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People's

Computer

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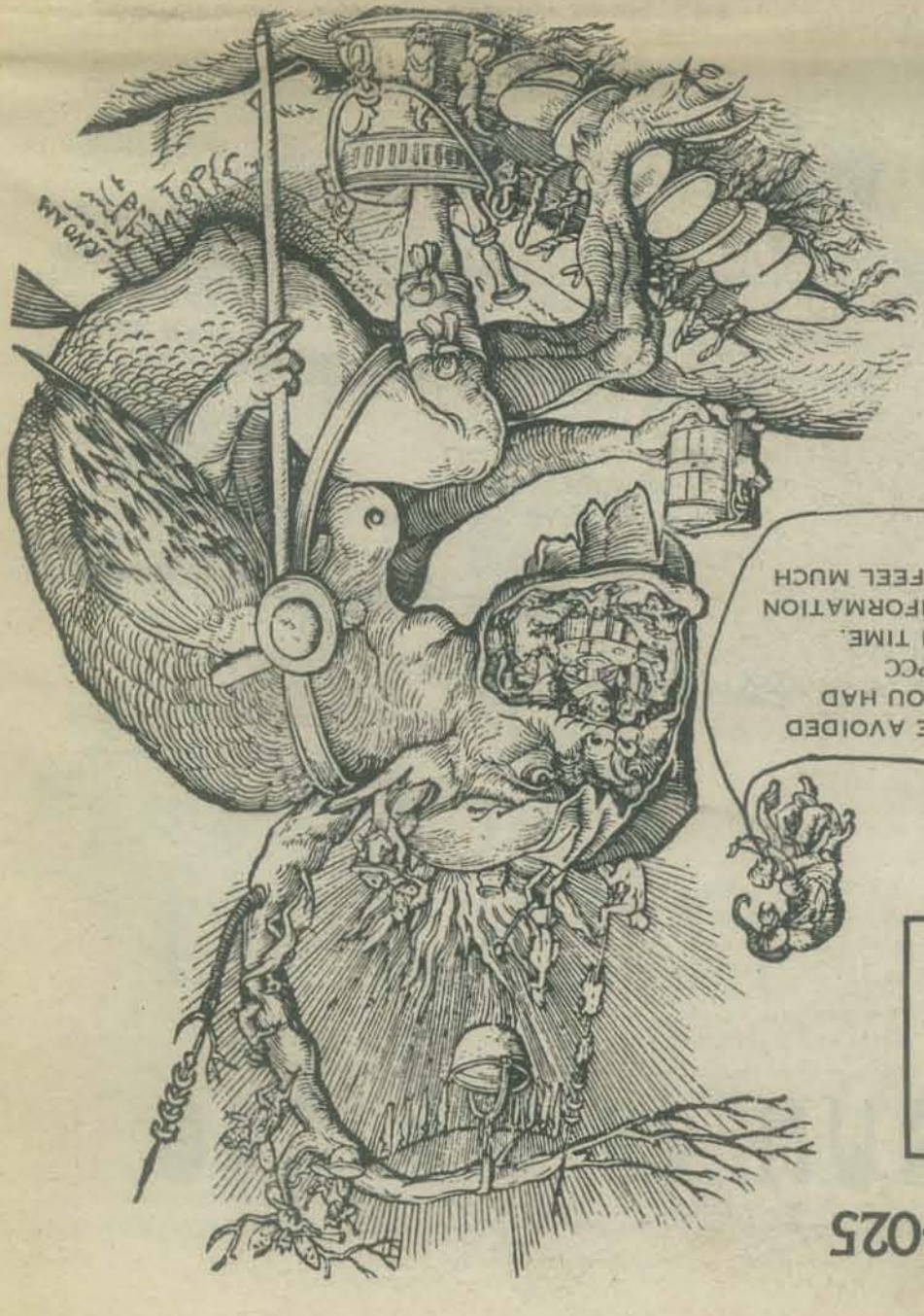
PLEASE SEE PAGES 19 - 22 FOR MORE ABOUT THE LEARNING FAIR.



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STRTRK: A 2 TTY GAME

If you've used a computer much, you've undoubtedly seen many computer games where a person plays a solitary game with the computer's assistance or plays a game against the computer. But games involving more than one player, at more than one terminal, can be much more exciting to play, and more interesting to write!

In the example given here, STRTRK, one player plays against another; but you could also have more than two players, or let the computer also play. STRTRK is written in BASIC for an HP 2000F.

Most time-share systems do not have easy methods for communicating between two or more terminals. But if you are clever, there is usually a way to do it. Here is how one of the programs does it:

THE MAKING OF STRTRK

The STRTRK program uses a very simple method of communication. Two two-record files are used to send data from one user to another. It will work on any HP system that has the ASSIGN statement, but can be used only on non-A idcodes, as A idcodes work slightly differently. First it is necessary for each user to get one file to read from and one to write on. The file will be used for the other purpose on the other terminal, so each reads from the file the other writes on and vice-versa. This is done by ASSIGNing the files and looking at the return value. When you ASSIGN the first file, a value of 1 tells you the other user has already run the program and is using the file, so it will be your read-file and the second file will be your write-file. If the value is 0, this means you ran first and the first file will be your write-file until a return value of 1 indicates the other user has ASSIGNed it, and you must ASSIGN some other file, like $ASCII, to "let go" of the second file between checks so the other user can "get" it. Once you have your write-file and read-file figured out, you can send data back and forth.

To understand how data is sent, it is first necessary to understand a feature of HP files called file buffers. For each file your program uses, a one-record "buffer" is kept in the computer's memory. When you want to read from a file, the computer checks to see if the record you want to read from is in the buffer. If so, it reads from it. Otherwise, it copies the desired record from the file into the buffer so you can read from the buffer. A similar process is used to write into the buffer. [Some details are not given here or are over simplified since they do not strictly apply to the application being discussed. PSC Publication 1:2-15, available at cost from PSC, explains file buffers in detail.]

Each user (or user's program, actually) writes two numbers in record 1 of his write-file. I will call these numbers the "new-data-flag" and the "got-data-flag". They are used to control the transfer of data between the users. To send data, the user's program writes the desired data in record 2 of its write-file. (Remember, this will really go into the buffer, so any old data from a previous transmission will still be available to the other user, as it is still in the file.) Then the program reads in the flags. This is done by reading to record 2 in the read-file, then to record 1, which will make sure a new copy of record 1 is read from the file. The value of the got-data-flag is checked against its previous value (which was stored in a variable). If it is still the same, this means that the other user hasn't read the data from last time yet, so you'd better not print over the data in record 2 of your write-file yet! The program checks the flags periodically (using an ENTER statement between checks to kill time) and when the got-data-flag is different, it remembers its new value in the variable and continues to transmit as follows. The program writes the new-data-flag and got-data-flag in record 1 of its write-file (this causes the data in record 2 to actually be written from the buffer to the file) as the same values that were previously there but compliments (changes 1 to 0 or 0 to 1) the value of the new-data-flag. Then record 2 of the write-file is accessed (with a READ #X,2 for example) to make sure the buffer (of record 1) is written back on the file.

To receive data, the program reads in the flags as described above. If the new-data-flag is different than its previous value, this means there is (obviously) new data. Otherwise, there is no data and the program can either wait for data (with ENTERs) or go on doing something else. If there is data, it reads to record 2 of the read-file to be sure the data is in a buffer, then writes its flags in the write-file, complimenting the value of the got-data-flag to indicate it has the data.

FROM PSC-ALF

STRTRK is an involved game, for those who like to play complex (and long) games. The object is described in the sample run. The player must pilot a star ship; a simple task for the typical star ship captain with his (or her) years of training, but not such an easy thing for the average player. Commands like WARP:2,.7 are used to control the ship. That example applies an acceleration of warp 2 for .7 verts (the game's time unit which allows velocities to be expressed in sectors per vert). In order to stop, you would then need to ROTATE:180 and WARP:2,.7 again to kill off your accumulated velocity. The closely-packed stars in the area require constant attention to the long-range scans to avoid collisions. At first, extreme caution is required, but soon the clever player knows his way around (the stars are always in the same place, from game to game, so you can make maps). Star bases are scattered around, and if you get close to one you either refuel or are killed, depending on whose it is (indicated by a short-range scan but not a long-range one). You can only refuel from a given base once in any given game. A variety of commands allow you to accelerate, turn the ship to any angle, set phaser firing levels, fire phasers at any desired angle, apply energy to the screens, talk to the other ship, take scans, and get status reports on your speed, course, location, destination, and energy levels.

Below are three samples from the 4-page "Owner's Manual" which STRTRK will print should anyone be foolish to answer "yes" to "Instructions?". It tells all about each command, gives examples, and a few jokes for the trekkies.

STARSHIP MODEL 2000 OWNER'S MANUAL Stardate 2127.3

Congratulations on choosing a STARSHIP ENTERPRISES, INC. starship model 2000K (Klingon) or 2000F (Federation). Each starship is hand crafted to give years of trouble-free operation. Your starship is guaranteed for 5 years or 5000 light years which ever comes first. Should your starship ever need repair, simply tow it to your nearest STARSHIP ENTERPRISES dealer for free repair within the guarantee period.

Although designed for a crew of two to four hundred, the controls of the starship are so simple they can be completely taken over by three or four unarmed children in Auxiliary Control (when controlled by an alien intelligence). Your ship can hold nearly one million energy units and can be refueled by your starbase remotely up to about two sectors away. The deflectors contain their own energy banks, also capable of holding about one million units. Deflector screens may be up when firing and refueling, and can protect your ship even from planetary phaser banks such as the type used at starbases (unless ship is within about two sectors of such phaser banks). Sensors have been pre-set to show Klingon/Federation space from quadrants 0 through 3I4 in both X and Y directions. Romulan space (which lies outside these Quadrants) is not shown by the sensors since the Romulan Cloaking Device interfers with the scan (this is not a defect).

Short range scans show four sectors in all directions. Example:

```
          160                 161
        2  3  4  5  6  7  8  0  1
      ---------------------------
139 7 !  !  !  !  !  !  !  !  !  !
    6 !  !  !  !  !  !  !  !  !  !
    5 !  !  !  !  !  !  !  !  !  !
    4 !  !  !  !  !  !  !  !  !  !
    3 !  !  !  !  !(+)!  !  !  !  !
    2 !  !  !  !  !  !  !  !  !  !
    1 !  !  !  !  !  !  !  !  !  !
    0 !  !  !  !  !  !  !  !  !(B)!
138 8 !  !  !  !  !  !  !  !  !  !
      ---------------------------
```

SECTION IV LIFE SUPPORT

Life support requires a mere 1 energy unit every Vert. The computer will prevent you from falling below a 5 unit margin with normal commands. Failure to keep at least 1 unit available results in destruction of the ship's crew. This does not damage the starship.

TTY 1

```
RUN
STRTRK

Instructions?No
WAIT...LOOKING FOR OTHER USER.
COMMUNICATIONS ESTABLISHED.
Federation or Klingon?Federation
Difficulty factor?Easy
Location difficulty?Regular
What is your name?  CAPTAIN Kwirk
Difficulty factor for this game: easy.
Message from Starfleet Command:

An object, the nature of which Starfleet Command is not disposed
to admit, is known to be located currently in the area of:
Quadrant (167,135)  Sector (6.000,2.000).

Since you are the only ship in the area, it is essential that you
destroy the object before it can be recovered by Klingon agents.
Our information indicates only one Klingon ship is in the area,
commanded by the notorious Captain Kangaroo.
If possible, destroy the Klingon ship and we will recover the object.
Intelligence reports he is in the area of:  Quadrant (163,124).
Do not attempt to recover the object since it is equipped with a
--shudder--harmonic neutralizer, which you have no defense against.
We must assume the Klingon ship is capable of recovering the object.
We do know that the harmonic neutralizer has a range of 4 sectors.
The object also has a deflector screen currently at force 25702
Starfleet Command out.  Good luck, Captain Kwirk.
750000-position
Current: Quadrant (165,146)  Sector (0.000,3.000)
750000-ship to ship:Die Klingon dog!!!
750000-help
Available commands:
CONTINUE  DEFLECTOR SCREENS  DESTINATION  FIRE PHASERS  HELP  PHASERS
POSITION  ROTATE  SCAN  SHIP TO SHIP  STATUS  TRANSFER ENERGY  WARP
750000-def:15000
735000-phasers:700000
735000-fire:-95.19
Ship's movement for 1 vert.
Sensors indicate phasers on target, Captain Kwirk.
Sensors indicate enemy ship completely destroyed, sir.
Congratulations, sir!  You win!

Direct COM mode.  Each line you type is sent to the other user.
Start a line with  GO!  to play again.

The Feds win, of course!
%$$%$#!PP$!!!!
>Klingons are only good for panty hose!
```

Easy, Regular, or Hard.

Regular or Hard.

Quadrant is 9x9 sectors.

(the amount of power left)

set up screens, as he is open to attack.

← star

← ship

← base

But power will be reduced as much as the hit area is expanded.

← sent to TTY 2.

← From TTY2

Klingon panty hose?!??

TTY2

```
RUN
STRTRK

Instructions?No
WAIT...SEEKING COMMUNICATION PERMISSION.
COMMUNICATIONS ESTABLISHED.
Difficulty factor?Easy
Location difficulty?Regular
What is your name?  CAPTAIN Kangaroo
Difficulty factor for this game: easy.
Message from Empire Command:

An object, the nature of which Empire Command is not disposed
to admit, is known to be located currently in the area of:
Quadrant (167,135)  Sector (6.000,2.000).

Since you are the only ship in the area, it is essential that you
destroy the object before it can be recovered by Federation agents.
Our information indicates only one Federation ship is in the area,
commanded by the notorious Captain Kwirk.
If possible, destroy the Federation ship and we will recover the object.
Intelligence reports he is in the area of:  Quadrant (165,146).
Do not attempt to recover the object since it is equipped with a
--shudder--harmonic neutralizer, which you have no defense against.
We must assume the Federation ship is capable of recovering the object.
We do know that the harmonic neutralizer has a range of 4 sectors.
The object also has a deflector screen currently at force 25702
Empire Command out.  Good luck, Captain Kangaroo.
750000-scan:long
Long range scan:
     159 160 161 162 163 164 165 166 167
    -------------------------------------
 128 |   |   |   |   |   |   |   |   |   |
 127 |   |   |   |   |   |   |   |   |   |
 126 |   |   |   |   |   |   |   |   |   |
 125 |   |   |   |   |   |   |   |   |   |
 124 |   |   |   |   |   |   |   |   |   |
 123 |   |   |   |   |   |   |   |   |   |
 122 |   |   |   |   |   |   |   |   |   |
 121 |   |   |   |   |   |   |   |   |   |
 120 |   |   |   |   |   |   |   |   |   |
    -------------------------------------
745950-wait:1:1
Ship's movement for 1 vert.
SHIP TO SHIP:
  Die Klingon dog!!!
Sensors indicate phaser hit of magnitude 285 , Captain Kangaroo.
Sensors indicate we have been totally destroyed by phaser fire, sir.
You lose, sir.

Direct COM mode.  Each line you type is sent to the other user.
Start a line with  GO!  to play again.

The Feds win, of course!
>$%$$1%!PP$!!!!
Klingons are only good for panty hose!
>
```

looking for stars in the way. Should have

← star

← ship

← base

time wait between "turns".

If screens were on, would only have drained 285 energy units. Wouldn't even phase him!

3D

HOW CAN I GET TAPES OF STRTRK?
Send $2 plus enough postage for 8 oz (which, at current rates, is $.45 for third class, or $.90 for first class). STRTRK is on three tapes (it's big!). $2 is our cost *per reel*, so it costs us $6 to make a copy of STRTRK. Send appropriate money and postage if you order STRTRK. No instructions are included, but both programs can print their own.

WHAT ELSE CAN I GET FROM PSC-ALF? ***ATTENTION ALTAIR USERS!***
We sell program tapes, documentation, publications, and educational publications for HP system users. We are now starting an ALTAIR group and we will soon have programs for ALTAIR users. Write us and tell us what kind of things you want.

WHAT/WHO IS PSC?
PSC is the Programming Standards Committee of ALF. All software provided by ALF must meet the standards which are set by PSC. To make these standards, PSC takes advice from the people who buy PSC Publications and programs. The PSC Staff consists of programmers who work for or own stock in ALF.

WHAT/WHO IS ALF?
ALF is ALF Products Incorporated. We design, build, and sell electronic products. We have been making devices for use with HP timeshare systems or terminals. We now are starting to make devices for ALTAIR users. Write us and tell us what type of devices you'd like to have. We also make custom devices for those with special needs.

WHAT PROGRAMS DOES PSC-ALF HAVE?
So far, mostly subroutines and data-manipulation programs for HP systems. We have programs for punching and editing files. Routines to paginate, print the date, input and output strings and numbers in special forms. For the ALTAIR, we plan to write a very special Assembler/Editor, floating-point math routines, drivers and software packages for ALF products (such as our music synthesizer).

HOW DO I GET MORE INFORMATION OR PLACE AN ORDER?
For more information on PSC or ALF, just write us; tell us what system you have or use, if any (be sure to say which type of 2000 if you use an HP 2000 system) and what you are interested in. All orders to PSC must have cash with order (in U.S. currency, check, or money order payable to ALF Products Inc.), no COD or credit.

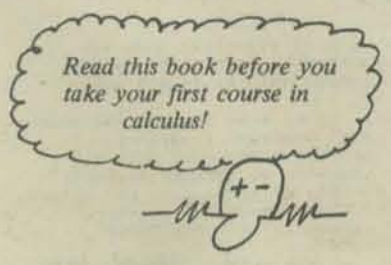
CAN I GET MY PROGRAMS IN THE PSC LIBRARY?
Yes. PSC accepts good programs which meet, or are at least compatible with, the various PSC standards. No payment can be made for programs. Only programs which the PSC Staff decides are useful enough and well-written will be accepted.

DOES PSC PUT OUT ANY REGULARLY PUBLISHED PERIODICAL?
Yes, the PSC Newsletter is published to announce newly available programs and publications. It, like all PSC Publications, is sold at cost (about 3¢ per sheet). The Newsletter also contains helpful programming hints and routines, jokes and programming challenges. Back issues are available. As an example, a programming challenge from the first issue was to write a program which would list itself when run (the list is the same as the run) without using any file except $ASCII. Another was to write a program two lines long which would run for a long time and then stop due to execution of the END statement, without using the TIM function.

Our address:
PSC of ALF Products Inc.
Attention: Philip Tubb
2130 Bell Court
Lakewood, CO 80215 (NOT Lakewood, CA. Be sure to write plainly.)

NEW BOOKS

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



Our original idea was this: if we could 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.

CALCULATOR CALCULUS
George McCarty, 1975, 254 pages,

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.

ADVANCED APPLICATIONS FOR POCKET CALCULATORS
Jack Gilbert, 1975, 304 pages, $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 Capture Maneuver calculations.

GETTING THE MOST OUT OF YOUR ELECTRONIC CALCULATOR
William L. Hunter, 1974, 204 pages, $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.

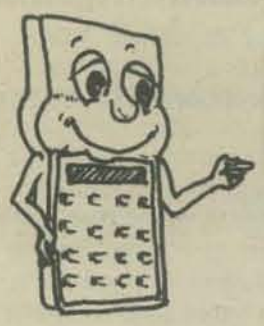
BIOFEEDBACK AND THE ARTS
Edited by David Rosenboom, 1976, 162 pages, $14.95 (Hardbound)

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

ARTICLES
- 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

PIECES AND IDEAS
- Portable Gold and Philosophers' Stones
- T'ai Chi Brain Wave Piece
- Biotelemetered Moon Walk
- Sound Sculpture

SEE PAGE 37 FOR ORDERING FROM PCC BOOKSTORE



Games With the Pocket Calculator

Sivasailam Thiagarajan & Harold D. Stolovitch

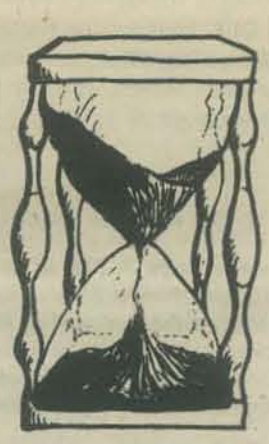
Each game is described in consistent format which makes selecting and learning the game easy. The special format which interweaves a complete sample game along with the rules to provide concrete illustrations has been found to be a most efficient teaching device.

The calculator revolution is spreading rapidly. The popularity of these handy devices has caused a profound shift in the way we teach, learn, and use numbers. Almost every day there is an article in some magazine commenting upon this phenomenon. Many books have appeared on the market, including some which deal with calculator games. However, on closer inspection, these "games" turn out to be tricks and puzzles. In contrast, the games in this book fall within the classical definition of interactive activities. All involve an element of conflict and competition, with rules for making moves and ending the game. In addition, the two dozen games described in this book share these features:

1. You do not need an expensive calculator. A cheap "four banger" with a six-digit display will work fine. However, if you have a sophisticated and expensive gadget, you can come up with variations which provide more exciting options.
2. You do not have to be a mathematician to play these games. All the games permit people at different levels to compete on satisfactorily equal grounds.
3. You don't need one calculator for each player. You can share a single instrument with all your friends and opponents.
4. You do not have to wait a long time before your turn. The games are fast-paced and permit immediate replay without loss of interest.
5. You do not have to play the same game again and again. The two dozen games have sufficient variety to intrigue those who love numbers and those who hate them. Although most of them require devious strategy, some have an exciting element of chance. And, all of the games permit variations so that you can add your own personal touch to come up with exciting new combinations.

Contents

PREFACE
A WHO'S CLOSER?
B TRIPLE NINE
A BLACK JACK
A THE MEAN GAME
A NUMBER PLEASE
B COUNTDOWN
B LUCKY SEVEN
B METRICATION
B NIM
B PLUS OR MINUS
B PRIME TIME
B 6 UP
B SQUARE BLUFF
B TOWARDS A MILLION
A UP, DOWN, REVERSE, 5-5-5
C TRIPLE TRIP
A-C THINK OF A NUMBER
C ONE WILL GET YOU TWO
C INTERPOL
C FIDDLERS FIVE
C BACK TO FRONT
B REFLECTIONS
A RIDDLED WITH WORDS
A-C DEFECT DETECTIVE
EPILOGUE
THE INFO SHELF



Up, Down, Reverse, 5-5-5

If you are looking for a quick-action game that's lots of fun and can also serve as an ice-breaker with any group, then this zinger is definitely it. Any three-digit number can become the base from which players try to score points. All they have to do is rearrange the original number in ascending, descending, or reverse order or come up with a 555 in one operation.

Triple Trip

The calculator's flexibility and instantaneous feedback capabilities suggest a wide variety of possible games. Here's another in our ongoing series that came to me while I was sitting in the bathtub the other day contemplating the endless ways some mason had fitted together a limited variety of wall tiles. The game is called TRIPLE TRIP because its object is to arrive at a three-digit number in which all three numbers are identical, using the least number of moves.

Fiddlers Five

It's amazing what you can do with a given set of numbers. This little game proves just how true that is. From a randomly generated five-digit number, all five digits must be manipulated to come up with only the first two digits of the original display. It can almost always be done in the four moves allowed. The winner is the one who either gets it right or comes closest to it.

NUMBER OF PLAYERS:
APPROXIMATE TIME REQUIREMENT:
SKILLS INVOLVED:
CHANCE FACTOR:
PLAY OF THE GAME:
VARIATIONS:
WINNING STRATEGY:

Reflections

6

A BRIEF HISTORY OF THE HUNTINGTON COMPUTER PROJECT

by Lud Braun & Mike Visich

The PCC Dragon asked us to tell his readers what the Huntington Computer Project is (or was), and here we are.

In 1968, there was the Pierce Report, which recommended that the Federal Government increase substantially its support of computers in education. The Johnson Administration responded by giving the National Science Foundation a lot of money to do this. NSF set up the Office of Computing Activities to supervise computer activities within the Foundation.

We were very lucky here because our timing was just right. Just a year before this happened, we were working with the Engineering Concepts Curriculum Project (ECCP) exploring the utility of time-shared computer terminals in five ECCP classes. Our experimental classes became very enthusiastic about the computer and were using it effectively in their ECCP classes and in their math and science classes.

The result of this ECCP experiment was so exciting to us that we went to the Office of Computing Activities (which had just started operations) and asked for funds for a two-year program to explore more broadly the uses of computer in the high school classroom. We worked with teachers in biology, chemistry, mathematics, physics, and social studies classes in ten high schools in Huntington, Long Island (whence our name).

Our objectives were to:

(1) Identify ways of using computers in all these disciplines and to find places in the several curricula where the computer would be useful.

(2) Attempt to discern differences in impact of computers due to socio-economic situations.

(3) Explore the relative merits of time-sharing and stand-alone computers.

During the 1968-69 and 1969-70 school years we found that:

(1) The computer was very useful to teachers and students in all the disciplines with which we worked. It was useful in problem-solving, simulation, computational support in laboratory courses, and in development of mathematical concepts through exploration of properties in the computer (here we essentially implemented Bill Dorn's idea of the mathematics laboratory). Some of the teachers we worked with tried CAI, but our computers did not have adequate hardware or software to support more than trivial CAI programs.

During the second year of this effort, we published a manual describing eighty programs developed by Huntington teachers, students, and staff. This manual has become known as Huntington One, and is available from Digital Equipment Corporation, Hewlett-Packard, IBM, Time-Share Corporation, and Wang.

(2) We have some anecdotal evidence that computers have a very powerful and positive effect with minority kids as well as with affluent majority kids. We also discovered how difficult it is to get hard evidence here. All of us, staff and participating teachers alike, had a good feeling in our gut about computers and kids, even though we *still* can't prove anything.

(3) We learned some interesting things about computer hardware and software, and about telephone lines and rainstorms, etc. We put PDP-8s in three schools and provided time-shared terminals for the other schools. The stand-alone schools all felt (and still feel) that they much preferred having their own local computer to having time-sharing. These schools still are using their PDP-8s (upgraded over the years) even though there is a very good local educational consortium using a PDP-10.

Our experience here convinced us that the ultimate destiny of educational computing is in the stand-alone computer. The continually decreasing prices of PDP-8 computers and the emergence of the Altair machines, the LSI-11, Sphere, etc. make this more and more attractive every year.

During this period we became convinced that computer simulation would emerge as one of the important educational computer applications, and so we asked NSF for support to explore their value. Between 1970 and 1975, we called ourselves Huntington Two and developed 24 simulations in biology, physics, and social studies. These were received very well by teachers all over the U.S., and in a number of foreign countries.

In Huntington One we wrote about three pages of documentation for each program and found that most teachers wouldn't use them, so in Huntington Two we developed more extensive documentation for each simulation program. For each one we wrote a teacher's manual to guide the teacher in bringing the simulation into his classroom, a student manual to help the student to plan his experiments, and a resource manual to provide the teachers and the student with more details about the simulation, the model and its assumptions, and additional references.

We wrote our programs in BASIC and worried about transportability, so we used only the *original* Dartmouth BASIC commands–except for TAB and RANDOMIZE. This sometimes meant that we couldn't do elegant programming and there were things we couldn't do at all (like strings), but our users could just drop in our tapes and go, without editing. (One of the things that has bugged us for years is the variety of expressions for particular commands used by different manufacturers. This is very irresponsible and insensitive to the users.)

After asking for proposals from publishers and computer manufacturers interested in publishing the Huntington Two packages, we picked Digital Equipment because they offered to price them very much lower than anyone else. We felt that low price was important so that people could afford to buy them. This has worked out pretty well. Digital has done a good job printing the manuals and has kept the price very low (mostly by eating a substantial part of the cost–the manuals cost more to produce than DEC charges for them). Some people have had problems ordering manuals from DEC, for which we apologize. We think these problems have been solved. If they haven't, let us know, and we will try to straighten things out.

Each program comes with the following kinds of documentation.

Resource Handbook – This is really a mini computer textbook which tells the student all about the subject of the simulation. Simple, straight forward writing supplemented with illustrations and articles reprinted from periodicals. Also included is a detailed explanation of the model. The best two are 30 pages each. (You can reproduce these for your students.)

Teacher Support Material – In 7 or 8 pages the program is described, you are advised of preparatory activities and follow-up activities and shown how the program runs.

Computer Laboratory Guides – Provides the student with a series of recommended learning activities to try on the computer.

For your convenience, we have listed brief descriptions of all of the Huntington Two simulations which are available.

HUNTINGTON TWO PACKAGES AVAILABLE FROM DEC

Biology

BUFLO Buffalo Herd Management Simulation. Both historic and current game-management problems can be simulated with this package. The American buffalo, or bison, is used as the study example of a game species. This program can be easily applied to both population studies, and ecology units.

DIET Dietary Evaluation Simulation. By specifying a typical intake of foods, a student can examine a diet for carbohydrate, protein, lipid, and caloric content. The program will then match the value of the foods against dietary requirements. The calculation of recommended daily allowance is dependent on: age, sex, stature, and activity. This program is designed for use with the human-studies portion of biology programs but may find wide use in programs such as home economics and health.

GENE 1 Genetics Simulation. This program simulates a cross involving a single monohybrid genetic difference. The student specifies the genotypes of the parents and the number of offspring to be produced. The computer then lists all of the offspring's genotypes and phenotypes, and calculates the ratios.

HARDY Hardy-Weinberg Law Simulation. HARDY leads the student through a population-genetics problem using the Hardy-Weinberg Law with data either from a simulated population, or data collected by the student as part of a classroom exercise.

LOCKEY Enzyme Experiment Simulation. Students may explore the basis for the Lock and Key Model of enzyme action. The particular enzyme used in this study is acetylcholinesterase, an enzyme that is essential to nerve function.

MALAR Simulated Malaria Eradication Program. The attack phase of a public health program, aimed at the eradication of malaria, is conducted according to student strategy. Results of the program over a 5-year period and evaluations of the student's program are printed. This program is particularly designed to be used with BSCS Yellow Version, but may be applied to any ecology unit.

PH pH Effect on Enzyme Function. A structural model of enzyme catalytic function allows the student to "design" his own enzyme and then test it for its pH optimum. The pH program is coordinated with the HUNTINGTON TWO's program LOCKEY and may be used either together with it or separately in the study of biochemistry.

POLUT Water Pollution Simulation. This simulation allows the user to explore many of the factors leading to water pollution. Inputs such as "Type of Body of Water" and "Water Temperature" allow students to model bodies of water close to the school.

POP Population Modeling Simulation. Three elementary models for population growth are presented. To lend interest, POP encourages the students to apply the models to the gypsy moth, then match the model's behavior against reality.

