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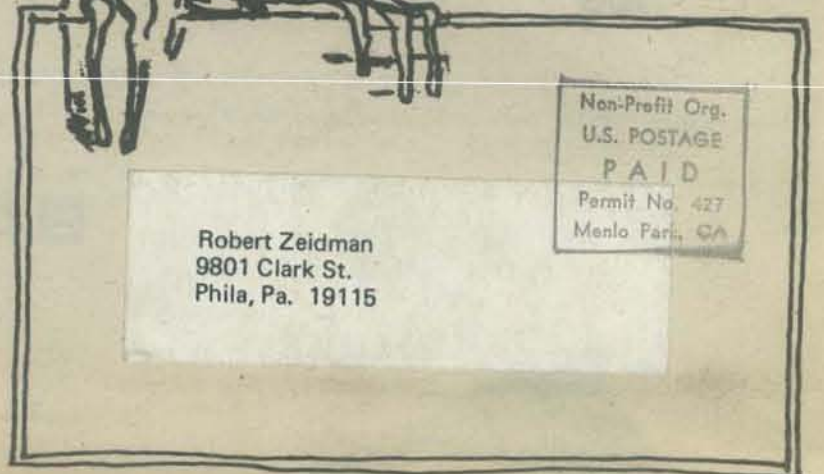### P.O. BOX 310 • MENLO PARK, CA • 94025

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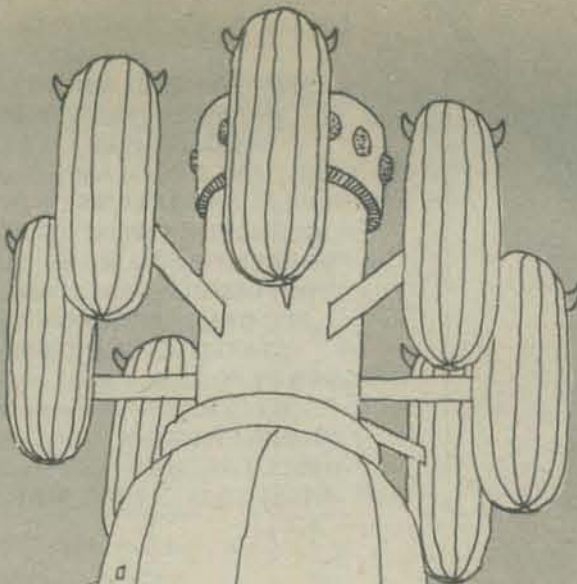
In this issue —

SPACE GAMES

TINY BASIC

SOLOWORKS

FORTRAN MAN

vol. 4 no.4

People's computer company
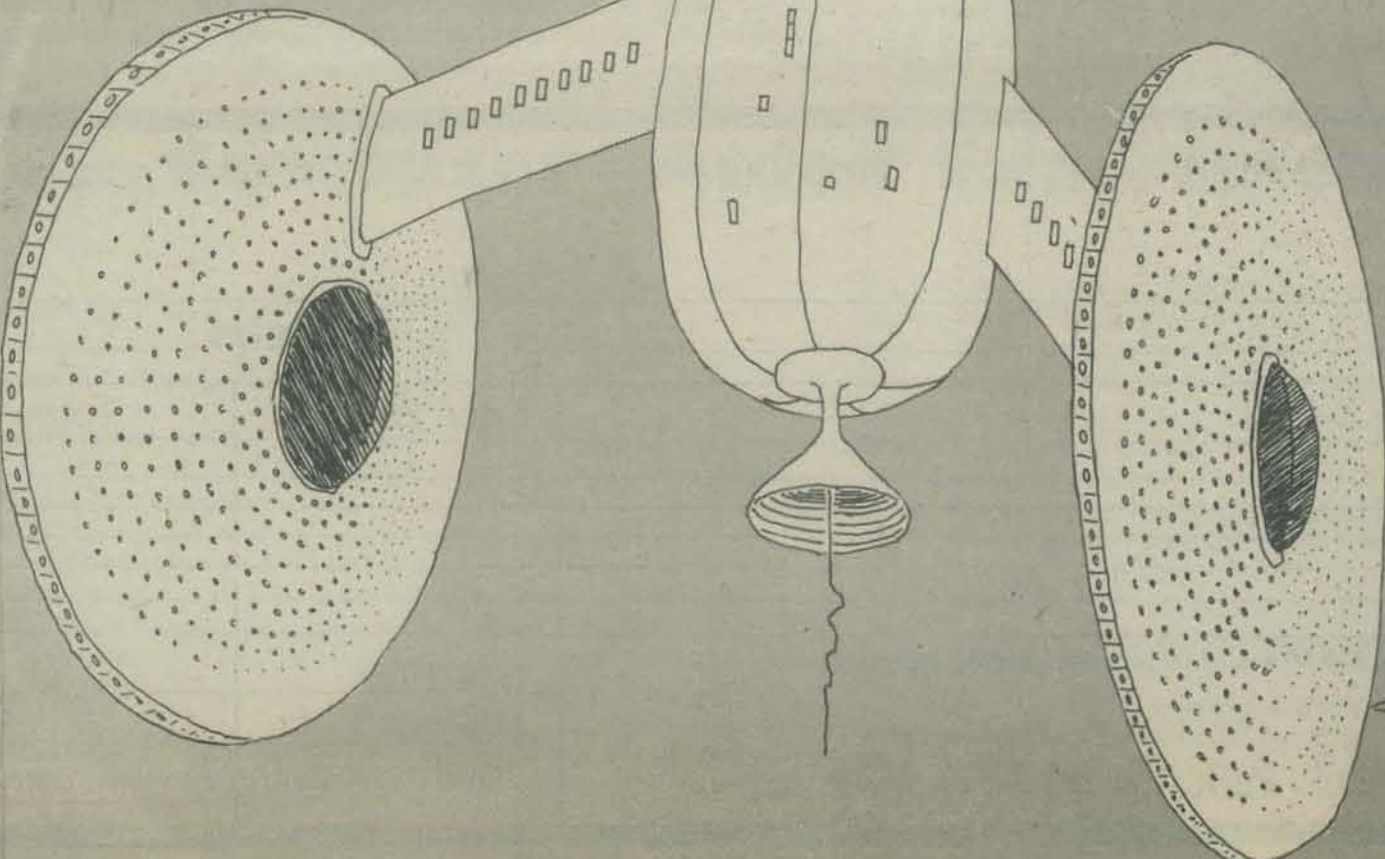
january '76

Report From Soloworks to PCC Readers

Should your school join the computer movement? Will spending money on hardware make for better learning?
We think most people can better arrive at answers to these questions by considering the following experiment:

A phonograph is placed in a room with a small group of listeners. A well-made recording of a Verdi opera is placed on the turntable, and for an hour or so the listeners concentrate on everything they hear. We then ask the question: What have the listeners received?

The answer is that the amount, subtlety, and utility of information received by each person is *radically* dependent on the history of experiences (or "cultural background") each person brings to the listening room. A listener raised in Napoli within a community that lived and breathed opera, will actually "hear" things (it's of course a psycho-acoustic phenomenon) that are beyond comprehension for other listeners. Even more startling will be the depth of information absorbed by a listener who has been a creative worker in the field of opera, whether at the composing, performing, or production levels. At the other extreme, a listener who has had no part of the operatic culture, will literally be hearing mostly "noise" ("yelling and screaming" in the words of one person). *Efforts aimed at perfecting either the record or record player will not substantially change this situation.*

Our imagined experiment serves as a rather accurate description of the model that underlies the Soloworks project's perception of human learning. The experiment reveals three fundamental elements in the learning process, and makes clear the remarkable epistatic interactions that can take place between them. These three elements can be described in terms of the adjectives "transmittal", "experiential", and "creative".

Transmittal elements are those that attempt to pass on ideas, facts, skills, etc. from person(s) to person(s). As our experiment suggests, this information can be both limited and cryptic, and heavily immersed in "noise". But when we add a *human* receiver to the system, there now arises the possibility of retrieving, reconstructing, and even creating content from the original noisy signal, provided the appropriate *experiential* and *creative* faculties of that human listener have been enabled.

The primary goal of the Soloworks project has been to invent new and effective mechanisms for enabling these faculties in young students. In particular, we have been investigating the potential of state-of-the-art computer-based technology for providing invigorating sets of experiences that will sensitize students as expert listeners in a laboratory-based mathematics curriculum. We have also used this same technology to support students in creative work, so that they will not only get maximum benefit from the transmittal elements of the curriculum, but will themselves eventually contribute to the growing body of knowledge from which transmittal mode draws.

How does it work? That's one question the readers of PCC don't need answered, if they've had a chance to use computers in a setting that isn't too hemmed in by lack of imagination. Some idea of how it's working for us is given by the "curriculum" topics we've developed as shown here in graphical form. *Most* of these ideas came from working with high school students who were interested enough in these topics to spend considerable time with them as projects. We can guarantee that these students have become expert listeners ("receivers") in the "transmittal" course we teach. We have found that the theory described here works out to be quite a sensational pedagogical technique, and recommend it as an idea worth trying.

> Note: The curriculum and sample modules shown are experimental only. Do *not* write for copies — we are not able to respond at present . . . sorry (not our decision).

About the SOLOWORKS CURRICULUM

The Soloworks curriculum development has been based on a "top down" approach, that is on the generation of curriculum materials by a process that starts with fairly advanced ideas, and immediately tries to capture them in the form of lab-oriented curriculum modules. As we write these modules, we discover that certain pre-requisites for both content and experience arise. This then suggests other modules. The process can be repeated to generate other modules at further levels of simplification, but it can also work in the opposite direction. For example, a module on single-server queuing theory has pointed "downward" to suggest new content. It has been organized to permit groupings in up to nine new one-semester courses, and to show how our lab-oriented approach relates to the great classical ideas of mathematics.

Our current working version of this curriculum together with sample first pages from representative curriculum modules is shown on page 5. The nine possible courses can be located by grouping together master topics with code numbers starting with A, C, EC, D, ED, S ES, M and EM.

Our intention in focusing on discrete curriculum modules (rather than "continuous" textbooks) has been to maintain flexibility. We felt that the innovative nature of our program mandated keeping an open mind about the structure of a lab-oriented curriculum, and that freezing a sequence at this time would be a mistake. This judgement has proved to have been a good one. In addition to allowing us to add new ideas as we discovered them, the modular approach has invited rearrangement and/or extension and/or deletion, by the teachers at our lab.

INTRODUCTION TO MEGATEK
LOW COST GRAPHICS

How good is your aim? Can you hit the target and make the dust fly? This program is a variation on the classical projectile problem, but with a few surprises. You are given the distance from your cannon to the target, and you decide how many shells you want. For each shell, you choose an initial angle and velocity. The computer is connected to a Megatek graphics unit which uses an ordinary oscilloscope to display your cannon, the target, and the trajectory of your shell. Enlarged pictures can be shown on TV monitors at various other places using the scheme shown in our picture.

HIT

BIG TV SCREEN

OSCILLOSCOPE — TV CAMERA

COMPUTER — TERMINAL — MEGATEK CONTROLLER — TV MONITOR — OPTIONAL TV TAPE RECORDER

RS-232 PLUGS
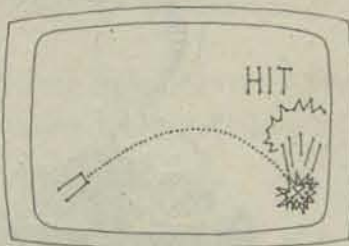
COMING ATTRACTIONS:

SPIN-PONG   HOCKEY   SWIMMING   ORBITS   SPACE WAR

Monte Carlo Pi

The mathematical symbol π (Pi) represents the number 3.14159265... As you know, Pi is used in calculating the area and circumference of a circle. It also has other remarkable mathematical properties. Have you ever wondered how one cou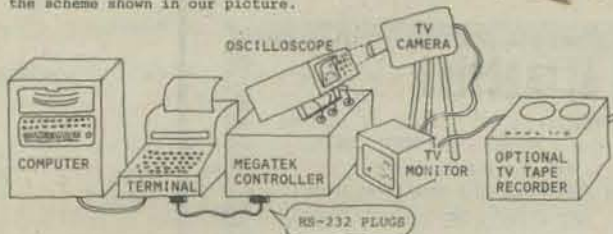ld calculate the value of Pi? There are a number of interesting ways (see modules #2105 and #2155). In this module, the "Monte Carlo Simulation" method for finding Pi will be described.

Monte Carlo Simulation originated as a method for testing mathematical model. This method was developed by nuclear physicists working on the Manhattan project during World War II. These physicists noticed that spontaneous disintegration of atoms seemed to occur randomly. To test their mathematical models of atomic events required sequences of random numbers such as those generated by the spins of a roulette wheel or the roll of a die. They named their testing method Monte Carlo Simulation in honor of the city along the French Riviera known for its plush gambling casinos.

Here is how we can use random events to calculate the value of Pi. First we draw a unit square and enclose a quarter circle within it as shown in figure 1.

Figure 1

Figure 2

1 unit
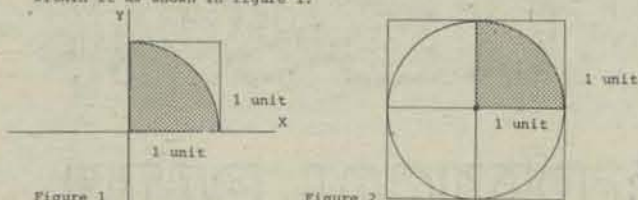
1 unit

1 unit

1 unit

The area of the square is 1 square unit. The area of the quarter circle is one fourth the area of a circle with a radius of 1 unit as you can see in figure 2.

NOTE: A more advanced version of this module (for calculus students) is found in Project Solo module #0111.

INDEXED SORTING

#15 Name: ARCHIE Weight: 980 lbs.

#8394 Name: TABBY Weight: 6 lbs.

ZOO CAT INDEX

#15   #8394

ALPHABETICAL SORTING:
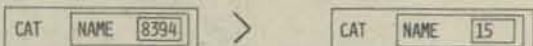
CAT NAME 8394 > CAT NAME 15

MAN-EATING SORTING:

CAT WEIGHT 15   CAT WEIGHT 8394

HAND-MADE GRAPHICS AND THE NINE-MASSCON PROBLEM
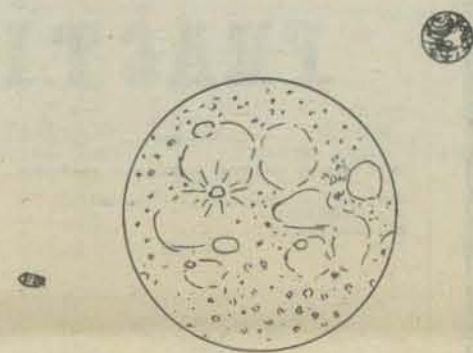
ORBITAL DYNAMICS

Pathan Politics
A Simulation Game

(Based on anthropological studies of Northwest Pakistan)
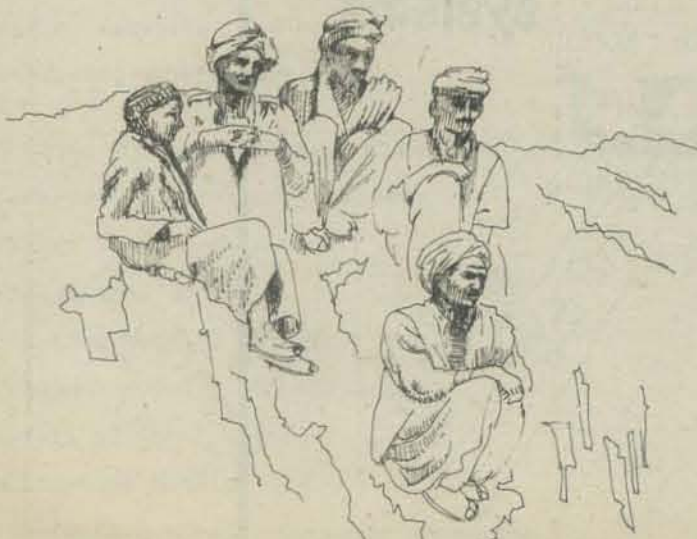
N-TREK

TABLE OF CONTENTS

CRITICAL PATH ANALYSIS

THE TALKING TURTLE

★ ★ ★ ★ ★ COMING ATTRACTION ★ ★ ★ ★ ★

SEE THE MEETING OF THE TORTOISE AND THE HARE
WHEN THE SOLOWORKS GIANT ROBOT RABBIT
(WITH THE BIG BLUE EYES)
JOINS THE TURTLE IN A ROLLICKING DANCE
★ YOU'LL GASP ★ YOU'LL CRY ★ YOU'LL LAUGH ★
IT'S ALL IN MODULE # 4115
COMING SOON
TO YOUR NEIGHBORHOOD SOLOWORKS LAB

FRACTURED FRACTIONS

```
THIS PROGRAM CONVERTS DECIMALS TO FRACTIONS.

WHAT DECIMAL WOULD YOU LIKE CONVERTED?
? 3.1415926538
HOW MANY LEVELS (1 TO 12)?
? 12

3 * 1
    ---------
     7 * 1
        ---------
         15 * 1
             ---------
              1 * 1
                 ---------
                  292 * 1
                      ---------
                       1 * 1
                          ---------
                           1 * 1
                              ---------
                               1 * 1
                                  ---------
                                   1 * 1
                                      ---------
                                       12 * 1
                                          -----
                                            1

    11359377
* ----------- =  3.1415926536
    3613802
```
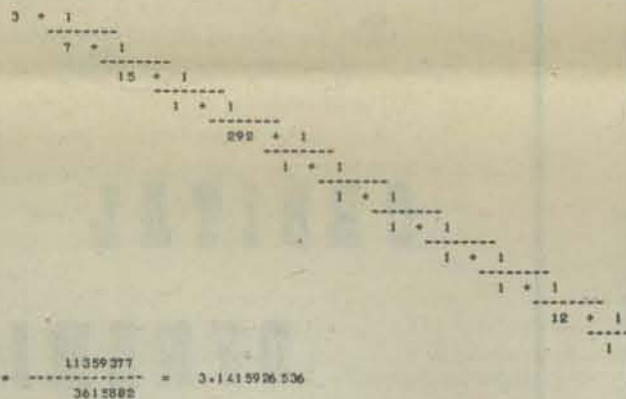
Single Server QUEUING SYSTEMS

ART & MATHEMATICAL STRUCTURES
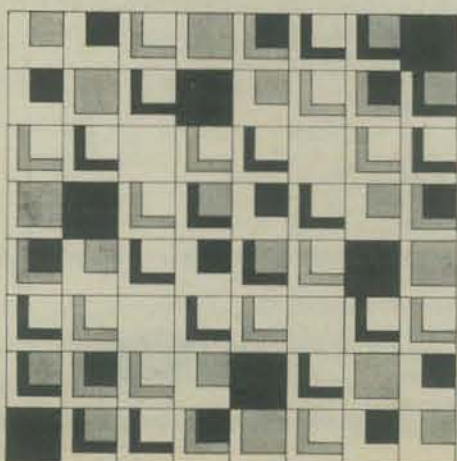
Multi-server Multi-queue systems
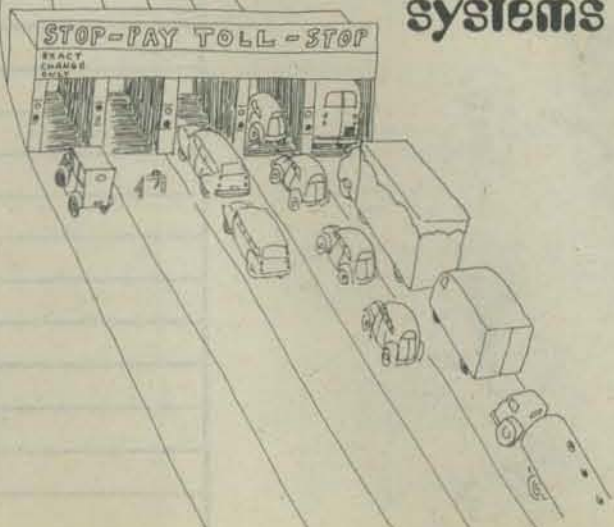
STOP—PAY TOLL—STOP

THE PREP SERIES

A1 A Whirlwind Tour of Computer Programming
A2 Professional Secrets of Exact Arithmetic

A3 Computer Arithmetic; Absolute and Relative Error
A4 Professional Secrets of Approximate Arithmetic
A5 Beyond Arithmetic: A Soloworks Sampler

Content Descriptors:
Programming
Variables
Operators

Arithmetic
Error Analysis
Number Theory
Distributive &
Associative laws
Spiral
Curriculum

Related Curriculum Modules:
A Whirlwind Tour of BASIC
A Guided Tour of BASIC;BASIC-PLUS Tutorials
Intense Addition;Intense Multiplication;Foreign Currency
Conversion Prog.
*Grouping Tricks;Inverse Tricks;Metric Conversion
Supermarket Estimation;A Home Accounting System
How Wrong Is Wrong?;Multiple Precision Arithmetic
Fantastic Fractions;Rational Approximation
*Impossible Problems Made Possible
*Computer Lab Preview;Dynamics Lab Preview
*Synthesis Lab Preview;Modeling Lab Preview;Critical Path
Analysis:I

THE COMPUTER LAB SERIES

C1 Computers, Algorithms, and Game Theory
C2 Computer Graphics
C3 The Power of Algebra; Finite Algorithms
C4 Iteration; Infinite Algorithms

C5 Graphing Multi-Valued Functions; Arrays; Sorting
EC6 Data Structures: Trees, Stacks, Queues
EC7 Recursive Programming
EC8 Computer Organization

EC9 Compilers and Interpreters
EC10 Systems Programming

Content Descriptors:
Algorithms
Coordinate
Geometry
Polynomials
Linear & Quad Eq.
Linear Systems

Nonlinear Eq.
Iteration; Roots

Matrices
Order Relations
Post-Fix Arith.
Simulation
Recursion
Polar Coord.
Computer
Literacy

Languages
Operating
Systems

Related Curriculum Modules:
NIM;Vector Race; Horse Race;Crazy Eights;Tennis;Star-Trek;
Submarine;Baseball;Basketball;Football;*Swimming;Bowling
Simple Teletype Graphics;Plotters;Polynomial Plots
Horner's Algorithm;*Budget CRT Graphics;*The Megatek System
Linear Systems;Gauss 2;Gauss 3;Gauss N;Quadratic Solver;
Quadratic Coding;GCD;Primes;The Big Ear:Computer Design
of Paraboloids
Root-Finding;Binary Search;Convergence Tests;*Secant Method
Synthetic Division;Newton's Method;Dwyer's Method;Finding
Derivatives
Picture Arrays;Parametric Equations
Sorting Tricks;Lissajous Figures;Polar Plots
Enumeration Problems;Reverse English;Polish Notation
*Mobiles;Circular Queues;33 Flavors
Factorials;GCD Revisited Recursively
*Turtle Geometry;Critical Path Analysis:II
Simulating A Computer;Machine Language
Minicomp III;Computer Generated English,Russian,Greek
Alphabets
How to Write a Compiler
How to Write an Interpretor
Mailbag;System Accounting;A File Formating System
Interactive Editors;Report Generators;Computer Generated
Ditto Masters

THE DYNAMICS LAB SERIES

D1 Geometry; Time, and Motion
D2 Integrating Machines
D3 Conquest of the Sky: VFR Flight
D4 On Solid Instruments: IFR Flight
D5 Moon Landing
ED6 Flights of Fancy: N-Trek
ED7 Flights into Space: Orbital Motion
ED8 Flights of the Mind: Mathematical Spaces
ED9 Flights of Invention: Creating New Worlds
ED10 The Theory of Relativity

Content Descriptors:
Distance
Metric Spaces
Integral
Calculus
Kinematics
Vectors
Trigonometry
Anal. Geometry
Differential
Calculus
Diff. Tables
File Structures
Kepler's
Laws
Euclid
Descartes
Lobachevsky
Riemann
Einstein
Lebesgue,Hilbert

Related Curriculum Modules:
*From Euclid to Newton to Einstein
Bounce Animation;Basketball Trajectory;Evel Knievel
Mechanical Integrators;Analog Integators
*Digital Integrators;3 A/D, D/A Lab Projects
Principles of Flight
How to Fly an Airplane
*How to Navigate an Airplane
*Instrument Landing Systems
1-D Lunar;*Difference Equations
2-D Lunar;*Fancy Lunar
Star-Trek;Space Ship Gamma
N-Trek
Satellite Orbits
Space War
*Euclidean Space;Vector Spaces
*Finite Abstract Spaces
*Infinite Abstract Spaces
*Function Spaces: Functional Analysis

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S1 The Mathematics of Orchestration
S2 Music in the Air: Pipes and Strings
S3 Electronic Music: Synthesizers and Filters
S4 Stereo Systems: Design and Measurement
S5 Quadraphonic Sound; Coding and Decoding
ES6 Multi-Media Worlds; The Geometry of Projection
ES7 Abstract Orchestrations: Mathematical Approximation
ES8 Functions and Transformations
ES9 The De-Orchestration Problem: Statistical Analysis
ES10 Cryptography

Content Descriptors:
Step Functions
Fractions
Random Numbers
System Design
Binary Codes
Harmonic Series
Fourier Series
Wave Geometry
Logarithms
Matrices
Information
Theory
Geometric Optics
Fractions
Weierstrass
Tchebychef
Topology
Probability
Weighted Data
Permutations
Statistics

Related Curriculum Modules:
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A Music Compiler,Editor, and File System
Computer Composition of Music;Rounds and Harmony
How to Build an Orchestra-to-Computer Interface
*How to Build Computer Controlled Instruments
*The Natural Richness of Natural Music
Synthetic Music and the Formant Theory
*The Secrets of Professional Stereo
*Fine Tuning Your Stereo: The Power of Measurement
*Four into Two: Matrix Coding
*Two into Four: Matrix Decoding
Computer Control of Multi-Media Technology
*Lenses, Mirrors, and Pictures Made of Light; *Laser
Continued Fractions;Polynomial Interpolation
Mini-Max Approximations;Famous Infinite Series
*Relations and Functions
*Mappings and Transformations
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Other Logic-Defying Events
Enciphering with the One Time Pad
*The Deciphering Problem

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M3 Systems of Equations; Relaxation Methods
M4 Graphs, Networks, and Boundary Value Models
M5 Analog and Hybrid Models

M6 Dynamic Models: Systems of Differential Equations
EM7 Geometric Models; Crystallography
EM8 Finite State Models
EM9 Statistical Models
EM10 Adaptive Models; Optimization
EM11 Feedback Models; Cybernetics
EM12 Models of Intelligence
EM13 Multi-Mode Models
EM14 Interactive Models; Computer Animation

Content Descriptors:
Interpolation
Functions
Boolean Alg.
Number Bases
Partial Diff.Eqs.
Green's Functions
Matrix Polyn.
Relaxation Mthds.
Digital Design

Abstract Spaces
Perturbations
Coupled D.E.
Plane Geometry
Solid Geometry
Automata
Psychology
Statistics
Sociology
Linear Prog.
Gradient Mthds.
Complex Nos.
Maze Algorithms
Natural
Language
Mathematics
Applied to
Non-determin-
istic systems

Related Curriculum Modules:
Linear and Nonlinear Predictors
Policy Models;Conflict Models
Digital Logic; 3 Lab Exercises in Digital Interfacing
*Macro-Micro Logic
Kirchoff Models;The Dirichlet Problem
Random Walk Models
Communication Networks
PDE&Nonlinear-Networks; Relaxation Methods
*Multi-Screen Multi-Terminal Systems; *How to use TV
with Computers
*Low-Cost Color Graphics for Minicomputers
*Advanced Orbital Mathematics
*Inside Flight Simulators
*Snowflakes
*Crystalline Architecture
Finite State Automata
Models of Behavior
Monte Carlo Models
*Data Based Models
*Mathematical Programming;Dynamic Programming;
*Optimal Seeking Methods
*Feedback Control
*Robots
Artificial Intelligence;Semantic Nets
Computer Programs that Learn;Hex
Anthropological Models
Simulation Games;*Ecological Models
An Interactive Nonlinear-Network Model
*Advanced Computer Graphics

COLA INSIGHT

COLA INSIGHT is the new publication of THE COMPUTER ORGANIZATION OF LOS ANGELES, an educational user's group for people interested in computer applications in the classroom. For info, write to: COLA, P. O. Box 43677, Los Angeles, Ca. 90043.

SHARING — THE DTSS NEWSLETTER

Monthly newsletter of the Dartmouth Time-Sharing System, the home of BASIC. Monthly, four pages. Vol. 1, No. 1 (November 1975) has information on TM086, *Publications List,* a catalog of publications by the Kiewit Computation Center at Dartmouth College. They can probably tell you how to get a Dartmouth BASIC reference manual so you can learn to read the listings of MOTIE and RESCUE in this issue of PCC. For info: DTSS, Inc., Box 799, Hanover, NH 03755.

ALPHA BRAIN WAVES

ALPHA BRAIN WAVES. by Jodi Lawrence. $1.25, paper. Avon Books, New York 1972.

Easy to read, non-technical introduction to brainwave (EEG) research and biofeedback.

NEW MIND. NEW BODY.

NEW MIND. NEW BODY. by Barbara Brown. $9.95, hard cover. Harper and Rowe, New York, 1974.

The *Compleat* introduction to biofeedback, from skin talk to brain waves. Heavy reading, but an incredible reservoir of information.

BLACK TIMES

BLACK TIMES: Voices of the National Community provides a celebration of Black America for all, aimed at creating awareness of developments in the Black Community, including: individual and group efforts and achievements in the community, national and international news bearing on Black America, letters from prisoners, Black history, book reviews, short stories, poetry. Subscriptions are $10 per year, with reduced rates for students, prisoners, and enlisted people. Those wishing to use BLACK TIMES, and/or subscribe, please write: BLACK TIMES, Box 1579, Palo Alto, California 94302.

COMPCON 76

IEEE Computer Society International Conference, Jack Tar Hotel, San Francisco, Ca., Feb. 24, 25, 26. We'll be there — Thursday, Feb. 26, doing the session:

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> "The Hobby Computer" Hal Singer
> "The Home Computer" Keith Britton

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GAMESMAG is a magazine for teachers, students, parents, and anyone else who likes games. Not only are there math games, but also action games, word games, non-western games, magic, illusions, and puzzles. There are also discussions on making games, teaching others to play, and game strategies, as well as book reviews and contributions from readers.

