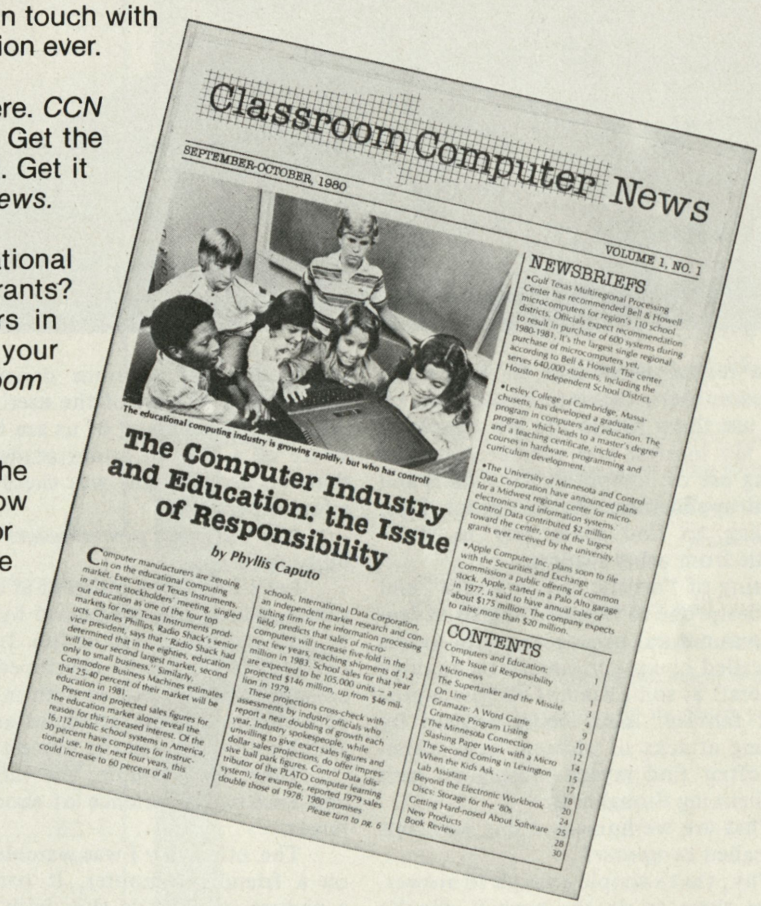
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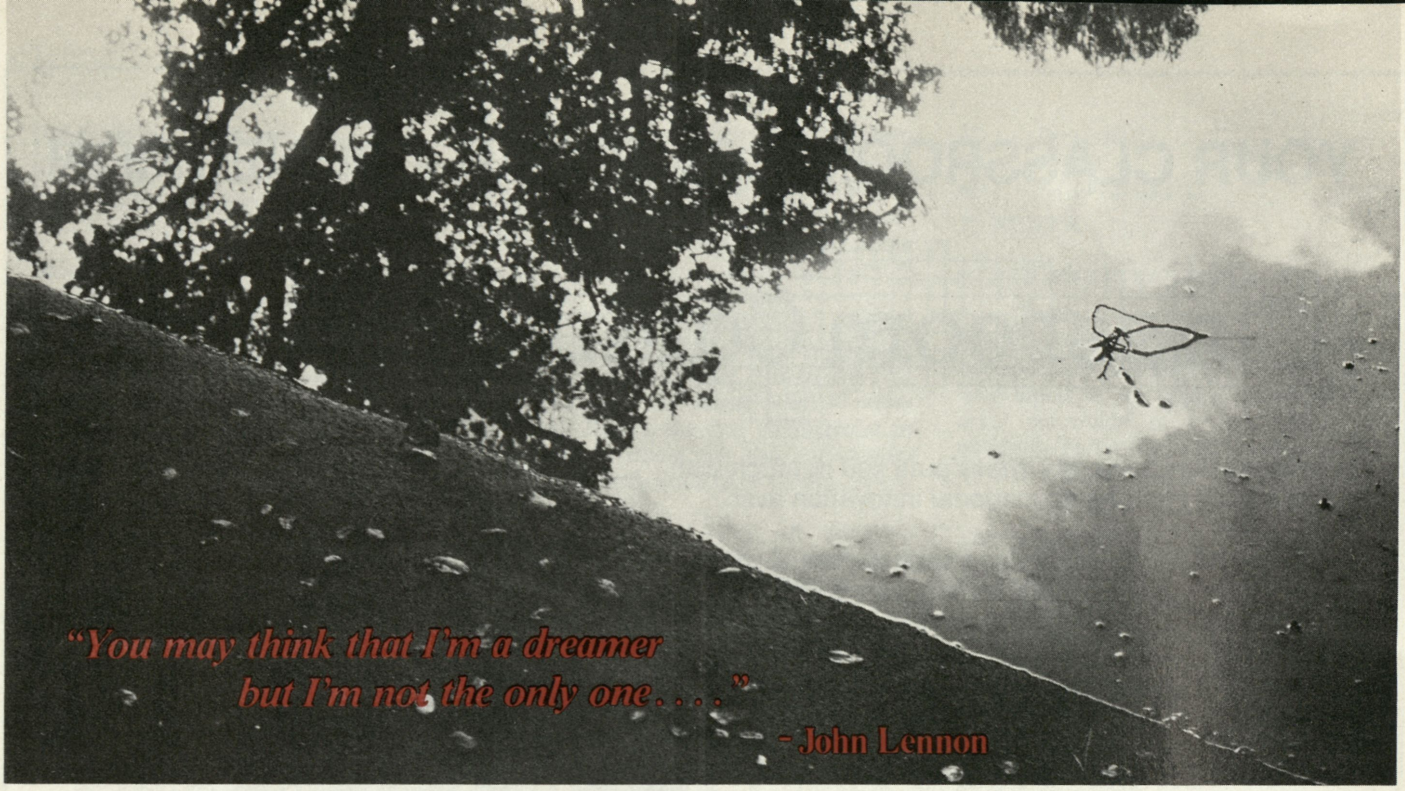

