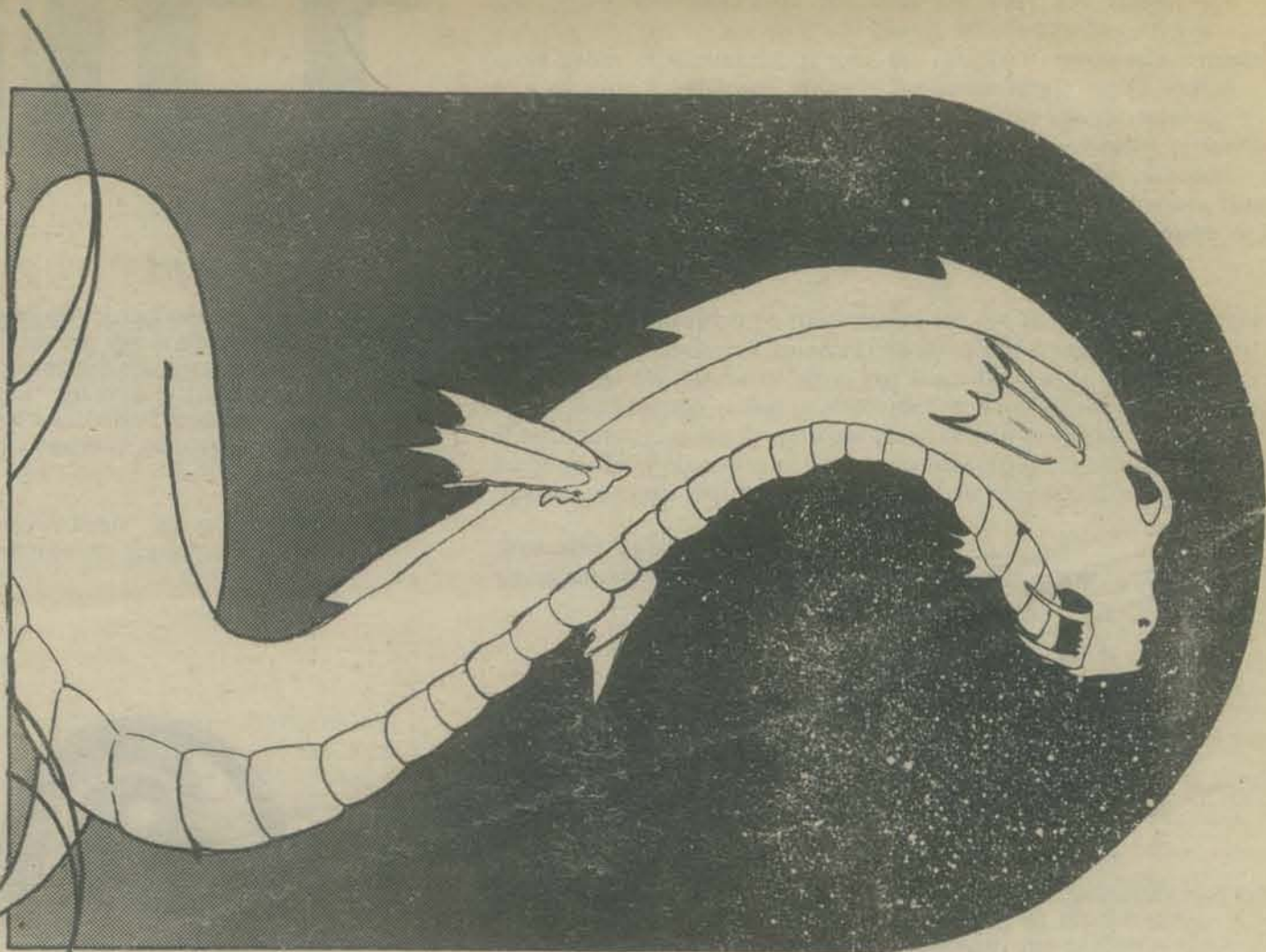


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**PEOPLE'S COMPUTER  
COMPANY**

vol. 4 no. 6 may 76

**\$1**

# DYNABOOK: dy-na-MITE! 2

We've been hearing about the Dynabook fantasy for a long time. Below are some excerpts from the recently published report on the Dynabook project, entitled "Personal Dynamic Media" by the Learning Research Group, Xerox Palo Alto Research Center. Inquiries about this project may be addressed to Adele Goldberg, Learning Research Group, Xerox Palo Alto Research Center, 3333 Coyote Hill Road, Palo Alto, CA. 94304.

## I. Introduction

The Xerox Learning Research group (LRG) is concerned with all aspects of the communication and manipulation of knowledge. We design, build, and use dynamic media which can be made accessible to human beings of all ages. Several years ago, we crystallized our dreams into a design idea for a personal dynamic medium the size of a notebook (the Dynabook) which can be owned by everyone and has the power to handle virtually all of its owner's information-related needs. Towards this goal we have designed and built a communications system: the Smalltalk language, implemented on small computers we refer to as interim Dynabooks. We are exploring the use of this system for programming and problem solving; as an interactive memory for the storage and manipulation of data; as a text editor; and as a medium for expression through drawing, painting, animating pictures, and composing and generating music.

We have used our experimental experiences with our interim Dynabooks to guide the design of learning activities and examples for children in different age groups: preschool, primary, intermediate, and high school. Since children differ as to interest and intellectual development, each activity explores the potential of this new medium for these various groups. Our work with adults includes those in fields other than the computer sciences, especially those who are professionally involved with handling knowledge, such as secretaries and librarians.

\* \* \*

Suppose it had enough power to outrace your senses of sight and hearing, enough capacity to store for later retrieval thousands of page-equivalents of reference material, poems, letters, recipes, records, drawings, animations, musical scores, waveforms, dynamic simulations, and anything else you would like to remember and change.

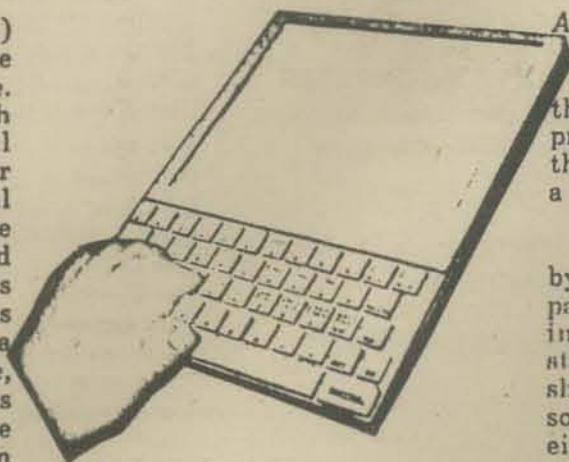
We envision a device as small and portable as possible which could both take in and give out information in quantities approaching that of human sensory systems. Visual output should be, at the least, of higher quality than what can be obtained from newsprint. Audio output should adhere to similar high fidelity standards.

\* \* \*

Our design strategy, then, divides the problem. The burden of system design and specification is transferred to the user (who will generally not be a computer scientist). This approach will only work if we do a very careful and comprehensive job of providing a general medium of communication which will allow ordinary users to casually and easily describe their desires for a specific tool. We must also provide enough already-written general tools so that a user need not start from scratch for most things he or she may wish to do.

\* \* \*

If such a machine is designed in a way that any owner can mold and channel its power to his own needs, then a new kind of medium will have been created: a metamedium, whose content is a wide range of already-existing and not-yet-invented media.



## Animation and Music

Animation, music, and programming can be thought of as different sensory views of dynamic processes. The structural similarities among them are apparent in Smalltalk, which provides a common framework for expressing these ideas.

All of the systems are equally controllable by hand or by program. Thus, drawing and painting can be done using a pointing device or in conjunction with programs which draw straight lines or curves, fill in areas with tone, show perspectives of 3-dimensional models, and so on. Any graphic expression can be animated, either reflecting a simulation (such as bouncing objects in free space) or by example (giving an "animator" program a sample trace or a route to follow).

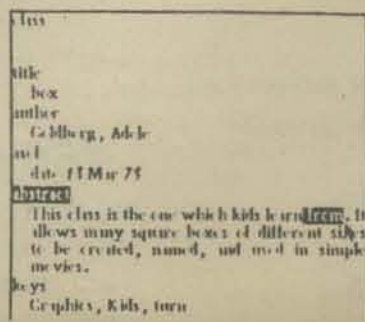
Music is controlled in a completely analogous manner. The Dynabook can act as a "super synthesizer" getting direction either from a keyboard or from a "score" (a sequence of actions over time). The keystrokes can be captured, edited and played back. Children can both learn to play (coordinating their minds and bodies) and compose at the same time because they do not have to spend several years becoming good enough technically to play their own compositions.

Timbres are the "fonts" of musical expression as they contain the quality and mood which different instruments bring to an orchestration. They may be captured, edited and used dynamically.

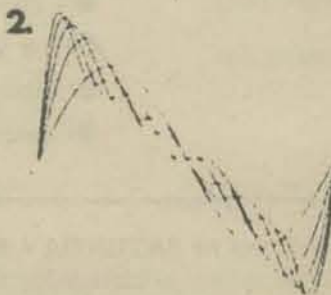
\* \* \*

Much of the design of SHAZAM is an automation of the media with which animators are familiar: movies consisting of sequences of frames which are a composition of transparent cels containing foreground and background drawings. Besides retaining these basic concepts of conventional animation, SHAZAM incorporates some creative supplementary capabilities.

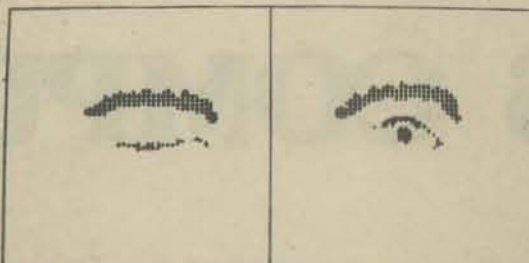
Animators know that the main action of animation is due not to an individual frame, but to the change from one frame to the next. It is therefore much easier to plan an animation if it can be seen moving as it is being created. SHAZAM allows any cel of any frame in an animation to be edited while the animation is in progress. A library of already created cels is maintained. The animation can be single-stepped; individual cels can be repositioned, reframed, and redrawn; newframes can be inserted; and a frame sequence can be created at any time by attaching the cel to the pointing device, then "showing" the system what kind of movement is desired. The cels can be stacked for background parallax; holes and windows are made with transparent paint. Animation objects can be painted by programs as well as by hand. The control of the animation can also be easily done from a Smalltalk simulation. For example, an animation of objects bouncing in a room is most easily accomplished by a few lines of Smalltalk which expresses the class of bouncing objects in physical terms.



text editor



generation of a timbre



blinking pairs--  
two frame movies

# ELECTRONICS CLASS

by Kurt Inman

Cabrillo College of Aptos is offering a basic electronics class for ages 10-14. I took that class. I'm 12.

The teacher was Mrs. Mary Duffield, a retired English teacher who belongs to UNESCO club and has a boat full of ham radio equipment. The class went for three Saturdays and was from 9 am to noon each Saturday. There were 17 people enrolled.

On the first Saturday, at the beginning, Mrs. Duffield had everybody tell their name and what field of electronics they liked best (computers, design, engineering, etc.). Then we talked about the parts and components used in electronics (resistors, transistors, etc.). We also learned the units for them (ohm for resistors, etc.). Each student received a surprise package of components, including resistors, capacitors, transistors, IC's, worth about \$10 or so. At about 10:45 am, we had refreshments, consisting of cookies and punch. There were some pc boards out on the desk for us to look at. Also a telegraph set and a 2-meter transceiver. After that, we saw a film on electricity, then we talked about test instruments. Our first homework assignment was to figure out how much electricity we used during a period of one week.

At the second meeting, we talked about construction, electronic techniques, printed circuit boards, etc. Then we saw a film which I thought was very good, entitled "Design and Development of Printed Circuit Boards."

One of the things my dad told the class, which I think you will find humorous, is that a few years ago, some people tried to translate English to Russian, word for word, and back again, word for word, by computer. They took two proverbs: 'Out of sight, out of mind', and 'The spirit is willing, but the flesh is weak'. These were translated to Russian and back to English again, word for word. They came out as: 1.: 'The person is blind, and is insane'. 2.: 'The wine is good, but the meat is raw'.

Towards the end of that meeting, Mrs. Duffield talked to us about the field of communications.

My dad and I brought our computer (Altair 8800) to the class for a demonstration. My dad was taking pictures for his article, which you see on pg. 4. During snack time the kids got to see the inside of it. They were fascinated! While my dad was telling the class about the binary number system, I was loading a program into the computer to make it play music on the radio. Then there was another program that I loaded in, that was a number guessing game. When you guess the right number, the computer plays 'Daisy' on the radio. Then there was a program where you try to 'kill the bit'. A bit went around on the upper address lights, and you had to toggle the switch where the bit was, at just the right moment. If you miss, another bit comes along, leaving you two bits to destroy.

## ELECTRONICS FOR YOUNG PEOPLE

Instructor: Mary Duffield  
Dates: Saturdays, Feb. 14 through 28  
Time: 9 a.m. to noon  
Place: Cabrillo College, Room 716  
Fee: \$11

Study electronic parts and components. See computers in action. Talk on the Cabrillo College amateur radio station. Participants will receive a free "surprise package" of components. Electronics test equipment as well as a basic introduction to electronics will be covered. Class is open to boys and girls, ages 10 to 14. Enrollment is limited to 21.

THE AD IN THE CABRILLO COLLEGE NEWS-  
LETTER. CABRILLO IS IN APTOS, CALIFORNIA

On the third Saturday, we talked about the different licenses for ham radio, and what you have to do to get them. We saw a video tape recording, "Ham's Wide World". Then we went on a tour of the Cabrillo College Amateur Radio Station. In the station, Eddy Pollock showed us a scanner and how to use it. He demonstrated it to us by finding a station and picking it up. One wall of the radio station was covered with QSL cards. We also got to see a frequency counter in action. We all got to talk on the radio to Eddy's uncle. Eddy's uncle recorded the things we said to him (name, age, etc.), and played them back over the radio. Eddy Pollock, a retired Naval Electronics Commander, set up and taught the original electronics class in 1971. Director of Technical and Vocational Education at Cabrillo, Eddy is in charge of programs in Electronic Technology at the Community College. Mr. Pollock also teaches an Electronic Construction class which I am attending.

We also toured the Radio & TV lab. Dr. Heshmati showed us through the lab and showed and demonstrated to us, a radio tester, TV tester, Color and Bar, Dot generator, and how it is used. Also, he showed and let us use an oscilloscope connected to a signal generator.

We talked about the use of amateur radio (back in class again). Then everyone got a course evaluation sheet.

Then we had a drawing for prizes (electronics books.). That was fun! I really like the electronics class. I learned a lot!



CRAIG (LEFT), ME (MIDDLE), AND EDDY (RIGHT).  
ME TALKING ON THE RADIO.



ALI HESHMATI SHOWS THE CLASS ONE OF THE  
MANUALS IN THE RADIO & TV LAB.

# HOW CABRILLO COLLEGE TEACHES ELECTRONICS TO YOUNG PEOPLE

by Don Inman

350 Nelson Rd.

Scotts Valley, CA 95066

Cabrillo College, through its Community Services, provides young people of Santa Cruz County with the opportunity to learn about electronics in an enjoyable environment. There is no pressure for grades and no cramming to pass a test. It's all for fun and knowledge. The kids get a chance to look at, feel and take home electronic components. Informal learning evolves as students discuss, and ask questions about, electronic parts which they are actually holding in their hands at the time. Basic electronics, mathematics, and some laws of physics creep into the course through informal discussions, educational movies, and demonstrations of applications and measurements in various laboratories. A microcomputer is programmed by one of the participating students. Students talk on an amateur radio station.

All these and other interesting projects take place over a period of three Saturday meetings. Each one is crammed full of exciting information, and students joyfully contribute comments and questions relating to electronics as it touches their lives. Gone is the cold, fact-filled classroom. In its place is a warm, action-packed experience.

Seventeen youngsters appeared for the opening session which I attended. Parents willingly dole out \$11 for the registration fee to enroll their offspring in this three meeting, three hours per meeting class. Over the past four years, over four hundred children, ages 10-14, have poured through Cabrillo's doors to take part. Twelve students showed up for the original offering in September, 1971. The classes have been full in every subsequent class.

What makes the course so successful? Let's look at the people who make it go. Eddy Pollock, a retired Naval Electronics Commander, set up and taught the original course in 1971. He did such a good job that little change has been made in the basic course outline since. Five basic areas are covered. I. Components and basic circuits. II. Instruments and recognition of the components that make them work. III. Basic computers and binary counters. IV. Books and publications in the electronic field. V. Communications and amateur radio.

As Director of Technical and Vocational Education at Cabrillo, Eddy is also in charge of programs in Electronic Technology at the Community College. As a result, the full resources at Cabrillo are available to the youngsters in the electronics class. Mr. Pollock is still teaching part time as well as performing administrative duties. He has now turned over the reigns of the young people's class to another inspiring teacher.

Mary Duffield, retiring from 33 years of service in the public schools, has begun a second "career". Due to her involvement with boats, (she owns and lives on a 35 footer at the Santa Cruz Yacht Harbor), Mary became interested in radio communications. This led her to the field of electronics. Through the helpful effort of Eddy Pollock and his staff, Mary is now completely involved and is teaching the youngsters. In Mary's own words

"My most rewarding outlet is serving as a volunteer organizer for UNESCO Clubs. There are thousands of clubs in almost every country, full of young people anxious to cement international bonds of friendship. I take Santa Cruz County club members on coastal cruises on the sailboat because it is a meaningful, ecological life style, from which to reach out to one another across obsolete boundaries. This is THEIR time to be alive in the world, and they need to know we need them now...putting their 'highest powers to their highest use', using their biological computers to bring about 'the greatest good for the greatest number.'"

Keeping the attention of a class of children in this age group for a three-hour time period is no small chore. Yet, in all three sessions, the job was accomplished with outstanding success.

In the first session students expressed their electronics interest. These included engineering, radio, television, ham and CB radio, computers, broadcasting, and space applications. A package of electronic components was distributed to each student, and a discussion of each component followed. Color codes and special markings were pointed out. Thus a direct connection was made between the component's physical appearance and its symbolic representation. Units of measurement were also presented along with typical values used. Mathematics was subtly introduced with students using power's of ten to describe the metric prefixes for milli, pico, kilo, meg, etc. Percent crept in through discussion of tolerances for the measurements.

As I said before, three hours is a long class period. Punch and cookies were served to break the session into two parts. During the brunch-time, students visited the "back room" to see a frequency counter in operation, as well as other instruments in the lab. Printed circuit boards were scattered about the room, and an integrated circuit chip was viewed through a microscope.

After the break, a movie was shown giving a pictorial development of electricity. Included were animated descriptions of electron action leading to a discussion of Ohm's law. The use of cartoon characters to represent electrons in motion was cleverly done. The first session concluded with an assignment to tally the electricity used by the student during the following week. The results, reported the following week, indicated values from 67 kilowatt-hours to 148 kilowatt-hours. This opened the second session with a discussion of energy conservation. Students also demonstrated their recall abilities during a review of the previous weeks lesson. Some are real electronic bugs showing a good knowledge and clamoring for more. Time was then devoted to a discussion of ham and citizen's band radio with emphasis on frequency, cycle, and wave length relationships.





Following the break, the Mountain Digital Group of the Scotts Valley-San Lorenzo Valley area donated the use of their Altair 8800 computer for a demonstration. The author led the discussion which was centered on the need for programmer-computer communication. Kurt Inman, (see article page 3) a member of the class, programmed the computer from the front panel switches while the discussion was taking place. He entered his own version of a number guessing game combined with Dompier's "Program to Make an Altair 8800 Play Music". When the correct number was guessed, the program played "Daisy". There were many "Ah's and Oh's" from the audience.

Then the questions fairly flew:

"How does it do it?"

"Is it coming out the radio?"

"How do you set the timing?"

"How does it get into the radio?"

"Could you make it play into a radio far away?"



While I was fielding the questions, Kurt was loading another program, "Kill the Bit" by Dean B. McDaniel num. 92751 from the Altair User's Library. Everyone in the class then had a chance to try their reflexes in "killing" the bit as it rotated in the upper eight address lights. We then cut off the demonstration so that a film on computers could wind up the days activities. Mary Duffield adds these comments on the computer demonstration, "There I sat, watching helplessly as an entire classroom of junior high schoolers became hopelessly addicted. The 'pusher', shockingly enough, was an 11 year old named Kurt Inman. Even we teachers were 'high' on the homebrewed computer demonstration. And the addiction to 'computerology' as Kurt 'pushed' the myriad switches on their home build Altair computer. He programmed it to play 'Daisy, Daisy' on an ordinary little transistor radio. Thus I reacted to San Lorenzo Valley math teacher, Don Inman, and Don's presentation of their project. As Kurt pushed the final switch, the class exploded with delighted 'Far out!' and 'How neat!', etc. The music climaxed Don's hour lesson on computer lang-

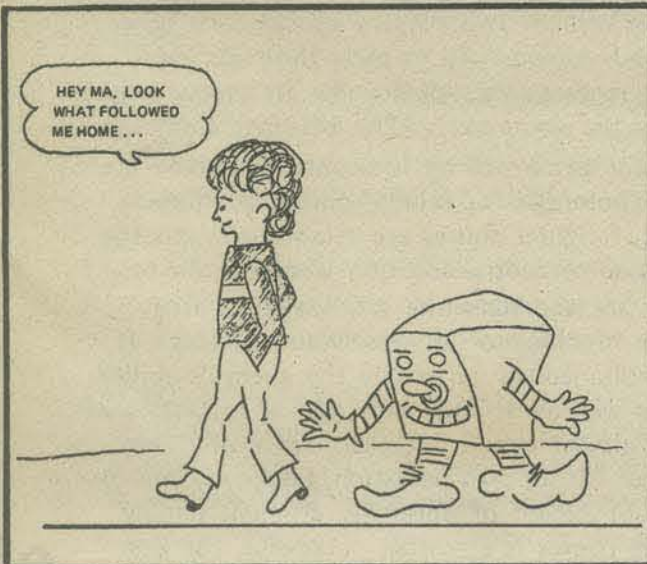
uages, the binary system, the infinite potential of computers, their uses, hobby aspects, etc. We hope to videotape the whole exciting thing soon so more youngsters will become productive addicts."

A visit to Cabrillo's amateur radio station highlighted the final meeting of the class. Over 147 different countries have been contacted by the station. A world map with a pin for each contact and a QSL card for each fills one wall of the room. Eddy Pollock pointed out the three essentials of a station—the receiver, the transmitter and the antenna. He then went "on the air" and contacted another station. Each student was allowed to speak into the "live" mike and his voice was transmitted over the airwaves. A few minutes later, the other station sent back each youngsters transmission which had been recorded on tape. Some were amazed at the sound of their own voices.

Next in popularity on the final Saturday was the visit to the college Radio-TV lab. Here, Ali Heshmati is in charge. Ali explained some of the projects which his students build. Lab manuals, some breadboarded kits, and finished projects were passed around. A radio demonstrator and a color TV demonstrator were exhibited. Ali introduces circuit errors into the demonstrators and his students have to discover the cause.

These two tours filled the class with anticipation as they returned to the classroom for refreshment time. During the break, most of the class gathered around Mary's transceiver, which was tuned to one of the amateur bands. Mary explained how to get a ham license and encouraged all to take a crack at it. The class closed with a film on the process of developing a printed circuit board from start to finish.

This class was quite satisfying. Much was crammed into a small amount of time, but I'm sure the appetites of the children were whetted. This class is followed at Cabrillo by a four meeting project to learn soldering techniques, and work under the supervision of Eddy Pollock and several of his lab assistants. At the end of the course, the students judge each others projects, and prizes are awarded for the best projects. We'll be there.



## Friends,

◇A) I have grown tired of continually borrowing copies of PCC from friends so please find enclosed my check for volumes 4 & 5 (\$10.00).

◇B) I have a number of observations regarding Bill Campbell's 'Ultimate STAR TREK Game'. (PCC Vol 4 & 5 pg 38)

Gene Roddenberry would have Mr. Harris and Mr. Campbell phasered at dawn if he were to see the gross bastardizations they have perpetrated upon his (not ours, his) STAR TREK universe. If one wants to call his game a STAR TREK game, then one must remain true to the guidelines established by Mr. Roddenberry. I cannot conceive of a 'cops and robbers' game with meter maids manning (or womanning) stakeouts and chasing hoods; a number of the abortions I have seen in "STAR TREK" games are just as bad. Addressing Mr. Campbell's article specifically:

### \*1. The new found enemies:

a) There are no such thing as 'Thallians'. The reference appears to be to the 'Tholians' from the episode THE THOLIAN WEB (by Judy Burns & Chet Richards, stardate 5693, aired 11/15/68)

b) I presume the 'Eminians' referred to are from the planet Eminiar VII, introduced in the STAR TREK episode A TASTE OF ARMAGEDDON (by Robert Hamner & Gene Coon from a story by Robert Hamner, stardate 3192, first aired 2/23/67). When we last saw the Eminians, Kirk had just stripped their ability to wage war with their neighboring planet Vendikar; a computer simulated battle that had lasted for five hundred years. This certainly implies that their technological advances during those 500 years must have been extremely limited. Indeed, their concerns were more for the humanistic and cultural aspects of life (the script, page 13, Anan 7 says "...The people die, but our culture goes on."). Now Mr. Harris wishes us to believe that the Eminians have not only learned to wage real wars (a technique that has not been used for 500 years) but have also learned hyperlight space travel techniques equivalent to the Federation, and have developed a 'stasis field'???? Sorry Tim, I don't buy it. Oh, by the way, the Eminians were using sonic disrupters; what happened to them?

c) The hardest of all to swallow is that the 'Hortae' (which, incidentally is spelled Horta) from Gene Coon's episode DEVIL IN THE DARK (stardate 3196, first aired 3/9/67) are warping around the galaxy shooting sonic disrupters at Federation starships. Who do you think you're kidding?? The Horta, first discovered by the pergium miners on Janus IV under the direction of Chief Engr. Vanderberg are intelligent and generally quite peaceful. They are also a fairly primitive silicon based life form asking nothing more than some rock to digest and a quiet place to raise their young, free from harrassment. They could care less (let alone have the capability) to set out into space. Did they steal the sonic disrupters from the Eminians???

(don't worry guys, I'm not through yet)

### \*2. Weaponry and defenses:

a) I must agree with the editorial comment written amidst the article: A photon torpedo that can super-nova a star is hard to conceive. However, it is harder to conceive that a power which did possess such a weapon could be threatened by the mere presence of Klingons or Romulans. Also, what happens to all the other life inhabiting all the planets around all the stars in the quadrant you just destroyed? Or didn't you think about them?

b) Cloaking devices are obsolete. (see the episode THE ENTERPRISE INCIDENT by D.C. Fontana, stardate 5027.3, first aired 9/26/68) The Romulans first developed them and the Federation stole it. If you know how to make one you know how to penetrate one.

### \*3. Finally, the boast.

Anybody who takes someone else's program, modifies it (and in the process degrades its authenticity), and calls it 'the ultimate, the only game of its caliber' is being not only premature, but very closed minded and quite infantile. However, to say that it is 'the greatest Star-Trek possible on the computer' is insulting to all STAR TREK fans and programmers alike. If this game is the greatest aspiration we can ever expect to achieve, then I will turn in my IBM flochart template and cut the wires on my modem.

Computer games are fun; STAR TREK games are more fun. But if one takes the liberty to steal the characters, themes, or technologies created by Gene Roddenberry, one must follow his guidelines. Artistic license goes only so far. Tim Harris' game may indeed be fun (which I doubt if you can never win; winning is fun) but if he can't create a game without tearing apart the realism of the STAR TREK environment, then the game shouldn't be called, or attempt to be a STAR TREK game.

A game called 'Armageddon' has been under development here at UVM for a couple of years. I have optimistic hopes of releasing the first version of our game by September, 1976. The game is a STAR TREK based game built upon the following premises:

- The game should always remain true to the themes, theories, technologies, people, places, and events created by Gene Roddenberry and the authors of the original STAR TREK episodes. Also, accuracy with respect to known facts of our own time is essential.

- The game must be more than just a 'chase the enemy and blow them up' game. Though the overall theme of the game is one of conflict, other aspects of life and survival in space must be dealt with.

- The game must be challenging and enjoyable to play.

- The game must be a real 'computer game', not a simulation of a game that could be played without the assistance of a computer.

Towards this end, we have created a game which contains the following aspects (to mention only a few).

- The game will be a conflict between the United Federation of Planets and The Romulan Empire. Battle with the Klingons is impossible due to the Organian Peace Treaty. (ERRAND OF MERCY by Gene Coon, stardate 3198, first aired 3/23/67)

- Each side will optimally consist of a multiple number of players, each with access to his own terminal and each with a specific duty assignment. To accomplish this, our game will be played during the wee hours of the morning, commandeering two lab terminal rooms (command centers) each with twelve terminals all linked to the University's Xerox Sigma 6.

A simplified version will pit two players against each other.

A far more advanced version (still in early developmental stages) will have one or more players challenging an enemy whose strategy is controlled by the computer. (The Ultimate Computer?)

- The object of the game will be to scout out and locate new planets which have potential for mining dilithium. Mining crews are then sent out, freighter routes are established, and the dilithium is freighted to some central location where it can be refined to a crystalline state and form the catalyst for matter-antimatter reactions, the lifeblood of all vessels and devices. It will be necessary to simultaneously terminate the enemy's ability to do the same thing as well as defend one's mining installations and freighters from the almost certain attacks. Since dilithium makes possible the power for all transportation, weapons, and defensive systems, the establishment of optimally efficient mining operations and freighting routes is essential. Likewise, the best way to stop the enemy is to cut off their dilithium supply lines.

