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Issue 22
Vol. 4, No. 3
63379

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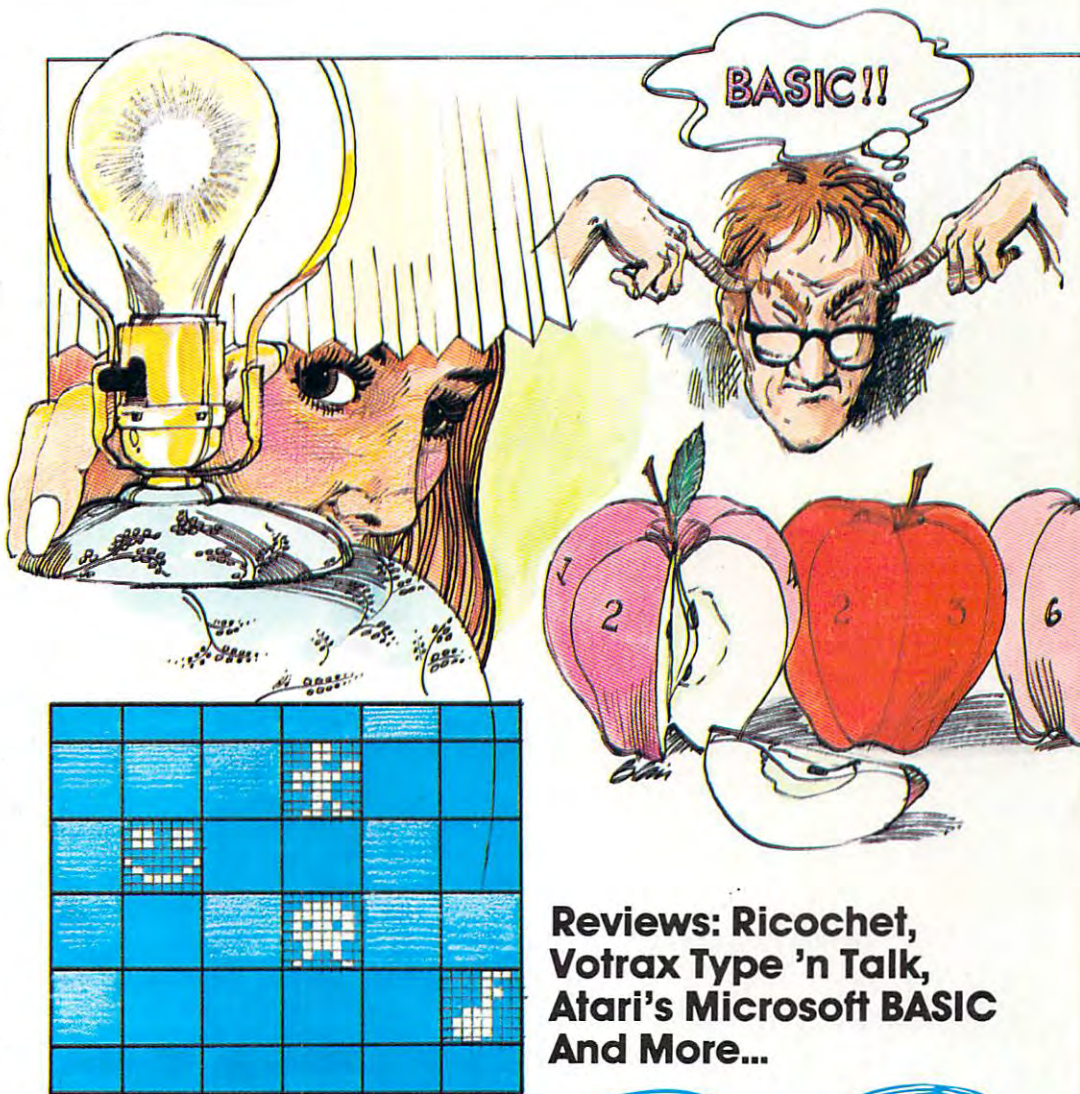
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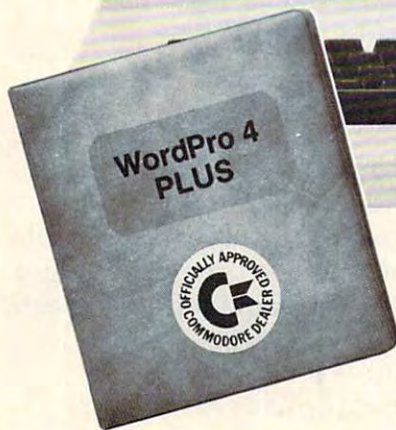
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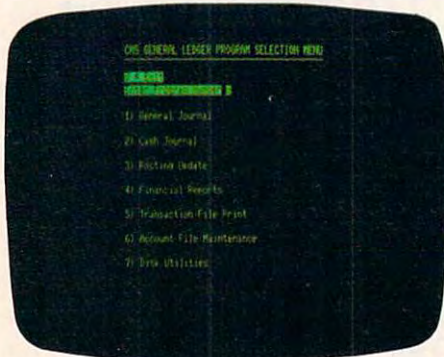
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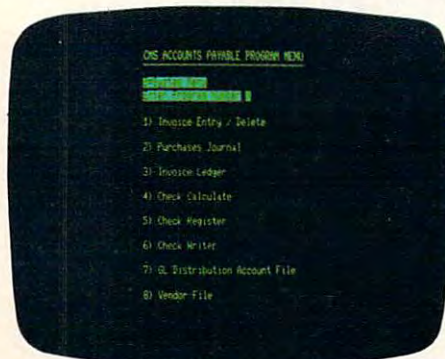
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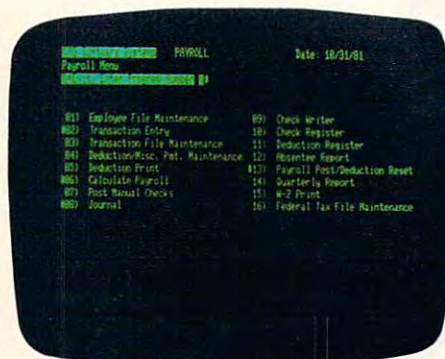
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The Editor's notes ---

Robert C. Lock
Publisher/Editor

COMPUTE!'s New Format

As we indicated last issue, the format of the magazine has been revised to allow us greater flexibility in article placement. In the front sections of the magazine you'll find general interest articles, including applications programs and games that have been developed to run on numerous computers. More advanced material, both applications and programming support, will be found in the *Journal* section of the magazine.