RATS Rat Control Simulation. Strategies involving rat control in an urban area can be explored. Factors involving sanitation, pesticides, rat immigration, and emigration are included.

STERL Sterile Male Pest Eradication. STERL is designed to test the effectiveness of two very different methods of pest control; the use of pesticide, or the release of sterile males into the population. The two techniques may be used singly or in an integrated program to control an infestation of screw-worn flies. Ecology units concerned with the effect of pesticides in the environment can make use of STERL.

TAG Wildlife Population Census Simulation. A simulated farm pond is investigated with the aim of establishing the population of large mouth bass. Students set up the investigation using the tagging-and-recovery technique. Elementary sampling concepts are taught through this ecological presentation.

USPOP Human Population Model of the United States. Using 1970 census data (stored within the program), the user explores the roles of fertility, birth distribution, offspring sex ratio age-dependent mortality, and population age structure in determining the pattern of population growth. Extensive materials supplied with the package explore each of the above factors from a biological and sociological point of view.

Physics

CHARGE Millikan Oil Drop Experiment. The student carries out a modern version of the Millikan Oil Drop Experiment designed to demonstrate the existence of a discrete unit of electrical charge.

SCATR Rutherford Scattering Package. This package simulates alpha-particle scattering according to three theoretical models of the atom: the hard sphere, the Thomson, and the Rutherford or nuclear model.

SLITS Young's Double Slit Experiment. This simulation allows the student to easily study several of the more difficult parameters involved in the wave interference of light. The computer allows greater flexibility than would be found in the classical high school experiment.

Social Studies

ELECT 1, 2, 3 Election Simulation. This package focuses on campaign decision-making and electoral politics. ELECT 1&2 simulate the strategy decisions in 14 American presidential elections of the past. ELECT 3 is a role-playing game which can be used in the classroom to simulate a campaign and election.

LIMITS Limits to Growth Model. LIMITS is a simplified simulation of world dynamics involving future changes in population, food supply, nonrenewable resources, industrial production, and pollution. Students may alter the program assumptions about change in the future and let the computer project what may result in the next 125 years.

MARKET Elementary Marketing Simulation. MARKET simulates two companies in a one-product competitive situation. Students make marketing decisions, quarter by quarter, and the computer reports on their company's profit, share of the market, total assets, and other decision-making information.

POLICY National Policy Formulation Simulation. The role of special-interest groups in making decisions regarding federal government decisions is examined. Students represent labor, nationalists, internationalists, business, military, and civil rights special-interest groups. The students attempt to organize to support or oppose governmental policies.

POLSYS City Government Simulation. This is a role-playing simulation in which the students represent opposing groups. The groups try to convince City Hall that their view of an issue is the one that City Hall should adopt.

SAP Statistical Analysis Package. SAP is used to facilitate a student-conducted survey research project. The program is able to carry out mean and standard deviation for any item, construct a table of frequencies, compute Chi square, and many other statistical operations on survey data.

USPOP Human Population Model of the United States. Using 1970 census data (stored within the program), the user explores the roles of fertility, birth distribution, offspring sex ratio, age-dependent mortality, and population age-structure in determing the pattern of population growth. Extensive materials supplied with the package explore each of the above factors from a biological and sociological point of view.

Each of these simulations was developed by a team consisting of a subject-matter specialist, a high school teacher (to keep us honest), a simulation specialist, a programmer, and a writer. Toward the end of the Project, we had gotten the cost of producing a simulation package down to about $7,000-$10,000.

We had hoped to receive funding to continue our efforts until we had developed one hundred units because we felt that this was the minimum number of units needed to get simulations to fly in schools. Unfortunately, NSF never has enough money to support all the things they think are worthwhile, and they couldn't continue our funding. (Actually, we're very grateful to them. They supported us for six years with a total of almost $1M, which was very generous.) We have tried to find other sources of funds to continue but haven't had any luck yet. We're still looking and have some hope of getting some support within a few months. In any event, we'll be around doing what we can to promote the use of computers in schools.

8 DODGEM

BY
MAC
OGLESBY

The game of DODGEM is described in Martin Gardner's "Mathematical Games" Department in the June 1975 issue of *Scientific American*. DODGEM was invented in 1972 by Colin Vout, who was then a student at the University of Cambridge.

This version of DODGEM is written in Dartmouth BASIC. It may be played by two players against each other, or by one player against the computer. Here is a sample RUN.

For instructions, see Lines 3120-3520 of the program listing.

```
WANT INSTRUCTIONS FOR DODGEM? NO

BOARD SIZE (3-6)? 4
HOW MANY PLAYERS  (1 OR 2)? 1
```

In this game, 1 player vs. computer.

```
HERE WE GO...

 1 . . .
 2 . . .
 3 . . .
 . A B C

OK, THE COMPUTER WILL MOVE THE DIGITS.
WHO MOVES FIRST  (1=COMPUTER  2=YOU)? 1

THE DIGITS MOVE:  2E
LETTERS MOVE? A,NORTH

 1 . . .
 . 2 . .
 3 A . .
 . . B C

THE DIGITS MOVE:  1E
LETTERS MOVE? B  NOR

 . 1 . .
 . 2 . .
 3 A B .
 . . . C

THE DIGITS MOVE:  2E
LETTERS MOVE? C---N

 . 1 . .
 . . 2 .
 3 A B C
 . . . .

THE DIGITS MOVE:  1E
LETTERS MOVE? CNN

 . . 1 .
 . . 2 C
 3 A B .
 . . . .

THE DIGITS MOVE:  1E
LETTERS MOVE? AN

 . . . 1
 . A 2 C
 3 . B .
 . . . .

THE DIGITS MOVE:  1E
LETTERS MOVE? AN

 . A . .
 . . 2 C
 3 . B .
 . . . .

THE DIGITS MOVE:  3E
LETTERS MOVE? BW
ILLEGAL MOVE OR BAD INPUT.
INPUT IGNORED.  TYPE H FOR HELP.
LETTERS MOVE? H
THE LETTERS HAVE THESE LEGAL MOVES:
  AN  AE  AW  BE  CN
LETTERS MOVE? AN

 . . . .
 . . 2 C
 . 3 B .
 . . . .

THE DIGITS MOVE:  3S
LETTERS MOVE? CN

 . . . C
 . . 2 .
 . . B .
 . 3 . .

THE DIGITS MOVE:  2E
LETTERS MOVE? CN

 . . . .
 . . . 2
 . . B .
 . 3 . .

THE DIGITS MOVE:  2E
LETTERS MOVE? BN

 . . . .
 . . B .
 . . . .
 . 3 . .

THE DIGITS MOVE:  3E
LETTERS MOVE? BN

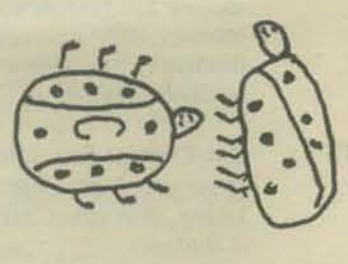
 . . B .
 . . . .
 . . . .
 . . 3 .

THE DIGITS MOVE:  3E
LETTERS MOVE? BN

*** THE LETTERS WIN!!!
```

why can't 3 move WEST? where is 3 now?

```
PUNCH
100 ' NAME:  DODGEM***
105 '
110 ' BY:  MAC OGLESBY ON 10/18/75
115 '
120 ' DESCRIPTION:  TWO SETS OF PIECES RACE AT RIGHT ANGLES ACROSS A
125 '   SQUARE BOARD.  FOR ONE OR TWO PLAYERS.
130 '
135 ' INSTRUCTIONS:  TYPE "RUN" FOR COMPLETE INSTRUCTIONS.
140 '
145 ' REMARKS:  THE GAME OF DODGEM IS DESCRIBED BY MARTIN GARDNER IN
150 '   'SCIENTIFIC AMERICAN', JUNE 1975.
155 '
160 ' CATEGORY:  KIDCAT***
165 '
170 ' LANGUAGE:  BASIC
175 '
180 ' INDEX LINE:
185 '     !ONE OR !TWO PLAYER !DODGEM !GAME
190 '
195 '
230 RANDOMIZE
240 PRINT "WANT INSTRUCTIONS FOR DODGEM";
250 LINPUT A$
260 GOSUB 2950                          'PROCESS INPUT
270 IF SEG$(A$,1,1)<>"Y" THEN 290
280    GOSUB 3130                       'INSTRUCTIONS
290 PRINT "BOARD SIZE (3-6)";
300 INPUT A
310 LET A=INT(A)
320 IF (6-A)*(A-3)=>0 THEN 340
330    GOTO 290
340 LET P(1,0)=P(2,0)=A-1               'HOW MANY PIECES AT START
350
360
370 ' MATRIX P(,) KEEPS TRACK OF PIECES
380 FOR J=1 TO A-1
390    LET P(1,J)=10*J+1                'LOCATE DIGITS
400 NEXT J
410
420 FOR J=1 TO A-1
430    LET P(2,J)=10*A+J+1              'LOCATE LETTERS
440 NEXT J
450
460 LET F=1
470 LET M$(1)="NES"                     'LEGAL MOVES FOR THE DIGITS
480 LET M$(2)="NE W"                    'LEGAL MOVES FOR THE LETTERS
490 LET C$(1)="DIGITS"
500 LET C$(2)="LETTERS"
510 LET A$(1)="12345"
520 LET A$(2)="ABCDE"
530
540
550 ' SET UP BOARD
560 FOR J=1 TO A
570    IF J=A THEN 630
580       LET D$(J,1)=CHR$(48+J)
590       FOR K=2 TO A
600          LET D$(J,K)="."
610       NEXT K
620       GOTO 670
630    LET D$(J,1)="."
640    FOR K=2 TO A
650       LET D$(J,K)=CHR$(63+K)
660    NEXT K
670 NEXT J
680
690 PRINT "HOW MANY PLAYERS  (1 OR 2)";
700 INPUT B
710 IF B=2 THEN 800
720    IF B=1 THEN 740
730       GOTO 690
740    PRINT "OK, THE COMPUTER WILL MOVE THE DIGITS."
750    PRINT "WHO MOVES FIRST  (1=COMPUTER  2=YOU)";
760    INPUT F
770    IF (2-F)*(1-F)=0 THEN 800
780       PRINT "PLEASE TYPE 1 OR 2.  NOW, ";
790       GOTO 750
800 PRINT
810 PRINT "HERE WE GO..."
820
830 ' PRINT THE DISPLAY
840 PRINT
850 FOR J=1 TO A
860    FOR K=1 TO A
870       PRINT " ";D$(J,K);
880    NEXT K
890    PRINT
900 NEXT J
910 PRINT
920
930
940 ' MAIN MOVE LOOP
950 FOR J=F TO 3-F STEP 3-2*F
960
970    ' CHECK IF PLAYER J HAS A LEGAL MOVE LEFT
980    FOR J1=1 TO A-1
990       LET R=INT(P(J,J1)/10)         'ROW OF J1TH PIECE
1000      LET C=P(J,J1)-10*R            'COLUMN OF J1TH PIECE
1010
1020      ON J GOTO 1040,1100
1030
1040      IF C=A THEN 1080              'AT EDGE OF BOARD?
1050         IF C>A THEN 1070           'OFF BOARD?
1060            GOTO 1160               'SEE IF PIECE CAN MOVE
1070         GOTO 1250                  'TRY NEXT PIECE
1080      GOTO 1300                     'LEGAL MOVE EXISTS
1090
1100      IF R=1 THEN 1140              'EDGE OF BOARD?
1110         IF R=0 THEN 1130           'OFF BOARD?
1120            GOTO 1160               'SEE IF PIECE CAN MOVE
1130         GOTO 1250                  'TRY NEXT PIECE
1140      GOTO 1300                     'LEGAL MOVE EXISTS
1150
1160      IF D$(R-1,C)="." THEN 1240    'SEE IF PIECE CAN GO NORTH
1170         IF D$(R,C+1)="." THEN 1240 'SEE IF PIECE CAN GO EAST
1180            IF J=2 THEN 1220
1190               IF D$(R+1,C)="." THEN 1210  'CAN IT GO SOUTH
1200                  GOTO 1250         'TRY NEXT PIECE
1210               GOTO 1300            'LEGAL MOVE EXISTS
1220            IF D$(R,C-1)="." THEN 1240  'SEE IF PIECE CAN GO WEST
1230               GOTO 1250            'TRY NEXT PIECE
1240      GOTO 1300                     'LEGAL MOVE EXISTS
1250    NEXT J1
1260    PRINT "THE ";C$(3-J);" HAVE LEFT NO LEGAL MOVE FOR THE ";C$(J);"!"
```



```
1270    PRINT "*** THE ";C$(J);" WINS!!!"
1280    STOP
1290
1300    IF B=2 THEN 1750
1310       IF J=2 THEN 1750
1320
1330          * GENERATE COMPUTER'S MOVE
1340          LET L1=2
1350          FOR L0=1 TO 3
1360
1370             ON L0 GOTO 1450,1380,1430
1380             IF RND <.5 THEN 1410
1390                LET L1=1
1400                GOTO 1450
1410             LET L1=3
1420             GOTO 1450
1430             LET L1=4-L1
1440
1450             LET P1=INT(RND*A)
1460             FOR L2=1 TO A-1
1470                LET P1=P1+1
1480                IF P1<=A-1 THEN 1500
1490                   LET P1=P1-(A-1)
1500                LET R=INT(P(J,P1)/10)  'ROW
1510                LET C=P(J,P1)-10*R  'COLUMN
1520                IF C>A THEN 1720
1530
1540                   ON L1 GOTO 1570,1620,1690
1550
1560                   * NORTH
1570                   IF D$(R-1,C)="." THEN 1590
1580                      GOTO 1720
1590                   GOTO 2090
1600
1610                   * EAST
1620                   IF D$(R,C+1)="." THEN 1660
1630                      IF C=A THEN 1650
1640                         GOTO 1720
1650                      LET P(J,0)=P(J,0)-1
1660                   GOTO 2160
1670
1680                   * SOUTH
1690                   IF D$(R+1,C)="." THEN 1710
1700                      GOTO 1720
1710                   GOTO 2230
1720             NEXT L2
1730          NEXT L0
1740
1750    PRINT C$(J);" MOVE";
1760    LINPUT A$
1770    GOSUB 2950                        'PROCESS INPUT
1780
1790    IF SEG$(A$,1,1)="R" THEN 2860
1800       IF SEG$(A$,1,1)="H" THEN 2460
1810          LET A$=SEG$(A$,1,2)       'LOOK ONLY AT 1ST 2 CHARACTERS
1820          LET P1=POS(SEG$(A$(J),1,A-1),SEG$(A$,1,1),1)  'WHAT PIECE
1830          IF P1=0 THEN 2430
1840             LET P2=POS(M$(J),SEG$(A$,2,2),1)  'WHAT DIRECTION
1850             IF P2=0 THEN 2430
1860                LET R=INT(P(J,P1)/10)  'ROW OF PIECE
1870                LET C=P(J,P1)-10*R  'COLUMN OF PIECE
1880                IF R=0 THEN 2430
1890                   IF C>A THEN 2430
1900
1910                      ON J GOTO 1930,1990
1920
1930                   IF C<A THEN 1970  'PIECE NOT AT EAST EDGE
1940                      IF P2<>2 THEN 1970  'DIRECTION NOT EAST
1950                         LET P(1,0)=P(1,0)-1  'REDUCE # OF PIECES
1960                         GOTO 2160  'UPDATE PIECE LOCATION
1970                   GOTO 2040     'CHECK MOVE FURTHER
1980
1990                   IF R>1 THEN 2040  'PIECE NOT AT NORTH EDGE
2000                      IF P2<>1 THEN 2040  'DIRECTION NOT NORTH
2010                         LET P(2,0)=P(2,0)-1  'REDUCE # OF PIECES
2020                         GOTO 2090  'UPDATE LOCATIONS
2030
2040                   ON P2 GOTO 2070,2140,2210,2280
2050
2060                   * SEE IF PIECE CAN MOVE NORTH
2070                   IF D$(R-1,C)="." THEN 2090
2080                      GOTO 2430  'ERROR MESSAGE
2090                   LET D$(R-1,C)=SEG$(A$(J),P1,P1)
2100                   LET P(J,P1)=P(J,P1)-10
2110                   GOTO 2330
2120
2130                   * EAST
2140                   IF D$(R,C+1)="." THEN 2160
2150                      GOTO 2430  'ERROR MESSAGE
2160                   LET D$(R,C+1)=SEG$(A$(J),P1,P1)
2170                   LET P(J,P1)=P(J,P1)+1
2180                   GOTO 2330
2190
2200                   * SOUTH
2210                   IF D$(R+1,C)="." THEN 2230
2220                      GOTO 2430  'ERROR MESSAGE
2230                   LET D$(R+1,C)=SEG$(A$(J),P1,P1)
2240                   LET P(J,P1)=P(J,P1)+10
2250                   GOTO 2330
2260
2270                   * WEST
2280                   IF D$(R,C-1)="." THEN 2300
2290                      GOTO 2430  'ERROR MESSAGE
2300                   LET D$(R,C-1)=SEG$(A$(J),P1,P1)
2310                   LET P(J,P1)=P(J,P1)-1
2320
2330                   LET D$(R,C)="."  'FINISH UPDATING DISPLAY
2340                   IF B=2 THEN 2380
2350                      IF J=2 THEN 2380
2360                         PRINT "THE DIGITS MOVE:  ";SEG$(A$(J),P1,P1);SEG$(M$(J),L1,L1)
2370                         'SEG$(A$(J),P1,P1);SEG$(M$(J),L1,L1)
2380                   IF P(J,0)<>0 THEN 2420  'CHECK FOR WIN
2390                      PRINT
2400                      PRINT "*** THE ";C$(J);" WINS!!!"
2410                      STOP
2420                   GOTO 2900     'GET NEXT PLAYER'S MOVE
2430       PRINT "ILLEGAL MOVE OR BAD INPUT."
2440       PRINT "INPUT IGNORED.  TYPE H FOR HELP."
2450       GOTO 1750
2460    PRINT "THE ";C$(J);" HAVE THESE LEGAL MOVES:"
2470    ' HELP! -- PRINT LEGAL MOVES
2480    FOR J3=1 TO A-1
2490       LET P$=SEG$(A$(J),J3,J3)  'NAME OF PIECE
2500       LET R=INT(P(J,J3)/10)     'ROW
2510       LET C=P(J,J3)-10*R        'COLUMN
2520
2530       ON J GOTO 2550,2620
2540
2550       IF C=A THEN 2590          'PIECE AT EAST EDGE
2560          IF C>A THEN 2580       'OFF BOARD
2570             GOTO 2690           'CHECK FURTHER
2580          GOTO 2830              'TRY NEXT PIECE
2590       PRINT "  ";P$;"E";
2600       GOTO 2690
2610
2620       IF R=1 THEN 2660          'NORTH EDGE
2630          IF R=0 THEN 2650       'OFF BOARD
2640             GOTO 2690
2650          GOTO 2830
2660       GOTO 2700
2670
2680       * NORTH
2690       IF D$(R-1,C)<>"." THEN 2730
2700          PRINT "  ";P$;"N";
2710
2720          * EAST
2730       IF D$(R,C+1)<>"." THEN 2770
2740          PRINT "  ";P$;"E";
2750
2760          * SOUTH AND WEST
2770       IF J=2 THEN 2810
2780          IF D$(R+1,C)<>"." THEN 2800
2790             PRINT "  ";P$;"S";
2800          GOTO 2830
2810       IF D$(R,C-1)<>"." THEN 2830
2820          PRINT "  ";P$;"W";
2830       NEXT J3
2840       PRINT
2850       GOTO 1750                    'TRY AGAIN
2860    PRINT "THE ";C$(J);" GIVE UP!!"
2870    PRINT "*** THE ";C$(3-J);" WINS!!!"
2880    STOP
2890
2900 NEXT J
2910 GOTO 840                           'PRINT DISPLAY
2920
2930
2940 * PROCESS INPUT; CHANGE LOWERCASE TO UPPERCASE, IGNORE COMMAS, SPACES
2950 IF LEN(A$)>10 THEN 3090
2960    LET C1=0                        'RESET COUNTER
2970    CHANGE A$ TO A
2980    FOR J2=1 TO A(0)
2990       IF A(J2)<96 THEN 3010        'CHECK FOR UPPERCASE
3000          LET A(J2)=A(J2)-32        'CHANGE TO UPPERCASE
3010       IF (57-A(J2))*(A(J2)-48)=>0 THEN 3040  'CHECK FOR A DIGIT
3020          IF (90-A(J2))*(A(J2)-65)=>0 THEN 3040  'CHECK FOR A LETTER
3030             GOTO 3060              'ELSE IGNORE THIS CHARACTER
3040       LET C1=C1+1
3050       LET A(C1)=A(J2)              'STORE THIS CHARACTER
3060    NEXT J2
3070    LET A(0)=C1
3080    CHANGE A TO A$
3090 RETURN
3100
3110
3120 ' INSTRUCTIONS
3130 PRINT
3140 PRINT "HERE'S A SAMPLE PLAYING BOARD:"
3150 PRINT
3160 PRINT "1 . . . ."
3170 PRINT "2 . . . ."
3180 PRINT "3 . . . ."
3190 PRINT "4 . . . ."
3200 PRINT "  A B C D"
3210 PRINT
3220 PRINT "TWO SETS OF PIECES (DIGITS AND LETTERS) RACE AT RIGHT ANGLES"
3230 PRINT "ACROSS A SQUARE BOARD.  VACANT LOCATIONS ARE SHOWN AS PERIODS."
3240 PRINT "YOU GET TO CHOOSE THE BOARD SIZE.  (THE ONE ABOVE IS SIZE 5.)"
3250 PRINT
3260 PRINT "  N"
3270 PRINT "  :"
3280 PRINT "W---E"
3290 PRINT "  :"
3300 PRINT "  S"
3310 PRINT
3320 PRINT "THE OBJECT IS TO MOVE ALL OF YOUR PIECES ACROSS THE BOARD"
3330 PRINT "AND OFF THE OPPOSITE EDGE.  DIGITS LEAVE THE BOARD ONLY AT"
3340 PRINT "THE EASTERN EDGE; LETTERS ONLY AT THE NORTHERN.  THE WINNER"
3350 PRINT "IS THE PLAYER WHOSE PIECES HAVE ALL LEFT THE BOARD."
3360 PRINT
3370 PRINT "THE PLAYERS GO IN TURN, MOVING ONE OF THEIR PIECES TO AN"
3380 PRINT "ADJACENT LOCATION WHICH IS EITHER OFF THE BOARD OR CURRENTLY"
3390 PRINT "VACANT.  THERE ARE NO DIAGONAL MOVES, NO JUMPS AND NO CAPTURES!"
3400 PRINT "DIGITS CANNOT MOVE WEST, NOR LETTERS MOVE SOUTH."
3410 PRINT
3420 PRINT "TO MOVE A PIECE, TYPE ITS NAME AND THE FIRST LETTER OF THE"
3430 PRINT "DESIRED DIRECTION.  EXAMPLES:"
3440 PRINT "  2E  MEANS PIECE  2  WANTS TO GO EAST"
3450 PRINT "  BW  MEANS PIECE  B  WANTS TO GO WEST."
3460 PRINT
3470 PRINT "NOTE:  YOU FORFEIT THE GAME IF YOUR MOVE LEAVES YOUR OPPONENT"
3480 PRINT "WITHOUT ANY LEGAL MOVE."
3490 PRINT
3500 PRINT "LASTLY, YOU MAY TYPE R TO RESIGN OR H FOR HELP."
3510 PRINT
3520 RETURN
3530 END
READY
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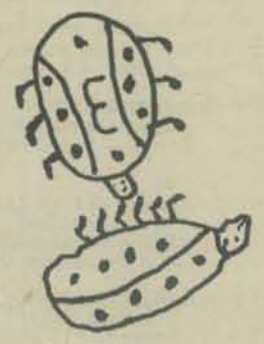

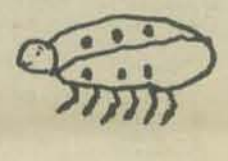

Periodicals That Progressive Scientists Should Know About

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Please send additions, corrections, etc. to PROGRESSIVE TECHNOLOGY; P.O. Box 20049 Tallahassee, Florida 32304 U.S.A.

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SSRS REVIEW
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JOURNAL OF THE NEW ALCHEMISTS
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THE WORKBOOK
SW Research & Info Center
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Ithaca, New York 14850

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GOOD GAMING!

THE YTHRI is a game of space invasion and planetary combat. $8 ($6.80 for subscribers to The Space Gamer)

When the Terran Empire decides to 'adjust' its borders with the Domain of Ythri Avalon is a prime objective. Home of the successful human/ythri biracial culture, Avalon becomes the pivotal battle of the war. Metagaming Concepts has transformed Poul Anderson's Hugo nominated novel, The People of the Wind, into a fast moving game scenario. The game is an abstraction of the book's basic situation into a play system less complex than our Stellar Conquest. The basic game and Advanced rules approach is ideal for novice gamers or beer and pretzel play by experts.

After Set-up the sequence of game events is Space Ship Movement, Space Combat, Planetary Debarkment, Planetary Movement, Planetary Combat, and Status Update of orbital movements and other information. Advanced rules include Hidden Movement, Ground Energy Projectors, Step reduction for some space combats, Morale and Reinforcement.

Components include 16 page,8 1/2 x 11, examples oriented rules book; 242 perforation cut counters, 17 x 14 Space Map, Space and Planetary Combat Tables, 17 x 18 four color Avalon Map. Unboxed.

(P.S. Non-gamer science fiction fans report The Ythri so easy and fun to play we have to tell you Don't buy it unless you're imaginative enough to enjoy handling new experiences.)

TUNNELS & TROLLS

Tunnels & Trolls is a set of rules for a fantasy adventure game. The rules may be used for single adventures or for a cumulative campaign. Similar in concept to Dungeons & Dragons T&T has the advantage of a more simple design and less detail. You still need to create a dungeon and a dungeon master is an added plus but the rules give you all the basic structure to play. This is a good bet for those new to fantasy gaming. You find out what it's all about for a modest price.

The 41 page 8 1/2 x 11 rules booklet contains the following sections: digging the dungeon, creating the characters, monster making, how to have combat, saving rolls, experience points, supplies and provisions, elaborations, the Peters-McAllister chart, logic of magic, advanced weapons and armor chart, berserker fighting rule, advice for dungeon masters. Also included are variety of illustrations and humor that are better than the D&D illustrations.

TUNNELS & TROLLS is $3
($2.75 for TSG subscribers.)

DUNGEONS & DRAGONS
The now classic of fantasy wargaming. $10
($8.50 for TSG subscribers)

DUNGEONS & DRAGONS

Dungeons & Dragons is a three volume set of rules for creating a series of fantasy adventures or an extended campaign. The game is best played with a moderator and the Chainmail rules are needed for some portions but, the wealth of detail and fantasy material can provided hours of solitaire 'fiddling'. The game requires some work and imagination since you will need to create your own dungeon or other play area and keep track of details in records. But, like anything that's a labor of love the more you put into it the more you get out of it.

The three rules booklets are 8 1/2x 5 1/2 for a total of 112 pages. Men & Magic, Monsters & Treasure, and The Underworld & Wilderness Adventures are the titles of the booklets and they cover all the data you need on characters and their abilities, magic spells, movement, combat, treasures, traps & suprises, and much, much, more.

CHAINMAIL is a booklet of rules for medieval miniatures combat. It is used in some portions of D&D. $5. ($4.30 for TSG subscribers)

GREYHAWK is the first rules supplement to D&D. The rules are segmented the same way as the original three booklets. $5. ($4.30 for TSG subbers)

BLACKMOOR is the second rules supplement to D&D. $5. ($4.30 for TSG subbers)

Empire of the Petal Throne

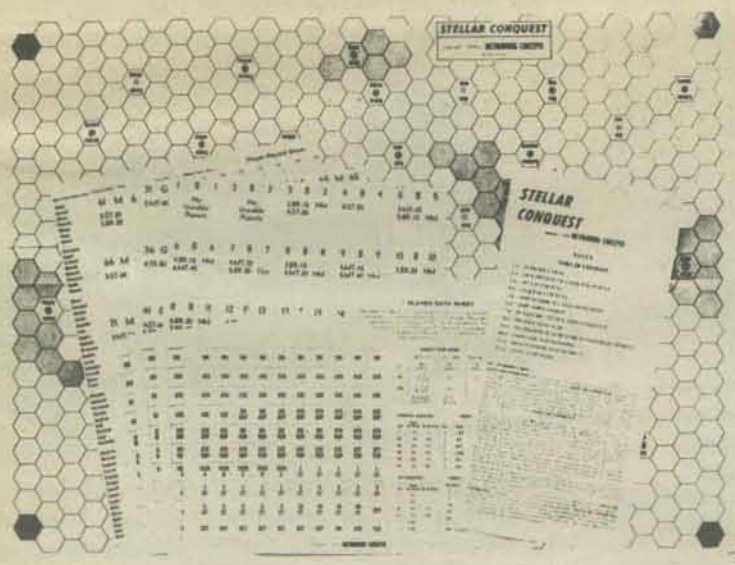
EPT is $25. (TSG subscribers $21.25)

Empire of the Petal Throne is the most carefully thought out fantasy world since The Lord of the Rings. And, professor M.A.R. Barker has put it all into game form. Barker's world of Tékumel suffered a cosmic cataclysm in the far past which stranded humans and exotic alien invaders. Medieval technology is all that survives with a healthy leavening of magic and supernatural powers. The game may be played as a series of adventures similar to Dungeons & Dragons. Indeed, the 114 pages of rules portrays a system of play that will be familiar to D&D fans. The illustrations of the races and lifeforms is unmatched in any other game published. The only problem you'll have is waiting for the novels Barker is working on based on Tékumel.

Rules include sections on character types and basic talents, skills, spells, combat, 'Hirilakte' Arenas, outdoor encounters, sea encounters, the Underworld, the 'eyes', Amulets, Scrolls, magic weapons and armour, Gods & divine intervention, treasure, erecting and buying buildings, advertising, relatives & bequests, levels of experience, reactions and hiring of nonplayer characters, salaries, slaves, etc., etc., etc.

Components include:
114 page rules booklet 8 1/2 x 11 in a plastic ring binder, profusely illustrated.
Map of the city Jakálla, full color detail, 28x22 1/2, suitable for mounting or play.
Map of Eastern Tékumel, full color detail, 22x34.
Map of Western Tékumel, full color detail, 22x34.
Separate sheet of tables and data for reference.

It all comes in a box. We must sincerely warn all fantasy fans that Tékumel is so carefully and lovingly created in detail that you run the risk losing yourself. Advertising claims are always suspect, but, remember, you were warned.



STELLAR CONQUEST is a game of exploration, colonisation, industrialisation, technological research, and conquest. Two to four science fiction fans or gamers direct complete interstellar societies as they compete for dominance of a star cluster. The game design emphasizes integration of multi-factor societies into a balanced, playable format. Stellar Conquest was our first design and it's already something of a popular classic. If games, science fiction, space or Star Trek appeal to you you'll surely regret missing this.

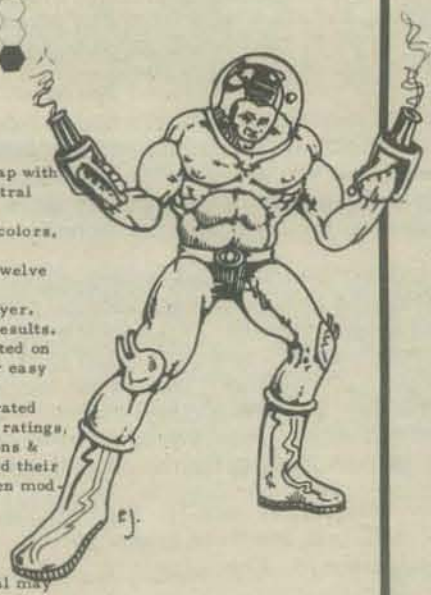
Sequence of Game Events:
1. Ship movement in semi-secrecy; all counters face down on the map.
2. Star exploration; Star Cards determine planetary types and resources. Random results for every game played.
3. Ship/Ship combat to resolve Star Hex control.
4. Planetary Attack resolves Warship/Planetary Defense combat in conquest assaults on colonies.
5. Colonization; population and industry are off-loaded from transports to habitable planets.
6. Industrial Unit Production; every 4th year/turn of play population growth, technological research, industrial expansion, ship-building, migration, etc are determined.

Components include:
* 18 x 24 six color plastic star map with 54 stars representing five spectral types by color.
* 400 5/8" ship counter. In four colors, on both sides. Half die-cut.
* Twelve page rules folder with twelve sections.
* Concise data sheet for each player.
* 78 Star Cards for exploration results.
* Seven 9 x 12 record sheets printed on both sides with example use for easy learning.

Stellar Conquest is the highest rated non-fantasy game in our s-f game ratings, TSG #2, surpassed only by Dungeons & Dragons. Many fans have developed their own advanced versions and one even moderates PBM games.

Stellar conquest is $9.
($8 for TSG subscribers)

(WARNING! The Surgeon General may soon rule that Stellar Conquest must bear a 'hazardous to your health label'. SC can cause confusion and resentment leading to depression among those of limited ability. For intelligent, imaginative persons only!)



OPEN THE DOOR

If you're one of those imaginative, intelligent people, let us open a door to a new experience, a futurist dimension of enjoyment shared by thousands.

THE SPACE GAMER is an informal new 'zine' devoted solely to the limitless worlds of science fiction and fantasy gaming. THE SPACE GAMER publishes the latest news and happenings of SF&F gaming. For only $5 you get six issues of game reviews, game narratives, reader letters, ads (like from play-by-mail referees), news, future game fiction, and a variety of other features. THE SPACE GAMER is a forum of ideas and exchange emphasizing reader participation for an exciting new hobby. Oh, yes, subscribers get substantial discounts on games from many publishers, discounts easily worth a subscription.

So, find out about games like STELLAR CONQUEST, THE YTHRI, WAR OF WIZARDS, STAR PROBE, DUNGEONS & DRAGONS, Prof. M.A.R. Barker's amazing EMPIRE OF THE PETAL THRONE (Tolkein fans eat your hearts out), and many more. Find out how to conquer a star empire, explore exotic new worlds, become a wizard (oops, a frog), plus many other fantastic game adventures.

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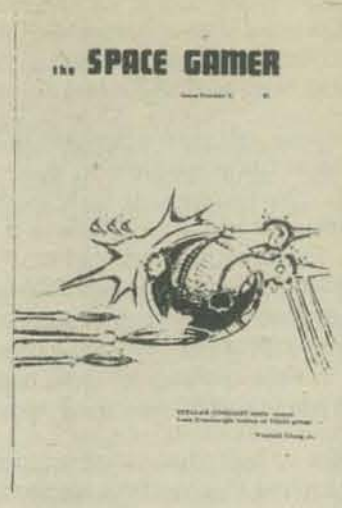

Six issues of THE SPACE GAMER come to you for only $5.

STELLAR CONQUEST, game of exploration, colonization, and conquest for 2-4, is now $9.

THE YTHRI, based on Poul Anderson's novel, simulates the Terran Empires invasion of Avalon for two science fiction fans. $8.

Don't forget, order today from the science fiction and fantasy gaming people, good gaming.

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The Mountain Digital Group

We are not a club. We are not a partnership. We are not a corporation. What are we? The Mountain Digital Group is composed of three guys who think the kids in San Lorenzo Valley deserve an opportunity to find out what is going on in the world of computers. The "Valley" is not the most cosmopolitan area around. There are no large, or even medium, industrial employers in the immediate neighborhood. Most of our high school graduates leave the area to find employment. Yet, they must compete for education and jobs against those who have a much broader educational and cultural background.

All members of our group are presently teaching, in either regular day or adult evening classes, at San Lorenzo Valley Unified Schools. Two are employed as full time teachers. The third is employed by Lockheed as a calibration technician.

We believe that computers and related equipment should be made available to the young people of the Valley. We believe that basic instruction should be provided for its use. We believe it should happen now. Since we have not had much luck in convincing those who decide the educational priorities in our educational system of this fact, we have decided to move ahead on our own. The "System" has allowed us to initiate one course in the high school, but funds have been limited to say the least.

In order to overcome the resistance to innovative ideas such as this, we have decided to "foot the bill" on this one ourselves. We feel that we can provide a minimum system to demonstrate the possibilities of computers at various school levels. We want to show what this minimum system can do in the classroom. Since we feel that students in our area are being deprived of educational opportunities that others have, it should be worthwhile to invest our own dollars in their future.

What can innocent beginners, with littler computer knowledge, do in such an advanced technological field? Who knows? The only way to find out is to plunge right in, read everything within reach, and document every mistake made along the line. Since we are so inexperienced, we have decided to keep a log of all the problems, solutions and uses that we encounter. Typical examples of problems are shown below:

12-31-75 (1) **Problem: Could not access memory**

Solution: Found pin 13 shorted to pin 14 (+5v) on ICA of memory board.

(2) **Problem: Could not write into bit D3**

Solution: Switched MC1 and MC2 on memory board. Problem switched from D3 to D6. Problem is pin 12 of 8101. IC replaced.

(3) **Problem: Could not access A15 and A14.**

Soultion: Found cold solder joint on mother board pin 32 (A15). Found bad 8T97 in ICD of CPU board (A14).

1-27-76 (4) **Problem: Examine would not access memory although Examine next and deposit both worked.**

Solution: Found cold solder joint on pin 5 of ICU on Display/control board.

We are now in the process of using each instruction in the instruction set in order to document the exact action of the instruction on the data involved. All this may seem like a lot of needless work, but we welcome it as an opportunity to learn.

The author's experience with computers consists of brief encounters with a HP 9830, A Wang 2200, and several desk-top programmable calculators (see artical PCC Jan. 76). The first two were beyond the school's budget, and the last has proved to be too limited for what we have in mind.

We finally decided on the Altair 8800. It looked and sounded good – but the major factor was that we could buy the kit on the monthly payment plan, the good old American way. Our budget, being nothing, did not enable us to buy an assembled unit, but a monthly plan would let us go as far as we could manage in nice, easy steps.

Needless to say, it hasn't all been a bed of roses. By now, our pocketbooks are empty and our Master Charges are full. Yet, we all feel it has been worth it Each shipment from MITS was received with enthusiasm after much anticipation in between.

It's hard to describe the mixed feelings encountered when putting the thing together, piece by piece, over a period of several months. You wonder, in between installments – will the blasted thing work after you get it all together? Did we get this board wired correctly? Suppose it doesn't work! How do we find out which piece is causing the problem? Where do we start looking for the problem(s)?

At last, the final day is here.The Big Chip has arrived. The Group, the three computer nuts by now, put the final piece in. They plug it in. Dig out the check list and turn it on.

MAN!! The lights light up – it works! Hold up STOP and flip up RESET. SON OF A GUN!! The data lights look like a Christmas tree – all on – won't go off. Address lights – some on – some won't go off – some won't come on.

"It doesn't work!" say Nut No. 1.

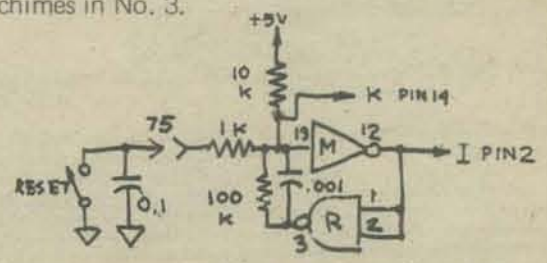
"All that money down the drain," pipes Nut 2.

"We should have bought it assembled," gripes Nut No. 3.

"But, we didn't have the money . . . " moans Nut No. 1.

"We can't quit now," counters No. 2.

"OK, dig out the test equipment, (one VOM)" chimes in No. 3.

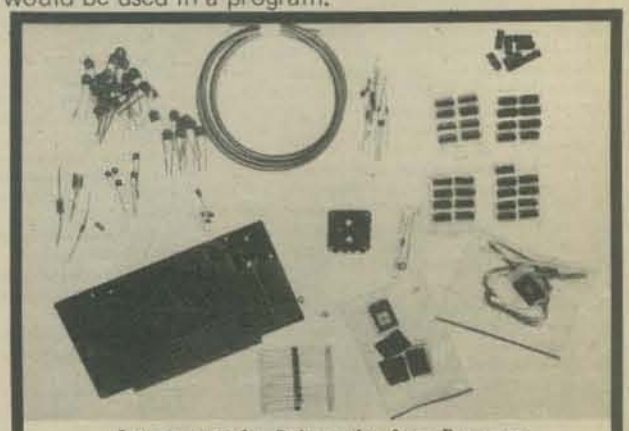


Several cold solder joints, solder bridges and replaced ICs later (actually several days), we have it up and running. It adds, subtracts, multiplies, divides and plays music. What a thrill! But for such a rugged looking piece of equipment, its innards seem fragile.

Computer Nut No. 1 hauled it off to school the next morning. There was not much formal teaching done in his math classes that day. Programming by toggle switch was demonstrated, and Dompier music was played. Students went wild. One of our bad members decided the computer should have a march. He is now in the process of composing one. Two others tried their hand at writing a tune but found the timing rather tricky. Students in Computer Math class had a try at entering and running a program. All were impressed by the need of higher level languages to really get things accomplished. Overall, student reaction was highly satisfying.

Demonstrations to teachers brought less favorable results. Overheard remarks – "... pretty expensive radio, or phonograph, or whatever ...", and "my hand calculator would have had the answer before that ... " Boy, what an educational job is ahead of us.

Well, back to the lab. We have to learn how to use this thing before we can sell it to others. If nothing else, we are developing a healthy respect for anyone who has to work in machine language. That long, complicated looking instruction set looks formidable. No matter how many times I read through the list, I can't tell from the manual what some of the instructions are supposed to do – let alone how they would be used in a program.



Lastest parts for Daisy arrive from Processor Technology Corp. The VDM-1, video display module, is ready for assembly. Still missing are a keyboard, 8K of memory, and BASIC.

Trying to keep a sense of humor, Tom Halverson (left) and Don Inman (right) try to chase down some stray bits in DAISY, the Mountain Digital Group's pride and joy. Tom's night class is about to appear and DAISY is the feature attraction.

Enough griping – on with the job. Nut No. 1 has been assigned the project of trying each instruction and documenting what it actually does with the data at its command. Why, oh why, hasn't someone written a simple explanation of what each instruction does along with many, many, many examples of how it might be used? Are all of us supposed to be able to read through this technolological blubbering? If computers are to be sold to amateurs, someone had better get with it quick and write some SIMPLE, UNDERSTANDABLE explanations for beginners.

Just as Number One gets started with the project Data No. 3 LED winks at me. "Get out of there, I didn't flip your switch." – He goes out. Then I flipped No. 4, deposit, and he won't go on.

"Holy Cow, what's wrong now?"

Number 3 winks again–then he stays on. Switch to RESET – Number three stays on and all others quiet. SHUT DOWN THE POWER! Take off the top and loosen up the front panel. Slide the computer back a little in the chasis and let's have a look. Turn on the power again. All data lights off – it works again. BLACK MAGIC. Slide her back in again, put on the top and tighten her up again. POWER UP! Hold STOP. Flip up RESET. Number Three winks again, stays on, and Number Four won't go on. Flip EXAMINE, and what does she do? She examines next. Flip EXAMINE again, and the counter goes up another notch. "Whoa there, Bessie, What's going on here?"

A phone call to Computer Nut No. 2, "Our Altair is sick." Number 2 has been assigned all technical problems beyond the realm of Number 1 (which includes one big ball pack). The Group is thus developing some natural divisions of responsibility. A half-hour later Nut Number Two (now Head Engineer) arrives. We coax our sick Altair, but to no avail. I guess we played "over the hill" one too many times, and she took us at our word. Head Engineer hauls the sick patient off to his home laboratory for an extended examination. Head Engineer has now fashioned a home-made logic probe to aid our VOM. He has now become quite proficient at probing Al Tear's innards. Two sick days from work later, he reports Al is well again. One more cold solder joint melts into oblivion. This probably is not the last of our problems with what we are now beginning to think is our patient, but it brings us up to date on Mountain Digital Group's progress. We have a keyboard on order. We are also awaiting the arrival of a video display from Processor Technology. We are planning on 8K memory and BASIC language as soon as we can afford it. The group, itself, is beginning to jell. We now have a HEAD Engineer, and a HEAD Programmer. Our third man is undergoing intensive training in order to take over the Head Programmers responsibilities. HEAD Programmer will then become HEAD Public Relations Man in order to push our progress forward. We have put approximately $900 into our folly and will need at least that much more to really get off the ground.

Now, how do we put it to work? Head Programmer will use it to teach a high school computer math class, as well as an adult night class. Head Engineer will use it to teach an adult class titled "Electronic Digital Calculators and Computers." We are also planning demonstrations for teachers and students of other schools in the area. Scotts Valley Intermediate School has asked for a demonstration at their Spring Fair.

The future of our group? If we are to implement our plans fully, we must acquire more equipment. We have stripped ourselves of cash and individually gone into debt in order to get this far. Surely, some suppliers, or sympathetic individuals, will read this and come forth in behalf of a worthy cause (and free publicity).

Will the Nuts hold together as a group? We don't really have any salable skills to further our own cause. Also, we don't have any money to pay anyone who does have the skills. Where will the support come from? The only thing our group possesses is a lot of guts and enthusiasm. We aren't ready to answer any of these questions, but we aren't ready to give up our goals. We're looking for encouragement. Any ideas? In the meantime I'm going to scour around to see what other schools are doing.

Tom Halverson, another member of our group, has the following to offer:

"In five thousand bytes or less, here is what Digital Mountain means to me. At this point in our existence, the direction we are going looks somewhat like all four points of the compass. Will our system (Altair 8800) be used just as an educational tool, business venture, hobby, or all three? My immediate use is the educational tool, both for me and a class I teach at the San Lorenzo Valley adult education program. The class, called digital calculators and computers begins with an introduction to the binary number system, includes basic logic circuits and ends with an overview of the systems application including microprocessors.

The first class, which was last Wednesday night, consisted of the mind boggling total of two students; one a TV repairman who wanted to expand his electronics repertoire and a retired gentleman wanting to know something about this thing called a computer, which is slowly taking over our lives. We had a good learning session, but the class is doomed unless we can maintain at least ten students.

For the last two years I've been working with a group of parents trying to create, within the public school system, a better learning environment for our children. (I have three, ages 7 mo., 5 and 8 years). Our program is in its first year and has 120 students in the first thru sixth grades. A multi-graded classroom where one, of a total of four, teacher has from three to four grade levels. (First – third and third – sixth.) The basic philosophy of the program is to allow each person to learn at their own rate and in a supporting, non-competitive atmosphere.

How can a computer fit into an educational environment is a question which parents and teachers must be considering. If a self paced learning environment allows more individualism, then it also creates a record keeping nightmare for the teacher. To have third thru sixth graders in the same classroom all learning at their own rate, the need for a computer based system which could maintain record of each students' progress and assist in real time learning such as mathematics, reading, vocabulary ... etc.

I don't believe the computer will ever replace the person to person contact which is so basic to a loving and supportive learning atmosphere. One of the downfalls of our public school system is that we have made the teacher responsible for the students learning. This creates an unbearable pressure on the teacher and makes dependents of the students. The students must be responsible for their own learning and the teacher responsible for creating a supportive and efficient learning environment.

The computer will not be able to completely change this situation as it takes a change of heart and philosophy of those parents and teachers involved. But with parent involvement and given their permission to use a computer, (permission of the parent is essential) a change for the better will come about.

14

SQUARE

by Mac Oglesby