● Battles will be more sophisticated than the tiresome 'aim and shoot' methods employed by most computer games. The actual attack situations are controlled by computers, not bombadeers squinting through sights. Strategy and optimal resource allocation will be the key; the game will carry the air of an 'Avalon Hill' approach, not 'Rock-em-Sock-em-Robots.'

● The game will require real gamers. A considerable degree of training will be required to take part in a full scale game situation. Would you let the kid around the corner pilot your starship?

An extensive description of all details and aspects of the game now exists in draft form. By the time this letter is printed (if ever) it will be available from me for those interested for a nominal cost to cover reproduction.

A program has been written to generate a section of the galaxy. The program creates stars and planets with all pertinent information its makeup and creates a database which will be accessed by other routines of the game. The program creates very nice solar systems, not unlike those which have been observed in space.

Routines are working to 'travel' through this space, locate and 'scan' planets.

The concept of the game calls for a rather extensive database which maintains the status of space and the other specific details of the game.

The game will be played by executing a series of programs, each designed for a specific task, (i.e., modifying a freighter route, assigning a starship to a certain mission, receiving subspace data transmissions from a scout ship, etc.) This modular approach makes game playing possible on most any computer. It allows for the most effective utilization of different programming languages for different tasks and it leaves the player free to write his own programs during the course of a game to solve simple problems (like computing the most optimal freighter route or the best number of starships in an attack fleet). The common ground for all programs will be the database.

The first implementation of 'ARMAGEDDON' will be written in FORTRAN with FORTRAN callable assembly language sub-routines to access and update the database. The game will make extensive use of UVM's graphics facilities (2 plotters, a Tektronix 4013 display terminal with a 30"x40" digitizing tablet and hard copy unit) to enhance the realism of the game. The user will be able to plot star maps, to chart planets and devise freighter routes and will be able to display any section of explored space to ascertain positions of vessels.

When operational, ARMAGEDDON will be generations beyond the current rash of STAR TREK games, but I would not think to call it the ultimate STAR TREK game possible on a computer. Why, after this one we'll start with a full scale mock-up of the Enterprise bridge, and an Advent projector TV, and 6 or 10 Altairs, and.....

For anyone considering developing a STAR TREK game, I recommend the following resource material as absolutely essential information:

1. *THE STAR TREK CONCORDANCE and THE STAR TREK CONCORDANCE 3RD SEASON SUPPLEMENT* by Dorothy Jones and Bjo Trimble, available from John Trimble, Box 74866, Los Angeles, Ca. 90004, send \$9.00.
2. *THE MAKING OF STAR TREK* Stephen Whitfield and Gene Roddenberry, Ballentine Books, SBN 345-02697-125, available in most bookstores.
3. *STAR FLEET TECHNICAL MANUAL* Franz Joseph Designs, Ballentine Books SBN-345-24730-2-695, check your bookstores. (NOTE: Don't believe everything you read in this book; for example, Gene Roddenberry hates the Dreadnaught. It won't appear in the upcoming STAR TREK movie(s).)

4. *THE WORLDS OF STAR TREK* David Gerrold, Ballentine books, SBN 23403-0-150. Your bookstore should have this one but sometimes its hard to find.

5. *STAR TREK BLUEPRINTS* Franz Joseph Designs, Ballentine Books SBN 345-24471-0-500 (this has good info on the ship's facilities and crew compliment.)

6. A good book on Astronomy --check out the library.

7. All the manuals you can scare up on the particular computer you are using. Find out everything it can do for you so you can make the most of it.

Other useful reference material includes the following:

1. The STAR TREK novel series (1-11) by James Blish, Bantam Books, check your bookstore.
2. Copies of the original scripts (These are the ultimate source for detailed information) Available from Lincoln Enterprises, P.O. Box 69470, Los Angeles, Ca. 90069. Write for a catalog; send a SASE and tell Majel that Bill Crow said 'Hi!' Lincoln Enterprises is the official source for STAR TREK collectables, you'll enjoy the catalogue
3. KLINGON BATTLE CRUISER BLUEPRINTS (didn't know they existed, did you?) Available from Galactic Designs & Productions, Box 1666, Poughkeepsie, N.Y. 12601. Send a SASE and ask for a price (mine cost \$6.00 at the 1976 NY STAR TREK Con).

A number of the STAR TREK publications may be difficult, if not impossible to locate through your local bookstore. In this case, the following people could help you out:

THE FEDERATION TRADING POST ◀  
210 E. 53rd Street  
New York, N.Y. 10022  
(212) 751-6716

▶ A CHANGE OF HOBBIT  
1371 Westwood Blvd.  
Los Angeles, Calif. 90024

Sherry Gottlieb specializes in finding hard-to-find fantasy and SF books; if Sherry can't find it, then hang it up.

- ◇C) I am beginning a new page to begin (and conclude) my final topic: A note to D. Van Tassel in reference to the article 'The Computer in Science Fiction' (PCC Vol 4 num. 5 pg 38).

David Gerrold's 'When Harlie Was One' is indeed a humorous book, but it is distressing to see it reviewed as nothing but frivolity. I had an opportunity to talk with David at some length at the N.Y. Star Trek Convention specifically about 'Harlie'. For a layman (Gerrold has never written a computer program in his life) his understanding of computers and their possible future is amazing. I will attempt to recap his summation of the theme of 'Harlie':

When computers are developed that are capable of creative thinking and rational thought processes, they won't answer questions, they will ask them. Man had better be prepared at that point in time with the answers.

After talking to David, 'When Harlie was One' stands out as one of the more profound statements about the possibilities of the future of computers and society. It is also a very enjoyable book to read.

My ravings are over.  
My fingers are numb.

Quite Sincerely,  
Bill Crow  
Systems and Graphics Analyst  
University of Vermont  
Burlington, Vermont 05401

# Do-it-yourself space navigation among planets

By David F. Salisbury  
Staff writer

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Society. All rights reserved.

*Suddenly the rocket thunders into life. Powerfully it rises on its tail of white-hot flame. Faster and faster it climbs as the clinging fingers of Earth's atmosphere lose their grip. Twenty thousand, twenty-three thousand, twenty-six thousand miles per hour: Finally the spaceship is going fast enough to break the bonds of Earth and begin the 400-million-mile journey to Mars.*

This was the scene last August when the first Viking spacecraft was launched, its mission to search for life on Mars. But it is also a journey you can re-create at home with a little imagination and some help from a pocket calculator.

You need not limit yourself to Mars. You can plot courses to the frosty Jovian planets or plunge inward to the molten world of Mercury. You can follow the course of comets, or calculate how long it takes a satellite to circle the Earth.

The most sophisticated mathematical oper-

# CALCULATORS

## power tools for thinking



ations needed are squaring numbers and taking square roots.

There are an infinite number of ways to planet hop. But the way which takes the least change in velocity - and so usually the least fuel - is a looping course called a Hohmann transfer. To calculate this course we must assume that the spacecraft and all the planets lie in the same plane; that the orbits of the planets are circular, and that the path of the spacecraft does not pass too near to a third planet. Even with these simplifications, the answers are surprisingly close to practical spacecraft trajectories.

Let us first figure the time it takes to travel between two planets. If  $R_1$  is the orbital radius or average distance from the sun (in millions of miles) of the planet we are leaving and  $R_2$  that of our destination, flight time (T) in hours is roughly:

$$T = \frac{(R_1 + R_2) \times \sqrt{R_1 + R_2}}{.5787}$$

Distances of planets from the sun (Orbital Radii) are given in the accompanying table. The 0.5787 includes factors determined by the geometry of the Hohmann transfer orbit and the sun's gravity.

So, using the formula, the time it takes to travel from Earth to Mars works out to be:

From earth to Mars:

$$T = \frac{(92.96 + 141.6) \times \sqrt{92.96 + 141.6}}{.5787}$$

$$= \frac{234.56 \times \sqrt{234.56}}{.5787} = \frac{234.56 \times 15.32}{.5787}$$

$$= 6208 \text{ hours or } 259 \text{ days}$$

The formula for T when multiplied by 2 also will give the time it takes a comet to travel full cycle around the sun (its orbital period) where  $R_1$  is the distance of the comet from the sun at its point of closest approach and  $R_2$  is its distance from the sun when it is farthest away.

To calculate the orbital periods of satellites circling Earth, you can use the same formula for 2T, but a different divisor is needed. Here  $R_1$  and  $R_2$  are the apogee and perigee of the satellite - many of which are listed in almanacs.

For earth - centered orbits:

$$2T = \frac{(R_1 + R_2) \times \sqrt{R_1 + R_2}}{501186} = P$$

P = Orbital Period

Returning to the journey from Earth to Mars, it is possible to calculate the distance a spacecraft travels through the interplanetary void:

$$D = \frac{\sqrt{R_1^2 + R_2^2}}{.450}$$

Here the 0.450 includes the geometry of the orbit and the strength of the sun's pull. To Mars, the interplanetary void equals 376 million miles.

The two Viking spacecraft are on somewhat longer orbits. Their trips last 300 and 330 days. They are both traveling more than 400 million miles.

**Orbital speed**

With just a little information, you can figure the speed (relative to the sun) of a spacecraft at any point in its orbit. Let us figure out how fast the first Viking probe was traveling on March 17. To do this we must first define a special constant A, which relates to a spacecraft's orbit:

$$A = \frac{R_1 + R_2}{2}$$

In the Earth-Mars transfer A works out to be 117.3 million miles.

Now the spacecraft's velocity (V) at a distance R from the sun is given by:

$$V = GM_s \times \sqrt{\frac{2}{R} - \frac{1}{A}}$$

where  $GM_s$  (gravity=mass factor) is a measure of the sun's gravitational pull and is listed in the table. On March 17, Viking 1 was 145 million miles from the sun, so:

$$V = 642,730 \times \sqrt{\frac{2}{145} - \frac{1}{117.3}}$$

$$= 642,730 \times \sqrt{.005269}$$

$$= 642,730 \times .07258 = 46,650 \text{ m.p.h.}$$

The velocity calculated by computer for the spacecraft is 48,600 m.p.h., so our answer is only 4 percent off.

This velocity equation also holds for comets, planets, and other bodies in elliptical or circular orbits. In this case  $R_1$  is the distance at closest approach and  $R_2$  the farthest distance from the sun. (Again check an almanac for these figures.)

For circular orbits A equals R, the radius of the circle. In orbits around planets instead of the sun, substitute the GM of the planet for  $GM_s$ . (See accompanying box.)

Some of the most important space calculations involve the changes in speed needed to enter a transfer orbit and to achieve a planetary orbit or touch down on the surface. The size of these velocity changes, together with the mass of the spacecraft, determine how much fuel it must carry.

**Leaving a planet**

First, a spacecraft must escape the planet's gravity. Escape velocities from the surface of planets are listed in the table. Call this escape velocity  $V_e$ .

For an interplanetary journey, a space probe needs an extra kick to carry it out to the orbit of an outer planet; it needs to kill some of its speed to fall inward to rendezvous with an inner planet. The velocity change needed to transfer from an inner planet to an outer one,  $V_a$ , is:

$$V_a = \frac{GM_s}{\sqrt{R_1}} \times \left[ \sqrt{\frac{2 \times R_2}{R_1 + R_2}} - 1 \right]$$

But for the speed adjustment to drop from outer to inner planets,  $V_a$  becomes:

$$V_a = \frac{GM_s}{\sqrt{R_1}} \times \left[ 1 - \sqrt{\frac{2 \times R_2}{R_1 + R_2}} \right] \quad 8$$

Therefore, for the journey from Earth to Mars,  $V_a$  is:

$$V_a = \frac{642,730}{\sqrt{92.956}} \times \left[ \sqrt{\frac{2 \times 141.64}{92.956 + 141.64}} - 1 \right]$$

$$= \frac{642,730}{9.64} \times \left[ \sqrt{1.208} - 1 \right]$$

$$= 66673.24 \times [1.099 - 1] = 6591 \text{ m.p.h.}$$

Now we must combine the escape velocity and transfer velocity to get the total amount of thrust needed ( $V_t$ ). For this the formula is:

$$V_t = \sqrt{V_e^2 + V_a^2}$$

For the Earth-Mars cruise, this gives 25,900 m.p.h. Viking needed an extra 1,000 m.p.h. for its somewhat different trajectory.

If instead of taking off from the surface a spacecraft starts from a circular orbit, its breakaway speed is going to be less. The formula for this is:

$$V_b = V_t - \left( 1000 \times \sqrt{\frac{GM_{\text{planet}}}{R_o}} \right)$$

where  $R_o$  is the radius of the spacecraft orbit around the planet.

**Planetfall**

When a spacecraft reaches a planet it must match speeds with it precisely. To determine the spacecraft's speed as it approaches, we return to an equation used before.

$$V = GM_s \times \sqrt{\frac{2}{R} - \frac{1}{A}}$$

Approaching Mars, this is:

$$V = 642,730 \times \sqrt{\frac{2}{141.64} - \frac{1}{117.30}}$$

$$= 48,076 \text{ m.p.h.}$$

This equation gives our craft's speed relative to the sun. But the planet also is moving. From the table we see that Mars is moving at 54,360 m.p.h.; that is, it is going faster than the spacecraft. The difference between the two velocities is the approach velocity,  $V_p$ . In our case it is 6283 m.p.h.

If the spacecraft reaches the vicinity ahead of the planet, then the distance between them is closing by  $V_p$ . But if the probe is trailing behind, this also is the speed at which they are moving apart. The direction of approach makes no difference in the amount of propellant needed to match velocities as long as the spacecraft stays in the plane of the planet's orbit.

Continued on next page

TABLE

	GM	RADIUS (Miles)	ORBITAL SPEED (m.p.h.)	ORBITAL RADIUS (Millions of miles)	ESCAPE VELOCITY (m.p.h.)
SUN	642,730	432,500			
MERCURY	258.91	1,504	107,640	35,983	9,395
VENUS	1,005.8	3,804	78,840	67,235	23,040
EARTH	1,114.2	3,956	66,960	92,956	25,010
MOON	123.57	1,080	2,304	2,389	5,324
MARS	366.15	2,071	54,360	141,640	11,520
JUPITER	19,868	43,430	29,520	483.72	136,500
SATURN	10,871	35,750	21,600	890.60	62,770
URANUS	4,257	14,730	15,480	1,777.0	49,210
NEPTUNE	4,634	13,380	12,240	2,799.4	55,920
PLUTO	450.37*	1,800*	10,800	3,654.4	22,370

\*estimated

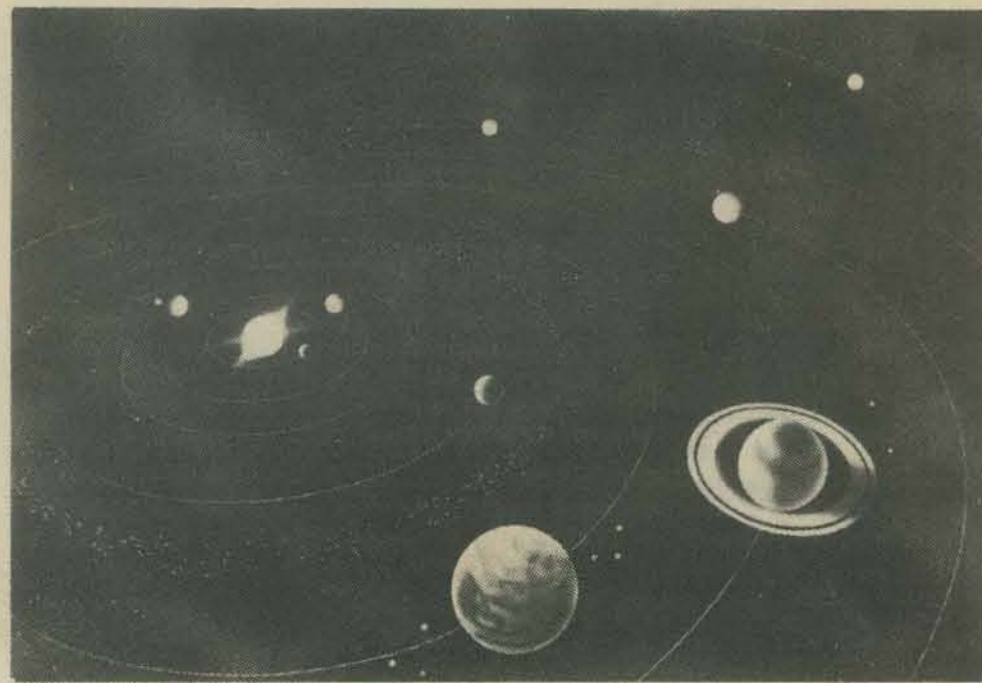
## Earth satellite data

If you wish to calculate Earth satellite orbits, or orbits of satellites of other planets, you can use the formulas in the accompanying story with two minor changes.

$R_1$  and  $R_2$  now are the high and low points of the satellite orbit (the apogee and perigee) measured in miles (not millions of miles) from the planet's center. In the case of Earth (and except for the moon), apogee and perigee are generally given as heights above the surface. Remember to add Earth's radius to these heights. For circular orbits,  $R_1$  equals  $R_2$ .

The other change is in the formula for "T." You use a new divisor which enables the formula to compute the time (in hours) it takes a satellite to circle the planet, that is, the orbital period. For Earth, this new divisor is 501,186. Divisors for other planets are given below. Otherwise, you can use the formulas as they are. Remember to use the GM for the planet where the formula gives GMs, for the sun. Also, multiply the planet's GM by 1,000. This compensates for using miles, rather than millions of miles, in specifying an orbit's high and low points.

PLANET	DIVISOR	PLANET	DIVISOR
Mercury	117,430	Venus	450,310
Earth	501,186	Mars	165,500
Moon	55,539	Saturn	4,889,000
Jupiter	8,941,000	Neptune	2,050,000
Uranus	1,925,000	Pluto	203,000



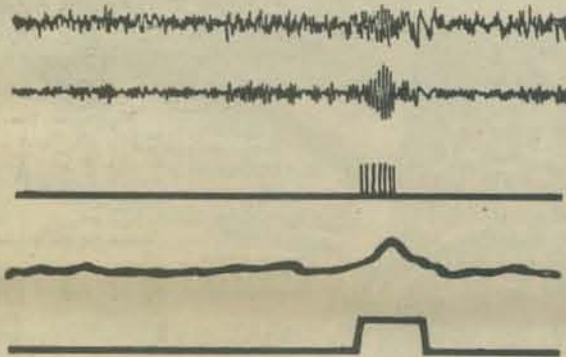
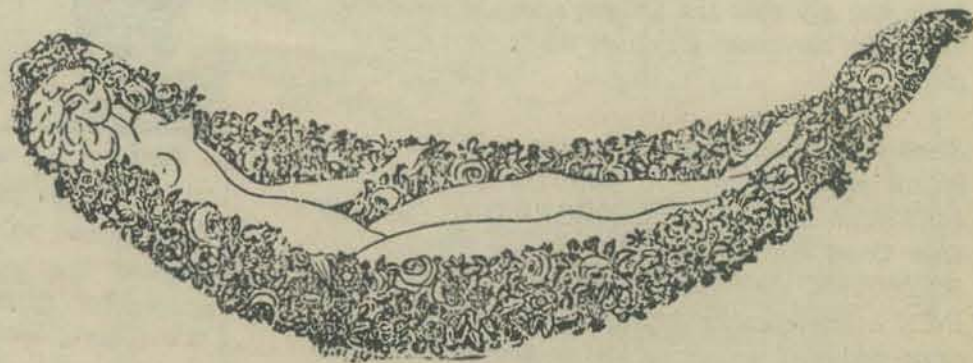
Artist's rendition of the solar system

Pocket calculators can get surprisingly close to real spacecraft trajectories



By: Alec Dubro  
1260 Hopkins St., No.48  
Berkeley, CA 94702  
(415) 525-3935

The claims made for Biofeedback read like the label of a 19th Century patent medicine bottle: "It cures migraines, high blood pressure, tension, insomnia, cold feet and hands, drug problems, makes thin girls fat and fat girls thin, and raises consciousness." It does everything but grow hair on a billiard ball—and they're working on that.



# BIOFEEDBACK

There is only a little exaggeration in the above quote; such claims are made for biofeedback techniques. For years, I simply ignored the entire subject because of the absurdity of the claims. However, a year or so ago, I stumbled into the Biofeedback Center of California in Oakland, and found, through personal experience and intensive reading that the claims are true...if you know how to read them!

The catch is that—unlike the patent medicine—you do the work, not the biofeedback. That's just a tool. But let me explain.

Basically, biofeedback is a large area of study which uses precise electronic sensors, placed on the outside of the body, which pick up and amplify internal bodily and mental processes, and provide read-outs to the individual who is being monitored. In practice, this means that you can find out just how you are making yourself sick. Chances are you are, you know. Many researchers believe that as many as 80% of the physical ills endured by modern, technological people are either wholly or partially psychosomatic. What this means is that since you made yourself sick, you can also make yourself well. But only if you know how to do it.



Besides the EMG, the Center has EEGs (Electroencephalographs, which measure brainwave rhythms and aid in learning concentration and relaxation), GSRs (Galvanic Skin Response meters. These can put you in touch with feelings that nervousness might hide by measuring the electrical conductivity of the skin), and Electric Thermometers (simple enough, but with this machine you can learn to control warmth and blood flow and thereby promote deep relaxation).

The catch, as I said, is that it's up to you. The machines can only guide. The people at the Center, who include an MD, have put together a variety of courses, including a \$1.00 introduction, and specialized courses for groups, which can fit your needs. The investment in time and money is fairly modest compared to some of the cure-alls that are being touted to a despondent public.

In the off chance you're not feeling sick, don't rule out biofeedback. It is also a proven and appropriate way of probing what is loosely called "consciousness". With the EEG, you can learn to control your Alpha, Beta, and Theta waves. These correspond to the various levels in consciousness which are studied in Eastern disciplines. Biofeedback can be used in conjunction with meditation or by itself. It is not a shortcut to "enlightenment," but is rather a particularly appropriate way for Westerners to explore the internal frontier.

All in all, Biofeedback is a worthwhile and fascinating approach to one's own self.

For more information on the Biofeedback Center of California, call 444-5513, or write or drop by at 319 13th Street, Oakland, 94612.



*The Biofeedback Center of California*

319 - 13th STREET  
OAKLAND, CALIFORNIA 94612  
TELEPHONE (415) 444-5513



SPROCKET MAN??

That's who I am, but what am I doing in PCC? Let's just say that the Dragon's innate curiosity takes him far and wide, into the most unusual places.

Since you'll be seeing me for the next few issues, let me introduce myself. With the URBAN BIKEWAY DESIGN COLLABORATIVE (assorted West Coast fringies plus members of URBAN SCIENTIFIC AND EDUCATIONAL RESEARCH, INC.) as my mother and Stanford University as my sugar daddy, I sprang to life on that campus in the fall of 1975.

The great increase in bicycling, coupled with the resulting accidents, thefts, and even untimely deaths, convinced people that a survival manual for bicyclists was long overdue.

A comic book format, with Louis Saekow's great drawings was chosen to most effectively portray the skills that cyclists must learn to survive in the age of the automobile. And now.....

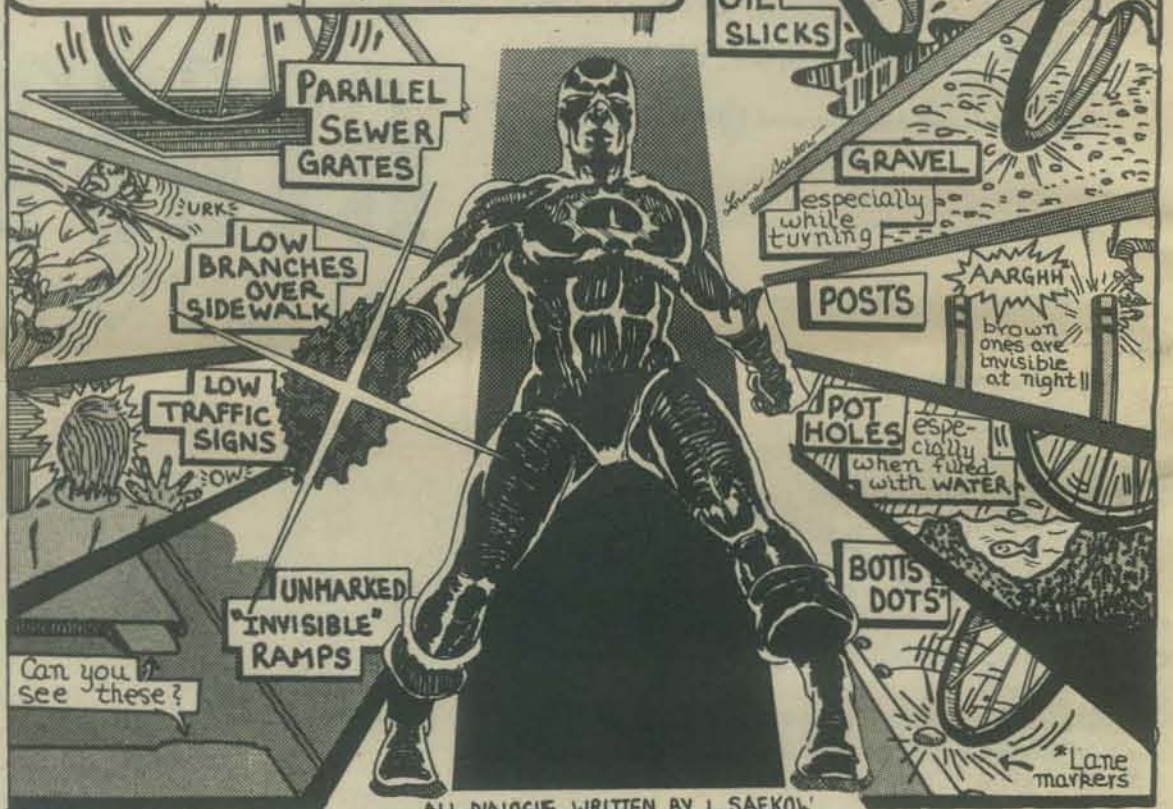


The sheer NUMBER of bikes in use around your town alone gives evidence to the fact that the days when bikes were merely TOYS for kids are BYGONE.... and that the ANARCHY which rules the cyclist can be afforded NO LONGER...

So here are a few tips on basic SURVIVAL skills, good locking systems, and SAFE riding etiquette.

To start off, here are some HAZARDS that you should be especially aware of...

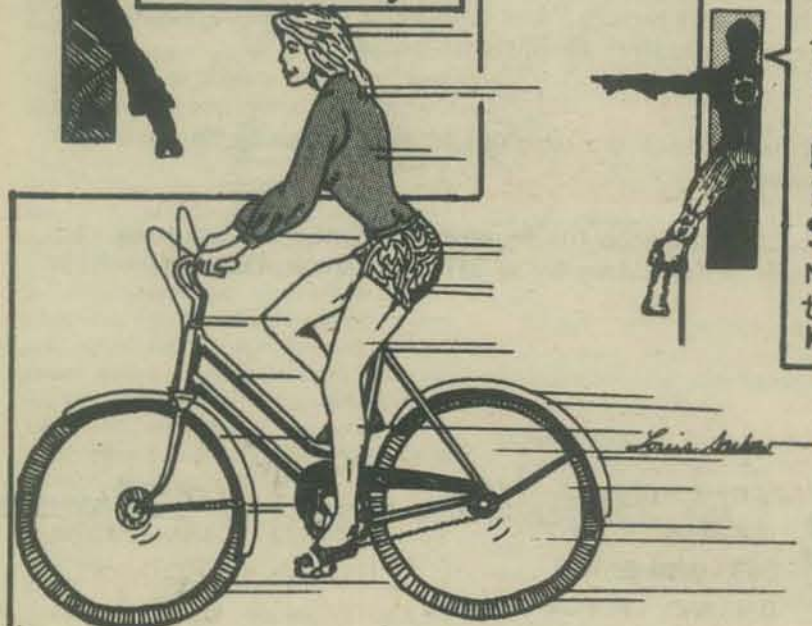
They are, by no means, the only dangers that the bicyclist has to face. Plenty more will confront you as you turn these pages. And as you do so, keep them in mind, because you WILL face them quite often.... Oh, should you encounter a particularly hazardous or troublesome situation, write your CITY & tell'em about it.



ALL DIALOGUE WRITTEN BY L. SAEKOW

USE FULL LEG EXTENSION!!

TRY WALKING LIKE THAT.... low efficiency, eh?





WATCH OUT FOR OPENING CAR DOORS!!



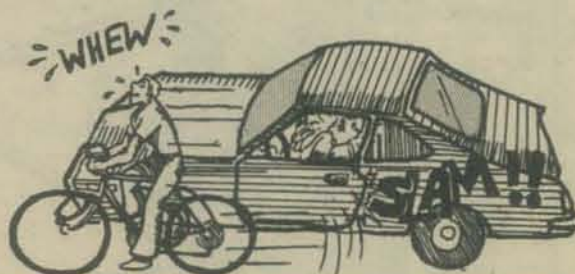
Did someone say something?



DON'T WASTE YOUR TIME FIDDLING A HORN OR BELL. GO FOR YOUR BRAKES AND.... SCREAM!!! MOVE LEFT BUT... DON'T SWING INTO TRAFFIC!!

Therefore... DON'T RIDE TOO CLOSE TO PARKED CARS.....  
-KEEP AN EYE OUT FOR DRIVER'S HEAD AS YOU APPROACH.....  
-WATCH OUT FOR DOUBLE-PARKING CARS 'CAUSE PASSENGERS MAY JUMP OUT ON YOUR LEFT.

WATCHOUT!!