Each column, article, program, etc. is keyed by page number in the Table of Contents to relevant microcomputers.

On The Importance Of Feedback

On our direct mail response cards at the end of this issue, you'll find a special Editor's Feedback card. Take a look at our new format for the magazine, and *please* take a few minutes to fill out and return the card.

We've tried to accomplish the changes as a constructive enhancement, and rely on your collective opinion as well. Let us know what you think.

Two New Personal Computers For Less Than \$200.00

The Winter Consumer Electronics show was impressive. Commodore was showing a startling array of VIC-20 software. Atari introduced some new twists as well. For full details on the show and the new computers, see David Thornburg's article in this issue.

Home Applications

Being firmly convinced that the myth of the utility of home computers is truly a myth, we've been excited by the range of useful software you've been sending in. With everything from our continuing series of Energy Conservation and Analysis programs by David Pitts, to Real

Estate Investment Analysis and sophisticated financial modeling, we've been proving by example that home computers are being used for education and applications as well as recreation. Keep your efforts coming.

COMPUTE! Books

Our Book Division is now off and rolling, with the release (finally) of our first two titles, **COMPUTE!'s First Book of ATARI®** and **COMPUTE!'s First Book of PET™/CBM™**. We have three more books scheduled for release in the first and second quarters of 1982. Having learned our lesson the first time around, these won't be announced until scheduled at our printers, but we're sure you'll find them equally useful resources.

The West Coast Computer Faire

Once again we expect to see hundreds of you among the 30,000 to 40,000 attendees at the Sixth West Coast Computer Faire. Jim Warren's annual extravaganza is a looked-for meeting place for old and new friends. Stop by our booths, numbers 1543 and 1642, and say hello.

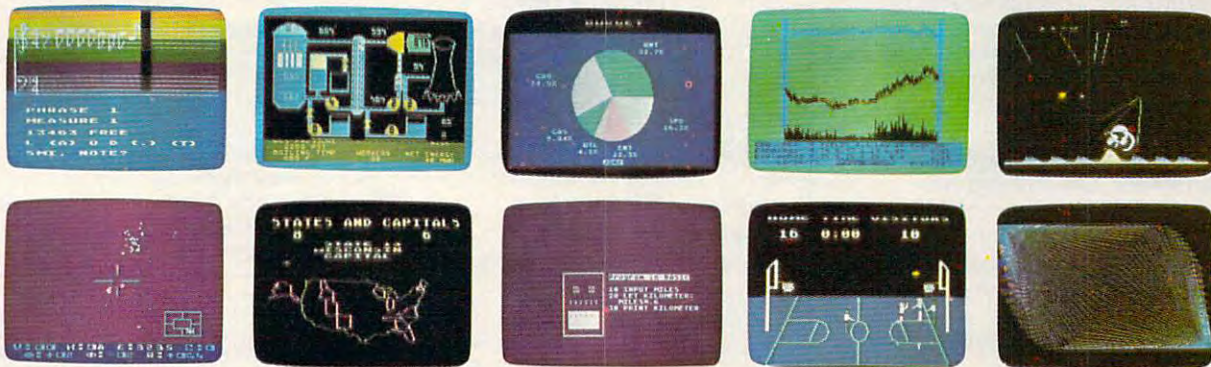
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As you've all noticed, we recently moved to a new billing system. By now, our scheduling and updating problems have been resolved. Your new invoices will be showing a message "Payments received after _____ are not reflected in this invoice." Interim shipments of back issues or **COMPUTE! Books** will be billed as shipped, and *also* reflected on your monthly statement-invoice.

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Sharing. To learn more about the amazing capabilities of ATARI computers, visit your local computer store for a demonstration. Or send for our Technical User's Notes, intended for the serious programmer. They are only \$27 and contain a lot more information about our computers' special capabilities than most companies could tell. See your ATARI dealer, or send \$30 (\$27 plus \$3 postage and handling), payable to ATARI, to Technical User's Notes, c/o ATARI Customer Service, 1340 Bordeaux Avenue, Sunnyvale, CA 94086.



*ATARI 800™ computer only.

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 -Physics, The School of the Ozarks
 Pt. Lookout, MO 65726
 David Thronburg, P.O. Box 1317,
 Los Altos, CA 94022
 Bill Wilkinson, Optimized Systems
 Software, 10379-C Lansdale, Ave.
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 Gene Zumchak, 1700 Niagara St.,
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Subscription Information