```
100 ' NAME:  ELEMLIB***:SQUARE
110 '
120 ' BY:  MAC OGLESBY ON 29 NOV 75.
130 '
140 ' DESCRIPTION:  A GAME FOR TWO PLAYERS ON A BOARD OF 25 (OR 24)
150 '   POINTS.  THE OBJECT IS TO CHOOSE POINTS TO FORM A SQUARE.
160 '
170 ' INSTRUCTIONS:  TYPE "RUN" FOR COMPLETE INSTRUCTIONS.
180 '
190 '
200 DIM S$(50),S(24,12)
210 LET A$(1)="X"
220 LET A$(2)="O"
230
240 'SET UP BOARD
250 FOR R0=0 TO 4
260    FOR C0=0 TO 4
270       LET D$(R0,C0)="."            'NORMAL BOARD HAS 25 DOTS
280    NEXT C0
290 NEXT R0
300
310 PRINT "WANT INSTRUCTIONS FOR SQUARE";
320 LINPUT A$
330 LET A$=SEG$(A$,1,1)
340 CHANGE A$ TO A
350 IF (89-A(1))*(121-A(1))=0 THEN 370
360    GOTO 510
370 LET A(1)=89
380 PRINT
390 PRINT "   THE GAME OF SQUARE IS FOR 2 PLAYERS.  THE NORMAL BOARD"
400 PRINT "LOOKS LIKE THIS AT THE START:"
410 GOSUB 1810
420 PRINT "   THE PLAYERS GO IN TURN AND CHOOSE ANY UNOCCUPIED POINT"
430 PRINT "(SHOWN AS A DOT).  EACH PLAYER HAS 12 MARKERS (X'S OR O'S)"
440 PRINT "WHICH ARE USED TO IDENTIFY CHOSEN POINTS."
450 PRINT "   THE WINNER IS THE FIRST PLAYER WHO HAS CHOSEN 4 POINTS"
460 PRINT "WHICH COULD FORM THE CORNERS OF A SQUARE."
470 PRINT "   TO CHOOSE A POINT, TYPE 2 DIGITS (0 TO 4) SEPARATED BY A"
480 PRINT "COMMA.  THE FIRST DIGIT TELLS THE DISTANCE OVER (TO THE RIGHT)"
490 PRINT "FROM POINT 0,0.  THE SECOND DIGIT TELLS THE DISTANCE UP."
500 PRINT "REMEMBER, OVER,UP."
510 PRINT
520 PRINT "1=NORMAL GAME (25 DOTS)   2=EXPERT'S GAME (NO CENTER DOT)";
530 INPUT B
540 IF (2-B)*(1-B)=0 THEN 580
550    PRINT "PLEASE TYPE 1 OR 2."
560    GOTO 520
570
580 IF B=1 THEN 620
590    LET D$(2,2)=" "                 'CENTER DOT BECOMES A SPACE
600    LET N=38                        'EXPERT'S GAME HAS 38 SQUARES
610    GOTO 640
620 LET N=50                           'NORMAL GAME HAS 50 SQUARES
630
640 FOR J=0 TO 24
650    READ S(J,0)
660 NEXT J
670 'S(J,0) TELLS HOW MANY SQUARES USE EACH POINT AS A CORNER.
680    DATA 4,7,8,7,4,7,10,11,10,7,8,11,12,11,8,7,10,11,10,7,4,7,8,7,4
690
700 FOR J=0 TO 24
710    FOR K=1 TO S(J,0)
720       READ S(J,K)
730    NEXT K
740 NEXT J
750 'S(,) TELLS WHICH SQUARES FROM LIST S$() HAVE A CORNER AT EACH POINT.
760    DATA 1,11,35,43
770    DATA 1,2,15,20,28,31,36
780    DATA 2,3,21,24,29,43,44,47
790    DATA 3,4,16,25,30,34,35
800    DATA 4,13,36,44
810    DATA 1,5,15,24,38,32,37
820    DATA 1,2,5,14,22,25,38,39,47,48
830    DATA 2,3,15,16,17,23,26,32,33,39,40
840    DATA 3,4,6,14,20,27,37,40,47,49
850    DATA 4,6,16,21,28,33,38
860    DATA 5,7,20,26,29,43,45,48
870    DATA 5,7,15,17,18,21,27,31,34,39,41
880    DATA 39,40,41,42,43,44,45,46,47,48,49,50
890    DATA 6,8,16,17,19,22,24,31,34,40,42
900    DATA 6,8,23,25,29,44,46,49
910    DATA 7,9,18,22,28,32,35
920    DATA 7,9,10,14,23,24,36,41,48,50
930    DATA 10,11,17,18,19,20,25,32,33,41,42
940    DATA 8,11,12,14,21,26,35,42,49,50
950    DATA 8,12,19,27,30,33,36
960    DATA 9,13,37,45
970    DATA 9,10,18,26,30,34,38
980    DATA 10,11,22,27,29,45,46,50
990    DATA 11,12,19,23,28,34,37
1000    DATA 12,13,38,46
1010
1020 FOR J=1 TO N
1030    READ S$(J)
1040 NEXT J
1050 'S$() STORES THE LOCATIONS OF THE CORNERS OF ALL POSSIBLE SQUARES.
1060 'EACH GROUP OF 4 PAIRS OF DIGITS LISTS 4 CORNERS (YXYXYXYX).
1070    DATA "03011110","01021211","22031312","03241413","10112120"
1080    DATA "13142423","20213130","23243433","30314140","31324241"
1090    DATA "32334342","33344443","02244440","11133331"
1100    DATA "21122110","03142312","12233221","21324130","23344332"
1110    DATA "01133220","02143321","11234233","12244331"
1120    DATA "02233110","03243211","12334123","13344221"
1130    DATA "01144330","02244232","03344110"
1140    DATA "01032321","10123230","12143432","21234341"
1150    DATA "00033330","01043431","10134340","11144441"
1160    DATA "11122221","12132322","21223231","22233332"
1170    DATA "00022220","02042422","20224240","22244442"
1180    DATA "02132211","11223120","13243322","22334231"
1190
1200 IF A(1)<>89 THEN 1230
1205    IF B=2 THEN 1230
1210       PRINT
1220       GOTO 1250
1230 GOSUB 1810
1240
1250 LET T=T+1                         'TURN COUNTER
1260
1270 FOR J=1 TO 2                      'MAIN MOVE LOOP
1280    IF T>1 THEN 1310
1290       PRINT "THE "JA$(J)"'S CHOOSE WHICH POINT";
1300       GOTO 1320
1310    PRINT A$(J)"'S CHOICE";
1320    LINPUT A$
1330    IF LEN(A$)<>3 THEN 1640        'CHECK FOR LEGAL INPUT
1340       CHANGE A$ TO A
1350       IF (52-A(1))*(A(1)-48)<0 THEN 1640
1360          IF A(2)<>44 THEN 1640
1370             IF (52-A(3))*(A(3)-48)<0 THEN 1640
1380                LET R1=A(3)-48      'R1 IS "Y" COORDINATE
1390                LET C1=A(1)-48      'C1 IS "X" COORDINATE
1400                IF D$(R1,C1)<>"." THEN 1620  'CHECK FOR LEGAL CHOICE
1410                   LET D$(R1,C1)=A$(J)  'UPDATE BOARD
1420
1430                   'CHECK FOR A SQUARE
1440                   IF T<4 THEN 1600
1450                      LET S0=5*R1+C1
1460                      FOR J1=1 TO S(S0,0)
1470                         IF B=1 THEN 1500
1480                            IF S(S0,J1)<=38 THEN 1500
1490                               GOTO 1670
1500                         FOR K1=1 TO 8 STEP 2
1510                            LET D1=VAL(SEG$(S$(S(S0,J1)),K1,K1))
1520                            LET D2=VAL(SEG$(S$(S(S0,J1)),K1+1,K1+1))
1530                            IF D$(D1,D2)=A$(J) THEN 1550
1540                               GOTO 1590
1550                         NEXT K1
1560                         PRINT "*** THE "JA$(J)"'S WIN!!! ***"
1570                         GOSUB 1810  'PRINT FINAL BOARD
1580                         GOTO 1730  'GOODBYE
1590                      NEXT J1
1600                   GOTO 1670
1610
1620                PRINT "ILLEGAL CHOICE!"
1630                GOTO 1650
1640    PRINT "YOU MUST TYPE 2 DIGITS (FROM 0 TO 4) SEPARATED BY A COMMA."
1650    PRINT "INPUT IGNORED.  PLEASE TRY AGAIN..."
1660    GOTO 1310
1670 NEXT J
1680
1690 IF T<12 THEN 1760                 '12 TURN LIMIT
1700    PRINT
1710    PRINT "THIS GAME IS A DRAW, FOR NEITHER PLAYER MADE A SQUARE!"
1720    GOSUB 1810                     'PRINT FINAL BOARD
1730    PRINT "TYPE  RUN  TO PLAY AGAIN."
1740    STOP
1750
1760 GOSUB 1810                        'PRINT BOARD
1770
1780 GOTO 1250                         'GO GET NEXT CHOICES
1790
1800 'PRINT THE BOARD
1810 PRINT
1820 FOR R0=4 TO 0 STEP-1
1830    PRINT STR$(R0);" ";
1840    FOR C0=0 TO 4
1850       PRINT D$(R0,C0);
1860       IF C0=4 THEN 1880
1870          PRINT "   ";
1880    NEXT C0
1890    PRINT
1900    IF R0=0 THEN 1930
1910       PRINT
1920       PRINT
1930 NEXT R0
1940 PRINT "  0   1   2   3   4"
1950 PRINT
1960 RETURN
1970
1980 END
READY
```

COMPLIMENTS TO MAC

Dear PCC, Please extend my compliments to Mac Oglesby. His two programs, MOTIE and RESCUE, are superb examples of program clarity. My personal opinion is that matters of style and the aesthetics of program construction are too often ignored by programmers; it's refreshing to encounter someone who understands that programs are read by entities other than a computer. More contributions by Mac will be greatly appreciated.

Sincerely,

TOM ALLEN
Box 81
Stevensville MI 49127

```
RUN

SQUARE    13 DEC 75  12:14

WANT INSTRUCTIONS FOR SQUARE? YES

   THE GAME OF SQUARE IS FOR 2 PLAYERS.  THE NORMAL BOARD
LOOKS LIKE THIS AT THE START:

4 .   .   .   .   .

3 .   .   .   .   .

2 .   .   .   .   .

1 .   .   .   .   .

0 .   .   .   .   .
  0   1   2   3   4

   THE PLAYERS GO IN TURN AND CHOOSE ANY UNOCCUPIED POINT
(SHOWN AS A DOT).  EACH PLAYER HAS 12 MARKERS (X'S OR O'S)
WHICH ARE USED TO IDENTIFY CHOSEN POINTS.
   THE WINNER IS THE FIRST PLAYER WHO HAS CHOSEN 4 POINTS
WHICH COULD FORM THE CORNERS OF A SQUARE.
   TO CHOOSE A POINT, TYPE 2 DIGITS (0 TO 4) SEPARATED BY A
COMMA.  THE FIRST DIGIT TELLS THE DISTANCE OVER (TO THE RIGHT)
FROM POINT 0,0.  THE SECOND DIGIT TELLS THE DISTANCE UP.
REMEMBER, OVER,UP.

1=NORMAL GAME (25 DOTS)   2=EXPERT'S GAME (NO CENTER DOT)? 1

THE X'S CHOOSE WHICH POINT? 22
YOU MUST TYPE 2 DIGITS (FROM 0 TO 4) SEPARATED BY A COMMA.
INPUT IGNORED.  PLEASE TRY AGAIN...
X'S CHOICE? 2,2
THE O'S CHOOSE WHICH POINT? 2,4

4 .   .   0   .   .

3 .   .   .   .   .

2 .   .   X   .   .

1 .   .   .   .   .

0 .   .   .   .   .
  0   1   2   3   4

X'S CHOICE? 1,1
O'S CHOICE? 1,3

4 .   .   0   .   .

3 .   0   .   .   .

2 .   .   X   .   .

1 .   X   .   .   .

0 .   .   .   .   .
  0   1   2   3   4

X'S CHOICE? 2,0
O'S CHOICE? 3,1

4 .   .   0   .   .

3 .   0   .   .   .

2 .   .   X   .   .

1 .   X   .   0   .

0 .   .   X   .   .
  0   1   2   3   4

X'S CHOICE? 1,2
O'S CHOICE? 2,1

4 .   .   0   .   .

3 .   0   .   .   .

2 .   X   X   .   .

1 .   X   0   0   .

0 .   .   X   .   .
  0   1   2   3   4

X'S CHOICE? 0,1
O'S CHOICE? 0,2

4 .   .   0   .   .

3 .   0   .   .   .

2 0   X   X   .   .

1 X   X   0   0   .

0 .   .   X   .   .
  0   1   2   3   4

X'S CHOICE? 1,0
O'S CHOICE? 0,0

4 .   .   0   .   .

3 .   0   .   .   .

2 0   X   X   .   .

1 X   X   0   0   .

0 0   X   X   .   .
  0   1   2   3   4

X'S CHOICE? 4,1
O'S CHOICE? 3,3

4 .   .   0   .   .

3 .   0   .   0   .

2 0   X   X   .   .

1 X   X   0   0   X

0 0   X   X   .   .
  0   1   2   3   4

X'S CHOICE? 3,2
O'S CHOICE? 1,4
*** THE O'S WIN!!! ***

4 .   0   0   .   .

3 .   0   .   0   .