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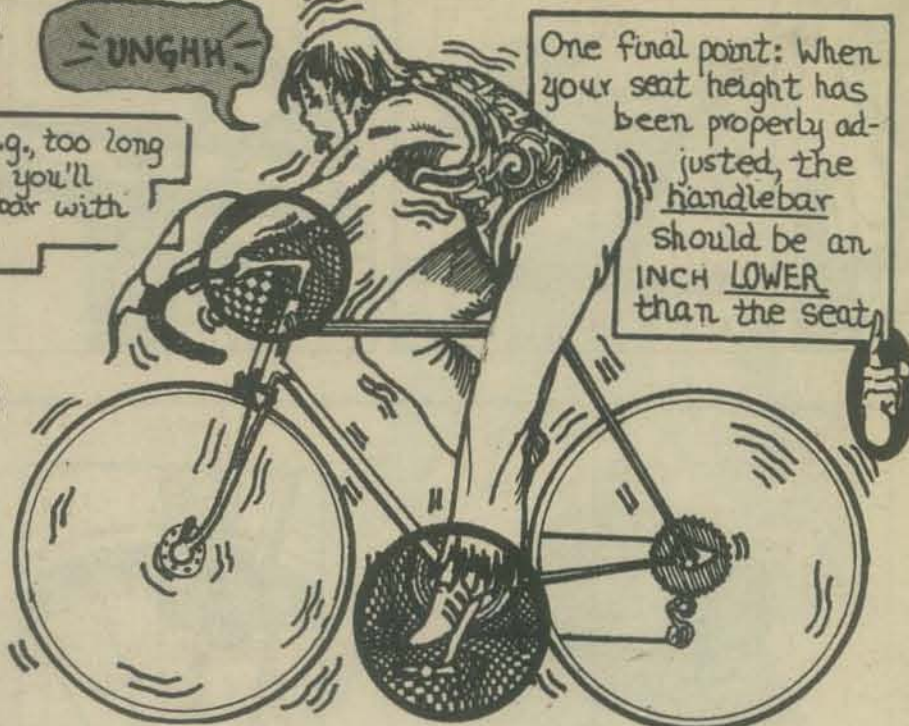


NEVER RIDE A BIKE THAT'S TOO BIG FOR YOU!!! You simply have TOO LITTLE CONTROL.

Remember, this not only applies to SEAT HEIGHT, but to GOOSE-NECK length as well. E.g., too long of the latter and you'll reach your handlebar with great difficulty.

UNGH

One final point: When your seat height has been properly adjusted, the handlebar should be an INCH LOWER than the seat.



As you might have guessed, I'll soon be on sale to those groups and people most interested in bicycle safety. If you are a school or school district, a police department, planning office, business, parks and recreation commission, bike shop, cycling club, or other group who might be interested in SPROCKET MAN, you can contact me at:

UBDC  
P.O. Box 2983  
Stanford, Ca. 94305



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RESEARCHER . . . . . CECILE HEROLD  
TECHNICAL ADVISOR . . . . . ROBERT SHANTEAU

# HIGH SECURITY

We recommend:  
**CHAIN** - Campbell 5/16" alloy  
**LOCK** - Master #11  
 - American HT15  
 - American KC40



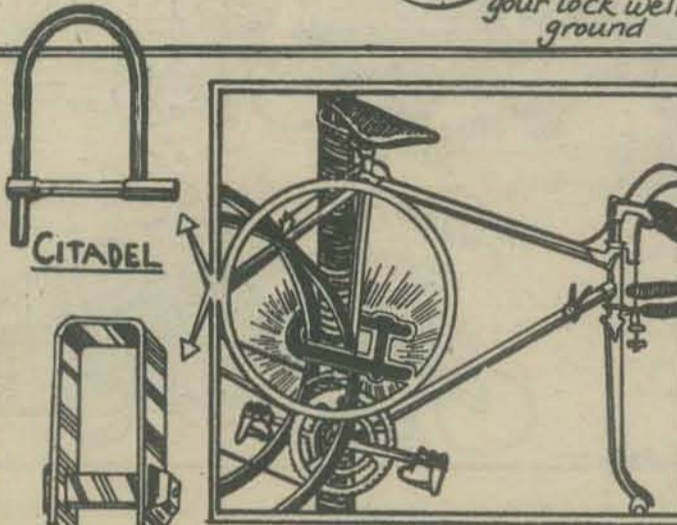
Be sure to keep your lock well off the ground



BAD YEAR

There's no one around. Robbie, ol' boy. Looks like you got yourself another bike.

ALWAYS LOCK BOTH WHEELS AND THE FRAME TO A SOLID STATIONARY OBJECT!



**CITADEL**

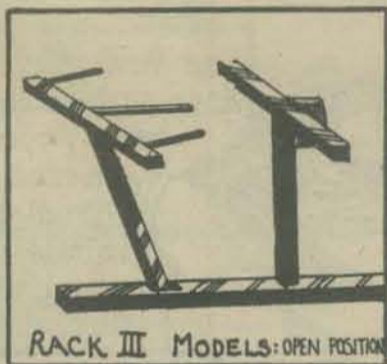


The Ultimate in bike security is, of course, to stay on your bike.... Okay, so that's not so funny, but....

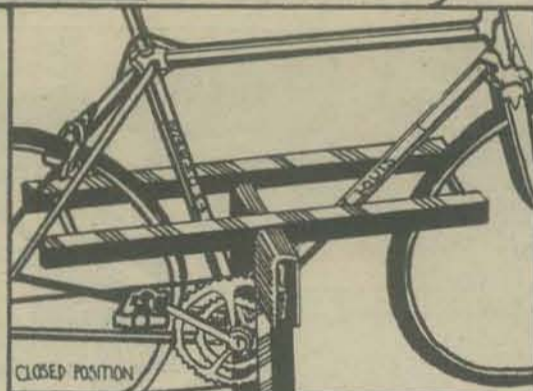
**KRYPTONITE**

## MAXIMUM SECURITY

can be had with the CITADEL and KRYPTONITE bike locks. Particularly for those with quick-release, it is best to remove your front wheel and lock it as well. The RACK III bike rack is one of the best around. Some will be installed around the Flo Mo dorms. All 3 security systems shown here are near-absolute in theft prevention.



**RACK III MODELS: OPEN POSITION**



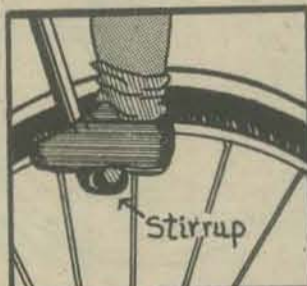
**CLOSED POSITION**




Robbie, if there are any more of these "secure" bikes running around, I think we've got ourselves a most happy hunting ground.



And for you PARENTS... or rather - more importantly - for the child, make **SURE** his feet will not be caught in the wheels. Baby seats with only **STIRRUPS** to support the baby's feet are **DANGEROUS!**



GOOD, SAFE SEATS ARE AVAILABLE. Consumer Report (July, 1975) recommends:

1. AMF AC 45
2. SEARS CAT.#48523
3. TROXEL 4
4. TROXEL DELUX 6
5. MONTGOMERY WARD'S CAT. # 82657 OR CAT. # 82656.

**LATERAL SWAY** is an important consideration. Use a **STRONG, FIRM RACK** to support the baby seat!!

All this talk on SECURITY obviously has much to do with THEFT.... The strip on your left has much to teach:

- First, always lock your bike properly, i.e., both wheels and frame to a SOLID stationary object.
- Second, lock your bike in a WELL-TRAFFICKED area.
- Third, LICENSE your bike with the local Police Dept. Many of the stolen bikes recovered were licensed. (Of course, report all bike thefts to the police).



WATCH OUT for objects that may CATCH.... First, the old purse-strap-in-wheel trick. Yes, I've seen it many times before---and I hope not to see it or its variations any more.

So don't let anything dangle around while riding....



... and this goes for pant cuffs as well.

Pant cuffs, when caught in bike chain, can easily lead to an accident... and assuredly to dirty cuffs. When riding, then, roll up your cuffs, or tuck'em into your socks, or better yet... clip'em in with those nifty pant clips.



Front baskets have a center of gravity that's way too high---which makes for awkward steering.

REAR BASKETS have a much lower center of gravity-- and they don't get in the way of proper steering.



The message of this picture is not just: "Don't carry TOO many things in your hand." It's: "DON'T CARRY ANYTHING THAT MAY HAMPER YOUR CONTROL OF YOUR BIKE!" Plan ahead and USE A BACK-PACK.



Louis Barber

# SMRT WILL HURT or, how

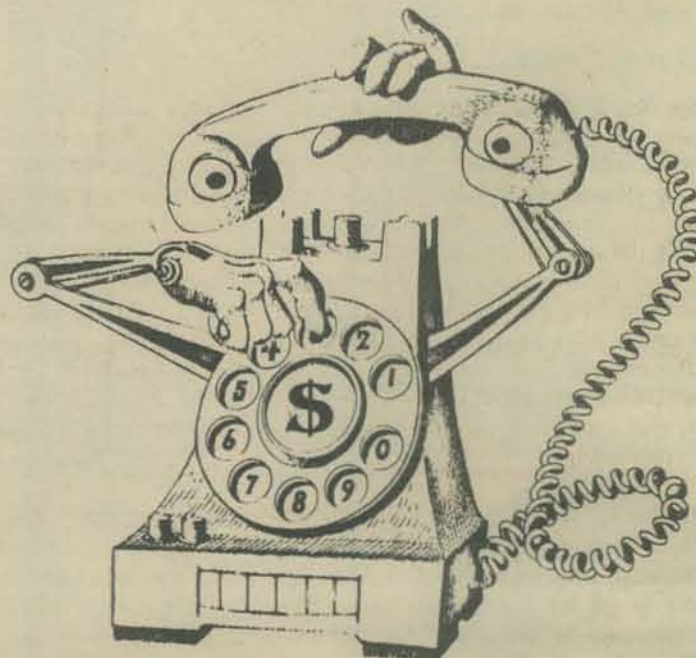
THIS ARTICLE WILL HELP YOU DECIDE ON PHONE NEEDS EVEN IF SMRT IS NO THREAT TO YOU.

On July 1, 1976 Pacific Telephone will implement a new phone tariff in major cities in California, on all business telephone service, called Single Message Rate Timing. SMRT, as it is known, will assess a supercharge of approximately 1 cent per minute on all calls over five minutes. This means that the dial-up, time-sharing setup that you presently enjoy for a cost of \$7.50 a month, or thereabouts, to make local computer calls could increase to as much as \$80 a month, based on a 6-hour day usage. HELP!

SMRT has come to California. How long will it be before it ZAP's you? How does SMRT work? For any call that exceeds 5 minutes a one message unit supercharge will be added to the bill for each 5 minutes after the first five minutes. Since one message unit currently costs Californians 5.75 cents, that means that a previously "free" 30 minute call will cost 28.75 cents under SMRT; a sixty minute call, 63.25 cents. Projecting hours into days, a school that uses dial-up service for 3 hours a day, 20 days a month can expect additional phone charges of \$36.00 each month; a six hour day, \$72.00 for EACH TERMINAL IN OPERATION. Can your budget afford that?

The affects of SMRT could make you reconsider your hardware acquisition, location and use decisions. SMRT makes local microprocessors in each school look like a real wise decision. Think about it!

In our area, the phone company has computer printouts projecting the implications of SMRT on your bill. Ask to see this information, it is scary. In all honesty, I must admit that this is one new phone charge that does make sense. Those of us that use dial-up service for computer data, all day long, are not using the equipment "as intended." Therefore, we 'tie-up' valuable equipment for long periods without paying our fair share of the costs. SMRT will even all this out... and then some!



## THINGS TO DO

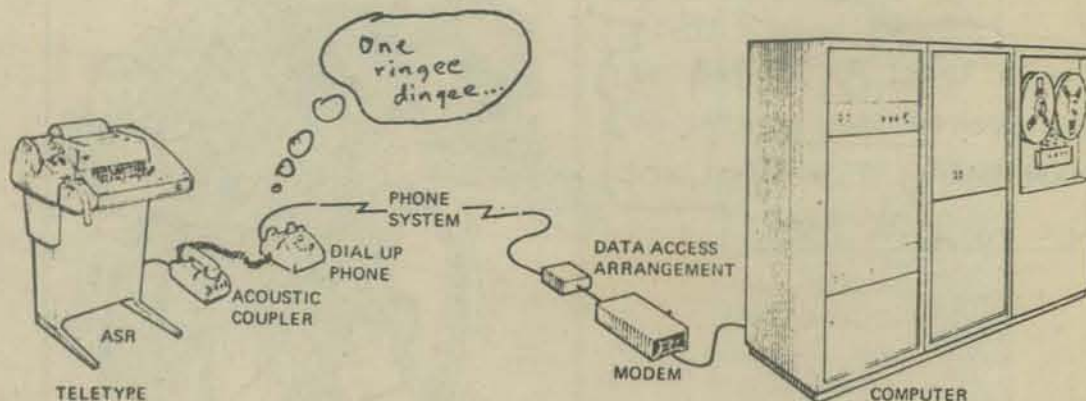
There are many things you can do to avoid or minimize the affects of SMRT. Your greatest problem will be getting all the right answers to your questions (We have not provided all the answers, just some suggestions.)

**CAVEAT EMPTOR.** Do not expect to get all the "right" answers from the local phone company staff. They provide a limited array of services in the area of data communications. The right solution for you may not be in their array. You must ask Telco competitors about services they offer that fill the void of services provided by Telco.

Your present phone-terminal-to-computer link probably like that shown in Fig. 1. Local costs will vary, but generally our costs break down like this:

At Terminal site - Dial-up business line	\$7.50/month
At Computer site-Business phone line(not shown)	7.50
Data Access Arrangement(DAA)	5.50
Phone costs per terminal	20.50/month
Add modem and acoustic coupler rental (\$15@)	30.00
(may be purchased for \$300 each)	
Total communications costs per terminal	\$50.50/month

This is the type of configuration that SMRT will really hurt. But, such a dial-up system has some real advantages to the user: Terminals can be used from any location where there is a standard dial-up telephone(home included); you can 'oversubscribe' your system and users schedule themselves or compete for open phone lines.



# to avoid getting screwed by the phone company

**Alternative No. 1** Probably the cheapest way to change your phone set-up to minimize the affects of SMRT is to convert all outside phone lines to run through your school or district PBX switchboard. (assuming you have one.) If you do not have a PBX, now may be the time for the school system to get one. Such a move should greatly reduce your normal monthly phone charges and because the system is "internal" via the PBX, no SMRT charges will be added to your bill. Schools can be located anywhere. SMRT charges are avoided as long as everything runs through the PBX. Flexibility continues as before. The only problem we have discovered is that there may not be space on your PBX to accomodate additional lines. Each computer line requires TWO PBX extensions (one at computer, one at the terminal). But do check this alternative out. We can't estimate how much, but can guarantee you substantial dollar savings.

**Alternative No. 2.** The phone company will likely suggest a Lease Line running from each terminal directly to the computer (picture a pair of wires running directly between the two sites). Lease lines are charged a fixed monthly fee for 24 hour usage that is based on distance from point to point. For the short distances we needed (no more than 12 miles), lease line costs ranged from \$14 to \$42 per month per terminal. Add to this a Telco modem at each end for \$50/month (No DAA needed).

Lease lines avoid SMRT costs, and, depending on distances, should save you substantial money. However, you lose the flexibility of dial-up from any phone and it is unclear how you can "oversubscribe" a lease line communication system.

**Alternative No. 3.** Instead of using two Telco modems for \$50/month, you can use lease lines as suggested in Alternative 2 but buy or lease modems from a company other than the phone company. Such modems may cost as little as \$200 each and may lease for as little as \$25 /month (for both). If you already own modems and acoustic couplers as part of a dial-up system, your present equipment MAY be usable with lease lines. Some will not be usable on lease lines. Contact your equipment supplier to see if your hardware is convertible for use on lease lines. We found our equipment was usable after a minor field modification made to our connecting cables.

**Alternative No. 4** In the long run, the least-cost method to provide for multiple terminals at one site is to connect ONE phone lease line between computer and terminal site. (Fig.3) To this one line you connect all your terminals (19 teletypes, claims one firm- 12 is more real) - using a special modem called a Frequency

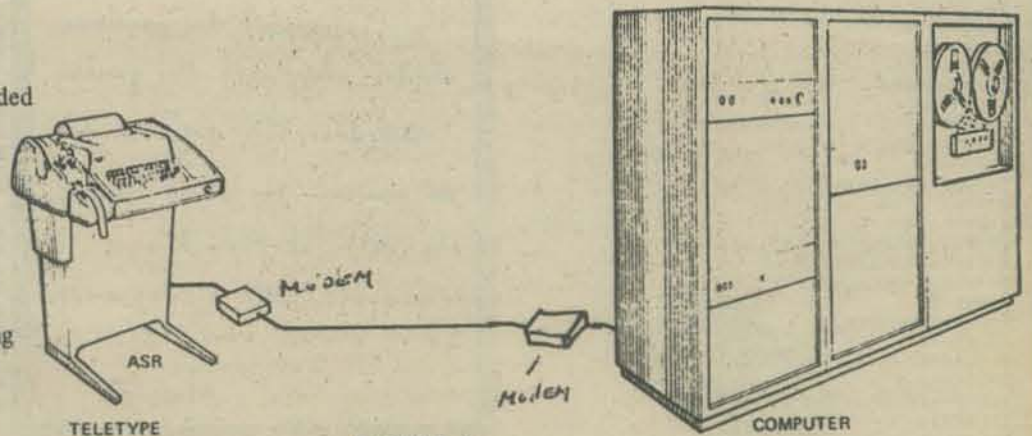


FIGURE 2

**Division Multiplexer (FDM).** The FDM allows multiple terminals to share one phone line by varying the frequency at which the data is transmitted. Teletypes at 10 CPS and 30 CPS terminals can share the same line via the FDM's. At each terminal you need an FDM with another FDM at the computer end to "unscramble" the data. The FDM units cost about \$450 each, more than the standard lease line modems. But you only need one phone line. Therefore, your initial cash outlay may be greater, but in the long run you will save money because phone costs are reduced dramatically.

Terminals can even be located in different classrooms using FDM's. There is even the possibility of using ONE lease line connecting a number of schools and a number of terminals. Technicians claim this Multi-Point lease line is not any more of a problem from a maintenance standpoint than a single point-to-point set-up. Thus, more phone money can be saved.

FDM capability is NOT available from the phone company at this time. Don't expect them to respond too warmly to your questions about this effective way to share lease lines and save money.

So now what? If this article serves no other purpose than to confuse you, we have accomplished something! Data communications has to be the most confusing topic we have investigated. Each call we made raised new confusion and new questions. Each "situation" at each new terminal site created a new set of problems, with a whole new set of answers.

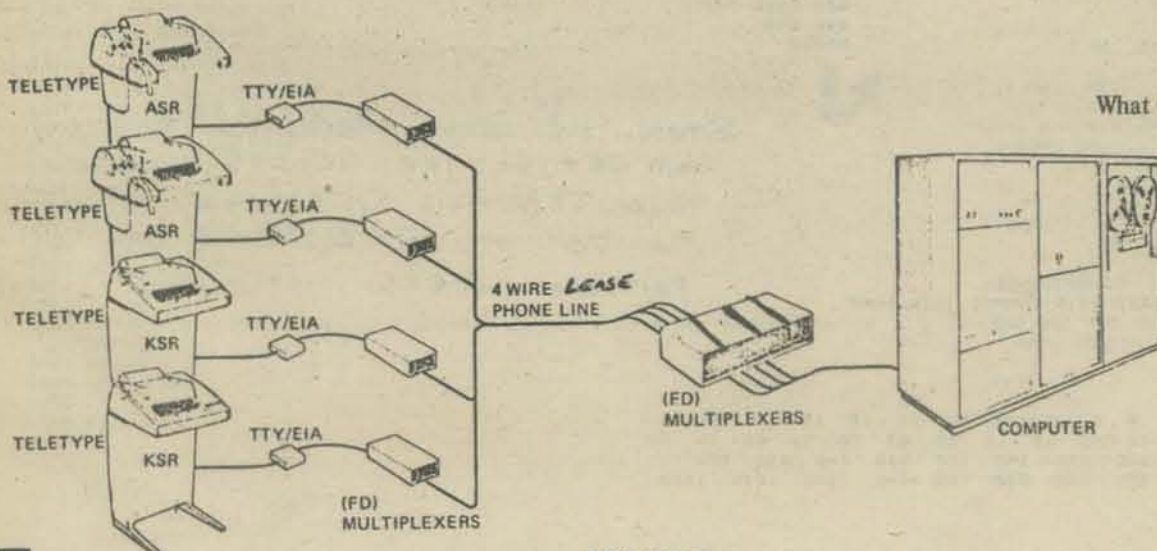


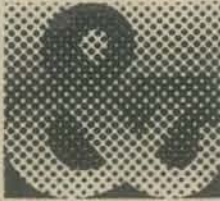
FIGURE 3

What is the answer? It all depends on  
Where you are in the greater US  
Your computer  
What equipment you already own  
how much money you have  
Should you spend big money NOW to save big money later  
Should you spend less money now and have a  
bigger phone bill forever...

and  
so  
on

→ Le Roy Finkel

# GOOD NIGHT PL VISION ASSISTANCE



# SO DO PEOPLE

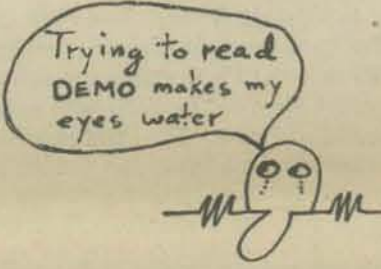
DEMO 23 OCT 75 17:48

```

@DIMF(32)
1 INPUT P,Q
2 IF (10000-P) < (P-1) < 0 THEN 7
3 IF P <= INT(P) THEN 7
4 IF (10000-Q) < (Q-1) < 0 THEN 7
5 IF Q <= INT(Q) THEN 7
6 GOTO 8
7 GOTO 1
8 IF P >= P THEN 12
9 LET P=P
10 LET P=Q
11 LET Q=P
12 PRINT
13 PRINT
14 FOR J=P TO Q
15 LET F=0
16 LET M=0
17 LET R=SQR(J)
18 PRINT
19 PRINT J;TAB(8);
20 FOR K=1 TO R
21 LET X=J/K
22 IF X <= INT(X) THEN 34
23 LET G=LEN(STR$(K))+2
24 IF M+G <= 64 THEN 28
25 PRINT
26 PRINT TAB(8);
27 LET M=0
28 PRINT K;
29 LET M=M+G
30 IF X <= R THEN 32
31 GOTO 35
32 LET F=F+1
33 LET F(F)=X
34 NEXT K
35 FOR K=FTO1 STEP -1
36 LET G=LEN(STR$(F(K)))+2
37 IF M+G <= 64 THEN 41
38 PRINT
39 PRINT TAB(8);
40 LET M=0
41 PRINT F(K);
42 LET M=M+G
43 NEXT K
44 PRINT
45 NEXT J
46 PRINT
47 PRINT
48 PRINT
49 GOTO 1
50 END
READY
    
```

1 APR 76

Bob,  
 DEMO is a bare bones version of FACTORS. DEMO "runs" and has been presented to programming classes along with the question, "What does this program do?" Of course, the point concerns the value of format and comments. 168 vs. 707 words. Is it worth it, being brief?  
 Mac ☺



FACTORS 22 OCT 75 17:48

```

100 * NAME: ELEMLIB***:FACTORS
110
120 * BY: MAC OGLESBY ON 5 AUG 75.
130
140 * DESCRIPTION: GIVEN WHOLE NUMBERS P AND Q, THIS PROGRAM PRINTS
150 * ALL OF THE WHOLE NUMBER FACTORS FOR EACH WHOLE NUMBER FROM P
160 * TO Q. THE USER SUPPLIES P AND Q, WHICH MUST BE WITHIN THE RANGE
170 * 1 TO 10000. THE LISTS GENERATED MAY BE USED AS MATHLAB OR CLASS-
180 * ROOM REFERENCE CHARTS. A BLOCK OF 120 NUMBERS MAKES A GOOD
190 * SIZE WALL CHART.
200
210 * INSTRUCTIONS: WHEN ASKED, SUPPLY 2 WHOLE NUMBERS (THEY MAY BE
220 * THE SAME NUMBER) FROM 1 TO 10000.
230
240
250
260 PRINT "PLEASE LIST THIS PROGRAM FOR COMPLETE INSTRUCTIONS."
270
280 DIM F(32) *SAVE SPACE FOR 32 STORED FACTORS
290
300 * GET P AND Q AND CHECK LEGALITY
310 PRINT
320 PRINT "TYPE TWO WHOLE NUMBERS SEPARATED BY A COMMA"
330 INPUT P,Q
340 IF (10000-P) < (P-1) < 0 THEN 390
350 IF P <= INT(P) THEN 390
360 IF (10000-Q) < (Q-1) < 0 THEN 390
370 IF Q <= INT(Q) THEN 390
380 GOTO 410
390 PRINT "PLEASE PICK WHOLE NUMBERS FROM 1 TO 10000."
400 GO TO 320
410 IF Q >= P THEN 450 *CHECK IF Q >= P
420 LET P=P *ELSE REVERSE P AND Q
430 LET P=Q
440 LET Q=P
450 PRINT
460 PRINT
470 PRINT "NUMBER FACTORS"
480 PRINT "-----"
490
500 * COMPUTE AND PRINT THE FACTORS
510 FOR J=P TO Q
520 LET F=0 *RESET STORED FACTOR COUNTER
530 LET M=0 *RESET CHARACTER COUNTER
540 LET R=SQR(J)
550 PRINT
560 PRINT J;TAB(8); *PRINT THE NUMBER, SPACES
570 FOR K=1 TO R
580 LET X=J/K
590 IF X <= INT(X) THEN 710 *SEE IF K IS A FACTOR OF J
600 LET G=LEN(STR$(K))+2 *G IS ROOM NEEDED BY FACTOR
610 IF M+G <= 64 THEN 650 *STILL ROOM ON THIS LINE
620 PRINT
630 PRINT TAB(8); *START A NEW LINE
640 LET M=0 *RESET M
650 PRINT K; *PRINT FACTOR
660 LET M=M+G *ADD G TO M
670 IF X <= R THEN 690 *SEE IF FACTOR IS SOR OF J
680 GOTO 720 *GO PRINT STORED FACTORS
690 LET F=F+1 *TALLY STORED FACTORS
700 LET F(F)=X *F(F) STORES FACTOR J/K
710 NEXT K
720 FOR K=F TO 1 STEP -1 *PRINT THE STORED FACTORS
730 LET G=LEN(STR$(F(K)))+2
740 IF M+G <= 64 THEN 780
750 PRINT
760 PRINT TAB(8);
770 LET M=0
780 PRINT F(K); *PRINT FACTOR F(K)
790 LET M=M+G
800 NEXT K
810 PRINT
820 NEXT J
830
840 PRINT
850 PRINT
860 PRINT
870 PRINT "TO STOP, TYPE THE LETTER 'S'. TO CONTINUE."
880 GOTO 320
890 END
READY
    
```

RUN

FACTORS 22 OCT 75 17:36

PLEASE LIST THIS PROGRAM FOR COMPLETE INSTRUCTIONS.