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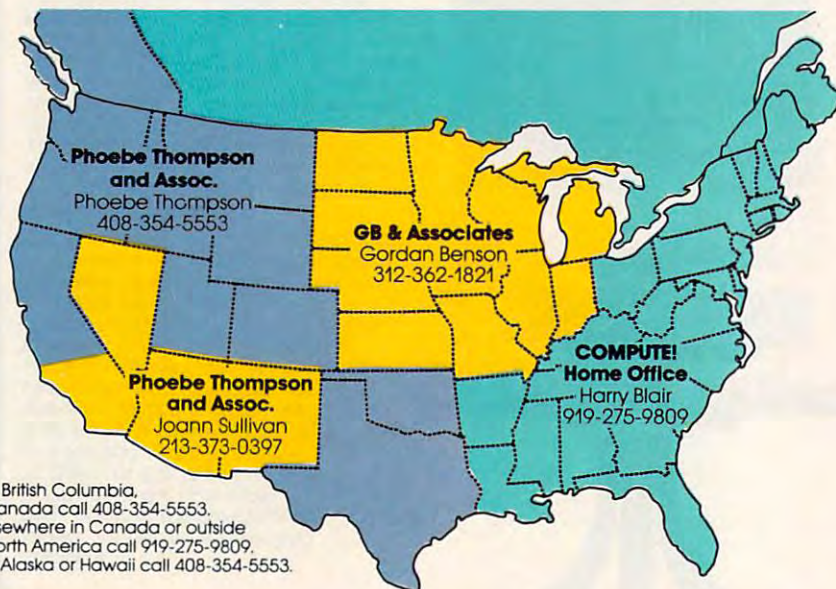
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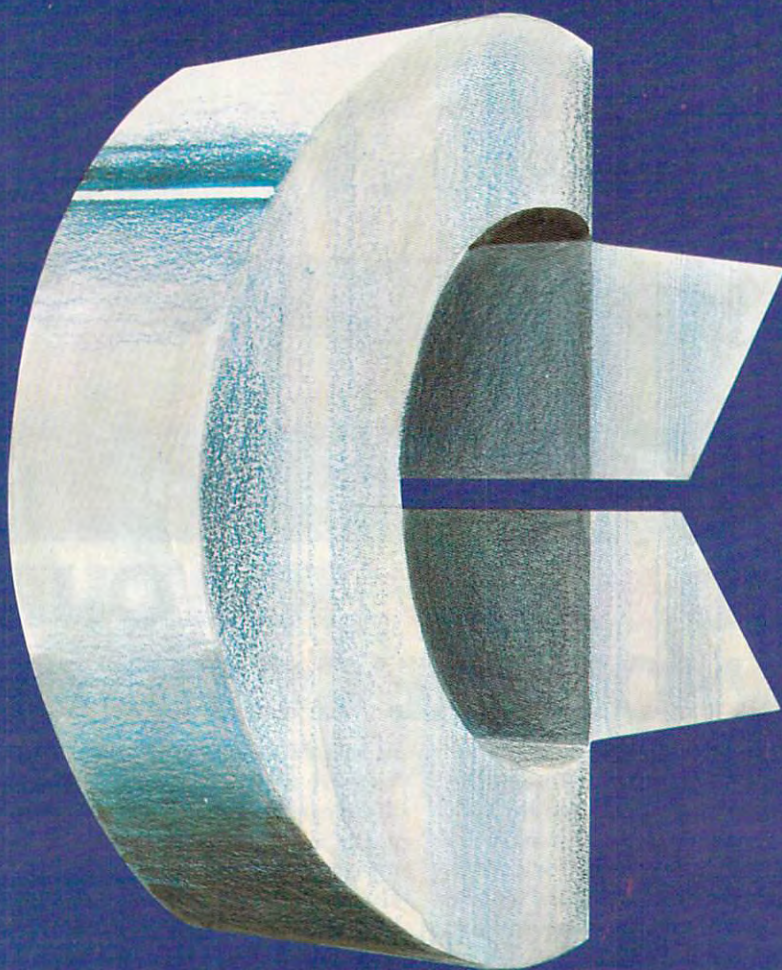
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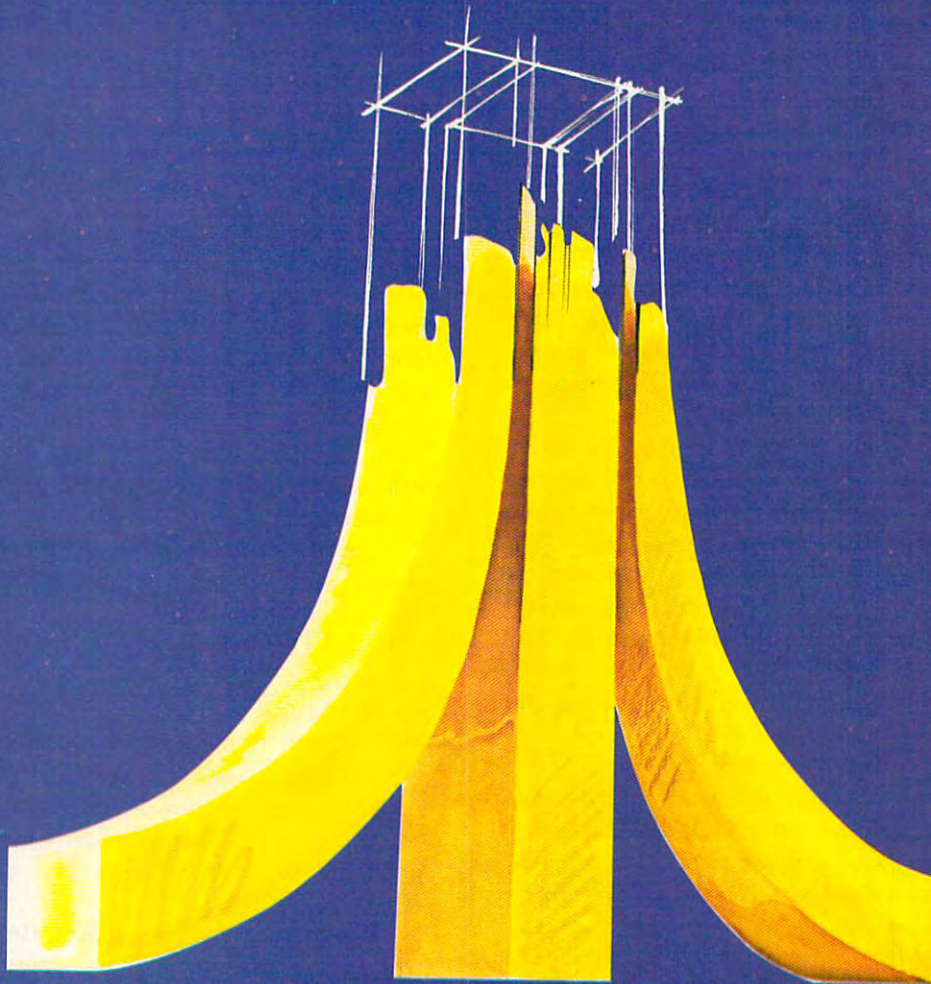


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Ask The Readers

Robert Lock, Richard Mansfield,
And Readers

If you have any questions (or answers to the questions printed below) please write to: Ask The Readers, **COMPUTE!** Magazine, P.O. Box 5406, Greensboro, NC 27403.