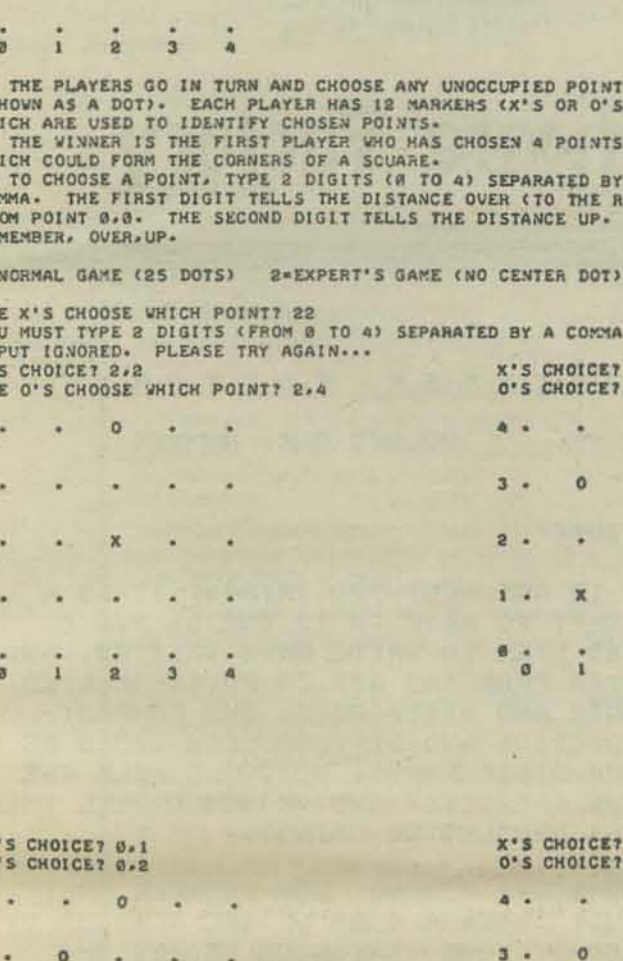
2 0   X   X   X   .

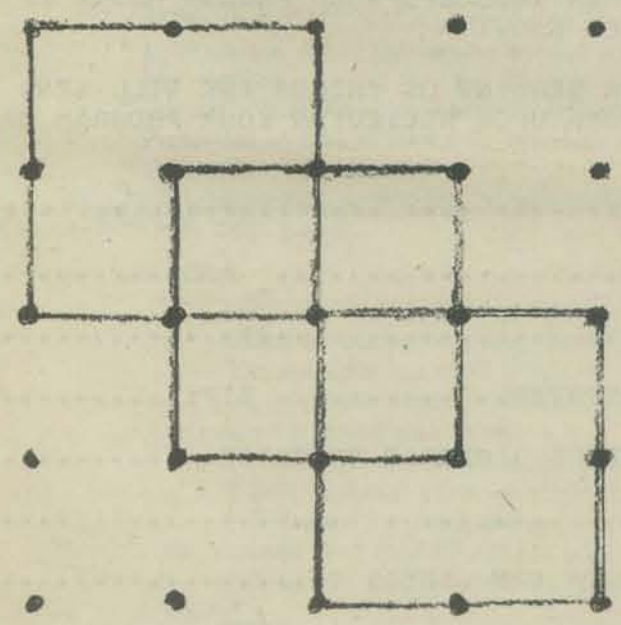
1 X   X   0   0   X

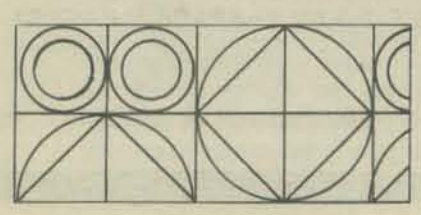
0 0   X   X   .   .
  0   1   2   3   4

TYPE  RUN  TO PLAY AGAIN.