TYPE TWO WHOLE NUMBERS SEPARATED BY A COMMA? 23,34

NUMBER	FACTORS
23	1 23
24	1 2 3 4 6 8 12 24
25	1 5 25
26	1 2 13 26
27	1 3 9 27
28	1 2 4 7 14 28
29	1 29
30	1 2 3 5 6 10 15 30
31	1 31
32	1 2 4 8 16 32
33	1 3 11 33
34	1 2 17 34

TO STOP, TYPE THE LETTER 'S'. TO CONTINUE.  
 TYPE TWO WHOLE NUMBERS SEPARATED BY A COMMA? 5040,5040

NUMBER	FACTORS
5040	1 2 3 4 5 6 7 8 9 10 12 14 15 16 18 20 21 24
	28 30 35 36 40 42 45 48 56 60 63 70 72 80 84 90
	105 112 120 126 140 144 168 180 210 240 252 280
	315 336 360 420 504 560 630 720 840 1008 1260 1680
	2520 5040

STUDENTS! WRITE "READABLE" PROGRAMS AND GET BETTER GRADES... WATCH YOUR TEACHER'S FACE LIGHT UP WITH THE JOY OF UNDERSTANDING HOW YOUR PROGRAM WORKS.

by Mac Oglesby



# POUN



# CE

Another readable program  
by MAC OGLESBY

```

100 * NAME: ELEM LIB***:POUNCE
110 *
120 * BY: MAC OGLESBY ON 01/28/76.
130 *
140 * DESCRIPTION: LOOK! LOOK! SEE THE CAT JUMP OVER THE MOUSE?
150 * POUNCE IS A GAME INVOLVING THE CONCEPTS OF SCALE AND
160 * ESTIMATION BUT REQUIRING ONLY SIMPLE READING SKILLS.
170 *
180 * INSTRUCTIONS: TYPE "RUN" TO PLAY.
190 *
200 *
1000 LIBRARY "BASCLIB***:QUESTION"
1010 'DELETE QUESTION MARK
1020 CALL "QUESTION":0
1030
1040 RANDOMIZE
1050 LET A1=1 'REPLAY RETURNS TO HERE
1060 LET C1=T1=0
1070 LET C5(1)=C5(2)=" "
1080 LET S1=1+INT(RND*5) 'SET THE SCALE (LENGTH OF CAT)
1090 LET N1=INT(70/S1) 'MAX. ALLOWABLE INPUT FOR POUNCE
1100 LET L1=S1*(INT(20/S1)+INT(RND*(50/S1))) 'DISTANCE, CAT TO MOUSE
1110 FOR J1=1 TO S1 'GENERATE CAT, MOUSE SYMBOLS
1120 LET C5(1)=C5(1)&" "
1130 LET C5(2)=C5(2)&" "
1140 NEXT J1
1150
1160 'PRINT THE BOARD
1170 PRINT
1180 PRINT C5(2); " = CAT"
1190 PRINT C5(1); " = MOUSE"
1200 PRINT
1210 PRINT TAB(C1);C5(A1);TAB(C1+L1);C5(3-A1)
1220 PRINT
1230
1240 'HAS MOUSE SPOTTED CAT?
1250 IF L1>S1*(-3+INT(RND*8)) THEN 1380
1260 PRINT "OHI OHI THE MOUSE SEES THE CAT!"
1270 PRINT " RUN, MOUSE, RUN!"
1280 IF RND>.2 THEN 1330
1290 PRINT "LOOK! LOOK! THE MOUSE RAN INTO ITS HOLE!"
1300 PRINT
1310 PRINT "WELL, THAT ONE GOT AWAY..."
1320 GOTO 1680
1330 LET L1=S1*(9-S1+INT(RND*(18-2*S1)))
1340 LET C1=0
1350 LET A1=3-A1
1360 GOTO 1200
1370
1380 PRINT "POUNCE!! ";CHR$(10);
1390 LINPUT AS
1400 IF (LEN(AS)-2)*(LEN(AS)-1)<>0 THEN 1820
1410 CHANGE AS TO A
1420 FOR J1=1 TO A(0)
1430 'CHECK FOR DIGITS
1440 IF (57-A(J1))*(A(J1)-48)=>0 THEN 1460
1450 GOTO 1820
1460 NEXT J1
1470 IF A(0)=2 THEN 1500
1480 LET P1=A(1)-48
1490 GOTO 1520
1500 LET P1=10*(A(1)-48)+(A(2)-48)
1510 IF P1>N1 THEN 1820
1520 LET P1=P1*S1 'POUNCE = INPUT X CAT'S LENGTH
1530 LET T1=T1+1 'COUNT POUNCES
1540
1550 ON SGN(L1-P1)+2 GOTO 1580,1640,1770
1560
1570 'JUMPED OVER MOUSE
1580 LET L1=P1-L1
1590 LET C1=0
1600 LET A1=3-A1
1610 GOTO 1200
1620
1630 'CAUGHT MOUSE
1640 PRINT "*** YOU'VE CAUGHT THE MOUSE WITH";T1;" POUNCES";
1650 IF T1=1 THEN 1670
1660 PRINT "S";
1670 PRINT "!!"
1680 PRINT "WANT TO CHASE ANOTHER MOUSE? ";
1690 LINPUT AS
1700 LET AS=SEG$(AS,1,1)
1710 CHANGE AS TO A
1720 IF (121-A(1))*(89-A(1))<>0 THEN 1740
1730 GOTO 1050
1740 STOP
1750
1760 'POUNCE FELL SHORT
1770 IF A1=1 THEN 1790
1780 LET C1=C1+P1
1790 LET L1=L1-P1
1800 GOTO 1200
1810
1820 PRINT "TO POUNCE, JUST TYPE A WHOLE NUMBER FROM 1 TO ";STR$(N1);"."
1830 PRINT
1840 GOTO 1380
1850
1860 END
    
```

SEND A 'READABLE' PROGRAM TO THE PCC DRAGON? LEARN TO WRITE PROGRAMS THAT PEOPLE & DRAGONS CAN READ - ALA MAC OGLESBY

POUNCE 29 JAN 76 17:33

\*\*\* = CAT  
!!! = MOUSE

POUNCE!!  
YES  
TO POUNCE, JUST TYPE A WHOLE NUMBER FROM 1 TO 23.

POUNCE!! 17

POUNCE!! 9

POUNCE!! 9

OHI OHI THE MOUSE SEES THE CAT!  
RUN, MOUSE, RUN!

POUNCE!! 9

POUNCE!! 9

\*\*\* YOU'VE CAUGHT THE MOUSE WITH 3 POUNCES!!

\*\*\*\*\* = CAT  
!!!!!! = MOUSE

POUNCE!! 17

TO POUNCE, JUST TYPE A WHOLE NUMBER FROM 1 TO 14.

POUNCE!! 10

POUNCE!! 10

OHI OHI THE MOUSE SEES THE CAT!  
RUN, MOUSE, RUN!  
LOOK! LOOK! THE MOUSE RAN INTO ITS HOLE!

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2

POUNCE!! 2



Wooooops! jumped over the mouse.

I CATCH 'EM, BUT DON'T EAT 'EM. ITS ONLY PLAY, YOU SEE.

# WE'RE BUILDING OUR OWN COMPUTER AT SAN LORENZO VALLEY

How do you turn on a computer class which has no computer? Microcomputer Associates, Inc. of Santa Clara recently donated a JOLT CPU kit, through the People's Computer Company and the Mountain Digital Group, to the computer math class of San Lorenzo Valley High School in Felton, Ca. At last, the class can see what is involved in making a computer program go. The JOLT should help us find some of the answers. The Mountain Digital Group has provided some stimulus to the class through the use of their Altair 8800, but now a real sense of accomplishment has been added through this gift from Microcomputer Associates. We are already receiving requests for enrollment in next year's class at a time that the class had been slowly dying due to lack of equipment. Four students were assigned the project of putting together the JOLT CPU board. The teacher's desk became a lab table. An extension cord was borrowed from the science department. Used soldering irons acquired from Hewlett-Packard were fired up and we were on our way.

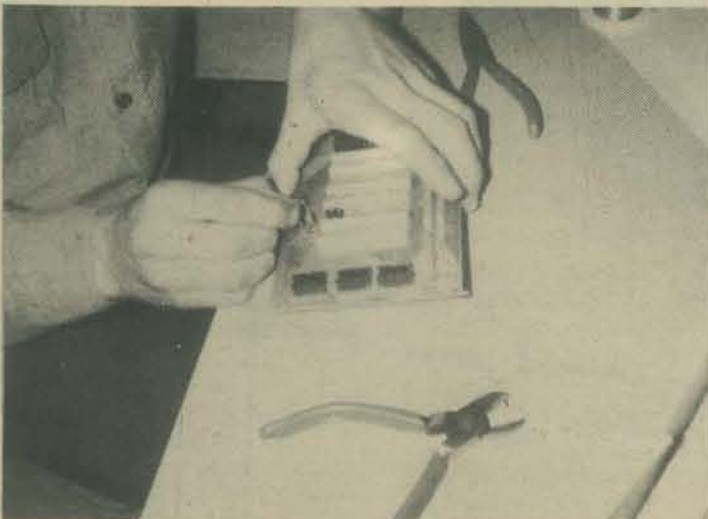
The JOLT kit came with an assembly manual, CPU hardware manual, and Demon software manual. We found the assembly manual instructions clear and straightforward. Even though the students had a limited amount of construction experience, no difficulties were encountered (outside of one misplaced resistor).



DUNCAN CASSELMAN (UNDER THE HAT) INSERTS MOLEX SOCKETS TO MOUNT THE JOLT ICS.



JEFF AVENMARG AND DUNCAN CASSELMAN STUFF THE BOARD AS CRAIG MCMASTERS (BACK TO CAMERA) IDENTIFIES PARTS. RON ROHRER, A SAN LORENZO VALLEY STUDENT PHOTOGRAPHER, SNAPPED THIS ONE.



THUMBS AND FINGERS WORK TOGETHER AS CRAIG STUFFS ANOTHER RESISTOR INTO THE BOARD.



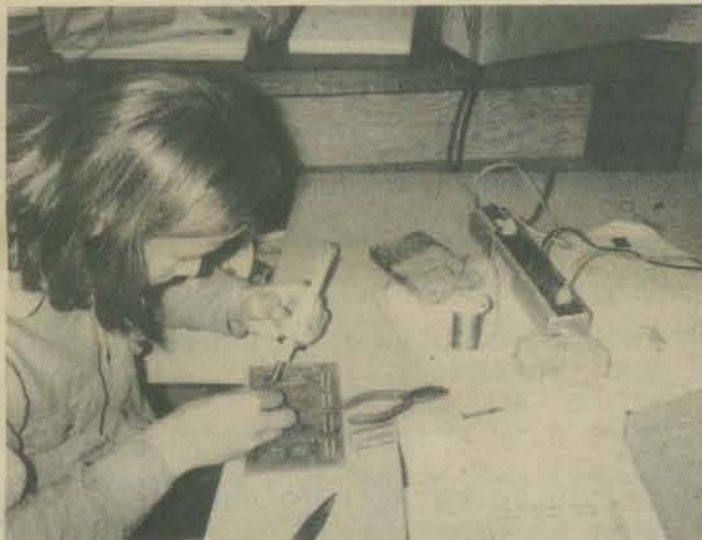
DON INMAN AND GANG DISCUSS THE DAYS PLANS AS PROGRESS ON THE JOLT MOVES RIGHT ALONG. ANOTHER OUTSTANDING PHOTO BY RON ROHRER, OUR SLV STUDENT PHOTOGRAPHER.

# by the Computer Math Class San Lorenzo Valley High School

Felton, CA 95066



THE GANG REALLY GETS INTO THEIR WORK.



CRAIG MCMASTERS DEMONSTRATES THE USE OF THE LEFT-HANDED SOLDERING IRON.



HERE'S THE JOLT! THANKS, MICROCOMPUTER ASSOCIATION, INC.



BARRY LIPPEY DOES SOME DETAILED SOLDERING ON THE JOLT BOARD.



EVERYONE GOOFS ONCE IN AWHILE. DUNCAN AND THE "OLD MAN" REMOVE A MISPLACED RESISTOR. ANOTHER MASTERFUL SHOT BY RON ROHRER, OUR STUDENT PHOTOGRAPHER

But alas, the project is completed, and we find the statements, "Your JOLT board should now be ready to power-up. Refer to the POWERING UP YOUR JOLT SYSTEM MANUAL". At the present time, we don't have a power supply. However, the Mountain Digital Group is coming to our rescue. They have ordered us a power supply.

Our class would like to hear from anyone out there who has a JOLT computer. What are YOU using for input and output? As you can tell, we don't have any money -- so we want cheap ideas. Tell us what you have done. Write to Don Inman, our teacher. #

Our plans are to donate all our work to San Lorenzo Valley High School so that they will have a complete computer at some future date.

We give thanks, again, to Microcomputer Associates, Inc. of Santa Clara for getting us off to a successful beginning. We also thank People's Computer Company and Bob Albrecht for their inspiration and help. And last, but not least, we thank the Mountain Digital Group for their continued help.

\* Don Enman

350 Nelson Road  
Scotts Valley, CA, 95066

# THE PROGRAMMER'S TOOLBOX

## STACKS

by marc le brun

The stack is a very widely used programming tool. A stack consists of a set of data items which are kept in some particular sequence. To help visualize this, think of a deck of playing cards, each card is "stacked" on top of the cards below it. Unlike arrays, the number of items in a stack may vary during a RUN of a program, much as the number of cards in a pile may vary during the course of a card game.

There are two simple operations which are associated with stacks; they are called "push" and "pop." Pushing an item onto a stack is equivalent to placing a card on top of a pile. Popping an item off the stack is the same as drawing a card from the top of a pile.

To implement a stack on a computer it is necessary to have the following things: a place to keep the items in the stack (in the program below, we use the array S), a variable in which to keep the number being pushed or popped (N below), a count of the number of items in the stack (T), and finally, the maximum number of items the stack has room for (T1).

We must also have two subroutines; one for pushing and one for popping. The last element pushed onto the stack at any given moment is called the "top" of the stack. In the program below the top of the stack is S(T).

```

10 REM *** DEFINITION OF A STACK ***
20 DIM S(10)
30 LET T1=10
40 LET T=0
1000 REM *** PUSH ***
1010 IF T<T1 THEN 1040
1020 PRINT "STACK IS FULL."
1030 STOP
1040 LET T=T+1
1050 LET S(T)=N
1060 RETURN
1500 REM *** POP ***
1510 IF T>0 THEN 1540
1520 PRINT "STACK IS EMPTY."
1530 STOP
1540 LET N=S(T)
1550 LET T=T-1
1560 RETURN
2000 END
    
```

With this issue we are beginning to reprint some of the juicier material from early issues of PCC that are now out of print. These two pages are from PCC Vol. 1 No. 3 (Feb. '73) and PCC Vol. 1 No. 4 (April '73). You can still pick Marc le Brun's mind as manifested in recent issues of CoEvolution Quarterly, the magazine published by the Whole Earth Catalog people, \$8/yr. from CO, Box 428, Sausalito, CA. 94965.

Type the program into your computer. Then add the following lines and RUN the program to get a feel for how a stack works.

```

100 PRINT "TYPE 0 TO PUSH, 1 TO POP:";
110 INPUT X
120 IF X=1 THEN 170
130 PRINT "WHAT NUMBER";
140 INPUT N
150 GOSUB 1000
160 GO TO 180
170 GOSUB 1500
180 FOR I=1 TO T
190 PRINT S(I);
200 NEXT I
210 PRINT
220 GO TO 100
    
```

```

RUN
TYPE 0 TO PUSH, 1 TO POP:? 0
WHAT NUMBER? 1
1
TYPE 0 TO PUSH, 1 TO POP:? 0
WHAT NUMBER? 2
1 2
TYPE 0 TO PUSH, 1 TO POP:? 0
WHAT NUMBER? 3
1 2 3
TYPE 0 TO PUSH, 1 TO POP:? 1
1 2
TYPE 0 TO PUSH, 1 TO POP:? 0
WHAT NUMBER? 4
1 2 4
    
```

### PUSH



### POP



For more information about stacks —

*The Art of Computer Programming*  
Vol. 1 Chapter 2  
by Donald Knuth  
Addison Wesley Publishing Co., 1968

Stacks are very useful in programming. For instance; every time your program does a GOSUB, BASIC pushes the line number to RETURN to onto a stack. That is why you can execute several GOSUB's in a row and always be sure of RETURNing to the right place in your program. Here are some questions concerning the GOSUB stack your BASIC uses:

- (1) What does the computer do when you ask it to pop an item off the GOSUB stack when it is empty? (This happens when you do a RETURN without doing a GOSUB first.)
- (2) What does the computer do when you ask it to push an item onto the GOSUB stack and the stack is full? (This happens when you do a whole lot of GOSUB's without doing a RETURN.)

Stacks are also used for many other things; they are used to untangle complicated arithmetic expressions, translate your program into a form the computer can more easily understand, perform calculations and keep track of complicated processes. Here are some things to try:

- (1) Write a program that INPUTs six numbers and then types them out again in reverse order.
- (2) Write a program that randomly pushes and pops random numbers, printing out the stack at each step.
- (3) Write a program that finds out how big the GOSUB stack is.
- (4) Write a set of subroutines which pop the first two numbers off the stack; add, subtract, multiply or divide the first by the second and then push the answer onto the stack. Use the routines in a program which simulates a desk calculator.
- (5) Write a program which computes X! recursively.

A logical expression is an expression whose value is either 0 or 1 depending on the values of the variables in the expression. For example

ABS(SGN(X))

is a logical expression

IF X = 0 THEN the expression equals 0  
IF X ≠ 0 THEN the expression equals 1

Notice the use of the words IF and THEN. It is sometimes convenient to think of 1 as representing *true* and 0 as representing *false*.

Many times it is possible to use a logical expression in place of an IF-THEN statement. In this article we will show how this is done.

In the following discussion we will use an *e* to represent a logical expression, and other lower case letters to represent any old kind of expression.

Notice the following "rules."

IF THEN  
 $e = 0 : 1 - e = 1$   
 $e = 1 : 1 - e = 0$

$1 - e$  is always the "opposite" of  $e$ . If we think of  $e$  as being equivalent to TRUE or FALSE then  $1 - e$  is equivalent to NOT  $e$ ; that is NOT TRUE (FALSE) and NOT FALSE (TRUE).

Remember also that any number multiplied by 0 is 0, and that any number plus 0 is that number.

Now suppose we wish to write an expression which is equal to  $a$  if  $e$  is one and equal to  $b$  if  $e$  is zero. Here is how we do it:

$$a * e + b * (1 - e)$$

Suppose we wish to set X to the value of this expression. The following two BASIC programs do this in different ways

```
PROGRAM 1
10 LET X=A*E+B*(1-E)
20 ...

PROGRAM 2
10 IF E=1 THEN 40
20 LET X=B
30 GO TO 50
40 LET X=A
50 ...
```

Clearly Program No. 1 is a lot simpler.

If we want a variable to have a certain value if something is true and another value if it is false, then in MOST cases we can use a logical expression instead of an IF-THEN statement.

The rest of this article will be devoted to showing how to write logical expressions for the usual sorts of "if's." First we will consider what are called "relational expressions," that is, those involving =, <, >, <=, >= and <> (or #). Here is a table giving the relational expressions and their equivalent logical expressions.

RELATIONAL EXPRESSION	LOGICAL EXPRESSION
$p = q$	$1 - \text{ABS}(\text{SGN}(p - q))$
$p < q$	$1 - \text{SGN}(1 + \text{SGN}(p - q))$
$p > q$	$1 - \text{SGN}(1 - \text{SGN}(p - q))$
$p <= q$	$\text{SGN}(1 - \text{SGN}(p - q))$
$p >= q$	$\text{SGN}(1 + \text{SGN}(p - q))$
$p <> q$	$\text{ABS}(\text{SGN}(p - q))$

For example, the phrase

"IF  $p <> q$  ..."

is equivalent to

"IF  $\text{ABS}(\text{SGN}(p - q)) = 1$  ..."

Secondly, we will consider what are called the "logical operators," that is, those involving AND, OR, NOT and others.

We already know that NOT  $e$  is equivalent to  $1 - e$ . If we have two logical expressions  $e1$  and  $e2$  then  $e1$  AND  $e2$  is equivalent to  $e1 * e2$ .

$e1$  OR  $e2$  is  $e1 + e2$ . (Remember the two facts about zero given above.)

here they are ;

SHORT FORM	LONG FORM	LOGICAL EXPRESSION
$e1$ AND $e2$	$e1$ AND $e2$	$e1 * e2$
$e1$ OR $e2$	NOT(NOT( $e1$ ) AND NOT ( $e2$ ))	$1 - (1 - e1) * (1 - e2)$
$e1$ XOR $e2$	( $e1$ AND NOT( $e2$ )) OR (NOT( $e1$ ) AND $e2$ )	$e1 * (1 - e2) + (1 - e1) * e2$
$e1$ NAND $e2$	NOT( $e1$ AND $e2$ )	$1 - e1 * e2$
$e1$ NOR $e2$	NOT( $e1$ ) AND NOT( $e2$ )	$(1 - e1) * (1 - e2)$
$e1$ EQV $e1$	( $e1$ AND $e2$ ) OR (NOT( $e1$ ) AND NOT ( $e2$ ))	$e1 * e2 + (1 - e1) * (1 - e2)$
$e1$ IMP $e2$	NOT( $e1$ AND NOT( $e2$ ))	$1 - e1 * (1 - e2)$
$e1$ NIMP $e2$	$e1$ AND NOT ( $e2$ )	$e1 * (1 - e2)$

For example the phrase

IF  $a$  OR  $b$  ...

is equivalent to

IF  $1 - (1 - e1) * (1 - e2) = 1$  ...

In many cases the resulting expressions can be algebraically simplified. It is also useful to use several LET statements rather than repeating the same sub-expression. An example - suppose we wish to set U to V if  $X >= Y$  and  $X <= Z$ ; and to set U to W if  $X < Y$  or  $X > Z$ . Here is a short program which does this:

```
10 LET T=SGN(1+SGN(X+Y))*SGN(1-(X-Z))
20 LET U=V*T+W*(1-T)
```

As a matter of fact, using a little algebra, we can write the whole thing in one line -

```
10 LET U=(V-W)*SGN(1+SGN(X-Y))*SGN(1-SGN(X-Z))+W
```

PROBLEMS (in order of increasing difficulty)

- Write an expression which sets Z to MAX(X,Y).
- Write an expression that sets U to V if  $X < Y$  and sets U to W if  $X < Y$  AND  $X < Z$ .
- The "rule"  
 $X = Y : 1/(X + Y)$   
 $X <> Y : 1/(X - Y)$   
has to be done with IF-THEN - why? Think up some more "rules" which can't be performed with a logical expression. Can you find a way to describe when you have to use IF-THEN?
- Without using the MOD operator, write an expression which is TRUE if an odd number of  $e$ 's in the set  $\{e1, e2, e3\}$  are TRUE and FALSE if an even number are TRUE.

Hint: Explore the properties of XOR.

- Logical expressions can only "select" one of two values. Write an "illogical" expression which "selects" one of three values according to the following rules.

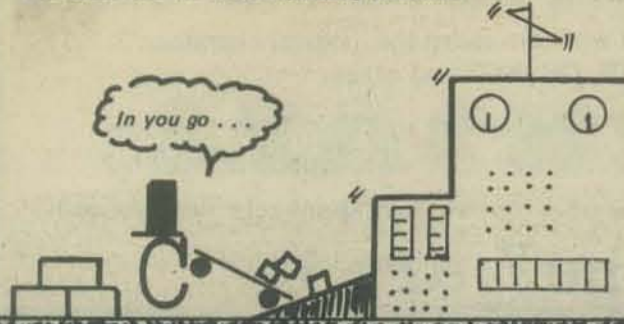
$X > Y : a$   
 $X = Y : b$   
 $X < Y : c$

Hint: Think about quadratics

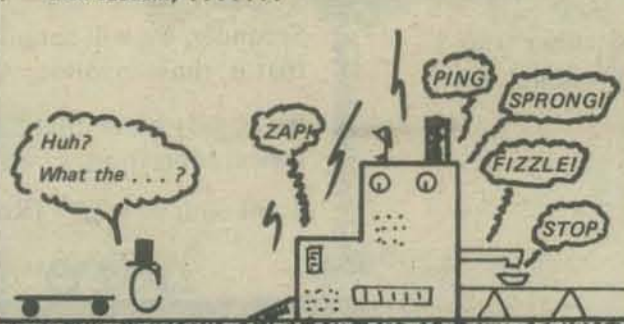
- Can you think of a general class of "selection" expressions which picks one of N values? Describe this class. Hint: Think about Problem 5.

- Can you generalize the logical operators to get some operators which "make sense" to use in combining "selection" expressions? Hint: Think about matrices

But then, before he can do anything, Fortran Man is dumped into the file compressing machine!!



For a moment, nothing happens . . . . . but then suddenly . . . . .



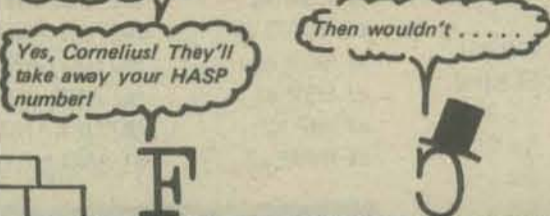
Then a voice behind him causes him to turn suddenly . . . . .



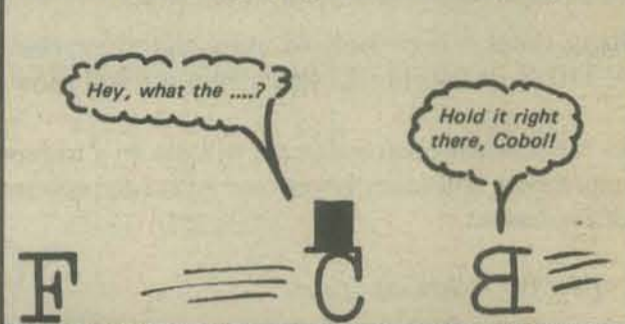
That's right, Cornelius! And your file compressor is stopped because its full of RANDOM PASSWORDS, which I generated when you dumped me in the machine!  
Even you know that you can't compress a file with a password on it!



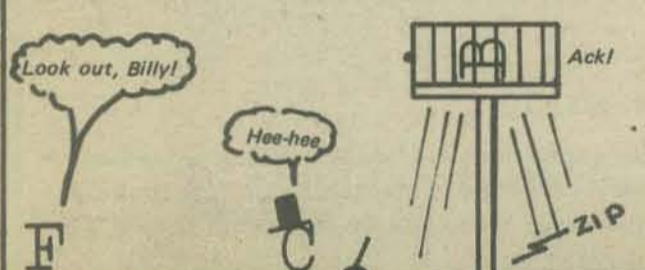
And now, you're coming with me back to the main processor - to stand trial before the System Monitor! And you know what that means!



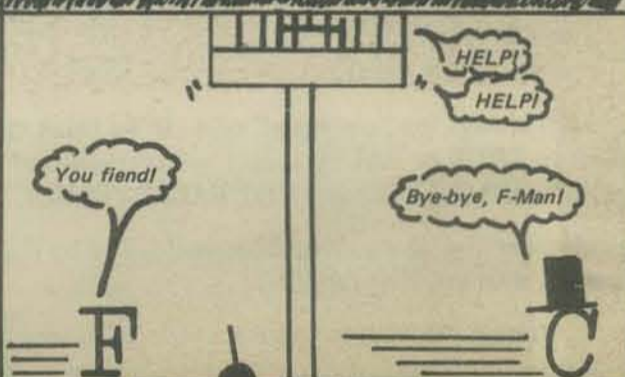
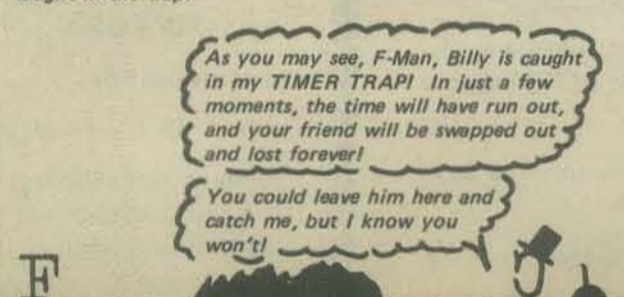
At that moment, Billy Basic, who was still waiting on the other side of the port, steps out and blocks the way -



But the wily Cornelius has planned ahead for this possibility . . . knowing that escape may be needed later . . . and hits a hidden interrupt button . . .



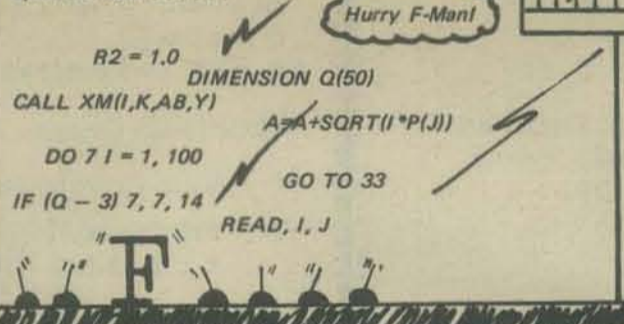
Before he can move away, the inexperienced Billy is caught in the trap!



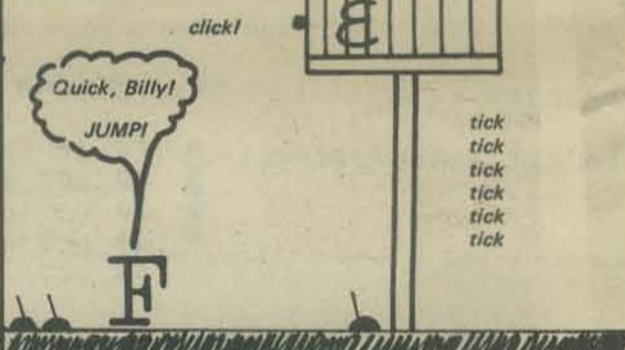
Letting Cornelius Cobol run out the data port and head for the city, Fortran Man swiftly examines the device in which Billy Basic has been imprisoned . . . . .



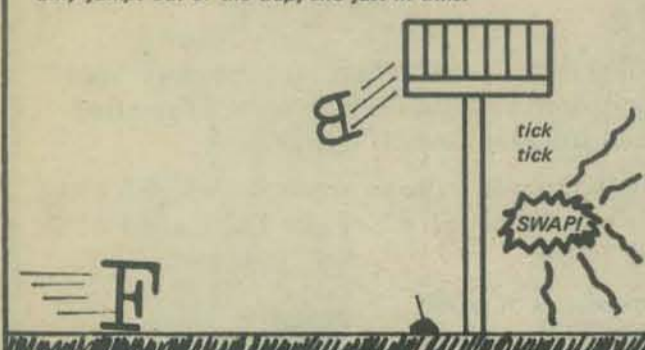
With incredible speed, Fortran Man manipulates the controls required to reduce the matrix and open the lock . . . . .



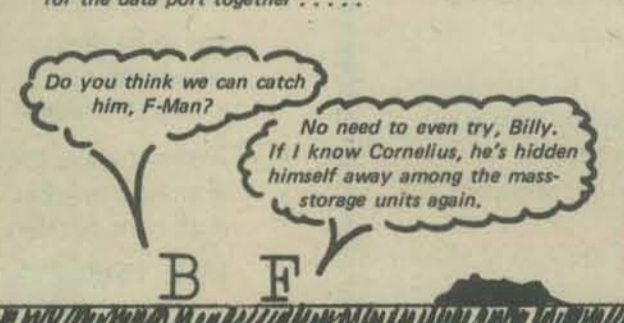
Then, suddenly, the lock is open!



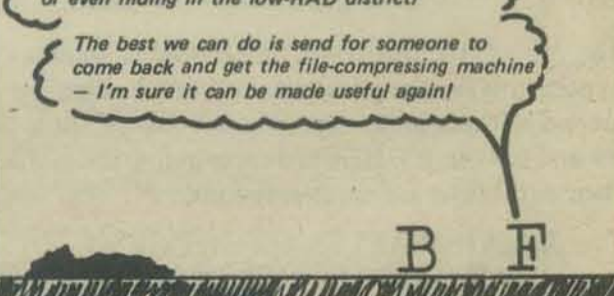
Billy jumps out of the trap, and just in time!