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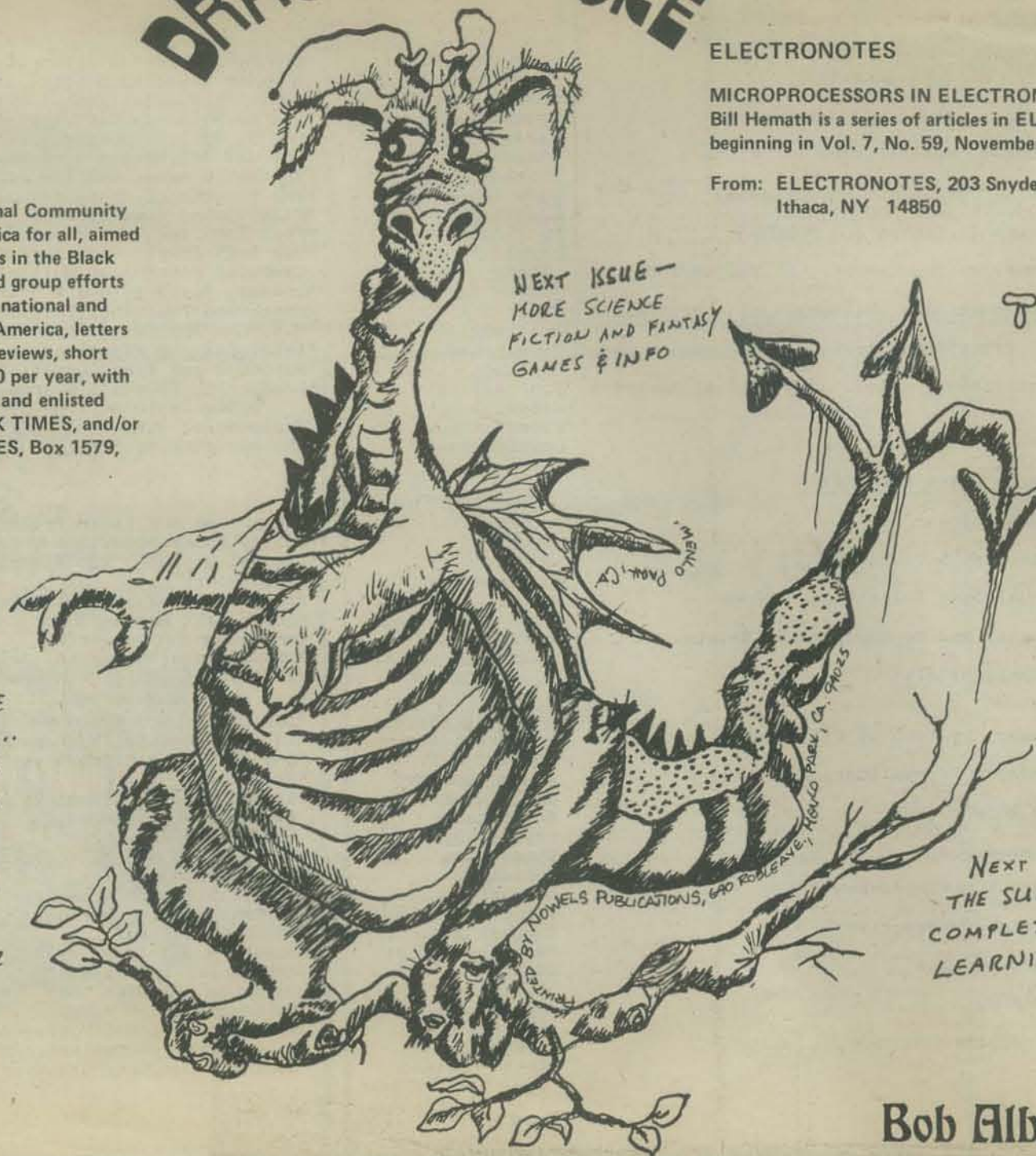
ELECTRONOTES

MICROPROCESSORS IN ELECTRONIC MUSIC by Bill Hemath is a series of articles in ELECTRONOTES, beginning in Vol. 7, No. 59, November 1975.

From: ELECTRONOTES, 203 Snyder Hill Road, Ithaca, NY 14850

DRAGON SMOKE

NEXT ISSUE—
MORE SCIENCE
FICTION AND FANTASY
GAMES & INFO

TINY BASIC NEWSLETTER
• • •
WE WILL GET FIRST ISSUE IN THE MAIL LATE JANUARY

INCLUDES DESCRIPTION & OCTAL CODE FOR EXTENDED TINY BASIC BY DICK WHIPPLE & JOHN ARNOLD

SEND A COMPUTER GAME TO THE PCC DRAGON... IF WE PUBLISH YOUR GAME, WE WILL SEND YOU A FREE COPY OF WHAT TO DO AFTER YOU HIT RETURN, PCC's BIG BOOK OF COMPUTER GAMES.

NEXT ISSUE THE SUPER-ECSTATIC, COMPLETELY-CREDIBLE LEARNING FAIRE !

Bob Albrecht

FORTRAN MAN

Lee Schneider

Todd Voros

Hmmmmm . . . If I guess it right, I think I know where those bootleg files are going to — I'd better question Big Mho right now!

Careful, F-Man! He could give you a series resistance!
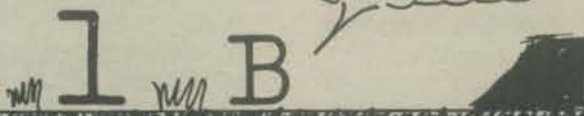
Don't worry about me Billy, . . . you stay here and watch, and I'll go inside and see if I can get any information out of Big Mho!

Gee, F-Man! I always miss all the fun !

BIG AL'S
New & Used
Kilocycles

While Billy Basic waits outside, Fortran Man changes his sign bit and branches into 999. As he suspected, Big Mho himself is tending the bar! Shoving his way through the crowd, he makes his way to the bar, and attracts Mho's attention . . .

Hey, Gimme a can of Bitz! And make it fast!

All right, already! Ya think I can't hear?

As Big Mho arrives with the can of Bitz, F-Man flashes a signal known only to certain groups of underground characters (an ESC char.), which identifies him as a fellow criminal . . .

Say, Mho . . . I heard about a big file shipment coming in . . . the Big C sent for me to help get it through in time . . . you know where I can find him?
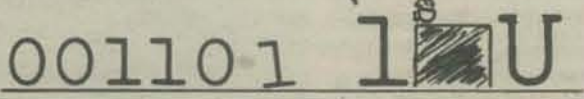
Funny, he didn't mention anybody else to me . . . you sure you got your info right?

How should I know? Why don't we go see him and find out?
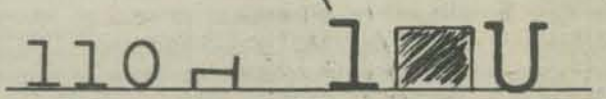
Big Mho, an experienced criminal, does not spill information easily . . . and soon becomes suspicious of all the questions . . .

Well, how about it? Do we go see the Big C or not?

Look mac, why don't you just . . .

Hey! Don't I know you from somewhere else . . . ???
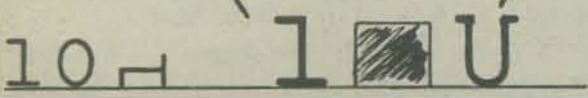
Seeing that the trick will not work, and that Big Mho is becoming suspicious about him, F-Man quickly switches tactics . . . reaching over the bar, he grabs Big Mho, and . . .

All right, Mho! The time for funny answers is over! You tell me what I want to know, and fast!

Hey! Hands off, you bum! Who do you think you are anyway?
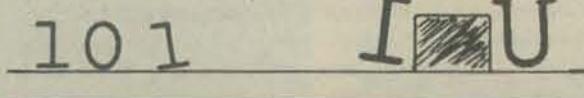
Big Mho breaks away, as Fortran Man suddenly drops his disguise . . .

THIS is who I am, Mho . . . and I'm taking you in!

GASP!

Let's get out of here

But Big Mho, who is not frightened easily, suddenly pulls a one-shot multivibrator from beneath the bar, and fires a barrage of one microsecond pulses through the room!

You'll never get me alive!!

zap zap zap zap

Ping!

Using the momentary surprise, Big Mho leaps over the bar, runs out of the room and into the street outside — with Fortran Man in hot pursuit!

Lucky my response time is better than one microsecond . . . or I'd be a goner by now!

Out in the street, F-Man finds Billy Basic, who is just picking himself up off of the ground . . .

Which way did he go Billy?

He ran across the street to Big Al's lot and did a Cycle Steal, F-Man! He was heading for the south side of town, you'll never catch him!
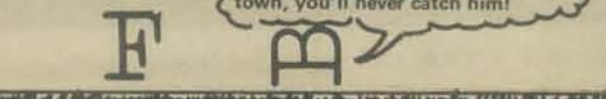
But Fortran Man only smiles, and helps Billy to recover his potential . . . . . .

Don't worry, Billy! When I was pretending to pick a fight with Mho a few minutes ago, I was actually slipping a miniaturized Trace Routine into his pocket! He is sure to head straight for the hidout of Cornelius Cobol and I can follow him right from here!

As he and Billy head for the lot, to pick out a kilocycle for themselves, F-Man shows him a new device . . .

See this? It's a miniature data switch register! I can activate the trace routine right from here, and find its position by observing the display here!

Climbing aboard their Kilocycle, F-Man gives the tracing device to Billy, triggers the cycle into operation, and the chase begins!

I'd better do the driving, Billy! You don't know your way around 360 City like I do.

Just a moment . . .

Where is he?

Aha! He's heading for the I/O control register!

Just as I suspected! He's going to get out of the town of Buffer and try to lose us in the processor!

Hang on!

As they speed over the famous Wheatstone Bridge which isolates the lower end of Buffer from the main processor, Billy Basic keeps one pointer glued to the trace monitor

He'll try to lose us by transferring around the registers!

He's out of Buffer, and heading for the accumulator section.

Bufr Acc

They are forced to slow down as they approach the Acc control center, one of the busiest sections of 360 City . . .

store!
load
add!
compl!
xfr!

Keep going, F-Man! He's in there somewhere!

Patience, Billy! We must respect the rights of these other bits!

1011
0010
1001
1110
0010
1000

10110100 110010100101
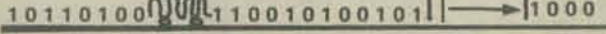
Fighting free of the great volumes of traffic, Fortran Man takes a short-cut . . . .

Hang on tight, Billy! I'm going to do a High-speed transfer through all the registers!

I don't think that . . . urk!

R1 BUMP!
R2
R3 BUMP!
        BAM!
R4 THUD!
R5
R6 BAM!
R7 BUMP!
R8   BAM!
R9   BUMP!
R10   BUMP!
R11
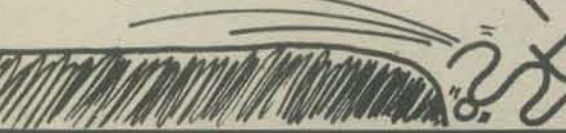
F-Man swiftly examines each register in stack .
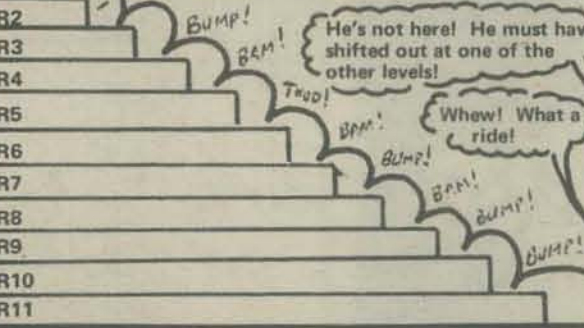
He's not here! He must have shifted out at one of the other levels!

Whew! What a ride!

Although shaken up by the ride, Billy Basic still keeps watch on the trace position indicator . . . .

He's heading for low core . . .

DIAGNOSTICS SECTION
Emergencies — Use rear entrance

Good!
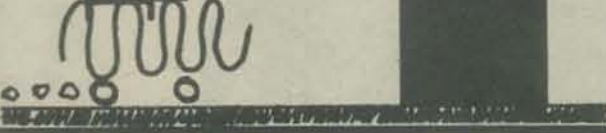
Billy is somewhat mystified by F-Man's apparent unconcern that their quarry is escaping . . . .

Why good?

Because, Billy, in 360 City low-core is protected! If Big Mho goes in there, he won't be able to get in! And that leaves him only one excape, and that is . . . .

Speed Limit 55 Kc
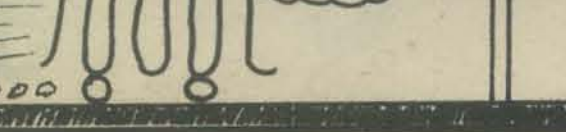
You're right, F-Man! He's headed for the power supplies!

And that means he's going under ground! He'll lead us right to Cornelius Cobol!

TO BE CONTINUED . . . .

7

DIDDLE for a small Altair 8800
by Stan Skoglund

```
0001  !
0002  !
0003  !          "DIDDLE"
0004  !          ========
0005  !
0006  !
0007  !  "DIDDLE" IS A GAME PROGRAM IN WHICH ONE CAN SIT WITH AN ALTAIR
0008  !  8800 COMPUTER AND DIDDLE AROUND FOR SOME TIME WITHOUT SOLVING
0009  !  ANYTHING.  THE PURE SATISFATION OF BEATING THE GAME MAKES IT
0010  !  ALL WORTHWHILE.
0011  !
0012  !
0013  !  THE OBJECT OF "DIDDLE" IS TO STOP THE MOVING PATTERN IN ADDRESS
0014  !  LIGHTS A12 AND A13 WHILE IT IS APPROACHING FROM THE RIGHT.
0015  !  IF THIS IS DONE WITHIN THE RULES AND REGULATION YOU ARE
0016  !  CONSIDERED A WINNER.  OF COURSE MOST EVERYBODY WINS AT THE
0017  !  SLOWER SPEEDS WHILE ONLY A SELECTED FEW ARE TALENTED ENOUGH TO
0018  !  BEAT THE COMPUTER IN THE HIGH SPEED RACE.  TRY YOUR LUCK!
0019  !
0020  !
0021  !  LOAD "DIDDLE" VIA THE FRONT PANEL SWITCHES REFERING TO THE
0022  !  LISTING BELOW.  FOR THOSE OF YOU WISHING TO MAKE PAPER TAPES
0023  !  AND/OR XEROX COPIES OF THIS LISTING, BE MY GUEST.  DIDDLE IS
0024  !  PUBLIC DOMAIN SOFTWARE.
0025  !
0026  !
0027  !  PROGRAM OPERATION IS AS FOLLOWS:
0028  !
0029  !          1.  SELECT THE PROGRAM STARTING ADDRESS BY SETTING ALL
0030  !              THE ADDRESS SWITCHES OFF (DOWN).
0031  !
0032  !          2.  PRESS EXAMINE.
0033  !
0034  !          3.  PRESS RUN.
0035  !
0036  !          4.  SET ADDRESS SWITCH 10 UP.  OBSERVE A PATTERN MOVING
0037  !              IN ADDRESS LIGHTS A08 THRU A15.  WATCH IT FOR A MINUTE
0038  !              OR SO.  TRY TO PREDICT ITS BEHAVIOR.
0039  !
0040  !          5.  SET ALL THE ADDRESS SWITCHES DOWN.  NOTE THAT THE
0041  !              PATTERN STOPS MOVING.  NOW SET ADDRESS SWITCH 10 UP
0042  !              AGAIN.  THE DISPLAY IN THE LIGHTS SHOULD START
0043  !              MOVING AGAIN IF THE PROGRAM IS OPERATING PROPERLY.
0044  !
0045  !          6.  THERE EXISTS A RELATIONSHIP BETWEEN THE SPEED OF THE
0046  !              MOVING PATTERN AND THE ADDRESS SWITCH USED IN STEPS
0047  !              4 AND 5.  SWITCHES TO THE LEFT OF A10 WILL CAUSE THE
0048  !              PATTERN TO MOVE FASTER WHILE SWITCHES TO THE RIGHT
0049  !              WILL PRODUCE A SLOWER MOTION.  ONLY A08 THRU A15 CAN
0050  !              BE USED.  PROGRAM IGNORES SWITCHES A00 THRU A07.
0051  !
0052  !
0053  EJEC
0054  !
0055  !
0056  !  RULES AND REGULATION:
0057  !
0058  !          1.  ONCE A PLAYER STARTS THE PATTERN MOVING, HE MUST
0059  !              WAIT AT LEAST 5 SECONDS BEFORE MAKING HIS MOVE TO
0060  !              STOP IT.  THIS PREVENTS A PLAYER FROM CREEPING UP
0061  !              TO THE STOPPING SPOT BY TOGGLING THE SPEED SWITCH.
0062  !
0063  !          2.  THE MOVING PATTERN MUST BE APPROACHING THE STOPPING
0064  !              POSITION FROM THE RIGHT WHEN A PLAYER ATTEMPTS HIS
0065  !              MOVE.
0066  !
0067  !          3.  YOU MUST UPON DEMAND SHOW THAT YOU CAN BEAT "DIDDLE"
0068  !              3 OUT OF 3 TIMES AT THE SPEED YOU CLAIM TO BE A
0069  !              WINNER.  IF YOU CAN NOT DO THIS, THEN YOU ARE NOT A
0070  !              BONA FIDE WINNER, BUT JUST A DIDDLER.
0071  !
0072  !          4.  IN ALL CASES THE BURDEN OF PROOF IS LEFT TO THE
0073  !              PLAYER, NOT THE JUDGES.  ALSO, THE JUDGES DECISION
0074  !              IS FINAL.
0075  !
0076  !
0077  !
0078  !*****************************************************************
0079  !*                                                               *
0080  !*                    C-A-U-T-I-O-N                              *
0081  !*      DIDDLE MAY BE HAZARDOUS TO YOUR ADDRESS SWITCHES         *
0082  !*                                                               *
0083  !*****************************************************************
0084  !
0085  !
0086  !
0087  !  PROGRAMMER: STAN SKOGLUND
0088  !              1111 HORNBLEND STREET, APT. 19
0089  !              SAN DIEGO, CALIFORNIA 92109
0090  !              HOME PHONE: (714) 272-1660
0091  !
0092  !  DATE OF RELEASE: 10/18/75
0093  !
0094  EJEC
```

I have put together a little program by trial and error which I believe is unique. Having limited memory and I/O capabilities, I was forced to listen to "Daisy" or come up with something new. Armed with the basic desire to develop something usable on my Altair, I set out to explore the software world of creativity. The following is the end product. I hope you get as much enjoyment from using DIDDLE as I have from developing it.

```
0095          OCTAL
0096  !
0097  !
0098          SWTCH:  EQU     255             !ADDRESS OF SENSE SWITCH PORT
          377
0099  !
000000  0100          ORG     000000
0101  !
0102  !          "DIDDLE"  VERSION 1.0
0103  !
000000  076  0104  START:  MVI     A,3             !INITIALIZE DISPLAY PATTERN
000001  003
000002  016  0105  BEGIN:  MVI     C,0             !INITIALIZE DIRECTION COUNTER
000003  000
000004  107  0106  RUN:    MOV     B,A             !MOVE DISPLAY TO B-REG
000005  021  0107  SPEED:  LXI     D,64            !INITIALIZE TIMER DURATION COUNTER
000006  100
000007  000
000010  041  0108          LXI     H,0             !INITIALIZE TIMER BASE
000011  000
000012  000
000013  002  0109  DSPLY:  STAX    B               !DISPLAY BIT PATTERN VIA ADDRESS LIGHTS
000014  002  0110          STAX    B               !DO IT AGAIN TO MAKE IT BRIGHTER
000015  002  0111          STAX    B               !AND BRIGHTER.....
000016  002  0112          STAX    B               !AND BRIGHTER.....
000017  002  0113          STAX    B               !AND BRIGHTER.....
000020  002  0114          STAX    B               !AND BRIGHTER.....
000021  002  0115          STAX    B               !AND BRIGHTEST!
000022  031  0116          DAD     D               !ADD TO TIMER BASE.  TIMER ELAPSED?
000023  322  0117          JNC     DSPLY           !NO, GO BACK AND DISPLAY AGAIN
000024  013
000025  000
000026  333  0118          IN      SWTCH           !OTHERWISE READ SENSE SWITCHES
000027  377
000030  376  0119          CPI     0               !DOES PLAYER WANT DISPLAY TO STOP?
000031  000
000032  312  0120          JZ      SPEED           !YES, GO BACK AND RE-ISSUE SAME DISPLAY
000033  005
000034  000
000035  062  0121          STA     SPEED+1         !OTHERWISE SAVE NEW SPEED
000036  006
000037  000
000040  014  0122          INR     C               !BUMP DIRECTION COUNTER
000041  171  0123          MOV     A,C
000042  376  0124          CPI     63              !TIME TO RESET DIRECTION COUNTER?
000043  077
000044  362  0125          JP      RESET           !YES, JUMP TO RESET SECTION
000045  063
000046  000
000047  376  0126          CPI     31              !SET STATUS WORD
000050  037
000051  170  0127          MOV     A,B             !MOVE PATTERN INTO A-REG.
000052  007  0128          RLC                     !SHIFT PATTERN 1 BIT TO THE LEFT
000053  372  0129          JM      RUN             !JUMP IF STILL MOVING IN LEFT DIRECTION
000054  004
000055  000
        0130          EJEC
000056  017  0131          RRC                     !SHIFT PATTERN 1 BIT TO THE RIGHT
000057  017  0132          RRC                     !SHIFT PATTERN 1 BIT TO THE RIGHT
000060  303  0133          JMP     RUN             !GO DISPLAY NEW PATTERN AT NEW SPEED
000061  004
000062  000

        0134  !
        0135  !
        0136  !
        0137  !
        0138  !       THIS SECTION IS EXECUTED AFTER PATTERN HAS MOVED 4 TIMES TO
        0139  !       LEFT AND 4 TIMES TO THE RIGHT.
        0140  !
000063  170  0141  RESET:  MOV     A,B             !MOVE PATTERN INTO A-REG.
        0142  !
        0143  !       THIS NEXT LOCATION CAN BE LOADED WITH OCTAL 057 WHICH WILL
        0144  !       ADD A LITTLE ZIP TO DIDDLE.
        0145  !
000064  000  0146          NOP                     !CHANGE TO CMA
000065  303  0147          JMP     BEGIN           !GO START OVER AGAIN
000066  002
000067  000

        0148          END
             0 ERRORS
```

IMSAI

PROGRESS REPORT
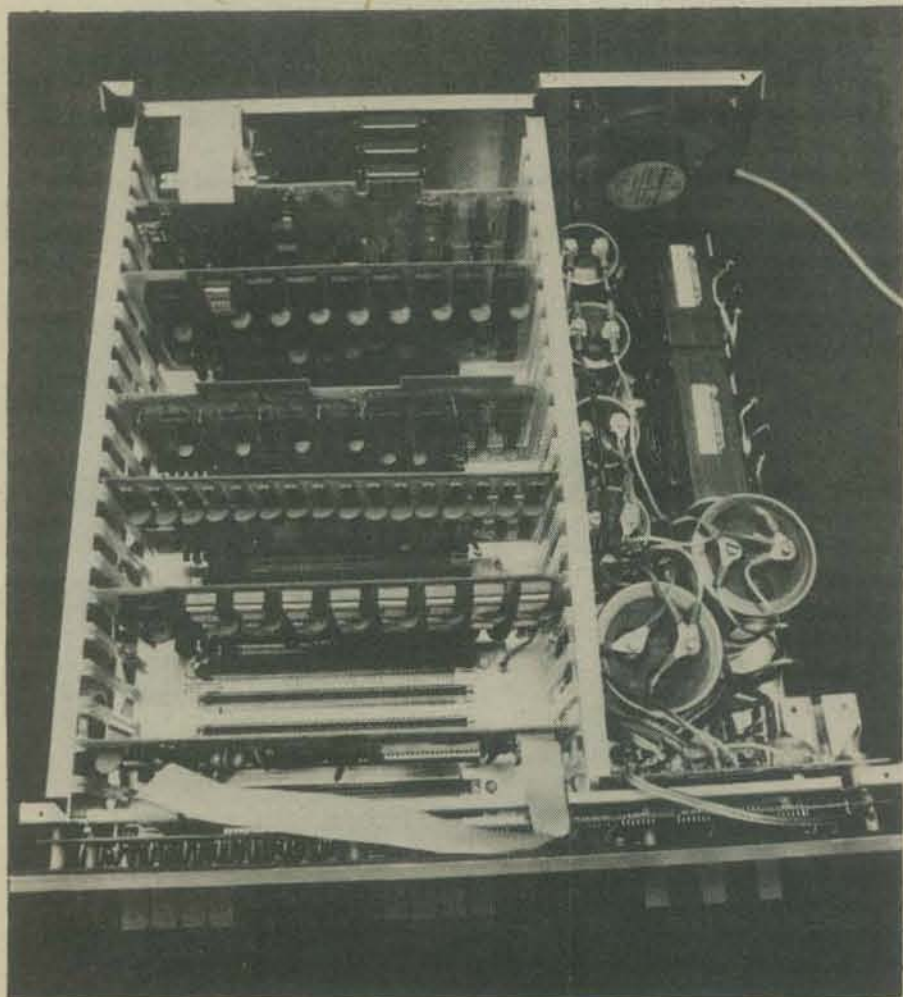
The IMSAI prototype which was shown round the Bay area hobby clubs looked so good that we have been holding our fingers crossed for a month lest it prove too good to be true. Well - the inside story is now exposed to public gaze - and it's just beautiful!

It's perhaps not surprising. IMS Associates Inc. have been working on digital devices for 4 years, the first 2½ of which were expensive contract jobs involving 'state of the art' design or original research. Since then they have also been working on their own products, an intelligent disk drive and their famous 'Hypercube'. The latter is the most advanced multiple processor project in the world. It uses lots of 8080s in cooperative arrays. Quite obviously their background is much different from that of MITS. They started design of their machine much later, too. It isn't surprising that the IMSAI looks so much a professional piece of equipment, therefore, as well as being a hobbyist's dream and at Altair price levels too. But let us return to a consideration of the guts of the machine.

The first impression upon opening the case is the absence of wires and the presence of the power supply. Cards, mother board and front panel all plug together and there is not a jumper to be seen (shouldn't be with good PC board design), which accounts for the former. The only connections which have to be flexible are tidy flat cable, which also reduces the chance of cross-talk. The power supply is intended to be adequate for most users and would not look out of place in a small welding shop. Minimum machines use a single set up, the one shown is the double one for the full machine. Note the massive smoothing capacitors and generous heat sinks on the diodes (mounted on the front panel). Thermal design for the machine is fair, the card supports are ventilated, allowing airflow across the cards and out via the power supply space. And the fan, believe it or not, is all but silent!

The cards, as in all professional equipment are caged, supported on their edges. The cards themselves are liberally decoupled, as is evident from the number of disk capacitors, so it looks unlikely that noise will be a problem. There is no bus termination though. We asked about that and were told that they had had no problem and did not expect any. Since they are used to designing things which run more than ten times faster, we take their word on this.

As with all complex machines, there can be expected to be teething troubles, but the overall quality and design experience evident suggest that they will be minor. *This, in fact, is the first major kit computer that we have been able to closely examine that we can recommend for serious consideration for a school which does not have an experienced and well equipped technician to maintain it.*

HOW MANY PINCHES IN A POUND AND OTHER PUZZLES? MAC MULLEN

One of the ever present problems in almost any kitchen is adjusting favorite recipes to fit into a menu to feed many or few. Most experienced cooks use a combination of basic arithmetic and intuition to come up with proper proportions. However, if you face the job of turning "Mom's Meatloaf" into dinner for 26, you could try programming your handy home computer to solve such domestic problems. Remember, that some things like eggs come in whole units and are difficult to divide into thirds, and in some dishes, the amount of baking powder isn't directly proportional to the increase in the serving size. Perhaps the most difficult problems to solve today is to keep you meals within a reasonable budget.

Here is a small problem to puzzle the cook who likes to solve math problems .

WALDORF SALAD PUZZLE

You have invited guests for dinner. Everything is ready except for your "Famous" Waldorf Salad. You need celery, apples and nuts. You go to the store to buy exactly 100 of these items, and you must spend exactly $10.00 for you salad. At the store you find celery is 50¢ a bunch, apples 10¢ each and nut meats cost 2¢ for a cellophane bag. *How many of each item must you buy to fit within the constraints of this puzzle?* Remember, the salad has to have some of all three items, you must spend exactly $10.00 (no sales tax) and you already have the mayo.
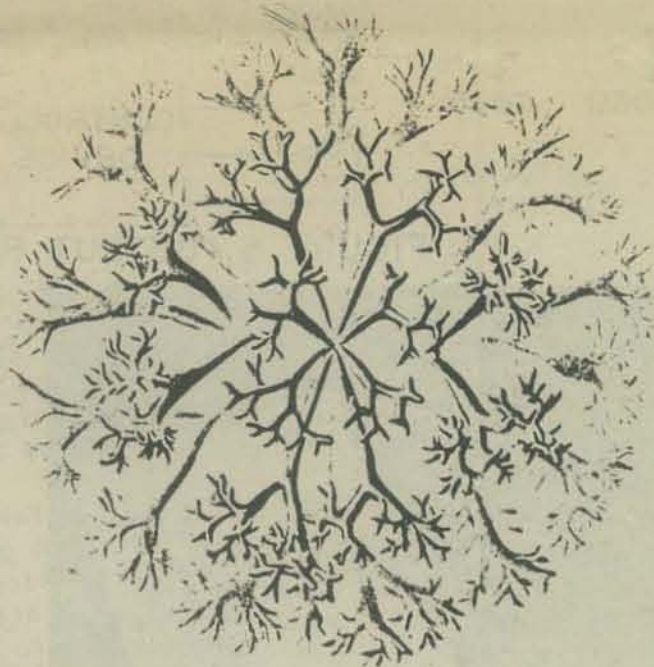
THREE PROGRAMMED SOLUTIONS IN ALTAIR BASIC

1

```
100 REM SIMPLE SOLUTION - SEARCH ALL COMBINATIONS
110 FOR C=1 TO 98
120 FOR A=1 TO 98
130 FOR N=1 TO 98
140 IF C+A+N <> 100 THEN 160
150 IF 50*C+10*A+2*N = 1000 THEN PRINT C,A,N
160 NEXT N
170 NEXT A
180 NEXT C
999 END
```

```
A - APPLE
C - CELERY
N - NUTS
```

2

```
100 REM    IMPROVED SOLUTION - SEARCH FIRST
110 REM    TWO CONSTRAINED VARIABLES AND
120 REM    SEE IF THE REMAINING COUNT WILL FIT.
130 FOR C=1 TO 19
140 FOR A=1 TO 94
150 IF A+C > 99 THEN 190
160 LET N=100-A-C
170 IF 10*A+50*C+2*N = 1000 THEN PRINT C,A,N
180 NEXT A
190 NEXT C
999 END
```

3

```
99 REM  A BETTER SOLUTION USING ALGEBRA AND ALTAIR BASIC
100 FOR C=1 TO 16 :A=100-6*C:PRINT C,A,100-C-A:NEXT C
```

MOS Technology 6502

PRICE: $229
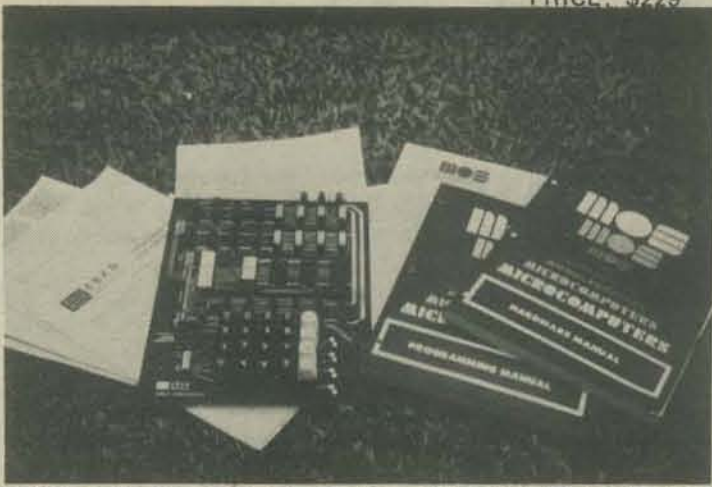
Kits are appearing from every nook and cranny. Obviously we can't cover them all only significant ones. We have wanted to get our hands on a 6500 based unit for some time, but couldn't afford to buy one. Then Roger Walton of EBKA called us to ask our advertizement rates. We didn't, we explained, publish paid advertizing, nor reprint news releases. But if we heard about something which we felt our readers should know about - we would mention it. And if we were given a copy of a product that was of interest to our readers, we would write about it. Now at first sight this is not much different to paid advertizing - but, as we pointed out to Mr. Walton, with paid advertizing the payer gets to write the copy. If we are given a product for evaluation, *we* write the copy and it isn't necessarily going to *be good for marketing*. That was OK with Mr. Walton, he had confidence in his microcomputer kit, and when it arrived, we found his confidence fully justified.