1.388 SEC.  116 I/O
READY
```







Square is a neat and uncomplicated computer game. Assuming each to his or her own taste, the range of ages to which this game will appeal is very broad. For teachers who have their feelers out for good learning tools and for students who are challenged to go beyond the confines of the game, this game will suit their purposes. A practical note about the game as it is: one doesn't need a computer to play it. Try a grid of points, or intersecting lines.

There are numerous mathematical concepts readily apparent. A few such are points of intersection, regions, area axes, ordered pairs, units of area, area of a triangle, and oodles of others. Just these will give your brain a start.

QUESTIONS

There are a lot of questions which can be asked. Try finding acceptable responses to these:

† How many more than twenty-four squares can be formed?

† A square whose corners are (0,4), (0,0), (4,0), (4,4) has the greatest area possible. List the corners for the square having the next greatest area.

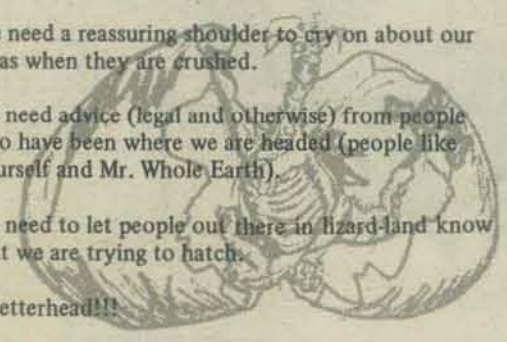
† Can you program this game to be played against the computer? In a simple fashion?

† What questions would you ask about the game?

Dear PCC,

You may remember me from a phone call I made to you on or about January 17. In it we talked about an idea myself and two of my friends had; creating an organization that puts out a newsletter with the freedom of PCC, but with the professional recognition of HP's User Group Newsletter (are such things possible), but fairly inexpensive (maybe even free). We would also sponsor a clearing house for computer programs and related materials.

Well, we've run into a veritable hogshead of problems; most involving that old nemesis of ideology MONEYMAN. A short list of our problems follows:



(1) We need a reassuring shoulder to cry on about our ideas when they are crushed.

(2) We need advice (legal and otherwise) from people who have been where we are headed (people like yourself and Mr. Whole Earth).

(3) We need to let people out there in lizard-land know that we are trying to hatch.

(4) A letterhead!!!

A short thanks to Steward Brand and his wondrous catalogs. Without these bibles of access, we wouldn't have gotten even this far (Note: Are there going to be any more?).

But, getting back to our problem at hand, we would be very glad if you people could print this letter, and maybe drop our name (when we decide on one) to other people at these pillars of knowledge in computer-land.

Many thanks for anything you people can do for our ideas!

Dear Bob,

Thank's for the very kind letter of February 5. I really do thank you for your ideas. I'm especially appreciative of your offer to have a part in TINY BASIC! Also, thanks for the ideas for the name of our group. I've decided to (if it's okay with you) adopt "THE PEOPLE'S SOFTWARE FACTORY" as our tentative name.

I've enclosed a copy of the PSF's organizing outline. I would appreciate, if you have the time, to go over it and give us some feedback on it. I think that, for the moment at least, it's pretty accurate in general descriptions of PSF.

COMPANY OUTLINE

Company and Newsletter name: People's Software Factory

Operator: Christopher Gerald Moseley Age: 17 Grade: 11

Purpose of Company: Provide a forum for computer program and information articles to be distributed to other computer operators. The types of programs would be general (we'd accept anything!). The information would be designs for computer systems, or manuals/books about computers or about most anything of interest to our reader audience.

Who would be the target group? We would serve mainly the group of young people in America who may write a decent program, or do a good paper on a computer-related subject. But, we would be general in that anybody who wants to may ask us to distribute/sell their programs or articles.

What would be the pattern of the Newsletter? It would be arranged so that, in the first actual issue, we would give listing of all current programs that we offer. Following, a bi-monthly newsletter would be sent out with all new additions, or removals to the list, and yearly thereafter a complete listing would be printed for the users (this would be separate from the actual newsletter and would cost extra.). The following information would be in the listings:

Program name, author, purpose, price, paper tape or cassette, and notes.

People's Software Factory
c/o Christopher Moseley
1927 Harper's Ferry
San Antonio, TX 78245

Dear Mr Albrecht, I've done it! The first issue of *People's Software Factory* is ready for the presses. I'm looking for a fair (CHEAP) printer to do the printing of about 50 copies for me, as the school where I go to won't (something about 'private use of public property'). Well, while this adventure is going on...

I've been looking over the bylaws that you people sent me and have gotten several good ideas from them as to the way PSF could be structured. Also, I've decided that if this company ever got to be making it (I consider PCC & WEC as things that have 'made it') then we could stop using the Service Center's machines, and actually BUY some . . . but I'm all too good at counting unborn fowl.

Also, I've enclosed my three dollars for a subscription to *Tiny BASIC*. From what you people sent me, this thing looks like a thing that has been needed for about 13 years; a good look at BASIC as a language that might take the wizardry out of computers, and maybe put a mini-computer in every home . . . (HOPE . . . HOPE . . . MAYBE MINE).

Not much else to say, so I'll be contacting you as soon as anything comes up about PSF or anything else.

CHRISTOPHER MOSELEY
People's Software Factory

People's Software Factory

P E O P L E ' S S O F T W A R E F A C T O R Y

EDITED BY CHRIS MOSELEY VOLUME ONE, NUMBER 1

WHAT IS 'PEOPLE'S SOFTWARE FACTORY' ?

PEOPLE'S SOFTWARE FACTORY IS ACTUALLY TWO THINGS; IT IS A SHORT NEWSLETTER THAT WILL ATTEMPT TO HAVE IN IT ONE OR TWO OF THE TYPES OF ARTICLES PEOPLE WHO LIKE TO WRITE HAVE WRITTEN, AND IT WILL HAVE LISTINGS OF COMPUTER PROGRAMS AND COMPUTER-RELATED MATERIALS THAT WE SHALL REPRODUCE AND DISTRIBUTE. THE COMPANY THAT WOULD DO ALL OF THE REPRODUCTION AND DISTRIBUTION WOULD BE 'PEOPLE'S SOFTWARE FACTORY' (THE OTHER PART). WE WOULD SELL THE PROGRAMS ON PAPER TAPE AND MAYBE CASSETTE, AND WE WOULD SELL THEM AT COST, (+ A CHARGE TO KEEP THE NEWSLETTER GOING).

YOU MAY BE THINKING TO YOURSELF; "OH NO! NOT ANOTHER ONE!". WELL, WE DON'T PLAN ON BEING JUST ANOTHER ONE! WE ARE A GROUP OF HIGH SCHOOL STUDENTS, AND BACKED BY SOME VERY NICE PEOPLE WHO HAVE PUT A LITTLE FAITH (AND HOPEFULLY $$$) IN US. WE ARE GOING TO TRY AND SERVE THE BULK OF THE DATA PROCESSING COMMUNITY, BUT MAINLY THE YOUNGER PEOPLE WHO HAVE JUST 'DISCOVERED' COMPUTERS. WHILE WE WON'T BE A STRICTLY FUN-'N'-GAMES NEWSLETTER, WE WILL HAVE A LOT OF GAME PROGRAMS IN OUR CLEARINGHOUSE.

AS FOR A LANGUAGE, WE WILL ACCEPT ALOT OF LANGUAGES, BUT MAINLY 'BASIC' & 'FORTRAN' & MAYBE (***GASP***) COBOL! WE PROMISE YOU THAT IF YOU TAKE THE TIME TO SEND US A LISTING OF YOUR PROGRAM, WE WILL TAKE THE TIME TO READ IT, AND REPLY. WE ASK THAT YOU FIRST SEND US A LISTING OF YOUR PROGRAM ONLY!!! WE DON'T WANT TO FIND OURSELVES UNDER MOUNTAINS OF PAPER TAPES OR DECKS. IF YOU WISH TO SEND US AN ARTICLE, SEND IT IN DOUBLE-SPACED PAGES. ALSO, IF IT IS COPYRIGHTED, PLEASE LET US KNOW!

USE THE FOLLOWING FORM FOR SENDING US THINGS (WE WILL SEND YOU A LONGER, MORE COMPLETE FORM UPON RECIEVING YOUR PROGRAM OR ARTICLE/S.)

****

NAME:..... AGE:.....

ADDRESS:.....

CITY:..... STATE:..... ZIP:.....

PROGRAM [ ] ARTICLE [ ] OTHER [ ] PLEASE DESCRIBE:.....

.....

IF A PROGRAM, WHAT IS IT'S LENGTH (IN LINES) ? .....

IF AN ARTICLE, WHAT IS IT'S LENGTH (IN DOUBLE-SPACED PAGES) ?....

REMARKS:

TINY BASIC TO GO!

TINY BASIC (the computer language) is alive and proliferating at a rapid rate.

Two versions are already up and running.

More are imminent.

Robert Suding (of The Digital Group) has volunteered to assist in developing TINY BASIC using calculator chips (thereby obtaining extensive mathematical capabilities . . . for those who want such things).

And it's mutating. Discussion is already underway concerning other "tiny" languages for other "great" purposes.

Tiny BASIC (the publication) is alive and maturing rapidly.

It's about to get married . . . a polygamous relationship with such warm friends as:

† The TV Dazzler (76Feb *Popular Electronics* pp 31-40; Vol. 9, No. 2)

† PILOT 73 (Programmed Inquiry, Learning Or Teaching) a system for controlling interactive conversation

† Musical Computers (76Jan *PCC* p. 12; Vol. 4, No. 4)

† MAPLE (Microcomputer APL for Enthusiasts) Text editors, spelling correctors, etc., and maybe ALGOL, PASCAL, et al.

Dear Bob, MAPLE, Microcomputer APL Enthusiasts, is here!

I'd like to know if anyone is interested in furthering the following projects–well, projects-to-be:

† APL for uP users: promote APL as a compact, universal code for program notation which can be easily read by any user, and then translated to his or her uP's code through an APL/uP dictionary. First, for the 8080, then . . .

† Software: initially, without vectors (PCC may begin work on this soon), next, vectors; then, arrays: 2D and color, then 3D?

† Hardware: firmware to automatically implement the APL character set on TVT's, and then for those dictionaries! A matrix printer which will be able to cover the whole page with dots (filling in even the spaces between lines and letters–and someday even between the dots!) to print the programs in APL text.

Essentially, I'd like MAPLE to serve as a focus for the information required to implement the aforementioned projects. If you know of anything that has to do with the above, please tell me about it!

JOHN SIKORSKI
Box 574
Northwestern University Medical School
303 E. Chicago Ave
Chicago IL 60611

The first issue (20 pages, Xeroxed) escaped from us the first week of February. You *did* get *your* copy, didn't you?

The second issue is rapidly approaching completion. It will:

† Be *at least* 25 pages.

† Contain:

* Complete, annotated source code matching the octal listing of the first TINY BASIC, printed in the first issue.
* Information about the *second* version of TINY BASIC, now up and running . . . and free for the cost of reproduction.
* Communiques from interested friendlies.
* Prologues to free software for graphics and music.
* And much, much more.

With luck (*and enough subscribers*) it will come out in a magazine format--with lots more pages!

IT'S GOING TO KEEP GOING!

When we started, we said we'd do three issues.

The response has been great.

We obviously found a hunger that needs feeding. A hunger for: software for doing real things.

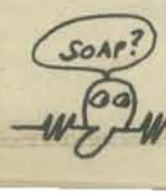
† Real software for doing real things.

† Software that's free or super-cheap.

† Software for doing things *hobbyists* want to do (instead of COBOL for business, and FORTRAN for scientists).

† Programs that will run on "tiny" computers (a very un-IBMish desire).

Subscriptions have been pouring in. If their arrival rate continues and increases (you *have* subscribed, haven't you?), this publication of *computer goodies for people* will continue, grow, and serve you well!



We've hired an editor, just to put together *Tiny BASIC*. He's Jim Warren, a computer phreaque from way back, having first programmed in SOAP on an IBM 650 around 1959.

American Telegraph and Telephone Co.

That's one mushroom & sausage pizza, *very* large.

We're going to a regular magazine format and publication schedule as soon as subscriptions will support it.

For those of you who have just begun receiving *PCC*, a word about TINY BASIC:

TINY BASIC is a computer language.

It is a subset of BASIC, a popular and simple interactive computer language, developed at Dartmouth.

It is designed to run on a microcomputer (*any* microcomputer) with very little memory.

It is designed to be easy to implement. That design criteria was obviously met. Two implementations were up and running in less than six months.

The *publication* by the same name, began as a medium for communication among TINY BASIC-ites.

It is dedicated to presenting nuts and bolts details, sufficient for the hobbyist and computer amateur to find useful and usable.

It has a major bias towards promulgating *inexpensive and free* software . . . and appears certain to expand into sharing free ideas and designs for hardware and systems.

It is designed to be able to change rapidly, to meet the explosively varying needs and desires of the home computer user.

Since *Tiny BASIC* (the publication) is entering relationships with so many new partners, it's going to change its name.

Have any suggestions? (Nothing very restrictive--it's a free spirit, dedicated to spreading the word about free hardware, software, ideas, and what have you.)

I want to subscribe to
▪ DR. DOBB'S JOURNAL OF
TINY BASIC CALISTHENICS & ORTHODONTIA ▪
(3 issues for $3)

NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

(If you would like us to publish your name, address, and equipment of access/interest in future issue(s), please indicate *VERY SPECIFICALLY:*

EQUIPMENT
OF ACCESS/INTEREST_____

Please send check or money order (purchase order minimum: $6)
to TINY BASIC CALISTHENICS & ORTHODONTIA
Box 310, Menlo Park CA 94025. Thank you.

jim day's DAZE

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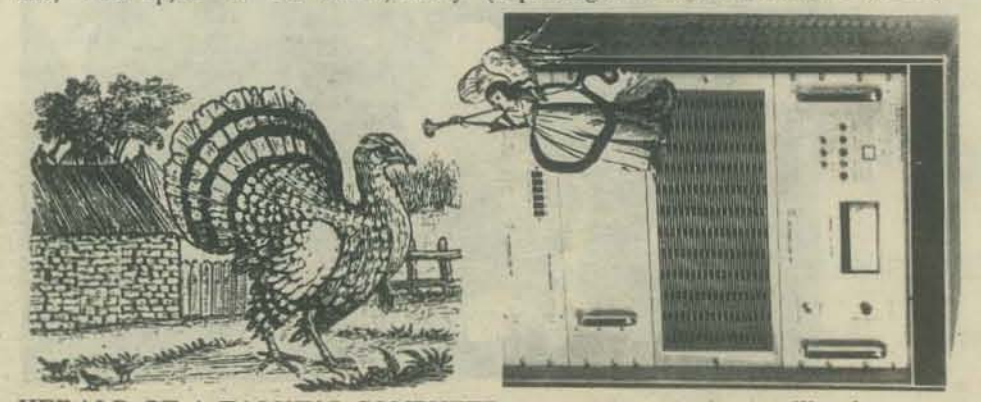
COMPUTERS THAT TALK

Wouldn't it be nice if your computer could speak to you in English, French, German, or Esperanto like the computer on the starship Enterprise? Then it could say things like, "Wake up, sir" or "Get with it, turkey" (depending on what kind of mood it was in)



HERALD OF A TALKING COMPUTER (owned by a turkey) telling its master, "Wake up, Sir"–in Turkish, of course.

or maybe, "The time is six o'clock, the temperature is 46 degrees, and tomorrow is your wife's birthday." Most people have probably assumed that some day, perhaps by the year 2000, talking computers will be a reality instead of simply science fiction. Well, hang onto your prognostications, people, because that day is today!

In recent years many people have been working on voice output devices for computers. Some of these devices have been electro-mechanical analogs of the human vocal tract, similar in principle to the Voder exhibited at the New York World's Fair in 1939. Others have used electronic waveform generators to synthesize human speech sounds. Of these, the Votrax synthesizer can truly be said to represent a significant breakthrough with respect to voice quality, ease of programming, and cost.

Smaller than a breadbox and priced at about $3500 for the basic unit, Votrax is produced by the Vocal Interface Division of the Federal Screw Works (500 Stephenson Highway, Troy MI 48084; (313) 588-2050). Any computer capable of outputting a string of ASCII code to a terminal can be used to control Votrax. As an output device, Votrax can be used alone or in conjunction with an ordinary TTY, using embedded ASCII control codes and simple logic to switch voice strings to Votrax, and print strings to the TTY, TVT, or other conventional terminal.

Programming Votrax is a snap. Using BASIC, FORTRAN, APL, PL/1, or just about any other programming language, it's easy to convert ordinary English (or other natural language) into voice strings for Votrax. The best quality of vocal output is obtained by using a dictionary lookup technique to substitute a string of phoneme codes for each English word. Votrax responds to ASCII codes for 63 different phonemes (basic speech sounds) and each phoneme can have one of four levels of inflection.

If perfect voice quality is not essential and random-access file space is not available for a large dictionary, an algorithm can be used to convert English words to phoneme codes. Such an algorithm, developed by Bell Telephone Laboratories, is said to work almost as well as dictionary lookup. An unpronounceable string such as "PDP-8" can be spelled out phonetically as though written "pee dee pee dash ate," and the number 10.6 can be rendered as "ten point six" by means of a simple subroutine. Pauses can be inserted automatically in response to punctuation and paragraphing.

Maybe you are wondering whether anyone has actually used Votrax and, if so, how did they like it? The answer to both questions is yes. People are using Votrax and they like it a lot. For example, the Coast Community College District in Costa Mesa, California, is using Votrax for computer-aided instruction and also in an on-line student information system. Votrax was chosen in preference to other audio response units not only because it is much less expensive but also because it is ideal for a wide range of applications, the size of its vocabulary is unlimited, and it functions well in a real-time environment. In the student information system application, Touch-Tone telephones are used as "terminals." Although this limits the user to numeric input, it would be hard to find a cheaper or more readily available I/O device. Several extensions to the district's present use of Votrax are being developed, such as a voice-output interface for their on-line budget system, allowing administrators to inquire about specific accounts and receive immediate vocal replies. David Clements, senior programmer/analyst for the district's student information system, reports that he is amazed at the results achieved with Votrax and believes that synthesized voice output will become a widely used medium in the near future.

Another application of Votrax is as an aid to blind programmers. In the Homer system, written in FORTRAN for a CDC 6500 at Michigan State University, Votrax is used to echo each line input from a conventional terminal. It is also used to deliver FORTRAN diagnostics and as a tool in the editing of source program files.

Operating in conjunction with an optical page reader, Votrax can be used to convert printed matter, such as books, magazines, and newspapers, into audible form. If desired, the output from Votrax can be tape recorded for distribution to the blind.

These are but a few of the uses to which voice output can be put, and it appears likely that voice output will soon become a familiar feature of many computer systems. Maybe yours will be one of them.

(Also see "Talking Calculator" in November 1975 PCC [Vol. 4, No. 3, p. 9].)

PREDICTION

Dear Bob, By all means keep up the calesthenics and orthodontia. But I suspect that as **Tiny BASIC (Dr. Dobb's Journal of Tiny BASIC Calisthenics & Orthodontia: running light without overbyte;** *3-issue subscription: $3; Box 310, Menlo Park CA 94025] matures it will acquire a full set of canines, biscuspids, and molars. As the price of main memory*

A FULL SET OF CANINES

continues to drop, the need for a minimal BASIC will assume less importance and the emphasis will shift to better performance and convenience. Still, IL is a good tool for those who may want to experiment with variants of BASIC or some other language. As unlikely as it may seem, I think that by 1980 most hobbyists will be using a subset of PL/1. I also preduct that the 1980 hobbyist will own a computer system the size of a breadbox, comprising a 16-bit CPU, 256K bytes of main memory, 8M byte floppy disc, dual tape cassettes, full ASCII keyboard, CRT display, modem, and non-impact printer (all in one box). The whole thing will sell (assembled) for $695 at Sears and will have the computing power of an IBM 370. Last, but not least, the CPU chip will be designed expressly for the hobbyist, not for some pedestrian application such as traffic signal control.

NEW ERA

The era of the computer hobbyist has finally arrived. Soon, second graders will be taught reading, writing, and RPG. Junior High will feature courses in "Conversational COBOL," and "Remedial ALGOL," while High Schools will offer "Context-Free Phrase-Structure Grammars in Syntax-Directed Compiling." Colleges will concentrate on the more abstract subjects like "Niladic Lambda Calculus as Applied to Fuzzy Automata."

FUZZY AUTOMATA are prone to melancholy, and brood a great deal

All well and good, I guess. But kids should learn that computers can be fun. Formal pedagogy has a nasty way of making almost any subject seem dull. I didn't know mathematics could be fun until I dropped out of college (25 years ago) and ran into some far-out books like Ogilvy's **Tomorrow's Math**, and Barr's **Experiments in Topology** (see Schaaf's **Bibliography of Recreational Mathematics** for other neat stuff). So I am delighted to see that PCC is proving that computers are not just for number crunching but for fun and games and art and music and poetry and, oh yes, for exploring the terra incognita of the universe and the human mind.

ELECTRONICS CONSTRUCTION ARTICLES

A few recent electronics construction articles that may be of interest to some dragons are as follows:

Radio Electronics, January 1976
- "Pocket Computer Terminal" by Charles Edwards
- "Portable Music Synthesizer (Part III)" by John Simonton

Electronic Experimenter's Handbook, 1976
- "Build the 'Tic-Tac-Toe' Logic Machine" by Herb Cohen
- "Universal Digital Clock Alarm Function" by Edward Friedman
- "The Easy Way to Make PC Boards--The Photopositive Method" by William Roubal
- "The IC 'Time Machine' " by Walter Jung
- "Log-Cost Logic Probe" by Randall Glissman
- "Applications for the 555 IC" by Walter Jung
- "Logidex--An Electronic Game for All Seasons" by Howard Nurse
- "Build an IC Light Modulator" by Edward Yandek
- "Tremolo Adapter" by Deane Gardner
- "Make Your Digital Clock 'Fail-Safe' " by Calvin Diller

Electronics Hobbyist, Fall-Winter 1975
- "Wiper-Trol II" by Felix Peterson
- "Hobbyist Power Supply for TTL" by Herb Friedman
- "Build Time Tally" by Thomas Fox
- "Maxiclock" by C.R. Lewart
- "Photo Timer" by Adolph Mangieri

Elementary Electronics, January-February 1976
- "Measure the Wind" by T.R. Fox
- "Heathkit GC 1093 Digital Car Clock"

Popular Electronics, January 1976
- "Envelope Generators & Sequencers for Electronic Music" by Don Lancaster
- "A Digital Stopclock for Short & Long Event Timing" by Michael Robbins
- "The Programmable Music Box (Part II)" by Mitchell Waite & Larry Brown
- "Computer Bits--Interrupts & Real-Time" by Jerry Ogdin
- "Experimenter's Corner--Using an Optoisolator" by Forrest Mims
- "Product Test Report--Heathkit Model TD-1006 4-Channel Color Organ Kit"

Parts for most of the above are available in kit form.

Dragons into solar heating might like **How to Build a Solar Heater** by Ted Lucas (Ward Ritchie Press, Pasadena, California).

Learning Fair

BY SUSAN SANDS

PHOTOGRAPHS BY STEPHEN FRISCH

What can you learn at a "learning fair"? What, for that matter, is a learning fair? One such event took place not long ago at the Peninsula School in Menlo Park, California, a few miles down the Bay from San Francisco. It may well have been the first of its kind, and it was certainly the first to be billed, with all good humor, as "super ecstatic and completely credible." SR asked Susan Sands, former Newsweek *staffer and now a general freelance writer, to look in and report.*

It happened at Peninsula School, a forty-seven-year-old, family-staff-owned cooperative, the "oldest free school in the country," site of the first New Schools Conference in 1969.

What was it? Fifteen "workshops and playshops"—Bead Game Music, Kids Teaching Kids, Gestalt Smörgasbord . . .—and forty ongoing events—Mobile Solar Sculpture, People's Computer Center, Tree Loom, the Alexander Technique. . . . All spread over two days and sprinkled among the oak trees of the six-acre school site and the rooms within Peninsula's main building, a green Victorian mansion. "Come together as participators/innovators," read the announcement.

"I was sick and tired of conferences," said Bob Albrecht, who came up with the idea for a learning fair and served as its codirector. "A fair was a way for a lot of us interested in new styles of education to get together, to let the public know what was going on, make money for the school, *and* have fun." Albrecht, a mischievous-looking man with a remarkable gray, blunt-cut beard, was one of the original founders of the Portola Institute (*Whole Earth Catalog, Big Rock Candy Mountain*). Now he's part of a Portola offshoot, the new educational group called Zephyros ("a gentle refreshing breeze"). He's also a Peninsula School parent and board member.

Pen director Barney Young, a rotund man of infinite calm, saw the aims of the fair as those of his school. "We want to loosen people up so they recognize all kinds of learning—emotional, physical, intellectual, mystical. Learning has to be happening in every conceivable area." Learning should be joyful, open-ended, exploratory. The fair, like a good school, should also urge "direct action involvement" in each event, heeding Dewey's maxim that abstract knowledge grows out of real experience.

The fair was not only for children, Young stressed, just as Pen School is not only for the 230 pupils from three to thirteen years old who regularly attend it. "A school is a place where parents, kids, the community, all of us, should be changing. There should be no artificial barriers between kids and adults."

Five dozen or more persons, professionals and nonprofessionals both, served as fair teachers. They came from throughout the Bay Area, and they were of exceptionally high caliber. Among them, for example, were five members of Zephyros—that "learning collective" of ten or so individuals, each engaged in his own unique project to stimulate new ideas in education. Through Zephyros's most visible project so far, Ron Jones's Materials Exchange, hundreds of teachers and parents throughout the country are trading learning ideas and resources (partly through supersize publications called the "Deschool Primers").

More than 1,200 people went to the fair—some for three hours, some for two days—leaving behind about $3,200 for Pen scholarships. They tended to be hip rather than straight, and there was a notable lack of people over fifty. Some spent their time in chatting over organic snacks or doing crafts; others hurried from workshop to workshop.

I went the workshop route myself. Here, then, are some notes and impressions from one fairgoer, an adult who learned a lot and liked it.

Life Games. A floppy, child-size puppet heaves into the air, then plops to the floor. A curly-haired four-year-old, grinning, apes the puppet and collapses into a heap. The game is designed to awaken "self concept"—to urge a child to ask, "What do I look like? What can I do?" There are 199 such games in a kit called Amazing Life Games Theater (Houghton Mifflin). The kit's creator, Ethel Young, who has taught young children for thirty years, says, "It's an answer for the teacher who's trying to open up her classroom. We give the kids a huge number of options so that each can find his own particular style."

"Remember, you and I are teaching the big people today," she tells the twenty youngsters present. We big people rove the classroom, learning. I ask a little blonde girl named Jessica to explain her magic-marker drawing of lots of different-colored triangles. She says, "Every way the triangles are going is the way the world is going. The world is getting happier. When it's happy, it goes up; when it's sick, it goes down. It took a hundred years for the world to go all these directions. When it's happiest, the world ends, in a hundred years. The people will be smashed. Then it will start over again."

Outside on the fair grounds a small, green-faced figure accosts me. "I'm the MOSS MONSTER!" he crows. Looking around me in the crowd, I notice more and more monster faces, clown faces, flower faces, all emanating from the Body Painting Booth.

Kids Teaching Kids. Relaxing on an orange-and-white parachute, four high school kids are rapping with anyone interested in what they do. What they do is go into local elementary and junior high school classrooms, help out the teacher, and at the same time learn something about teaching, other people, and themselves. They're part of a Zephyros project that right now covers four schools and has ninety members. One girl says the younger kids "respond more to us than to their regular teacher." Their tough-kind adviser, Carol Young, nods, adding, "They don't come on as teachers; they're open to new ways of doing things. They're not full of rules."

A tight-lipped couple asks the fair's codirector, Lynne Sonenberg, "But where is the school? I mean, where are the desks?"

The Alexander Technique. I am ushered into a small room by Edward Avak, a small, intense man and a certified member of the Society of Teachers of the F. Mathias Alexander Technique. "It helps people use themselves better, with greater control, effortlessness, and balance," he explains. "We want to give a person the tools to replace his own habits by choice." Until a few years ago the technique was taught mainly in Europe, Avak explains. Now it's appearing in drama courses and music schools around the country. "Sit down; stand up," Avak says to me. He watches closely. Then, with authoritative yet scarcely perceptible pressure of the hands, he "broadens my back" (to make this powerful body part do more of the work) and guides the rest of my person into proper balance. Have I been leaning at a 20-degree angle all of my previous life? Now properly aligned, guided by Avak, I again sit down and stand up. Sure enough, it is indeed more effortless.

People of all sizes are weaving a woof —strips of velvet, gingham, carpet, whatever—through a warp hanging from a tree limb. They're producing the funkiest "fabric" I've ever seen.

Pantomime Journey. We curl into balls, then unwind into our mightiest yawning stretches. We choose partners, mirror each other's movements in sequence, then both try being mirrors at the same time. Leader Cliff Trolin, who laughs throughout, takes us through some basic "appelle" techniques. We "hold" a bar and "handle" the bar, we carry tables, set tables, pour milk, eat steak, bounce balls. A thirty-year-old and a four-year-old "play catch" with a giant beach ball. I ask Trolin, an experienced pantomime consultant, when children acquire pantomime skills. "Usually between the second and third grade," he says.

We curl into balls, then unwind into our mightiest yawning stretches. We choose partners, mirror each other's movements.

A mime, this one in white face, cradles a curved piece of wood like a baby, then uses the same piece of wood to give himself a shave.

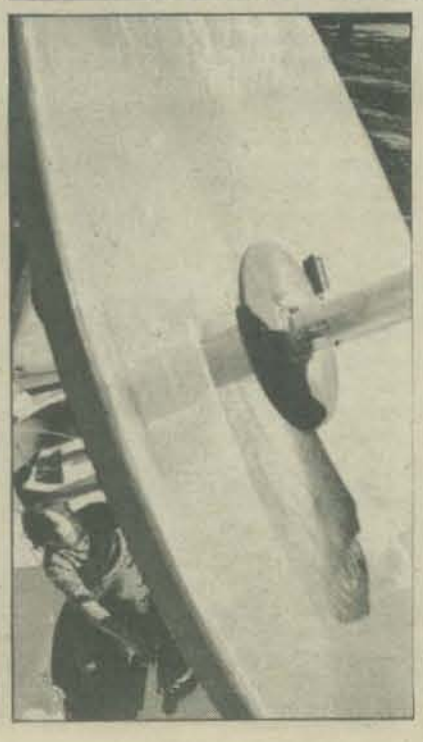
Continued

Learning Fair

BY SUSAN SANDS

Loosening people up so they recognize all conceivable learning—emotional, physical, intellectual, mystical.

Fifteen workshops and forty events. It was all there at Pen School's fair.



continued from page 19

People's Computer Center. "Gotcha!" cries a twelve-year-old as he "shoots down" an enemy spaceship blipping across a computer screen. Another computer plays football and is on the short end of a 35–0 route at the hands of a dignified middle-aged man. My computer plays "guess a number." I guess three-digit combinations; it signals "bagels" if none of the digits are correct, "pico" if a digit is correct but in the wrong place, and "fermi" if a digit is correct and in the right place. I try five times, and it types, "You got it."

Bob Albrecht runs this workshop. It's much like his People's Computer Center in Menlo Park, which, he hopes, will be a prototype for setting up "friendly neighborhood computer centers" everywhere. "We'd like people to think of us as the local bowling alley —a place to come have fun," says Albrecht. What about the schools? Another workshop leader says nearly a million students in grade school and high school are now getting some part of their education from computers. "A computer can respond moment by moment to the fluctuations of a kid's curiosity," he says. "Kids can learn to program computers as early as fourth grade."

Folk dancing. "Zorba the Greek." Hand in hand, in a line growing longer each minute, people are twisting, kicking, shuffling, stomping, gaining boldness as the steps begin to feel right. It's an odd-looking, ragged sort of line —with some dancers three feet, others six feet, tall. Nearby a tiny flower of a girl sits alone in a cardboard chair, rocking quietly.

How, Not What, We Think. Workshop leader Linda Williams passes out a "problem." On the sheet is a drawing of a bunch of sticks lying on a table. Our task: to figure out which sticks are "level," which sticks "slope." Some of us do so easily; some sweat. Some finish quickly; some take a long time. Such time differences, Linda assures us, are functions of strategy rather than intelligence, and we discuss how we arrived at our solutions. One of us constructed a physical model of the sticks in his head; another worked things out mathematically. Some of us "leaped in"; some "held back." "If I get irrationally angry during an argument when I don't really care about the issue, then I know it's the process or strategy we're arguing about rather than the subject," says Linda. She is currently putting her ideas on process education into a book. Her message for teachers: get beneath the operational level to the process level in a student's problem solving. Find out *how* as well as *what* he thinks and then approach him.

"Help create the Loving Beast," says the sign. The beast is now two feet high and ever growing. I add a milk-carton "snout." A small coworker puts on some papier-mâché "hide."

Videotape Workshop. A young man with the fiery intensity of a recent convert is creating bizarre, often beautiful, kaleidoscopic images on a TV screen by pointing a studio camera at it. He's getting a picture of a TV screen inside a TV screen inside a TV screen inside a TV screen . . . . Into the room stride a grinning boy and girl carrying a Sony "portapak," a video camera the size of a cigar box, and a five-pound recorder. They've been out filming the fair, even though they've never held such equipment until today. Workshop leader Suki Wilder, of Video Free America, says she's pushing for more use of the medium in schools: as a communications tool ("a student can set up a camera at his desk to show things from his point of view"); as a technological aid ("a biology teacher can show the whole class what's going on under his microscope"); for turning kids on ("kids who are really dunces in English really dig this"); for learning writing skills ("to work in video, you must organize, be clear, concise, specific").

Over by the mansion there's a white, futuristic-looking pod: inventor Eric Reiter's "Mobile Solar Workshop," whose solar cells charge batteries that power a saw/lathe within. Eric, a twenty-two-year-old whiz kid who hasn't gone past high school, also has some of his "musical sculptures" along . . . an electric bass guitar adorned with a representation of a big foot, a "drum cello," a modified version of an Indian sitar. "I thought I could improve on the ancients," says Eric.

The Creative Process. Adults only in this workshop. A handful of stubby crayons and a stack of paper are dropped in front of each of us. "Draw rapidly, without thinking or planning; bring the inside feelings out. When you're through with one, go on to the next," says Barbara Clark, workshop leader, a college art teacher. Next we use crayon to show how we feel in a "place we like to be." "Stand up; let yourself go!" cries Barbara. We scribble frantically. Some of us giggle with joy; others remain reserved, drawing

Continued

slowly, almost methodically. Next we carry on a conversation with our neighbor—in crayon—and when we've said all we can in crayon, we continue in words. Then we're given clay. "Work it; and when a shape takes form under your hands, go with it," she says. We do. Barbara's message: In the creative process "getting there is more than half the fun; it's the whole trip."

A blind woman is sitting at a table, reading a magazine. She is using an Optacon, a machine that gives an instantaneous, tactile image of any printed material, letter by letter. As the Optacon's eye passes over the letter O, I reach inside its dark compartment and feel a circle of vibrating dots.

Bead Game Music. We begin by constructing cardboard wheels with twelve spokes; on each spoke is a red, blue, yellow, or green bead. It's a musical abacus: push some beads out to the rim and you've got a chord. "This is a way of visualizing twelve-tone music so you know what it's going to sound like as you write it," says Peter Lynn Sessions, Zephyros member, a computer scientist and former rock musician. "With the bead game an absolute beginner can learn to compose twentieth-century music."

On the screen a boy is shot. He tumbles to the ground, rolls over and over, then lies still. The film's a bit shaky, but this sequence and others are powerful. It was conceived, cast, directed, photographed, and edited by students at Pen School. And so were all the other films being screened here. Pen School art director Paula Fieldhouse breaks children into film at the kindergarten level. Even now some children are sitting outside the screening room, drawing pictures that will be transferred to film. And two girls are inking peace symbols on film strips, frame by frame.

Gestalt Smorgasbord. People sitting in a circle on big pillows, staring at each other or trying to look contemplative or cracking one liners. We look to Gestalt therapists Peter Rogers and Judy Bell for guidance. "We have no program," they repeat. "We're all just here." Finally, a middle-aged woman takes off on what seems to be a "Gestalt trip," questioning her conflicting desires to be young and not young. On and on she goes. Tears streaming down her face, she stops, looks at us, and beams. "I feel so warm inside now," she says. Rogers and some kids wrestle on the pillows.

At the potter's wheel a small boy sits on a woman's lap, and together (his hands on hers) they shape a pot. As the clay is brought up, he sucks in his breath; as the clay is pressed down, he lets it out.

Sunflower Source. Mike Young, who looks as if he weighs 180 pounds, leaps onto a cardboard table and jumps up and down. It holds firm. The demonstration is Mike's way of advertising the strength of tri-wall—a three-layered, corrugated cardboard. Close by, a young woman is using an electric saw to cut out a table top in the shape of a dolphin. Someone else carries away a new easel. Mike runs a resource center for teachers ("Sunflower Source") that carries tri-wall, toys, and other supplies for schools." Using tri-wall, Mike says, kids can make themselves what they use in their own classrooms. "Teachers have got to get the hell out of the abstract and into the physical so the kids can see." I decide to make three bookcases. That'll take two sheets of tri-wall at $2.55 a sheet.

Graffiti scrawled on the "I wish" wall: "I wish this was 1947 and Pen School was in Marshall, Illinois, and I was going to it."

—While I am still cutting up bookshelves, the fair comes to its close. I am reluctant to leave it, and I realize why: I have reopened doors into ways of learning that I had shut or that had been closed upon me years ago.

For I am a product of that educational process by which we are systematically and deliberately weaned away from what Jerome Bruner called the "left-handed" (visual, intuitive, imaginative) and toward the "right-handed" (verbal, rational, logical), that process which separates one kind of learning from another and rates each in terms of its usefulness to society and not to the individual.

> I had reopened doors into ways of learning that I had shut or that had been closed upon me for years.

That may be changing now in many schools for many younger children. But we adults and older children need support, encouragement, what Barney Young called "loosening up," to open the doors again—to realize that a variety of "life games" are equally important parts of our education. And that sort of encouragement a "learning fair" can provide. At Peninsula's fair the children were there as our guides, making creativity look natural and easy as pie. We learned from them that weekend. But for me it was only a start. □

Continued ——→

photos by Carol Dilfer

It's really wonderful. I mean it's like what we all want the world to be.
–a child's view of Peninsula

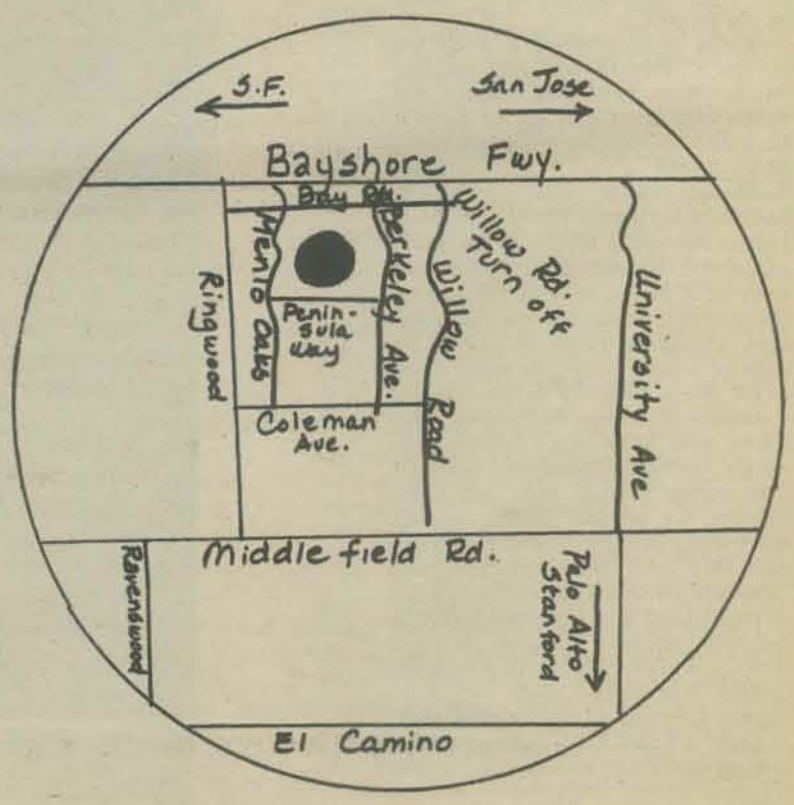
It's a place where children learn about adults and learn to trust them. And they learn not to be stopped by mistakes; in fact, that making mistakes in itself is itself a form of learning. At the same time it gives them lots of chances to be successful. It is this combination of opportunities that helps to make an effective person.
–a Peninsula group teacher's view

A small group of parents and teachers started Peninsula School in 1925, determined to build a new kind of school for their children, with warmth in relationship and joy in learning. It was to be a place where education was not separate from life, and childhood was valued for itself rather than as a stage preparatory to adulthood. In basic spirit and function Peninsula continues in the spirit of its founders. It is today a school of 240 children from nursery through 8th grade, with a staff of 35. It is a parent and staff owned cooperative school, whose life and buildings and grounds have been shaped by the children and adults who have moved through it.

We think of ourselves as a learning place more than a teaching place, and try to move as much as possible with child-initiated projects and inquiries.

Plans for the fourth Super Ecstatic Completely Credible Learning Fair to be held on April 24 and 25 this year are presently underway. A special emphasis is being placed this year on making the Learning Fair an exhilarating, enjoyable experience for the whole family–there will be many activities for younger children such as puppet shows, storytimes, dancing, make-up and magic; for older children there will be many opportunities for experiences in art, film making, clay, finger-puppet making; for adults the range is wide–from aikido to zen, from dream analysis to holistic health workshops. More participants are being added every day–new workshops along with some old favorities as well as the good food, music, dancing, will all add up to making this year's Learning Fair the best ever.

If you would like to receive more up-to-date information on the Learning Fair, please call Peninsula School at 325-1584.



TV DAZZLER software contest

- Help our Tee-Vees Dance in Living Color