Answers

On page 10 of **COMPUTE!** #19, a reader asked about, and you commented on, COM as an Atari BASIC keyword.

I very recently bought an Atari and as yet have not delved extensively into the programming aspects of it since most of the time it has Missile Command in the left slot, but, in other computer systems I have used with either interpreter or compiler BASIC, COM or COMMON defines common variables, either string or numeric, for programs which are to be chained instead of POKEing the information into protected memory by one program, then PEEKing it out by a subsequent one. This is usually accomplished under DOS control.

A question that I have, and perhaps another reader can answer, is how I could build an interface or two to use the Radio Shack (Tandon 40 track) drives and Centronics 737 parallel printer I have for my TRS-80 Model I with the Atari serial port. I realize this identifies me as a "Hardware Nut," but for personal satisfaction, I would rather build, than buy, an interface. William E. Allen

Our thanks to the others who sent in responses to this question.

*I am writing in response to columnist Zumchak's comments in the "Ask The Readers" section of **COMPUTE!** #16.*

The question of a next generation 6502 microprocessor is certainly not a dead issue. However, this is a market-driven decision. Synertek would readily undertake the development and marketing of a sequel to the 6502 if there were reasonable expectations that this would be justified by adequate business in the new part.

As to the SYM board, the SYM-2 version is laid out to accept the 6502, 6800, or 6809. There is also a plug-in module for the SYM-1 to adapt it to those processors. These new products were introduced to widen the market for the SYM, not as a move away from the 6502.

Synertek is continuing to support the 6502, as we

have in the past. New peripheral products are being designed to work with the 6502. We believe that the 6502 is one of the best 8-bit processors available. Although many applications use 1MHz parts, the 6502 is available in versions that run with clocks of 2, 3, and 4 MHz.

Dr. Michael Smolin
Director, Strategic Planning
Synertek Inc.

*In his excellent article Machine Language: What's Your Sign? (**COMPUTE!** #17), Jim Butterfield discusses how the Overflow (V) flag will be set if the addition or subtraction of two signed numbers causes a "sign switch."*

A rarely publicized fact is that a sign switch, or overflow, can only occur if you are adding two numbers that have the same sign (both positive or both negative) or subtracting two numbers that have opposite signs. Moreover, because a sign switch indicates that the result exceeds the legal limits of a signed number, -128 or +127, V=1 always constitutes an error condition...

One further point of interest is that CMP, unlike SBC, does not affect the contents of the Accumulator. This allows you to compare N1 to some other number (N3) immediately, without another LDA N1 instruction.

Leo J. Scanlon

For several years I have been dealing with the CRASH of the INPUT statement on our 2001 and 4016 COMMODORE Computers when the RETURN key is depressed with no input! I have read of several fairly short routines that overcome this problem and have developed my own favorite, as have most users (Our students develop software for the Elementary School - kids, and their teachers, will crash programs).

Anyway - this evening, quite by accident, I stumbled upon a quick way to protect the RETURN key on INPUT! At least I have never heard of it. [Lines 70, 80, 160, 170, and 180 will do.] If you type in the enclosed program and RUN same, you will notice that the INPUT at line 70 (numeric) and line 160 (string) are protected under input/return (and, of course RUN/STOP)!!

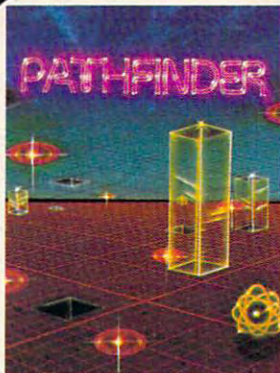
When you look at the listing, I'm sure your reaction will be the same as mine was when I looked at the listing and said to myself and all within earshot, "What's going on here? I tried this years ago! It didn't work then, so why is it WORKING now???"

The key lies in the length of the input prompt - exactly 38 characters. This configuration puts the INPUT question mark at the end of the input line and the cursor all by itself on the left of the next line. Bingo - RETURN = null. The conditional picks up the pieces and we're in business.

John Taylor

To answer John Fry's question [in **COMPUTE!** #18]:

NASIR GEBELLI PRESENTS:



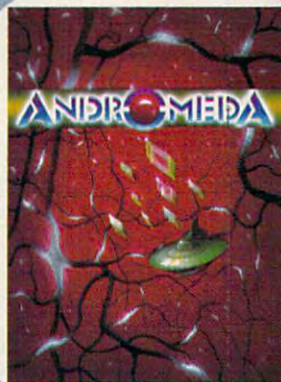
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HOLLYWOOD



Gebelli Software Inc.,
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sequential data files: you have two problems.

Statement in line 40 is wrong. It should read 40 DISK CLOSE,6 not 40 DISK CLOSE,6,A\$.

Also, don't forget to run change program to shift BASIC work space to allow for your 1 buffer (step 3 on page 24 in my system's manual).

OSI puts the buffers used for device 6 and 7 before the BASIC program. If you don't run change to tell BASIC to allow for these, it will start in this area for program storage. So your first print #6, A starts writing over your program and, thus, garbage on LIST.

Alex J. Kowalski, Jr.

I am writing with a few odds and ends, corrections/modifications to a couple of programs, and a question that "Ask the Readers" may be able to answer.

To begin with, users of "Keyword" as revised in **COMPUTE!** #17 may have advised you by now that this very nice utility crashes when used with Upgrade (3.0 BASIC) ROMs. I found that the following line fixed the problem:

```
215 POKE BASE+8,46:POKE BASE+12,230
```

While on the subject of "Keyword," it may be worth mentioning to all that this and any program that alters the interrupt vector must be turned off prior to initiating tape SAVES or LOADS. I also found that "Keyword" should be turned OFF prior to running a BASIC program to avoid printing a collection of keywords where graphics or lower case should be printed. Perhaps someone can explain this problem.