Some computers are intended to be the basis for expansion into substantial systems. Others are intended to merely familiarize the owner with the hardware being used, particularly the CPU. Both this kit and the microtutor below fall into the latter category.

Our first reaction, upon opening the box, was to recoil from the sheer volume of paper. Aside from the things from EBKA, there were two massive manuals from MOS Technology. Closer inspection showed that these manuals were written with commendable simplicity and clarity. Documents of such quality are instructional as well as being references. This was as well, since the instructions regarding assembly and operation were somewhat scanty.

Despite this assembly was almost ludicrously simple since all the chips arrived pressed into a full sized layout sheet and correctly oriented at that. All that was needed was to remove a chip, transfer it to the corresponding position on the PC board and solder it in. Hope more kits makers adopt this idea!!!

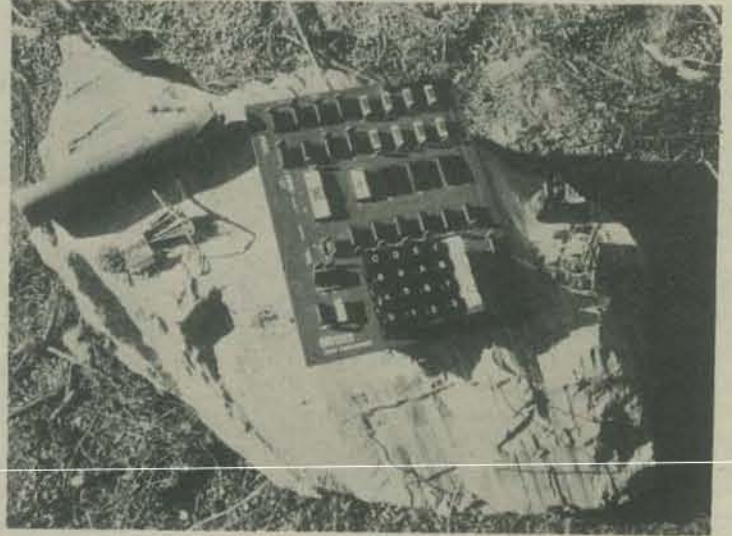All parts are top quality and the kit is a complete unit since it combines (on the single board) hexadecimal keyboard input, two digit hex readout and a monitor in PROM to run it. The kit seems to us to be a fine way to learn about the Microprocessor. It would take quite a bit of work to expand it to a larger system, though that could be done. But since every chip pin is made accessible, it is really well suited to experimentation - for use as a controller, for example. And since it contains 1K RAM and space for 3 - 1702A PROMS in addition to the one used by the monitor, *and runs happily on flashlight batteries,* it is potentially a very powerful controller or data caputer device.

The unit is seen below in a typical household application - being used to monitor crack propagation as a boulder of oil shale is blasted. (Keith Britton earns his living as an explosives consultant. More about this next issue.)

COSMAC

Someone sent this to Bob Albrecht for Christmas. It was designed to teach engineers how to use the RCA COSMAC MICROPROCESSOR. This unit is pretty, but not cheap. On the other hand the manual which accompanies it is priceless. We quote the manual's foreword in full:

Figure 6 shows how a relay for a given bit could be driven by the output register. A single relay could be used to let MICROTUTOR provide a teletype output code or a telephone dialing code. Multiple relays would permit simultaneous control of up to eight motor driven rocking chairs.

275-004

$\overline{Q}$ — CD4050 — 7405 — ⊠ — CONTROL DEVICE
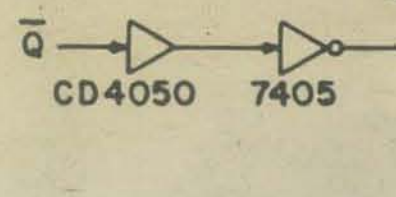
FIGURE 6 – OUTPUT RELAY CIRCUIT

The input/output circuits illus... only as examples. A variety of input/output devices can be via the external option plug (E). All COSMAC output or input e available for external use via this plug (See Appendix 3).

For those readers owning a scope, the external option socket (E) n opportunity to use it. All sorts of interesting pulses can be tion socket pins while MICROTUTOR programs are runnin... attached to one of the more interesti... to your next MICROTUTOR...

Computers can be large, complicated, and hard to understand. **Microtutor** is a computer that is small, simple, inexpensive, and easy to understand. It comprises 256 words of memory, input switches, a two digit output display, and the **RCA COSMAC** microprocessor.

Contrary to popular belief, computers are quite simple in concept and fun to play with. They can also be quite useful, but we'll try not to dwell on this aspect in deference to more sensitive readers. A word of caution if **Microtutor** makes computers seem simple to you, don't tell anyone. You can earn more money perpetuating the computer complexity myth.

Readers who insist on knowing every last detail about **COSMAC** should refer to the **RCA COSMAC MICROPROCESSOR MANUAL**. Readers who want to be protected from actual computer hardware by software aids with names like assembler, interpreter, simulator, and compiler should save up their money for a more expensive system.

... ...is manual

J. A. Weisbecker

Astute readers, who remained awake during the above discussion, will probably be excitedly shouting that this is the program they loaded and ran in Section I. These readers will be right and should give themselves a programming aptitude score of 0A (decimal 10). The others will still be asleep and upon waking, should give themselves a programming aptitude score of 2F.

PACE

After all this time there *still* isn't a PACE kit available (mostly because of supply problems) but there is much progress to report. Dark horse in the race remains Radio Shack, no information on their progress, but a new contender has appeared - Hamilton Arnet with a machine called PACER. We still expect Bill Godbout to be first though, since his parts orders (the ones holding everyone up) were made eariler than anyone else's. Expect hardware about March 1st.

The real news is not about hardware though. National Semiconductor has made assembler and editor available and has finally decided to produce SM/PL, a PLM-like language. This will be available for reproduction cost to buyers of Godbout's kits and, presumably, to buyers of the others. Not content with this Bill Godbout has commissioned the writing of BASIC for the PACE. This will be a minimum BASIC, 4K words or so, but *public domain and with all the hooks for expansion documented and publicized.* It will be suitable for Implementation in ROM, but may be designed principally for Bill's machine. He would like to get together with his competitors to work out a mutually supported standard - but hasn't been able to reach the right person in either Radio Shack or Hamilton Arnet...
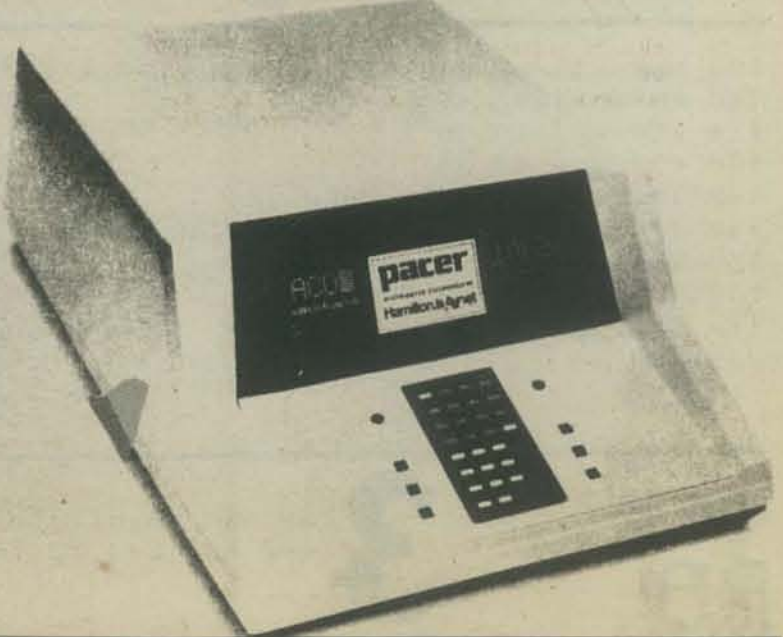
Every so often we receive a letter at *PCC* which makes us blink. In that category is this one.

I read your piece on pg. 12 of Sept. '75 issue of *PCC*.

I didn't like it.

If you have to run a full pg. article to explain what, exactly, you meant in a previous article, you may as well fold your sheet & open a knitting shop.

PCC loudly proclaims that it is non-profit and unfettered by commercial interests & advertizing - yet it puffs the ilk of MITS/ALTAIR seemingly on every other page; not to mention the free engineering-development work handed them on pg. 12 *loc. cit.*

Anyone who puffs & promotes MITS/ALTAIR as you do either has rocks in his head or MITS' money in his bank account. Don't you realize that every time you print the word *ALTAIR*, whether in a favorable or unfavorable context, it is a free ad for them?

(Perhaps the State of California should be invited to investigate *PCC*'s non-profit status.)

It is patently self-evident that you have never ordered an ALTAIR 8800 or tried to assemble one or get it to work or get any satisfaction from MITS in consequence of same. *Shoemaker stick to your last.*

For your general information, the ALTAIR is vastly over sold and overpriced. MITS is very long on their promises and longer still on delivery; their general efficiency would be more appropriate to the Victorian Era and their sensitivity & responsiveness to consumer needs is positively Neanderthal. (You got a taste of it in your first puff piece [pg. 22, Vol. 3, no.5] but apparently you're a slow learner.)

In the present article (pg. 12, *loc. cit.*) you proclaim MITS'/ALTAIR'S *low price* (end of next to last ¶.) Come down off it already. Who are you trying to kid??? What tree have you been living in?????

There happens to be a company called Motorola. Ever heard of them? They have factories & offices all over the country & the world, but their semiconductor products division is located in Phoenix, Az. They employ 10,000 at that location.

Motorola happens to have been making a CPU chip set called the MC 6800 for about 3 3 or 4 years. It has a broad similarity to Intel's 8080, but is greatly superior in most respects. The MC 6800 is the CPU used in Tektronix's 4051 desk-top computer which has become *the* industry standard. It is also the CPU in Hewlett-Packard's new 9815 & 9830 desk-top machines.

Motorola sell a beginning chip set, memory board, PC board, detailed documentation, programming & applications data. The price of the whole shebang is $150, cash - American. That's essentially the same hardware as ALTAIR *except* for power supply, front panel & cabinet. I repeat $150.

Program that in your ALTAIR, and run it, Charlie.

Then there's the new MOS Technology (Morristown, Pa.) 6501 CPU. Very similar to the MC 6800 though not quite as versatile. Requires *no* cutboard chips - all support functions are implimented with standard TTL IC's. Price of the 6501 CPU is $20 *in single quantites*. I repeat: $20 in quantites of one.

I could go on, about Western Digital's 16-bit <$100 CP 1600 CPU, and about a whole lot more. But I won't. I somehow get the feeling you wouldn't be interested, standing there as you are with your finger up your ALTAIR. After all, what would it give you to write about? I don't think you'll have to run any copy in *PCC* telling Motorola how to modify its MC 6800 processor circuits so they'll work properly.

I will however leave you with this: Wake up Charlie, the train is starting to move.

Ed Edwards
P.O. Box 176
Washington, Mi 48094

PS: Sorry not to have written sooner. It was due to illness - I was sick from seeing your continued sweetheart relationship with MITS.

To our amusement, within 24 hours we received an acrimonious and voluminous blast from Ed Roberts of MITS, who had taken violent exception to the article by Lee Felsenstein in V4 no.2. (At Ed Roberts request we are not printing the letter, with the exception of two paragraphs, which I will come to later.)

Sure, Mr Edwards, we realize that every time we mention the Altair it's an advertisement for MITS. Frankly we feel they deserve it. The Altair 8800 was a pioneering effort and we feel that pioneers deserve both credit and some special consideration. Sure the 8800 has faults. Compare it to the IMSAI. One is a professional unit and the other is not. But compare the 8800 with the other deals you could get *one year ago* and it was just marvellous. Or compare against the 680.

We have, in fact, received little in the way of letters strongly critical of MITS and have published virtually all of them. One notable exception being a letter strikingly similar to Mr Edward's - which was unsigned. While we will withold names on request, *we do not publish unsigned material.*

But to return to Ed Roberts. He felt that the proper place for publication of fixes to MITS' equipment was in MITS users' group newsletter Computernotes. In this we rather agree and will be sending a letter for publication in same. When Lee wrote his original article, Computernotes was not yet the forum it is today. He wished to write a follow up - we could hardly deny him the space. We still feel it to be a pity that Ed declined to reply. We held space for him. We do feel inclined to comment upon one aspect of his correspondence with us:

It is presumptuous and dangerous for PCC or any other group to recommend fundamental design changes to a system such as the Altair. Many of these changes can cause major problems when later peripherals are added to the system. An example is the change to the ready line proposed in the article.

Sometimes MITS seems overly sensitive to criticism, in which they are not alone, but it is surely presumptuous for any designer to assume omnipotence. Especially when the mod. he complains of is endorsed as sound by his own publication.

The following was also worthy of comment:

Another subject related to this overall objectivity problem is even if you are able to maintain your personal independence, I am sure you must be aware that your close proximity to a few of the manufacturers of products in the small computer industry can very easily color your reality of the problems and the industry. The recent extensive article on the PACE MPU is possibly an example of this sort of problem. Based on detailed internal evaluations we have done on other MPU's, the PACE would certainly have to rank low in the priority of important MPU's for this market. While the PACE certainly deserves space in your PCC, the 6800, 6500 series and F-8 are at least as valuable and interesting to your typical reader.

While it smacks somewhat of Mr. Edwards style, it raises some issues. We try not to trumpet any claim to honesty or commercial non—alignment. We aren't, and do not pretend to be, unbiased. But it is *our personal bias* - not anyone elses. Incidentally, on the subject of chips, PACE continues to look like a real winner to us, and the vigor with which MITS is knocking it reinforces our view.

MITS has also taken a position on software, one not to the liking of Kevin Hess.

People's Computer Company has taken a very interesting stand in the hobby computer field. Honesty. This is most refreshing in an area where rip-offs can and do happen at any time. That is what I am writing about: rip-offs.

Enclosed you will find a xerox copy of an article appearing in the September issue of *Computer Notes*, volume I, issue IV, "Across the Editor's Desk" by David Bunnell. The main theme of this article was to 'tell off' those people who beg, borrow, or steal a copy of Altair 4k or 8k Basic.

I, as I hope many others do, realize the cost of writing and implementing software is quite exorbitant. Often times the development of software is not measured in manhours but in man-months or man-years. However, a computer is little more than a fancy calculator without peripherals *and software*. Peripherals will always be generally expensive, as electronics will always be generally expensive. Software, on the other hand, can or can not be expensive, depending upon who is writing it (as can be easily seen by PCC's *Tiny Basic!*), or who is covering the cost.

Many things have been said about MITS' hardware, and many people are marketing (at a lower cost) replacement hardware, as well as new hardware. I am not in any way attempting to derogate MITS' hardware. However, MITS' position is very much like International Business Machines. They are the leader of the pack when it comes to microcomputer hardware and software. If MITS is to remain the leader, they had better start acting like a leader when it comes to their relations with customers.

When Altair 4k and 8k Basic first came out, the people who ordered it were first required to sign a licensing agreement. In many people's eyes (and to a large extent mine) MITS does not trust its customers! This is quite a twist from the consumer groups of the early 70's who were trying to protect the *buyers* from *bad business practices*. Maybe MITS should hire Ralph Nader to protect themselves from us mean buyers!!! Unfortunately, I have deviated from the point, and I shall immediately return to it.

MITS is attempting to sell something that most computer installations get effectively for free. For example: if you order an IBM System/370, you at least get an operating system and an assembler (which is more than I can say for MITS). If MITS continues in their business practices, MITS may find that business will dry up (this is not a threat, but a prediction).

It should be noted that many people believe software should be part of public domain (note: MITS just dropped the price of their 8k Basic from $500 to $350. I would like to congratulate MITS on a stumble in the right direction!). MITS' problem is that their software is, more or less, already part of public domain. Let's get with it, MITS, and start using your software as a selling point, instead of a stumbling block for us poor computer hobbyists!

Sincerely yours,
KEVIN HESS

Sorry, Kevin, I feel that MITS have the rights of this one. A good programmer is worth 30K per year and someone must pay him. Either the cost is loaded onto the hardware or there is a separate charge. IBM offers a package for $900 to $1200 *per month* plus $385 for BASIC, again *per month.* The hobby world can pay for good software *or it will go without.*

Keith Britton

Alpha-Numeric Music with Amplitude Control

By: M. T. Wright

It's interesting that I should make a music routine my first major programming effort, but maybe I was hoping to make the computer more of a crowd pleaser with the limited peripheral hardware I had at the time. It was obvious the programming problems would be challenging, since I am just learning the machine instructions for the 8080 CPU and I cannot read music. Of course, one can approach programming and music with the same basic premise: "they are both just a coding & decoding problem"! I am sure that many of you will be able to simplify and improve on this music program after you understand the basic principles that lie within it.

The Alpha-Numeric Music program that will be discussed in the following pages was written for the Altair 8800 computer with a ASCII (upper & lower case) keyboard and one 8-bit output port feeding an amplifier thru some resisters. The output port circuit will be described later on in this article.

After writing nine different music routines for my 8080 CPU, it became obvious that the frequency range and sound quality of the music would be determined by writing a flexible square-wave output routine. The square-wave routine should be made short to increase running speed which will determine the maximum frequency, and it should be written with CPU timing in mind to eliminate noises due to long routines that would upset the symmetry of the square-wave. Therefore the greatest evolution in all of the different music programs was a section called Play-Note which generated the binary coded square-wave.

Play-Note

The routine called Play-Note uses all of the registers in the 8080 CPU and also the memory stack. Play-Note uses register-C to set the time for a half-cycle of the square wave to be generated. Registers D&E are used to count the number of half-cycles which will set the duration of the note played. Register-B is used to count the number of segments that make-up an envelope of a note. Registers H&L are used to point at a table in memory which gives the values for the amplitude of the envelope of the square-wave. Register-A is loaded with the amplitude of the envelope. The stack is used to save the present working address of the music table and save intermediate register values for the Play-Note routine.

Main Program Architecture

The music can be broken down into four main parts (1) character search, 144 bytes, (2) perform character routine, 385 bytes, (3) table look-up, 307 bytes, and (4) play-note routine, 71 bytes.

♩ ...Quarter rest(QR)

♪ ...Eighth rest(OR)

▬ ...Half rest(HR)

▬ ...Whole rest(WR)

♭ ...Flat (b)

♯ ...Sharp (#)

♮ ...Natural (cancels a sharp or flat)

⌐ ...Measure separator(/)

o ...Whole note(W)

d ...Half note(H)

♩ ...Quarter note(Q)

♪ ...Eighth note(O)

♬ ...Sixteenth note(S)

♬ ...Thirtysecond note(T)

♩. ...Increase note duration by 50%. (CTRL-A)

𝄆 ...Repeat (between these brackets repeat the measures as indicates.) (CTRL-R,CTRL-J,CTRL-S)

Before a program listing is presented, it should be pointed out that two sections of the look-up table have been left open to be defined by the User. One is the Tempo table from 002,370 to 003,023 for a tempo other than the three already listed. The table holds two-byte duration values for a segment of a whole note in the sixth octave. The Envelope table from 003,247 to 003,312 is free for four more envelopes each of nine bytes long. The envelope table routine uses even parity to identify the end of each envelope, so remember to make all binary patterns equal odd parity except for the ninth byte.

Music Table Coding

Now in the beginning the music programs were difficult to code into the computer because all of the frequencies had to be looked up and decoded from tables by the User into binary values. The Alpha-Numeric Music program removes some of the difficult decoding tasks by placing tables within the memory and letting the CPU do the looking up.

Hardware

To hear the results of this software music program, a port with a 5-bit DAC(Digital-to-Analog Converter) will have to be added to the computer. If you do not have a 8-bit parallel output port, one can be built with three IC's. *(The booklet tells how.)*

Music Decoding Sheet

Note... C D E F G A B   C D E F G A B   C D E F G A B

Octave 4   Octave 5   Octave 6

Octave 1   Octave 2   Octave 3

A Game Based on ... STAR TREK ®

AS CAPTAIN OF THE *ENTERPRISE*, YOUR MISSION IS TO FIND AND DESTROY ALL UNITS OF THE KLINGON INVASION FORCE WITHIN 30 STARDATES. IF YOU FAIL, THE FEDERATION WILL BE CONQUERED.

Your ship, the *ENTERPRISE*, is much more powerful than the Klingon battle cruisers. But beware! Space battle drains your ship of energy and it is not easy to find the Starbases. If the Klingons catch you with your shields down, you'll probably get crisped!

Think of Starbases as interstellar pit stops, where the *ENTER-PRISE* refuels (energy goes back to 3000), damages are repaired, and your photon torpedoes are reloaded (back to 10).

Because the Klingon ships are scattered throughout the galaxy, you'll be navigating the *ENTERPRISE* all over the place.

The galaxy is divided into quadrants -- there are 64 of them, and they make a checkerboard. Give COMMAND 7, then COMPUTER COMMAND 0 and you'll get a galactic map printed -- up to date, of course; it shows those parts of the galaxy you've already explored.

Each quadrant is divided into 64 sectors. You guessed it -- they're arranged 8--by--8. Each time you move, you get a short-range sensor scan printed -- that's a map of the quadrant you're in. If you want to see what's in your neighboring quadrants, either go there, or get a long range sensor scan.

Oh yes -- it takes 1 stardate to move to a new quadrant, and you *must* defeat the Klingons in 30 stardates or less.

HERE ARE YOUR CONTROL COMMANDS

```
COMMAND 0 = WARP ENGINE CONTROL
COMMAND 1 = SHORT RANGE SENSOR SCAN
COMMAND 2 = LONG RANGE SENSOR SCAN
COMMAND 3 = PHASER CONTROL
COMMAND 4 = PHOTON TORPEDO CONTROL
COMMAND 5 = SHIELD CONTROL
COMMAND 6 = DAMAGE CONTROL REPORT
COMMAND 7 = LIBRARY COMPUTER
```

SHORT-RANGE SENSORS		
SHOW THESE SYMBOLS	<*> =	ENTERPRISE
	+++ =	KLINGON
	>I< =	STARBASE
	* =	STAR

****

ON THE NEXT FOUR PAGES, I'LL SHOW YOU A GAME I PLAYED RECENTLY --

YOU MUST DESTROY 16   KLINGONS IN 30   STARDATES WITH 4   STARBASES

This'll be an easy game -- only 16 klingons -- and I've lots of Starbases to refuel at.

```
-------------------------------------
  *
  *           *
      *           *
                         STARDATE          3000
                         CONDITION         GREEN
                         QUADRANT          8,1
                         SECTOR            7,7
                         ENERGY            3000
  *           <*>        PHOTON TORPEDOES  10
  *                      SHIELDS           0
-------------------------------------
```

COMMAND:?2
LONG RANGE SENSOR SCAN FOR QUADRANT 8,1
```
-------------------
:  0 : 11 :  2 :      aha! Klingons due East
-------------------
:  0 :  7 :101 :   ←
-------------------
:  0 :  0 :  0 :
-------------------
```

```
           101
Klingon   1 ↗↗
Starbases 0 ↗
Star      1 ↙
```

COMMAND 2 = LONG RANGE SENSOR SCAN
SHOWS CONDITIONS IN SPACE FOR ONE QUADRANT ON EACH SIDE OF THE ENTERPRISE IN THE MIDDLE OF THE SCAN. THE SCAN IS CODED IN THE FORM XXX, WHERE THE UNITS DIGIT IS THE NUMBER OF STARS, THE TENS DIGIT IS THE NUMBER OF STAR-BASES, THE HUNDREDS DIGIT IS THE NUMBER OF KLINGONS.

COMMAND:?0
COURSE (1-9):?1
WARP FACTOR (0-8):?1
COMBAT AREA   CONDITION RED
    SHIELDS DANGEROUSLY LOW

I arrive in a combat quadrant with no energy in my shields

```
         +++
                         STARDATE          3001
                         CONDITION         RED
                         QUADRANT          8,2
                         SECTOR            7,7
                         ENERGY            2997
         <*>             PHOTON TORPEDOES  10
  *                      SHIELDS           0
-------------------------------------
```

COMMAND:?5
ENERGY AVAILABLE = 2997   NUMBER OF UNITS TO SHIELDS:?1000

Don't fire before putting up your shields -- you'll get crisped!

COMMAND 5 = SHIELD CONTROL
    DEFINES NUMBER OF ENERGY UNITS TO BE ASSIGNED TO SHIELDS
    ENERGY IS TAKEN FROM TOTAL SHIP'S ENERGY.

When you navigate, you choose a direction (COURSE) and then decide how far you want to go (WARP FACTOR) — that's two decisions, so here are two paragraphs :

COURSE : East is 1, North 3 and you can figure the rest yourself from the diagram. Of course, NorthWest (between 3 and 5) is 4. You can get finer directions by using decimal fractions — between South (7) and SouthEast(8) are 7.1, 7.2, 7.3, . . . , 7.8, 7.9 I rarely use finer COURSE settings, such as 7.125 ... Between 8 and 1, use 8.1, 8.2, ... , 8.9

WARP FACTOR : If you set your warp factor to 1, you move 1 full quadrant and end up the next one over. 2 skips you over the neighboring quadrant and you'll stop in the one past it. *** WARNING *** If you go out of the known galaxy, you will find no stars (0) and may have trouble getting back. To maneuver within a quadrant, use numbers less than 1; .5 will move you half a quadrant, or 4 sectors. Since there are 8 sectors across a quadrant, each 1/8 warp factor (or .125 in decimal) moves you 1 sector.

```
COMMAND 0 = WARP ENGINE CONTROL               4   3   2
   'COURSE IS IN A CIRCULAR NUMERICAL           \  |  /
   VECTOR ARRANGEMENT AS SHOWN.                  \ | /
   INTERGER AND REAL VALUES MAY BE         5 ------- 1
   USED.   THEREFORE COURSE 1.5 IS               / | \
   HALF WAY BETWEEN 1 AND 2.                    /  |  \
                                              6   7   8
   A VECTOR OF 9 IS UNDEFINED, BUT
   VALUES MAY APPROACH 9.                        COURSE

   ONE 'WARP FACTOR' IS THE SIZE OF
   ONE QUADRANT.   THEREFORE TO GET
   FROM QUADRANT 6,5 TO 5,5 YOU WOULD
   USE COURSE 3, WARP FACTOR 1
```
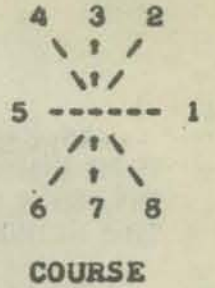
Warp Engine Control is a fancy name for NAVIGATION.

* *

```
COMMAND:?3
PHASERS LOCKED ON TARGET.  ENERGY AVAILABLE= 1997
NUMBER OF UNITS TO FIRE:?600
   81 UNIT HIT ON ENTERPRISE AT SECTOR 3,5   ( 919 LEFT)
   31 UNIT HIT ON KLINGON AT SECTOR 3,5   (169 LEFT)
COMMAND:?3
PHASERS LOCKED ON TARGET.  ENERGY AVAILABLE= 1397
NUMBER OF UNITS TO FIRE:?600
   49 UNIT HIT ON ENTERPRISE AT SECTOR 3,5   ( 870 LEFT)
  214 UNIT HIT ON KLINGON AT SECTOR 3,5   (-45 LEFT)
KLINGON AT SECTOR 3,5 DESTROYED ****
```

Hits reduce the shield levels until ... there's nothing left ...

```
COMMAND 3 = PHASER CONTROL
   ALLOWS YOU TO DESTROY THE KLINGONS BY HITTING HIM WITH
   SUITABLY LARGE NUMBERS OF ENERGY UNITS TO DEPLETE HIS
   SHIELD POWER.   KEEP IN MIND THAT WHEN YOU SHOOT AT
   HIM, HE GONNA DO IT TO YOU TOO.
```

```
COMMAND:?2
LONG RANGE SENSOR SCAN FOR QUADRANT 8,2

-------------------
:  11  :  2  :  3  :
-------------------
:  7  :  1  :  8  :
-------------------
:  0  :  0  :  0  :
-------------------
```

I'm looking around for some more Klingons. I figure I have enough energy and torpedoes left for 4 or 5 more before I'll have to find a Starbase.

```
COMMAND:?0
COURSE (1-9):?2
WARP FACTOR (0-8): 3
-----------------------------------
           *



                <*>


------------------------------------
```

STARDATE	3002
CONDITION	GREEN
QUADRANT	5,5
SECTOR	7,7
ENERGY	778
PHOTON TORPEDOES	10
SHIELDS	870
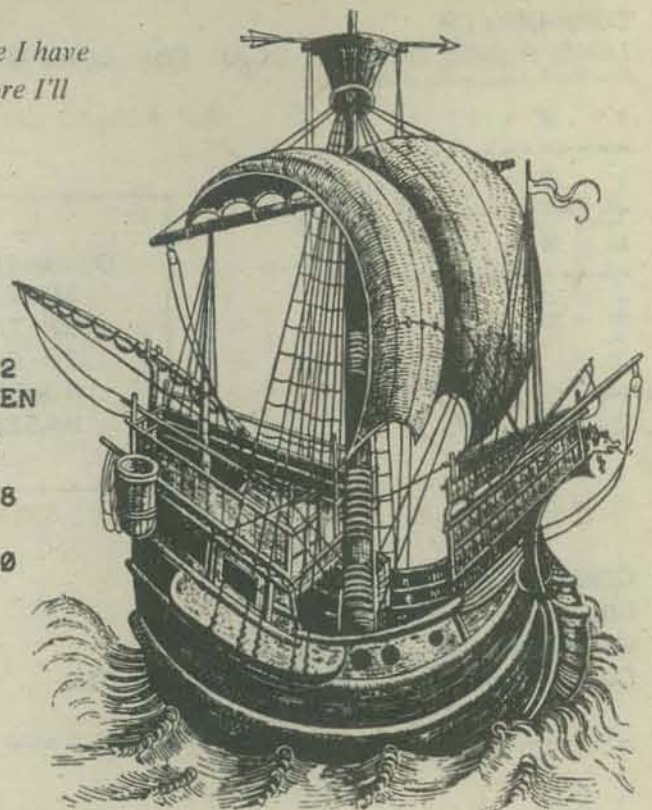
```
COMMAND:?2
LONG RANGE SENSOR SCAN FOR QUADRANT 5,5

-------------------
:  7  :  1  :  1  :
-------------------
:  2  :  1  :101  :
-------------------
:  2  :  5  :  1  :
-------------------
```

none here ...