- Glory & Fame for the Author(s)

- And **prizes** ☐ 1st Prize: **$500** in hardware from CROMEMCO (manufacturer of the TV DAZZLER)

☐ 2nd Prize: **$250** in hardware from CROMEMCO

WHAT!! You don't know about the TV DAZZLER?!? Quick--read about it in the Feb. 1976 *Popular Electronics*.

(Judges: People & Dragons at PCC)

SOFTWARE FOR THE PEOPLE:

- Your programs to be public domain;
- CROMEMCO will distribute the software (including paper tape, manual, and source code) for cost of reproduction;
- Everyone else may also distribute it.

For details, contact:

PCC
Box 310
Menlo Park CA 94025

or

CROMEMCO
One - 1st Street
Los Altos CA 94022

MAKE BELIEVE COMPUTERS

or, I wish I had . . .

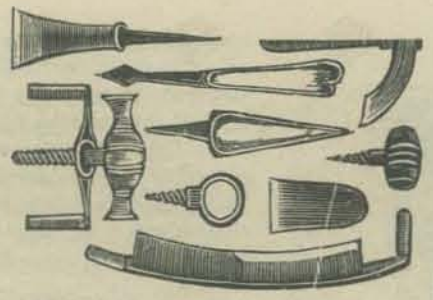
Ted Nelson's **Computer Lib/Dream Machines** is a wish book of incredible computers that . . . (sigh) . . . are all locked up in institutions of higher learning or in government or corporate research labs. Far beyond the clanking TTY–computers for artists, musicians, dancers, filmmakers, writers, editors, fantasizers. THINKERTOYS--systems to help people think. Exotic, million-dollar machines for the select few, not available to you or me.

But the picture brightens! The personal computer is here. The TV DAZZLER is here. Computer synthesized music is at hand for the home computer. Relay boards for real-time control of toy robots are available. Cheap A to D converts are appearing. People Power is Here!

So . . . we will start a section of PCC called **Make Believe Computers**. Send us your realizeable fantasies and let's recreate in the home the Dream Machines of Ted Nelson's fantastic book.

Much of the stuff from which Dream Machines can be made is already here. (Go to your local computer store and browse--see next column.) The Make Believe part is mostly software. Let's hook up the hardware and write the software.

Send a MAKE BELIEVE COMPUTER to PCC, Box 310, Menlo Park CA 94025.



ARROWHEAD COMPUTER CO.
(The Computer Store)
11656 W. Pico Blvd.
Los Angeles, CA 90064
(213) 478-3168

BARGAIN ELECTRONICS
La Meda, CA
(213) 529-2260

BYTE SHOP
1063 El Camino Real
Mountain View, CA 94043
(415) 969-5464

BYTE'TRONICS
5604 Kingston Pike
Knoxville, TN 37919
(615) 588-8971

CANADIAN MICRO COMPUTER TECH
Greg Pearen
861 – 11th St.
Brandon, Manitoba R7A-4L1

COMMUNICATIONS, S.A.
San Jose, Costa Rica
(phone) 234712

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Berkeley, CA 94710
(415) 845-5300

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15525 Computer Way
Huntington Beach, CA 92649
(714) 892-8816

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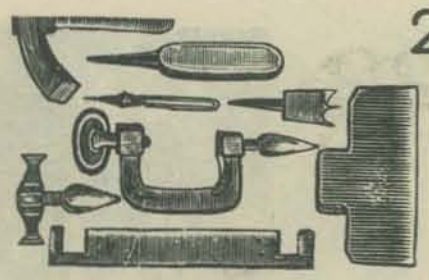
Montgomery County, Maryland
(301) 468-0455



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San Lorenzo, CA 94580
(415)278-4720

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111 South College Ave.
Bloomington, IN 47401

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Denver, CO 80211
(303) 458-5444

GATEWAY ELECTRONICS
8123-25 Page Blvd.
St. Louis, MO 63130
(314) 427-6116

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244 Crystal Lake Rd.
Ellington, CT 06029

INTERMOUNTAIN DIGITAL
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Boulder, CO 80302

MARSH DATA SYSTEMS
5405-B Southern Comfort Blvd.
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MICRO BYTE
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183 East 8th Ave.
Chico, CA. 95926

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c/o Tom Hudson
28120 Peacock Ridge Dr. No. 806
Rancho Palos Verdes, CA 90274

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Springfield, VA 22150
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RETAIL COMPUTER STORE
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Seattle, Wash. 98115
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Retail Computer Center
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Chagrin Falls, OH 44022
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SANDRLY ASSOC.
c/o Dickinson
7020 Balboa Blvd.
Van Nuys, CA 91406

WELLINGTON ELECT
529 No. 33rd St.
Omaha, NB 68131

AN OPEN LETTER TO HOBBYISTS

To me, the most critical thing in the hobby market right now is the lack of good software courses, books and software itself. Without good software and an owner who understands programming, a hobby computer is wasted. Will quality software be written for the hobby market?

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.

I would appreciate letters from any one who wants to pay up, or has a suggestion or comment. Just write me at Alvarado SE, No. 114, Albuquerque, New Mexico, 87108. Nothing would please me more than being able to hire ten programmers and deluge the hobby market with good software.

Bill Gates

General Partner, Micro-Soft

Dear Dragon:

The February issue of Homebrew Computer Club Newsletter carried a letter from Bill Gates of Micro-Soft (also in this issue of PCC) decrying the number of people who were stealing ALTAIR BASIC.

A very good case was made for the viewpoint that, since MITS had spent so much time and money developing this software, they deserved to be compensated directly for that effort, and anyone who obtained their BASIC without payment was a thief.

Without in the least disputing their right to so react, I would like to suggest that there is another way to look at the question of software development cost that they might consider, which at least has the advantage of not requiring the commitment of a large part of their effort to policing the use of that software.

I don't believe anyone interested in the hobbyist computer field wishes to denigrate the contribution of MITS to that field. They were the first, without question, to have faith enough in the hobbyist market to put together a package enabling large numbers of us to get into home computing. It would be a big mistake, however, for MITS et al, to forget that the hobbyist also brought something to the party. We brought money, time, interest and FAITH, in quantities that no mere advertising campaign or magazine article can take credit for. Had it not been for the early gathering together of "Computer Freaks" to mutually reinforce one another's desire to get into home computing, I question whether MITS or any other hobbyist computer supplier could have gotten off the ground.

It is one thing to have one's interest piqued by a provocative ad or article, but another thing entirely to commune with others who have actually taken the step into home computing. I imagine many purchasers of kits were motivated to make the jump only after they discovered that other purchasers were folks just like them rather than triple-domed geniuses or millionaires.

If we hobbyists can bring MITS and others to accept the "Free Software for Hobbyists" if only because we have already stolen it and spread it beyond recall, does this mean we are home free? By no means. Having gone to the well of free software we have to be consistent and continue to drink from that well. Our obligations would be as follows:

(1) No hobbyist should incorporate software developed by someone else into a commercial package without prior agreement of that developer, including financial agreement.

(2) Hobbyists should give non-exclusive "Shop rights" to their applications packages to the manufacturer from whom they stole their high level language.

(3) Hobbyists must recognize that our mainframers such as MITS, SPHERE, IMSAI and others must penetrate the small commercial user market if they are to survive and continue to develop hard and soft goodies for us. To further that goal, we must all act as extensions of the R & D and PR department of our chosen CPU manufacturer, by feeding back our developments to them and by talking up the use of small computer systems whenever the opportunity presents.

Computers are now sitting in the same place automobiles were at the beginning of this century. Until the roads (software) become generally available, there can be no "Model T" marketed to bring the cost and utility of the automobile (computer) within reach of the common man. Those of us pioneering in the field of personal computers have each to pave our share of the road.

Personal computing has come a long way in the past year, but we are not home free yet. WE need low cost hard copy, low cost mass storage, and low cost applications packs that will permit entry into the field at any level of proficiency. These things will come about only if we maintain a profitable market for those who supply us. The structure of this market requires the interaction and cooperation of all interested parties. What do you say?

The Old Soldier

PS – Lest someone misunderstand me, I am neither a source nor a recipient of stolen software, nor do I intend to be. The preceding discussion represents my thoughts on a way to heal an unfortunate breach between manufacturer and hobbyist that, if allowed to widen, would be disasterous to the continued growth of personal computing.

–O.S.–

Altairitus

In the computer industry, you can always tell how well a company is doing by the type of remarks made about them. IBM is unequivocally numero uno. This is easy to tell, just ask any of the millions of satisfied/unsatisfied users. There probably isn't a single, involved, IBM user who doesn't daily say things like:

"This !*/%† system, you can sure tell it was designed by IBM"; "This operating system is so bad, only IBM could sell it and get away with it"; "$4500 a month for that measly little piece of do nothing hardware . . . OK I'll take one"; etc.

And the world keeps rushing to their door.

IBM is a leader. They know what the market is ready for. They know precisely when the market is ready for it. And they know exactly how much technology to offer – and not to offer at this precise time.

Sometimes you have to stick your neck out. I heard that IBM had two internal dates for announcing the 360 (way back when . . .), the second date being the real date when the system would be complete with an operating system, etc. Market intelligence told them to bring it out on the first date. I remember very well, playing with a delivered and installed 360/30 which had NO operating system available for it. At some point in the following months, a system called BOS (this was the forerunner of the current DOS) appeared. Anyway – what I'm getting around to is, somebody has to be first. Getting something out at the right time seems to be very important. The IBM of micros currently seems to be MITS. They had the intestinal fortitude (just plain guts) to bring out a complete computer aimed at the hobbyist market – which anybody knows is a million + times tougher than the industrial market (shudder shudder) and then proceed to plow headfirst through the tons of flack, only to come out as the HOBBYIST'S INDUSTRY STANDARD. You may still be a hold-out, but it's true.

How many ME TOO companies are thriving businesses today only because of the ALTAIR? DOZENS . . . . And what is the next most hopefully successful mini computer-size micro maker emulating? the ALTAIR of course (I'm speaking of the IMSAI 8080). It's plain to see that all of the background noise, panning MITS as a purveyor of faulty merchandise, unmet schedules, and scanty support, is equivalent to that which can be heard about IBM. It may be true. It may be false. But in reality, MITS has done (and is still doing) one hellava job in running the ball in the micro-hobbyist world. "ME TOOers" are

great too. If it weren't for them, the front runners might get lazy. It's also the best way to get a better variety of paraphernalia and to get various levels of sophistication for each type of item. You can get 4K of RAM for just under $100 up to just under $200, each having something different to offer. Try buying a Video Display Module for $160 from MITS, or try buying a dynamic RAM board from PTC, or try buying a Dazzler from either. But when you think about it, we're still talking about an ALTAIR. If your grandmother is/was like mine, all cameras in the world are Kodaks. To lay computer people, all computers are "IBM machines." Is it possible that all 8080's with a front panel and 100 pin wide bus will be called ALTAIR's? Probably not but it sure is getting close. Those people at MITS deserve a lot of praise, thanks, hoorahs, etc., because they are the ones who blew the whole micro-hobbyist scene wide open.

Thanks MITS, my ALTAIR is a great machine. And if it weren't for you, I most likely wouldn't have a home computer yet.

Jim Brick
820 Sweetbay Dr.
Sunnyvale, Ca. 94086

SOME THOUGHTS

I have been thinking quite a lot lately about *People's Computer Company* and *Creative Computing*, and what the existence of such publications means; about the explosion in computer, minicomputers, microprocessors and the "hobby" computer thing, and what such an explosion means; and about community communications and free schools and deschooling society and social change and the certain knowledge that world-wide disaster is imminent, and I am wondering if anyone has the faintest idea as to what is going on.

We appear to be rushing head-on in this country (only in this country?) into something which I have started thinking of as the distributed-computer society. Two computers in every garage . . . and in every washing machine, oven, radio, watch, telephone, doorbell, in short, a computer as an integral part of every technological device. The $10 microprocessor is here and getting cheaper every day. Already everything is electronic, soon, everything will have a microprocessor snuggled somewhere within it. This worries me.

To help you see why it worries me, let me rephrase a sentence from the above paragraph: Already our *tools* are all electronic, soon, our *tools* will all have micro-processors as integral parts. This is an important point because a microprocessor is an *inherently incomprehensible device;* a device which cannot be understood out of the context of an extremely complicated, elite technology. How does a microprocessor work? No, not what it does, but how it actually does it? Is that not really important? We are beginning to build things using tools which we do not really understand. Do we understand what we build with those tools?

We are touting the computer as the educational device to end all educational devices, but we frequently stress the point, "Don't worry about how it works, that isn't important," often adding, "I don't really understand it myself." I can't help but think of what Ivan Illich says in *Deschooling Society* about the radio, how mass production techniques changed it from an educational source of parts and electronics knowledge into a disposable throwaway. With computer it's worse; in many cases we don't even understand the software. In many cases we are prohibited from understanding the software because it is critical or proprietary or necessary to "system security" or simply written in a half-assed way which makes it impossible to figure out.

Continued

Some of us are thinking of basing various social revolutions around the "inexpensive" computer. Try comparing the price of an Altair against the world median income! And how secure is any revolution based on a black box, the production, the understanding, of which is not in the hands of the revolutionaries? (Seen any basement diffusion furnaces lately? Ion-Implantation in the bathroom?) Whose revolution is it, anyway? The people's? Or the fraction of a fraction of a percent of the population who at least partially understands the technology involved? Think of the *eliteness* of even the readership of *People's Computer Company* and *Creative Computing!* Are we serious, or are we just playing with our fascinating new toy?

I'll assume that we think we are serious, because computers are transforming world technology. It's hard to comprehend how omnipresent the influence of the computer has become. Environmental and social impact statements are not required on new technologies that bloom overnight and captivate all thinking in the wink of an eye. And that's the way it happened!

I entered college in 1971 and the hottest thing going was the Heathkit electronic calculator that would do four functions for only $130.00. It was fantastic! By the time I graduated the Altair was in production and the 8080 had 78 instructions for $130.00. That is starkly unbelievable! Except that it happened and it's still happening. I entered college from one culture and graduated into another one. I'll have my master's degree in one year and what will it be like then? Star Trek on every TV in the nation, probably. Is that the idea?

The idea is for some people to make a lot of money and expand their industry and keep the GNP growing. That is the gut force behind the computer explosion, that and the fact that the computer is the advertiser's dream come true. "Here is our universal do-all. Take a close look at it. We guarantee that you can think of something to use it for! If you can't, well, sorry, it looks like your business is obsolete." The self-expanding product; the product which grabs you by the throat and says, "Thou shalt do it my way, or your investment is worthless. And by the way, I'd do it a lot better with another 32K."

To return to my main point, I guess what really bothers me is that we are beginning to base so much of our everyday world on technologies which are not intuitively understandable. We no longer feel that it is necessary to understand our tools. I believe that if we do not understand our tools, then we do not control our tools, our tools control us. The people who do understand our tools control us.

If I am the end user of a computer statistical package, but I am not a programmer, then if someone changes the package I must change. If I am a programmer, but don't understand hardware, then if someone changes the machine I program for, I must change. Even if I understand all facets of the computer I use, from software to hardware, I am still in trouble, for if someone changes the design of an integrated circuit device such as a microprocessor or a memory chip, there's not a damn thing I can do about it except change to suit Them.

All users of advanced technologies are subservient to the elite who understand and control those technologies.

Even the elite represented by *PCC* and *Creative* are not very elite. How do *People's Consumer Company* and *Creative Consuming* grab you? (Down, Dragon!, Down!) I'm not too taken with those names, but even though I am fairly knowledgeable about computers I realize that I am basically helpless. I am still only a user of someone else's technology. If things continue on in the same way they are going right now, I am not sure that I see the situation getting any better.

Aha! The way is clear for the usual Basic Question: Must Things Go On This Way? No, I'm not denouncing computers or technology or capitalism or anything else. Perhaps there was only one way to reach this point in history, it makes little difference, we are here. The distributed-computer society is upon us. We know that computers are, if nothing else, great toys and we have hopes that they can be much more.

But must computers remain black boxes? Must computer technology, itself, remain of no educational value? Must control of the use of computers for social change remain, ultimately, with others than those who are trying to bring about change? Must the public forever fall farther and farther behind in understanding the devices with which it is manipulated?

Okay, I am but an egg, and all that, and I don't have many answers, so I'm asking: Can we have an understandable computer technology? Is the way we are doing things now the only way to do them? Can we transform computers into tools which most people can understand and use? Can we have computers for people? Can we use computers to bring about useful social change? Can we reconcile personal computers in this country with the fact that much of the world population will starve to death by the end of this century of technological progress? Are we really doing something useful in terms of the future of this planet, or are we really just playing games?

Those are some pretty brutal questions, and to some degree I have been playing the devil's advocate, but I really want to find some answers. So now that I've raised the points, and I'll admit that some of the things I've said could use some expansion and clarification, let's have some discussion.

John R. Lees, Jr.
Associate Editor
Creative Computing
P. O. Box 1543
Rolla, MO 65401

MINI MICRO MART

I read in your paper that you have only heard negative comments on Mini Micro Mart. Well, I waited 6 months for the Monitor ROM and PC Board and 8 months for the cassette interface.

But--on 2 December 75 I ordered the MOD 80-1 CPU Board and MOD 8-8 Backplane and I received them on 17 December 75! So I think M.M.M. has gotten their stuff together. I for one still plan to do business with them.

Lee C. Hanson
2914 Snyder Ave.
Cheyenne, WY 82001

NEW ORLEANS COMPUTER CLUB

If you live in the metropolitan New Orleans area and are interested in computers, you are invited to join our group. Whether your interest is hardware, software, applications, or just general interest--we welcome your input. For further details, please write or call:

Emile Alline
1119 Pennsylvania Ave.
Slidell, LA. 70458
504-641-2360

LONG ISLAND COMPUTER CLUB

We would like to advise you that a computer club now exists on Long Island, namely, the "Long Island Computer Association."

As chairman of this organization, I would like to be able to keep the membership informed of what is happening in the computer hobbyist field. We would appreciate any help you could offer in assistance or advice to a new club.

Gerald S. Harrison
Long Island Computer Association
36 Irene Lane East
Plainview, New York 11803

(Ever feel like you were being clubbed to death?)

ORANGE COUNTY COMPUTER CLUB?

I'm thinking of starting a computer club for Orange County, California. Please contact me if you are interested.

Kenneth Donnell II
P.O. Box 2533
Seal Beach, CA 90740

AMATEUR COMPUTER CONVENTION

The first Convention of Amateur Computer Hobbyists will be held on Sunday, May 2, 1976, at Trenton State College, Trenton, New Jersey. Called the "Trenton Computer Festival," it will include: a convention of amateur computer clubs, technical talks related to home computing, door prize contests, demonstrations by computer amateurs and groups, program duplication service, manufacturers' booths and seminars, and a flea market area for swapping and selling of components by amateurs.

The Festival is sponsored by the Amateur Computer Group of New Jersey (the largest such group in the east with over 160 members), and Trenton State College.

The amateur computer hobby is off and growing at a phenomenal pace. It is anticipated that over 1,000 amateur computer enthusiasts will attend this first convention.

For more information contact:

DR ALLEN KATZ
Trenton State College
Trenton NJ 08625
(609) 771-2487
(609) 443-3184 (eves)

PROF. SOL LIBES (President, ACG-NJ)
Union County Technical Institute
Scotch Plains NJ 07076
(201) 889-2000 x247
(201) 227-2063 (eves)

Dear Bob, Enclosed you will find a paper entitled "One Evaluation of a SPHERE System" for publication in People's Computer Co. *I have also sent a copy to* Micro-8 Newsletter *to get as much hobbyist coverage as possible (I realize some duplication will occur).*

I have a request to make. I would like to know of any inexpensive 1702A PROM Programming circuits that I can buy or build that will be compatible with my Sphere system (as is, or by modification). I have a copy of the Intel circuit and it is quite complicated and heavily discrete. There has to be a better way. I could design my own but why re-invent the wheel.

Speaking of re-inventing the wheel, I grew tired of waiting for Sphere to deliver my cassette interface so I designed my own. It uses Manchester (Aiken F/2F) coding, has no one-shots, will tolerate +25% to -31.25% speed and/or frequency variations, records at 1500 bps, and 800 bpi, and uses 16ICs. Why go against the KC Std? you asked. Well, for trading software I will have a KC Std, via Sphere, but my own design is more efficient at packing data and record and playback times. However, if you wish to use the KC Std, changing one timing circuit will get you there. If you are interested let me know and I will do a short article on it.

I guess that is it for now.
Yours truly,

CHARLES BURTON, Ph.D.
2309 Hazel Ave.
Dayton OH 45420

ONE EVALUATION OF A SPHERE

by Charles Burton

WHICH PROCESSOR?

In the early 1970's, Intel developed some microelectronic circuits that would revolutionize the electronics industry and would intrigue hobbyists. Although the Intel 4004 was developed first, the Intel 8008 has probably been used by more hobbyists than the 4004 because of the design of the Mark 8, and of the Microsystems International MOD-8. The major drawbacks of the 8008 are the large quantity of overhead circuitry required and the slower speed, when compared with the second generation devices; however, the price made it attractive. Then MITS introduced the Altair 8800, using the Intel 8080, and the hobbyist market exploded. Now kits are available which use the National IMP-16 and PACE, the Motorola 6800, the Fairchild F-8, the MOS Technology 6502, the Intersil IM6100, and others. After surveying all of the available microprocessor data, I decided to go with an M6800 system; although for software support the IM6100 might have been a better choice since it emulates the PDP-8/E, thus opening up a vast library of DEC software. The M6800 has an architecture similar to the PDP-11, treating I/O and memory addressing the same. The chip family approach and a single power supply are also desirable features of the Motorola device.

PLACING THE ORDER

Sphere was probably the first company to introduce a system using the Motorola microprocessor. They started their design in early 1975 and I believe their first advertisement appeared in *Radio-Electronics* in July, 1975. Their introductory offer was very enticing and subsequent telephone conversations convinced me to take a chance on this new system. I ordered the System 2 kit containing a CPU board with 4K bytes of dynamic RAM, a CRT board (similar to the TVT video generator), a keyboard, Communication/Cassette board, power supply, and terminal. Their introductory offer included a 180-day guarantee, and a 5% rebate for late delivery (in excess of 60 days).

DELIVERY

The kit was not delivered within the 60-day period, and Sphere lived up to their rebate offer. The kit did arrive about a month later and it came in five or so installments. However, as of the first of the year, the Communication/Cassette board has not been delivered. This late delivery is due in part to a re-design required to make the cassette interface compatible with the BYTE conference standard. The delivery has been promised for March, 1976. The Operator and Reference Manual and the System Software were not delivered until about 1½ months after the parts were received.

ASSEMBLY

† CPU Board. The instructions consisted of 1½ pages of assembly procedure, a parts list, a part layout sheet, and schematics. I spent about five hours assembling this board. The 1702As containing the system monitor were not included with the parts, and were not received until November. One resistor was mislabelled and on the layout sheet; there were no instructions on using the real time clock; a few of the parts were crowded making part insertion difficult at times; and there were a few errors on the schematics.

† Keyboard. The instructions consisted of 3½ pages of assembly procedure, a parts list, a part layout sheet, and schematics. I spent about five hours assembling this board. The assembly procedure for the space bar was absent from the instructions, causing some head-scratching. The key-switches are similar to those used in the SWTP TVT and their reliability is questionable. At the outset, four checked out bad, i.e., open or short. After assembly, three turned out to have extremely bouncy characteristics and two went bad (shorted) during a three-week period of no use. Sphere indicated that the manufacturer has tightened their QA, and if the owner wants to return the old switches for exchange, along with $5 for handling, Sphere will replace the keys. The major problem is that after the keys are soldered in place, unsoldering may destroy the etch (because the lines are very thin) and the plated-through holes.

There were a few PC board layout errors which had been corrected by Sphere by cutting the etch and running wire. One of the original bad key-switches was one that Sphere had soldered into the board as a PC board correction.

† CRT Board. The instructions consisted of 2 pages of assembly procedure, a parts list, a part layout sheet, and schematics. I spent about four hours assembling this board. Numerous resistor positions on the layout sheet were absent or wrong; part count and components delivered were wrong in a couple instances; instructions to complete the RF section were not included; and one PC board layout error which Sphere had corrected was evident.

An RF transmitter can be added to this board since the PC board has the etched area available. The circuit for the transmitter is identical to the TVT circuit published by *Radio-Electronics*. There are also pads available for affixing a Gaussian shield. I made my shield from copper screen, cut to form a five-sided box. All edges were soldered, and silicon rubber glue was applied to the base of the shield to insulate the shield, thus preventing component shorting. Wires were soldered to the screen, then soldered to the shield grounding pads.

† Power Supply Module. The instructions consisted of no assembly procedure, a parts list, a part layout sheet, and schematics. I spent about four hours assembling this module. The major problems came from missing hardware (nuts and bolts) and a couple of misdrilled holes. The lack of enclosed assembly procedure caused some frustration.

† Terminal Module. The assembly instructions consisted of no assembly procedure, a parts list, and no part layout sheet. I spent about one hour assembling this module. Again, missing hardware and some tolerance errors caused problems. Also, the lack of assembly procedure and a part layout caused frustration.

General. The boards are good quality and the plated-through holes saved untold problems. The only thing that I am apprehensive about is the narrow etch widths. Because they are narrow, soldering and unsoldering components can cause the etch to lift away from the boards; also, ohmic drops and noise problems can occur. There are more than enough decoupling capacitors on all of the boards.

Any missing parts and hardware were promptly sent. The new assembly procedures (included in the Operator and Reference Manual) have been up-dated to include some of the procedures that were missing from the original instructions. However, I must say that a major deficiency of this kit is the documentation. I believe that the assembly procedures are not nearly sufficient for the general hobbyist. Sphere would do well to survey Heathkit, SWTP, and MITS kit assembly instructions for use as guidelines to improvement. After reading the Operator and Reference Manual, it was found that the manual could also stand a vast amount of improvement. I estimate that there are at least two typographical, grammatical, and/or technical errors per page.

DEBUGGING

After the components were soldered to the boards, the flux was removed by using a toothbrush and alcohol. I found that backlighting the boards with a high intensity light allowed me to easily find most solder bridges. However, because some of the component solder pads were so close to etch lines, a couple of bridges appeared as though they were proper solder connections. In particular, one of the clock circuits had such a solder bridge and it took me about two hours to find it.

Much has been written about "the front panel vs. the software monitor." During the debugging of the system, a front panel can be invaluable. If clock circuits, memory address or data busses, etc. are defective, a system monitor is of no use! I started debugging the system with a VOM and a logic probe, progressed to an oscilloscope, and ended with a logic state analyzer. In all I spent about seven hours running down the various "bugs."

I had and still have some power supply problems. The zener diodes and the series resistors of the -5 Volt and -12 volt supplies run extremely hot. Increasing the series resistor to reduce the zener current would probably alleviate the problem. The +5 volt and +12 volt supplies are low, but within the regulator specifications. However, ohmic drops in the cable from the power supply to the terminal (about 10 feet of 22 AWG wire) and in the interconnecting and distribution ribbon cable (about four feet of 30 AWG wire) drop these voltages to near or below the lower limit of the IC supply voltage specifications. I believe that it would have been much better to distribute the unregulated voltages to the boards and to put regulator circuits on each board. The system cost would have increased somewhat, but the problems with ohmic drops would have been overcome.

The power-on-restart circuit only works occasionally. However, a "fix" has been suggested in Sphere's *Global News*.

Another documentation deficiency that is also evident is the lack of information on debugging *any* hardware problems. If the kit builder does not have a good understanding of digital circuits and the other circuits which make up the kit, he will have a rough time during this phase of the kit construction. Also schematic errors can make things even worse!

HARDWARE

The CPU board contains the M6800 CPU, four 1702A PROM's (1K bytes) containing the Sphere Program Development System (PDS) software, eight 2107 dynamic RAM's (4K bytes), an optional PIA, a two-phase system clock, a refresh clock, a real time clock, and control logic. The system of clock phases (01 and 02) are derived from two monostable multi-vibrators configured into an astable arrangement. The 01 time is about 500 nsec. in duration. The 02 is about 820 nsec. for all cases except during a write RAM cycle where it is 1000 nsec. This cycle time is 32% to 50% longer than the fastest CPU clock rate. The dynamic RAM refresh is not done on a cycle steal basis but shuts down the CPU by pulling the HALT line low for 64 system clock cycles out of about every 2 msec. The refresh clock is also derived using two monostables. The . .

real time clock is derived from the refresh clock using a binary counter to produce 512, 256, 128, or 64 interrupts per second (tied to IRQ). The action of pulling the HALT line low during refresh causes two major problems. First, software timing loops, a major programming tool, are impossible to use reliably. Second, the real time clock suffers from a similar problem since all interrupts are ignored while the CPU is halted. There is another problem with the real time clock. It has the lowest priority in the interrupt structure since there is no way to directly detect that the real time clock was the interrupting device. All other I/O devices whose interrupts are enabled must be polled before the real time clock can be assumed to have caused the interrupt, i.e., assumed by default.

The keyboard module has and is still giving me 90% of my headaches. The major cause seems to be the key-switches. The keypress codes are derived using the system clocks. two binary counters and a one of sixteen decoder, i.e., a multiplexing scheme. The keyboard I/O is done through ½ of a PIA, leaving the other ½ of the PIA for a user-defined function.

The CRT board contains a video generator (similar to the SWTP TVT), etched area for an RF oscillator/twinlead antenna hook-up (parts and connection instructions not supplied), 512 bytes of static RAM, and a video clocking circuit. The video clock is also derived from two monostables. This clocking method does produce some waves in the display. The RAM not only provides storage for the CRT characters (32 characters per line by 16 lines) but is also memory for the CPU, i.e., directly addressable. The nifty part of this circuitry is that it has a DMA controller, whereby the video circuit can access the memory as long as the CPU is not addressing this memory segment, i.e., the CPU takes precedence.

All connections between boards (address buss, data buss, control buss, and power supply voltages) are made by ribbon cable and DIP connectors. I have experienced a couple of problems with the DIP connectors. First, the connector/socket interconnection is not real tight so that connectors tend to work themselves loose. Second, the pins on the connectors are somewhat frail and I have had two pins break off during insertion. Third, care must be taken when inserting the connectors in the sockets. I missed proper insertion of the power supply buss cable by one "shift left." Luckily the boards are protected against connecting positive voltages to the negative supply lines and vice versa and I only burned out one diode.

SOFTWARE

It is evident that Sphere has some good software writers. Within the 1K bytes of the PDS PROM's is an Editor, Mini-Assembler, Debugging Aid, and some Utility Programs. The Editor has full cursor control and scrolling capabilities. The scrolling can store and retrieve text throughout the entire extent of the memory. The Assembler allows for 63 one-character labels and origin and equates pseudo-operations. The opcodes are presented as two-hex digit codes. The operands are defined as data (one byte), extended (two byte), or relative and take the form of two or four-hex digits, or a label. The Debug routine allows for addressing any memory location, viewing the contents, and changing the contents; the stack can be retrieved and modified; breakpoints (using Software Interrupt) can be set and reset; the Assembler symbol table can be accessed; and a program can be executed, all under keyboard control. The Utility routines include multiply, divide, ASCII-to-Base and Base-to-ASCII conversions, CRT I/O, and more.

GENERAL COMMENTS

Sphere has what I consider some major hardware deficiencies (especially the keyboard) and some very good software. Be that as it may, Sphere is one of the few companies that sells a complete system for a reasonable price. However, in its kit form, the present state of the documentation probably makes construction extremely difficult for the inexperienced hobbyist. To date, Sphere has lived up to most of their promises, has paid their rebate for late delivery, has promptly responded to supply missing parts, has really answered questions, and has been appreciative of feedback. On the other hand, the delivery times are not as good as had been first anticipated and promised.

In general, depending on the intent of the user, the Sphere system is a pretty good system for the money. After all is said and done, you have a *system* for the $860 or so that you have spent and not just a box with front panel switches. Each individual will have to weigh the benefits against the deficiencies and make his or her own decision as to whether the system will meet his or her needs. My intent has been to indicate problem areas and good points, so that the potential buyer can go into the purchase with eyes wide open. I should note here that my system was one of the first delivered and problems can be expected under such circumstances. I do not intend to scrap the system; on the contrary, I intend to use the system to the full extent of its capabilities to solve the problems that interest me.

Two new arrivals in the market place are computers based on Intersil IM 6100. The Intersil IM 6100 microprocessor is a 12-bit static CMOS device that is software compatible with the Digital Equipment Corporation's PDP-8/E.

The key words here are "software compatible". Everyone from the hobbyist to the Federal Government is discovering that the real cost of computers is software.

The PDP-8 family has been around a long time and is widely used in schools and industry, as a result the amount of PDP-8 software could best be measured in tons or cubic yards. Much of the software can be acquired at very low cost (4k Basic for $1.50).

Of greatest interest to the hobbyists will be the PCM-12 in kit form from PCM, Box 215, San Ramon, CA. 94583. Kit prices range from $400.00 and up. An assembled and tested computer, the LSI-80, is available from Douglas Electronics, Inc., 718 Marina Blvd., San Leandro, CA. 94577. The price for a complete 4k package , $1,500.00.

For a good comparison of microprocessors compiled into a single volume, get a copy of *Microprocessor Reprints, Vol. 2.*

Contents include a fold-out wall chart giving capabilities, software support, prices, etc., and a file card type listing containing information on architecture, performance, and availability.

Single copies cost $7.95 from *EDN Magazine*, 221 Columbus Ave, Boston MA 02116.

VIDEO GAME DATA BOOKS

Every thing you need to know to fix that video game you found in your favorite electronic surplus store or pawn shop. Available, so far, are data books for Altair's PONG ($12.50), Midway's WHEELS I and WHEELS II (set of two for $39.50), and TANK by Altair/Key ($29.50).

Order from; Kush 'n Stuff, 60 Dillon Ave., Unit D, Campbell, CA 95008, or call Bill Arkush at (408) 379-7180.

MICRO-8 NEWSLETTER

Thank you, Hal Singer, for starting *Micro-8 Newsletter*, still the best tell-it-like-it-is, people-talking-to-people forum for the dedicated computer hobbyist. $6 for 9 issues of Volume 2. Ask about back issues (it's like panning for gold!). *Micro-8 Newsletter*, Cabrillo Computer Center, 4350 Constellation Rd, Lompoc CA 93436.

COMPUTE

The Microprocessor Users Group from National Semiconductor--a club for users of National's microprocessors (PACE, IMP-16, SC/MP), and Hamilton Avnet's PACER kits. Contributions cheerfully accepted! Subscribers are entitled to free listings of user library programs and a monthly newsletter, *Bit Bucket*. For membership info and a sample issue, contact Georgia Marzalek, National Semiconductor, MS115, 2900 Semiconductor Dr., Santa Clara CA 95051.

POLYPHONY

New. The PAIA people's newsletter and User's Group journal; an information exchange primarily for owners of PAIA electronic music synthesis modules and systems. Edited by Marvin Jones. In the first issue, John Simonton, Jr, president of PAIA, sez, "If you're into digital electronics in a big way you can expect to see some PAIA things to go along with your computer. . ." Send $2 for 4 issues in 1976 to *Polyphony*, PAIA Electronics, Inc., 1020 W. Wilshire Blvd, Oklahoma City OK 73116.