I am using an Original ROM PET with Upgrade ROMs installed. The Upgrade ROM Monitor, available all the time, is great. I have found at least one anomaly with this Monitor, however: it refuses to accept program names that are more than 15 characters long. Perhaps occasionally, an "End-of-Tape" header is recorded at the end of a machine language program SAVE using the Monitor. Are there any explanations for this out there?

Lastly, I finally got to try the program "Basic Math for Fun and Profit" from **COMPUTE!** #9. It's a great program! I did make one significant change to it, however:

```
922 IFZ$(T)=CHR$(13)THENZ$(T)=STR$(0):I=9
923 PRINTZ$(T);"";
924 Y$=Z$(9)+Z$(8)+Z$(7)+Z$(6)+Z$(5)+Z$(4)+
    Z$(3)+Z$(2)+Z$(1):W=VAL(Y$)
925 NEXT:GOTO357
```

(Changes at lines 922 and 925.)

R. D. Young

I would like to share some lessons learned about the VIC 20. In obtaining a TV for use with the VIC 20 I learned several items I thought would be of interest to all VIC 20 owners. Zenith TV's models L, M, N, can have a jump in the picture because of the difference in the sync rate between the VIC 20 and the TV's. This jump can be taken out by your service man by having him connect the jumper (sometimes called non standard vertical or cable standard

jumper) on the vertical output board. If your TV has a crystal controlled tuner and there is no fine tuning, you can adjust your modulator with the adjustment screw closest to the input end so you can get color on both channels 3 and 4 on the TV.

If you are having wavy lines on your TV you could be picking up RF interference signals on the wires from the TV computer switch box. If your TV has cable input capability, use of coaxial cable from the modulator to the input for cable can eliminate this interference. If your picture is not the right spot on the TV POKE 1 through 14 into 36864 will move it right and left, and 0 through 125 into 36865 will move it up and down.

Want to use your "f" keys? You can if you GET A\$ and use the ASC(A\$) to create a value 133 for f1 to 140 for f8. This CHR\$ value can then be used in the program. Jim Turrentine

Questions

I want to thank you and Dub Scroggin for the fine game program in the January 82 issue for the VIC 20. Instead of using the keyboard, I made a change in "ZAP!!" to use a joystick and it works great.

I have a problem with my recorder. I have to turn it upside down to load a program. I have taken the back off, but can't find anything loose. If I try a load it finds a program then doesn't load and prints "out of memory" or loads a scrambled up program. Any ideas? Don Dudley

The school at which I teach has just purchased the VIC 20. Software is scarce at the moment. Could you suggest or indicate programs of an educational nature that I might use in an elementary school setting?

I'm really keen on getting a good start with the VIC 20 in my school. Michael Moher

Hallo there in USA!

I've opened an Atari User Club here in West Germany. I would appreciate it if you could send me the addresses of Atari Programmers. Here in Germany you can only buy some games like Star Raiders and some more, but they are few. My Club wants to make it possible for the members to buy programs from the USA.

Also, could you send me the addresses of Atari User Clubs there in the USA?

I hope you can help me.

Knut Hermann

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Computers And Society

David D. Thornburg
Innovision
Los Altos, CA 94022

Artists have always been among the first to explore new technologies. Many times this exploration begins before the technology leaves the laboratory. For example, long before the laser found its way into supermarket check stand scanners, it was being used as an expressive medium by artists like Robert Whitman who received major technical assistance from Bell Laboratories and the optical scientist Eric Rawson.

The collaboration between artist and technologist requires extraordinary sensitivity on the part of both people. Historically, this collaboration has also required that the artist have access to a large university or industrial research laboratory where the needed technical resources could be found.

The innovative use of movie cameras in the 1940's benefited as much from technological collaboration as does the use of computers by artists today. Whenever a new technology offers an expressive medium to the artist, some technologists are more than happy to lend their assistance when needed. But one must wonder if the need for collaboration aids or inhibits the flow of creative ideas. Some artists are happy to work with others, and some are loners – preferring the solitude of an isolated studio to the constant interchange of ideas with co-workers.

One artist who has spent many years making innovative use of technology is John Whitney. Over the span of several decades, Whitney evolved the idea that the dynamic visual media (such as motion pictures, videodisks, and real-time computer animation) open the door to the creation of visual harmonies which are the counterparts of musical harmonies. His book, *Digital Harmony: On the Complementarity of Music and Visual Art* (Byte Books, 1980) expresses this philosophy in great detail. In it, Whitney traces his own development as an artist involved with technology.

In the late 1930's, he saw the motion picture

camera as a tool which would allow him to create visual images which somehow "looked" the way music sounded. During his early experiments he learned something very important. To suggest that a motion picture camera can contribute to a new visual art makes about as much sense as suggesting that a tape recorder can contribute to the art of music.

Music Into Visual Symmetries

In the computer, on the other hand, Whitney saw a new medium – a medium of creative expression in

**...we are on the threshold
of an era when isolated
artists will ... be able
to use the computer
with as much ease as...
pastels, oils, or clay.**

which his quest for the dynamic display of visual harmonic symmetries could be satisfied.

Thus began a period in which his images were created first on a cathode ray tube and then captured on film for others to see. This work benefited from collaboration with technologists. For example, Larry Cuba assisted in the making of Whitney's film *Arabesque*. (Cuba's software talents in computer animation have probably been seen by many **COMPUTE!** readers – he created the Death Star animation sequence in *Star Wars*.)

Arabesque is occasionally shown on public television, and is a film worth seeing. Each time I have seen it I am once again impressed with its fluidity of geometric form. Not surprisingly, Whitney devotes a chapter of his book to this film.

Books of this sort are inspiring to artists and non-artists alike. It is exciting to see the art which springs out of centers of excellence, such as universities.