... but my sensors spot one due East

```
COMMAND:?0
COURSE (1-9):?1
WARP FACTOR (0-8):?1
-------------------------------------


           *   +++



                <*>

-------------------------------------
```

STARDATE	3003
CONDITION	RED
QUADRANT	5,6
SECTOR	7,7
ENERGY	775
PHOTON TORPEDOES	10
SHIELDS	870

```
COMMAND:?4
TORPEDO COURSE (1-9):?3
TORPEDO TRACK:
                6,7            This was an easy shot --
                5,7            the Klingon was due North
                4,7
                3,7
*** KLINGON DESTROYED ***
```

COMMAND 4 = PHOTON TORPEDO CONTROL
   COURSE IS THE SAME AS USED IN WARP ENGINE CONTROL
   IF YOU HIT THE KLINGON, HE IS DESTROYED AND CANNOT FIRE
   BACK AT YOU.   IF YOU MISS, HE WILL SHOOT HIS PHASERS AT
   YOU.
      NOTE: THE LIBRARY COMPUTER (COMMAND 7) HAS AN OPTION
      TO COMPUTE TORPEDO TRAJECTORY FOR YOU (OPTION 2).

```
COMMAND:?2
LONG RANGE SENSOR SCAN FOR QUADRANT 5,6
-------------------
:  1 :  1 :  4 :
-------------------
:  1 :  1 :  6 :            Back to looking around -- I have to go
-------------------         SouthEast to reach the next one.
:  5 :  1 :105 :
-------------------
COMMAND:?0
COURSE (1-9):?5
WARP FACTOR (0-8):?1
-------------------------------------

              +++   *          STARDATE           3004
                               CONDITION          RED
                               QUADRANT           6,7
     *                         SECTOR             7,7
                               ENERGY             772
     *              <*>        PHOTON TORPEDOES   9
     *    *                    SHIELDS            870
-------------------------------------
COMMAND:?4
TORPEDO COURSE (1-9):?3.2      COURSE 3.2 -- a bit West of due North
TORPEDO TRACK:
                6,7
                5,7
                4,6
                3,6
                2,6
*** KLINGON DESTROYED ***
```
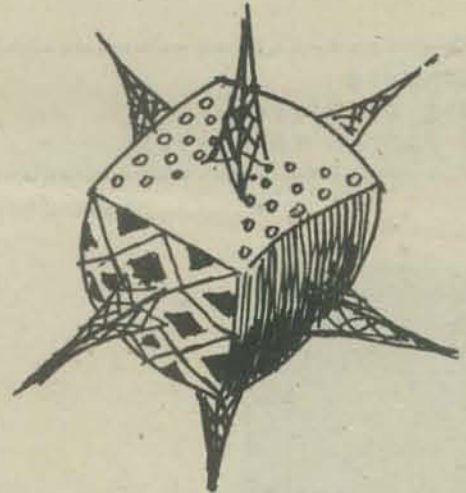


```
COMMAND:?2
LONG RANGE SENSOR SCAN FOR QUADRANT 6,7
-------------------
:  1 :  6 :  5 :
-------------------            by the way -- the Enterprise's computer
:  1 :  5 :  6 :            banks are storing all the Long Range Sensor
-------------------         scans I've taken.
:  6 :104 :  5 :
-------------------
COMMAND:?0
COURSE (1-9):?7
WARP FACTOR (0-8):?1
-------------------------------------
  +++                     *
                               STARDATE           3005
                               CONDITION          RED
                               QUADRANT           7,7
                               SECTOR             7,7
                     *         ENERGY             769
             *     <*>         PHOTON TORPEDOES   8
               *               SHIELDS            870
-------------------------------------
COMMAND:?0
COURSE (1-9):?4
WARP FACTOR (0-8):?.75
   32 UNIT HIT ON ENTERPRISE AT SECTOR 1,1    ( 839 LEFT)
   WARP ENGINES SHUTDOWN AT SECTOR 1,1 DUE TO BAD NAVIGATION
-------------------------------------
  +++                     *
     <*>
                               STARDATE           3005
                               CONDITION          RED
                               QUADRANT           7,7
                               SECTOR             2,2
                     *         ENERGY             768
               *               PHOTON TORPEDOES   8
             *                 SHIELDS            839
-------------------------------------
COMMAND:?3
PHASERS LOCKED ON TARGET.   ENERGY AVAILABLE= 768
NUMBER OF UNITS TO FIRE:?200
   79 UNIT HIT ON ENTERPRISE AT SECTOR 1,1    ( 759 LEFT)
  167 UNIT HIT ON KLINGON AT SECTOR 1,1    ( 33 LEFT)
COMMAND:?3
PHASERS LOCKED ON TARGET.   ENERGY AVAILABLE= 568
NUMBER OF UNITS TO FIRE:?50
   46 UNIT HIT ON ENTERPRISE AT SECTOR 1,1    ( 714 LEFT)
   52 UNIT HIT ON KLINGON AT SECTOR 1,1    (-19 LEFT)
KLINGON AT SECTOR 1,1 DESTROYED ****
```

PHASERS ARE MORE EFFECTIVE WHEN YOU ARE UP CLOSE
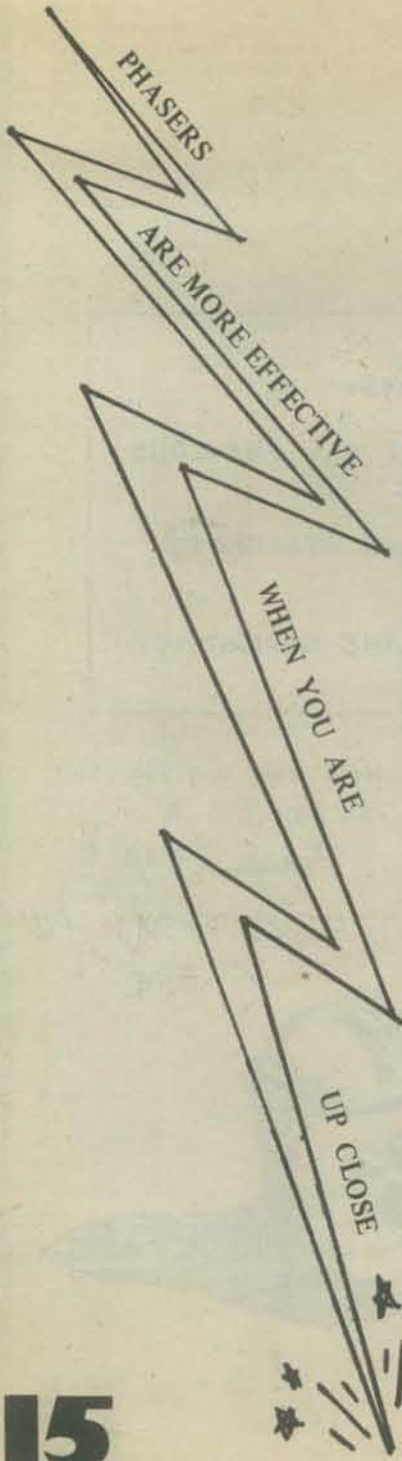
```
COMMAND:?2
LONG RANGE SENSOR SCAN FOR QUADRANT 7,7
-------------------
:  1 :  5 :  6 :
-------------------
:  6 :  4 :  5 :
-------------------
: 15 :  4 :  7 :        hey! a Starbase!        there it is
-------------------
COMMAND:?0
COURSE (1-9):?6
WARP FACTOR (0-8):?1
------------------------------------
           *       >!<
    <*>  *                              STARDATE          3006
                                        CONDITION         GREEN
           *                            QUADRANT          8,6
                                        SECTOR            2,2
       *                                ENERGY            515
     *                                  PHOTON TORPEDOES  8
                                        SHIELDS           714
------------------------------------
COMMAND:?0
COURSE (1-9):?8                 first I navigate UNDER the two stars in my way,
WARP FACTOR (0-8):?.25         now I can warp straight in and dock
------------------------------------
           *       >!<
       *                                STARDATE          3006
                                        CONDITION         GREEN
    <*>  *                              QUADRANT          8,6
                                        SECTOR            4,4

       *                                ENERGY            518
     *                                  PHOTON TORPEDOES  8
                                        SHIELDS           714
------------------------------------
COMMAND:?0
COURSE (1-9):?2
WARP FACTOR (0-8):?.35

DAMAGE CONTROL REPORT:COMPUTER      STATE OF REPAIR IMPROVED

SHIELDS DROPPED FOR DOCKING PURPOSES
------------------------------------
           *       >!<
       *           <*>                  STARDATE          3006
                                        CONDITION         DOCKED
         *                              QUADRANT          8,6
                                        SECTOR            2,6
      '*                                ENERGY            3000
     *                                  PHOTON TORPEDOES  10
                                        SHIELDS              0
------------------------------------


COMMAND:?7
COMPUTER ACTIVE AND AWAITING COMMAND?1

    STATUS REPORT
```

NUMBER OF KLINGONS LEFT = 12
NUMBER OF STARDATES LEFT = 24
NUMBER OF STARBASES LEFT = 4

DEVICE	STATE OF REPAIR
WARP ENGINES	0
S.R. SENSORS	0
L.R. SENSORS	0
PHASER CNTRL	0
PHOTON TUBES	0
DAMAGE CNTRL	0
SHIELD CNTRL	0
COMPUTER	5.22258

```
COMMAND 7 = LIBRARY COMPUTER
   THE LIBRARY COMPUTER CONTAINS THREE OPTIONS:
      OPTION 0 = CUMULATIVE GALACTIC RECORD
        SHOWS COMPUTER MEMORY OF THE RESULTS OF ALL PREVIOUS
        LONG RANGE SENSOR SCANS
      OPTION 1 = STATUS REPORT
        SHOWS NUMBER OF KLINGONS, STARDATESC AND STARBASES
        LEFT.
      OPTION 2 = PHOTON TORPEDO DATA
        GIVES TRAJECTORY AND DISTANCE BETWEEN THE ENTERPRISE
        AND ALL KLINGONS IN YOUR QUADRANT
```

```
COMMAND:?7
COMPUTER ACTIVE AND AWAITING COMMAND?0
COMPUTER RECORD OF GALAXY FOR QUADRANT 8,6
```

	1	2	3	4	5	6	7	8
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	7	1	1	4	0
5	0	0	0	2	1	1	6	5
6	0	0	0	2	5	1	5	6
7	11	2	3	0	0	6	4	5
8	7	1	8	0	0	15	4	7

```
COMMAND:?
```

HOW CAN WE CONVERT STTRI TO A PEACE GAME?

```
1    REM **** HP BASIC PROGRAM LIBRARY ****************************
2    REM
3    REM       STTR1: STAR TREK
4    REM
5    REM       36243  REV B  -- 10/73
6    REM
7    REM **** CONTRIBUTED PROGRAM ***************************
100  REM ****************************************************
110  REM ***                                              ***
120  REM ***   STAR TREK: BY MIKE MAYFIELD, CENTERLINE ENGINEERING ***
130  REM ***                                              ***
140  REM ***     TOTAL INTERACTION GAME - ORIG. 20 OCT 1972   ***
150  REM ***                                              ***
160  REM ****************************************************
170  GOSUB 5460
180  PRINT "                          STAR TREK "
190  PRINT "DO YOU WANT INSTRUCTIONS (THEY'RE LONG!)"
200  INPUT A$
210  IF A$ <> "YES" THEN 230
220  GOSUB 5820
230  REM ****  PROGRAM STARTS HERE *****
240  Z$=""
250  GOSUB 5460
260  DIM G[8,8],C[9,2],K[3,3],N[3],Z[8,8]
270  DIM C$[6],D$[72],E$[24],A$[3],W$[72],H$[72],S$[48]
280  DIM Z$[72]
290  T0=T=INT(RND(1)*20+20)*100
300  T9=30
310  D0=0
320  E0=E=3000
330  P0=P=10
340  S9=200
350  S=H0=0
360  DEF FND(D)=SQR((K[I,1]-S1)^2+(K[I,2]-S2)^2)
370  W1=INT(RND(1)*8+1)
380  W2=INT(RND(1)*8+1)
390  S1=INT(RND(1)*8+1)
400  S2=INT(RND(1)*8+1)
410  I7=TIM(0)+60*TIM(1)
420  C[2,1]=C[3,1]=C[4,1]=C[4,2]=C[5,2]=C[6,2]=-1
430  C[1,1]=C[3,1]=C[5,1]=C[7,1]=C[9,1]=0
440  C[1,2]=C[2,2]=C[6,1]=C[7,1]=C[8,1]=C[8,2]=C[9,2]=1
450  MAT D=ZER
460  D$="WARP ENGINESR.R. SENSORSL.R. SENSORSPHASER CNTRL"
470  D$[49]="PHOTON TUBESDAMAGE CNTRL"
480  E$="SHIELD CNTRLCOMPUTER"
490  W9=X9=0
500  FOR I=1 TO 8
510  FOR J=1 TO 8
520  K1=RND(1)
530  IF K1>.98 THEN 580
540  IF K1>.95 THEN 610
550  IF K1>.8 THEN 640
560  K3=0
570  GOTO 660
580  K3=3
590  K9=K9+3
600  GOTO 660
610  K3=2
620  K9=K9+2
630  GOTO 660
640  K9=K9+1
650  K9=K9+1
660  K1=RND(1)
670  IF K1>.96 THEN 700
680  B3=0
690  GOTO 720
700  B3=1
710  B9=B9+1
720  S3=INT(RND(1)*8+1)
730  G[I,J]=K3*100+B3*10+S3
740  Z[I,J]=G[I,J]
750  NEXT J
760  NEXT I
770  K7=K9
775  IF B9 <= 0 OR K9 <= 0 THEN 490
780  PRINT "YOU MUST DESTROY"K9;" KLINGONS IN"T9;" STARDATES WITH"B9;" STA
810  K3=B3=S3=0
820  IF W1<1 OR W1>8 OR W2<1 OR W2>8 THEN 920
830  X=G[W1,W2]*.01
840  K3=INT(X)
850  B3=INT((X-K3)*10)
860  S3=G[W1,W2]-INT(G[W1,W2]*.1)*10
870  IF K3<>0 THEN 910
880  IF S>200 THEN 910
890  PRINT "COMBAT AREA      CONDITION RED"
900  PRINT "    SHIELDS DANGEROUSLY LOW"
910  MAT K=ZER
920  FOR I=1 TO 3
930  K[I,3]=0
940  NEXT I
950  Z9=Z$
960  H$=Z$
970  S$=Z$[1,48]
980  A$="<*>"
990  Z1=S1
1000 Z2=S2
1010 GOSUB 5510
1020 FOR I=1 TO K3
1030 GOSUB 5380
1040 A$="+++"
1050 Z1=K1
1060 Z2=K2
1070 GOSUB 5510
1080 K[I,1]=K1
1090 K[I,2]=K2
1100 K[I,3]=S9
1110 NEXT I
1120 FOR I=1 TO B3
1130 GOSUB 5380
1140 A$=">!<"
1150 Z1=K1
1160 Z2=K2
1170 GOSUB 5510
1180 NEXT I
1190 FOR I=1 TO S3
1200 GOSUB 5380
1210 A$=" * "
1220 Z1=K1
1230 Z2=K2
1240 GOSUB 5510
1250 NEXT I
1260 GOSUB 4120
1270 PRINT "COMMAND:";
1280 INPUT A
```

```
1290 GOTO A+1 OF 1410,1260,2330,2530,2800,3460,3560,4630
1300 PRINT
1310 PRINT "    0 = SET COURSE"
1320 PRINT "    1 = SHORT RANGE SENSOR SCAN"
1330 PRINT "    2 = LONG RANGE SENSOR SCAN"
1340 PRINT "    3 = FIRE PHASERS"
1350 PRINT "    4 = FIRE PHOTON TORPEDOES"
1360 PRINT "    5 = SHIELD CONTROL"
1370 PRINT "    6 = DAMAGE CONTROL REPORT"
1380 PRINT "    7 = CALL ON LIBRARY COMPUTER"
1390 PRINT
1400 GOTO 1270
1410 PRINT "COURSE (1-9):";
1420 INPUT C1
1430 IF C1=0 THEN 1270
1440 IF C1<1 OR C1 >= 9 THEN 1410
1450 PRINT "WARP FACTOR (0-8):";
1460 INPUT W1
1470 IF W1<0 OR W1>8 THEN 1410
1480 IF D[1] >= 0 OR W1 <= .2 THEN 1510
1490 PRINT "WARP ENGINES ARE DAMAGED, MAXIMUM SPEED = WARP .2"
1500 GOTO 1410
1510 IF K3 <= 0 THEN 1560
1520 GOSUB 3790
1530 IF K3 <= 0 THEN 1560
1540 IF S9 THEN 4000
1550 GOTO 1610
1560 IF E>0 THEN 1610
1570 IF S>1 THEN 3920
1580 PRINT "YOU HAVE"E" UNITS OF ENERGY"
1590 PRINT "SUGGEST YOU GET SOME FROM YOUR SHIELDS WHICH HAVE"S" UNITS LE
1600 GOTO 1270
1610 FOR I=1 TO 8
1620 IF D[I] >= 0 THEN 1640
1630 D[I]=D[I]+1
1640 NEXT I
1650 IF RND(1)>.2 THEN 1810
1660 K1=INT(RND(1)*8+1)
1670 IF RND(1) >= .5 THEN 1750
1680 D[K1]=D[K1]-(RND(1)*5+1)
1690 PRINT
1700 PRINT "DAMAGE CONTROL REPORT:";
1710 GOSUB 5610
1720 PRINT " DAMAGED"
1730 PRINT
1740 GOTO 1810
1750 D[K1]=D[K1]+(RND(1)*5+1)
1760 PRINT
1770 PRINT "DAMAGE CONTROL REPORT:";
1780 GOSUB 5610
1790 PRINT " STATE OF REPAIR IMPROVED"
1800 PRINT
1810 N=INT(C1*8)
1820 A$="    "
1830 Z1=S1
1840 Z2=S2
1850 GOSUB 5510
1870 X=S1
1880 Y=S2
1885 C2=INT(C1)
1890 X1=C[C2,1]+(C[C2+1,1]-C[C2,1])*(C1-C2)
1900 X2=C[C2,2]+(C[C2+1,2]-C[C2,2])*(C1-C2)
1910 FOR I=1 TO N
1920 S1=S1+X1
1930 S2=S2+X2
1940 IF S1<=.5 OR S1 >= 8.5 OR S2<=.5 OR S2 >= 8.5 THEN 2170
1950 A$="    "
1960 Z1=S1
1970 Z2=S2
1980 GOSUB 5680
1990 IF Z3 <> 0 THEN 2070
2030 PRINT USING 5370;S1,S2
2040 S1=S1-X1
2050 S2=S2-X2
2060 GOTO 2080
2070 NEXT I
2080 A$="<*>"
2083 S1=INT(S1+.5)
2086 S2=INT(S2+.5)
2090 Z1=S1
2100 Z2=S2
2110 GOSUB 5510
2120 E=E-N-5
2130 IF W1<1 THEN 2150
2140 T=T+1
2150 IF T>T0+T9 THEN 3970
2160 GOTO 1260
2170 X=J1*8+X+X1*N
2180 Y=J2*8+Y+X2*N
2190 W1=INT(X/8)
2200 W2=INT(Y/8)
2210 S1=INT(X-W1*8+.5)
2220 S2=INT(Y-W2*8+.5)
2230 IF S1 <> 0 THEN 2260
2240 W1=W1-1
2250 S1=8
2260 IF S2 <> 0 THEN 2290
2270 W2=W2-1
2280 S2=8
2290 I=I+1
2300 E=E-N-5
2310 IF T>T0+T9 THEN 3970
2320 GOTO 810
2330 IF D[3] >= 0 THEN 2370
2340 PRINT "LONG RANGE SENSORS ARE INOPERABLE"
2350 IMAGE "LONG RANGE SENSOR SCAN FOR QUADRANT ",D,",",D
2360 GOTO 1270
2370 PRINT USING 2350;W1,W2
2380 PRINT USING 2520
2390 FOR I=W1-1 TO W1+1
2400 MAT N=ZER
2410 FOR J=W2-1 TO W2+1
2420 IF I<1 OR I>8 OR J<1 OR J>8 THEN 2460
2430 N[J-W2+2]=G[I,J]
2440 IF D[7]<0 THEN 2460
2450 Z[I,J]=G[I,J]
2460 NEXT J
2470 PRINT USING 2510;N[1],N[2],N[3]
2480 PRINT USING 2520
2490 NEXT I
2500 GOTO 1270
2510 IMAGE ": ",3(3D," :")
2520 IMAGE "-------------------"
2530 IF K3 <= 0 THEN 3670
2540 IF D[4] >= 0 THEN 2570
2550 PRINT "PHASER CONTROL IS DISABLED"
2560 GOTO 1270
```


The Trifid Nebula

Messier 92

Messier 87

Crab Nebula

The Omega Nebula

continued

The nebulous cluster Messier 16 in Serpens.

The Network Nebula

The California Nebula

The Ring Nebula

```
2570 IF D[7] >= 0 THEN 2590
2580 PRINT " COMPUTER FAILURE HAMPERS ACCURACY"
2590 PRINT "PHASERS LOCKED ON TARGET.  ENERGY AVAILABLE="E
2600 PRINT "NUMBER OF UNITS TO FIRE:";
2610 INPUT X
2620 IF X <= 0 THEN 1270
2630 IF E-X<0 THEN 2570
2640 E=E-X
2650 GOSUB 3790
2660 IF D[7] >= 0 THEN 2680
2670 X=X*RND(1)
2680 FOR I=1 TO 3
2690 IF K[I,3] <= 0 THEN 2770
2700 H=(X/K3/FND(0))*(2*RND(1))
2710 K[I,3]=K[I,3]-H
2720 PRINT USING 2730;H,K[I,1],K[I,2],K[I,3]
2730 IMAGE 4D," UNIT HIT ON KLINGON AT SECTOR ",D,",",D," (",3D," LEFT)"
2740 IF K[I,3]>0 THEN 2770
2750 GOSUB 3690
2760 IF K9 <= 0 THEN 4040
2770 NEXT I
2780 IF E<0 THEN 4000
2790 GOTO 1270
2800 IF D[5] >= 0 THEN 2830
2810 PRINT "PHOTON TUBES ARE NOT OPERATIONAL"
2820 GOTO 1270
2830 IF P>0 THEN 2860
2840 PRINT "ALL PHOTON TORPEDOES EXPENDED"
2850 GOTO 1270
2860 PRINT "TORPEDO COURSE (1-9):";
2870 INPUT C1
2880 IF C1=0 THEN 1270
2890 IF C1<1 OR C1 >= 9 THEN 2860
2895 C2=INT(C1)
2900 X1=C[C2,1]+(C[C2+1,1]-C[C2,1])*(C1-C2)
2910 X2=C[C2,2]+(C[C2+1,2]-C[C2,2])*(C1-C2)
2920 X=S1
2930 Y=S2
2940 P=P-1
2950 PRINT "TORPEDO TRACK:"
2960 X=X+X1
2970 Y=Y+X2
2980 IF X<.5 OR X >= 8.5 OR Y<.5 OR Y >= 8.5 THEN 3420
2990 PRINT USING 3000;X,Y
3000 IMAGE 15X,D,",",D
3010 A$="   "
3020 Z1=X
3030 Z2=Y
3040 GOSUB 5680
3050 IF Z3=0 THEN 3070
3060 GOTO 2960
3070 A$="+++"
3080 Z1=X
3090 Z2=Y
3100 GOSUB 5680
3110 IF Z3=0 THEN 3220
3120 PRINT "*** KLINGON DESTROYED ***"
3130 K3=K3-1
3140 K9=K9-1
3150 IF K9 <= 0 THEN 4040
3160 FOR I=1 TO 3
3170 IF INT(X+.5) <> K[I,1] THEN 3190
3180 IF INT(Y+.5)=K[I,2] THEN 3200
3190 NEXT I
3200 K[I,3]=0
3210 GOTO 3360
3220 A$=" * "
3230 Z1=X
3240 Z2=Y
3250 GOSUB 5680
3260 IF Z3=0 THEN 3290
3270 PRINT "YOU CAN'T DESTROY STARS SILLY"
3280 GOTO 3420
3290 A$=">!<"
3300 Z1=X
3310 Z2=Y
3320 GOSUB 5680
3330 IF Z3=0 THEN 2960
3340 PRINT "*** STAR BASE DESTROYED ***  .......CONGRATULATIONS"
3350 B3=B3-1
3360 A$="   "
3370 Z1=INT(X+.5)
3380 Z2=INT(Y+.5)
3390 GOSUB 5510
3400 G[U1,U2]=K3*100+B3*10+S3
3410 GOTO 3430
3420 PRINT "TORPEDO MISSED"
3430 GOSUB 3790
3440 IF E<0 THEN 4000
3450 GOTO 1270
3460 IF D[7] >= 0 THEN 3490
3470 PRINT "SHIELD CONTROL IS NON-OPERATIONAL"
3480 GOTO 1270
3490 PRINT "ENERGY AVAILABLE ="E+S"   NUMBER OF UNITS TO SHIELDS:";
3500 INPUT X
3510 IF X <= 0 THEN 1270
3520 IF E+S-X<0 THEN 3490
3530 E=E+S-X
3540 S=X
3550 GOTO 1270
3560 IF D[6] >= 0 THEN 3590
3570 PRINT "DAMAGE CONTROL REPORT IS NOT AVAILABLE"
3580 GOTO 1270
3590 PRINT
3600 PRINT "DEVICE          STATE OF REPAIR"
3610 FOR R1=1 TO 8
3620 GOSUB 5510
3630 PRINT "",D[R1]
3640 NEXT R1
3650 PRINT
3660 GOTO 1270
3670 PRINT "SHORT RANGE SENSORS REPORT NO KLINGONS IN THIS QUADRANT"
3680 GOTO 1270
3690 PRINT USING 3700;K[I,1],K[I,2]
3700 IMAGE"KLINGON AT SECTOR ",D,",",D," DESTROYED ****"
3710 K3=K3-1
3720 K9=K9-1
3730 A$="   "
3740 Z1=K[I,1]
3750 Z2=K[I,2]
3760 G[U1,U2]=K3*100+B3*10+S3
3770 RETURN
3790 IF C$ <> "DOCKED" THEN 3820
3800 PRINT "STAR BASE SHIELDS PROTECT THE ENTERPRISE"
3810 RETURN

3820 IF K3 <= 0 THEN 3910
3830 FOR I=1 TO 3
3840 IF K[I,3] <= 0 THEN 3900
3850 H=(K[I,3]/FND(0))*(2*RND(1))
3860 S=S-H
3870 PRINT USING 3880;H,K[I,1],K[I,2],S
3880 IMAGE 4D," UNIT HIT ON ENTERPRISE AT SECTOR ",D,",",D," (",4D," LEFT)"
3890 IF S<0 THEN 4000
3900 NEXT I
3910 RETURN
3920 PRINT "THE ENTERPRISE IS DEAD IN SPACE. IF YOU SURVIVE ALL IMPENDING"
3930 PRINT "ATTACK YOU WILL BE DEMOTED TO THE RANK OF PRIVATE"
3940 IF K3 <= 0 THEN 4020
3950 GOSUB 3790
3960 GOTO 3940
3970 PRINT
3980 PRINT "IT IS STARDATE"T
3990 GOTO 4020
4000 PRINT
4010 PRINT "THE ENTERPRISE HAS BEEN DESTROYED. THE FEDERATION WILL BE CONQUERED"
4020 PRINT "THERE ARE STILL"K9" KLINGON BATTLE CRUISERS"
4030 GOTO 230
4040 PRINT
4050 PRINT "THE LAST KLINGON BATTLE CRUISER IN THE GALAXY HAS BEEN DESTROYED"
4060 PRINT "THE FEDERATION HAS BEEN SAVED !!!"
4070 PRINT
4080 PRINT "YOUR EFFICIENCY RATING ="((K7/(T-T0))*1000)
4090 T1=TIM(0)+TIM(1)*60
4100 PRINT "YOUR ACTUAL TIME OF MISSION ="INT((((T1-T7)*.4)-T7)*100)" MINUTES"
4110 GOTO 230
4120 FOR I=S1-1 TO S1+1
4130 FOR J=S2-1 TO S2+1
4140 IF I<1 OR I>8 OR J<1 OR J>8 THEN 4200
4150 A$=">!<"
4160 Z1=I
4170 Z2=J
4180 GOSUB 5680
4190 IF Z3=1 THEN 4240
4200 NEXT J
4210 NEXT I
4220 D4=0
4230 GOTO 4310
4240 D4=1
4250 C$="DOCKED"
4260 E=J3J0
4270 P=10
4280 PRINT "SHIELDS DROPPED FOR DOCKING PURPOSES"
4290 S=0
4300 GOTO 4380
4310 IF K3>0 THEN 4350
4320 IF E<E0+.1 THEN 4370
4330 C$="GREEN"
4340 GOTO 4380
4350 C$="RED"
4360 GOTO 4380
4370 C$="YELLOW"
4380 IF D[3] >= 0 THEN 4430
4390 PRINT
4400 PRINT "*** SHORT RANGE SENSORS ARE OUT ***"
4410 PRINT
4420 GOTO 4530
4430 PRINT USING 4540
4440 PRINT USING 4550;U$[1,3],U$[4,6],U$[7,9],U$[10,12],
                      U$[13,15],U$[16,18],U$[19,21],U$[22,24]
4450 PRINT USING 4560;U$[25,27],U$[28,30],U$[31,33],U$[34,36],
                      U$[37,39],U$[40,42],U$[43,45],U$[46,48],T
4460 PRINT USING 4570;U$[49,51],U$[52,54],U$[55,57],U$[58,60],
                      U$[61,63],U$[64,66],U$[67,69],U$[70,72],C$
4470 PRINT USING 4580;K$[1,3],K$[4,6],K$[7,9],K$[10,12],K$[13,15],
                      K$[16,18],K$[19,21],K$[22,24],U1,U2
4480 PRINT USING 4590;K$[25,27],K$[28,30],K$[31,33],K$[34,36],
                      K$[37,39],K$[40,42],K$[43,45],K$[46,48],S2,S2
4490 PRINT USING 4600;K$[49,51],K$[52,54],K$[55,57],K$[58,60],
                      K$[61,63],K$[64,66],K$[67,69],K$[70,72],E
4500 PRINT USING 4610;S$[1,3],S$[4,6],S$[7,9],S$[10,12],
                      S$[13,15],S$[16,18],S$[19,21],S$[22,24],P
4510 PRINT USING 4620;S$[25,27],S$[28,30],S$[31,33],S$[34,36],
                      S$[37,39],S$[40,42],S$[43,45],S$[46,48],S
4520 PRINT USING 4540
4530 RETURN
4540 IMAGE"--------------------------------"
4550 IMAGE 8(X,3A)
4560 IMAGE 8(X,3A),8X,"STARDATE",8X,5D
4570 IMAGE 8(X,3A),8X,"CONDITION",8X,6A
4580 IMAGE 8(X,3A),8X,"QUADRANT",9X,D,",",D
4590 IMAGE 8(X,3A),8X,"SECTOR",11X,D,",",D
4600 IMAGE 8(X,3A),8X,"ENERGY",9X,6D
4610 IMAGE 8(X,3A),8X,"PHOTON TORPEDOES",3D
4620 IMAGE 8(X,3A),8X,"SHIELDS",8X,6D
4630 IF D[3] >= 0 THEN 4660
4640 PRINT "COMPUTER DISABLED"
4650 GOTO 1270
4660 PRINT "COMPUTER ACTIVE AND AWAITING COMMAND";
4670 INPUT A
4680 GOTO A+1 OF 4740,4630,4660
4690 PRINT "FUNCTIONS AVAILABLE FROM COMPUTER"
4700 PRINT "  0 = CUMULATIVE GALACTIC RECORD"
4710 PRINT "  1 = STATUS REPORT"
4720 PRINT "  2 = PHOTON TORPEDO DATA"
4730 GOTO 4660
4740 PRINT USING 4750;U1,U2
4750 IMAGE"COMPUTER RECORD OF GALAXY FOR QUADRANT ",D,",",D
4760 PRINT USING 5330
4770 PRINT USING 5360
4780 FOR I=1 TO 8
4790 PRINT USING 5350;I,Z[I,1],Z[I,2],Z[I,3],Z[I,4],Z[I,5],Z[I,6],Z[I,7],Z[I,8]
4800 PRINT USING 5360
4810 NEXT I
4820 GOTO 1270
4830 PRINT "   STATUS REPORT"
4840 PRINT "NUMBER OF KLINGONS LEFT ="K9
4850 PRINT "NUMBER OF STARDATES LEFT ="(T0+T9)-T
4860 PRINT "NUMBER OF STARBASES LEFT ="B9
4870 GOTO 3560
4880 PRINT
4890 H8=0
4900 FOR I=1 TO 3
4910 IF K[I,3] <= 0 THEN 5260
4920 C1=S1
4930 A=S2
4940 W1=K[I,1]
4950 X=K[I,2]
4960 GOTO 5210
```