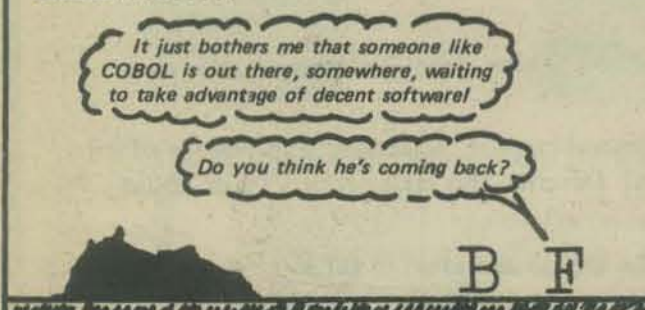
Billy joyfully rejoins Fortran Man, and the two head for the data port together . . . . .



Who knows where he is now . . . maybe on an unused disk sector, or the end of a scratch tape, or even hiding in the low-RAD district!



As they head back to BUFFER, another adventure over, Billy remarks . . . . .



The criminal always comes back, Billy! All we can do is wait, and watch, and always be willing to fight for what is right!



Lee Schneider  
Todd Voros

# FORTRAN MAN

Despair not Fortran Man fans, deep in the heartland of the USA the fertile minds of Lee and Todd are churning, churning . . . a new F-Man series.

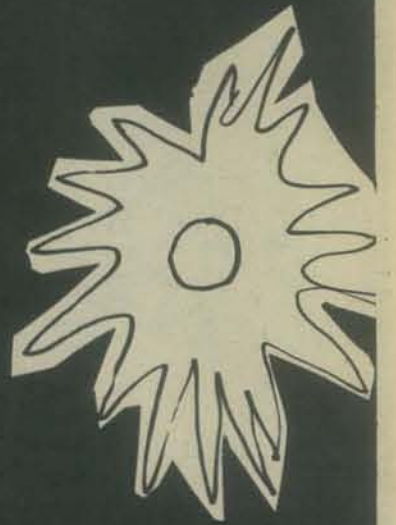
suddenly the ship jolted. the image on the screen went blank. "scott, what's happened to the viewscreen?" "i don't know sir. it just died." "sir," said spock said, looking into the scanner, "it would appear that we have somehow transmuted into 2-dimensional space. specifically, we are appearing on a newspaper page for the entertainment of an inferior species of the human race called 'programmers'." "how embarrassing" said the captain. "how do things like this happen?" "sir," said scott: "somethings appearing on the viewscreen....."



.....and this is what appeared on the viewscreen.....



flashing light > ↗



"peoples computer center..." said kirk mysteriously. "we can all read" replied spock sarcastically. "but i thought it was peoples computer company." said kirk. "no, dummy, thats the name of the newspaper we're in. this is the place they used to live next door to: the community computer center." "then why does it say 'peoples computer center' on the window?" "well, its very simple....." replied spock. he peered into the scanner for a few minutes. "uh, yes--" he said: "you see, they were going to be called the peoples computer center but when they incorporated the state of california told them that they couldn't have that name because it was too close to the name of an existing company - namely the peoples computer company - but the state didn't know that that was the parent organization and the center didn't know that that was the reason they couldn't have that name and that they really could have had that name if they wanted but by the time it was straightened out the signpainter had left town and they couldn't find anybody to repaint it." and with that, the text on the first page of the article ended.

# CCC:

## INSIDE AND JOIN



An old HP2114 waiting to be put to use



Expert friends repair our equipment, but sometimes we work on it ourselves - as in minor TTY repairs.

Peter finding a quiet spot on a noisy Friday night



The Friday from 5-6 meeting gets the week's problems into the open. It's followed by a potluck dinner and Games Night



Birthday parties and field trips. We feed them the kids play the terminals.



We talk in dig which builds The new be "ad theon



# Things on



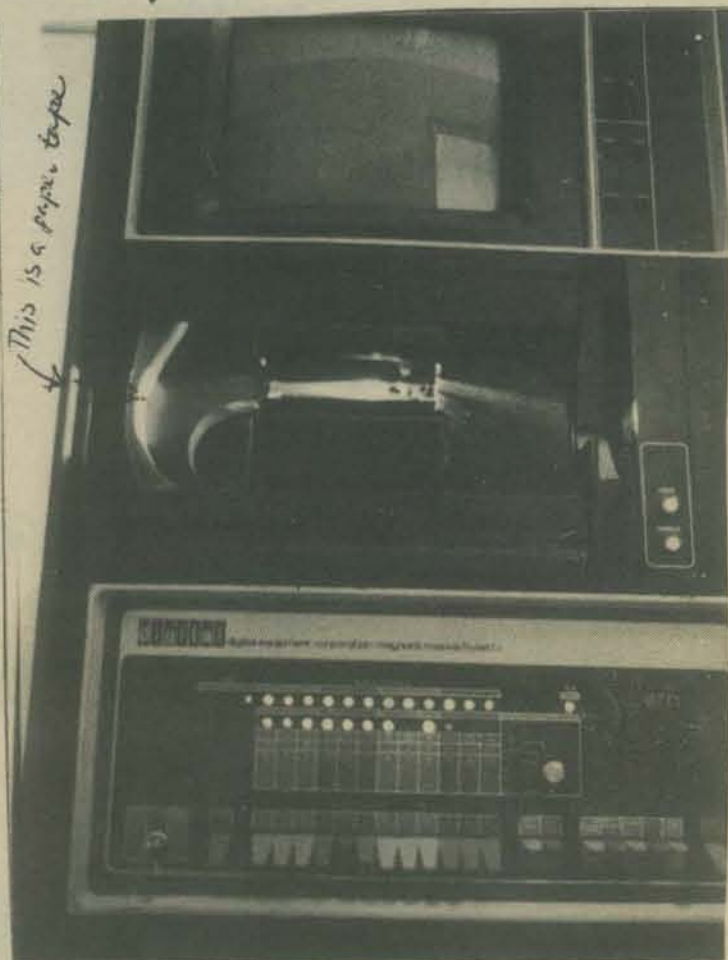
Jim - creator of "Mr. Smarty"

Our workhorse - the PDP-8 - at some point to be rebuilt into a spacewar machine, but now busy running games, duplicating tapes, and generally being reliable.

Very much Beneath - the computers two - the 8 and our new 11 and a bit of Bob, our system software manager.



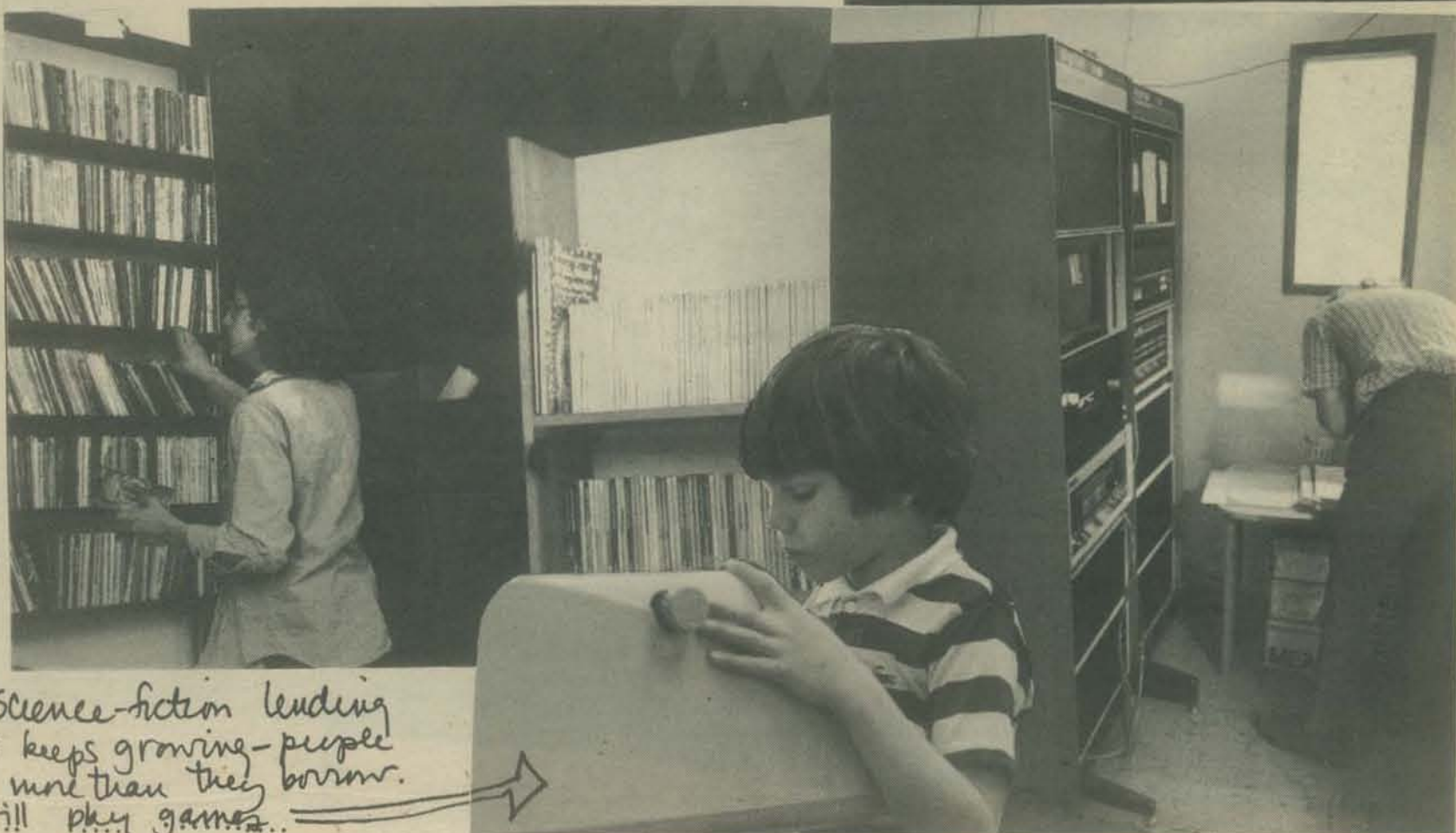
They're playing PONG which you can see if you look close.



This is a paper tape

are little teach games and lay them on 2s!

taught a class digital electronics which included building a digital clock. next course will be advanced digital logic."

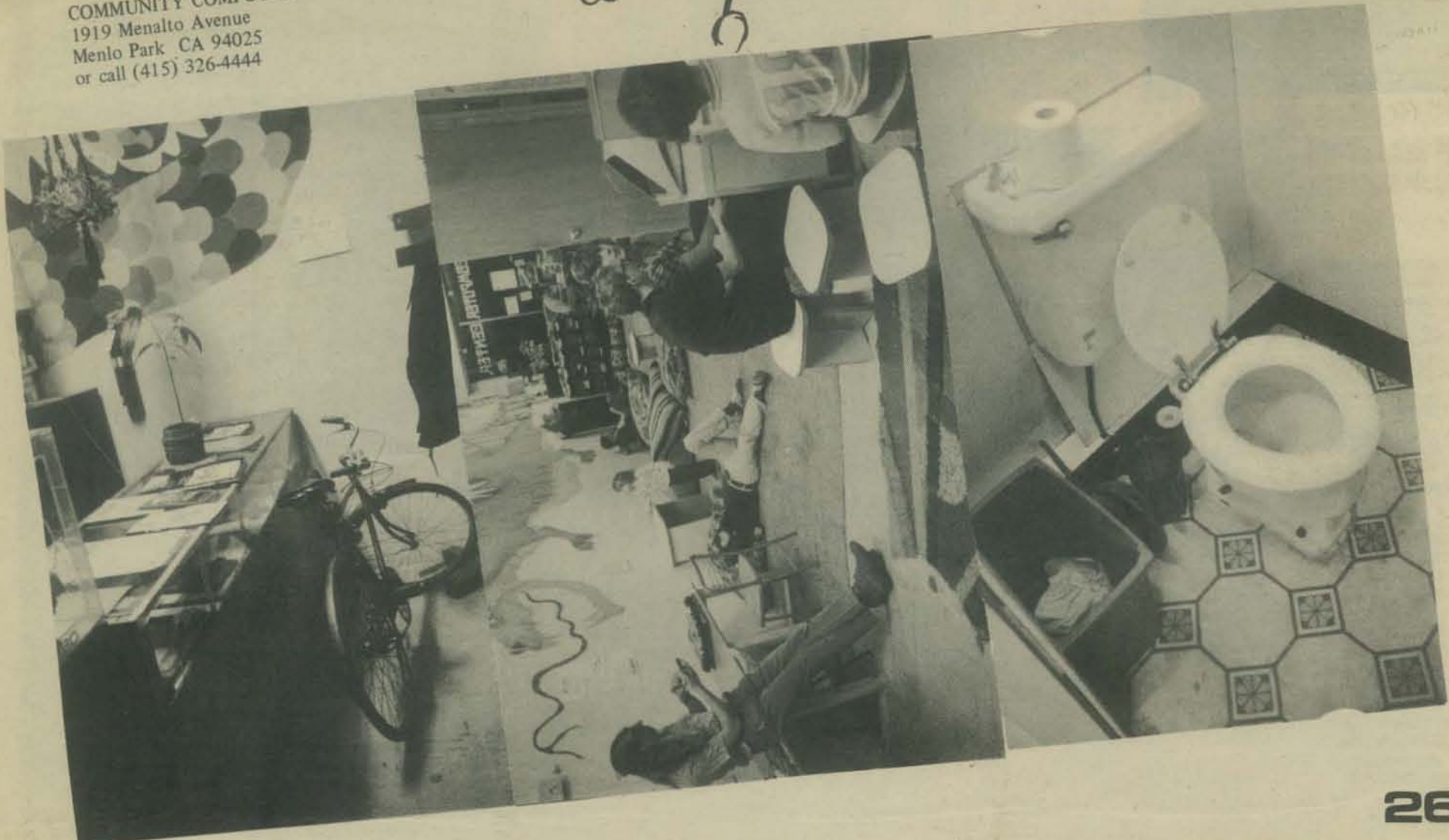


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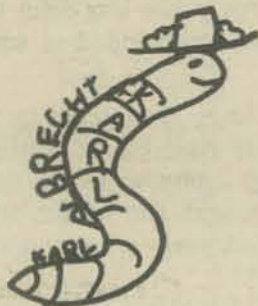
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Bill Gates' OPEN LETTER TO HOBBYISTS made a lot of eyebrows go up and sparked some heated discussion in clubs and among enthusiasts of micros (see *The Old Soldier's* reply last issue, *PCC* Vol. 4 No. 5). Below we have reprinted the body of that letter, to accompany Bill's latest communique. Jim Warren, an alter ego of Dr. Dobbs, gives his views on the opposite page.

Almost a year ago, Paul Allen and myself, expecting the hobby market to expand, hired Monte Davidoff and developed Altair BASIC. Though the initial work took only two months, the three of us have spent most of the last year documenting, improving and adding features to BASIC. Now we have 4K, 8K, EXTENDED, ROM and DISK BASIC. The value of the computer time we have used exceeds \$40,000.

The feedback we have gotten from the hundreds of people who say they are using BASIC has all been positive. Two surprising things are apparent, however. (1) Most of these "users" never bought BASIC (less than 10% of all Altair owners have bought BASIC), and (2) the amount of royalties we have received from sales to hobbyists makes the time spent of Altair BASIC worth less than \$2 an hour.

Why is this? As the majority of hobbyists must be aware, most of you steal your software. Hardware must be paid for, but software is something to share. Who cares if the people who worked on it get paid?

Is this fair? One thing you don't do by stealing software is get back at MITS for some problem you may have had. MITS doesn't make money selling software. The royalty paid to us, the manual, the tape and the overhead make it a break-even operation. One thing you do do is prevent good software from being written. Who can afford to do professional work for nothing? What hobbyist can put 3-man years into programming, finding all bugs, documenting his product and distribute for free? The fact is, no one besides us has invested a lot of money in hobby software. We have written 6800 BASIC, and are writing 8080 APL and 6800 APL, but there is very little incentive to make this software available to hobbyists. Most directly, the thing you do is theft.

What about the guys who re-sell Altair BASIC, aren't they making money on hobby software? Yes, but those who have been reported to us may lose in the end. They are the ones who give hobbyists a bad name, and should be kicked out of any club meeting they show up at.



Since sending out my "OPEN LETTER TO HOBBYISTS" of February 3rd I have had innumerable replies and an opportunity to speak directly with hobbyists, editors and MITS employees at MIT's World Altair Computer Convention, March 26-28. I was surprised at the wide coverage given the letter and I hope it means that serious consideration is being given to the issue of the future of software development and distribution for the hobbyist. In my remarks at the WACC I spent a great deal of time explaining why I think software makes the difference between a computer being a fascinating educational tool for years and being an exciting enigma for a few months and then gathering dust in a closet.

Unfortunately, some of the controversy raised by my letter focused upon me personally and even more inappropriately upon MITS. I am not a MITS employee and perhaps no one at MITS agrees with me absolutely, but I believe all were glad to see the issues I raised discussed. The three negative letters I received objected to the fact that I stated that a large percentage of computer hobbyists have stolen software in their possession. My intent was to indicate that a significant number of the copies of BASIC currently in use were not obtained legitimately and not to issue a blanket indictment of computer hobbyists. On the contrary, I find that the majority are intelligent and honest individuals who share my concern for the future of software development. I also received letters from hobbyists who saw the stealing going on and were unhappy about it, and from small companies that are reluctant to provide software because they don't think enough people will buy the software to justify its development. Perhaps the present dilemma has resulted from a failure by many to realize that neither Micro-Soft nor anyone else can develop extensive software without a reasonable return on the huge investment in time that is necessary.

The reasons for writing my first letter were to open the issue for discussion, let people know that someone was upset about the stealing that was going on, and to express concern about the effect such activities will have on future software development. Some letters suggested that software should be sold for a flat fee to hardware companies who would add the cost of the software to the price of their computer. Whether this is legal or not, the marketability of software to hardware companies is questionable when software is so freely shared among hobbyists. Providing software in ROM may help, but committing a complex software package to ROM before it has been field tested means that users will have to accept the bugs that inevitably turn up. Having a select trustworthy group do field testing for six months would mean that most of the bugs could be eliminated, but delaying the introduction of a product this long isn't feasible or desirable. In any event, software on ROM can be copied.

In discussing software, I don't want to leave out the most important aspect, viz., the exchange of those programs less complex than interpreters or compilers that can be written by hobbyists and shared at little or no cost. I think in the foreseeable future, literally thousands of such programs will be available through user libraries. The availability of standardized compilers and interpreters will have a major impact on how quickly these libraries develop and how useful they are.

Two factors that will encourage people to develop software are that the hobbyist market is expanding rapidly and that many commercial applications of microcomputers require the same software that hobbyists need. Unfortunately, some of the companies I have talked to about microcomputer software are reluctant to have it distributed to the hobbyist, some of whom will steal it, when the company is being asked to pay a huge sum to finance the software development.

To avoid an endless dialogue, and to keep the current controversy centered on the primary issue, this is the last open letter I will write on this subject. I thank those who responded in writing to my first letter.

APL is well under way and should be completed by the middle of the summer, when it will be made available to hobbyists. Micro-Soft also has a high-level language compiler in the design stage and is trying to work out a way to publish the source of one of its interpreters in a fairly inexpensive book form along with about one hundred pages of explanatory text.

BILL GATES 1180 Alvarado Suite 114  
General Partner, Micro-Soft Albuquerque, NM 87108

Consider then, TINY BASIC

- Integer arithmetic only - 8 bits? 16 bits?
- 26 variables: A, B, C, D, ..., Z
- The RND function - of course!
- Seven BASIC statement types

INPUT  
PRINT  
LET  
GO TO  
IF  
GOSUB  
RETURN

- Strings? OK in PRINT statements, not OK otherwise.

TINY BASIC

Pretend you are 7 years old and don't care much about floating point arithmetic (what's that?), logarithms, sines, matrix inversion, nuclear reactor calculations and stuff like that.

And... your home computer is kinda small, not too much memory. Maybe its a MARK-8 or an ALTAIR 8800 with less than 4K bytes and a TV typewriter for input and output.

You would like to use it for homework, math recreations and games like NUMBER, STARS, TRAP, HURKLE, SNARK, BAGELS, ...



dr. dobb's journal of  
**COMPUTER**  
**Calisthenics & Orthodontia\***  
*Running Light Without Overbyte*

Box 310, Menlo Park CA 94025

Greetings,

There is a viable alternative to the problems raised by Bill Gates in his irate letter to computer hobbyists concerning "ripping off" software. When software is free, or so inexpensive that it's easier to pay for it than to duplicate it, then it won't be "stolen."

Example: There are at least five versions of Tiny BASIC up and running on at least three processors. A cassette containing Tiny BASIC for the Intel 8080 is available for five bucks. A version for the Motorola and AMI 6800 also costs \$5, including complete user documentation. If the price is still too high, complete user documentation and implementation details for one of the 8080 versions has already been published. This includes complete annotated source code. Anyone is welcome to retype it and reassemble it. No one will yell, "thief." All details of a second version will be published before the end of April. Several more versions will be published shortly thereafter, including a cross-assembled version created using the macro facilities of the IBM 360 Assembler. Versions are expected shortly thereafter for the MOS Technology 6502, and Signetics 2650. Note: Tiny BASIC is, essentially, BASIC sans array and floating-point operations, although one of the versions has array operations, and another uses a calculator chip to obtain floating-point capabilities. It is explicitly designed for minimal memory micros.

Example: Gary Kildall, who built the PL/M compiler for Intel and the PLuS compiler for the Signetics 2650, is making an entire floppy-disc operating system available. He plans to sell a disc and complete documentation for not much more than what it would cost to duplicate them.

Example: A complete alpha-numeric music system, including amplitude control, has been designed and made available. The documentation costs only \$2, including complete schematics for the minimal hardware that must be added.

Information on all of these systems--and much more--is being published in a new, reference journal for home computer users (and anyone else interested in micros), *Dr. Dobb's Journal of Computer Calisthenics & Orthodontia*. The *Journal* is publishing all available details. For instance, the first issue contained: complete design details for Tiny BASIC, complete user documentation for the first 8080 version, complete details for using a calculator chip to obtain mathematical and floating-point functions, and a 16-bit, binary-to-decimal conversion routine.

The second issue included: complete implementation details and annotated source code for the first version of tiny BASIC, complete documentation and source code for a simple music program for Altair 8800s, design notes on a forthcoming high-level language for 8008/8080s, two articles on a \$1K phoneme generator kit for micros that allows unlimited English speech synthesis, and a quick note on the 6800 version of Tiny BASIC.

The third issue will include complete details and code for the second 8080 Tiny BASIC which includes 1-D arrays, a simple debugger for the 6502, a keyboard loader for octal code, details of a contest to generate public-domain graphics software for CroMemCo's TV Dazzler, and much more. The *Journal* is also reprinting carefully selected, good stuff from the growing multitude of computer club newsletters. Additionally, it is publishing complete indices to all major computer hobbyist publications and selected articles from other publications, lists of hobbyists and their equipment, used equipment sources, clubs and organizations, computer stores and distributors, etc. Finally, it is actively pursuing a consumer advocacy role relative to the home computer user.

The point is that all of this information--systems software, design notes, schematics, etc--is being made available for little more than the cost of reproduction. The *Journal* came into being, explicitly to aid creation and distribution of that information. In some ways, it creates a sort of manufacturer-independent user's group.

It is reasonable to expect that free and inexpensive software will become increasingly available to and through the hobbyists' community. This is true, in spite of the failure of such SHAREing in the business and industrial communities.

1. Hobbyists are developing home-grown hardware and software, just for the fun of it. Since it's "fun" rather than "work," they have shown a great willingness to share and distribute what they develop. This is not an unknown phenomenon. It is the usual practice in most other hobby environments, and is certainly true in the academic environment.

2. As with the industrial mini and micro markets, hobbyists have learned to be wary of purchasing hardware from manufacturers who provide no software support. Through common sense, and by observing Mr. Gates' experience, those who wish to sell software for significant sums of money must realize that there is only one group that can practically be expected to pay for it: the hardware manufacturers. They need it to enhance their products in a highly competitive marketplace.

3. Concerning quality: A significant minority of computer hobbyists are also experienced computer professionals. It's their (our) play as well as work. The competency level is more than sufficient for the design and implementation of excellent systems software.

4. Finally, the approach used in producing the Tiny BASICs will be continued and expanded, a sort of modified Chief Programmer Team approach: An experienced pro does the overall design and outlines the implementation strategy (via the *Journal* and other hobbyist publications). Following those directions, the more experienced amateurs do the necessary hack-work (exciting to them, but drudgery for the "old pro"). Since it is a symbiotic effort, the implementors are almost certain to share their work with the designers, and hence, with the larger community of home computer users.

It's amazing how much "good stuff" becomes available when the producers think of their labor as "play" instead of "work." All who wish to do so are invited to join with the publishers of *Dr. Dobb's Journal* in the pursuit of realizable fantasies.

Jim C. Warren, Jr., Editor  
*Dr. Dobb's Journal of Computer Calisthenics & Orthodontia*



P.S. *Dr. Dobb's Journal* is published by People's Computer Company, Box 310, Menlo Park CA 94025. Subscriptions are \$10 per year. PCC is an established publisher of PCC newspaper (devoted to computers in education, and computer games), and of numerous computer books.

# The Worm in the Apple

Well, I was right the other day, when I wrote about the enthusiasts. They really are wild, these computer hobbyists. And I can easily watch the enthusiasm grow; my own wife has caught the bug!

We went off to our first meeting, the Homebrew group. There were over two hundred attendees; no formal registration; very little organization; copies of the newsletter available, with the suggestion of a donation; no formal presentations.

There were frequent references to the equivalent Los Angeles operation, the Southern California Computer Club. Already there is informal interchange of news, expertise, and even software, between the northern and southern activities. I was reminded of the formation of chapter-level Special Interest Committees in ACM, but of course the hobbyists are free of the shadow of a central or incorporated (or, to be blunt, experienced) group. The session verged on incoherence many times, and could have come apart at the seams, or turned into a raucous flea market, except for the fundamentally intellectual bent of the men - and the few women - present.

The focus is on LSI: on the power and beauty of microprocessors and micromemories. And on their cheapness, needless to say. CPU and RAM (read-only memory) and PROM (programmable read-only memory) chips were described, displayed and sold - often with only the barest description of function - for a few dollars each.

The Stanford Linear Accelerator Center has a policy of offering meeting facilities to groups of interest to its employees, and had furnished Homebrew with a fine small auditorium. But SLAC insists that no money actually change hands, at least openly. The chattering proceeds so loudly that you can be sure sales and swaps are going on just outside the doors, and in the parking lot. And there are highly informal exhibits, hampered by the lack of easily accessible electrical power; these also point toward,

ah, consummation. But not in the lobby!

Inputs range from the recital of the serial number and label on a single fortuitous chip, and requests for dope about what it might be, and be good for, to highly sophisticated description of hardware - tape drives, even! - salvaged from abandoned systems or purchased from employers.

To revert to the metaphor in my title, one can see the fruit ripening. A lovely Delicious, handsome in size, rewarding to bite into, nourishing. But alas! there is an ugly worm. It is, to use the kindest possible word, dishonesty. Clearly a great many of the items being traded are hot: stolen goods. And remember, especially here in Semiconductor Gulch there are unexampled opportunities for casual pilferage and planned theft. Trade papers report the appearance of great quantities of stolen chips, often substandard. Somewhere between Singapore and Sunnysvale, several million dollars worth of easily transportable goodies have already been ripped off.

Mind you, SCCC and Homebrew are not major outlets. Professional thieves want to unload their loot in much larger quantities. But attendees are customers at retail and surplus shops, which in turn are hungry for new and cheap merchandise. There will be customs searches, and police raids, and the rest of the apparatus of enforcement. Hopefully, not too many of us will be involved - only Them!

But there is a much uglier worm in this great new apple, one much more dangerous in the long run than the maggots of petty pilferage. It was obvious from the first mentions of software, at both COMPCON and SLAC, that a stunningly large percentage - perhaps a majority - of the enthusiasts regard systems and applications programs as fair game: at best, common property; at worst, subject to undetectable rip-off.

Quite a bit of this is just plain stealing: "Loan me that [paper] tape for a couple of days and

I'll make a few dozen copies." And at the other extreme, there are people *anxious* to share their home-written software; people who want it tried out, and used, and who want only feedback on the bugs as compensation. What disturbs me most is the middle range, the counterculture attitude: private property is an obsolete idea. "Steal this book," say the Hoffmans and the Rubins. It sounds good. The government, the insurance companies, IBM and DEC look like fair game. But from there to Intel and Data General is an easy step, and downward to the struggling software house of the individual consultant even easier.

I hope some small fraction of the hobbyists and home computer enthusiasts read this column: those who are already in the business professionally, or who are students with library habits. Please, those of you who do, spread the word: "Play clean!" Don't copy copyrighted software. Don't steal program products from Altair. Don't abuse your company or college access to expensive systems and games, and to technical data, which you would not be welcome to as an individual.

It is as immoral to steal software, or to buy hot chips for a hobby computer, as it is to swipe fancy goodies in a supermarket or department store. I'd like Big Business and Big Government to be ethical, and so would almost every hobbyist. Let's set them an example!



Herb Groch

## The Enthusiasts

I have just become aware of a new and important activity in our trade, and by a considerable margin the most rapidly growing. This is the computer hobbyist/home computer idea; only two years old, yet with literally thousands of adherents up and down the country. Clubs are forming everywhere one looks; publications, from the crudest to extremely exciting and sophisticated ones (color covers, yet!), are proliferating; retail stores to sell the chips and boards and tools and manuals are springing up in unlikely places; Albuquerque, not precisely the nexus of major or mini or microaction, houses the most prominent supplier - of the ALTAIR family of computers.