But it is even more exciting to realize that we are on the threshold of an era when isolated artists will themselves be able to use the computer with as much ease and familiarity as they presently use pastels, oils, or clay. While the early phases of computer-based art required a high level of technical and financial support, the implementation of easy-to-use graphics environments on low-cost computers (e.g., Atari PILOT on the Atari 400 or 800, TI LOGO on the 99/4A, and Apple Super-PILOT or LOGO on the Apple II) places this medium within the comprehension and budget of many artists.

This adoption of the computer as a new medium will not occur overnight, however. Most of



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the serious artists I know have two concerns about computers. First, for many, the cost of a \$3,000 system is prohibitive. Second, there seems to be no easy way for these people to bridge the software barrier. Artists who really want to use computers as more than playthings know that, sooner or later, they will have to become programmers. How sad it is to see these people attending evening courses at the local community college learning BASIC or (Heaven forbid!) COBOL, in the hopes that by learning how to write bubble sort routines, the computer will become less mysterious.

Most introductory programming courses don't satisfy any of these students' real needs. The fact that at least *some* artists (Whitney, for example) have been able to bridge this gap is heartening news, but this is likely to be cold comfort to those art/computer students who think a string variable refers to the color of a length of twine.

Sooner or later, artists in great numbers will start using computers on their own. Whitney's book shows us the promise of this tool and he encourages others to follow their own path with this technology.

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The Beginner's Page:

How Computers Remember

Richard Mansfield
Assistant Editor

Computers fascinate us for many reasons. We have only recently built this machine and it is fast and complex, but the same could be said of a jet airplane. One reason for our fascination might be that, after years of passively watching TV, we can finally take control of what appears on the screen. Beyond this, perhaps, is the fact that the computer is the thing we've built which comes closest to being a copy of our own mind.

There are significant differences, though, between the way we think and the way the computer thinks. For complex, abstract thinking, a child can easily outdo the finest computer available today. On the other hand, the computer is far faster than any human. For one thing, the computer was *designed* to be efficient when dealing with numbers. The engineers realized from the start that the computer would be much better off if it avoided using our "decimal" system.

Let's look into some reasons why thinking in decimal is less effective than *binary*, the computer's way. This will help us understand how a machine can "remember."

A computer does two major things: it solves problems (computes) and it *remembers*. To add $2 + 2$, the computer first remembers (stores) your instructions which contain the problem. $10 \times = 2 + 2$. When you type RUN, it looks for the lowest line number in its memory and solves whatever it finds. Then it remembers the answer (elsewhere in its RAM, its temporary memory cells). If there is another line number (20 PRINT X) it will put the number 4 on your screen, showing that it not only computed the problem in line 10, but also remembered the result.

How does it remember?

Let's try an experiment. Type: POKE 0,1 and notice that nothing happens (at least nothing we can see). In fact, the "lowest" cell in your computer's memory just changed. POKE is a way that you can directly change a memory cell. Each cell has its own *address*, just as if each cell were a house in a city with 65536 houses. (The addresses go from 0 to 65535.) So, when you POKE, you are replacing the

number in that cell with whatever number follows the comma in your POKE command. (If your machine does not have the maximum memory, some zones will not respond to POKE. Also, you can't expect to POKE into the ROM memory because it never changes – its contents are carved in it forever.)

Now type: ? PEEK (0) and notice that our "1" is printed (? is short for PRINT). The "1" is still in the 0 address cell and it will stay there until you POKE something else in, or the computer, in the course of performing a task, needs to use that cell to remember a number of its own. It will also "forget" if you turn off the power. But we still don't yet know just *how* this number is remembered in that cell.

Why We Count By Tens

Another name for a cell in your computer's memory is *byte*. If you have 16K of free memory (a K is 1024 bytes, called a *kilobyte*) this means that you have 16×1024 cells for a total of 16384 cells for your use. What are these cells? Each one is able to "remember" numbers. How high can a cell count? A byte can hold the numbers from 0 up to 255.

Nobody knows for sure, but it seems a good guess that we humans count in groups of 10's (*decimal*) because long ago, in caves, when the hunters were asked how many bison they saw that morning, the leader would likely hold up a certain number of fingers in the air. On a good day, the leader might say, "We saw many. My hands plus Joe's hands and one hand more!" The people would nod and vaguely understand the concept of 25 bison.

We tend to think that 10's are logical, even a natural, way to count. After all, so many things seem to fall into groups of tens: a dime, a quarter (four hands plus one), a dollar, a \$10 bill, etc. Nevertheless, if lobsters ran the world, it is quite possible that things would be counted in fours. If you're curious, the most "natural" number grouping (found in shells, feathers, flowers and so forth) is called the Fibonacci series. The next number in this series is equal to the sum of the two previous ones: 0,1,1,2, 3,5,8 and so on.

So, since 10's are not natural except to creatures with that many fingers, there is no reason why a computer should count by 10's. For something that runs on electricity, the easiest way to count is by 2's (called *binary*, meaning "can be counted using only two symbols, the zero and one"). The computer finds binary counting very simple since this lets it represent numbers by merely turning something on (like a lightbulb) to stand for "1" or leaving it off to mean "0". If it had to deal with 3's, and 7's, and the rest, it would need to recognize and juggle ten different symbols, 0 through 9, like we do. This

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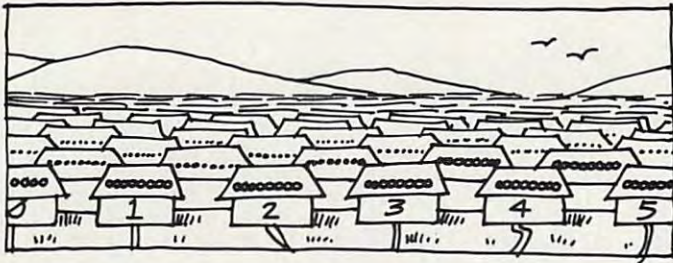
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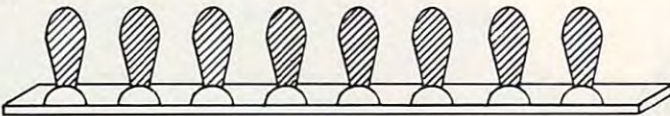
is what we mean when we say that the decimal system has ten *digits* (0-9). The binary system has only two digits, zero and one. By the way, *digit* also means *finger*.