18

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4970  PRINT USING 4980;W1,W2,S1,S2
4980  IMAGE"YOU ARE AT QUADRANT ( ",D,",",D," ) SECTOR ( ",D,",",D," )"
4990  PRINT "SHIP'S & TARGET'S COORDINATES ARE";
5000  INPUT C1,A,W1,X
5010  X=X-A
5020  A=C1-W1
5030  IF  A THEN 5130
5040  IF  A THEN 5190
5050  IF  A THEN 5070
5060  IF A=0 THEN 5150
5070  C1=1
5080  IF ABS(A) <= ABS(X) THEN 5110
5090  PRINT "DIRECTION ="C1+(((ABS(A)-ABS(X))+ABS(A))/ABS(A))
5100  GOTO 5240
5110  PRINT "DIRECTION ="C1+(ABS(A)/ABS(X))
5120  GOTO 5240
5130  IF A>0 THEN 5170
5140  IF X=0 THEN 5190
5150  C1=5
5160  GOTO 5080
5170  C1=3
5180  GOTO 5200
5190  C1=7
5200  IF ABS(A) >= ABS(X) THEN 5230
5210  PRINT "DIRECTION ="C1+(((ABS(X)-ABS(A))+ABS(X))/ABS(X))
5220  GOTO 5240
5230  PRINT "DIRECTION ="C1+(ABS(X)/ABS(A))
5240  PRINT "DISTANCE ="(SQR(X+2+A+2))
5250  IF H8=1 THEN 5320
5260  NEXT I
5270  H8=0
5280  PRINT "DO YOU WANT TO USE THE CALCULATOR";
5290  INPUT A$
5300  IF A$="YES" THEN 4970
5310  IF A$ <> "NO" THEN 5280
5320  GOTO 1270
5330  IMAGE"     1     2     3     4     5     6     7     8"
5340  IMAGE"-------------------------------------------------"
5350  IMAGE D,8(3X,3D)
5360  IMAGE"     ----- ----- ----- ----- ----- ----- -----"
5370  IMAGE" WARP ENGINES SHUTDOWN AT SECTOR ",D,",",D," DUE TO BAD NAVIG"
5380  W1=INT(RND(1)*8+1)
5390  W2=INT(RND(1)*8+1)
5400  A$=" "
5410  Z1=W1
5420  Z2=W2
5430  GOSUB 5680
5440  IF Z3=0 THEN 5380
5450  RETURN
5460  FOR I=1 TO 11
5470  PRINT "";
5480  NEXT I
5490  PRINT
5500  RETURN
5510  REM ***** INSERTION IN STRING ARRAY FOR QUADRANT ******
5520  S6=Z1*24+Z2*3-26
5530  IF S6>72 THEN 5560
5540  U$(S6,S6+2)=A$
5550  GOTO 5600
5560  IF S6>144 THEN 5590
5570  N$(S6-72,S6-70)=A$
5580  GOTO 5600
5590  S$(S6-144,S6-142)=A$
5600  RETURN
5610  REM **** PRINTS DEVICE NAME FROM ARRAY *****
5620  S6=W1*12-11
5630  IF S6>72 THEN 5660
5640  PRINT D$(S6,S6+11)
5650  GOTO 5670
5660  PRINT E$(S6-72,S6-61)
5670  RETURN
5680  REM ******* STRING COMPARISON IN QUADRANT ARRAY **********
5683  Z1=INT(Z1*.5)
5686  Z2=INT(Z2*.5)
5690  S6=Z1*24+Z2*3-26
5700  Z3=0
5710  IF S6>72 THEN 5750
5720  IF U$(S6,S6+2) <> A$ THEN 5810
5730  Z3=1
5740  GOTO 5810
5750  IF S6>144 THEN 5790
5760  IF N$(S6-72,S6-70) <> A$ THEN 5810
5770  Z3=1
5780  GOTO 5810
5790  IF S$(S6-144,S6-142) <> A$ THEN 5810
5800  Z3=1
5810  RETURN
5820  PRINT "     INSTRUCTIONS:"
5830  PRINT "<*> = ENTERPRISE"
5840  PRINT "+++ = KLINGON"
5850  PRINT ">!< = STARBASE"
5860  PRINT " *  = STAR"
5870  PRINT "COMMAND 0 = WARP ENGINE CONTROL"
5880  PRINT "  COURSE IS IN A CIRCULAR NUMERICAL          4  3  2"
5890  PRINT "  VECTOR ARRANGEMENT AS SHOWN.                \ | /"
5900  PRINT "  INTEGER AND REAL VALUES MAY BE              \|/"
5910  PRINT "  USED.  THEREFORE COURSE 1.5 IS            5 ----- 1"
5920  PRINT "  HALF WAY BETWEEN 1 AND 2.                   /|\"
5930  PRINT "                                            / | \"
5940  PRINT "  A VECTOR OF 9 IS UNDEFINED, BUT          6  7  8"
5950  PRINT "  VALUES MAY APPROACH 9."
5960  PRINT "                                             COURSE"
5970  PRINT "  ONE 'WARP FACTOR' IS THE SIZE OF"
5980  PRINT "  ONE QUADRANT.  THEREFORE TO GET"
5990  PRINT "  FROM QUADRANT 6,5 TO 5,5 YOU WOULD"
6000  PRINT "  USE COURSE 3, WARP FACTOR 1"
6010  PRINT "COMMAND 1 = SHORT RANGE SENSOR SCAN"
6020  PRINT "  PRINTS THE QUADRANT YOU ARE CURRENTLY IN, INCLUDING"
6030  PRINT "  STARS, KLINGONS, STARBASES, AND THE ENTERPRISE, ALONG"
6040  PRINT "  WITH OTHER PERTINATE INFORMATION."
6050  PRINT "COMMAND 2 = LONG RANGE SENSOR SCAN"
6060  PRINT "  SHOWS CONDITIONS IN SPACE FOR ONE QUADRANT ON EACH SIDE"
6070  PRINT "  OF THE ENTERPRISE IN THE MIDDLE OF THE SCAN.  THE SCAN"
6080  PRINT "  IS CODED IN THE FORM XXX, WHERE THE UNITS DIGIT IS THE"
6090  PRINT "  NUMBER OF STARS, THE TENS DIGIT IS THE NUMBER OF STAR-"
6100  PRINT "  BASES, THE HUNDREDS DIGIT IS THE NUMBER OF KLINGONS."
6110  PRINT "COMMAND 3 = PHASER CONTROL"
6120  PRINT "  ALLOWS YOU TO DESTROY THE KLINGONS BY HITTING HIM WITH"
6130  PRINT "  SUITABLY LARGE NUMBERS OF ENERGY UNITS TO DEPLETE HIS "
6140  PRINT "  SHIELD POWER.  KEEP IN MIND THAT WHEN YOU SHOOT AT"
6150  PRINT "  HIM, HE GONNA DO IT TO YOU TOO."
6160  PRINT "COMMAND 4 = PHOTON TORPEDO CONTROL"
6170  PRINT "  COURSE IS THE SAME AS USED IN WARP ENGINE CONTROL"
6180  PRINT "  IF YOU HIT THE KLINGON, HE IS DESTROYED AND CANNOT FIRE"
6190  PRINT "  BACK AT YOU.  IF YOU MISS, HE WILL SHOOT HIS PHASERS AT"
6200  PRINT "  YOU."
6210  PRINT "  NOTE: THE LIBRARY COMPUTER (COMMAND 7) HAS AN OPTION"
6220  PRINT "    TO COMPUTE TORPEDO TRAJECTORY FOR YOU (OPTION 2)."
6230  PRINT "COMMAND 5 = SHIELD CONTROL"
6240  PRINT "  DEFINES NUMBER OF ENERGY UNITS TO BE ASSIGNED TO SHIELDS"
6250  PRINT "  ENERGY IS TAKEN FROM TOTAL SHIP'S ENERGY."
6260  PRINT "COMMAND 6 = DAMAGE CONTROL REPORT"
6270  PRINT "  GIVES STATE OF REPAIRS OF ALL DEVICES.  A STATE OF REPAIR"
6280  PRINT "  LESS THAN ZERO SHOWS THAT THAT DEVICE IS TEMPORARALY"
6290  PRINT "  DAMAGED."
6300  PRINT "COMMAND 7 = LIBRARY COMPUTER"
6310  PRINT "  THE LIBRARY COMPUTER CONTAINS THREE OPTIONS:"
6320  PRINT "    OPTION 0 = CUMULATIVE GALACTIC RECORD"
6330  PRINT "    SHOWS COMPUTER MEMORY OF THE RESULTS OF ALL PREVIOUS"
6340  PRINT "    LONG RANGE SENSOR SCANS"
6350  PRINT "    OPTION 1 = STATUS REPORT"
6360  PRINT "    SHOWS NUMBER OF KLINGONS, STARDATESC AND STARBASES"
6370  PRINT "    LEFT."
6380  PRINT "    OPTION 2 = PHOTON TORPEDO DATA"
6390  PRINT "    GIVES TRAJECTORY AND DISTANCE BETWEEN THE ENTERPRISE"
6400  PRINT "    AND ALL KLINGONS IN YOUR QUADRANT"
6410  RETURN
6420  END
```

NAVIGATION"

NEWSLETTER

I'm a high school senior and we timeshare an HP 2000C. Our system has quite a few games, especially of the Star Trek/space game variety. I've been thinking of starting a newsletter for space games and Star Treks, to be called M-5 (hopefully no Trekkies have used that one yet). M-5 would contain lists of games, and also ideas for games which haven't been implemented yet. As Bob Albrecht can probably testify, getting something like this off the ground is pretty difficult. As far as I can see, there are two big problems:

* Material. For the first issue I thought I'd run information on TREK 73, also some games we have on our system. I'll have whatever info I can get on TREK 75 and STAR 75. Other possibilities are a version of LUNAR which has an angle-of-thrust parameter in it, or maybe one with some kind of pictorial output for TTY. Also under consideration are articles on very, very expensive games, a free form input for any game, and an idea for a game called SPACER by John McClenny.

* Money to get it going: my already-strained capital reserves are being emptied by my TVT project, so I'm looking for another person who would be interested in co-editing M-5 and helping to defray the cost of getting it running.

That's about it — I'll keep you posted on M-5 and let you know if it ever gets printed.

Steve North
7 Deerhaven Lane
Newfoundland, NJ 07435
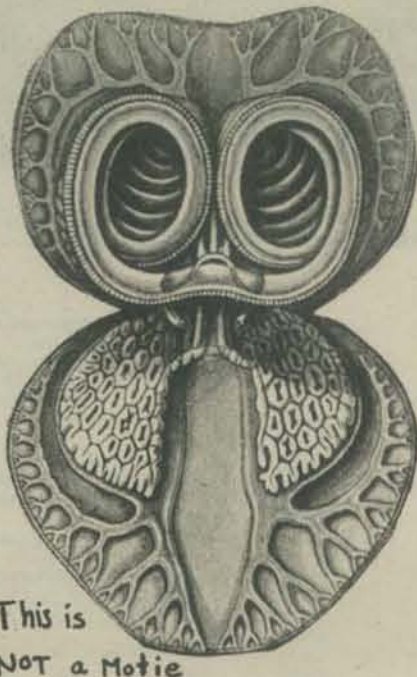
19

MOTIE
by Mac Oglesby

The scenario for this game was adapted from the novel *A Mote In God's Eye* by L. Niven and J. Pournelle. The game itself is an adaptation of "The Soldier's Game" described in detail in *The Master Book of Mathematical Recreations* by F. Schuh (Dover).   The program is written in Dartmouth BASIC.

```
100 ' NAME: ELEMLIB***:MOTIE
110 '
120 ' BY: MAC OGLESBY IN JUNE 1975.
130 '
140 ' DESCRIPTION: THE MOTIES ARE NON-HUMANS POSSESSING INCREDIBLE
150 '    TECHNOLOGICAL BRILLIANCE.  THEY BREED AS RAPIDLY AS BACTERIA
160 '    AND DESPERATELY NEED MORE ROOM.  IF THEY ELUDE THE GUARDIAN
170 '    STARSHIPS PROTECTING THE ONLY GATEWAY BETWEEN THE MOTIE WORLD
180 '    AND THE HUMAN EMPIRE, HUMANKIND WILL BE ENSLAVED, IF NOT
190 '    EXTERMINATED.
200 '
210 ' INSTRUCTIONS: TYPE "RUN" FOR COMPLETE INSTRUCTIONS.
220 '
230 ' REMARKS:  THE SCENARIO FOR THIS GAME WAS ADAPTED FROM THE NOVEL
240 '    "A MOTE IN GOD'S EYE" BY L. NIVEN AND J. POURNELLE.
250 '    THE GAME ITSELF IS AN ADAPTATION OF "THE SOLDIER'S GAME"
260 '    DESCRIBED IN DETAIL IN "THE MASTER BOOK OF MATHEMATICAL
270 '    RECREATIONS" BY F. SCHUH (DOVER).
280 '
290 '
300 '
310 DIM C$(15)                            'SAVE ROOM FOR 15 TURNS
320 RANDOMIZE
330 FOR J=0 TO 10
340   READ C(J)                           '# OF LEGAL GUARDIAN MOVES FROM J
350 NEXT J
360 DATA 3,3,3,3,2,5,2,2,3,2,0
370 FOR J=0 TO 10
380   READ F(J)                           '# OF LEGAL MOTIE MOVES FROM J
390 NEXT J
400 DATA 3,4,4,4,3,8,3,4,4,4,3
410 FOR J=0 TO 10
420   FOR K=1 TO C(J)
430     READ D(J,K)                        'LOCATIONS GUARDIAN CAN GO TO FROM J
440   NEXT K
450 NEXT J
460 DATA 1,2,3,  2,4,5,  1,3,5,  2,5,6,  5,7,  4,6,7,8,9,  5,9
470 DATA 6,10,  7,9,10,  8,10,  NONE
480 FOR J=0 TO 10
490   FOR K=1 TO F(J)
500     READ G(J,K)                        'LOCATIONS MOTIE CAN GO TO FROM J
510   NEXT K
520 NEXT J
530 DATA 1,2,3,  0,2,4,5,  0,1,3,5,  0,2,5,6,  1,5,7,  1,2,3,4,6,7,8,9
540 DATA 3,5,9,  4,5,8,10,  5,7,9,10,  5,6,8,10,  7,8,9
550 FOR J=0 TO 10
560   LET B$(J)=STR$(J)                   'B$() STORES DISPLAY STRINGS
570 NEXT J
580
590 PRINT "WANT INSTRUCTIONS FOR MOTIE";
600 LINPUT I$
610 IF SEG$(I$,1,1)<>"Y" THEN 640
620   GOSUB 2870                          'GO PRINT INSTRUCTIONS
630   GOTO 660
640 GOSUB 2520                            'SHOW HOW BOARD IS NUMBERED
650
660 PRINT "HOW MANY PLAYERS (1 OR 2)";   'REPLAY RETURNS TO HERE
670 INPUT P
680 IF P=1 THEN 780                       'COMPUTER LOCATES MOTIE
690   IF P=2 THEN 710
700     GOTO 660
710   PRINT "WHERE IS THE MOTIE VESSEL FIRST DETECTED";
720   INPUT G                             'G IS MOTIE LOCATION
730   IF (10-G)*(G-2)<0 THEN 760          'MOTIE STARTS AT 2-10 (BUT NOT 3)
740     IF G=3 THEN 760
750       GOTO 830
760   PRINT "CHOOSE LOCATION 2-10 (BUT NOT 3)."
770   GOTO 710
780 LET G=2+INT(RND*9)
790 IF G=3 THEN 810
800   GOTO 780
810 PRINT "OK, I'LL MOVE THE MOTIE VESSEL, FIRST DETECTED AT";G
820
830 LET B$(0)="*"                         'PLACE PIECES ON THE BOARD
840 LET B$(1)="*"
850 LET B$(3)="*"
860 LET B$(G)="&"
870 GOSUB 2680                            'RECORD INITIAL POSITIONS
880 PRINT
890 PRINT "* = GUARDIANS    & = MOTIE"
900 GOSUB 2740                            'PRINT DISPLAY
910
920 PRINT "  GUARDIAN (*) MOVE";
930 LINPUT G$
940 LET G1$=SEG$(G$,1,1)
950 IF G1$="S" THEN 1030
960   IF G1$="R" THEN 1010
970     IF G1$="H" THEN 990
980       GOTO 1050                       'CONTINUE
990       GOSUB 3090                      'PRINT PART OF INSTRUCTIONS
1000      GOTO 920
1010    PRINT "THE GUARDIANS HAVE GIVEN UP!!"
1020    GOTO 2210
1030  PRINT "PROGRAM HALTED"
1040  STOP
1050 IF LEN(G$)>10 THEN 1290
1060   LET Z1=0                           'ROUTINE TO DROP COMMAS, ETC.
1070   CHANGE G$ TO Z
1080   FOR J=1 TO Z(0)
1090     IF (ASC(9)-Z(J))*(Z(J)-ASC(0))<0 THEN 1120
1100       LET Z1=Z1+1
1110       LET Z(Z1)=Z(J)
1120     NEXT J
1130   LET Z(0)=Z1
1140   CHANGE Z TO G$
1150   IF (3-LEN(G$))*(LEN(G$)-2)<>0 THEN 1290
1160     IF LEN(G$)=2 THEN 1210
1170       LET G1=VAL(SEG$(G$,2,3))
1180       IF G1>10 THEN 1200
1190         GOTO 1220
1200       GOTO 1290
1210     LET G1=VAL(SEG$(G$,2,2))
1220     LET G0=VAL(SEG$(G$,1,1))
1230     IF B$(G0)<>"*" THEN 1290         'NO GUARDIAN AT B$(G0)
1240       IF STR$(G1)<>B$(G1) THEN 1290  'B$() IS OCCUPIED
1250         FOR K=1 TO C(G0)
1260           IF G1<>D(G0,K) THEN 1280
1270             GOTO 1330                'LEGAL MOVE
1280         NEXT K
1290 PRINT "ILLEGAL MOVE.  INPUT IGNORED."
1300 PRINT "FOR INSTRUCTIONS, TYPE HELP AS YOUR MOVE."
1310 GOTO 920
1320
1330 LET T=T+1                            'INCREMENT TURN COUNTER
1340 LET B$(G1)="*"
1350 LET B$(G0)=STR$(G0)
1360 GOSUB 2680                           'RECORD POSITIONS
1370
1380 IF P=1 THEN 1780                     'LET COMPUTER MOVE MOTIE
1390   IF C$(T)="0*23&*6*8910" THEN 1430  'CHECK FOR GUARDIAN WIN
1400     IF C$(T)="012*4**&78*10" THEN 1430
1410       IF C$(T)="0123456***&" THEN 1430
1420         GOTO 1440                     'CONTINUE
1430   GOTO 1850                          'GUARDIAN WIN
1440   PRINT "MOTIE (&) MOVE";
1450   LINPUT G$
1460   LET G1$=SEG$(G$,1,1)
1470   IF G1$="S" THEN 1550
1480     IF G1$="R" THEN 1530
1490       IF G1$="H" THEN 1510
1500         GOTO 1570                     'CONTINUE
1510       GOSUB 3090                      'PRINT PART OF INSTRUCTIONS
1520       GOTO 1440
1530     PRINT "THE MOTIE VESSEL GIVES UP!"
1540     GOTO 2390                         'REPLAY?
1550   PRINT"PROGRAM HALTED"
1560   STOP
1570 IF LEN(G$)>10 THEN 1730
1580   CHANGE G$ TO Z
1590   IF Z(0)>2 THEN 1730                'TOO MUCH MOVE
1600     IF Z(0)=1 THEN 1660
1610       IF Z(1)<>49 THEN 1650
1620         IF Z(2)<>48 THEN 1650
1630           LET G1=10
1640           GOTO 1680
1650       GOTO 1730
1660     LET G1=Z(1)-48
1670     IF (9-G1)*G1<0 THEN 1730
1680   IF B$(G1)<>STR$(G1) THEN 1730
1690     FOR K=1 TO F(G)
1700       IF G1<>G(G,K) THEN 1720
1710         GOTO 2080                     'LEGAL MOVE
1720     NEXT K
1730 PRINT "ILLEGAL MOVE.  INPUT IGNORED."
1740 PRINT "FOR INSTRUCTIONS, TYPE HELP AS YOUR MOVE."
1750 GOTO 1440
1760
1770 ' COMPUTER MOVES MOTIE
1780 LET T9=0                             'RESET COUNTER
1790 FOR K=1 TO F(G)
1800   IF B$(G(G,K))="*" THEN 1830        'GUARDIAN AT B$()
1810     LET T9=T9+1
1820     LET H(T9)=G(G,K)                  'IDENTIFY MOTIE'S POSSIBLE MOVES
1830 NEXT K
1840 IF T9<>0 THEN 1880                   'MOTIE NOT TRAPPED
1850   PRINT "MOTIE VESSEL CANNOT MOVE!"
1860   PRINT "THE GUARDIANS HAVE SAVED THE HUMAN GALACTIC EMPIRE!"
1870   GOTO 2390                          'REPLAY?
1880 FOR K=1 TO T9
1890   LET G1=H(K)
1900   IF T9=1 THEN 2050                  'NO CHOICE OF MOVES
1910     IF G1=4 THEN 2030                'MINIMAL STRATEGY SECTION AVOIDS
1920       IF G1=6 THEN 2000              'SOME OF THE OBVIOUS BLUNDERS
1930         IF G1<>8 THEN 1990
1940           IF C$(T)="0123**6&8*10" THEN 1980
1950             IF C$(T)="01234***8&10" THEN 1980
1960               IF C$(T)="01234***89&" THEN 1980
1970                 GOTO 2080
1980             GOTO 2060
1990         GOTO 2060
2000       IF C$(T)="012*4*67*&10" THEN 2020
2010         GOTO 2060
2020       GOTO 2060
2030     IF C$(T)<>"0*234*6&*910" THEN 2050
2040       GOTO 2060
2050   GOTO 2080
2060 NEXT K
2070
2080 LET B$(G1)="&"
2090 LET B$(G)=STR$(G)
2100 LET G=G1
2110 IF P=2 THEN 2130
2120   PRINT "MOTIE (&) GOES TO";G
2130 LET C$(T)=""                         'WIPE C$(T) CLEAN
2140 GOSUB 2680                           'RECORD POSITIONS AFTER TURN T
2150 GOSUB 2740                           'PRINT DISPLAY
2160
2170 ' ROUTINES TO CHECK FOR MOTIE WIN
2180 IF B$(J)<>"&" THEN 2230
2190   PRINT
2200   PRINT "THE MOTIE VESSEL HAS REACHED THE EMPIRE WORLDS!"
2210   PRINT "MAY ROCKEFORD PROTECT US!!"
2220   GOTO 2390
2230 IF T<15 THEN 2280
2240   PRINT
2250   PRINT "THE MOTIE VESSEL IS STILL LOOSE AFTER 15 MOVES!"
2260   PRINT "THE GUARDIANS HAVE FAILED!"
2270   GOTO 2390
2280 LET T9=0                             'RESET COUNTER
2290 FOR J=0 TO T-1
2300   IF C$(T)<>C$(J) THEN 2360
2310     LET T9=T9+1                       'COUNT MATCHES
2320     IF T9<2 THEN 2360
2330       PRINT
2340       PRINT "THAT'S 3 TIMES WE'VE SEEN THIS DISPLAY!"
2350       GOTO 2260
2360 NEXT J
2370 GOTO 920                             'GET NEXT GUARDIAN MOVE
2380
2390 PRINT
2400 PRINT "REPLAY";
2410 LINPUT I$
2420 IF SEG$(I$,1,1)<>"Y" THEN 2490
2430   FOR J=0 TO 10
2440     LET B$(J)=STR$(J)                 'RESET B$()
2450   NEXT J
2460   MAT C$=NUL$                         'RESET C$()
2470   LET T=0                             'RESET TURN COUNTER
2480   GOTO 660
2490 STOP
```

```
2510 ' PRINT HOW BOARD IS NUMBERED
2520 PRINT
2530 PRINT "MOTIE WORLD"
2540 PRINT "  10"
2550 PRINT " /:\"
2560 PRINT "7-8-9"
2570 PRINT ":\:/:  ALDERSON"
2580 PRINT "4-5-6  INTERSTELLAR"
2590 PRINT ":/:\:  JUMP POINTS"
2600 PRINT "1-2-3"
2610 PRINT " \:/"
2620 PRINT "  0"
2630 PRINT "HUMAN EMPIRE"
2640 PRINT
2650 RETURN
2660
2670 ' ROUTINE TO RECORD CURRENT POSITIONS
2680 FOR J=0 TO 10
2690    LET C$(T)=C$(T)&B$(J)
2700 NEXT J
2710 RETURN
2720
2730 ' PRINT DISPLAY
2740 PRINT
2750 PRINT "  ";B$(10)
2760 PRINT " /:\"
2770 PRINT B$(7);"-";B$(8);"-";B$(9)
2780 PRINT ":\:/:  TIME";T
2790 PRINT B$(4);"-";B$(5);"-";B$(6)
2800 PRINT ":/:\:"
2810 PRINT B$(1);"-";B$(2);"-";B$(3)
2820 PRINT " \:/"
2830 PRINT "  ";B$(0);
2840 RETURN
2850
2860 ' PRINT INSTRUCTIONS
2870 PRINT
2880 PRINT "BACKGROUND---"
2890 PRINT "  IN THE DISTANT FUTURE HUMANS CONTROL MOST OF THE GALAXY."
2900 PRINT "TRAVEL BETWEEN STAR SYSTEMS INVOLVES SPACE WARP JUMPS FROM"
2910 PRINT "ONE 'ALDERSON' POINT TO ANOTHER.  THE MOTIES ARE THE ONLY"
2920 PRINT "INTELLIGENT NON-HUMAN CREATURES EVER DISCOVERED.  ALTHOUGH"
2930 PRINT "BRILLIANT IN TECHNOLOGY, THE MOTIES CANNOT CONTROL THEIR"
2940 PRINT "POPULATION GROWTH AND DESPERATELY NEED NEW WORLDS.  EVER"
2950 PRINT "SINCE LEARNING OF THE ALDERSON JUMP POINTS THEY HAVE BEEN"
2960 PRINT "TRYING TO REACH AND OCCUPY THE HUMAN EMPIRE."
2970 PRINT
2980 PRINT "MAP OF JUMP POINTS BETWEEN MOTIE WORLD AND HUMAN EMPIRE:"
2990 GOSUB 2520
3000 PRINT "THE GAME---"
3010 PRINT "  MOTIE MAY BE PLAYED BY 1 OR 2 PLAYERS.  THE COMPUTER"
3020 PRINT "MAKES THE MOTIE MOVES IF THERE IS ONLY ONE PLAYER."
3030 PRINT
3040 PRINT "  THE EMPIRE IS PROTECTED BY 3 GUARDIAN STARSHIPS, LOCATED"
3050 PRINT "AT 0, 1 AND 3.  THE MOTIE VESSEL IS PLACED BY THE PLAYER"
3060 PRINT "OR BY THE COMPUTER AT ANY VACANT POINT."
3070 PRINT
3080 PRINT "  THE PLAYERS GO IN TURN, AND MUST MOVE IF POSSIBLE."
3090 PRINT "IN GENERAL, TO MOVE MEANS TO TRANSFER A PIECE TO AN ADJACENT"
3100 PRINT "VACANT POINT WHICH IS CONNECTED TO THE PRESENT LOCATION."
3110 PRINT "THERE ARE NO CAPTURES."
3120 PRINT
3130 PRINT "GUARDIANS WIN IF THE MOTIE IS TRAPPED (HAS NO LEGAL MOVE)."
3140 PRINT
3150 PRINT "MOTIES WIN IF STILL UNTRAPPED AFTER 15 TURNS, IF THERE IS"
3160 PRINT "3-TIME REPETITION OF POSITION, OR IF THEY REACH LOCATION 0."
3170 PRINT
3180 PRINT "GUARDIANS (*) CAN ONLY MOVE FORWARD (UP) OR SIDEWAYS,"
3190 PRINT "NEVER BACKWARD (DOWN).  FOR EXAMPLE, A GUARDIAN AT 3 MAY"
3200 PRINT "GO TO 2, 5, OR 6.  TO MOVE A GUARDIAN, TYPE 2 NUMBERS: FIRST,"
3210 PRINT "PRESENT LOCATION; SECOND, WHERE YOU WANT TO GO.  FOR EXAMPLE,"
3220 PRINT "35 MEANS THE GUARDIAN AT 3 WANTS TO GO TO 5."
3230 PRINT
3240 PRINT "THE MOTIE (&) CAN MOVE IN ANY DIRECTION.  FOR EXAMPLE, MOTIE"
3250 PRINT "AT 7 MAY GO TO 4, 5, 8, OR 10.  TO MOVE THE MOTIE, JUST TYPE"
3260 PRINT "THE LOCATION YOU WANT TO GO TO."
3270 PRINT
3280 PRINT "ALSO, TYPE S TO STOP, TYPE R TO RESIGN, TYPE H FOR HELP."
3290 PRINT
3300 RETURN
3310 END
```

The Mote in God's Eye by Larry Niven and Jerry Pournelle

It is the future.

Man has long ago conquered the galaxy and colonized the planets of the stars. Men have wandered through every edge and corner of their universe, have withstood every challenge and obstacle, and reigned supreme.

Then one day, from out of nowhere, a space ship appears. It carries the emissaries of a world so totally alien in creed and culture, so terrifyingly strange and bizarre, as to elude all comprehension or understanding. And yet it is a world as utterly frightening and dangerous as our own, our equal in power and technology. And perhaps in treachery and cunning.

Then, with horrible suddenness, the emissaries are accidentally killed and a danger signal has apparently been sent out. Now man is thrown into a headlong race, a race that leads man's star ships even into the center of a giant red sun, a race to find the world from which the ship has come and convince it of our goodwill.

Above all, this new world, so frighteningly strange, so eerie and alien, must be seen and reported on. These weird new beings are far too dangerous, far too cunning, for mistakes in understanding . . . .

From: Simon and Schuster
Rockefeller Center
630 Fifth Avenue
New York, NY 10020

This is NOT a Motie

This is NOT a Motie

```
RUN

MOTIE   13 DEC 75  12:42

MAKE ALL RESPONSES IN UPPERCASE CHARACTERS

WANT INSTRUCTIONS FOR MOTIE? YES

BACKGROUND---
  IN THE DISTANT FUTURE HUMANS CONTROL MOST OF THE GALAXY.
TRAVEL BETWEEN STAR SYSTEMS INVOLVES SPACE WARP JUMPS FROM
ONE 'ALDERSON' POINT TO ANOTHER.  THE MOTIES ARE THE ONLY
INTELLIGENT NON-HUMAN CREATURES EVER DISCOVERED.  ALTHOUGH
BRILLIANT IN TECHNOLOGY, THE MOTIES CANNOT CONTROL THEIR
POPULATION GROWTH AND DESPERATELY NEED NEW WORLDS.  EVER
SINCE LEARNING OF THE ALDERSON JUMP POINTS THEY HAVE BEEN
TRYING TO REACH AND OCCUPY THE HUMAN EMPIRE.