I expect to attend my first Homebrew meeting, at the Stanford Linear Accelerator Center, before this column appears - found out about it at COMPCON in San Francisco. The Homebrew Computer Club meets biweekly(!), goes on for hours and hours(!), and draws more bods than the very active ACM Peninsula Chapter(!). And note the host location: most of the attendees, I'm told, are pretty fancy technically. Physicists, computer science students, computer and chip-company employees, all come together to boast of their adventures, compare and exchange - I'll believe that when I see it - software, warn each other of the many ripoffs from advertisers and would-be suppliers, and gloat over forthcoming new microprocessor chips, printer and CRT cutdowns, interfaces with home TV sets, and (need I say) price reductions.

Over a period of less than a year, major chip outfits like Intel have gone from complete obliviousness through irritated avoidance to assiduous solicitation of this new kind of business. Unbelievable as it sounds to me, a complete and open-mouthed novice, the enthusiast market is now a very major factor, in, say, 8080 chip sales.

Everybody and his great uncle wants to build a computer - not just play with a hand-held calculator, although clearly there is an inter-

action, but actually put together a system with 2K or 4K (and now, only a few months into existence, people talk 16K) bytes of memory. There are cheap printers, stripped-down keyboards, interfaces to color TV equipment, even floppy disks!

It was obvious at COMPCON that there were two entirely disparate ideas afloat. On the one hand, the technician-enthusiast, the hobbyist, wants to put together hardware and write software, and play Star Trek. Or control a model railroad, or whatever. But there is also a counterculture group, Great Earth Catalog types, who see the cheap home-built machine as a key to ghetto education, a counter to commercial TV, and so on. I love both of 'em; I have to say that I doubt the success of the second group, however. I admire their drive, understand their motives, despise the same politicians and the same oil companies - but alas! do not share their faith in the perfectibility of mankind. Sesame Street is great (noninteractive, of course); the Talking Typewriter is (was?) great; but TV commercials and fast foods and systematic exploitation of *underkinder* are hard, hard things to lick.

The hobbyists, though, should continue to explode in numbers and grow in sophistication. The technology is ready, the men and women - and kids - are crazy enthusiastic. There are a million things to try: cheap text editing, graphics, computer art and music, games of all kinds. Not income tax/bank balance/credit card stuff: all that needs is a \$15 hand machine. But imagine the fun things our trade would do at work, if they had time and access and didn't worry that the boss would complain (the boss also belongs to Homebrew!).

A warning, though: these beasties are horrid to program in machine language, in zeros and ones. Microprocessor customers in the real world know this, and when they put on their hobbyist T-shirts they don't forget. So chip and kit suppliers talk about assemblers, and even fur-

nish them, in a few cases. And the door is open for the software fanatic: the guy or gal who admires ALGOL or the latest nutty dialect string processor. Already we hear of TINY BASIC, BASIC, APL, simple FORTRANs and PL/Is. And operating systems, for Heaven's sake! For Heaven's sake, with the whole shebang on one table top!

That's just horrible, and I spoke out as much as a complete newcomer could, at the San Francisco session. I tried to tell them about SHARE, and how the only thing worth exchanging is the philosophy and layout of programs; how the new and pretty primitive peripherals would make it hard to even read in another hobbyist's code, even if it were documented enough to be theoretically useful.

Of course, there will be hobbyist software packages, just as there is already a wild variety of hobbyist CPUs and RAMs and ROMs and I/O gear. And some of them will work, and some will even be worth buying. There is already an enthusiast standards activity - cheap cassettes (from the audio world) for peripherals. So everybody will not have to build scratch software, just as most model railroad fans don't build all their own rolling stock. But only those who ultimately hope to sell such hobby software should spend much time on, gulp, ALGOL '68. The rest should concentrate on having fun!



Herb Groch

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HOBBYISTS -  
send your comments to  
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Menlo Park, Ca. 94025



# MUSIC

## WHAT IS ALPHA-NUMERIC MUSIC?

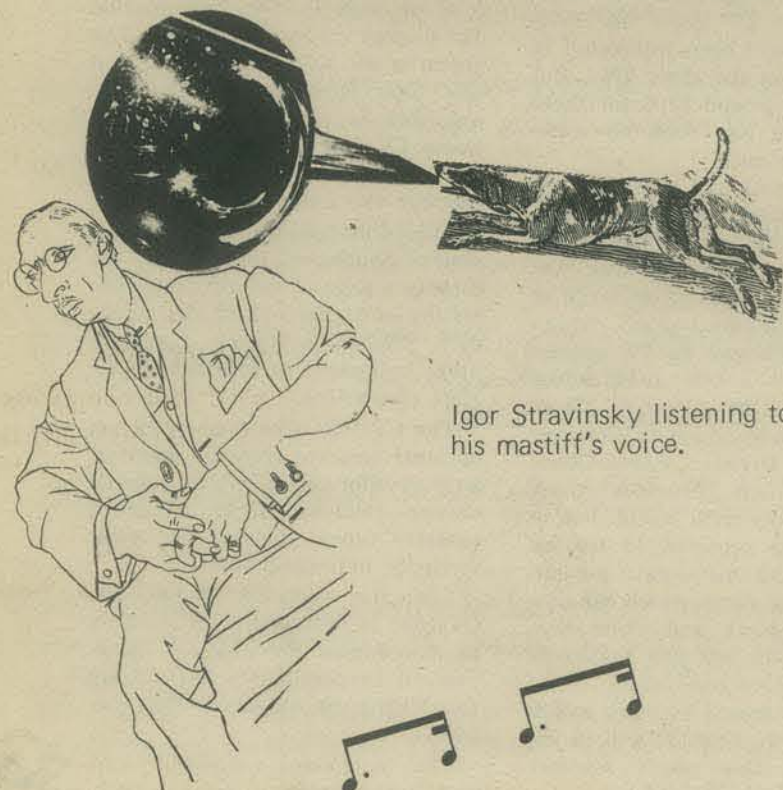
In the PCC, January 1976 issue, an article was published on a music program for the 8080 CPU called "Alpha Numeric Music with Amplitude Control". Since January, the PCC bookstore has made this 22 page article available for \$2.00 and the interest at the Home-Brew Computer Club, the Byte Shops (computer stores) and mail service has been relatively high. There have been many other music routines written for the 8008 and 8080 CPU's but Alpha-Numeric Music seems to be getting a lot of interest from music majors as well as the general hobbyist. Why?

Looking into the Alpha-Numeric Music (ANM) program, one can see many features that don't exist in most of the other routines.

1. An easy to follow encoding scheme for writing music. Not just number look-up tables for coding, but letters like C, D# (D-sharp), A! (A-flat) for the actual notes to be played.
2. A range of 6 octaves can be played, from about 31 Hz up to 2092 Hz.
3. Different voicing (different sounds) can be specified any time in the musical piece by typing CTRL-E and a number 0 thru 9 to pick up the sound.
4. Three different volume levels can be call upon for loud and soft passages of music.
5. The duration of the note can be set from a whole note (W) down to a thirty second note (T), to satisfy most music fans, any time in the musical measure.
6. The tempo of the music can be changed to three different rates including a nominal 100 beats a minute.

If you have a convenient way of loading programs into your 8080 computer, I am sure you will enjoy this program.

"This is a NOTEworthy routine that will MEASURE up to any other music program and help you SCALE new heights in micro-computer enjoyment by BEATING the dull and average software". by M.T.W. '76



Igor Stravinsky listening to his mastiff's voice.

April 13, 1976

in my program with a few changes.

To All Music Buffs,

The interest that has been shown in my Alpha Numeric Music routine is surprising. I've been approached by more music enthusiasts wanting to encode a favorite tune of theirs on my computer. I am starting to collect quite a few popular pieces for my computer's library through the musical help of some more talented friends.

It looks like there might be enough interest in my music routine that people may soon want to exchange songs, so let me make sure we have a standard here.

(1) On page 20 under NOTES, item 6\*, I want to make the exclamation mark the standard for a flat. This will allow people with teletypes to exchange music with other ASCII keyboard systems.

(2) I am sorry that I didn't know that a Control-J is the same as a LINE FEED, so let's change it to a CTRL-Q. Therefore at address 000,162 (p. 10) change byte 012 to 021 (octal).

(3) Final item. I have found a way to improve the transfer of the desired envelope with-

Routine Address	Change only the following
001,343	072,121,002 MOD1: LDA SaveV
001,347	176 MOV A,M
001,350	117 MOV C,A
001,363	171 MOV A,C
001,366	000 NOP
001,370	372,376,001 JM Cont4
001,373	303,343,001 JMP MOD1

These changes will improve loading and coding of the ten envelopes. Instead of using "even parity" to mark the end of each envelope, you will now use only the "MSB." This changes the envelope table to:

003,161	007,007,007,007,007,007,007,007,207
003,172	007,007,007,007,000,000,000,000,200
003,203	007,007,000,007,007,000,007,007,200
003,214	007,006,005,004,003,002,001,000,200
003,225	001,002,003,004,005,006,007,000,200
003,236	001,002,005,007,007,005,002,001,200

\*pages from an article called Alpha Numeric Music with Amplitude Control by Malcolm Wright being distributed by PCC.

Good Luck,

MALCOLM T. WRIGHT

## OZ FOR YOUR GNOME

I'm enclosing information on one of our new goodies. We call it OZ and it's intended to be used as a stand alone instrument for composing or getting one's chops down or (better yet) as a poly-tonic pitch source for GNOME s or other synthesizers.

- \*Built in amplifier and speaker (with mixing capabilities)
- \*6 - 1/2 octave range (5 octave range switch)
- \*Unique (really) capacitive pitch bender
- \*Completely portable and battery powered
- \*LED status indicators

We're going to be selling these things for \$80 apiece in kit form. That's a little higher than I would like but the keyboard is by Pratt-Read and they're 'spensive.

My congratulations to Malcolm Wright - Using the D/A for dynamics rather than waveshaping is really a good idea.

John Simonton  
PAIA Electronics, Inc  
P.O. Box 14359  
Oklahoma City, OK 73114

[For information on the GNOME, read John's articles--"Portable Music Synthesizer"-in the November 1975, December 1975, and January 1976 issues of Radio Electronics Magazine.]

# Home TV to double as terminal, information and game center

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Thanks George —

## 16

The home television receiver is taking on a more important role. Although intended originally only to receive broadcasted TV programs, the set is being eyed for such applications as these:

- An information service, whereby up to 100 pages of information are available at the touch of a button.

- Recreation, with improved and cheaper electronic games using the picture tube for a display.

- A home computer terminal, with the user simply plugging in a typewriter keyboard that has some extra electronic circuitry.

The most dramatic new development is a system that can give headlines, local and national news, stock market reports, sports scores, weather and a variety of other information in both alphanumeric and graphic form.

The new system is known both as CEEFAX (for seeing facts) and ORACLE (for optional reception of announcement by coded line electronics). It was developed in a joint effort in Britain by the BBC and the Independent Broadcasting Authority. Conceived in 1972, the information service is now part of BBC's regular TV programming.

### Between the lines

Operation of the CEEFAX/ORACLE system is based on the fact that several lines in the TV signal carry no video information. These are lines that occur during the field blanking interval.

According to James Redmond, BBC's director of engineering, information transmitted as a series of coded pulses is carried by two of these normally invisible lines in each TV field. Two fields are interlaced to form one picture.

Television engineers have for years used these TV lines to transmit information on picture quality and to identify the source of a transmitted program in central control rooms.

In the CEEFAX system, which is based on a television picture composed of 625 lines (in contrast with the 525-line system in the United States), the extra information is added to the 17th and 18th lines of the first TV field and the 330th and 331st lines of the second TV field.

The time it takes to scan one line in a 625-line system is 64  $\mu$ s. Of that, 12  $\mu$ s are used for synchronization and line blanking. The remaining 52  $\mu$ s are normally used to transmit the picture signal. But instead of sending a picture signal, engineers at the BBC decided to break this 52- $\mu$ s period up into 45 equal segments, each of which would contain one 8-bit word of data. Only 40 data words are needed to transmit the information to be displayed. The remaining five words are for synchronization and row identification.

Jules Gilder  
Contributing Editor

Updated information is being entered into the CEEFAX system via computer terminal (upper left), while a TV monitor shows a weather map that is being transmitted (lower right). →

The system uses an NRZ (non-return to zero) format to transmit data. The advantage is that this minimizes the bandwidth required, because it also minimizes the number of pulse transitions encountered. For example, if several bits that have the logic value ONE are transmitted one after the other, the voltage simply stays at the high level for the required number of bit periods instead of producing a pulse for each bit.

The reduction in bandwidth, however, comes at a price. The receiving system must provide its own clock, because with the NRZ coding, there is no built-in clock in the signal when several bits with the same state follow one another. The frequency of the receiving system clock is 444 times the line scan frequency, or 6.9375 MHz. This is also the bit rate of the data received.

In operation, a subscriber to the CEEFAX/ORACLE system pushes one of two buttons on a hand-held, calculator-like keyboard to select either normal viewing or CEEFAX. If the CEEFAX viewing is chosen, the picture that would normally be seen on the channel the set is tuned to is blanked out and the CEEFAX data are displayed instead.

To choose a particular page, a user merely punches in the number of the page he is interested in. Different pages are used for different subjects.

A page of information on the CEEFAX/ORACLE system consists of 24 lines of information, each containing 40 characters. Since there are only two lines available per field, and there are 50 fields per second (with a 625-line system), it takes 0.24 s to transmit a full page of 24 lines.

Once a page has been selected, the 960 words of digital data that make up the 40-by-24 character array are entered into a random access memory. The RAM allows the page of data selected to stay on the TV screen until a new page is selected, or the Normal Viewing button is pushed.

BBC's Redmond notes that a 100-page magazine, containing between 150 and 200 words on each page, can be serially transmitted in about 25 s. Thus the average access time to any particular page is 12.5 s. Each television channel is capable of carrying up to eight magazines.

### Special decoder needed

The major obstacle preventing widespread adoption and use of the CEEFAX/ORACLE system at present is a lack of decoders to process the received signal. There are only about 200 TV receivers in Britain equipped to receive the



special signal. But British TV manufacturers are busy developing decoders for their top-of-the-line sets, while other manufacturers are looking at the add-on market for already existing sets.

Texas Instruments Ltd. of Bedford, England, has developed a decoding module that it calls Tifax. The decoder, which should be going into production by the first quarter of 1976, will initially cost TV makers about \$100 each. A TI spokesman notes, however, that as production increases, the price of the decoder could drop to about \$20. The company sees this coming sometime in 1978.

The Tifax decoder is on a 4-by-6-in. PC board and is designed for use in new TV sets. It requires only a composite video signal, a line pulse feed for synchronization and a 5-V power supply. The signal and blanking outputs it provides can be easily connected to a cascade video output stage.

An external adapter that could be connected to already existing sets would cost considerably more, because it would need a separate tuner, i-f strip modulator.

### New interest in TV games

Ever since Magnavox introduced its Odyssey TV game in 1972, consumers have been interested in add-on devices for their TVs. But at a cost of around \$100 for these games, there has been no widespread acceptance.

However with the potential low price of large-volume LSI circuits, game prices are now dropping and with manufacturers looking for new consumer markets as large as the calculator one, much design effort is underway on TV games. One result is a new game under the trade name "Novus," from National Semiconductor's Consumer Products Division, Santa Clara, CA. This unit provides three games not only with sound, but in color, and is reported to use an LSI chip with metal-gate p-channel MOS. The game, which can also be used on black and white sets, attaches to the antenna terminals of the television receiver.

National's unit is expected to sell at from \$75 to \$100. It will be introduced at this year's summer Consumer Electronics Show. Atari Inc. of Los Gatos, CA, one

of the earliest entrants into the electronic-game competition, is currently marketing "Pong," a home-TV table-tennis game. "Pong" uses a MOS chip in place of hard-wired circuitry.

Other developments for the TV sportsman come from Magnavox. The original Odyssey 100 featured two games, hockey and tennis. Current versions allow the players to vary the speed of the ball and to apply "English" to it. In addition, the sound of the ball or puck's rebound is heard.

The newer Odyssey 200 adds handball to the original two games and includes a switch so that either two or four individuals can play. Electronic scoring, displayed on the screen, is also provided in the newer model.

### TV becomes terminal

By hooking up a TV typewriter to a television set, the user can convert it to a computer terminal. TV typewriters come as assembled units, but they are also available in kit form. An example is the CT-1024 from Southwest Technical Products Corp., San Antonio, TX.

The CT-1024 has a ROM that generates ASCII characters and 1 k of memory to store information for display on the TV screen. The input is an ASCII keyboard, and the output is connected to the TV's amplifier by a 75- $\Omega$  coaxial cable. Some TV typewriters are connected to the television receiver through the antenna terminal.

According to Dan Meyer, president of Southwest, the CT-1024 can display a page of information, consisting of 16 lines of 32 characters each. The unit's memory can store up to two pages of information, or 1024 characters.

The CT-1024 also comes with an optional cassette recorder adaptor, so that information can be entered on or retrieved from standard cassette tapes, thereby providing virtually unlimited storage.

Like the electronic games, the CT-1024 is designed to be used on an unoccupied TV channel. However, it is possible to hook it up for titling on standard TV pictures.

The complete computer unit ranges in price from \$200 to \$300, depending on options. ■■

# DAZZLER

## Software

### Contest

Sponsored by People's Computer Company  
P.O. Box 310, Menlo Park, Ca. 94025

- FIRST PRIZE: \$500 certificate for hardware from CROMEMCO
- SECOND PRIZE: \$250 certificate for hardware from CROMEMCO
- 10 THIRD PRIZES: \$35 certificate for hardware from CROMEMCO
- 16 FOURTH PRIZES: *"What to Do After You Hit Return: PCC's First Book of Computer Games* from PCC.

**OBJECT:** Develop a program resulting in a new and interesting display using the Cromemco TV Dazzler. (The Dazzler is an interface that permits a home color TV set to be a graphic terminal for certain microcomputers.)

- RULES:**
- All entries must use the Cromemco Dazzler display and must not require more than 20K of computer memory.
  - All entries will be judged by People's Computer Company on
    - 1 - originality
    - 2 - general user appeal
    - 3 - clarity of documentation
  - Entries should include source code and object code on punched paper tape. A listing of an appropriate bootstrap loader should also be provided.
  - Software should be compatible with MITS REV 1 serial I/O port convention for I/O requirements (i.e., data transfer is on port 1, bit 7 [active low] of input port 0 is used to indicate transmitter empty, and bit 0 [active low] of input port 0 is used to indicate receiver ready).

Microcomputers can be incredibly versatile. The Dazzler adds the dimension of full-color graphic display to the microcomputer.

What can you develop? — games? — business? — education? — art? — others?

SEND ALL ENTRIES TO: PEOPLE'S COMPUTER COMPANY  
P.O. Box 310  
Menlo Park, Ca. 94025

ENTRIES MUST BE RECEIVED BY SEPT. 30, 1976

The TV DAZZLER plugs into your ALTAIR or IMSAI computer. For more information about the DAZZLER, write to: CROMEMCO, 1 First St., Los Altos, CA 94022. Or . . . read "Build the TV DAZZLER" by Terry Walker, Roger Melen, Harry Garland and Ed Hall in the February 1976 issue of POPULAR ELECTRONICS.

### COMPUTERFEST!

The Midwest Alliance of Computer Clubs is sponsoring the First Annual Midwest Regional Computer Convention June 11, 12, 13, 1976.

...Besides the many manufacturers that will be present to display their computer products we will have a large flea market, technical sessions, computer demonstrations and games, program duplication with media conversion etc. Copy machines will be available.

The Place: The Stouffer Somerset Inn  
3550 Northfield Rd.  
Shaker Heights

For Info: The Midwest Alliance of Computer Clubs  
P.O. Box 83  
Brecksville, Ohio 44141

or: John Kabat, Jr., Pres.  
Cleveland Digital Group  
1200 Seneca Blvd. No. 407  
Broadview Hts., OH 44147  
(216) 237-2734

or: Gary Coleman, Pres.  
M.A.C.C.  
14058 Superior, Apt. 8  
Cleveland, OH 44116  
(216) 371-9304

### TINY BASIC GAMES

Chomp, Checkers, Tic-Tac-Toe, Digiguess, Brainteaser, War-3, Therapy, Golf, Reverse, Biorhythm, Taxman, Snark, Trap, Number, Clock, Hamurabi, Stars, 23-Matches, 20-Questions, Blackjack, Batnum, Kingdom, and Life. They all RUN in Whipple and Arnold's TINY BASIC EXTENDED. Available on cassettes from THE DIGITAL GROUP, P.O. Box 6528, Denver, Co. 80206. For more information, get Flyer Number 6 from THE DIGITAL GROUP.

And for more info on TINY BASIC and other free or inexpensive software, subscribe to DR. DOBB'S JOURNAL. See page 31 of this issue of PCC.

### A VERY CHEAP I/O . . . The Model 15 TTY

by Dick Whipple and John Arnold of TINY BASIC fame . . . in the May 1976 issue of 73 MAGAZINE. Tells you how to buy a cheap Teletype for your blinking light machine. 73 Magazine, Peterborough, NH 03458.

# YOUNG AND OLD and COOPERATION GAMES

Dear Bob:

I want to get in touch with people in your company (and others that you may suggest) whose interests and activities overlap mine in certain areas. I have been busy in instructional application of computers (that we like to call IAC) since 1968, teaching many students and building up our departmental competence in IAC. Before that I spent many years in scientific applications of computers. My official job in the Department has to do with anything in educational (instructional and some administrative) applications of computers, especially under the philosophy "computers for the whole school," the term used by Bill Goddard, my colleague in British Columbia. We put out mimeographed papers on the educational applications of computers.

But more and more, with the help of many students from my classes, I am concentrating in three areas: cooperation games, computer uses for elders; and helping to minimize computer-based invasions of privacy and civil rights. I'm sort of people and mission and development oriented rather than just for research with a capital R.

Some of our games are briefly described below:

On PLATO IV (in TUTOR)

Cooperation games

- ROBERTS/Hicks\* - simulation of elements of parliamentary procedure
- SOS/Waldrop\* - a new cooperation game
- DISASTER/Petak\* - an incomplete simulation based on Petak's simulation driver SCORPIO
- TRINIM/Hicks\* - incomplete game derived from the TRINIM published by AID, Inc.

On DEC 10 (BASIC)

Cooperation game

- LAFI/Taylor\* - Lost and Forgotten Island (derived from SOS on PLATO IV)

Games and programs for elders (not thoroughly tested yet)

- FOOD/Nortrup\* - "food for thought": quotations appropriate to your mood
- CUE - nutrition checklist and recipes
- HANDS/Jaycox\* - writing poems about hands (from Stanford University)

\*Names of people primarily responsible now for the programs.

LAFI was written in BASIC so that it can be used in the majority of high school computers. We think this is an important consideration in encouraging the spread of cooperation games. SOS has been played a lot, LAFI very little. Each will be refined further, and comments by players are of course most essential here.

Two student teams have worked on computer uses for elders and a third is working this semester. I've enclosed summaries of the full reports from the first two teams. We are working on a short report that will incorporate the experience and results from all three semesters.

Bruce Hicks

University of Illinois  
Education Building  
Urbana, IL 61801

## LETTERS



### ASCUE MEETING

The Association of Small Computer Users in Education (ASCUE) will meet at Oklahoma Christian College in Oklahoma City June 16-18. Registration will begin the evening of June 15. Contact Jack McElroy, Oklahoma Christian College, Rt. 1 Box 141, Oklahoma City, Ok. 73111.

### SEND GAMES!

I am a computer game freak! Please send me any computer game listings. If you have any books of computer games, in good condition, I would like to buy them.

Thanks.

David Deitz 19 Little Brook Rd.  
Springfield, N.J. 07081

### DATA GENERAL EDUCATION NEWS

Twice a year educational news letter.  
Free from Data General, Southboro MA 01772



### LO\*OP CENTER

Dear Bob:

People ask me: DRAGON? Why dragons? What do dragons have to do with computers? Why not, I say. Dragons are partly real, partly imaginary. So are computers. Dragons can be benevolent, terrifying, or humorous. So can computers.

As far as I know, yours was the first public access computer center and you told me you just liked DRAGONS. I was going to use a Möbius strip as the LO\*OP Logo but I thought maybe together we could start a trend - world-wide- find turned-on, creative people using computers for education, recreation and problem solving at the sign of the dragon. So if you PCC readers are thinking of starting a Computer Center why not design a DRAGON too!

Lisa Loop  
LO\*OP Center

8099 La Plaza  
Cotati, CA 94928  
(707) 795-0405



Dear PCC,

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Having recently received a copy of "What To Do After You Hit Return" I have found it to be another excellent publication.

I would like to add a copy of the HP2000F BASIC reference manual to my collection. Could you possibly direct me to a source of such manuals.

Eric Bjornsen 1615 East Street  
Baraboo, Wis. 53913

Eric and Everyone--

Ask for: TIMESHARED BASIC/2000F  
Part Number: 02000-90073

Price: \$7.50 + 1.50 postage and handling  
California residents add 6% tax

From: Hewlett-Packard Mail Order Dept  
P.O. Drawer No. 20  
Mountain View, CA 94043

For Dragon's sake, don't forget the Part Number!

## CHANGING TIMES:

A CELEBRATION FOR INDIVIDUAL JOY AND  
LEARNING

June 19-23, 1976

at: California State College, Sonoma  
1801 East Cotati Avenue  
Rohnert Park, CA 94928

The OBJECTIVES of this gathering are:

- to gain new insight into alternative, innovative, practical "models" of education.
- to help the teacher and administrator develop alternative education programs within their schools.
- to assist the teacher, administrator, student and parent in creating alternative schools within their district.
- to give parents, professionals and para-professionals who live and work with children new views of the potential of the young person and to illustrate new resources.

AND

- here's a time and place where YOU, as participant, can share YOUR insights, experience, expertise, where YOU can bring what you have to offer, and share this in an atmosphere of genuine inquiry, sharing and play.
- and - we'll establish SYNTHESIS - an Educational Resource Network that will provide a year-round, on-going resource information support system for various educational ventures.

Please note: There will be housing accommodations (including food) for conference participants at the California State College, Sonoma Housing facilities. We invite you to utilize these facilities so we can develop a strong sense of community during our stay together. Evening activities will be planned. The cost is \$9.75 per day which includes room (double occupancy) and board. Family rates available.

For more information on housing write:

Housing Office  
California State College, Sonoma  
1801 East Cotati Avenue  
Rohnert Park, California 94928  
Re: CHANGING TIMES CONFERENCE



Dear Bob,

I want to comment on the letter from John R. Lees, Jr. associate editor of *Creative Computing*. I think he has the right idea about some things. Here's where I think the amateur computer field is going - not that anyone asked. I don't think Sears Roebuck is going to make millions of Altair-type computers! Face it, years ago people were running around predicting we'd have terminals in every home, and now a lot of people think we'll have an Altair in every living room! Wrong! Just because Marconi invented the radio doesn't mean we have a shortwave in every home either. People want something that is as easy to use as a TV set, and not have to worry about stuff like GOSUBs and interrupts and serial interfaces. If there will be another, (yes, I said another) computer revolution it will take the form of microprocessors appearing in everything from your toaster to your wristwatch, and not in the form of a rather useless black box with blinky lights.

Think about it— what good are home computers anyway? Computer games, and maybe balance the check-book... that's a real social revolution you have on your hands there! But I'll disagree with the argument that "we can't really understand what we create with a tool we don't understand." A really mystical sounding sentence. The truth is, no one understands any tool exactly. How many people in the construction trades know that a hammer is mostly empty space? How many of them can explain why, if a hammer is mostly empty space, it doesn't just pass right through the nail which is also empty space? (Mostly). Does that mean that he doesn't understand the hammer, and he doesn't understand the house he builds? And if we had to totally understand what a microprocessor actually does before we could use it, I doubt many people would be doing much with them, on the hobby level. So remember, home computer fans,

\*\*\*\*Your Altair will not feed starving children in India\*\*\*\*

Now that I have that out of my system, I thought I'd also keep you informed of what's happening to M-5\* I have a general idea of what the first few issues will contain but I'm still looking for material. Nevertheless, if it doesn't pan out, I will have some interesting stuff for you. Incidentally, that thing about the "Ultimate Star Trek" in the back of the latest PCC... it really annoys me when people go to extremes like that... I am presently trying to come up with what I hope will be the most advanced ST game I know of, but I already know that there is, somewhere, one better than it already. Calling that matrix-version ST game "the Ultimate" is kind of exclusive of all simulation types like TREK73, multi-player types, very advanced matrix type games which the authors of that game didn't know of (I know one that occupies about 60KB and is a real-time game which keeps track of the actual time you use to play the game!) and any graphics type game! Star Trek, that is. I guess I just wrote this to keep some things in perspective.

Yours truly,

\*Steve North????

7 Deerhaven Lane  
Newfoundland NJ 07435

\*M-5 is a proposed newsletter about ST\*R TR\*K and other space games. For info, see January 1976 issue of PCC, page 19, or write to Steve.

Dear Dragon!

Your last issue (Vol.4 no.5) carried a letter from John R. Lees, Jr. of *Creative Computing* implying that the computer was somehow less than fully useful to "the people" because we are subservient to the elite who "understand and control those technologies," primarily because the "inards" of a C.P.U. are "inherently incomprehensible" to us.

John need have no fears in that direction, since "inherently incomprehensible" technology has been the rule rather than the exception ever since the discovery of fire. Does Johnny really know what happens when he strikes a match? Or starts his car? Or makes his own yogurt?

Only in theology can we have the comfort of absolute knowledge. I as an engineer must continually be guided by "close enough". Given all the "facts" anyone should be able to make a correct decision. It is not in the nature of our universe, however, that anyone will ever be given "all the facts". We must, instead, make decisions based on intuition, hints, trends, and wild-assed guesses. Our continued survival indicated that we have done pretty well in that department so far.