Much thanks to MICROCOMPUTER DIGEST for permission to reprint their list of micro manufacturers. Here is their description of their publication:

If you think you need a microcomputer, we know you need MICROCOMPUTER DIGEST - Industry's first, and only TOTAL microcomputer news source. We're dedicated to filling the microcomputer information gap.

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Microprocessor Manufacturers

The following microprocessor companies, to the best of our knowledge, have produced or will be producing a microprocessor. We have attempted to eliminate the "paper tiger" announcements.

U.S.

ADVANCED MICRO DEVICES 901 Thompson Place, Sunnyvale, CA 94086 (408) 732-2400, John Springer, AM 2901, AM 9080A (8080 Second Source)

AMERICAN MICROSYSTEMS 3800 Homestead Road, Santa Clara, CA 95051 (408) 246-0330 Dave Gellately, AM6800 (Second Source) S9209

ELECTRONIC ARRAYS 501 Ellis Avenue, Mt. View, CA 94040, Dick Eiler, EA 9002

FAIRCHILD SEMICONDUCTOR 313 Fairchild Drive, Mt. View, CA 94040, (415) 962-5011, Jack Mattis, F-8

GENERAL INSTRUMENTS 600 W. John Street, Hicksville, NY 11802, (516) 733-3333, Jeff Stein, CP-1600

HARRIS SEMICONDUCTOR P.O. Box 883, Melbourne, FL 32901, (305) 727-5407, IM6100 (Second Source)

INTEL CORP 3065 Bowers Ave., Santa Clara, CA 95051, (408) 246-7501, Jim Lally - Systems, Hal Freeney - Components, 404, 4040, 8008, 8080, 3000

INTERSIL 10900 N. Tantau Ave., Cupertino, CA 95014, (408) 257-5450, Gene Miles, 6100

MONOLITHIC MEMORIES 1165 E. Arques Ave., Sunnyvale, CA 94086, (408) 739-3535, Don Winstead, MMI6701, 5701

MOS TECHNOLOGY Valley Forge Corporate Center, 950 Rittenhouse Rd., Norristown, PA 19401, (215) 666-1950, Chuch Peddle, 650X Series

MOSTEK CORP. 1215 W. Crosby Rd., Carrollton, TX 75006, (214) 242-0444, Bob Cook, MK 5065, Mk-F8 (Second Source)

MOTOROLA SEMICONDUCTOR 5005 E. McDowell Rd., Phoenix, AZ 85008, (602) 244-6900, MC6800, MC10800, AMD2901 (Second Source)

NATIONAL SEMICONDUCTOR 2900 Semiconductor Dr., Santa Clara, CA 95050, (408) 732-5000, Phil Roybal, GP/CP Set, IMP8/16, PACE, CMP-8 FIPS (4004 Second Source) PPS-4, PPS-8, PPS-4/2 (Second Source)

NEC MICROCOMPUTERS, INC. 5 Militia Drive, Lexington, MA 02173, (617) 862-6410, Howard A. Sharek, uCOM-8 (Similar to 8080), uCOM-8A (8080 Second Source)

PLESSEY MICROSYSTEMS 1674 McGraw Ave., Santa Ana, CA 92705, (714) 540-9945, Miproc-16

RAYTHEON SEMICONDUCTOR 350 Ellis St., Mt. View, CA 94040, (415) 968-9211, 2900 (Second Source)

RCA SOLID STATE DIVISION Box 3200, Rt. 202, Sommerville, NJ 08876, (201) 722-3200, Bill Wagner, CDP-1800

ROCKWELL INTERNATIONA 3310 Miraloma Ave., Anaheim, CA 92803, (714) 632-6650, Bill Treleaven, PPS-4, PPS-4/2, PPS-8, GP/CP Set, IMP-8/16, PACE, CMP-8 (Second Source) CP3-F (Second Source)

SCIENTIFIC MICRO SYSTEMS 520 Clyde Ave., Mt. View, CA 94043, (415) 964-5700, Tal Hurant, Microcontroller

SEMI, INC. 3883 No. 28 Ave., Phoenix, AZ 85017, (602) 263-0202, CP 1600 (Second Source)

SIGNETICS CORP. 811 E. Arques Ave., Sunnyvale, CA 94086, (408) 739-7700, George Riggs, 2650, 3000 (Second Source)

SYNERTEK CORP. 11810 Parklawn Drive, Rockville, MD 20852, (301) 770-0550, 650X (Second Source)

TEXAS INSTRUMENTS Houston Components Division, P.O. Box 1443, Houston, TX 77001, (713) 494-5115, Gerald McGee, SPB0400, TMS 1000, TMS 1200, TMS 9900, TI8080 (Second Source)

TRANSITRON ELECTRONICS CORP. 168 Albion St., Wakefield, MA 01880, (617) 245-4500, Ronald W. Evans, TMC/1601

WESTERN DIGITAL CORP. 19241 Red Hill Ave., Newport Beach, CA 92663, (714) 557-3550, LSI-11

JAPAN

HITACHI LTD., 6-2, 2-Chome, Ohtemachi, Chiyodaku, Tokyo 100, Japan HMCS-4, HMCS-81; M6800 (Second Source)

MITSUBISHI ELECTRIC CO. Chiyoda-ku, 2-12 Marunouchi, Tokyo, Japan M58710S (8080 pin-compatible)

NIPPON ELECTRIC CO., 1735, Shimonumabe, Makahara-ku, Kawasaki City, Kanagawa 211, Japan uCOM-4, uCOM-8, uCOM-8A, uCOM-16

OKI ELECTRIC INDUSTRY CO., 2826-4 Mitsugi, Masashinurayana, Tokyo, Japan M58710S (Second source, 8080 pin-compatible)

PANAFACOM LTD., 16-10, 2-Chome, Jiyugaoka, Meguro-ku, Tokyo, 152 Japan, Takuo Shinkai PFL-16A

TOSHIBA ELECTRIC CO., 2-1 Ginza, 5-Chome, Chuo-ku, Tokyo, Japan TLCS-12, TLCS-12A

Microcomputer Manufacturers

Advanced Memory Systems 1275 Hammerwood Ave., Sunnyvale, CA 94086, (408) 734-4330
Allen-Bradley Co. 747 Alpha Dr., Highland Hts., OH 44143, (216) 449-6700
American Microsystems, Inc. 3800 Homestead Rd., Santa Clara, CA 95051, (408) 246-0330
Applied Computing Devices Box 3194, Terre Haute, IN 47803, (812) 232-1840
Applied Computing Technology Inc. 17815 Sky Park Circle, Irvine, CA 92664, (714) 557-9972
A/S Myrcron Ensjoveien 20, IV, Postboks 6199 Etterstad, Oslo 6, Norway, (472) 67-51-93
Cal Data Processors 2019 S. Rilchey St., Santa Ana, CA 92705, (714) 558-8211
California Micro Computer 9323 Warbler Ave., Fountain Valley, CA 92708, (714) 963-5050
Comp-Sultants P.O. Box 1016, Huntsville, AL 35800, (205) 837-5100
Computer Automation, Inc. 18651 Von Karman Ave., Irvine, CA 92664, (714) 833-8830
Control Logic, Inc. 9 Tech Circle, Natick, MA 01760, (617) 655-1170
Cramer Electronics 85 Wells Ave., Newton, MA 02159, (617) 969-7700
Data Numerics, Inc. 151A Central Ave., Farmingdale, NY 11735, (516) 293-6600
Dataproducts Corp. 6219 DeSoto Ave., Woodland Hills, CA 91364, (213) 887-8000
Dedicated Computer Systems 750 Westmount Rd. West, Kilchiner, Ontario, N2M 1S3 Canada, (519) 576-3808
Digital Electronics Corp. 2126 6th St., Berkeley, CA 94710, (415) 548-2944
Digital Equipment Corp. One Iron Way, Marlborough, MA 01752, (617) 481-9511
Display & Decision Systems Ltd., 80 Galaxy, Toronto, Canada, M92 4Y8, (416) 678-7525
Douglas Electronics, Inc 718 Marina Blvd., San Leandro, CA 94577, (415) 483-8770
Electronic Memories & Magnetics Corp. 12621 Chadron Ave., Hawthorne, CA 90250 (213) 644-9881
Electronic Product Associates, Inc. 1156 Vega St., San Diego, CA 92110, (714) 276-6911
E&L Instruments, Inc. Tychon Div., Box 242, Blacksburg, VA 24060, (703) 951-9030
Fairchild Camera & Instruments Corp. MOS Div. 464 Ellis Ct., Mt. View, CA 94042, (415) 962-3200
General Automation, Inc. 1055 S.E. St., Anaheim, CA 92805, (714) 778-4800
General Instrument Corp. Microelectronics, 600 W. John St., Hicksville, NY 11802, (516) 733-3000
Heurikon Corp. 700 W. Badges Rd., Madison, WI 53713, (608) 255-9075
IMS Associates, Inc. 1922 Rupublic Ave., San Leandro, CA 94577, (415) 483-2093
Intel Corp. 3065 Bowers Ave., Santa Clara, CA 95051, (408) 246-7501
International Microsystems, Inc 122 Hutton St., Gaithersburg, Md. 20760, (301) 840-1078
Intersil, Inc. 10900 N. Tantau Ave., Cupertino, CA 95014, (408) 996-5000
Jacquard Systems 1505 11th St., Santa Monica, CA 90400, (213) 393-3711
Martin Research, Ltd. Microcomputer Design, 3336 Commercial, Northbrook, IL 60062, (312) 498-5060
Microcomputer Associates, Inc. 10440 N. Tantau, Cupertino, CA 95014, (408) 247-8940
Microcomputer Technique, Inc 1120 Reston Int'l Center Office Bldg., Reston, VA 22091, (703) 620-9676
Microdata Corp. 17841 Red Hill Ave., Irvine, CA 92705, (714) 540-6730
Microkit Inc. 2180 Colorado Ave., Santa Monica, CA 90404, (213) 828-1722
Micrologic Systems 12 Walden, Burnsville, Minnesota 55337, (612) 890-0983
Millenium Information Systems Inc. 420 Mathew St., Santa Clara, CA 95050, (408) 243-6652
Mini and Microcomputer Laboratory Swiss Federal Institute of Technology, LCD, EPFL, Bellerive 16, CH-1007 Lausanne, Switzerland
Mini Micro Mart 1618 James St., Syracuse, NY 13203, (315) 422-4467
MITS, Inc. 6328 Linn N.E., Albuquerque, NM 87108, (505) 265-7553
Monolithic Memories, Inc. 1165 E. Arques Ave., Sunnyvale, CA 94086, (408) 739-3535
Monolithic Systems Corp. 14 Inverness Dr. E., Englewood, CO 80110, (303) 770-7400
MOS Technology, Inc. Valley Forge Corporate Ctr. Norristown, PA 19401, (215) 666-7950
Mostek Corp. 1215 W. Crosby Rd., Carrollton, TX 75006, (214) 242-0444
Motorola Semiconductor Products, Inc. Box 20912, Phoenix, AZ 85036, (602) 244-3466
Mycro-Teck, Inc. 216 North Washington, Wichita, Kansas 67201, (316) 265-5276
National Semiconductor Corp. #900 Semiconductor Dr., Santa Clara, CA 95051, (408) 732-5000
NEC Microcomputers, Inc. 5 Militia Dr., Lexington, MA 92173, (617) 862-6410
Olson, Brent C. 1950 Colony St., Mt. View, CA 94043, (415) 967-1199
Panafacom, Ltd. Box 4637, Mt. View, CA 94040
Panafacom, Ltd. 10-16, Jiyugaoka 2-chome, Meguro-ku, Tokoy, Japan, (03) 718-3351
Pehaco Corp., Dept. M 111 Main St., Suite 4, Los Altos, CA 94022, (415) 941-1977
Plessey Microsystems Inc. 1674 McGaw Ave., Santa Ana, CA 92705, (714) 540-9945
Process Computer Systems, Inc. 5467 Hill 23 Dr., Flint, MI 48507, (313) 767-8920
Pro-Log Corp. 825 Airport Rd., Monterey, CA 93940, (408) 372-4593
Raytheon Co. Semiconductor Div., 350 Ellis St., Mt. View, CA 94040, (415) 968-9211
RCA Solid State Div. Box 3200, Somerville, NY 08876, (201) 685-6713
Rockwell International Corp. 3310 Miraloma Ave., Anaheim, CA 92803, (714) 632-3698
Scelbi Computer Consulting 1322 Rear, Boston Post Rod., Miford, CT 06460, (203) 874-1573
Scientific Micro Systems, Inc. 520 Clyde Ave., Mt. View, CA 94043, (415) 964-5700
Semiconductor Specialists, Inc. Box 66125, O'Hare Int'l. Airport, Chicago, IL 60666, (312) 279-1000
Signetics Corp. 811 E. Arques Ave., Sunnyvale, CA 94086, (408) 739-7700
Solid State Scientific Inc. Montgomeryville, PA 18936, (215) 855-8400
Sord Computer Systems, Inc. 37-15 Okudo 2-chome, Katsushika-Ku, Tokyo, 124 Japan
Sorrento Valley Group 11339-K Sorrento Valley Rd., San Diego, CA 92121, (714) 452-0101
Sphere Corp. 791 S. 500 W., Bountiful, UT 84010, (801) 292-8466
Struthers-Dunn, Inc. 411 14th St., Bettendorf, IA 52722, (319) 359-7501
System Integration Associates RD-1, Box 126, Glenmore, PA 19343, (215) 242-8315
Technitrol, Inc. 1952 E. Allegheny Ave., Philadelphia, PA 19134, (215) 426-9105
Teledyne Systems Co. 19601 Nordhoff St., Northridge, CA 91324, (213) 886-2211
Texas Instruments, Inc. Digital Systems Div., Box 2909, Austin, TX 78767, (512) 258-5121
Warner & Swasey Co. Comstar Div., 30300 Solon Industrial Pkwy., Solon, OH 44139, (216) 368-6200
Western Digital Corp. 3128 Red Hill Ave., Newport Beach, CA 92663, (714) 557-3550
Wintek Corp. 902 North 9th St., Lafayette, IN 47904, (317) 742-6802
Wintex Computer Corp. 544 Lunt Ave., Schaumberg, IL 60172, (312) 529-3080
Xecon Associates Box 267, Hawthorne, CA 90250, (213) 676-8346

* * * * * * * * * * * * *

MAIL

"I Can't Get No..."

I have purchased an "8080" kit, and have assembled the basic kit and a 1K static board. I have two 4K boards on backorder, along with the manufacturer's 8K "Basic" (whatever that is) on cassette tape.

The construction of the equipment was easy for me as I have many years experience in the TV-Radio service business. Buttt---the taming (programming) of this electronic marvel is new to me.

I need, very badly, some help writing bookkeeping and inventory programs that I need in my business. I can't afford $35-40,000 for a "Wang" or PDP 11, etc., and I believe there are thousands of small businessmen out there just like me that could use a machine of moderate cost that would help us in our business to compete with the RCA's and Zeniths.

I have read all I could get my hands on (I've ordered your books and newsletters) about micro computers, but everything, so far, has been games and other hobby activities.

I don't have much time to work on this, as my shop keeps me busy all day and part of the night sometimes.

I don't expect or want anyone to forget the fun end of this micro-computer game, but us working stiffs could use a hand.

In the past, when I've had a problem I've gotten me some good books on the subject and read up on the subject. The things that I didn't understand, I would go to someone who demonstrated a knowledge of the subject and asked for help.

I guess that's what I'm doing now . . . . . Help!

Jack Robertson
P.O. Box 10482
Birmingham, Alabama 35202

QUESTIONS LOOKING FOR ANSWERS

Dear Bob,

I am interested, as probably many others are, in setting my mini-computer system up. The thing that probably makes most people worry is getting ripped off in the process. Maybe you could write an article where you, "start to finish" put together a computer, i.e., what to look for, expandability, prices, what to do after you finish the last solder joint and plug it in (programming it?!). Also maybe a little blurb on whether to stick with a stripped computer and run assembled or spend some more on software and go to BASIC, and what is the best type of memory for the money (ram, rom, prom, eprom)?

I am also interested in joining or starting a computer club in S-SE Michigan. Could you tell me if there is any or maybe put a small notice in your mag?

I also need to know what is the best type of I/O device and where you can get them. Also the ups and downs of mass storage using a cassette interface. I know there are many people out in your readerland who would appreciate some advice and comments on the above (not to mention myself!!!) Meanwhile, I'll try to swallow the fundamentals of ALCOL-60. Talk to you later.

Steven Romanski
13362 Balfour
Huntington Woods, MI 48070

P.S. Does anybody sell used or rebuilt teletypes cheaply?

"...SAT-IS-FAC-SHUN..."

I have been satisfied with Wilcox Enterprises. He has sent what he offered, when promised.

I have been dissatisfied with:

Poly Paks. I have yet to receive a complete order. Usually they send the fillers and back order the important items. And back orders never come until they are reminded at least once.

MP Publishing Company. I sent Carl Helmers an order in June, and have written to him about it twice. He answered in August but nothing came of it. In November he said he had to check his records, but still no action.

My add-on subscription to *BYTE* was put in parallel, and I receive duplicate copies. That doesn't get straightened either.

Kendall Stambaugh
5009 Guide Meridian Road
Bellingham, WA 98225

The Price Was Right

I have the Altair special that was good thru September 75, i.e., two four K memory boards, Altair 8800, cassette interface, and 8 K Basic . . . all are in good working order, with no problems in assembly. I hope to get some games and things up and running before Christmas. My opinion is that I got what I paid for, and that all things being equal, the price was right.

I also belong to the digital group (I concur with your statement of "turning into another commercial source") the Micro-8 newsletter group (Hal Singer et al have done great things for all of us and really deserve more credit than they are getting for getting the Micro-computer hobby off the ground) and "the computer hobbyist" group out of North Carolina (haven't heard from them for a while).

M. Douglas Callihan
Berkley St., R.F.D. No. 1
Berkley, Mass. 02780

AN IMPRESSION

Dear PCC, I am favorably impressed with:
Your games book;
Your small BASIC ideas
The fact that Bob Albrecht took a minute to answer my boy's letter;
Your whole approach.
I have just gotten my Digital Group 8080 system going. Did it to learn about it and hope to get into games soon.

DONALD SOUTHWICK
7611 Aberdeen Way
Boulder CO 80301

WANTED: INFO ON HEURISTIC GAMES

Dear Dragon;

If I can scrape up the bucks I want to get into building a micro. I am really fired up about TINY BASIC. The Computer Science Department here has an IBM 370/135, a PDP8E running EDU-20, a PDP12 running EDU-50, a PDP81 for playing with, including building hardware, and ports into the Minnesota MECC (Univac 1110) and MERITSS (CDC 6400) systems. We are getting a micro kit of some sort and I may try writing a TINY BASIC for it. Another student here has written some music programs for the 8I using two D/A converters. The people around here are just getting into games and such. There are literally hundreds of games on MECC and MERITSS, lots of posters, and poster generators, too.

The only game I have written is a version of Conway's LIFE for EDU-50 and a Digi-Log TVT. The program was written in PAL-D (PDP Assembly Language). Using the interrupt capability of EDU-50 it is possible to break into the program at any point, position the cursor anywhere on the screen, remove and add cells, and then continue on with the new population. I used to start it up with a random pattern and let it run for hours while I worked.

I am fascinated by games, especially heuristic games, do you know if there are any good intro level books on the subject: Also what other organizations are involved in recreational and educational computing: That's about it for now. I'll be looking forward to my first issue of PCC with ill-concealed glee.

Harold DeVore, Jr.
P.O. Box 7161
University Station
Grand Forks , ND 58202

LETTERS

A READER'S INTERESTS

Dear PCC, Just in case your readers' interests will affect the content of your publication, I'll inform you of my interests and abilities. First, I am an experienced systems programmer and systems analyst. Second, my principal interest is mathematics, and I want a computer to aid me in the preparation of papers. Third, I would like to have my own computer and haven't a small fortune to spend on it.

So I would like to find out about inexpensive mini- and micro-computers, preferably those with reasonable software (including assembler and text-editor), large and relatively permanent and safe, long-term, secondary or tertiary storage (e.g., magnetic tape, tape cassette, disc, paper tape, etc.), and good printed output that fits on an 8½" x 11" page, though standard computer paper as an output medium is also desired. Ease of maintainability (of the computer hardware and system software) is strongly desired, as are debugging tools, utility packages, clean and relatively standard interfaces, etc. ASCII typewriter (teletype or flexowriter, etc.) input/output is probably the most standard character set to use.

Sources at which systems can be purchased at discount, and easy modifications that a user can make to his equipment are other items that I would like to know about.

Sincerely,

GERALD STOLLER
8313 Bay Parkway
Brooklyn NY 11214

MIRACLE WANTED

Freeman Junior College is in the midst of a struggle to help its students respond to the technical world in a Christ-centered human way. A donation of a PDP-8 would allow us to study the use of computers for human benefit. Anyone wishing to donate such a machine and/or peripherals, please contact:

ED EPP
Freeman Junior College
Freeman SD 57029

SUGGESTION

Dear PCC Dragon, I have a suggestion for you. If your organization has enough time/people, how about putting a regular Question & Answer column on hardware/software problems. You could call it "Dear Dragon," or "Dear Dr Byte" or something. The main thing is to open a channel between computer hobbyists/freaks--something you have already accomplished, but that a regular column would reinforce.

ANTHONY OZRELIC
1905 Crestwood St
San Pedro CA 90732

This is already being done most wonderfully by Hal Singer in *Micro-8 Newsletter*, Cabrillo High School Computer Center, 4350 Constellation, Lompoc CA 93436.

IMPETUOSITY

PCC and friends, Impetuosity has its rewards! On seeing a terse and rather innocuous looking ad of yours in the classified section of a popular electronics monthly. I decided to throw caution to the wind and send for a sample copy of something called PCC. What I received was Volume 3, Number 5 (printer's overrun or prize issue?) of your mag and was very favorably impressed. In fact, I was very nearly overawed. In my few years of rather tenuous association (now seemingly severred) with the 'Comp. Sci.' dept of Western Washington State College I had no intimations of computers being anything other than what one might read about in an IBM systems reference manual. Some serious proselytizing is indicated.

At any rate, I would very much like to subscribe to PCC and perhaps help spread the word at the outer reaches of the empire. Thanks for the inspiration!

LOREN PENNOCK
4326 SW Cambridge
Seattle WA 98136

COMPUTER FAN

Dear PCC, I am presently an undergraduate in Information Sciences at the University of California, Santa Cruz. As part of my studies I have become interested in the uses of computers by and for non-big business, non-technical people. Specifically, I am interested in computers used in a community access or resource system, computers used in elementary education, computer usage by small business, both in production of a product (I'm thinking of the computer-printed children's story books which are customized to include references to the child, his friends, pets, etc.), and for normal business applications on a small scale, and organizations developed around the "computer fan" as described by (among others) Ted Nelson and Stewart Brand.

In re-reading the above list I see that I may be giving the impression of an aloof proto-professional studying some lower life form. Let me dispel all doubts; my allegiance is clearly with the computer fan, and my interest in these activities, while academic (I hope to complete my thesis in this area), might better be described as a passion.

I am writing you in the hopes that you can provide me with some information in these areas. I am particularly interested in your company's history and operation. How did you people get started? How do you fund your hardware and overhead? What is the nature of your decision-making process? Is most of your programming and system work paid for or donated? Have you advised, assisted, or worked with any local business in some aspect of their work that involves computers?

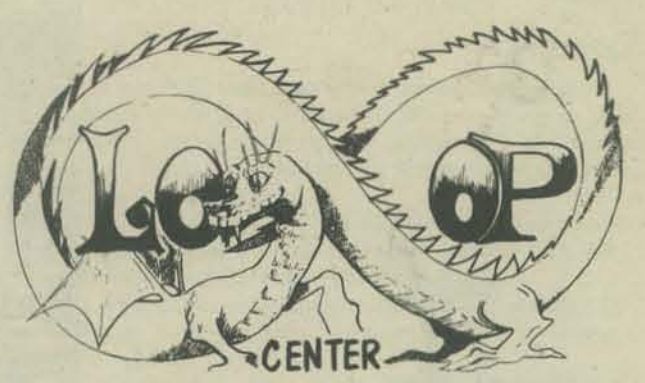
I would also be interested in any people, sources, or groups that you know of that are doing the things I listed earlier. In the same line, do you know of any publications or newsletters for or by people with these interests. The closest I have seen to this are the computer articles in the *Co-evolution Quarterly*.

I realize that I have asked for a lot, and any help you can provide will be greatly appreciated. If it is more convenient, I would be pleased to visit you in Menlo Park. I can contacted at (408) 429-2024 (days), and (408) 426-5587 (eves).

Thank you very much for your time.

Sincerely,

JEFF BONAR
Thimann Labs
University of California
Santa Cruz CA 95064



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LO*OP CENTER

Dear Bob, I am writing you this letter to ask you to support LO*OP Center, Inc., a non-profit educational organization devoted to teaching people how they can use computers.

LO*OP Center is currently engaged in three interlocking projects. First, we operate a storefront facility where anyone may investigate computers through playing computer games, taking introductory classes in computer operation and programming, and using the Center's machines for personal data processing. Second, we are researching the existing literature of classroom computing for elementary and secondary schools in order to provide a consulting service for teachers wishing to introduce their students to computers and programming within the schools. Third, we publish two newsletters, contribute to other journals in the field of educational computing, attend professional conferences, and put on demonstrations of computer applications to education, art, music, etc.

Most of us are aware that the computer is a powerful manipulator of something--but we don't know what, or how, or by whom. Our ignorance leads to misconception and apprehension at best, fear and underserved respect at worst.

By providing direct access to small computers and promoting discussion about their uses and limitations, we hope to dispel some of the mystery which surrounds them. By teaching programming and computer operation we help the student develop general problem-solving techniques while incidentally acquiring a useful vocational skill. By encouraging communication between educators, computer professionals, classroom teachers, and students of all ages, we are contributing to the evolution of more creative and meaningful education within our increasingly technical society.

We encourage your readers to become active members of LO*OP Center, Inc., by writing for further information.

Sincerely,

LIZA LOOP
LO*OP Center director
8099 La Plaza
Cotati CA 94928

BOSTON STOREFRONT

Dear Bob, I've heard you are doing something I've been considering for quite a while, opening a storefront computer center. If you wouldn't mind telling me, I would like to know how you went about it. How did you get financing? What are you using for machines? What kind of facilities and/or services are you providing? Do you have a standard software library? If so, where did you get it? How are you charging people using the center, if at all? In general, I just want to know all about what you are doing.

If I can do it, I would like to make a facility available to anyone in the Boston area. I was thinking of a microprocessor-based computer co-op. So far I have not generated enough interest to get it going though.

Sincerely,

MICHAEL ROONEY
The Boston Systems Office, Inc.
100 Allied Dr.
Dedham MA 02026

[Hope to do something on this next issue. In the meantime, write to: Community Computer Center, 1919 Menalto, Menlo Park CA 94025, and LO*OP Center (see above).]

COMPUTERS AND HEALTH

HEALTH CARE USERS' GROUP

Physician with IBM 5100 would like to correspond with anyone in the health care field who is interested in using the 5100 for CAI applications, e.g., patient education. I would be willing to exchange documentation in BASIC or APL and/or start a 5100 USERS CLUB specifically oriented toward medical applications. Write:

RICHARD EASTON, M.D.
5541 Parliament Dr., No. 104
Virginia Beach VA 23462
(804) 490-0124

(The PCC Dragon would also like to hear about Health Care applications using IBM 5100, WANG 2200, HP 9830, TEKTRONIX 4051, ALTAIR 8800, and similar stand-alone computers. In fact, we would like to start a regular section on Health Care applications, especially (1) CAI, and (2) biomedical instrumentation.

PEOPLE VS IBM

Dear Friends, I'm a systems analyst and programmer who is going back to secondary teaching and educational research (mass-media oriented). Boy, can I use some information about the revolutionary use of computers!

Between now and June 31st, I'm on a research and development project in a health information system. I intend to write about it--what publications are interested? I can also use some psychological support in making this health system turn people-serving instead of IBM-serving, as it now stands.

A year from now I will be working with kids again somewhere and want to do as much as I can toward getting computers to be tools instead of masters. I've read *Zephyros* and want to see more of what People's Computer Company is up to.

JOAN KARNES
City of New Orleans Health Dept, Co-operative Health
City Hall Blg, Civic Center
New Orleans LA 70112

RESEARCH SYSTEMS FOR MEDICINE

Dear Bob, I am writing after reading about your interests in microcomputers and brain waves. Our interests seem to be somewhat the same so I'll tell you a little about mine.

First, I work as the biomedical engineer in the Department of Neurosurgery at Jefferson Medical College in Philadelphia. I am also a graduate student at the University of Pennsylvania (Dept of Bio-engineering). Research Systems for Medicine evolved when I found myself doing lots of small computer/electronic jobs for different people around the city (programming, interfacing, equipment design, etc.). Though it is still basically a one-man operation, I have moved into a larger area and have a few people working for me part-time.

I have been working with microcomputers for about a year now and hope to concentrate only on their applications to medical instrumentation in the future. One project I have just started is the design of an automated neurological diagnostic laboratory. I plan to use an Altair 8800 to control a number of subsystems (signal averager, stimulator, frequency analyzer, etc.). Our primary emphasis will be analysis of evoked potentials from the brain but I will also be doing some spectral analysis of EEGs and thus could easily do some biofeedback.

My interests are mostly in computers and the brain. I will keep you informed of my results and any other projects of interest. I hope to hear further of your work.

Sincerely,

RICHARD MOBERG
Research Systems for Medicine
404 S. Quince St
Philadelphia PA 19147

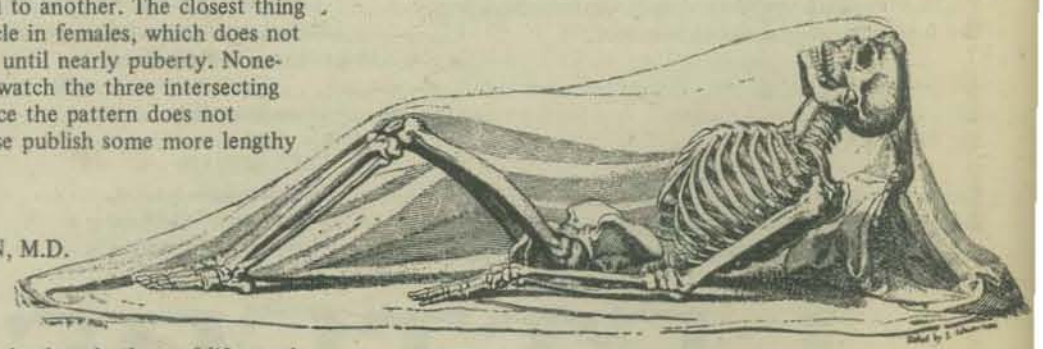
BIOSIN

Dear PCC, The September issue is, from my point of view, the best ever, but that is somewhat biased in that I am heavily into Altair 8800 and MITS BASIC, and the issue was loaded in that direction as well as toward what seemed to be a somewhat greater number of BASIC games than in the past. I've just recently gotten enough memory to do "BIOSIN" which you published last year. The scientific basis for it has been discredited, or at least greatly modified. For example, much work has been done in circadian rhythms; however, very few people believe in 23-, 28-, or 33-day cycles. The work that has been done suggests the possibility of something like that, but with cycles whose periods are not constant and not the same from one individual to another. The closest thing to it is the menstrual cycle in females, which does not operate in the same way until nearly puberty. Nonetheless it is great fun to watch the three intersecting sine waves, especially since the pattern does not repeat for 58 years. Please publish some more lengthy BASIC Programs.

Sincerely,

RICHARD RUBINSTEIN, M.D.
7711 Elba Rd
Alexandria VA 22306

(For info on circadian and other rhythms of life, read *Body Time* by Gay Gaer Luce [Bantam. 1971. 441 pp. $1.50, paper.])



doing it!

Doing it! is a new magazine which publishes specific, concrete descriptions of what people in cities are actually doing to evolve alternatives to the mainstream in goals, values and practices. Articles contain reports of cooperative working, buying and living arrangements; growing food in the city; deschooled learning; neighborhood self-reliance; decentralized low or non-profit economics; non-traditional medicine and other services; community organizing, and more. Six issues a year, with the first one coming out in May '76. Sample copy $1.--a year's subscription is $10.--(first issue free to subscribers). Personal or non-profit group classified ads 5 cents per word, $1. minimum (first issue). We'd be happy to receive articles, information about alternative groups, letters, comments or requests for more information. Ruth Kaswan, editor, doing it!, Box 303 Worthington, OH 43085. (614) 885-8964.

FIRST RETAIL COMPUTER MART IN NEW YORK CITY

The Computer Mart of New York, Inc. will open the first week of March, 1976. It will provide a complete source of microcomputers and supplies to computer enthusiasts in the metropolitan New York area.

The Computer Mart will feature SPHERE and IMSAI computer products, GBC CCTV Video Monitors, and equipment from other manufacturers. Working computers will be displayed, with support from printers, video terminals, and data storage devices.

The Computer Mart will also be a specialized book store, stocking the books, and periodicals of all publishers in the field of computers and data processing.

The Computer Mart will be at 314 Fifth Avenue, near 32nd Street (close to the Empire State Building). It is located in Polk's Hobbies, a five level building that is a hobby department store. This department store is a tourist attraction, in itself.

Computer Mart of New York, Inc.
314 Fifth Avenue
New York, New York 10001

EKOTEKET

Dear PCC, A group of people of different professions in Stockholm, Sweden, have started an information center, a public library and information gathering system called Ekoteket about alternative *technologies and ways of habitation* based on ecologically adapted technologies.

At the outset we are trying to locate, monitor and acquire the most relevant and interesting books, periodicals and reports treating our field of interest.

We thank you in advance and hope you will be in touch if you have any thoughts or material which you feel might benefit our project.

Yours sincerely,

KEITH ELKIN
Ekoteket
c/o The Museum of Modern Art
Skeppsholmen
Stockholm
SWEDEN

ANNOUNCEMENT

300 NEW COMPUTER-ORIENTED BOOKS PUBLISHED IN 1975

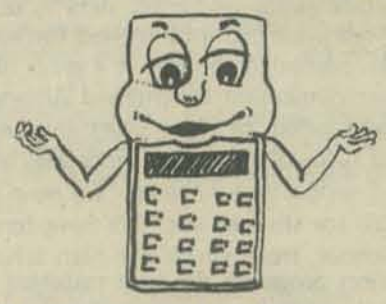
33

Dear PCC, More than 300 computer books were published in 1975, an increase of 50% over the prior year. The ninth edition of the *Annual Bibliography of Computer Oriented Books*, published by the University of Colorado, contains 311 new entries.

All books prior to 1970 were deleted, except for a few classics. Despite the deletions, the bibliography still contains over 1,000 books from 224 publishers.

Two new categories were added to the previous 51 categories: data base with 19 entries and structured programming with 7 entries.

Copies of the bibliography are available for $4 from *Computer Newsletter*, Box 7345, Colorado Springs CO 80933. The cost is $5 if an invoice is required.



CALCULATOR CURRICULUM STUDY

Dear Mathematics Educator, In just three years, more than a hundred million electronic calculators have come into common use. Millions more are on the way at prices almost anyone can afford. Clearly a fundamental change is occuring in the application of mathematics to everyday problems.

Such a large-scale innovation has implications for those of us involved in mathematics education. At the same time many research studies just being published, reveal an alarming decline in mathematics computational skills, concept understanding and problem analysis. An important area for all of us to examine is the role of the calculator in meeting the challenges revealed in these studies.

We are searching for answers to the question, will the hand-held calculator become a part of the problems or can it be the key to solving many of them? We need your help. Will you please permit us to send you a copy of our Calculator Curriculum Study Questionnaire, along with our postpaid return envelope? We would appreciate your time.

Sincerely yours,

DR RUTH HOFFMAN
Mathematics Laboratory
University of Denver
Denver CO 80210

page

From: MECC SYSTEMS UPDATE
Vol. 3 No. 1 (Jan/Feb '76)

MECC Systems Update
2520 Broadway Drive
(Hwy. 280 at Broadway)
Lauderdale, Minnesota 55113

MINNESOTA EDUCATIONAL COMPUTING CONSORTIUM — MECC

WINNERS OF ART CONTEST RECOGNIZED

At the Annual Meeting of the Association for Computer Machinery, the top ten winners of the ACM '75 Computer Art Contest were publicly acclaimed. Those present were personally congratulated by Dr. Ken Brumbaugh, MECC Instructional Field Services Manager.

The top ten winners were:

1st prize —
"PLOT" - wall hanging — by **Mark Olson,** grade 10, Burnsville;

2nd prize —
"OP.-6-7-8 in 3 Movements, Allegro, Adagio, Allegero" - music — by **Tom Howell,** grade 12, St. Paul;

3rd prize —
"Bald Eagle on a Shield" - wall hanging — by **Robert Holbrook,** grade 12, Edina;

4th prize —
"QUADS" - worksheet with art composition on it — by **Craig Finseth,** grade 12, Duluth;

5th prize —
"Computer Synthesized Music" — by **Vincent Splett,** grade 12, Cloquet;

6th prize —
"POSTER ART" - designs — by **Craig Copley,** grade 12, Little Falls, and "D PERIOD" - poster — by **William Wilson,** grade 10, Elk River;

7th prize —
"DIAMOND" - patterns — by **Steve Mathers,** grade 12, Duluth;

8th prize —
"MOUSE" - presenting Herbert - picture simulation — by **Danny Poppelaars,** grade 6, Edina;

9th prize —
"Paper Tape Punching Patterns" — by **Steve Trapp,** grade 9, Columbia Heights;

10th prize —
"SCHROEDER" - picture — by **Jeff Ellison,** grade 8, Duluth.

DID YOU KNOW THAT...

- Of all the public school districts in Minnesota, the percentage served by instructional timesharing has grown rapidly:

  1973-74 (prior to MECC) - 18%
  1974-75 (first year of MECC) - 56%
  1975-76 (second year of MECC) - 70%

- Of all the school districts having access to instructional timesharing for some portion of the period 1973-76, the percentage of those which are located outside of the Minneapolis-St. Paul greater metropolitan area has significantly increased:

  1973-74 - 50%
  1974-75 - 82%
  1975-76 - 85%

- Of all the students in school districts having access to instructional timesharing for some portion of the period 1973-76, the percentage of those in districts located outside of the Minneapolis-St. Paul greater metropolitan area is growing proportionately:

  1973-74 - 14%
  1974-75 - 46%
  1975-76 - 49%

- Of the total public school enrollment in Minnesota, the percentage represented by school districts served by instructional timesharing looks impressive:

  1973-74 - 52%
  1974-75 - 84%
  1975-76 - 91%

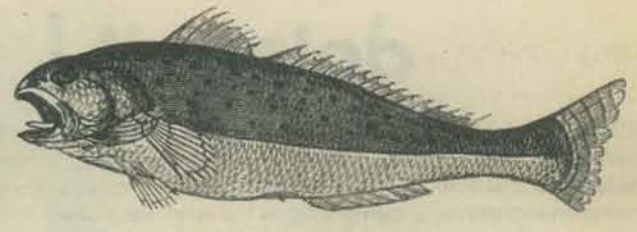
- The school districts served by MECC during 1975-76 vary widely in enrollment from a maximum of 54,000 to a minimum of 150, with 70% having total K-12 enrollments of less than 2000 students

- The districts included as being served by MECC vary greatly in the availability of instructional computing to their students due to the fact that the ratio of students to terminals is different for each district

COMPUTERS AND THE TOTAL CURRICULUM
(or A Sneaky Way to Get More Computing Power) 34

We've done a super neat thing, here at Sylmar HS, Los Angeles, Ca.
We took a simple idea and some time and generated, via federal funding, a computer system of our very own.
Initially we wanted time share capability for our students but the costs couldn't seem to be met. We decided that if we could provide support for the entire curriculum, we could then justify the costs of a terminal. This led to another question, "What could be done to support the entire instructional program?"
Clearly, with only a single terminal, conventional CAI was out of the question. What we did was substitute teachers for students at a terminal. We would generate materials for teachers to use in class.
We formalized our thoughts and applied for some Federal money through ESEA Title III. Someone thought it a great idea and the CHAT Project was born. (Communication Heightened Among Teens-Tots.)
The project was funded for three years and began operation in July, 1974. We have a Data General Nova 830 with 96K bytes of memory, 10 megabyte disc, capable of supporting 32 lines. We now have four (wow!) terminals and a special lab for student use. We have terminals in three elementary and a junior high school, from which our high school students derive.
Essentially project programs produce materials according to teacher input. Output is directly to a ditto master. From one run of the ditto, a teacher can produce enough copies for two or three classes. We have explored the use of small data banks from which teachers can obtain needed information. And we have done some work with simulations. Several of our programs are being terrorized by reading teachers. Teachers grades 3-12 are using our materials.
Amidst all this usage, excitement and service, it is doubtful anyone will ever question the cost of the four terminals we now have for student use. And the lab facilities we have created are delightful; lots of room and equipment. We now have two formal computer courses and are instituting a third for advanced students. Many folks are using the system on their own. (We don't know what they're doing, but they're busy!)
One of the most exciting spin-offs has been our experiences with other disciplines. We have learned a great deal about what's happening in other curriculum areas and we're a bit awed about what we've learned about computing. Much of what we learned came as a consequence of solving problems we would never have encountered in a purely mathematical environment.
We think we have a neat idea. It has certainly been successful for us. Perhaps other can apply this basic approach to their situation and thus provide their program with some extra goodies, at least an extra terminal or two. We will be glad to help in any way we can.

Bob McElwain Sylmar HS
CHAT Project Los Angeles, Ca.



Dear PCC

Enclosed is a copy of a program I recently completed that I thought you might want to see. It functions as a software interface between two or more terminals by passing the data through a file. Theoretically speaking, any number of people could use this program at the same time. Practically speaking, however, if any great number of people attempt this the programs execution will slow to a crawl. In the typical two terminal configuration, execution time varies from 3 to 8 seconds. Any modifications or improvements that can be made I would appreciate being informed of. This program is written for the HP 2000F time sharing system. It will not, to my knowledge, execute on the E version, and on the next higher version (the 2000 Access System) much of the program becomes unnecessary due to it s multiple access files. I have heard that there is a method of doing a similar routine on the Dartmouth time sharing network, but I am not aware of how it functions.

The heart of the program is it s multiple assign statements. Two files are utilized by this program. FILE1 is the actual work file. Record1 is used as a counter to determine whether to go immediately to the read routine or write the message into the file. Record2 contains two variables. The first is a message counter used to alleviate the problem of receiving your own or an old message by accident. The second variable is the message itself. Lines 230-240 of the program are used to clear the counter so that the next person to use the program will go directly to the write routine without getting stuck at the read routine first. If this program is broken in the usual manner, it must be supplemented by a program placing a zero in the first record. FILE2 is only a dummy used to clear the first file from the assignment. Statement 2500 is necessary to clear FILE1 back to read-write status. If this statement is forgotten, tests have shown that it becomes necessary for the user to log off the system to clear the files status again. I hope someone has a use for this program. It would seem useful to games such as Battleship where two players must keep data secret from each other but still use the computer as a referee or third participant. I am currently working on a version of spacewar based on this routine, and would appreciate any hints, suggestions, or assistance anyone would wish to contribute to this program. †

Bill Leininger
President, LOCUST
219 N. School St.
Mt. Prospect, Ill 60056

† Bill, See see pages 2 and 3 of this issue!