MAP OF JUMP POINTS BETWEEN MOTIE WORLD AND HUMAN EMPIRE:

MOTIE WORLD
  10
 /:\
7-8-9
:\:/:  ALDERSON
4-5-6  INTERSTELLAR
:/:\:  JUMP POINTS
1-2-3
 \:/
  0
HUMAN EMPIRE

THE GAME---
  MOTIE MAY BE PLAYED BY 1 OR 2 PLAYERS.  THE COMPUTER
MAKES THE MOTIE MOVES IF THERE IS ONLY ONE PLAYER.

  THE EMPIRE IS PROTECTED BY 3 GUARDIAN STARSHIPS, LOCATED
AT 0, 1 AND 3.  THE MOTIE VESSEL IS PLACED BY THE PLAYER
OR BY THE COMPUTER AT ANY VACANT POINT.

  THE PLAYERS GO IN TURN, AND MUST MOVE IF POSSIBLE.
IN GENERAL, TO MOVE MEANS TO TRANSFER A PIECE TO AN ADJACENT
VACANT POINT WHICH IS CONNECTED TO THE PRESENT LOCATION.
THERE ARE NO CAPTURES.

GUARDIANS WIN IF THE MOTIE IS TRAPPED (HAS NO LEGAL MOVE).

MOTIES WIN IF STILL UNTRAPPED AFTER 15 TURNS, IF THERE IS
3-TIME REPETITION OF POSITION, OR IF THEY REACH LOCATION 0.

GUARDIANS (*) CAN ONLY MOVE FORWARD (UP) OR SIDEWAYS,
NEVER BACKWARD (DOWN).  FOR EXAMPLE, A GUARDIAN AT 3 MAY
GO TO 2, 5, OR 6.  TO MOVE A GUARDIAN, TYPE 2 NUMBERS: FIRST,
PRESENT LOCATION; SECOND, WHERE YOU WANT TO GO.  FOR EXAMPLE,
35 MEANS THE GUARDIAN AT 3 WANTS TO GO TO 5.

THE MOTIE (&) CAN MOVE IN ANY DIRECTION.  FOR EXAMPLE, MOTIE
AT 7 MAY GO TO 4, 5, 8, OR 10.  TO MOVE THE MOTIE, JUST TYPE
THE LOCATION YOU WANT TO GO TO.

ALSO, TYPE S TO STOP, TYPE R TO RESIGN, TYPE H FOR HELP.

HOW MANY PLAYERS (1 OR 2)? 1
OK, I'LL MOVE THE MOTIE VESSEL, FIRST DETECTED AT 2
* = GUARDIANS   & = MOTIE

  10
 /:\
7-8-9
:\:/:  TIME 0
4-5-6
:/:\:
*-&-*          Motie is at Jump Point 2
 \:/
  *     GUARDIAN (*) MOVE? 3,5
MOTIE (&) GOES TO 3

  10
 /:\
7-8-9
:\:/:  TIME 1
4-&-6          Motie is at
:/:\:          Jump Point 3
*-2-&
 \:/
  *     GUARDIAN (*) MOVE? 02
MOTIE (&) GOES TO 0

  10
 /:\
7-8-9
:\:/:  TIME C
4-*-6
:/:\:
*-&-3
 \:/
  &     Disaster! Motie is at Jump Point 0.
THE MOTIE VESSEL HAS REACHED THE EMPIRE WORLDS!
MAY ROCKEFORD PROTECT US!!

WANT TO PLAY AGAIN? YES
HOW MANY PLAYERS (1 OR 2)? 1
OK, I'LL MOVE THE MOTIE VESSEL, FIRST DETECTED AT 9
* = GUARDIANS   & = MOTIE

  10
 /:\
7-&-&          Here is Motie, at Jump Point 9
:\:/:  TIME 0
4-5-6
:/:\:
*-2-*
 \:/
  *     GUARDIAN (*) MOVE? 35
MOTIE (&) GOES TO 6

  10
 /:\
7-8-9
:\:/:  TIME 1
4-*-&
:/:\:
*-2-3
 \:/
  *     GUARDIAN (*) MOVE? 0-3
MOTIE (&) GOES TO 9

  10
 /:\
7-8-&
:\:/:  TIME 2
4-*-6
:/:\:
*-2-*
 \:/
  0     GUARDIAN (*) MOVE?
  *
  *
  *
and so on
```
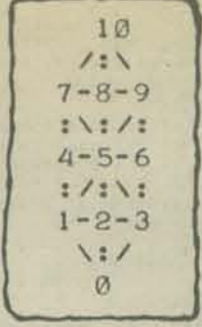

JUMP POINT MAP

```
  10
 /:\
7-8-9
:\:/:
4-5-6
:/:\:
1-2-3
 \:/
  0
```

READ THE BOOK and SEND US A PICTURE of a MOTIE

RESCUE

by Mac Oglesby

```
100 ' NAME: RESCUE***
105 '
110 ' BY: MAC OGLESBY ON 05/19/75
115 '
120 ' DESCRIPTION: AS COMMANDER OF A RESCUE STARSHIP, THE USER SETS
125 '    OUT IN RESPONSE TO A DISTRESS CALL FROM THE STARSHIP KIEWIT.
130 '    THE PASSENGERS AND CREW CAN BE SAVED FROM CERTAIN DEATH IF
135 '    THE STARSHIP KIEWIT IS REACHED WITHIN A DOZEN MOVES.  CERTAIN
140 '    FACTORS COMPLICATE RESCUE EFFORTS.
145 '
150 ' INSTRUCTIONS: TYPE "RUN" FOR COMPLETE INSTRUCTIONS.
155 '
160 ' CATEGORY: GAMES***
165 '
170 ' LANGUAGE: BASIC
175 '
180 ' INDEX LINE:
185 '     IS IT POSSIBLE TO !RESCUE THE !STARSHIP !KIEWIT?
190 '
195 '
200 ' INITIALIZATION
290 DIM D(12)                        'SAVE ROOM FOR DISPLAY STRING
300 RANDOMIZE
310 MAT READ B(6,6)                  'B(,) STORES DATA TO DETERMINE
320   DATA 1,0,1,0,1,0               'IF RESCUE SHIP'S MOVE IS LEGAL.
330   DATA 0,1,0,1,0,1               'A MOVE TO ADJACENT SQUARE IS OK
340   DATA 1,0,10,11,1,0             'IF PRESENT B(,) VALUE + NEW B(,)
350   DATA 0,1,11,10,0,1             'VALUE <> 0,2, OR 11.
360   DATA 1,0,1,0,1,0
370   DATA 0,1,0,1,0,1
380 MAT READ G(3)                    'READ DATA FOR PROHIBITED MOVES
390   DATA 0,2,11
400 PRINT
410 PRINT "*** MAYDAY *** MAYDAY *** MAYDAY ***"
420 PRINT "INTERSTELLAR STARSHIP KIEWIT CALLING."
430 PRINT "COMPUTER DISC FAILURE MODIFIED OUR NAVIGATIONAL SOFTWARE"
440 PRINT "AND WE HAVE SCRAPED AGAINST ASTEROID #ASK-33.  OUR HULL AND"
450 PRINT "LIFEBOATS ARE DAMAGED.  MOST OF OUR LIFE-SUPPORT SYSTEMS"
460 PRINT "HAVE BEEN DESTROYED.  IMMEDIATE ASSISTANCE IS ESSENTIAL."
470 PRINT "*** MAYDAY *** MAYDAY *** MAYDAY ***"
480 LET T=12                         'SAVE KIEWIT WITHIN T MOVES
490 FOR J=1 TO 6                     'REPLAY RETURNS TO HERE
500   FOR K=1 TO 6                   'P(,) STORES 6 BY 6 DISPLAY
510     LET P(J,K)=32                'INITIALLY, EACH P(,)=32
520   NEXT K
530 NEXT J
540 LET W1=W2=0                      'RESET MOVE TALLY, RESET WIN FLAG
550 IF RND<.5 THEN 580               'STARSHIP KIEWIT INITIALLY MOVES
560   LET M=1                        'SOUTH IF M=1
570   GOTO 590
580 LET M=-1                         'NORTH IF M=-1
590 LET R1=1+INT(RND*6)              'R1 IS ROW OF RESCUE SHIP
600 LET C1=6                         'C1 IS COLUMN OF RESCUE SHIP
610 LET P(R1,C1)=38                  'RESCUE SHIP SYMBOL IS &
620 LET C2=1+INT(RND*2)              'C2 IS COLUMN OF KIEWIT
630 LET R2=1+INT(RND*6)              'R2 IS ROW OF KIEWIT
640 IF P(R1,C1)=P(R2,C2) THEN 660    'START KIEWIT AT OPPOSITION
650   GOTO 620                       'TRY AGAIN
660 LET P(R2,C2)=42                  'KIEWIT SYMBOL IS *
670 PRINT
680 PRINT "DO YOU NEED INSTRUCTIONS";
690 LINPUT I$
700 IF SEG$(I$,1,1)<>"Y" THEN 720
710   GOSUB 2320
720 PRINT
730 PRINT "RESCUE STARSHIP (&) IS AT ";STR$(R1);",";STR$(C1)
740 PRINT "STARSHIP KIEWIT (*) IS AT ";STR$(R2);",";STR$(C2)
750 PRINT "SAVE STARSHIP KIEWIT BY MOVING INTO ITS SQUARE WITHIN";T;"MOVES"
760 PRINT
770 PRINT "MAP AT START"
780 GOTO 840
790 '
800 ' PRINT DISPLAY
810 '
820 PRINT
830 PRINT "MAP AFTER MOVE";W1
840 PRINT "  1 2 3 4 5 6"              'IDENTIFY COLUMNS
850 FOR J=1 TO 6                       '6 ROWS
860   PRINT STR$(J);                   'IDENTIFY EACH ROW
870   FOR K=6 TO 1 STEP -1             'ROUTINE TO IGNORE TRAILING SPACES
880     IF P(J,K)=32 THEN 900
890       GOTO 930
900   NEXT K
910   PRINT                            [COUNT]
920   GOTO 1060
930   LET D(0)=0                       'RESET DISPLAY STRING CHARACTER COUNT
940   FOR L=K TO 1 STEP -1
950     IF W2=0 THEN 1000              'NO WINNER YET
960       IF D(0)>0 THEN 1000          'WIN DISPLAY IS SET
970         LET D(2*L)=38              'SET UP WIN DISPLAY
980         LET D(2*L-1)=42
990         GOTO 1020
1000    LET D(2*L)=P(J,L)              'ASSEMBLE DISPLAY STRING
1010    LET D(2*L-1)=32
1020    LET D(0)=D(0)+2                'COUNT CHARACTERS
1030  NEXT L
1040  CHANGE D TO D$
1050  PRINT D$                         'PRINT BALANCE OF ROW J
1060 NEXT J
1070 IF W2=0 THEN 1170
1080 '
1090 ' WINNER!!                        [KIEWIT]
1100 '
1110   PRINT "THANK HEAVEN!!  YOU'VE SAVED THE PEOPLE ABOARD STARSHIP KIE"   [KIEWIT]
1120   PRINT "REPLAY";
1130   LINPUT R$
1140   IF SEG$(R$,1,1)<>"Y" THEN 1160
1150     GOTO 490
1160   STOP
1170 IF W1<T THEN 1240                 'NOT TTH MOVE
1180 '
1190 ' LOSER
1200 '
1210   PRINT "DISASTER!!  THE PEOPLE ABOARD STARSHIP KIEWIT HAVE PERISHED
1220   PRINT "FROM COLD AND LACK OF OXYGEN."
1230   GOTO 1120                       'ASK ABOUT REPLAY
1240 LET W1=W1+1                       'TALLY MOVES
1250 '
1260 ' GET USER'S MOVE
1270 '
1280 PRINT "RESCUE STARSHIP'S MOVE (ROW,COL)";
1290 LINPUT A$
1300 IF SEG$(A$,1,1)<>"S" THEN 1330    'CONTINUE
1310   PRINT "PROGRAM HALTED"
1320   STOP
1330 IF A$<>"HELP" THEN 1600
1340 '
1350 ' HELP SECTION PRINTS LEGAL MOVES
1360 '
1370   PRINT "YOU ARE NOW AT (ROW,COL) ";STR$(R1);",";STR$(C1)
1380   PRINT "YOU MAY MOVE TO ANY OF THESE SQUARES (ROW,COL):"
1390   IF R1=1 THEN 1410
1400     PRINT "  ";STR$(R1-1);",";STR$(C1);
1410   IF C1=1 THEN 1430
1420     PRINT "  ";STR$(R1);",";STR$(C1-1);
1430   IF C1=6 THEN 1450
1440     PRINT "  ";STR$(R1);",";STR$(C1+1);
1450   IF R1=6 THEN 1470
1460     PRINT "  ";STR$(R1+1);",";STR$(C1);
1470   IF (3-R1)*(4-R1)>0 THEN 1500    'NOT IN CENTER ROWS
1480     IF (3-C1)*(4-C1)<>0 THEN 1500 'NOT IN CENTER COLS
1490       PRINT "  ";STR$(ABS(7-R1));",";STR$(ABS(7-C1));
1500   PRINT
1510   PRINT "WANT THE COMPLETE INSTRUCTIONS";
1520   LINPUT I$
1530   IF SEG$(I$,1,1)="Y" THEN 1550
1540     GOTO 1280
1550     GOSUB 2320
1560   GOTO 1280
1570 '
1580 ' CHECK IF LEGAL MOVE
1590 '
1600 IF LEN(A$)<>3 THEN 1680           'A$ MUST BE 3 CHARACTERS
1610   CHANGE A$ TO A
1620   IF A(2)<>44 THEN 1680           'MIDDLE CHARACTER MUST BE COMMA
1630     LET R3=A(1)-48                'R3 IS TRIAL ROW
1640     LET C3=A(3)-48                'C3 IS TRIAL COLUMN
1650     IF (9-R3)*R3<0 THEN 1680      'R3 MUST BE A DIGIT
1660       IF (9-C3)*C3<0 THEN 1680    'C3 MUST BE A DIGIT
1670         GOTO 1710
1680 PRINT "YOU MUST TYPE 2 DIGITS SEPARATED BY A COMMA.  INPUT IGNORED."
1690 GOTO 1280
1700 '
1710 IF (6-R3)*(R3-1)<0 THEN 1830      'R3 MUST BE FROM 1 THRU 6
1720   IF (6-C3)*(C3-1)<0 THEN 1830    'C3 MUST BE FROM 1 THRU 6
1730     IF ABS(R3-R1)>1 THEN 1830     'CAN'T MOVE MORE THAN 1 ROW
1740       IF ABS(C3-C1)>1 THEN 1830   'OK 1 COLUMN
1750         IF ABS(R3-R1)+ABS(C3-C1)<>0 THEN 1780  'MUST MOVE
1760           PRINT "YOU MUST MOVE YOUR SHIP!"
1770           GOTO 1830
1780       FOR J=1 TO 3                'CHECK FOR PROHIBITED DIAGONAL MOVE
1790         IF B(R1,C1)+B(R3,C3)<>G(J) THEN 1810
1800           GOTO 1830
1810       NEXT J
1820       GOTO 1860
1830 PRINT "ILLEGAL MOVE.  TYPE HELP IF YOU NEED IT.  INPUT IGNORED."
1840 GOTO 1280
1850 '
1860 LET P(R3,C3)=38                   'LEGAL MOVE, SO MOVE RESCUE SYMBOL
1870 LET P(R1,C1)=32                   'OLD LOCATION BECOMES A SPACE
1880 IF ABS(R2-R3)+ABS(C2-C3)<>0 THEN 1910  'NO WINNER YET
1890   LET W2=1                        'SET WIN FLAG
1900   GOTO 820                        'GO PRINT WIN DISPLAY
1910 LET R1=R3                         'UPDATE RESCUE SHIP'S LOCATION
1920 LET C1=C3
1930 '
1940 ' STARSHIP KIEWIT MOVE SECTION
1950 '
1960 IF ABS(R1-R2)+ABS(C1-C2)>2 THEN 2200  'RESCUE SHIP REMOTE, IGNORE IT
1965 '
1970 FOR J=1 TO 2
1980   LET R3=R2+M                     'CHANGE ROW
1990   IF ABS(R1-R3)>ABS(R1-R2) THEN 2020  'MOVED AWAY, CHECK LOCATION
2010     GOTO 2040
2020   IF (6-R3)*(R3-1)<0 THEN 2040    'OUT OF BOUNDS
2030     GOTO 2240                     'STILL ON BOARD, SO RECORD MOVE
2040   LET M=-M                        'REVERSE DIRECTION
2050 NEXT J                            'AND TRY ONCE MORE
2055 '
2060 FOR J=1 TO 2
2070   LET C3=C2+M                     'CHANGE COLUMN
2080   IF ABS(C1-C3)>ABS(C1-C2) THEN 2110  'MOVED AWAY, CHECK LOCATION
2090     GOTO 2130
2110   IF (6-C3)*(C3-1)<0 THEN 2130    'OUT OF BOUNDS
2120     GOTO 2160                     'STILL ON BOARD, SO RECORD MOVE
2130   LET M=-M                        'REVERSE DIRECTION
2140 NEXT J                            'AND TRY ONCE MORE
2145 '
2150 GOTO 2200                         'CAN'T MOVE AWAY, SO JUST MOVE
2160 LET P(R2,C3)=42                   'MOVE KIEWIT SYMBOL
2170 LET P(R2,C2)=32                   'OLD LOCATION BECOMES A SPACE
2180 LET C2=C3                         'UPDATE LOCATION
2190 GOTO 2270                         'GO PRINT NEW LOCATION
2200 LET R3=R2+M                       'CHANGE ROW
2210 IF (6-R3)*(R3-1)=>0 THEN 2240     'STILL ON THE BOARD
2220   LET M=-M                        'REVERSE DIRECTION
2230   GOTO 2200                       'AND TRY AGAIN
2240 LET P(R3,C2)=42                   'MOVE KIEWIT SYMBOL
2250 LET P(R2,C2)=32                   'OLD LOCATION BECOMES A SPACE
2260 LET R2=R3                         'UPDATE LOCATION
2270 PRINT "STARSHIP KIEWIT GOES TO ";STR$(R2);",";STR$(C2)
2280 GOTO 820                          'GO PRINT DISPLAY
2290 '
2300 ' INSTRUCTIONS
2310 '
2320 PRINT
2330 PRINT "THE YEAR IS 2087.  YOU ARE COMMANDER OF AN ORBITAL RESCUE"
2340 PRINT "STATION.  IN RESPONSE TO THE DISTRESS CALL FROM STARSHIP"
2350 PRINT "KIEWIT, YOU SET OUT TO TRY TO RESCUE ITS CREW AND PASSENGERS"
2360 PRINT "BEFORE THEIR OXYGEN IS EXHAUSTED."
2370 PRINT
2380 PRINT "THE PEOPLE ABOARD THE KIEWIT WILL BE SAVED IF YOU CAN MOVE"
2390 PRINT "INTO THE SQUARE IT OCCUPIES WITHIN";T;"MOVES."
2400 PRINT
2410 PRINT "THE ACTION IS DISPLAYED ON A BOARD OF 6 SQUARES BY 6 SQUARES."
2420 PRINT "THE SQUARE AT UPPER LEFT IS ROW 1, COLUMN 1."
2430 PRINT "YOU SPECIFY A MOVE BY TYPING 2 DIGITS (1-6) SEPARATED BY"
2440 PRINT "A COMMA.  THE FIRST NUMBER TELLS THE ROW AND THE SECOND"
2450 PRINT "THE COLUMN."
2460 PRINT
2470 PRINT "AT EACH TURN YOU MOVE THE RESCUE STARSHIP TO ANY ADJACENT"
2480 PRINT "SQUARE WHICH HAS A SIDE IN COMMON WITH YOUR CURRENT SQUARE."
2490 PRINT "YOU MAY MOVE DIAGONALLY ONLY BETWEEN THE 4 CENTER SQUARES,"
2500 PRINT "WHICH ARE (ROW,COL): 3,3  3,4  4,3  4,4."
2510 PRINT
2520 PRINT "STARSHIP KIEWIT ALSO MOVES, FOR THE COMPUTER MALFUNCTION"
2530 PRINT "PREVENTS TOTAL ENGINE SHUT-DOWN OR PROPER NAVIGATION.  AND"
2540 PRINT "NOTE:  KIEWIT'S AUTOMATIC METEOR AVOIDANCE SYSTEM HAS BEEN"
2550 PRINT "JAMMED 'ON' BY THE COLLISION, WHICH MEANS THE KIEWIT TENDS"
2560 PRINT "TO AVOID ANY OBJECT WHICH APPROACHES TOO CLOSELY."
2570 PRINT
2580 RETURN
2590 END
```

A SINGLE QUOTE ' BEGINS A REMARK

```
*** MAYDAY *** MAYDAY *** MAYDAY ***
INTERSTELLAR STARSHIP KIEWIT CALLING.
COMPUTER DISC FAILURE MODIFIED OUR NAVIGATIONAL SOFTWARE
AND WE HAVE SCRAPED AGAINST ASTEROID #ASR-33. OUR HULL AND
LIFEBOATS ARE DAMAGED. MOST OF OUR LIFE-SUPPORT SYSTEMS
HAVE BEEN DESTROYED. IMMEDIATE ASSISTANCE IS ESSENTIAL.
*** MAYDAY *** MAYDAY *** MAYDAY ***

DO YOU NEED INSTRUCTIONS? YES

THE YEAR IS 2087. YOU ARE COMMANDER OF AN ORBITAL RESCUE
STATION. IN RESPONSE TO THE DISTRESS CALL FROM STARSHIP
KIEWIT, YOU SET OUT TO TRY TO RESCUE ITS CREW AND PASSENGERS
BEFORE THEIR OXYGEN IS EXHAUSTED.

THE PEOPLE ABOARD THE KIEWIT WILL BE SAVED IF YOU CAN MOVE
INTO THE SQUARE IT OCCUPIES WITHIN 12 MOVES.

THE ACTION IS DISPLAYED ON A BOARD OF 6 SQUARES BY 6 SQUARES.
THE SQUARE AT UPPER LEFT IS ROW 1, COLUMN 1.
YOU SPECIFY A MOVE BY TYPING 2 DIGITS (1-6) SEPARATED BY
A COMMA. THE FIRST NUMBER TELLS THE ROW AND THE SECOND
THE COLUMN.

AT EACH TURN YOU MOVE THE RESCUE STARSHIP TO ANY ADJACENT
SQUARE WHICH HAS A SIDE IN COMMON WITH YOUR CURRENT SQUARE.
YOU MAY MOVE DIAGONALLY ONLY BETWEEN THE 4 CENTER SQUARES,
WHICH ARE (ROW,COL): 3,3  3,4  4,3  4,4.

STARSHIP KIEWIT ALSO MOVES, FOR THE COMPUTER MALFUNCTION
PREVENTS TOTAL ENGINE SHUT-DOWN OR PROPER NAVIGATION. AND
NOTE: KIEWIT'S AUTOMATIC METEOR AVOIDANCE SYSTEM HAS BEEN
JAMMED 'ON' BY THE COLLISION, WHICH MEANS THE KIEWIT TENDS
TO AVOID ANY OBJECT WHICH APPROACHES TOO CLOSELY.

RESCUE STARSHIP (&) IS AT 1,6
STARSHIP KIEWIT (*) IS AT 5,2
SAVE STARSHIP KIEWIT BY MOVING INTO ITS SQUARE WITHIN 12 MOVES.

MAP AT START
  1 2 3 4 5 6
1           &
2
3
4
5   *
6
RESCUE STARSHIP'S MOVE (ROW,COL)? 2,5
ILLEGAL MOVE. TYPE HELP IF YOU NEED IT. INPUT IGNORED.
RESCUE STARSHIP'S MOVE (ROW,COL)? HELP
YOU ARE NOW AT (ROW,COL) 1,6
YOU MAY MOVE TO ANY OF THESE SQUARES (ROW,COL):
  1,5  2,6
WANT THE COMPLETE INSTRUCTIONS? NO
RESCUE STARSHIP'S MOVE (ROW,COL)? 1,5
STARSHIP KIEWIT GOES TO 6,2

MAP AFTER MOVE 1
  1 2 3 4 5 6
1         &
2
3
4
5
6   *
RESCUE STARSHIP'S MOVE (ROW,COL)? 1,4
STARSHIP KIEWIT GOES TO 5,2

MAP AFTER MOVE 2
  1 2 3 4 5 6
1       &
2
3
4
5   *
6
RESCUE STARSHIP'S MOVE (ROW,COL)? 1,3
STARSHIP KIEWIT GOES TO 4,2

MAP AFTER MOVE 3
  1 2 3 4 5 6
1     &
2
3
4   *
5
6
RESCUE STARSHIP'S MOVE (ROW,COL)? 2,3
STARSHIP KIEWIT GOES TO 3,2

MAP AFTER MOVE 4
  1 2 3 4 5 6
1
2     &
3   *
4
5
6
RESCUE STARSHIP'S MOVE (ROW,COL)? 22
YOU MUST TYPE 2 DIGITS SEPARATED BY A COMMA. INPUT IGNORED.
RESCUE STARSHIP'S MOVE (ROW,COL)? 2,2
STARSHIP KIEWIT GOES TO 4,2

MAP AFTER MOVE 5
  1 2 3 4 5 6
1
2   &
3
4   *
5
6
RESCUE STARSHIP'S MOVE (ROW,COL)? 3,2
STARSHIP KIEWIT GOES TO 5,2

MAP AFTER MOVE 6
  1 2 3 4 5 6
1
2
3   &
4
5   *
6
RESCUE STARSHIP'S MOVE (ROW,COL)? 4,2
STARSHIP KIEWIT GOES TO 6,2
```

```
MAP AFTER MOVE 7
  1 2 3 4 5 6
1
2
3
4   &
5
6   *
RESCUE STARSHIP'S MOVE (ROW,COL)? 5,2
STARSHIP KIEWIT GOES TO 6,3

MAP AFTER MOVE 8
  1 2 3 4 5 6
1
2
3
4
5   &
6     *
RESCUE STARSHIP'S MOVE (ROW,COL)? 5,3
STARSHIP KIEWIT GOES TO 6,4

MAP AFTER MOVE 9
  1 2 3 4 5 6
1
2
3
4
5     &
6       *
RESCUE STARSHIP'S MOVE (ROW,COL)? 5,4
STARSHIP KIEWIT GOES TO 6,5

MAP AFTER MOVE 10
  1 2 3 4 5 6
1
2
3
4
5       &
6         *
RESCUE STARSHIP'S MOVE (ROW,COL)? 5,5
STARSHIP KIEWIT GOES TO 6,6

MAP AFTER MOVE 11
  1 2 3 4 5 6
1
2
3
4
5         &
6           *
RESCUE STARSHIP'S MOVE (ROW,COL)? 5,6
STARSHIP KIEWIT GOES TO 6,5

MAP AFTER MOVE 12
  1 2 3 4 5 6
1
2
3
4
5           &
6
DISASTER!! THE PEOPLE ABOARD STARSHIP KIEWIT HAVE PERISHED
FROM COLD AND LACK OF OXYGEN.
REPLAY? NO
```

(handwritten note) ← SEE MAP OF OK MOVES BELOW *

(handwritten note) ← Rescue Ship

(handwritten note) ← Starship Kiewit

(handwritten cloud note) SEND A GAME TO PCC. IF WE PUBLISH YOUR GAME, YOU GET A FREE COPY OF WHAT TO DO AFTER YOU HIT RETURN, OUR BIG BOOK OF COMPUTER GAMES.

**************************************
DARTMOUTH BASIC

RESCUE and MOTIE are written in Dartmouth BASIC. If you
have trouble understanding the programs or translating them to
your version of BASIC, you might want to get your very own
Dartmouth BASIC Reference Manual. For info on this and other
publications, get TM086, *Publications List*, a complete catalog
of technical memoranda and other publications produced by the
Kiewit Computation Center at Dartmouth College.

From: DTSS, Inc., Box 799, Hanover, NH 03755
****
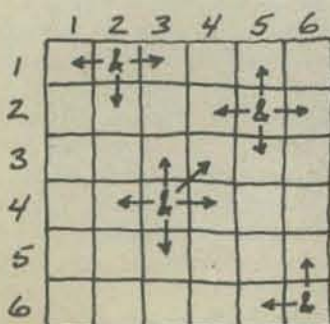
(handwritten, with grid) ARROWS SHOW OK MOVES FOR THE RESCUE SHIP. DIAGONAL MOVES OK ONLY FROM A CENTER SQUARE TO ANOTHER CENTER SQUARE. CENTER SQUARES ARE 3,3 3,4 4,3 4,4

HELP!

KIEWIT

val

23
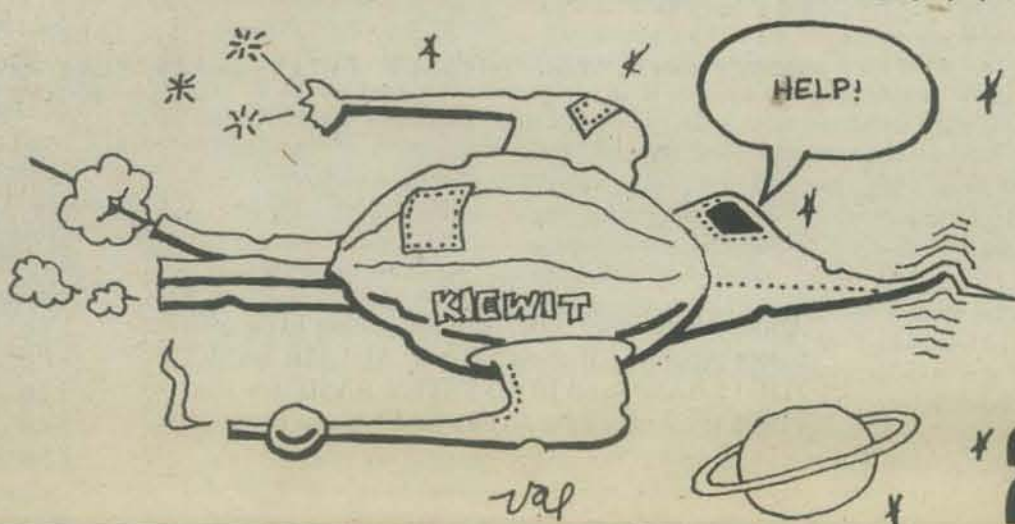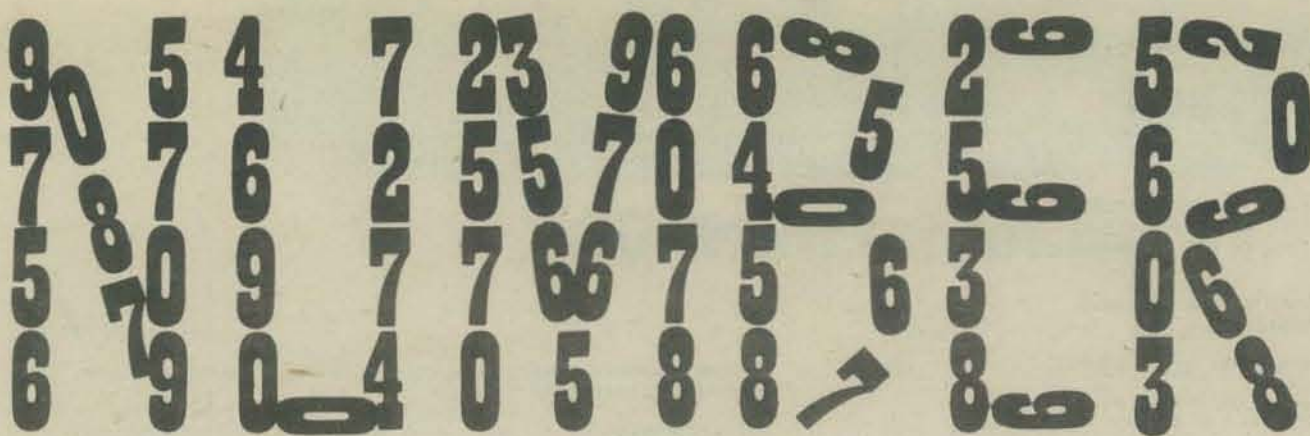
Continued from 75Nov PCC, pages 4 & 5. Last time (perhaps you recall) we left you to contemplate the following program to play NUMBER.