Photo by Clifford West

Reflections

by Herb Moore

I'm a recent newcomer to the world of computers, having begun to actually use them within the last couple of years. My interest was generated by the growing use of computers for artistic and musical applications. At this point, I am struggling to find some way to invite dialogue from other readers.

Being of "artistic temperament" and therefore prone to frequent flights of fancy, it was natural for me to relate to this thing called *computer* (and to technology in general) as some kind of elaborate puzzle or fantasy. Also, being plagued by recurring attacks of philosophical whimsy, I often find myself musing on such overwhelming thoughts as:

What are we humans doing with this thing called *computer?*

Why, that's simple enough to answer. We use them to do the payroll, they're somehow involved in making telephones work and space shuttles fly, and I'm writing this very article on a word processor. Things like that.

"True enough," you say, "but a catalog of computer uses seems like more of a cop-out than an answer to the question you've raised."

Okay, I admit it. My answer is:

I DON'T KNOW (a feeling most likely shared by millions). But maybe the question needs to be slightly refined to something like:

WHAT WOULD WE LIKE TO DO WITH COMPUTERS?

Do you suspect a motive? I confess . . . I do indeed have a motive. I'd like to see computers become something to help people help people.

Too general?

Okay, let me try to explain my idea. The computer itself is really a very general kind of tool that can be easily molded to different applications depending on the need or interest of the user. For that reason, I think many of us are becoming aware of a kind of power available to us that we had thought was the domain of a few experts.

Ah, but with power comes responsibility (gulp).

Let's look for a moment at computer games, which are understood by many to be educational as well as fun. Indeed, all kinds of skills can be developed through computer games. But as with most forms of education, many attitudes and values are also developed in the process.

Take, for example, the very natural and exciting experience of shooting at a target.