The personal computer can help us by allowing us to correlate, move hints, trends, and wild-assed guesses quicker, but we still must make the final decision: Is this close enough?

A well known dinosaur maker has brought us "Virtual System", where certain computer internal actions that previously required programmer guidance were taken care of automatically. My own concept of my "Ultimate computer" is a total "Virtual System" where input, programming and output are as automatic as my other body functions. I may not fully, or even partially understand how it works when I get it, but Johnny baby, that won't keep me from using it to the utmost of my abilities. If you still pray, John, pray that your universe is never limited just to that which you totally comprehend.

—The Old Soldier—



En garde, John!

## Letters

Dear People, Dragons or whatever,

Please renew my subscription to your newspaper. I have enclosed a check for \$5.00. Please also send me information on the TV-Dazzler Contest. I don't have a Dazzler but I saw one at the Lawrence Hall of Science Computer Fair. I hope you will furnish details of the I/O to and from the dazzler to the contest entrants, because many of them may not have a Dazzler.

➡ See Dazzler Page this issue. ⬅

I enjoy your newspaper very much and have no criticisms of it; but I do have some suggestions for things you could include:

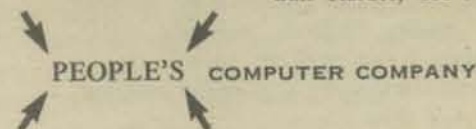
1. An article on how to get something (especially a computer program) copyrighted, and just what rights the copyright gives you.
2. An explanation of the 8080 instruction set (the MITS Manual is extremely vague about the details of certain operations like CMP and DAA and even ADD.)
3. Construction projects for 'make believe computer' peripherals.

One of my old PCCs says that PCC was trying to build a model for a 'recreational language', more suited to games and simulations than other languages now available. I have tried to design one myself; I came up with lots of ideas and individual features it should include, but was not able to organize them all into a consistent whole. Were you able to do any better? I will write the compiler or interpreter if someone helps me invent the grammar and syntax. I don't own a computer yet (money, nothing else, prevents it), but I have a friend who does.

Sincerely,

Bruce Smith

57 Glenside Way  
San Rafael, CA 94903



Dear People's Computer Company;

Help me. I have at last found some money to use for another years subscription to your newspaper. I thought that I could survive without it but I recognize the errors of my ways. So please renew my subscription before it is to late. Enclosed you will find a check for \$5.00. Please note my new address and forgive me for trying to make it without you.

Donald D. Hartley

(Meanwhile, somewhat later.....)

Hi!

Your newspaper has reminded me that computers are used by people and therefore, programs should be written for people. In my classes at Oregon State University this is something which is not pushed. It therefore becomes one of the least important goals in writing a program when it should be the most important. I thank you for getting me back on the correct track.

Donald Hartley

1220 NW 26th St.  
Corvallis, OR 97330



# MAIL

Hello Bob:

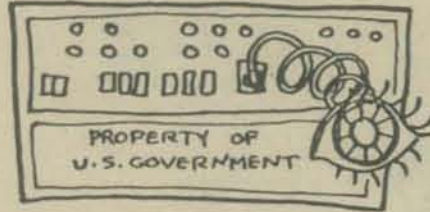
I am an enthusiastic, budding computer hobbyist and programming genius. That is, I will be if I ever manage to get my hands on your BASIC Language Manuals. I have tried in vain to procure at least one of them here in New York, but it seems that none of the college or electronics bookstores carry them. Some time ago, I managed to thumb through My Computer Likes Me...for about three minutes (the owner of it refused to part with it, understandably, and we were in the subway at the time, so...). I have been looking for a copy ever since. It's a fabulous book. I am in the process of constructing a homebrew Altair 680 and am interested in the engineering applications of microcomputers. I am studying aeronautical engineering at an east coast university; physics is my forte. I liked your book because of its simplicity and informality in explaining BASIC. It lets me enjoy the pleasure of this great hobby, without the "no fun" quality of heavy scientific texts, such as the ones I deal with in school. I want microcomputers to be a pleasant learning experience, not a drag.

Thanks much.

Alejandro Rodriguez, Jr. 225 E. 106 St. 19B  
New York, N.Y. 10029



# PRIVACY



We received this press release from PRIVACY JOURNAL "An Independent Monthly on Privacy in the Computer Age" P.O. Box 8844 Washington, D.C. 20003

For release March 22, 1976

Four states have passed fair information practices acts affecting state government data banks and 13 regulate consumer credit investigative reporting, according to *Privacy Journal's* annual survey of state privacy laws.

No state has yet enacted broad-based privacy legislation affecting the private sector, according to the Washington newsletter, which reports monthly on confidentiality of personal information in government and business data banks. Arkansas, Massachusetts, Minnesota and Utah are the four states that have enacted fair information practices acts, which limit disclosure of personal information, allow the individual to see his file and correct it, and require data managers to give public notice of their systems and meet security requirements.

In addition, the states of New Hampshire and Washington require state data banks to be registered with a central state authority. Indiana, Virginia, Rhode Island, Montana, and Illinois have appointed privacy commissions to study regulation in the private sector, and many state legislatures are considering such proposals.

"There is more protection of confidentiality than is generally realized, but it is all piece-meal," said Publisher Robert Ellis Smith, in announcing publication of *Privacy Journal's Compilation of State and Federal Privacy Laws*. This 200 page book is available for \$10 from *Privacy Journal*, Box 8844, Washington, D.C. 20003 (202) 547-2865.

The *Compilation* includes citations and descriptions of more than 200 state and federal privacy laws, plus the texts of representative state laws. Federal laws on privacy, consumer credit reporting, wiretapping, criminal justice information systems, school records, and tax records are included.

States regulating the consumer credit investigative industry are Arizona, California, Florida, Kentucky, Kansas, Massachusetts, New Hampshire, New Mexico, New York, Oklahoma, Texas, and Virginia. *Privacy Journal* found that 33 states limit disclosure of school records with various laws, and others do so by regulation. Two states limit state demands for Social Security numbers (Oklahoma and Arkansas) and two others include privacy as a state constitutional right (Montana and California).

"With the increased use of computers for personal information, states are passing more and more privacy laws," said Smith, in pointing out that this year's *Compilation* is a vast expansion over last year's. California alone passed 11 laws in late 1975 affecting confidentiality of data.



The Public Interest Satellite Association (PISA) was formed in October 1975 as a non-profit national organization to explore how satellite communications technology can be adapted to meet the long-distance telecommunications needs of non-profit users.

For the past fifteen years, satellites have been providing global links via television, radio, telephone, data, telex and facsimile for business, industry and the military. Up to now, though, the technology for a number of reasons, has been beyond the reach of public groups, despite the fact that satellites have been developed with nearly \$80 billion of public funds. But recent technical breakthroughs in the field promise to greatly reduce satellite costs, and make the technology available for low-cost public use. To spearhead the public effort that will be required to turn this potential into reality, PISA has been formed.

PISA's goals are to:

1. Help non-profit groups understand the many facets of satellite technology;
2. Assist these groups in examining their long-distance communications costs, and in determining how satellites -- and what kinds of satellites -- may better serve their needs; and
3. Explore ways the technology can be used by them to form new networks of information exchange, and to improve their outreach to the public-at-large.

In March 1975, PISA received grants from the Stern Fund and the Ottinger Foundation to permit the following first steps to be taken:

1. Conduct a survey of the communications needs, uses, and costs of non-profit organizations;
2. Prepare written material informing these groups about satellites, the potential benefit they hold for the non-profit community, and what must be done to realize this potential;
3. Design one or more demonstration projects, using available NASA experimental satellites, to give non-profit groups some experience with the technology; and
4. Plan PISA's organizational structure

## FOR ADDITIONAL INFORMATION

WRITE OR CALL:

Andy Horowitz  
Co-Director  
PISA  
55 W. 44th Street  
New York, N.Y. 10036  
212-661-2540

# Public Service Video



New City's Public Service Video students

Excerpts from Vol. V, No. 1  
Resources for Youth Newsletter  
Free from: Resources For Youth  
36 E. 44th Street  
New York, N.Y. 10036

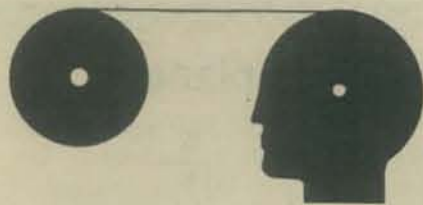
## PUBLIC SERVICE VIDEO

New City School  
400 Sibley Street  
St. Paul, MN 55101

Students who sign up for the Public Service Video course spend two weeks at New City School learning how to handle portable video equipment. They also learn to do research, to script, direct, interview, narrate and edit. Then, for the next 10 weeks, they work with representatives of community agencies who approach them for help.

Public Service Video has a list of 20 video tapes available for distribution. Write to PSV for price information and ordering instructions.

## COMPUTERIZED LITERATURE SEARCHES



Dear Bob;

It was great to learn of your interest in Computerized Literature Searches. I'll plan to keep you informed in the future about new services as they are established.

We do literature searches in almost all subject areas, and also provide a number of other computer based information retrieval services. We have statistical business forecasts, Congressional legislation, Census data summarized for any area, US patent data, SEC corporation reports, PhD dissertation abstracts, summaries of current research in progress, addresses for all kinds of individuals and organizations, sources of grants, law, and other kinds of data. We provide both retrospective searching and SDI (current awareness) services, and we can supplement the computer search with a manual search of sources that are not available for searching by computer. Finally, we can give copies for you of any of the articles you would like to read.

For more information, including prices, contact Fred Bellomy, P.O. Box 2400, Santa Barbara, CA 93120 - or telephone (805) 963-9055.

## SCHOOL COMPUTER SERVICES NEWS

Here are some excerpts from the April 1976 issue of School Computer Services News, published bi-monthly, Oct.-Apr. by the Office of School Computer Services Center, 326 Poe Hall, North Carolina State University, Raleigh, North Carolina, 27607.  
Editor: Edward G. Blakeway

Huntington I usage showed a decline of about 27%, but Huntington II simulation usage increased by almost 50%. STOCK and DECAY 1 were the most popular in Hun I, while the ELECT series, not surprisingly in a presidential election year, was in greatest demand in Hun II, followed by MARKET and SLITS. In light of the number of schools offering ECCP (The Man-Made World) we are surprised that POLUT and BUFLO are not in greater demand.

Clemson University announces, for the fifth year, a series of 5-day workshops on *Interactive Computing for High School Students*, to be held during June and July 1976. Further information may be obtained from Continuing Engineering Education, 116 Riggs Hall, Clemson University, Clemson, S. C. 29631.

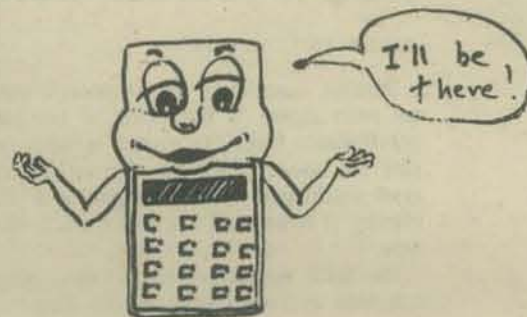
North Carolina State University announces 2 two-week *Instructional Computing Workshops* for teachers with or without previous experience, in any discipline, to run concurrently. Dates: June 17-30, 1976. Closing date for applications is April 30, 1976. Late applicants may be accepted if space is available. Further information may be obtained from Dr. Herbert E. Speece, Director, Department of Mathematics & Science Education, 326 Poe Hall, N.C. State University, Raleigh, N. C. 27607.

## ADCIS - SUMMER OF '76

The 1976 Summer Meeting of the Association for the Development of Computer-Based Instructional Systems (ADCIS) will be sponsored by Control Data Corporation at Minneapolis, Minnesota, August 10-12, 1976. For further information about the conference, contact the General Program Chairperson: Dr. Karen Duncan, Director, Office of Computer Resources, College of Dental Medicine, 80 Barre Street, Charleston, South Carolina 29401, (803) 792-3211.

## INSTITUTE IN COMPUTER SCIENCE

University of California Extension, Santa Cruz  
July - August 1976

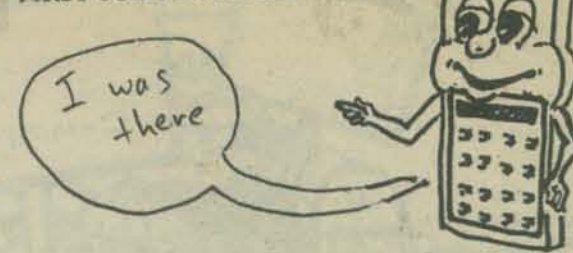


Seven intensive computer short courses presented by an outstanding faculty under the technical coordination of Dr. William McKeeman, Professor of Information Sciences, UCSC. The courses are designed to give students an immediately useful increment of knowledge and skill.

Operating Systems, Structured Programming, Compiler Construction, Principles of Data Base Management Systems, Simulation Using GPSS, Computer Graphics, Using Microcomputers.

For Further Information: write or phone Joleen Kelsey, University of California Extension, Santa Cruz, CA 95064, (408) 429-2761.

## FIRST COLA CONFERENCE HELD



The first COLA mini-conference on Computers and Calculators in Education was held on March 6 at Le Conte Junior High School in Hollywood.

The keynote speaker, Dr. Raoul Freeman, outlined the current status and future goals of the Management Information Division of the Los Angeles Unified School District. The district currently has two large-scale computers and eight mini-computers. The large machines are used for administrative services and by students, via timesharing. Further expansion of these services is planned as funding becomes available.

Art Armstrong of Venice High School and Gene Murrow of Harvard School demonstrated their Altair 8800 computers and enthusiastically summarized their experiences in constructing machines for school use.

Dick Lubin, Mathematics Consultant for Los Angeles County Schools, lectured on the topic "Computers are for Humans," illustrating his talk with a series of BASIC program examples.

Several other sessions and workshops were conducted, and a number of commercial exhibits were presented.

For more information contact: COLA, P.O. Box 43677, Los Angeles, CA 90043.

## WHAT ABOUT THE HP 2000E?

Dear Bob,

Thank you for another good issue of PCC. I look forward to it. I am presently working with another private school in town (where I will be working full time next year) helping them set up a modest computer center. They will be buying a HP 2000/E system shortly for next school year.

Part of my job is and will be to help both students and teachers become familiar with the computer and to help in its use by as many teachers and departments in the school as possible.

I noticed in the last issue of PCC some discussion of programs for the 2000/F. Also, your book (*What to Do After You Hit Return*) is set up for the 2000/F.

What about the 2000/E? I would think that there is and will be extensive use of the 2000/E in schools especially now that the price of used systems makes them fairly reasonable (the only way we were able to do it).

I would really appreciate any information that you can send me on where I can get software/simulations that will run on the 2000/E for any and all educational disciplines.

I would also like to put in a hope that, when you publish programs in PCC (or in separate books), you will state whether or not they will run on a 2000/E as is or suggest possible changes so that they will run on a 2000/E.

Thank you,  
Rev. James H. Keene, S.J.  
DeSmet Jesuit High School  
233 N. New Ballas Road  
St. Louis, Missouri 63141

*LeRoy sez: Nearly all HP education programs and games will work on HP2000E and will come with the System Library. Also, it's easy to "fix" small programs: have a student do it!!*



## the illinois six

Hi,

We are members of a group of 6 students at the University of Illinois presently at work outlining a source-book/guidebook on computer use for Central Illinois Government Officials. We found out about the People's Computer Company from chance encounters with your newspaper. Since we are now in the early stages of self-education we are trying to get in touch with various groups around the country which are involved in similar activities. So, this letter is here to introduce us to you (Hi), let you know what we are doing, and hopefully begin some good exchanges of ideas and information.

Our group consists of undergraduates in majors ranging from mathematics and computer science to biology and music. Our present project goal is the creation of a manuscript by August of this year. We have applied for a grant from the National Science Foundation but have yet to receive notification of acceptance (or otherwise.) The grant is significant to the extent that if we do not get it, we will have to look for other sources of monies since none of us can afford to buy the necessary materials, not to mention eating while we're doing it.

The book will be of a 2-part format. The first part will be written with the needs of local government officials in mind. We hope to give them sufficient background in legal, technical and political factors concerning their role in legislating the use and control of government (school, police, institutions, etcetera) computers. The second part of the book will be written with for residents of communities. This part will inform them of what is going on in computers, how computers are affecting their lives, what they can do about it, the legal aspects of their situation, etc. There will also be a section for community organizers. The organization section will contain a specific outline for the creation of a community ombudsman. The book will be approximately from two to three hundred pages in length. We have enlisted the help of 5 members of the local alternative high school, who are presently at work learning the use of Basic and Fortran, and the Plato Computer.

We would appreciate any suggestions, ideas, publications, or approaches which you think will help us. If you consider us newsworthy please announce our existence in your newspaper.

Thanks,  
We'll be in touch soon.

Glen Kowack and David Chalmers

P.S. We now have access to the Plato computer and will have access to the ARPA net within a month or so. Our Plato group notefile is 'Pronotes' and P-notes can be sent to 'Kowack of Ed' and 'Chalmers of Ed317'.

## NIU2M3B4E5R G6A7M8E9S

Parents, teachers, students, and computer hobbyists looking for new games to program will find over 100 simple games described in the book *Number Games to Improve your Child's Arithmetic*, by Abraham B. Hurwitz et al. (Funk & Wagnalls, 1975). These games have been classroom-tested and found useful in teaching number skills to children from preschool age through grade 6.

Although many of the games could easily be computerized all of them can be played without using a computer. Starting with simple counting games for younger children, the book proceeds to more advanced concepts via games using pencil and paper, cards, dice, and dominoes, as well as special aids readily constructed from inexpensive materials.

Also, included are chapters on number tricks, shortcuts, jokes, and puzzles. Teachers will appreciate the comprehensive cross-index of number skills, and those looking for more games will find a list of 34 books on mathematical games, plus a list of commercially available games. —Jim Day

## ★ Do-it-yourself navigation among planets

continued from page 8

Besides calculating the approach velocity, we must figure in the effect of the planet's gravitational field. The escape velocity ( $V_e$ ) is also the speed which an approaching spacecraft would gain due to the pull of a planet's gravity, if it went all the way down to the surface.

The total velocity change ( $V_d$ ) — assuming it is done with one rocket thrust — equals:

$$V_d = \sqrt{V_e^2 + V_c^2}$$

To Land on Mars:

$$V_d = \sqrt{(6283)^2 + (11,520)^2} \\ = 13,120 \text{ m.p.h.}$$

If instead of landing, the spacecraft is going into orbit, the velocity change will be less. The craft need only slow to adjust to an orbital velocity,  $V_c$ . For a circular orbit, this is:

$$V_c = \frac{V_e}{\sqrt{N}}$$

where  $N$  = radius of the orbit divided by the radius of the planet.

From the table, the radius of Mars is 2,071 miles. So if the spacecraft wishes to go into an orbit 2,071 miles above the surface,  $N = 2$  (twice the planet's radius) and

$$V_c = \frac{11,520}{\sqrt{2}} = 8150 \text{ m.p.h.}$$

To go into orbit, then, the total speed correction is:

$$V_{\text{orbit}} = V_d - V_c$$

To circle Mars at two planetary radii, then, requires a deceleration by

$$V_{\text{orbit}} = 13,120 - 8,150 = 4970 \text{ m.p.h.}$$

What planet will you head for next?

If you've thought of a clever way to get more use out of your pocket calculator, let us know. We'll pay \$5 for every idea we publish. Send suggestions to: Feature Editor, Box 353, Astor Station, Boston, MA 02123.

## COMPUTER CLUB NEAR SALEM, OREGON?

Dear PCC,

I am a student attending North High School and I am very interested in computers. I would like to know if there are any computer clubs in my area.

John Artherton 970 Hulsey Ct. S.E.  
Salem, OR 97302

## ANY CLUBS IN SO. CAROLINA?

Dear PCC,

I would like information on any Computer Club in my area if you have any information on this.

Sincerely,

Billy W. Garrett 3502 Maybank St.  
Columbia, SC 29204

## C<sup>5</sup> [CCCCC]

Dear Dragon,

Could you please list in your next issue the formation of a new club/magazine.

The club is tentatively called the CCCCC(Contra Costa County Computer Club (5C).

When you join the club you have subscribed to the magazine and visa versa. Meetings will be about once a month. There will probably be dues for members who attend the meetings (we'll have to vote on it), and this is not(attendng the club meetings) necessary if you want to get the magazine, and you'll pay no dues in that case.

The magazine will be a "bit" more software oriented then PCC. Most programs listed in the magazine will be available to members/subscribers at a small cost on mag tape, paper tape or cards.

So, please send for information at 50 cents for a copy. We may also have the chairmen of RCA's CMOS division talk at one of our meetings.

Sincerely,

Eric Bergman 3188 Kingsley Pl.  
Lafayette, CA 94549

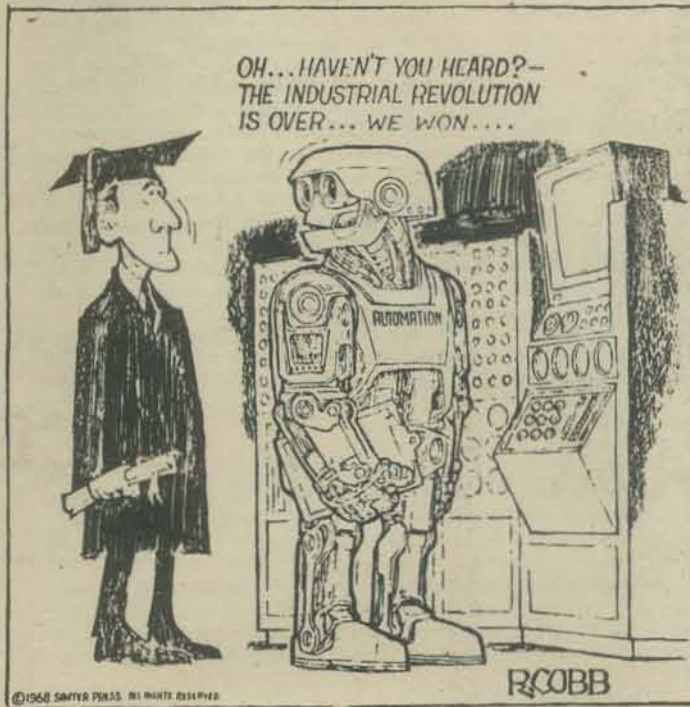
REM TO THE DRAGON: I'll send you a copy soon.



THE COMPLEAT COMPUTER  
 By Dennie L. Van Tassel  
 University of California, Santa Cruz  
 \$5.95 216 Pages



"Being a compendium of: Tales of the Amazing and Marvelous, Poetry, Informative news items, Articles for Edification & Enjoyment, Cartoons plus Many Other Illustrations, with a special section of: Splendiferous Science Fiction Art in full color".



So promises the soft cover of this 1976 release. In large part, the promise is kept. The Compleat Computer is not a "how to" book, nor is it a highly technical work. What it is, is a well assembled "compendium" of articles from a variegated list of general and special interest publications dealing primarily with the impact of the computer on the general public, with just enough looks at the computers' "inards" to give the uninitiated an overview of what computers are all about.

With some redundancy because of the number of different authors represented, we are given a fairly complete picture of what the computer is doing for us now, and both positive and negative projections of what computers can do for and to us in the future. The many examples of the successful computer criminal could be an inspiration to us all? The 1984ish usage and potential usage for constructing dossiers on all of us of such outwardly innocent appearing processes as utility monitoring and automatic fund transfer is enough to evoke some paranoia in even the most pure of heart.

This is truly a multi-use book. Those of us secure in our knowledge of computers can read it for sheer pleasure, yet the construction is somewhat text-booky in style, with each chapter followed with references and exercises suitable for classroom use. "The Compleat Computer" belongs right along side "Computer Lib—The Dream Machine" in every computer lover's library.

—The Old Soldier—



At first glance, a book about programming the 8008 sounds about as useful in 1976 as a treatise on housebreaking dinosaurs. But that was the last negative thought I did have about this book.

The introduction first makes the obvious point that machine language programming is the only way the computer with small amounts of memory can be made to do anything, but then goes on to puncture my 36K pride by pointing out that M.L.P. is the only way even a big core machine owner can be free of the constraints of high level language and get full use out of the beast.

From an easy start where we are introduced to the instruction set and have each individual instruction explained, we are lead into flowcharting and basic techniques, thru math subroutines, memory allocation, I/O programming, then into real time, PROM burning and a final chapter in creative programming concepts.

I went through several of the shorter subroutines with my op-code card in hand, and had little difficulty in finding equivalencies. Translating something like their floating point subroutine could take 1 bit longer.

If I had an 8008 machine, I would own the book now. For those owning other microprocessors, the cross-translation problems do not appear too severe, so unless a book specific to your chip is available, it still is worth a look. This would be a fine companion to a "Dr. Dobb's" subscription."

—The Old Soldier—



MACHINE LANGUAGE PROGRAMMING  
 For the "8008" & Similar Microcomputers  
 From: SCELBI Computer Consulting, Inc.  
 168 pages, \$19.95 By Nat Wadsworth  
 and PCC Bookstore

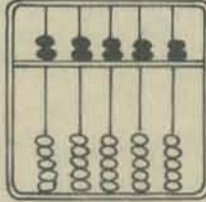


- Detailed presentation of "8008" codes • Flow Charts
- Mapping • Floating-point Package • Debugging
- Basic programs: loops, counters, masks
- Organizing Tables • Editing/Assembling
- Math operations • I/O, Real Time Programming
- Maximizing memories •

# MIT computer scientist contrasts mind, machines

COMPUTER POWER AND HUMAN REASON: FROM JUDGMENT TO CALCULATION by Joseph Weizenbaum. W. H. Freeman and Co., \$9.95.

The most devastating attacks sometimes come from within. Now a distinguished computer scientist at Massachusetts Institute of Technology has dealt a powerful blow to many of his own colleagues, the proponents of un-harnessed computer technology. In this tour de force, Joseph Weizenbaum pleads with his fellow 'hard' scientists to "listen with their third ear" to their own humanity and to stop delegating to machines the kinds of decisions that require human wisdom.



Aware that his title may frighten many readers, Weizenbaum notes in the preface that "this book is only nominally about computers." Indeed, the issues are much larger. He traces the role of technology in society, beginning with the first medieval clocks that began to substitute measurement for direct experience (eating when hungry, sleeping when tired). He eloquently compares instrumental reasoning—the merely quantifiable—to complex human thought and imagination. He urges hard science to teach "the validity and legitimacy of softer knowledge."

If human values are illusory, as B. F. Skinner argues, Weizenbaum says it is up to science to demonstrate that fact—an impossibility, he maintains, since science itself must be an illusory system. "For the only certain knowledge science can give us is knowledge of the behavior of formal systems; that is, systems that are games invented by man himself..."

The rejection of direct experience that began with the early mechanical clocks "was to become one of the principal characteristics of modern science. ... Today enormously intricate manipulations of often huge sets of numbers are thought capable of producing new aspects of reality. These are validated by comparing the newly derived numbers with pointer readings on still more instruments..." It becomes a circular trap, with man omitting himself from the loop.

Although he acknowledges the important contributions of computer technology to society, Weizenbaum gives a chilling account of inherent dangers in our love affair with the computer. The programmers can become so involved in technical sub-problems that no one notices the flaw in an inherently unsound program. Furthermore, a certain scientific mystique is lent to the original concept because it has now spawned rivers of data.

Some larger systems have actually grown unknowable because too many programmers have come and gone. "Decisions are made with the aid of, and sometimes entirely by, computers whose programs no one any longer knows explicitly or understands."

The systems become immune to change, Weizenbaum says, because no one at that point will risk rendering the whole system inoperative and possibly unrestorable. "Such computer systems can therefore only grow."

Another great danger is the abdication of responsibility by human beings. Weizenbaum cites instances of high officials blaming computers for life and death decisions, as in the Viet Nam war.

One of Weizenbaum's best-known accomplishments was a 'natural-language processing system' called ELIZA. ELIZA could "listen to" human language and respond on a very simple and mechanical level. A human subject would say something like, "My mother and father hate me," and ELIZA (later known as "Doctor") would respond, "Tell me about your parents."

When psychotherapists began touting the

program as the answer to the manpower shortage, Weizenbaum was horrified. How could human beings place so little value on human interaction?

"Science promised man power," Weizenbaum said. "But, as so often happens when people are seduced by promises of power, the price is servitude and impotence. Power is nothing if it is not the power to choose."

He urges those who teach computer science to help their students understand the limitations of instrumental reasoning. "The computer is a powerful new metaphor for helping us to understand many aspects of the world, but it enslaves the mind that has no other metaphors and few other resources to call on. The world is many things, and no single framework is large enough to contain them all, neither that of man's science nor that of his poetry, neither that of calculating reason nor that of pure intuition."

If this book has even half the exposure it deserves, it should rank with Thomas Kuhn's 'The Structure of Scientific Revolutions' in its impact on how we think about science.

—M.F.

What emerges as the most elementary insight is that, since we do not now have any ways of making computers wise, we ought not now to give computers tasks that demand wisdom.

\*\*\*

It is much too easy, especially for computer scientists, to be hypnotized by the 'fact' that linguistic utterances are representable as linear strings of symbols. From this 'fact' it is easy to decide that linguistic communication is entirely a left-hemisphere affair. But human speech also has melody, and its song communicates as well as its libretto.

\*\*\*

The part of the human mind which communicates to us in rational and scientific terms is itself an instrument that disturbs what it observes, particularly its voiceless partner, the unconscious.

\*\*\*

Learned people are constantly asking one another what they must do, whereas the only really important question is what they must be.