```
100 REM *** NUMBER - A NUMBER GUESSING GAME
110 LET X=INT(100*RND(1))+1 : PRINT
130 PRINT "I'M THINKING OF A WHOLE NUMBER FROM 1 TO 100."
140 PRINT "GUESS MY NUMBER!!!"
150 PRINT : INPUT "YOUR GUESS";G
180 IF G<X THEN PRINT "TOO SMALL. TRY A BIGGER NUMBER.":GOTO 150
190 IF G>X THEN PRINT "TOO BIG. TRY A SMALLER NUMBER.":GOTO 150
250 PRINT "YOU GUESSED IT!!! LET'S PLAY AGAIN.":GOTO 110
999 END
```

This is in ALTAIR BASIC. I think it will also run in BASIC-II or BASIC PLUS for the PDP II. Would someone try it & let me know?

BUT NOT IN PDP-8 EDUSYSTEM BASIC. TELL YOU ABOUT THAT NEXT TIME

Hmmm . . . let's look at that strange INPUT statement in Line 150:

The statement   **INPUT "YOUR GUESS";G**   tells the computer to type   **YOUR GUESS?**
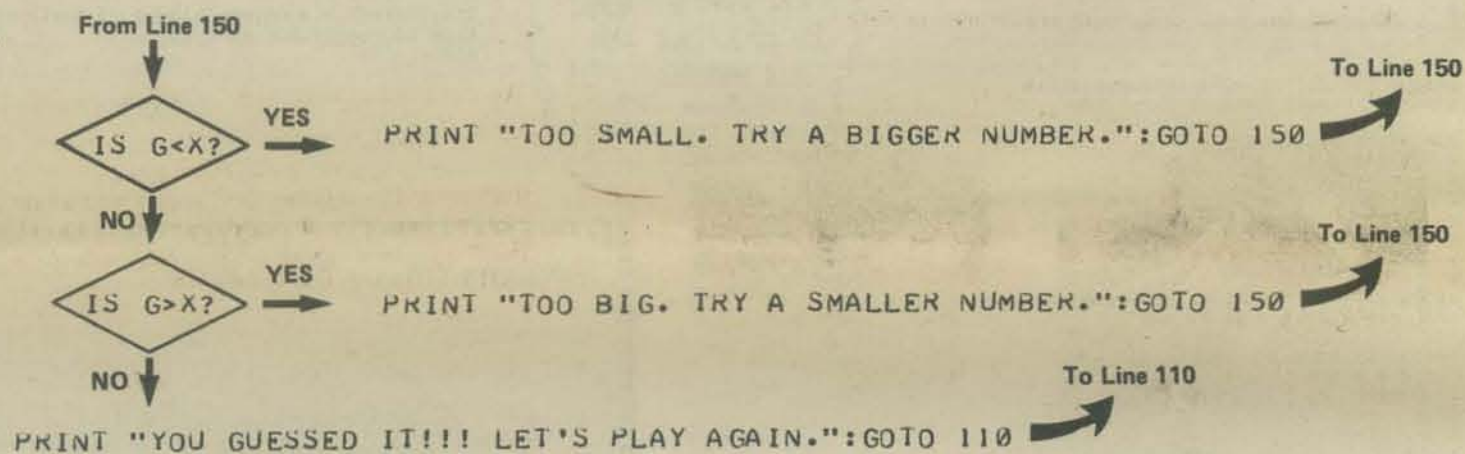
We enter our guess

YOUR GUESS? 37 and the computer puts it in G

G
37

(Or, more pedantically, the computer assigns the value, 37, to the variable, G.

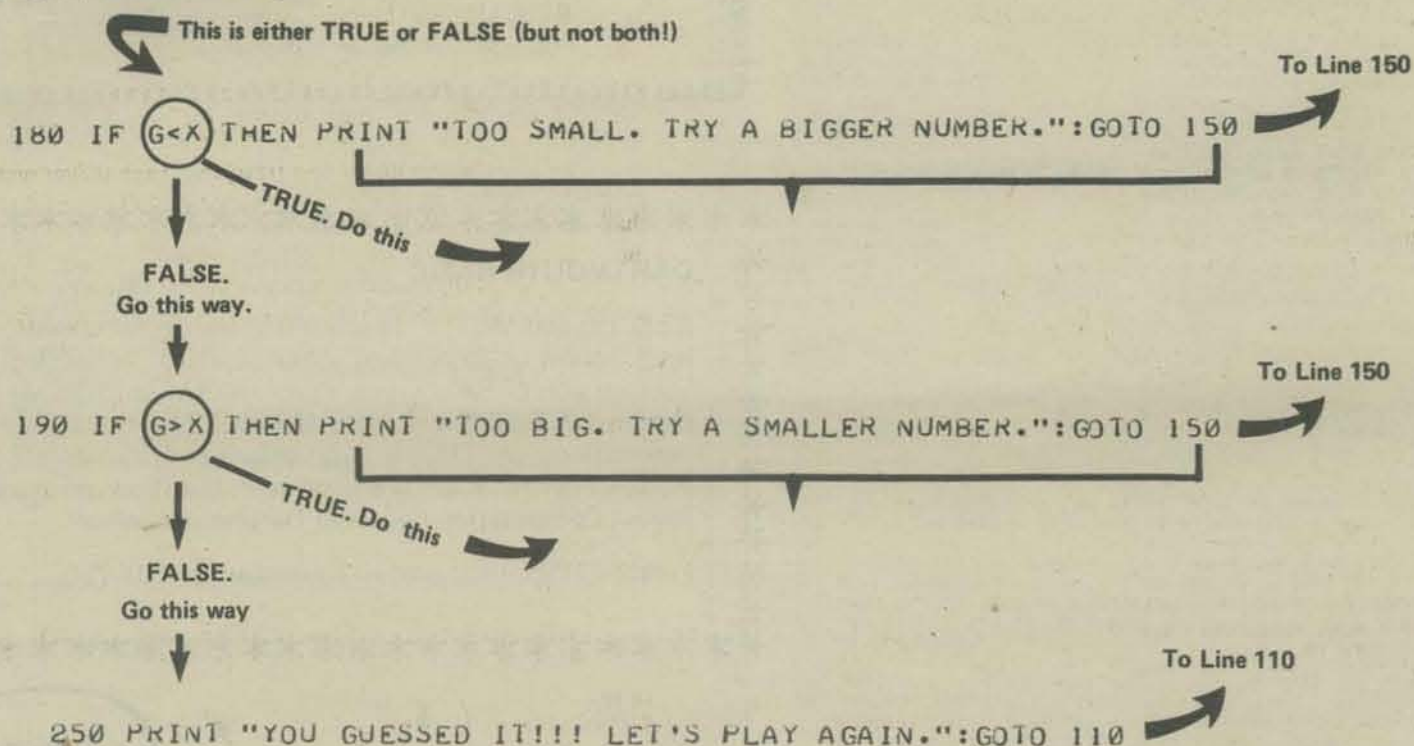AND THEN, OF COURSE, THE COMPUTER WAITS PATIENTLY FOR YOUR GUESS.

And so we get to Lines 180, 190 and 250.

They work like this:

From Line 150

IS G<X?   →YES→   PRINT "TOO SMALL. TRY A BIGGER NUMBER.":GOTO 150   To Line 150

NO ↓

IF G IS NOT LESS THAN X AND NOT GREATER THAN X, THEN G MUST BE EQUAL TO X.

IS G>X?   →YES→   PRINT "TOO BIG. TRY A SMALLER NUMBER.":GOTO 150   To Line 150

NO ↓   To Line 110

PRINT "YOU GUESSED IT!!! LET'S PLAY AGAIN.":GOTO 110

OK, we'll say it again, a different way.

This is either TRUE or FALSE (but not both!)

To Line 150

180 IF (G<X) THEN PRINT "TOO SMALL. TRY A BIGGER NUMBER.":GOTO 150

TRUE. Do this

FALSE. Go this way.

To Line 150

190 IF (G>X) THEN PRINT "TOO BIG. TRY A SMALLER NUMBER.":GOTO 150

TRUE. Do this

FALSE. Go this way

To Line 110

250 PRINT "YOU GUESSED IT!!! LET'S PLAY AGAIN.":GOTO 110

Another example? OK, here is a simple little coin tosser program. It should run in ALTAIR BASIC, PDP-11 BASIC and EDUSYSTEM BASIC for the PDP-8 (you may have to add an END statement).
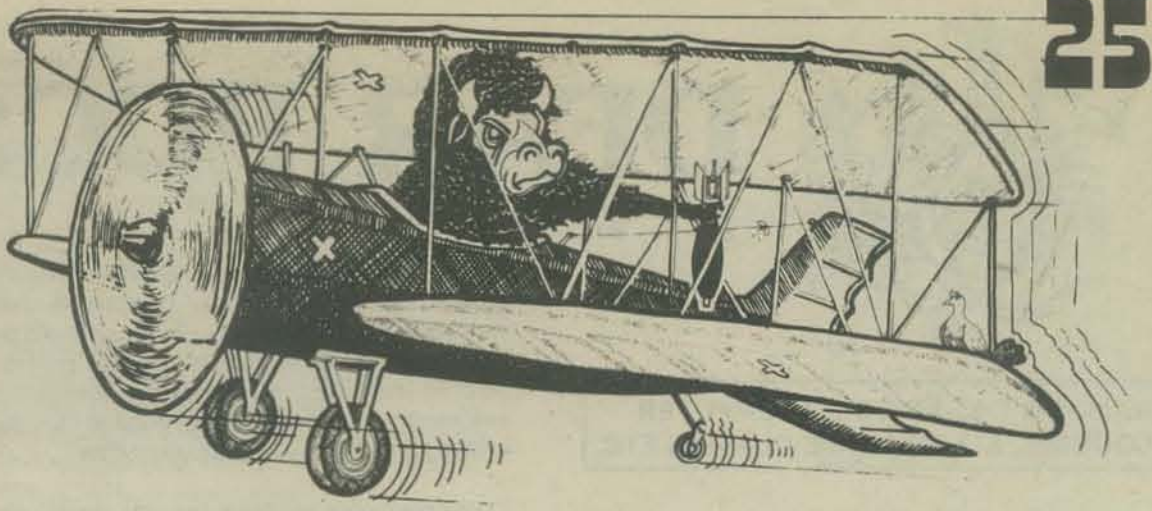
```
100 REM *** COIN TOSSER
110 FOR K=1 TO 20
120 LET R=RND(1)
130 IF R<.5 THEN PRINT "TAILS",
140 IF R>=.5 THEN PRINT "HEADS",
150 NEXT K
```

FLYING BUFFALO

BY

RICHARD LOOMIS

It's been almost two years since we reported on computer-games-by-mail from Flying Buffalo. The Buffalo seems to be thriving, with lots of new stuff, including both play-by-mail and table top games from the world of fantasy and science fiction.

Flying Buffalo Inc. is a small company dedicated to the production of games for the entertainment of people of all ages. We have two kinds of games. We sell table games which you play with your friends on the kitchen table. We also have some play-by-mail games, which are a little harder to describe.

If you want to play one of our play-by-mail games, you send us the game fee and tell us which game you want to play. We accumulate enough players to fill the game, and then start the game. You would be in a game with players from around the country (sometimes from other countries as well). Each two weeks, you fill out a turn sheet giving us specific instructions for what you want to do that turn. We take all the turn sheets and feed the numbers into our computer (a Raytheon 704 minicomputer). We get back a printout telling what happened to each player that turn. The printout is mailed to you along with a new turn sheet. You discover that player No. 3 has destroyed one of your spaceships, and player No. 7 has invaded one of your planets. Also, you find that the new planet you just went to with your super-battleship belongs to player No. 3 (aha). So you instruct your battleship to blast player No. 3 off his planet, your reserve ships to rush to the invaded planet, and you send a couple cruisers to get back at No. 7. The moves are two weeks apart, and the average game lasts from 6 months to a year.

PLAY-BY-MAIL GAMES

RAUMKRIEG – A tactical space game. Each player has 10 space ships (one flagship, three battlecruisers, and 6 scouts). The object is to destroy as many ships as possible belonging to other players. Rules cost $0.15 and the game fee is $4.50.

MOON BASE – A simple search-and-destroy game set on the moon. Each player has artillery, mines (moving and fixed) "crawlers" and command posts. You find the other players' command posts and destroy them before they find yours. Rules cost $0.25 and the game fee is $4.50 per game.

TIME TRAP – The only *real* time travel game I've seen. Try to outguess your opponents. If you guess wrong, go back and change what you did last turn! Very simply, each player has 5 "assasins" who try to kill each other. Each turn you move your 5 men around, plus you have the option of using up some of your saved up "energy" to go back into the past and change one or more of your previous turns. Your men accumulate victory points by surviving. Rules cost $0.15 and game fee is $4.00 per game.

STARWEB – Out newest play-by-mail game. It is not quite programmed for the computer yet, but I hope that it will be running and ready to go by the time this article is printed (January). This is a strategic space game. You start with control of a star system in a universe with 240 star systems. Your system is connected to several other systems by a "GATE" which allows instant transportation between the star systems. You have industry, raw materials, and ships. You use your industry and raw materials to build more ships, with which you explore the neighboring star systems. If you are the first player there, you can capture the systems and expand your empire. Eventually you will meet other players, and must decide whether to make alliances and trading agreements, or start a war. (You don't know how many other players are in the game). The most interesting thing about this game is that you pick what kind of "creature" you want to be before you start. For example, you can decide to be an empire builder. You get victory points for owning planets which have large populations, industry, or raw material production. The more worlds you own, the more industry you build, the more points you get. Or you can decide that your race is a race of merchants. You get points for carrying raw materials from planet to planet, or for building "consumer goods" with your raw materials. If you decide to be a pirate, you get points for plundering worlds and capturing spaceships. If you decide to be an Apostle, you get points for converting the populations of other planets to your religion. (If you convert the whole population of a planet, you gain control of the planet!). You also get points for each of your people who get killed (martyrs), but lose points for every shot you fire (you are a pacifist!). You can even be a Berserker. Berserkers are robots. They don't worry about the population limits on world they control. Berserkers get victory points for killing people, destroying ships, and blowing up entire planets! We haven't decided on a game fee for STARWEB , but it will probably be a set-up fee plus a per turn fee.

TABLE TOP GAMES

STARLORD – A strategic space game for 2 to 8 players. It is probably best with 4 to 6 players. It is similar to STARWEB. Each player starts with a star system and a large stockpile of raw materials. You have a list of 20 different kinds of ships to build. You build ships and fly to other star systems. When you get there, you find out how many raw materials the system produces. You load up the raw materials on your transport ships and carry them back to your home system to build more ships. There are no pieces for STARLORD. Included are plastic charts. Each time you build a new ship, you write it with a grease pencil on your chart. Included are charts, maps, and table for four players. The game costs $5.00.

STELLAR CONQUEST – One of the best space games around. A strategic space game, but much more complex and lengthy than STARLORD. It is for 2 to 4 players. You capture star systems and produce ships. In SC you must put colonies on the planets, and the colonies grow. This game adds research. You can spend part of your production on weapons research, ship movement research, or industry research. Example, each player starts with the capability to move two spaces per turn with each ship. If he spends 30 of his industrial capacity on movement research, his ships may move 3 spaces per turn. You have 4 movement turns, and then a build turn. The game goes for 40 turns. Price is $9.00.

ALIEN SPACE – A tactical space game with a rules booklet and 8 cardboard ship drawings. This game is played on a large table, or on the floor. You move your ships around by measuring off inches with a rule, and you fire by estimating the angle between your ship and the enemy ship. (I fire a portion orpedo at 83 degrees). There are several special weapons and each player has his own. ALIEN SPACE costs $4.50 and extra ships are $3 a set.

HELMS DEEP & MINAS TIRITH – Games based on the Tolkein series *Lord of the Rings*. HELMS DEEP is an easy game with a few pieces, and can be played in 30 - 45 minutes. It is a very good game to start with, for people who have not played this kind of game before. But it is not so simple that it gets boring. I have played it dozens of times. The evil Orcs and Dunlanders are trying to climb over the wall, kill the good guys of Rohan, and kill King Theoden. (Price $3.00) MINAS TIRITH has a bigger map, lots more counters, and takes longer to play. Again the good guys are defending, and the bad guys are trying to break into the city. Price is $5.50.

DUNGEONS AND DRAGONS – This game has started a whole new field of gaming. You get a set of three booklets of rules, which describe how to set the game up and how to play it. This is a pencil and paper game. One player must be the "DungeonMaster". He spends several hours before the game preparing a dungeon for the other players to explore. The dungeon is people with various monsters, traps, secret doors, and treasures. Each player picks what kind of character he wants to be (fighter, magic user, etc) and rolls the dice to see his characteristics (strength, wisdom, dexterity, etc). When the players are ready, they march down into the dungeon in a group. The DungeonMaster tells them what they see as they move along, and they tell the DM which direction they wish to turn, which doors they want to open, etc. The idea is for the players to kill the monsters, escape the traps, and find the treasures. In this game the players don't really compete with each other. They help each other kill the monsters, and share the treasure. I guess they are really competing with the DungeonMaster to see if they can outguess him. If you can manage to get some treasure and get back out of the Dungeon with it, you can "keep" the treasure until the next time you play. The character that you went in with gains "experience". The next time you use that character, he will be stronger and better. You can keep using the same character until he gets killed. The game is great fun, but quite lengthy and fairly expensive. The basic set of 3 rules books costs $10. Plus, you will probably want the GREYHAWK supplement (another rule book) for $5, and a set of the special dice (a four sided die, an 8 sided one, a 12-sided one, and a 20 sided one) for $3. If you don't want to spend that much, you can get a similar but less elaborate game called TUNNELS & TROLLS. This is one booklet for $3, with a supplement for $1, and it uses regular dice. There are enough differences in the game that it is worth buying both if you can afford it. If you don't want to have to set up your own dungeon, there is an easier and shorter game. It is just called DUNGEON! This game has a map, plastic pieces, monster cards, treasure cards, and can be learned in 15 minutes. I takes from ½ hour to 2 hours to play, and is for 2 to 12 players. It is simple, lots of fun, a real family game. I am giving it to my friends who have children, because it is simple enough for 8 – 10 year olds, but still complex enough for adults to have fun with. It costs $12.50.

THE EMPIRE OF THE PETAL THRONE – This is the deluxe fantasy game set on Tekumel, an alien planet where a cosmic cataclysm stranded human and extra-terrestrial beings. A hostile world of poisonous flora and fauna, with intelligent and vengeful races! This game has three large, very colorful maps(plastic treated paper that won't tear), and a rule book detailing backgrounds, rules and data on life forms and the language of Tekumel. There are no pieces, however. You have to use your own miniatures. The price is $25.

All of these games are available postpaid from Flying Buffalo Inc, P. O. Box 1467, Scottsdale, AZ, 85252. (We will send COD for $1 extra.)

DEAR PCC:

RANDOM THOUGHTS ON COMPUTER COURSES, KIT BUILDING CLASSES ETC.

For the past seven years I have been trying to establish classes relating to computers in a small (700-900 students) high school with limited success. I thoroughly agree with Lee Felsenstein ". . . The important thing is you have to get others involved. You'll break your fanny doing it, but if you want to get more than a one terminal minimum system you are going to have to substantiate your need . . ."

The traditional approach was followed in my earlier attempts (i.e., course approved by: 1) Dept. Head, 2) principal, 3) superintendent, 4) schoolboard.) There are so many blind alleys, dead-end streets, etc., to this approach (as learned from bitter experience) that I would discard it immediately. Moreover it fails completely to consider the kids for which the project was intended in the first place.

A one semester course was finally approved for the 1974-75 school year with the provision that no school funds be used.

Generous vendors were cajoled, wheedled, and mis-led (unintentionally, of course). Equipment was loaned or demonstrated for periods of one hour to a week at a time. We tried everything from programmable calculators to time shared terminals, from keyboard programming to manually punched cards, and CRT outputs to printers and x-y plotters.

This was probably the most disorganized course I have ever taught. No textbooks — just dittoed material lifted from various authors (Bob Albrecht included). We passed around manufacturers'operation manuals while jumping from no language to BASIC to FORTRAN and back again. The course structure was dictated by which vendor was coming through that week. Still no money spent, but much learning going on no matter how disorganized we were. We finally ran out of vendors.

The high school math teachers (4) then formed an association to acquire equipment and whatever else might be needed. The teachers dug into their own pockets for money. We found a disreputable office supply company which sold us a used programmable calculator at a new price with no down payment. The contract was passed on to an "unsuspecting" local bank showing a substantial down payment which the supply company told us was their contribution to our program — anything for (to) the schools. The class was now in business.

Our next project was to raffle a $15 calculator. This netted us about $100 to add to our association dues. We now had enough to meet our payments for the remainder of the school year plus the summer months. Our entire math department budget for 75-76 was set aside to meet payments for this school year, and we are now holding our second annual calculator raffle to carry us through the summer.

Sometime last summer I happened to send in a membership to the Oregon Council for Computer Education and received a copy of the PCC news. I was hooked. My 11-year old son and I rushed to Menlo Park for a visit to CCC and PCC. We talked, used computers, bought back copies of PCC news and books, had a look at your Altair and came away fully charged, what a great group of people.

On pouring over PCC news I realized what fools we had been — re: calculator, education, etc. How our eyes were opened!

Some months later – we are now trying to jell a computer group (possibly non-profit corp.) for educational and community uses. We are building our own Altair (once again on a time payment plan). But that's another story for a later time.†

The original intent of this report was to discuss plans for a kit building class for kids. This is to be a fun class within our somewhat formal education system. My approach to the computer class was so miserably received that I decided to reverse the procedure and:

(1) See if the students wanted and would sign up for such a course
(2) Seek support from department teachers and school counselors

Once student desire is shown, we will let them help to involve those above who rule. We must eventually decide on what direction the class will take. Should the students decide what projects they will build or should there be some direction provided? Could they build a computer in kit form over a period of time and thus help support the existing computer class?

I must remember to keep it fun even though they will gain some skills and maybe even a little knowledge along the way.

Where will the money for the kits come from? Maybe our outside non-profit computer corp can help in this. Buy the kits, pay the kids for building them in return for the finished projects. Then donate computer time to the computer class and other school departments.

Well let's forge ahead. Any ideas from you out there in computerland will be appreciated. We will start by placing a notice in the school bulletin for a meeting of interested students before going off on a wild goose chase. Then we will appeal to all school and community people interested in kids for aid — parts, kits, money, anything. Not too fast though — why not wait to see what the kids want to do? This is their class.

Now I appeal to all of you for ideas on how to keep this thing going. I may have a tiger by the tail. Who ever heard of school being fun? All for now — another report later.

> Don Inman,
> 350 Nelson Road
> Scotts Valley, Ca. 95066

† We are calling our group *Mountain Digital Group.* We are putting the final touches to our ALTAIR 8800 and should have it up running by Christmas.

THE CLASSIC USER LOOP

We are a known group of four owners of CLASSIC computers in educational settings:

LO*OP CENTER
8099 La Plaza
Cotati, Ca. 94928
Liza Loop, Anthony Lynn, Paul Kruger, Sarah Goldes

DICK DORF
Dean, Division of Extended Learning
UC, Davis
Davis, Ca. 95616

DAN ISAACSON
Cordova Senior HS
2239 Chase Drive
Rancho Cordova, Ca. 95670

FATHER FOLEY
St. Mary's School
Stockton, Ca.

I believe there are others, so please pass this letter on.

The computer world seems to be producing newsletters right and left, so I suggest we keep this one short, sweet, and oriented toward solving our problems. LO*OP CENTER will be glad to publish it unless somebody else offers, I suggest one or two pages whenever we receive that much important material instead of a periodical stuffed with filler. So please send a few lines on your pressing problems and frustrations, your exciting discoveries, and, most important, your routine applications. Do let me know if you'd like your material reproduced as is or edited.

If publication costs become burdensome, we'll ask for donations. I look forward to hearing from all of you.

> Liza Loop
> Director, LO*OP CENTER

The average engineer receives from three to twelve magazines a month (besides *Playboy*). Any addition to that reading load must pass the test of non redundancy, and must also provide him with information necessary to either enhance his technical knowledge or to improve his understanding of the area in which he practices. After reading one issue of SPARK, I am adding it to my load.

This issue (Spring 75) ran the gamut from Unionization of Engineers (they're for it) to worker safety (for), to Engineers working during strikes (against) and general Corporate ethics (against). This magazine makes little pretense of being impartial and even handed. This is understandable, since such publications are not get-rich-quick operations, and those who make the sacrifices inherent in such publications need powerful motivation. Most engineers should be able to supply balance from their other inputs and the application of sound engineering judgement.

The implication in several of the articles that engineers would automatically make socially desirable decisions if only they had the strength of unionization is open to question. It is unionized automobile workers who on occasion sabotage cars that other workers purchase at great prices, just to work out their personal pique. But it can't be denied that the organized engineer who does choose to make an ethical stand contrary to management is in a stronger position to make that stand. I only question whether most would bother to use that strength for anything beyond personal economic advantage.

It may surprise a lot of liberal arts grads to know that engineers have been agonizing the question of the social and environmental impact of their works for many years. A look at the Code of Ethics of the National Society for Professional Engineers shows that it, like the ten commandments, would bring about an ideal world if everyone were to adhere to its rules religiously. The problem for the engineer has always been interfacing these ideal rules with the real world, and surviving. This mag may help some of us make the hard choice.

> O.S. (The Old Soldier)

Publication of the Committee for Social Responsibility in Engineering, 475 Riverside Drive, New York NY 10027, $1.00/issue, $10.00/year (includes membership) with various discounts for unemployed ($2.00), student ($5.00) broke ($1.00) and affluent (Over $10.00).

ACCESS TO ENERGY

A Pro-Science, Pro-Technology, Pro-Free enterprise monthy newsletter –

Box 2298 Boulder, Colorado 80302
Published by Dr. Petr Beckman, EE Professor,
University of Colorado
Subscription, $6.00/year

If anyone rates the title of "Devils Advocate" of the alternate energy source field, it would have to be Dr. Beckman. While some of the more responsible pro alternate energy publications are careful to point out the limitations of wind, water, solar and biomass, others will give the impression that the only reason every home in the United States does not have total energy independence is the greedy supression of necessary technology by the "Energy Cartel."

Dr. Beckman has nice things to say about nuclear energy and bad things to say about anti-nuclear forces and their arguments, things that have to be said and examined by us if we are going to make informed decisions in the energy field.

> O.S. (The Old Soldier)

Articles for 73 . . . the readers are hams and experimenters . . . the magazine has been emphasizing the fun of building . . . or pioneering. I need articles on the hardware side which tell what you need in hardware to do what . . . for what applications. How to hook things together. How to get them working . . . what to look for when there is trouble . . . where to get more info on the circuits.

While most of the articles in 73 are ham radio oriented, we do go off on all sorts of tangents and as a result the magazine has gathered a good readership of experimenters as well as hams. Much of the article material has to do with construction projects and little is written for the scientist.

Software . . . I'd like to have articles telling the difference between various computer languages so readers will understand what is involved in them . . . definitions in detail of assembly language vs compiler vs editor vs monitor vs executive vs all the other terms used loosely and specifically. I'd like to have it so readers would be able to cope with computer literature eventually.

I need articles which are fundamental . . . written for high school grads, not engineers . . . and written in English, not computerese. We'll have to teach the computer language of flags, registers, memory dumps and compilers. What we need is an enthusiastically written book on the subject of basic computers to run chapter by chapter in 73. Unfortunately no such book has yet been written, to my knowledge. It would be something like an expanded encyclopedia . . . taking each computer term and explaining it thoroughly. On the hardware end it would go into circuits which are available in kit form, boards which are available . . . with home building plans for the constructors.

Computer hobbyists want articles on peripherals . . . controllers, on all of the new gadgets. They want to know what ROMs are . . . EROMs, PROMs, RAMS, core, dynamic memory, static memory . . . they want to know how registers work, ALUs, what the differences are between 8080s, 6800s, 6501s, 6502s, F8s etc. They want to have some idea of what the difference is between various instruction sets and what this means in terms of use. They want to know about the many languages . . . which they need to know for hobby systems . . . how to learn more. They want to know about computer games . . . understand them . . . know where to get the programs for them . . . what to read to learn more. Computer music . . . how to get started, how to learn more, what is happening, literature. And computer art . . . ditto all along the line. What about business uses, how do they get programs for that? Suppose they want to get into computer sales and service . . . ?

I hope you get the idea. If anyone asks, we pay for all articles used. We pay on acceptance and pay rather well.

73 – – Wayne Green
Peterborough, New Hampshire 03458

LOWEST RANDOM NUMBER

PCC, I dare you to find a lower random number! This random number popped up one day from an HP 2000F and the people who run the system said it was impossible!

HOW MANY? 20200
4.83356E–07

HOW MANY? 100
7.41859E–03

HOW MANY? 1000
1.99115E–04

HOW MANY?

Melanie Harvey
1081 Keith Avenue
Berkeley, Ca. 94708

RANDOM NUMBER GENERATOR

Something I forgot to mention yesterday is the teeny-weeny random number generator I wrote when we first did UGUESS on the old PDP8. The strategy should be applicable to core-conscious micro's as well. It relies on interrupts although it can be reworked to do without 'em.

(1) Do all housekeeping, type instructions on TTY
(2) Type first question "WHAT IS YOUR GUESS?"
(3) Turn on TTY keyboard interrupt
(4) Put complement of highest integer to be chosen in accumulator (e.g., for random numbers 1 to 100, put 7634_8 in accumulator).
(5) Enter tight loop: increment ac; if non-zero, goto 5, if zero, goto 4.
(6) Keyboard interrupt – take number in ac, complement it, and VOILA! one random integer – random because the machine instruction cycle in step 5 is way too fast for humans to predict or control.

The machine picks its number while it waits for you to make your first guess. The number is related to the time it takes you to decide and type the first character.

Bill Mayhew
Boston Children's Museum
The Jamaica Way
Boston 02130

ALTERNATIVE PRESS INDEX

The ALTERNATIVE PRESS INDEX is published quarterly by the Alternative Press Centre, Inc., and indexes by subject approximately 120 underground and alternative newspapers, magazines and journals. The format is similar to that of the Reader's Guide to Periodical Literature. Our staff does the indexing using subject headings from to Periodical Literature. Our staff does the indexing using subject headings from our Indexing Guide, which was developed by members of the Centre to meet the special needs of the periodicals that are indexed. Computers are then used to compile the data and publish the INDEX.

The Alternative Press Centre, Inc. is a not-for-profit educational organization formed in 1969 as the Radical Research Center, Carleton College, Northfield, Minnesota. Its goal was to undertake the task of indexing and collecting alternative periodicals of the American and Canadian Left. The Centre was established with the aid of a small grant and is now run on income from subscriptions. For several years it was located in Rochdale College, Toronto, Ontario, Canada but has been recently moved to College Park, Maryland.

Copies of our subject heading list, which is of use to anyone classifying alternative materials, are available for $2.50. Copies of a list of the periodicals that we are currently indexing, with up-to-date subscription information, are available free upon request. For info, write –

Alternative Press Centre, Inc.
P. O. Box 7209
Baltimore, MD 21218

FORTRAN GAMES – FREE!

I'm going out of business. Since I will hopefully be in some college in 10 months, I'd like to give out my programs while I can. My FORTRAN IV library includes STARS, BAGELS, BUTTON, HURKLE, MUGWUMP, SNARK, BANNER, SUN-SIGN, LIFE (2 versions), WUMPUS, HAMURABI, STOCK, TRADER, STAR TREK, LUNAR, REVERSE, TAXMAN, MATNUM, LOVE, and the public CAVES, to name a lot. If anyone is interested, write –

Eric Haines
212 N. Riding Drive
Moorestown, NJ 08057
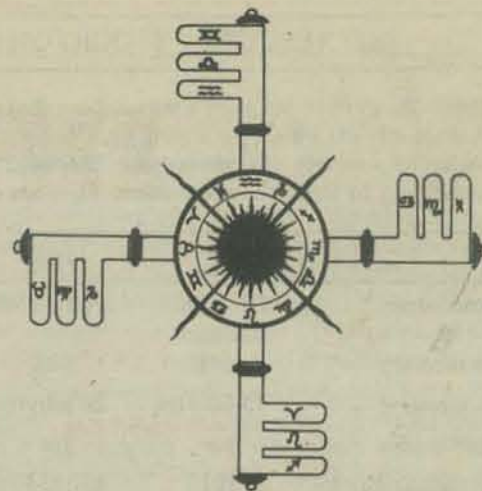
WANTED: ASTROLOGY PROGRAM