The other day I was watching a game on a friend's computer. It consisted of a picture of a battle ship with airplanes flying over, some dropping bombs on the ship. With the joystick, one could aim a gun from the deck of the ship and shoot at the bombers. Any time a bomb hit or a plane was shot, the computer made a little squeaky-buzzing sound, and a measure of the resulting destruction was graphically depicted. That's the game, folks . . . DESTRUCTION to either THEM or US.

Now I wouldn't advocate banning such games anymore than banning handguns, but can we do any better?

Being one who has enjoyed such sports as target shooting with bow and arrow, bowling, and golf, I'm convinced that the pleasure of hitting a target can be rewarded in ways that aren't reinforced by seeing other humans destroyed. Or, since we're on the dawn of cosmic exploration, possibly I should refer to other beings in the universe. Maybe one day we'll find some superior force which is totally unimpressed with our weapons. What'll we do then? Bring on the pea shooters?

But I digress. My wish is not to condemn one thing, but to encourage another. The question is this:

Can we develop exciting computer games and computer uses which cultivate a friendly and cooperative attitude towards our neighbors both on this planet and elsewhere in the universe?

Pretty tall order . . . maybe.

My view stems from a feeling that through the power of games and simulations with personal computers, we can examine our own beliefs about the universe and the types of constructs we develop to reinforce those beliefs. I also feel that, through the games we create, we can influence our constructs and beliefs, and possibly even what we find in the future.

I would like to hear from others who share similar ideas. Computers and technology in general might be seen as a modern mirror. If you'd like to contribute to a beautiful reflection of humanity, let's hear from you. ■

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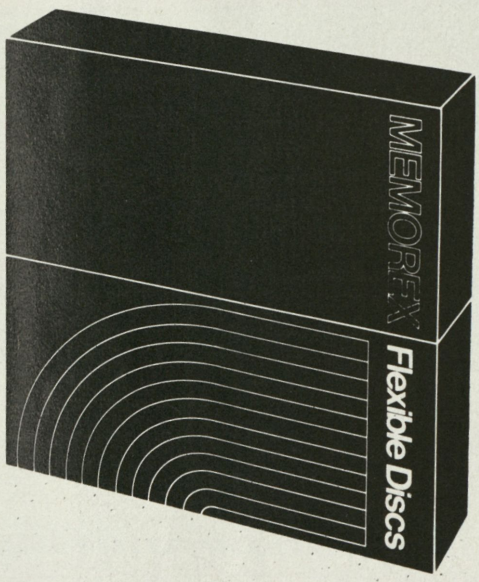

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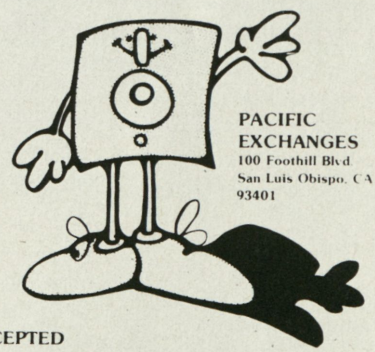

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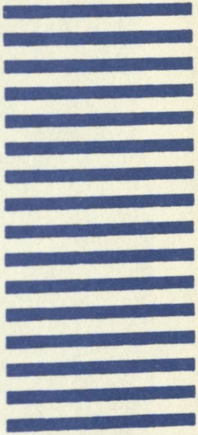

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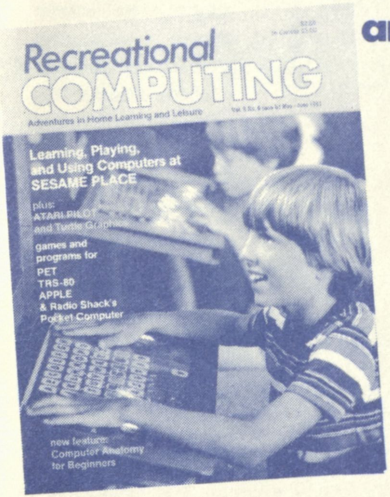

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