In The City Of Bytes

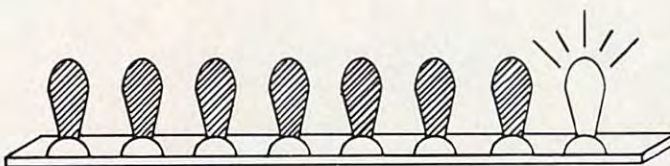


In our computers, there are thousands of rows of bytes lined up. Each of these bytes has an "address" of its own which is just its position in the city of bytes. POKE 5,1 puts the number one into the fifth byte and POKE 8001,0 changes the 8001th byte to zero. We can easily visualize bytes if we think of each one as a house with an odd decoration on the roof: a row of eight lightbulbs. Let's imagine that we have just turned on our computer and all our free bytes are "empty" – we haven't yet typed in a program or loaded anything into them from a tape or disk.

If we fly over the city of bytes, we see only darkness. Each byte contains nothing (zero) so all eight of its bulbs are off. (On the horizon we can see a glow, however, because the computer has memory up there, ROM memory, which is very active with its built-in programs.) But we are down in RAM (our free user-memory) and every house is dark. Let's observe what happens to an individual byte when different numbers are stored there; we can randomly choose byte 1504.

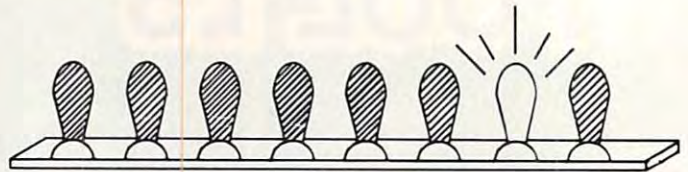


Like all the rest, this byte is dark. Each bulb is off. Observing this, we know that the byte here is holding a zero. If someone types in POKE 1504,1 – suddenly the rightmost lightbulb goes on and the byte holds a one instead of a zero:

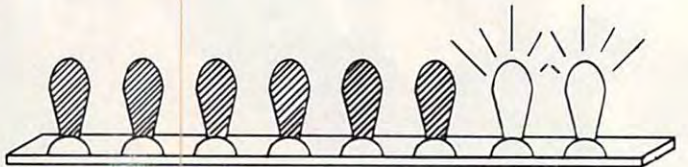


This rightmost bulb is the 1's column (just as it would be when counting by tens in our *decimal* system.) But the next bulb is in the 2's column, so

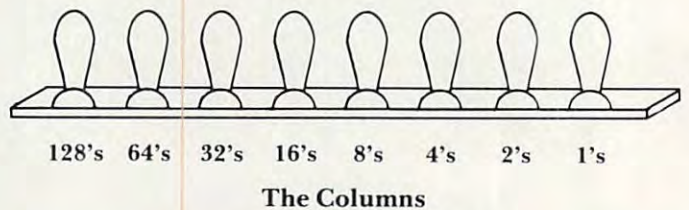
POKE 1504, 2 would be:



And three would be one and two:



In this way – by checking which bulbs are turned on and then adding them together – the computer can look at a byte and know what number is there. These lightbulbs are called *bits* which is short for *binary digit*. Each bit is in its own position and has a value twice the value of the one just before it:



Here is a program which will show you a byte as it looks in binary. You then try to give the number in decimal. It has been designed to run on Atari, PET, or Apple. Don't type in any line which has REM in it *unless* it's followed by the name of your computer.

```

100 REM BINARY QUIZ
110 C1=20:C0=111: REM FOR ATARI ONLY
120 C1=88:C0=79: REM FOR APPLE ONLY
130 C1=209:C0=215: REM FOR COMMODORE ONLY
140 X=INT(256*RND(1)): D = X: P = 128
150 PRINT CHR$(125);: REM ATARI ONLY
160 PRINT CHR$(147);: REM COMMODORE ONLY
170 HOME: REM APPLE ONLY
180 FOR I = 1 TO 8
190 IF INT(D/P) = 1 THEN PRINT CHR$(C1);:
    D = D-P: GOTO 210
200 PRINT CHR$(C0);
210 P = P/2: NEXT I: PRINT
220 PRINT " WHAT IS THIS IN DECIMAL?"
230 INPUT Q: IF Q = X THEN PRINT
    "CORRECT": GOTO 250
240 PRINT "SORRY, IT WAS";X
250 FOR T = 1 TO 1000: NEXT T
260 GOTO 140
  
```

SYSRES™

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SYSRES™ EXTENDED DOS SUPPORT COMMANDS

@ (type "N" keyboard)
 ⌘ (type "B" keyboard)
 ! (original keyboard)
 > (for 'wedge' users)

These commands may be used interchangeably, to perform the following dos support functions.

| Disk | Printer | Tape | Directory | Modes | Command | Function |
|------|---------|------|-----------|-------|---------|------------------------------------|
| x | | | | 3 | @ | Display disk status / send command |
| x | | | | | @N | Format (header) a new diskette |
| x | | | | | @I | Force initialize diskette |
| x | | | | | @V | Validate diskette (collect) |
| x | | | | | @D | Duplicate diskette |
| x | | | x | 4 | @C | Copy or concatenate disk file(s)* |
| x | | | | | @R | Rename file |
| x | | | x | 3 | @S | Scratch file(s)* |
| x | | | | | @\$ | List directory** |
| x | | | | | @U: | Reset disk drive |
| x | x | x | x | 6 | @L | List disk file or BASIC program** |

Note: Some of the disk utility command set may also be used, if an appropriate direct access channel has been opened.

* Standard command with added options.