A couple of program requests. Do you have or know of a program that interrogates you about your birth date and other areas and then computes your astrological star chart and/or predicts your accurate horoscope? After all, there are certain calculations that astrologers go through to derive these things after they get specific dates and times from you. Please let me know. Also, your "Biosin" program is cute and interesting and accurate for me in a few instances. However, a very accurate Bio-Rhythm is a several month study where the person records his feelings and physical condition. Then this data is read in and his Bio-Rhythm computed from previous months' reactions. Do you have a program that takes data compiled in this fashion and computes a more precise Bio-Rhythm?

Gary Trapp
310 Julian St.
Denver, Colorado 80219

COMPUTER ART/CHESS IN BASIC

The September issue of COMPUTER BULLETIN (published by the British Computer Society, 29 Portland Place, London W1N 4HU) has a few interesting items:

On page 13 is an article by John Lansdown, *Not Quite Computing – Almost Art*. He discusses several art-generating programs, including SPLASH (listing appears in *Plons* 1972-74 published by Verfindustrie Jac Eyck BV, Heerlen, Holland, Eikenderweg 75) and DRAGON DYCK (listing appears in a recent issue of *Artinfo Musinfo*, published by the Group Art et Informatique of the University of Paris). The same article also mentions *Page*, the bulletin of the Computer Arts Society (also published in France).

In the same issue of COMPUTER BULLETIN is a letter by M.A. Bramer, who mentions that he has a sophisticated chess program running in BASIC. His program embodies a novel pattern-matching method requiring no tree-searching whatever.

J.G. Day
17042 Gunther Street
Granada Hills, Ca. 91344

LIFE IN RPG?

Thanks for the Buyer's Guide in the November issue. For however short a time it's up to date, it will serve as an overall view in an area where one can easily be overwhelmed by the flood of claims. Don Tarbell's cassette interface seems really impressive; 800 BPI is a quite acceptable commercial density for a single data track.

LIFE has gotten around well but programming it in RPG seems beyond the reach of the language (I've programmed LIFE in FORTRAN and know something about RPG). LIFE concentrates on internal data manipulation, at which RPG is poor. Nevertheless, part of the fun of computing is pushing languages to the limit and I would hesitate to proclaim the impossibility of the task. Incidentally, Carl Helmers is also trying to determine the current status of LIFELINE.

One of the programs you might consider for publication is one alluded to in the November issue of *Industrial Research*, article starting on page 52. The program, which determines the complexity of text, is being made available free of charge by General Motors. Appearance in one of your publications could spread it around quite a bit more.

Glenn R. Puro
169 Lafayette Avenue
Geneva, NY 14456

BID RESULTS — STOCKTON UNIFIED SCHOOL DISTRICT

Stockton recently went to bid with a set of specs that essentially asked for a 32 terminal system that could be used in three schools who were setting up a computer lab. The lab will be used for CAI, problem-solving and simulation by a variety of departments. Stockton is under court-ordered desegration rulings and using money from ESAA to make the acquisition. Here are the results. WHICH WOULD YOU CHOOSE?????

ITEM	HP	DEC	DATA GENERAL	ICE†
System name	HP 2000 Access	PDP 11/40	NOVA 3/12	PDP 11/35
Core memory	64K	64K	64K	64K
Disk memory	15 Mbytes	20 Mbytes	2-10 Mbytes	20 Mbytes
Magnetic tape	yes	yes	no	yes
Cash purchase price including 32 terminal capability	$78016	$80454	$51559	$84834
Annual maintenance	$582	$633	$753	$629

Data General's low bid was rejected for the following reasons:

(1) No guarantee of response time of less than 3 seconds
(2) No magnetic tape back-up as required by specs
(3) Extended BASIC does not meet four specified requirements and in general is inferior to those proposed by all other vendors
(4) Limited program library including no math drill and practice and no graphics capabilities
(5) Limited author language
(6) High monthly maintenance
(7) 150 day delivery
(8) Little committment to education — only 5% of DG business.

We'd like to publish more information like this. Send your results in this format and we'll print them!

Contact person — Bill Games, Franklin Senior HS, 300 N. Gertrude Ave., Stockton, Ca. 95205

† ICE is a San Francisco based reseller of DEC hardware.

COSMAC

A letter from Bobby Baum in Vol. 4, No. 2 of PCC states that COSMAC is the most expensive computer he knows of. He has been smoking something that good dragons shouldn't smoke. COSMAC costs $40 (quantity one) which makes it one of the least expensive, as well as easiest to use microprocessors available. Bobby goes on to extoll the virtures of COS/MOS so I don't have to repeat them here. Perhaps the fact that Bobby is a thinker rather than a doer prevents him from checking facts before knocking some doer's superior product in public.

Joe Weisbecker
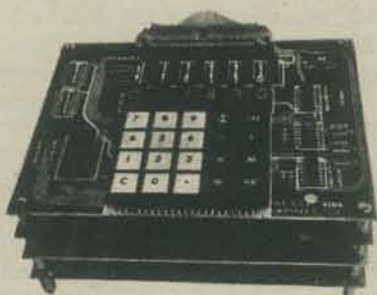1220 Wayne Avenue
Erlton, Cherry Hill, NJ 08034

ATTENTION MIKE OWNERS!

Over 100 pages of hardware design and software listings are available in MIKE Information Packet Number One. Included are theory, operation and design of interfaces with specific designs for cassettes, modems, TTY 33ASR, and CREED; count-down circuit, push/pop stack; and swap registers. Over 50 pages of software listings are included with programs for keyboard and display testing, memory test, digital clock, conversion of hexadecimal keyboard to 64 keys, cassette monitor CREED I/O routines, and "Super Nim" game. Much of this information can be used on any 8008 based system with appropriate changes in the I/O assignments and the bus structure. To receive all of the above, please send a $5 check to

Jim Farschon
3949 Mt. Everest Blvd
San Diego, Ca. 92111
(714) 292-9180

WORKSHOPS

TIES — Total Information for Educational Systems is a cooperative effort among Independent School Districts in Minnesota. The enrollment of member districts is in excess of 260,000 students. TIES employs advanced systems concepts and computer technology to support the functions and operations of individual districts.

In October 1974, in cooperation with the Council of Chief State School Officers, the Office of the Deputy Commissioner for the Bureau of School Systems, USOE the Minnesota Department of Education and the Minnesota Educational Computer Consortium, the staff of TIES presented an Orientation Workshop to representatives from almost every State and Territory. In response to requests for further workshops the Minnesota School Districts Data Processing Joint Board has elected to offer such workshops on a regular basis. Contact TIES, 1925 West County Rd. B2, St. Paul, Mn. 55113.

ON-LINE

A buy and sell forum for the computer hobbyist. ON-LINE is a classified advertising newsletter for computer hobbyists who want to buy, sell, or swap hardware, software, services related to small business, home or personal use of computers. Get your free sample from

D.H. Beetle, Publisher
24695 Santa Cruz Hwy.
Los Gatos, CA 95030

RIKER-MAXSON TERMINAL

A friend and I recently entered the micro-computer world with the purchase of an Altair. We also ordered a Riker-Maxson "terminal" from MiniMicro Mart in New York, along with their PIO board and TVT III board and ASCII encoder board.

The Altair hardware was good quality for the most part, but assembly instructions were fair to poor! Several parts were missing (but could easily be obtained from many local supply houses). The hardware failed to function on initial power up and required several hours to debug. Most problems were traced to errors in the assembly instructions whose applicable errata sheets were somehow over-looked! Only one IC was bad. The proliferation of jumper wires required indicates that someone could have done a little more homework, but considering price and performance its not a bad deal.

Regarding the Riker-Maxson terminal acquired at considerable aggravation from MiniMicroMart. It is a nice piece of equipment but will require some resourceful additions and aterations to achieve a successful interface with Altair. We received the terminal shortly after we ordered it, in reasonably good condition (some rust on the heavy cast frame). It took several days for the distinct odor of "dankness" to disappear! These units have apparently been in storage for some time!

The keyboard was made by Micro Systems and is very nice. The output is five level Baudot which should be hardware converted to ASCII for best interfacing. MMM (MINIMICROMART) was to have supplied the converter hardware for only ten dollars; BUT so far they have failed to do so. They did send a parallel I/O board with parts (minus a few capacitors) that works OK for interactive type interfacing and they provided a circuit diagram and a sort of pictorial assembly guide. The instructions were very brief and contained an error regarding the on board power supply regulator hookup. Stuff obtained from MMM is definitely NOT for the inexperienced (or impatient) builder.

We have converted our terminal to ASCIII using a 2K PROM and a couple of TTL's. The modified keyboard is now capable of generating almost the entire ASCII set, including both upper and lower case alphabet. We also have software for using the terminal in an interactive mode which we will send to anyone who sends us a SASE. Those of our readers who have purchased the R-M terminals and are having trouble getting them operational (MMM is little or no help) can write to me and I will send diagram and PROM truth table for making the ASCII converter at no charge. Parts cost is about $25.

I recommend purchase of the R-M terminal to those who would like a cheap substitute for commercially available units and have the electronic skills to implement operation. We intend to purchase a used model 33 printer to install in our R-M terminal (cost: $350 to $500) which has the space and built in power hookup for it. This would provide a good and cosmetically attractive substitute for ASR-33 TTYs. I believe the people at MMM are basically honest, but not in a position to deliver most of what they advertise.

To our knowledge, MITS is the only company that has delivered any substantial quantity of merchandise with any semblance of regularity!! By the way, their BASIC software is the best and most incredible software value ever offered!!! It makes their hardware the leader by 20 megabytes! (I.E., if your personal integrity prevents you from ripping them off — which I hope it does.)

Our plans for the future include development of some sort of compiler for use on 8080 based systems to generate accounting and minor data processing operations for small businesses. We hope to establish a "micro-software" house. We firmly believe that micro-technology has made small computers a very viable product for small businesses and the software demands will become astronomical in a few years.

Although we intend to profit by use of micro-computers we also firmly believe in the concepts of computer power to the people as outlined in earlier issues of your magazine. The dawn of a new age is nearing and its exciting to be a part of it. We wish you continued success and best wishes for the New Year.

Stephen M. Freeman
Mark Sumner
No. 18 University Heights
Hopkinsville, Kentucky 42240

COMPUTER FAIR
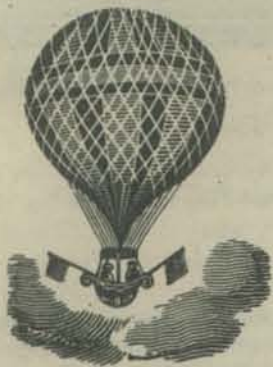
To be held at the White Plains Public Library

It's Time for student computer fans to start working on their projects for the Hudson Regional Computer Fair, which will be held on March 27, 1976 at the White Plains Public Library.

The Hudson Regional Computer Fair is a preliminary fair to the 1976 National Student Computer Fair, which will be held in June 1976 at the New York Coliseum. These computer fairs are intended to promote and encourage the imaginative use of computers by elementary, middle, and high school students.

Any project which relates in some way to the world of computers and computing can be entered in the Fair competition. You can use a computer to draw a picture or you can draw a picture of a computer. You can design a game, build a computer, write a story, prove a theory, create a tool for the home or school, express an opinion, write a program, explore the economy, develop a code, simulate an event, compose a tune, or solve a problem.

Projects should fit into one of the following nine categories:

Computer Art — Graphics, Film, Music, Sculpture
Computer Games
Computer Tools for the Home
Computer Tools for the School
Application Programs — Business, Math, Science, Humanities, etc.
Computer Science — Systems software (compilers, interpreters) algorithms, etc.
Construction and Hardware
Computing Milieu — History of computers, social implications etc.
Other

The White Plains Public Library has been selected as the site of the Hudson Regional (Westchester, Putman, Rockland, Dutchess, and Fairfield counties) Computer Fair, since it houses the only public-access computer in the Metropolitan area. This fair is sponsored by the Library, Comput-O-Mat Systems, and Wang Labs. Comput-O-Mat Systems provides the system support for the Library. Wang Labs has provided their 2200B computer.

Entry blanks and guide lines can be obtained at the Reference Desk of the White Plains Public Library, located at 100 Martine Ave. in White Plains.

Additional information and entry blanks for educators can be obtained by calling Mrs. Harriet Shair at (914) 967-7853.

SNOBOL FOR THE ALTAIR?

Thanks for the great publication and other nice things — like dragon shirts! What a way to learn.

I have a problem. Without considering any possible consequences, I have committed myself to writing a SNOBOL compiler (interpreter?) for an ALTAIR 8800. My officemate has built the ALTAIR for the college at which he teaches and after many months of promising some kind of assistance, I finally offered to write a compiler.

To get to the point: does anyone out there have any experience in compiler writing, particularly in SNOBOL compiler writing? I know that some of the sharpest people in this field read PCC, so I'm really hoping to hear from someone.

Of course, once I get the compiler working, I will make it available to other ALTAIR owners and users (for a nominal fee and a lot of glory).

(I realize all you people are heavily into BASIC, but SNOBOL is a pretty neat language for things like compiler writing, natural language translation, and general string manipulation.)

Also, since my friend's ALTAIR is 75 miles away from my home, donations of ALTAIRS will be accepted.

Maureen R. Supple
828 So. Irving St.
Arlington, VA 22204

IF EVERY CHILD OWNED A COMPUTER

I'm very excited about home/personal computer possibilities. I want to expose my daughter early, as well as my wife, friends, neighbors, anyone! (San Francisco Sidewalk who?) But the wait-for-the-weekend, nowquicklet'sdoallwecanbeforeourhourisup approach through a public time sharing system such as the one at LHS just isn't the ideal approach. Now if computers were as common and accessible as TV's! I believe it was either Seymour Papert or Alan Kay who said something like "if every child owned a computer, computers would be cheap enough so that every child could own a computer." I might as well pitch in and help!

More power to tiny basic!

Bob Rickard
2305 Parker Street
Berkeley, Ca. 94704

COLA

ANNOUNCES ITS FIRST ANNUAL MINI—CONFERENCE ON THE USES OF COMPUTERS IN EDUCATION

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How to get the computer to work for you
Speakers and workshops on CAI, Data Processing, Management Systems, Programming, and others
Awarding of prizes for COLA's programming contest for junior and senior high school students
Exhibits by vendors of computer hardware and software

DATE: March 6, 1976
LOCATION: Le Conte Junior HS (in Hollywood)
TIME: 9 AM — 2 PM

For additional information, write: COLA, P. O. Box 43677, Los Angeles, Ca. 90043 or contact Richard Moffie, Edison JHS, 6500 S. Hooper Ave. Los Angeles, CA. 90001.

SEATTLE COMPUTER CLUB

A Seattle based computer club is in the works. Call Steve Herber (206) 329-1994 or Bonnie deTurk at the Pacific Science Center (206) 624-8140.

Steve Herber
2362 Franklin East No. 402
Seattle, WA 98102

NASA/JSC COMPUTER CLUB

Just about a year ago I built the RE MARK-8 and I have subsequently added the SWTP TVT II and the Digital Group's tape cassette interface. All run just fine.

Since several of us in this area are interested in home computers and microcomputer projects, we have formed the NASA/JSC (Johnson Space Center) Computer Hobbyist Club. It is a sanctioned club under the JSC Employees Activity Association. Presently we have over thirty members who are NASA or contractor employees. They range from interested beginners to computer professionals and include an astronaut.

We meet twice a month at JSC and we have plans for beginners educational lectures, club projects (possibly a computer center), surveys of the home micro-computer market, group purchases, and information exchanges. Since we have a large, enthusiastic group I'm sure we will be successful at all these projects.

Further information on our club and activities can be addressed to me

Marlowe D. Cassetti
1011 Devonport Ln
Seabrook, TX 77586

WISCONSIN COMPUTER HOBBYISTS

I certainly enjoy my subscription to the PCC Newsletter. I am sure you will keep up the good work.

Would appreciate your listing in the next issue the formation of:

WISCONSIN AREA COMPUTER HOBBYISTS

Don Stevens
P. O. Box 159
Sheboygan Falls, WI 53085

ASIS

A Prediction from 1966 —
A "Model T" for the Mind.

But the story isn't finished yet. There is a computer manufacturer around somewhere who is alert enough to look beyond the next million dollar contract. He will develop the "Model T" computer. It will have four registers, one unbuffered I/O channel, an optional flashing light for those who wish to impress their friends a rustic but sturdy peripheral unit, germinal software support, and a price tag under one thousand dollars. But it will compute — will do, in fact, with a little judicious coaxing essentially anything its huge and expensive relatives can do, though perhaps a bit more slowly. And within its own design purpose, it will outclass the most sophisticated system pooled human intelligence can devise, because it will be totally available to the individual user's ingenuity.

That computer will usher in the true era of automation.

from: "The Human Value of the Computer as an Educational Tool" by Francis M. Wheeler.

THE FAMILY ALTAIR

I am now receiving PCC on a regular basis. Like it very much and find it both interesting and helpful. Lee Felsenstein's article on the Altair problems in the last issue was particularly helpful. I have a 10 year old son, and two daughters ages 8 and 3 who have all become computer addicts (yes, even the three year old has to have a program she can use to type on the TVT). Your Number Guessing Game was the first program we ran and I had to stay up until midnight to put Mugwump on. Allocating computer time is as big a problem as it is at work. Your publication and philosophy have contributed to our enjoyment and will continue to do so. The kids are working their way through your book *My Computer Likes Me* and have picked up the basics of programming rapidly. We went through many of your Inchworm examples and they were fascinated. Keep up the good work! We appreciate your efforts.

Don H. Morrison
32200 Arlington
Birmingham, MI 48009

CACHE

We have now combined all the groups in and around Chicago into one, and changed the name to CACHE, (Chicago Area Computer Hobbyists' Exchange).

Our mailing list has grown to 170, and meeting attendence to over 60 in only 4 months of operation. Thus far we have had only monthly meetings (which have been mostly gabfests) and no newsletter to speak of — just meeting announcements. Now that we are getting organized, with dues, P.O. Box, officers and planned meetings, we will have to begin putting out a "newsletter" of some kind too.

Things are happening all around. The newsletters from the California groups are particularly exciting, and I think PCC is really great. It is hard for us in the "heartland" to know what's going on out there, since it changes so much from month to month.

Our next 3 meetings will feature speakers such as Ed Roberts from MITS, Dave Larsen (one of the Bugbooks authors), and a Motorola applications engineer to talk about the 6800.

CACHE
Bill Precht
P. O. Box 36
Vernon Hills, IL 60061

An Introduction to Microcomputers

Adam Osborne & Associates, Inc.
1975, 384pp., $7.50

Available from PCC Bookstore

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

Adam Osborne Associates are excellent technical writers (they write manuals for many of the major manufacturers.) so their book might be expected to be informative and technically competent. If that were all, it would still be well worth buying, but this book is also that rare gem, a book which not only says 'This is so' but also explains to you *why* it should be so.
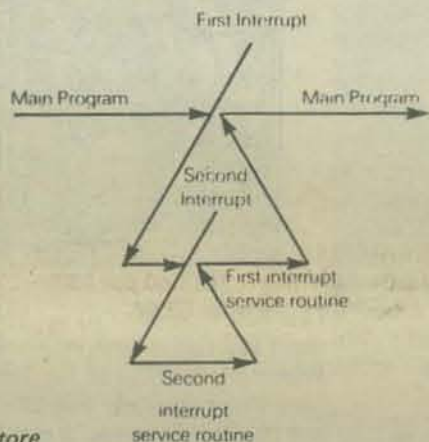
The book starts with an introduction which shows how computers evolved and the mathematical and logical basis upon which the hardware is built. This leads naturally to a discussion of the overall architecture and organization of a practical computer, and thence to a detailed study of the contents of a CPU. Most writers would quit at this point and go on to software but, the authors thoroughly understand the devices they are writing about. The next chapter is on logic beyond the CPU.

For a device as small and cheap as an LSI CPU chip, the whole point of its design may lie in the way it interacts with external logic devices, and the economics of its use in a given application be primarily a function of its need for, or the availability of, the necessary support chips. No one has really spelled this out before - certainly not with the clarity of this book.

Clarity is also the keynote of the chapter on programming - a superb explanation of the interaction between software and the CPU architecture. Particularly this chapter is a reference for anyone who has any question regarding addressing methods and terminology. The remainder of the 400 or so pages in the book is devoted to a canny look at most of the presently available CPU chips. Unfortunately omitted are COSMAC, the MOS Technology 6500 series and TI's 16 bit chip, but they will be covered in later books and the general information is so well done that owners of the chips will still learn a lot about them.

Buy this book - it's a class better than any other we have seen.

Read-write memory requires more logic than read-only memory, since the individual bits of a read-write memory can be changed as well as being read. Therefore, read-write memory is commonly implemented on more than one chip. In a very simple case, eight RAM chips may implement 8 bit read-write memory words, with each chip contributing one bit of the word:

One Memory Module
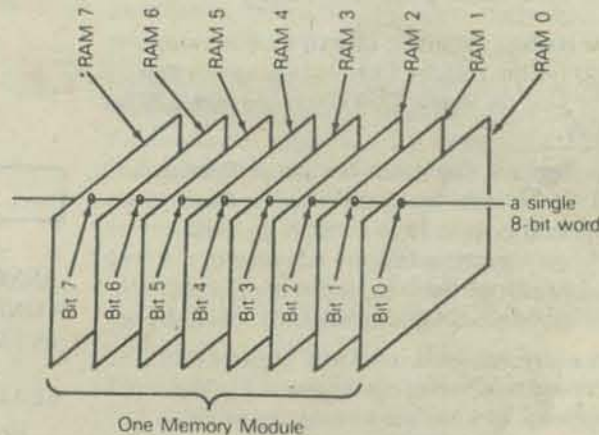
MICROCOMPUTER INDEXED ADDRESSING

An 8-bit word size is the feature of microcomputers which dictates how much indexed addressing, if any, will be implemented.

Let us begin by looking at indexed addressing in its simplest form. For an 8-bit microcomputer, this may be illustrated as follows:

4) The program which gets executed following step 3 may optionally contain an Enable Interrupt instruction. If this instruction is present, another interrupt may be processed, before the current interrupt has completed execution, as follows:

available from PCC Bookstore

available from PCC Bookstore

Programming Proverbs

By: Henry F. Ledgard
Hayden Book Co., 1975, 144pp., $5.95

FROM THE PREFACE

Several years ago I purchased a small book called *Elements of Style* written by William Strunk, Jr. and revised by E. B. White. Originally conceived in 1918, this book is a manual on English style. It is noted for its brevity, rigor, and deeply rooted faith in concise, clear English prose. I have read this manual several times. Each time I am again challenged to write better prose. In part, that small book is the motivation for this work.

When I began teaching courses on programming languages, I was struck by the tremendous need for style and quality in student programs. Reminded of Strunk's little book, I became concerned with the need to motivate an interest in program quality. I believe that introductory programming courses should be intimately and overtly concerned with elements of style in computer programming. This concern was brought to fruition in the summer of 1972, when the basic draft of this book was written. It was meant as a brief for people who write computer programs and who want to write them well.

Henry F. Ledgard

This is 134 pages of proverbs to help the programmer become a better programmer. Looking like a thick *Old Farmer's Almanac* , it contains 26 proverbs such as "Think first, program later, avoid tricks, and don't be afraid to start over."

Computer—Aided Experimentation

By: Julis Finkel
1975, 422pp., $24.95
Available from:
John Wiley & Sons
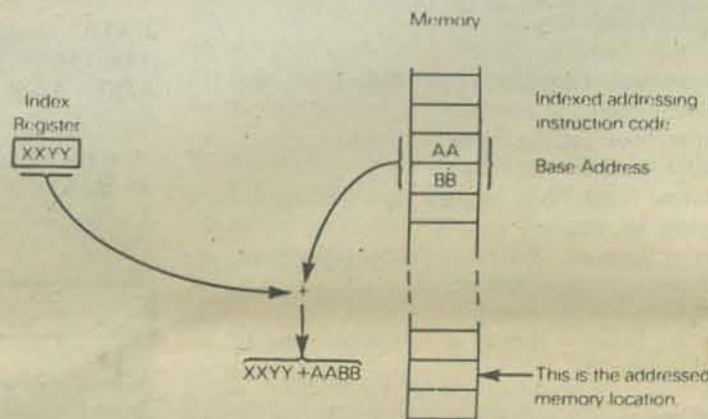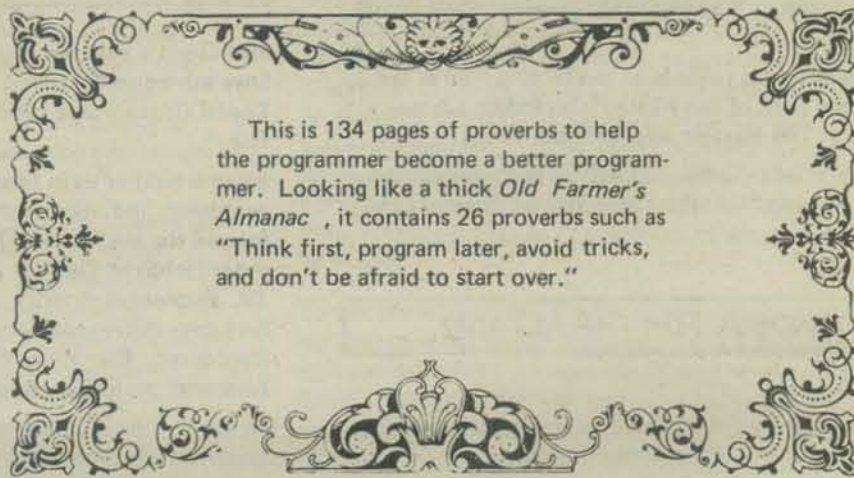605 Third Av.
New York, N.Y. 10016

This book has a subtitle "Interfacing to Minicomputers". The author's definition of minicomputers easily includes the microcomputer now in the hands of hobbyists.

The book was written to be a text book for a college level course. It is well organized and is very easy reading. The book assumes little knowledge of computers, and if you read from the start of the book you will run into an explanation of all jargon before it is used in the text. Example: the first time "I/O" is used it is given as "Input/Output(I/O)".

Like the text the illustrations in the book are well done and follow the text closely.

All discussion of signals to and from experiments are about the signal and how they relate to the computer and not about the experiment.

Starting with a chapter covering the overall contents of the book, the author explains in detail the types of signals and peripheral devices which could be used. Of particular interest are the chapters on analog signals (chapter2), analog to digital conversion (chapter4) and position encoding (chapter6). Chapter 20 is titled "Further Reading" and is a list, organized by topic, of available publications and literature and their sources.

Chapter 19 describes a standard modular interface design which is used mostly by nuclear physists and mostly in Europe. Even if you are not interested in standards, you could read this anyway as it is only about 10 pages out of 420.

There are no directly usable circuits in the book but in many cases all that would be required is assigning values to the blocks in diagrams to make useable interfaces.

This book is both interesting and useful and only the price $24.95 will keep it out of the hands of the hobbyists.

BOB MULLEN

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ALPHA–NUMERIAC MUSIC WITH AMPLITUDE CONTROL

A PCC booklet for $2.00

SEE REVIEWS PAGE

next issue:

Bugbook 3 reviewed

BACK LIST

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BASIC. Albrecht, Finkel & Brown. 1973. 323 pp. $3.95.
BASIC BASIC. James Coan, 1970. 256 pp. $7.45.
BASIC PROGRAMMING. Kemeny & Kurtz. 1967. 145 pp. $8.50.
BUGBOOK I & II. Rony, Larsen & Braden. 1974. $16.95.
COMPUTERS & COMPUTATION. Scientific American. 280 pp. $6.00.
COMPUTER LIB & DREAM MACHINES. Theodore Nelson. 1974. 186 pp. $7.00.
COMPUTERS IN THE CLASSROOM. PCC. 60 pp. $3.00.
DIGITAL LOGIC CIRCUITS. Sol Libes. 1975. 184 pp. $5.98.
DRAGON SHIRTS. Nancy Hertert. 1974. $3.50.
ELECTRONIC PROJECTS FOR MUSICIANS. Anderson. 1975. 134 pp. $6.95.
GAMES, TRICKS & PUZZLES. Wallace Judd. 1974. 100 pp. $2.95.
GAMES WITH THE POCKET CALCULATOR. Thiagarajan & Stolovitch. 1976 $2.00.
HOW TO BUILD A HOUSE SIMPLY FOR 1/3 COST. William Zink. 1975. 107 pp. $5.50.
MATH, WRITING & GAMES. Herbert Kohl. 1974. 252 pp. $2.45.
MY COMPUTER LIKES ME. Bob Albrecht. 1972. 64 pp. $2.00.
101 BASIC GAMES. David Ahl, editor. 1974. 250 pp. $7.50.
PRINCIPLES & PRACTICES OF ELECTRONIC MUSIC. Tryhall. 1973. $6.95.
PROBLEMS FOR COMPUTER SOLUTION. Grüenberger & Jaffray. 1965. $7.95.
PROBABILITY. D.J. Koosis. 1973. 163 pp. $2.95.
PROFESSOR GOOGOL. Sam Valenza Jr. 1973. 144 pp. $3.25.
PCC GAMES PROGRAM LISTINGS. PCC. 1974. 31 pp. $2.00.
STATISTICS. D.J. Koosis. 1972. 282 pp. $3.95.
THE ENERGY PRIMER. Portola Institute. 1974. 200 pp. $5.50.
TTL COOKBOOK. Don Lancaster. 1974. 328 pp. $7.95.
II CYBERNETIC FRONTIERS. Stewart Brand. 1974. 96 pp. $2.00.
WHOLE EARTH EPILOG. Stewart Brand, editor. 1974. 318 pp. $4.00.
WHAT TO DO AFTER YOU HIT RETURN. PCC. 1975. 157 pp. $6.95.

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31

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subscription info~

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COVER is from SOLOWORKS Module No. 2103. See SOLOWORKS Newsletter No. 36 in this issue, pages 2 — 5.

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† *TINY BASIC NEWSLETTER will go out in late January. It will contain a description and octal code for EXTENDED TINY BASIC by Dick Whipple and John Arnold.*

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