\*\*\*

Man, in order to become whole, must be forever an explorer of both his inner and outer realities... What could it mean to speak of risk, courage, trust, endurance and overcoming when one speaks of machines?

—Joseph Weizenbaum  
'Computer Power and Human Reason'

REPRINTED FROM:

**BRAIN MIND**  
bulletin  
FRONTIERS OF RESEARCH,  
THEORY AND PRACTICE

February 16, 1976

Volume 1, Number 7



P.O. Box 1113, East Lansing, Michigan, 48823

# The Media Guild

Dear people,

I really enjoy your magazine! I eagerly read each issue from cover to cover. The exuberance which you and your contributors convey is great.

My major abstract interest is in the utopian potential of computers. *Dream Machines*, for example, as a sort of personal utopian vision. Berkeley's *Community Memory*, and Resource One's projects, represent a community vision, and I would like to know more about such. All your efforts, since they demystify the power of computers, give people a feeling of power which, itself, is subversive.

In a more practical vein, I would like to know more about what people at large, time-sharing computers (e.g. universities) are doing to share resources, have fun, and do useful things. Do people keep indexes or public files of games, for example, or of mailing label programs, check-book balancers, or other generally handy things?

Yours truly,

Mark Charles  
The Media Guild  
P.O. Box 1113  
East Lansing, Michigan 48823



# DRAGON SHAK

### RENEW NOW

If you haven't renewed, your subscription probably ends with this issue. Volume 5 begins with the July 1976 issue . . . so, RENEW NOW!

### MINICALCULATORS INFORMATION RESOURCES

is about using minicalculators in the classroom. Free from National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA. 22091

### STAR TREK IN TINY BASIC?

An intriguing rumor just floated in - some people say that Lichen Wang has STAR TREK running in his very own TINY BASIC ... the whole thing in 6K in an ALTAIR or IMSAI. We plan to have Lichen's TINY BASIC in DR. DOBB'S JOURNAL, Vol. 1, no. 4. Hang in there, Tiny Trekkies!

### SYNERGISTIC BEER DRINKING

If you should materialize in Menlo Park, CA on a Friday afternoon, join us for Synergistic Beer Drinking at Pete's Harbor in Redwood City, the Village Host in Menlo Park, or another of our conference rooms. Call us (415)323-6117 for exact locale.

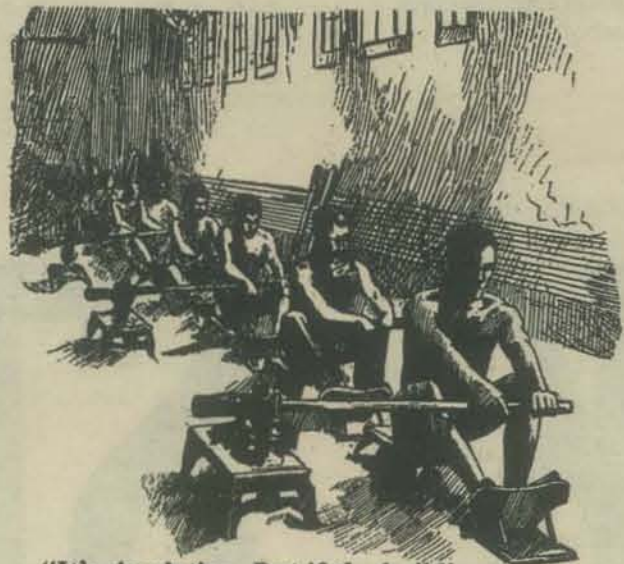
### STAR TREK IN ALTAIR BASIC

TREKKIES, rejoice! STAR TREK is now available in ALTAIR BASIC for your friendly ALTAIR 8800 or IMSAI 8080. RUNs in a 12K machine. Crunched for you in strange ways by Lynn Cochran. Read about it in the June 1976 issue of INTERFACE. Check with your local computer store (see list on page 27) or write to: McPheters, Wolfe & Jones, INTERFACE, 6515 Sunset Blvd., Suite 202, Hollywood, CA. 90028

### NAUCAL CONFERENCE 1976

National Association of Users of Computers Applications to Learning . . . Conference 1976 . . . Ramada Inn, Portland, Oregon, Oct. 28-30, 1976. Want to give a paper? Send your abstract by July 1, 1976 to: Marcia Zuber, Conference Chairman, P.O. Box 200, BEaverton, OR 97005.

**ELECTRONIC PROJECTS NEWSLETTER** features a complete "student-tested" electronics project in each issue. Helps the eager student transform a handful of parts into an interesting electronic gadget. The April 1976 issue tells how to build an electronic die. Published monthly September thru May by Robert Delp Electronics, Box 1026, Fremont, CA. 94538. \$10/yr.



**"It's simulation. But if the building moves, then it's something else--"**

\*\*\*\*\*

### TIES SUMMER WORKSHOPS

TIES will offer lots of workshops for educators in the summer of 1976. Including: Elementary School Computer Application Survey, Enrollment Projection, Instructional Dialog Facility, HP Math Drill and Practice, Secondary School Computer Applications Survey, Introduction to BASIC, Advanced BASIC, Political Science Simulations, and Comprehensive Achievement Monitoring. For info, write (quickly!) to: TIES, 1925 W. County Rd. B2, St. Paul, MN. 55113

### HELP ME, PLEASE

A well-known catalog house has discontinued my game, KRYPTO. They were the only ones who handled it, and now I've got a lot of them in storage. I'd rather sell them by mail at a reduced price than go through the headache of trying to find another distributor.

KRYPTO is a really fine arithmetic game for grades three through twelve. If you don't honestly agree, I'll give you your money back. Ask another teacher about KRYPTO, many already know about it.

I'll send you the deck and the instructions (exactly the same thing they offered in the catalog) for a dollar, complete. Send me a large self-addressed envelope-I'll put the stamps on it, and you'll get the game back by return mail. California residents must add sales tax.

send to: F. O. Armbruster  
P. O. Box 4863  
Agnew Station, CA 95054

Or, if you just send a stamped envelope, I'll send the instructions and then you can decide if you want the game.

### "IDEAS"

DEC(Digital Equipment Corporation) did a clever thing. They took a bunch of stuff from their educational software catalog (stuff they want to sell to you ) and put it into a big, thick, inefficient book (lots of white space). You can buy it for "only" \$10. It is called IDEAS (Index and Description of Educational Application Software), weighs 1 1/2 pounds, is almost 1 inch thick. Get it by sending 10 hard-earned or ill-gotten dollars to

Digital Equipment Corporation  
Communication Services NR2/M15  
444 Whitney St.  
Northboro, MA 01532

Ask for IDEAS Book, Part Number EA 05857

### NASAGA

The basic goal of the North American Simulation and Gaming Association (NASAGA) is to advance an optimal, RESPONSIBLE application of the technique of simulation and gaming. The objectives of this Association are:

- ... to facilitate communication among persons interested in the field of simulation and gaming;
- ... to promote the training of specialists in the field of simulation and gaming;
- ... to facilitate communication between these specialists and policy-makers, students, and other concerned persons; and
- ... to promote the development of better techniques in the field of simulation and gaming.

You can become a charter member for \$5. For info: NASAGA c/o COMEX, U.S.C., University Park, Los Angeles, CA 90007. [I joined.]

**ACTIVE FILTER COOKBOOK**  
Don Lancaster. 1975. 240pp. \$14.95.

This book shows how to select and design the filter type you want. Using simple math, you can design basic filters, operational amplifiers, tunable filters. Get this book and activate!

**ADVANCED APPLICATIONS FOR POCKET CALCULATORS**  
Jack Gilbert. 1975. 304pp. \$5.95.

At last! A book to help you use all those funny looking keys on scientific calculators such as the Hewlett-Packard HP-45 and Texas Instruments SR-51. Includes simple stuff like cosine law solutions and Saturn Maneuver calculations.

**ALPHA-NUMERIC MUSIC WITH AMPLITUDE CONTROL**  
Malcolm T. Wright. 1975. 23pp. \$2.00 (Xeroxed)

Program the Altair 8800 computer or any 8080 CPU chip for a complete 6 octave music system with tempo and duration control and DAC (digital-to-analog converter) for playback. Far out music! Or, far in!

**BASIC**  
Albrecht, Finkel and Brown. 1973. 325pp. \$3.95.

A self-teaching text with self-tests at the end of each chapter and answers that refer back to the frame numbers in each chapter. You need no special math or science background to learn BASIC from this superb text. Includes strings, files, matrix operations, and invisible incantations.

**Basic BASIC**  
James S. Coan. 1970. 256pp. \$3.95.

This book is an attempt to incorporate computer programming, using BASIC and the teaching of mathematics. The first seven chapters may be studied concurrently with a first year algebra course. Chapters 8 through 13 are applications oriented, covering many of the popular topics of precalculus mathematics, with all of the required algorithms developed in the text.

**BASIC PROGRAMMING**  
Kemeny and Kurtz. 1961. 1971. 150pp. \$6.95.

On the first day, Kemeny and Kurtz invented BASIC. Then they wrote a book. We don't recommend this book for *learning* BASIC but we do, do, do recommend it as a reference guide, applications resource, and idea generator for people who already know a little BASIC.

**BIOFEEDBACK AND THE ARTS**  
Edited by David Rosenboom. 1976. 162pp. \$12.95 (Hardbound)

This book sent me spinning off in new directions. It reports on work done by artists . . . dancers . . . musicians . . . researchers in biofeedback and the arts and neurological information processing related to aesthetic experience. Here is a partial table of contents:

Homuncular Homophony . . .  
Instrumental Control of EEG Alpha Activity with Sensory Feedback  
In Tune: Some Early Experiments in Biofeedback Music (1966-74)  
On Being Invisible  
Considerations for the Design of Low Cost Biofeedback  
Instrumentation  
A Bibliography of Source Materials on Biofeedback and the Arts

**THE BUGBOOK I & II and INSTRUCTORS WORKBOOK**  
Rony, Larsen & Braden. 1974. two volumes plus workbook. \$16.95

Ninety logic and memory experiments with TTL Integrated Circuits, with much of the 'dog-work' of putting the less glamorous sub-modulars together, already done.

**CALCULATOR CALCULUS**  
George McCarty. 1975. 254pp. \$8.95.

This book is about the calculus. What distinguishes it, however, from other books is that it uses the pocket calculator to illustrate the theory. A computation that requires hours of labor when done by hand with tables is quite inappropriate as an example or exercise in a beginning calculus course. But that same computation can become a delicate illustration of the theory when the student does it in seconds on his calculator. The machine is like a microscope, and its magnification is a hundred millionfold.

**COMPUTER LIB/DREAM MACHINES**  
Theodore Nelson. 1974. 186pp. \$7.00.

Man has created the myth of the computer as cold, oppressive and sterile. This book sees them as veritable panoply of things and dreams. Enuf info for 3 books.

**COMPUTERS AND COMPUTATION**  
Scientific American. 1950 through 1971. 280pp. \$6.00.

Twenty-six articles from Scientific American about computers, what they are, how they happened, how they work and how they are used.

**ELECTRONIC PROJECTS FOR MUSICIANS**  
Craig Anderton. 1975. 134pp. \$6.95

The first 4 chapters are an introduction to basic electronics, the fifth contains 19 projects including a preamp, metronome, 8-in one-out Mixer, electronic foot switch and ultra-fuzz, concluding with a section on trouble-shooting and access to further information. **The best book we have seen for the beginning kit builder.**

**FUNDAMENTALS AND APPLICATIONS OF DIGITAL LOGIC CIRCUITS**  
Sol Libes, 1975, 192 p. \$5.98

Learn the basics of digital logic. Enough info to be used as a reference for deconfusing semiconductors, logic and logic classes, binary arithmetic, memory types, and analog-digital devices.

**FUN AND GAMES WITH THE COMPUTER**  
Edwin R. Sage, 1975, 360 p. \$5.95

An introductory text which teaches BASIC computer programming through games of chance and strategy. Most of the games in the text can be run on a minimum 4K computer and remainder on an 8K system.

**GAMES, TRICKS AND PUZZLES FOR A HAND CALCULATOR**  
Wallace P. Judd, 1974, 1974 100p., \$2.95

This book is for anyone who owns or intends to purchase a hand calculator, from the most sophisticated to the basic "four banger." Also good clean fun.

**GAMES WITH THE POCKET CALCULATOR**  
Thiagaragan & Stolovitch, 1976 54 p. \$2.00

No tricks or puzzles, the 24 games in this book fall within the classical definition of interactive activities. They all involve an element of conflict and competition with rules for making moves and ending the game. Fast paced games that do not require being a mathematician or having more than one "four banger" per game.

# BOOK STORE

**GETTING THE MOST OUT OF YOUR ELECTRONIC CALCULATOR**  
William L. Hunter, 1974, 204 p. \$4.95

A "how to" book for people who want to use electronic calculators for basic math, homework, unit pricing, grocery shopping, simple interest, income tax preparation, and running the modern kitchen.

**INTRODUCTION TO MICROCOMPUTERS**  
Adam Osborne & Associates, Inc. 1975, 384 p. \$7.50

People call PCC and ask for a book which is a good introduction to microcomputers. Previously we have had to say that there really isn't one—but now there is—and this is it.

**MATH, WRITING & GAMES IN THE OPEN CLASSROOM**  
Herbert R. Kohl, 1974, 252 p., \$2.45

A careful analysis of the ways in which games can be used for teaching descriptions of countless games and learning ideas, that stimulate children's imagination so they can comprehend complex mathematical concepts, strategy and probability theory. Herb Kohl loves kids - and it shows in his book.

**MY COMPUTER LIKES ME WHEN I SPEAK IN BASIC**  
Bob Albrecht, 1972, 64 p., \$2.00

This "learn by doing" workbook introduces BASIC to young or old, with no previous computer experience or knowledge or programming. Designed to be used with frequent access to a time share terminal.

**101 BASIC COMPUTER GAMES**  
Editor, David Ahl, 1974, 250 p., \$7.50

This book contains instructions for 101 games, all in BASIC. Most games are simulations of sports, card games, board games and games of chance.

**PRINCIPLES AND PRACTICE OF ELECTRONIC MUSIC**  
Gilbert Trythall, 1973, 214 p. \$6.95

The first few chapters are concerned with the relationship between waveform and sound quality, and with the elementary electronic concepts one needs to know in order to produce the desired waveforms. At this point the author begins to build, piece by piece, and electronic music studio—your own synthesis and recording facility. Uncle Gilbert tells how to translate conventional musical notation of all forms into synthesis instructions. Also included is a brief history of electronic music, how to get and protect a copyright and a 200 word glossary of electronic music terminology. Very elementary, and nothing about computer music.

**PROBLEMS FOR COMPUTER SOLUTION**  
Gruengerger & Jaffray, 1965, \$7.95

After you learn to talk to computers, what do you talk about? If you want inspiration, this book has 92 problems, something for everyone — easy stuff, hard stuff, math stuff, non-math stuff, all beautifully written.

**PROBABILITY**  
D.J. Koosis, 1973, 163, p. \$2.95

This book is for people who want to learn probability. Work your way thru this book before you take STAT. 1.

**PROF E. MC SQUARED'S (ORIGINAL FANTASTIC & SATISFYING CALCULUS PRIMER)**  
Swann and Johnson, 1975 111 p., \$2.95

Our original idea was this: if we would find characters for each mathematical concept in differential calculus, and set them all to work, the result would be far more lively and involving than the usual textbook trip. What happened along the way was that the characters acquired more life than we had expected and sometimes seem to charge off in their own directions. So, if they lead you astray, go back and re-read what you have already done and try the exercises - we have left room to work them out in the book, and the answers are in the back.

**PROFESSOR GOOGOL'S MATH PRIMER**  
Sam Valenza Jr., 1973, 144 p., \$3.25

This is a math text book with a sense of humor—an experiment in the visualization of mathematical ideas through cartooning. Effective and interesting communication of a sometimes unexciting subject. Mad, mad, visual stuff makes this great for all you kids, young and old.

**PROGRAMMING PROVERBS**  
Henry F. Ledgard, 1975, 134 p. \$5.95

Principles of good programming with numerous examples to improve programming style and proficiency. Examples in ALGOL 60, BASIC, FORTRAN and PL/1. Long section on programming the game KRIEGSPIEL CHECKERS.

**PCC GAMES PROGRAM LISTINGS**  
PCC, 1974, 31 p. \$2.00

This booklet contains the bare program listings of the computer games presented in Volumes I and II of People's Computer Company. They are written in HP 2000F time shared BASIC and may easily be modified for other systems;

**STATISTICS**  
D.J. Koosis, 1972, 282 p.. \$3.95

This book is for people who want to learn statistics. Do this book before you take STAT 1.

**TEACH YOURSELF BASIC VOLUMES 1 and 2**  
Technica Education Corp., 1970, 64 pp each, \$1.95 each

Written by a Dragon with a seventh grade mind, this book covers teletype fundamentals and BASIC instructions in Book 1 and more sophisticated instructions for the novice in Book 2. Slooow and easy learning.

**THE ENERGY PRIMER**  
Portola Institute, 1974, 200p. \$5.50

A comprehensive guide mostly made up of information usable to the individual or small community having an interest in non-depletable energy resources. Sources, prices and application information are enough to permit an economic analysis just from the info contained in this book. From the people who brought us the Whole Earth Catalog.

**TTL COOKBOOK**  
Don Lancaster, 1974, 328 p., \$7.95

The author discusses what is required to understand and use transistor logic, assuming the reader is familiar with electronics up to and including transistors. Covers basics of construction and a discussion of the different types of TTL. An excellent instructional aid which doubles as a quick reference guide to the 7400 series.

**II CYBERNETIC FRONTIERS**  
Stewart Brand, 1974, 96 p., \$2.00

- I. Both sides of the necessary Paradox (Conversations with Gregory Bateson)
- II. Frantic Life and Symbolic Death among the Computer Bums (Space war freaks should check this one out.).

**WHOLE EARTH EPILOG**  
Stewart Brand, editor., 1974, 318 p., \$4.00

The Epilog functions as an evaluation and access device. With it the user should know better what is worth getting and where and how to do the getting. The Epilog commences where the LAST WHOLE EARTH CATALOG left off and does not repeat any of the material.

**WHAT TO DO AFTER YOU HIT RETURN**  
of PCC's First Book of Computer Games  
PCC, 1975, 157 p., \$6.95

All the games are run in HP 2000F BASIC. Why Computer Games? A simulation is a model of a real-life situation. The computer does the complicated bookkeeping - you create the initial conditions, manipulate the parameters, and analyze the results. The effects of each parameter can be isolated; the simulation can be repeated as often as you want.

**DRAGON SHIRTS**  
Nancy Hertert, 1974, \$3.50

Three-Headed Dragon (green) on a white or bright yellow T-Shirt. Available in sizes S, M, L, XL, and child's 8, 14, and 16.

**NEW**

**BOOKS**

WELL, NOT ONLY DO WE HAVE A HOT NEW 'COOKBOOK' FROM DON LANCASTER, BUT, ALSO, WE GOT A WHOLE BRAND NEW SUBJECT SECTION, NAMELY *THE SOFTWARE OF THE HUMAN BRAIN/MIND*. WITH A TITLE LIKE THAT, THE SUBJECT IS LIABLE TO BE WIDE OPEN - TO INCLUDE ANYTHING THAT PERTAINS TO THIS TENUOUS AND MYSTERIOUS ACTIVITY WE CALL THOUGHT. THAT'S, POTENTIALLY, ANYTHING YOU CAN THINK OF ABOUT HOW YOU THINK, WHAT YOU THINK, AND WHY. NOW, YOU CAN IMAGINE THAT A COMPUTER WITH THE DIVERSITY AND SCOPE OF THE ONE YOU CALL YOUR VERY OWN, IS GONNA HAVE 'MUCHO' PROGRAMS. IT'S GOING TO HAVE PLENTY OF ROOM, TOO MORE BYTES THAN YOU'VE EVER FONDESTLY DESIRED. BIG AND COMPLEX, TO SAY THE LEAST.

THE SIX NEW BOOKS LISTED BELOW ARE A START. LOOK FOR ARTICLES AND REPRINTS BEGINNING THIS ISSUE (see page 9), EXPLORING THE PARAMETERS AND POTENTIALS OF THIS ( SOMETIMES ) CONSCIOUS COMPUTER. IF YOU HAVE SUGGESTIONS FOR ANY BOOKS THAT YOU THINK WOULD INTEREST OTHER P.C.C. READERS, SEND 'EM TO

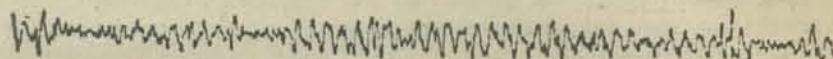
...Daniel Rosset

**BODY TIME**

Gay Gaer Luce. 1973, 411 p., \$1.25

"An absorbing and fully-detailed treatment of a subject we're all at least vaguely aware of--the physiological, social, and emotional rhythms in our lives. While there are enough studies and experiments to boggle the brain, the author retains the proper perspective between detail and readability. Read the book and you cannot help but gain a greater awe, appreciation, and respect for the beautiful complexity of the human body--leading to greater care of/for and understanding of your own."

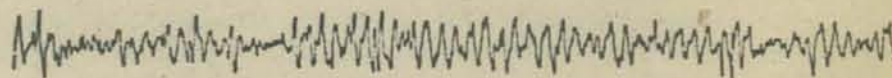
--Lt. General Gadabout



**NEW MIND, NEW BODY; BIO-FEEDBACK: NEW DIRECTIONS FOR THE MIND**

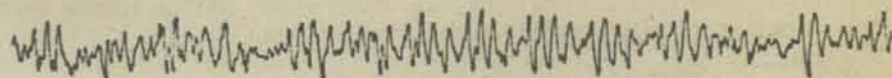
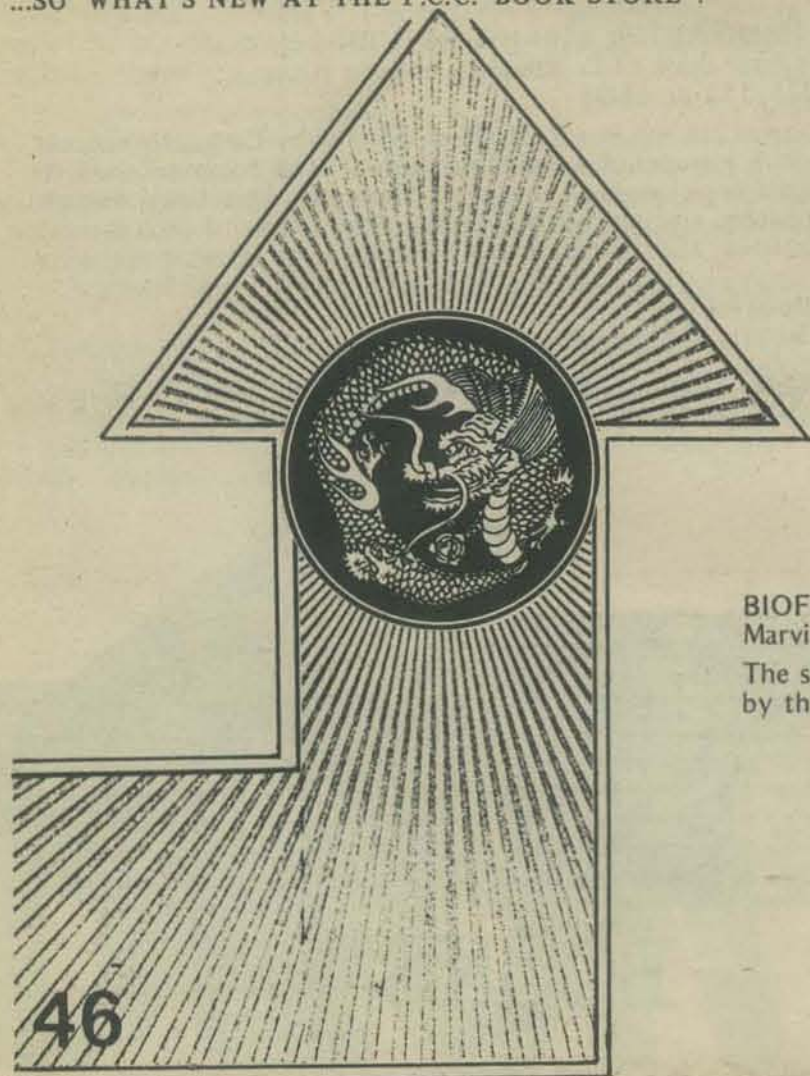
Barbara B. Brown Ph.D., 1974 523 pp., \$2.50

A basic source for the technician, home or otherwise. This is the definitive text on biofeedback, presented simply and clearly, while retaining all the worth of traditional scientific methods. ...D.R.



**NEW**

...SO WHAT'S NEW AT THE P.C.C. BOOK STORE ?



**SEEING WITH THE MINDS EYE: THE HISTORY' TECHNIQUES AND USES OF VISUALIZATION**

Mike Samuels, M.D. and Nancy Samuels, 133 p., 1975, \$9.95

Two questions raised by brainwave work stand out, what do I do when I've developed good Alpha-Theta spaces, and how do I build expertise in these spaces from waking state. The text and visual imagery are super and far beyond medical shrouds you find in biofeedback material.

...Peter Wonacott

**BIOFEEDBACK: TURNING ON THE POWER OF YOUR MIND**

Marvin Karlins and Lewis M. Anderson, 1973, 190 P., \$1.25

The spirit of adventure in the blossoming biofeedback field is well expressed by this widely read classic. It remains the best full field introduction.

...Peter Wonacott

**EYE AND BRAIN: the psychology of seeing**

R.L. Gregory. 1973. 253 pp. \$2.95.

Beautifully illustrated and easily understood, this book is it for learning how the eye and brain function together. This book sheds new light on looking--what you see isn't necessarily what you get. --Dan'l R.



TV TYPEWRITER COOKBOOK  
Don Lancaster, 1976, 256 p., \$9.95

Another fine "cookbook" from Don Lancaster! And it really is a cookbook, not just a recipe book. Although there are plenty of schematics, the emphasis is on what the problems are in designing a TV typewriter and various ways of solving those problems. I especially like the discussions of the advantages and drawbacks of different designs.

There is no complete plan for a TV typewriter here. It's up to you to put together the right pieces to get one that does what you want. You should have a fairly good understanding of digital circuitry to get the most out of the book, although it contains a lot of useful general information.

...Mike Geary

THE UNIVERSAL TRAVELER

The Universal Traveler, - a soft-systems guide to: creativity, problem-solving, and the process of reaching goals. By Don Koberg, and Jim Bagnall., 1974, 128 pp., \$4.95

A definitive manual presenting a logical systematic approach to the Creative problem solving of everyday life, employing graphic visualization as well as statistical representation. Written in the belief that the same mathematical discipline used in solving complex world problems can be utilized in our everyday lives for the attainment of systematic and creative resolution of everyday problems.

... J.D. "Whyit" Erp

MICROPROCESSOR/MICROPROGRAMMING HANDBOOK  
Brice Ward 1976. 294 pp; \$ 6.95

The cover blurb indicates this book is "an authoritative, practical guide to microprocessor construction, operation, programming, and applications!" It isn't! For the most part, it is simply a repackaging of the information found in specification manuals for the Intel 8080, Intel 4040, and Motorola 6800 LSI microprocessors together with a smattering of transition paragraphs and misinformation. Even the examples are identical to those found in the Intel 8080 and 4004 reference manuals.

The emphasis is almost exclusively on the internal organization of the various processors. Some little space is devoted to the various integrated circuit technologies. One chapter is devoted to 'machine language programming' while another discusses "assembly language programming"—but neither ever really address the problem of how to solve a particular problem programatically. They simply show about programming (if they get that far). As to applications, I found nothing substantive; the timing signals and pinouts for the various processors were discussed, but there was nothing detailed about the hard problem of interfaces to the real world.

Worse, the author is fond of defining terms, and does so without really understanding them. Reverse Polish is not the same as a push-down stack or a LIFO (last in first out), list. And micro-programming has little or nothing to do with most LSI microprocessors: the former refers to a means of structuring the data pathing of hardware using memory; the latter refers to small computers implemented in one or two packages using integrated circuit technology. There's a world of difference. That a supposed 'expert' would confuse the terms is disturbing.

Yet, the book is not that bad. If you want a compendium of machine reference manuals you could do worse. Just don't believe everything he says.

...D. Allison

# STUFF

THE BEST OF CREATIVE COMPUTING, VOL. 1  
David Ahl, editor. 1976. 328 pp. \$8.95.

The diversity here is staggering. Volume 1 has articles and fiction about computers, games for calculators and computers, cartoons, graphics, and book reviews. Over 170 authors represented in over 200 separate articles. --Dan'l R.

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*Our apologies to SATURDAY REVIEW and author SUSAN SANDS who we failed to acknowledge for the reprint of "Learning Fair" in our last issue. The article was reprinted with permission from SATURDAY REVIEW, copyright © 1973.*

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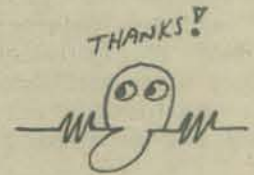
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The Computer Corner, Harriet Shair  
John Ribbe



## The Cutting Edge

Now that Dr. Dobb's Journal is here to deal with the present, PCC will move out into the future. The next year or two of PCC will skim the edge of realizable fantasy while holding on to the realities of computers in schools, homes and in the hands of people. Watch for—

- Music! Music! Music!
- The San Andreas Fault Caper
- Biofeedback
- Improbable Art
- The Impossible Game (The Don Quixote Starship)
- The Care and Feeding of Computer Numbers
- Machine Language Programming for People and Dragons
- New Ideas for Computers in the Classroom
- A New FORTRAN MAN Adventure
- New Ways to Learn BASIC
- Letters! Letters! Letters!
- Games! Games! Games!

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