```
10 B=0
20 DIM A$[72]
30 FILES *
40 ASSIGN "FILE1",1,A
50 IF A#0 THEN 30
60 READ #1,1;C
70 PRINT #1,1;C+1
80 A=0
90 IF C#0 THEN 170
100 A=1
110 INPUT A$
120 PRINT #1,2;A,A$
130 IF A$="DONE" THEN 230
140 ASSIGN "FILE2",1,B
150 ASSIGN "FILE1",1,B
160 IF B#0 THEN 140
170 READ #1,2;B,A$
180 IF A=B THEN 140
190 PRINT A$
200 A=B+1
210 IF A$="DONE" THEN 230
220 GOTO 110
230 PRINT #1,1;0
240 PRINT "PROGRAM IS TERMINATED"
250 ASSIGN "FILE2",1,A
260 END
```

A COMPUTER WORD SEARCH - FROM THE CHAT PROJECT

```
T D G P F G U I S M R F L I P F L O P P A E L G X U S T A T E M E N T
R G A L I N N N Y A E S C P E T C Z W R O X M U L T I P L Y A P K R K
A C M O N I I F N G L Y H R D E B U G O J E T A P E M R C L N T Y G N
N H E T T M V O C N L M I O E N I A C G E C K E R T S V F S A I B M A
S Y S T E M A R H E O B P G S H G U O R R U B O A C C U M U L A T O R
M P O E R A C M R T R O P R I N T E R A E T R S C O R Q D B O K Y H T
I R F R R R D A O I T L S A G P J Y A M T I E C N M I B I T G E W O R
S O T D U G I T N C N D I M U P C G L M Z O A I V P P Z S R D Y C U O
S G W A P O O I O C O M E M O R Y J T A G N D L Z U T A C A I B H T F
I R A T T R D O U R C U T E I O D Q A B Z T E L E T Y P E C G O A P F
O A R A Q P E N S M O G C R F I L E I L F G T A F E E D E T I A R U B
N M E M T R A N S I S T O R D R U M R E Z K O T S L W O R D T R A T G
I N T E R F A C E C R O X E L P I T L U M X A O U O I N P U T D C T B
P A S S W O R D E R A H S E M I T W R I T E L R C G P C A S S E T T E
M E I C B S L O G O F F D I G I T A L D D A G E A I F O R M A T E F R
Y C N A Y O B X P S C A L C U L A T O R O Z O R B C O M P I L E R R O
K I C R T L I C H E X A D E C I M A L R O M L X A I D P K W M F H P T
T V R D E U N I K C A B D E E F A S S I G N M E N T K U V S E L P C C
J E E R A T A R Y O N A N O S E C O N D C O M P U T A T I O N O T C U
W D M E M I R C S N K B V G F N S E R V I C E D W E D E C R A W U A D
N L E A O O Y U T D N C Z L A T L N B E T M B F P O N R Q T P C F C N
L I N D D N O I M A T R I X B R O C O P E A M O S F O S G O L H C V O
D S T E E T H T Y Q I T Y R M A G Y O O C T Q D Z H C V O L T A G E C
Z P Q R M I N S T R U C T I O N O C L C H H A L B R E C H T R R X D I
H A R D W A R E C B R H V T D S N L E S N E W T G G S B I T W T Z J M
P R O C E S S O R G A X P X U P E E A P O M B A A I O D V Y W G W W E
S T G M A U C H L Y L B S A L O D R N T L A A P U G N I N I D G G E S
P E R I P H E R A L S Z B I E R O A J E O T S E F O O V P R I N T R Z
A D D R E S S T O R A G E A G T C M N W G I I Z T G N I S T R I N G S
G R A P H I C S A I K E N F G N C R T G Y C C G X K D D S I G N O F F
C O M M U N I C A T I O N S A E O R E G I S T E R Y B E J O V I A L N
M I C R O P R O C E S S O R A S Y N C H R O N O U S C O U P L E R L F
```

AEDS CONVENTION

The 14th annual convention of the International Association for Educational Data Systems will be in Phoenix, Arizona, May 3-7, 1976. PLATO and TICCIT workshops are scheduled. Here is your chance to see, touch, and play with PLATO and TICCIT terminals. For info, contact

Rick Meyer
P.U.H.S.S.
2526 W. Osborn Rd.
Phoenix, AZ 85017
(602)257-3045

POPULAR COMPUTING

The publication for computists--people interested in the art of computing. Includes new problems for computer solution, numerical results to problems, flow-chart solutions, news of developments in the computing art, essays on the Art of Computing, and reviews of electronic calculators. Popular Computing is for the serious student of computing. If you like Journal of Recreational Mathematics or Martin Gardner's "Mathematical Games" Department in Scientific American, then I think you will like Popular Computing. Published monthly at Box 272, Calabasas CA 91302. $18 per year; $15 if remittance accompanies order. For Canada and Mexico, add $4 per year to above rates. For all other countries, add $6 per year. Back issues, $2 each.

PERSONAL DYNAMIC MEDIA

If you read only one book about computers this year, read this one. *Personal Dynamic Media* is a 74-page report by the Learning Research Group of Xerox Palo Alto Research Center. It reads like a book of dreams, but people are making the dreams come true. Slowly, carefully, lovingly, people at Xerox are designing and building a personal dynamic medium for everyone . . . and . . . with the help of many children, exploring the use of the system for programming; problem solving; storing, manipulating and retrieving information; text editing; and self-expression through drawing, painting, animating pictures, composing and generating music.

For information, write: Adele Goldberg, Learning Research Group, Xerox Palo Alto Research Center, 3333 Coyote Hill Rd, Palo Alto CA 94304.

PROBLEMS FOR COMPUTER SOLUTION

Ninety problems for computer solution, by Stephen Rogowski, ranging from very easy to "unsolved." Problems are presented one to a page, usually with references to interesting and useful literature. 71 of the problems are from math (arithmetic, algebra, geometry, trig, number theory--the largest "chapter"--probability, statistics, and calculus). Plus 4 science problems, and 15 "general" problems (music, games, computer timepiece, and others. Student edition, $3.95. Teacher edition, $9.95. For further info, contact EDUCOMP, 196 Trumbull St, Hartford CT 06103.

TREK TOURNAMENT * * * * *

Trek Competition™ is promoting Trek 75™ an advanced interstellar computer simulation. Compete in a tournament using the original Trek 75™, written by William K. Char, an advanced battle simulation computer game based on the TV series "Star Trek." The game can be played thru any terminal/telephone hookup on the time share systems of GRW Systems, Inc., of Mountain View, CA. Free assistance available for new accounts. Check local computer store for terminal time.† First mission will run from April 12, thru April 16, 1976. Top three players will share 75% of the entry fees (40%–25%–10%). Entry fee $5. Regulations available for $2. Prepaid computer account $10. Make checks payable to Commercial Information Systems. Please include SASE on all inquires.

Trek Competition ™
2580 Westford Way
Mt. View, CA 94040

† SEE PAGE 23 FOR A LIST OF COMPUTER STORES

INTERNATIONAL DIRECTORY OF LITTLE MAGAZINES & SMALL PRESSES 11TH EDITION, 1975-1976

The name speaks for itself. It provides information (mag's/press's name, address, editor, type of material, rates, and much more), and excitement (discovering the vast range of topics and sources people get into). Extremely useful, it also provides the reader with a refreshing reaffirmation of people's energy and imagination. $5.95/copy, $18/4-yr. subscription; $8.95/cloth copy, $25/4-yr cloth subscription. Also available: *Small Press Review*, a monthly magazine with listings of new presses/mags, reviews of small press books and little magazines, and news from the small press world. $10/year. Both available from Dustbooks, Box 1056, Paradise CA 95969.

HEAVILY TATTOOED MEN & WOMEN

Available in April 1976, *Heavily Tattooed Men and Women* by Spider Webb. Contains 100 b&w photos of tattooed people. From: McGraw-Hill Paperbacks, 1221 Ave. of the Americas, NYC 10020.

SPROCKET MAN
is coming next issue!!

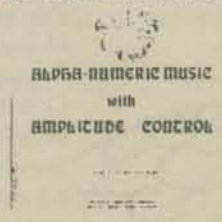
Book Store

ACTIVE FILTER COOKBOOK
Don Lancaster, 1975, 240 p., $14.95

By the author of R-TL Cookbook and TTL Cookbook, 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. Computing component values to give the desired characteristics.

ALPHA-NUMERIC MUSIC WITH AMPLITUDE CONTROL
Malcolm T. Wright, 1975, 23 p., $2.00 (Xeroxed)

Programming 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.



BASIC
Albrecht, Finkel and Brown, 1973, 325 p., $3.95

Designed as 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 and matrix operations.

Basic BASIC,
James S. Coan, 1970, 256 p., $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.

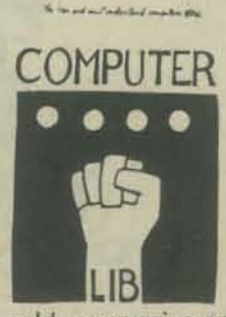
BASIC PROGRAMMING
Kemeny and Kurtz, 1961, 1971, 150 p., $6.95

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 recommend it as a reference guide, applications resource, and idea generator for people who already know a little BASIC.

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.

COMPUTER LIB/DREAM MACHINES
Theodore Nelson. 1974, 186 p., $7.00



Man has created the myth of the computer as cold, oppressive and sterile. This book sees them as versatile gizmos which may be turned to any purpose, in any style – a veritable panoply of things and dreams.

COMPUTERS AND COMPUTATION
Scientific American, 1950 through 1971, 280 p., $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 Anderson, 1975, 134 p., $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 footswitch 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

This book is intended to allow electronic technicians to learn the basics of digital logic. It has 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 stragegy. Most of the games in the text can be run on a minimum 4K computer and the remainder on an 8K system.

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

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

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

No tricks or puzzles, the 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. (See page 5 of this issue for a review.)

HOW TO BUILD A HOUSE SIMPLY FOR 1/3 THE COST
William Zink, 1975, 107, p., $5.50

Dr. Zinks purpose is to show the inexperienced person how he can build his house with a minimum of professional sub-contracting. His emphasis is on ease of construction of a comfortable shelter.

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 micro-computers. 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.

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 108 games including variations of seven of the primary 101, all in BASIC. Most games are simulations of sports, card games, board games and games of chance.

PRINCIPLES AND PRACTICE OF ELECTRONIC MUSIC
Gilbert Tryhall, 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 peice, 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.

PROBLEMS FOR COMPUTER SOLUTION
Gruenberger & 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 hard, math, non-math, all beautifully written.

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

This book is designed for anyone who wants to learn the basic concepts and skills of probability. To work the problems in this book you will need only knowledge of elementary algebra to subsititute numbers for symbols in a formula and to keep the order of computations straight when the formula involves parentheses.

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

This is a math textbook with a sense of humor – an experiment in the *visualization of mathematical ideas through* cartooning. Effective and interesting communication of a sometimes unexciting subject, written for the child in all of us.

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&I. 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 designed for the general student who wants to learn the basic concepts and procedures of statistics as it is used today. Knowledge of elementary algebra – enough to substitute numbers for symbols in a formula and to keep the + and – signs straight when working with positive and negative numbers.

TEACH YOURSELF BASIC VOLUMES 1 and 2
Tecnica Education Corp., 1970, 64 p. each, $1.95 each

Written at about the seventh grade level, covering teletype fundamentals and BASIC instructions in Book 1 and more sophisticated instructions for the novice in Book 2.

THE ENERGY PRIMER
Portola Institute, 1974, 200 p., $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 Gregoy 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
or 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 T-shirt. Available in sizes S, M, L, XL and childs 8, 14, and 16.

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pcc P.O. Box 310 Menlo Park, Ca. 94025

THE ULTIMATE STAR-TREK

Around mid--1974 Star--Trek came to Santa Ana College, in Orange County, California. The person responsible, Timothy David Harris, obtained a version from the University of California at Irvine, and, with a little ingenuity, made it acceptable to the Santa Ana College computer.

The original version was popular from the outset and within a few short months nearly a dozen persons had copied it for themselves. The game lost its challenge after a while, however, and steps were taken to improve it.

With the help of a few intelligent assistants, Mr. Harris set about creating the "ultimate Star--Trek." The first object of concern was the course for both the moving of the Star--ship and the firing of photon torpedoes. The original version used a vector arrangement which numbered from one to nine; one was horizontal and to the right, two was at a forty-five degree angle up and to the right, three was vertical and upward, and so on. Fractional numbers were supposed to be between two integers, but, according to one of the co-writers, "made no sense at all. They sent you off to God-knows-where and used no logic whatsoever."

The new version uses a course based on the degree division of a circle. It utilizes the trigonometric functions already in the computer and is, thus, considerably more accurate than the old format. These built-in functions allow the course to be determined by a pair of equations, whereas the old course required upward of five and, hence, allowed more possibilities for error. This also means that the new course is more efficient as less storage space is required for the fewer steps.

With the added strength brought about by more accurate torpedoes, the Enterprise became virtually unstoppable. The only vessles to oppose it were those of the Klingon Empire, and their armament consisted solely of phasers which offered no match to the photon torpedoes.

To the new version, then, were added Romulans. Romulans are only three-quarters as prevalent as Klingons, but they still average forty-five per game and are twice as difficult to destroy as Klingons, requiring a hit of eight-hundred units of phaser energy or two torpedoes to be killed. Romulans are armed with photon torpedoes comparable to those of the Enterprise, but more than twice as destructive. As much of a challenge as the Romulans provided, they were still not enough to stop the Enterprise.

To that end, Mr. Harris and his associates did hours of research into the show itself and came up with Thallians, Eminians, and Hortae; these three aliens were added in a minor capacity to further harass the Enterprise. These aliens are unique in that they cannot be picked up on the Enterprise's long range sensors; thus, their presence is not known until the ship is within their firing range. Thallians were armed with a device that builds an impenetrable "web" around the Starship rendering it immobile. Eminians received a "stasis field", a form of electromagnetic radiation that prevents the reaction of matter with anti-matter and, thus, makes warp engines, phasers, and photon torpedoes inoperable. Hortae were given a "sonic disrupter beam", an extremely low frequency oscillator that breaks down chemical bonds and thus causes all matter to reduce to its elemental form. These aliens are not overly aggressive, but are vindictive, accepting no attack upon themselves nor their compatriots without severe retaliation.

Having succeeded in making a game that is much more difficult to win than any other (as is evidenced by the fact that, to date, a single game has yet to be won), effort was directed to other problems. Stars, while they appeared in vast numbers in the original game, were virtually worthless as they offered no realism to the game. They did no more in the first version than to stand as obstacles to movement, and minor obstacles indeed as they merely hampered quickness.

Novas were added to alleviate this problem and heighten authenticity; super-novas were later added and have aided in making this form of Star--Trek unique. Novas come about when a star is struck by a torpedo.* It then expands into the sectors immediately adjacent to the star, destroying anything in its way. Super-novas lie dormant for a single command and then begin to expand, doing so until the entire quadrant has been engulfed.

* WOW! WHAT KIND OF TORPEDO IS THAT?

All these additions were helping to make the game more difficult, so steps were taken to counter-balance this trend. The Enterprise was given a cloaking device, a special type of shield impervious to all forms of electromagnetic radiation and hence unscannable. This offers the possibility of approaching an enemy without having its presence known, sneaking up, as it were. Probes were created to allow the Enterprise to scan far distant points of the galaxy, which aided in finding starbases and plotting strategy. Starbases were limited in the number of times they could replenish the Enterprise's supply of energy and torpedoes, depending upon the number of Klingons, Romulans, and Starbases. Ghost-ships were added; they offer both the possibility of gaining and losing these two essential items.

Thus, while other versions have only Klingons to boast as enemies, here have been created Thallians, Romulans, Hortae, and Eminians. No other game begins to challenge the ingenuity, innovation, and intelligence that has here devised "the ultimate, the only game of its caliber, the greatest form of Star--Trek possible on this computer!"

Bill Campbell
907 E. Wilson Ave.
Orange, Ca. 92667

THE COMPUTER IN SCIENCE FICTION

Since the computer is so ubiquitous in our life it is not surprising it is a common character in fiction and poetry. The main thrust of this article is about computers in literature, but I will mention a couple robot books for those interested in robots.

There are several common motifs in computer related literature. The first is the computer-run society. In this type of story the whole society is run by a computer. Robert Heinlein's *The Moon is a Harsh Mistress* is a book about a colony on the moon which is run by a friendly computer. Heinlein's book is unusual because the computer is good. Heinlein's other books are somewhat computer oriented and are all good, especially *Time Enough for Love.*
Usually the computer is evil. D.F. Jones has two books, *Colossus* and *The Fall of Colossus.* In these books the computer ruthlessly runs the world. The book was also made into a movie called *The Forbin Project.*

In Ira Levin's *This Perfect Day* we again see a computer-run society which is very unpalatable to humankind. In Levin's book the computer completely controls everyone, including their work, sex, and friends by a combination of drugs and surveillance. One more story along this line is E.M. Forster's *The Machine Stops,* where we have a computer run society, and people have no control over how it is run, and even forgot how it was started. In this story the computer tries to be a benevolent despot and fails.

CHALLENGING THE GODS

The next common motif is humankind's attempt at something previously forbidden, and failing. Like the old myth--if you challenge the gods you are going to get it in the end. Old books that fall in this motif are *Frankenstein* (must reading for computerniks) and Capek's play *R. U. R.* Next we have Michael Crichton's excellent book *The Terminal Man.* Some doctors install a computer in a mentally sick man's head to control him. Everyone get what they deserve in this fast moving book. Crichton's other books are excellent too.

HUMOR

Humor is rather rare in literature and life, but there is some good computer humor. *When Harlie Was One* by David Gerrold is about a computer research institute where the researchers try to write literature, simulate sex and sports, and teach a computer some ethics. The book is very funny and one might even think of SRI when reading it. *The Compleat Computer* by Dennie Van Tassel contains several pieces of humor, fiction, and poetry about computers. It also contains some more references to computer fiction.

There are two excellent mathematical anthologies by Clifton Fadiman which contain humor and fiction of a mathematical bent.

A good anti-machine book is Samuel Butler's *Erewhon.* In this book written in the 1890's, a society destroys all machines lest machines dominate humankind. Finally, two robot books are Isaac Asimov's *I,Robot* and Damon Knight's *The Metal Smile.*

If you like this I will do another one next year. Also, since collecting poems, songs, stories, and miscellaneous about computers is a hobby of mine, feel free to send me the titles of any you know of. Good reading.

D. Van Tassel
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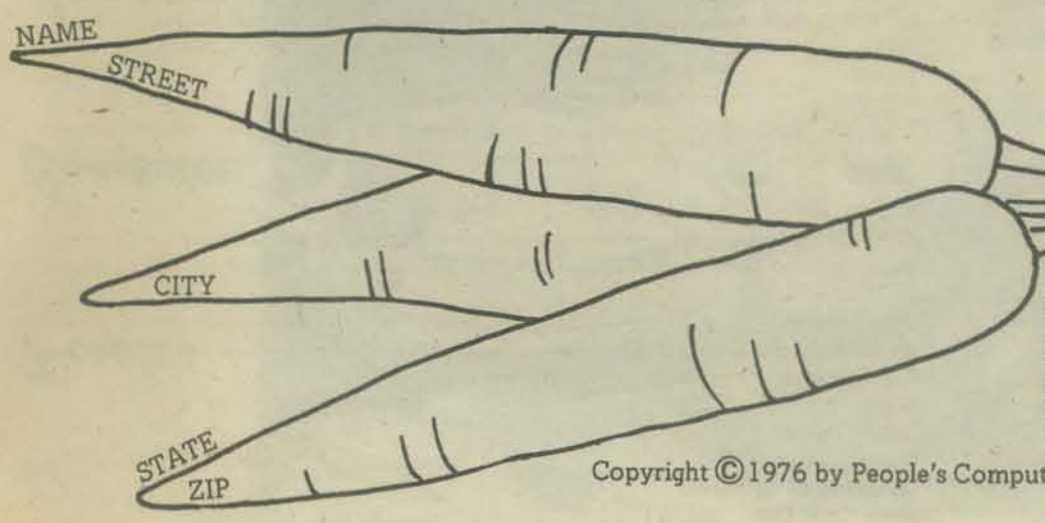

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Our apologies to Tom Dwyer, whom we failed to specifically acknowledge for his authorship of "Report from Soloworks to PCC Readers" in our last issue (Vol. 4, No. 4). And when we did acknowledge him as a contributor, we misspelled his name. Sorry, Tom.

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cover photo by Betty Estersohn

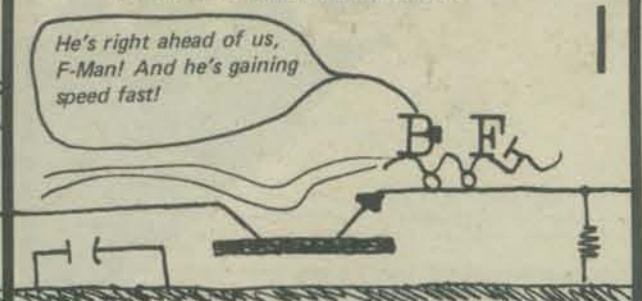
FORTRAN MAN

Lee Schneider

Todd Voros

Fortran Man and Billy Basic speed past low-core, which is a fortress of protection against the majority of the outside world . . .

They finally reach their goal, entering through an unobtrusive side current limiter . . .

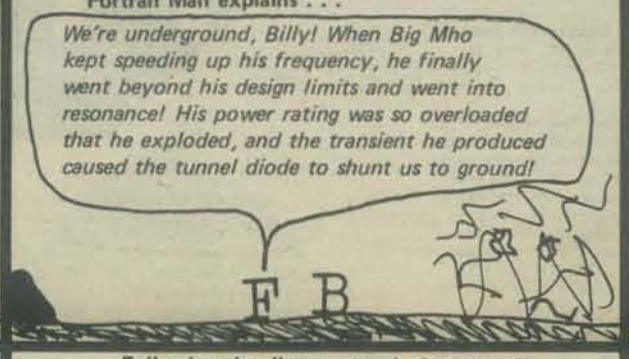


The speed of the chase continues to rise, as Big Mho attempts to elude his pursuers . . .

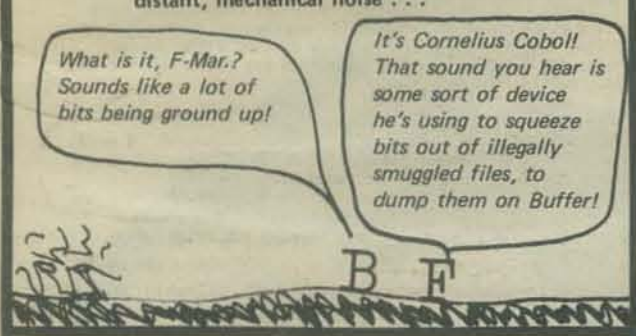
They enter the tunnel diode, when suddenly . . .

A few moments later, Fortran Man and Billy Basic regain consciousness, only to find themselves in a strange, deserted place . . .

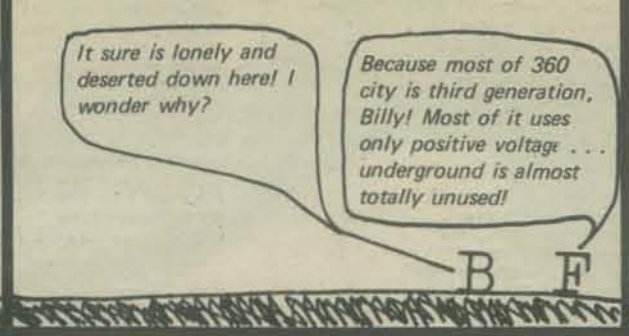
As Billy examines the wreckage of their Kilocycle, Fortran Man explains . . .



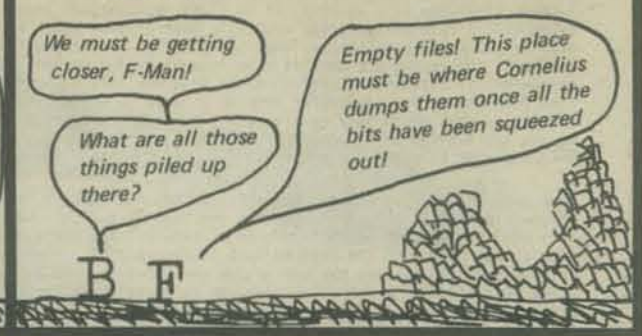
Billy listens, and he too hears the strange, distant, mechanical noise . . .



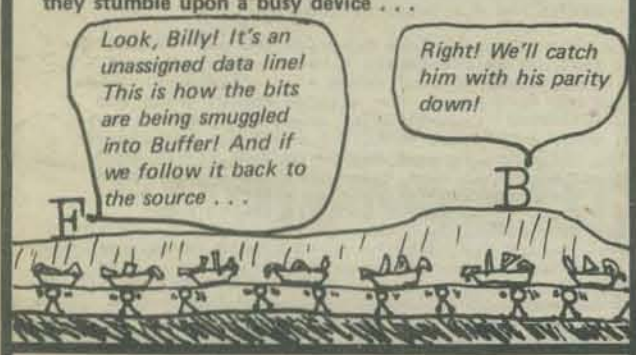
Following the distant sound, they set off cautiously toward the source . . .



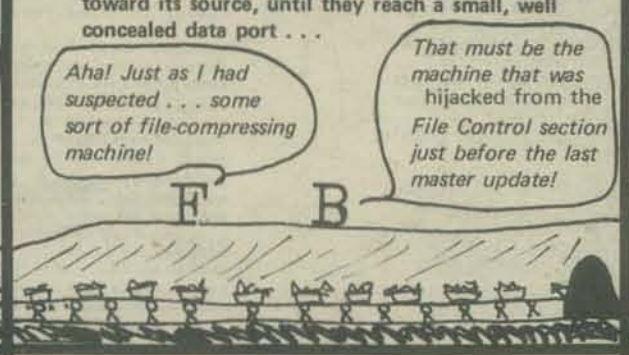
They turn a corner, and the sound is suddenly much louder . . .



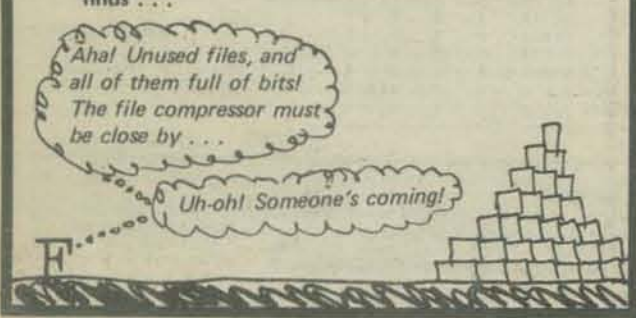
They move cautiously around the file stack, and they stumble upon a busy device . . .



The pair carefully but swiftly follow the data line toward its source, until they reach a small, well concealed data port . . .

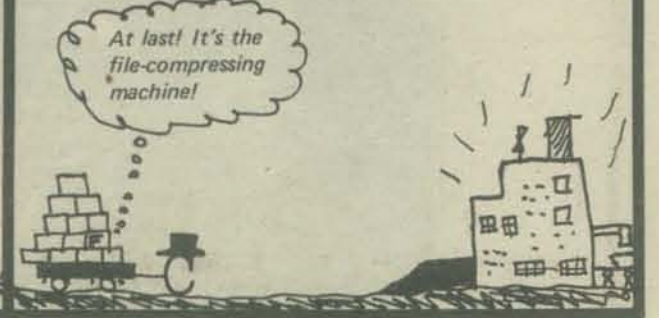


Observing the path taken by the hidden data line, Fortran Man swiftly curve-fits an optimal path to the entrance side. Following this path, he soon finds . . .



Swiftly disguising himself as a harmless but bit-filled text file, F-Man places himself at the front of the pile . . . and, as he suspected, his arch-enemy appears on the scene . . .

Placed on a low-speed transport with a number of other files, F-Man finds himself transported into a large, busy room . . .



TO BE CONTINUED...