** Added disk command.

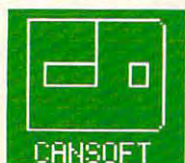
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- * Advanced repeat-key routine!
- * Re-define any or all keys as any keyword (full or short form) or as any string up to 255 characters long!
- * Auto line numbering which can feed a string of up to 127 characters as well!
- * Extended DOS support (requires DOS 2A or greater)!
- * Never enter another file name! All file commands work from the directory!
- * Supports multiple disk drives!
- * List BASIC programs, sequential and relative files without loading them into memory!
- * TRUE PROGRAM MERGE (overlay). Supports subroutine libraries!
- * Load and run machine language programs with parameter passing!
- * Supports multiple printers!
- * Automatic printer output with paging plus formatted listings with full ASCII code conversion including cursor control and special characters for non-CBM™ printers!
- * Edit text files and assembler source code without leaving BASIC!
- * Renumber part of a program or even change the order of lines!
- * Over 700 FIND/CHANGE commands including variable names ("A\$" will not match "BA\$"), pattern matching with "wild-cards", and even commands to remove spaces and REM's!
- * Three TRACE modes including trace variables!
- * Does not affect BASIC program operation!
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- * Diskette and Extensive Manual – only \$75 (cdn) Documented Source Code (YES!) – \$150 (cdn) Custom versions are available for unique systems!

Dealer enquiries are welcome.

SYSRES™ EXTENDED EDITOR COMMANDS

| Disk | Printer | Tape | Directory | Modes | Command | Function |
|------|---------|------|-----------|-------|----------|---|
| x | | | x | 4 | / | Quick load from disk |
| x | | | x | 4 | ↑ | Quick load from disk with auto run |
| x | | | x | 2 | APPEND | Append from disk to end of current program |
| | | | | 4 | AUTO | Auto line number (allows header) |
| x | | | x | 3 | BLOAD | Load machine language (binary) file |
| x | | | x | 3 | BRUN | Load and execute machine language program |
| | x | | | 776 | CHANGE | Change pattern to another pattern |
| | | | | 2 | CLOSE | Close one or all files |
| | | | | 1 | CMD | Set output to file (does not send "READY.") |
| | | | | 4 | DELETE | Delete a range of lines from program |
| | x | | | 1 | DUMP | Dump all scalar variables to screen or file |
| | | | x | 2 | EXEC | Execute a file as keyboard commands |
| x | x | | | 240 | FIND | Find occurrences of a pattern |
| x | | x | x | 3 | GET | Read a sequential file into editor |
| | | | | 7 | KEY | Define a key as a special function |
| | | | | 1 | KEYS | Turn key functions on |
| | | | | 1 | KILL | Disable SYSRES™ |
| | | | | 1 | KILL* | Disable SYSRES™ and unreserve memory |
| | x | | | 10 | LIST | Improved BASIC LIST command |
| x | | x | x | 3 | LOAD | Defaults to disk drive |
| x | | | x | 2 | MERGE | Merge from disk into current program |
| | x | | | 1 | MON | Break to current machine language monitor |
| | | | | 1 | OLD | Restore program after "NEW" |
| x | x | x | x | 24 | PUT | Send program to disk as text file |
| | | | | 6 | RENUMBER | Renumber all or part of program |
| | | | | 2 | RUN | Run current program, ignores screen garbage |
| x | | x | x | 3 | SAVE | Defaults to disk drive, allows replace |
| x | | x | | 1 | SETD | Set disk device #, allows multiple drives |
| | x | | | 4 | SETP | Set printer channel, format mode, paging |
| | | | | 4 | TRACE | Select 1 of 3 trace/step modes and speed |
| x | | x | x | 3 | VERIFY | Compare current program against disk/tape |
| | | | | 1 | WHY | Print position of last error |
| | | | | 1 | WHY? | List line of break or error |
| x | x | | | * | * | Send output to printer |
| | x | | | 1 | # | Display current version of SYSRES™ |



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.. one good thing

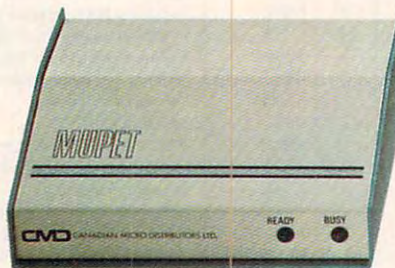


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The Winter Of Our Content

A Report On The January Consumer Electronics Show

David D. Thornburg
Innovision
Los Altos, CA

At a time when most of us are contemplating sugar plums, planning New Year's parties, or replacing shingles kicked loose by Santa's reindeer, a few hardy souls are preparing for a major event – the Winter Consumer Electronics Show held each January in Las Vegas.

In the area of personal computers, this year's show will be long remembered. Formal announcements by Commodore, Panasonic, Astrovision, Sharp, and Toshiba, more than justified leaving the remains of our sudden 12" rainstorm for the sunny (if somewhat cold) desert of Nevada.

Here, then, are the highlights of some of the more exciting products for 1982. As you read this, remember that many of the products displayed were prototypes, and that they may undergo some modification before going to market.

For sheer impact, Commodore stole the show with the announcement of two new color computers! Imagine a color computer with separate graphics and sound chips, two memory-mapped graphics modes, the traditional PET 40 column display, three voice music and sound effects, and cartridge programmability. Sound interesting? Got your checkbook ready? The price for the Commodore Ultimax is \$149.95. Yes, the decimal point is in the right place. For less than two-hundred dollars, you will be able to do wondrous things which previously required much more expensive hardware.

What's the catch? Well, the Ultimax doesn't have a full stroke keyboard; it uses the membrane type instead. Also it doesn't have a lot of RAM. However, you do get access to a 300 x 200 dot graphics display (two color mode), or a 160 x 200 screen (four colors at a time out of 16). Also (for you Atari and TI users), Commodore gives you access to up to 255 animated "sprites" per screen (up to 8 per line). Each sprite (or player, for Atari fans) resides in a 63 byte field and is composed of 24 x 21 dots.

The Ultimax uses the VIC peripherals (joy-

sticks, cassette, etc.).

But what about those of us who want more RAM? Well, Commodore has us in mind too. The Commodore-64 comes with 64K of RAM. Using the same chip set as the Ultimax, and equipped with a full-stroke keyboard, this gem sports a \$595 price tag.

Both new computers use the 6510 processor (a stretch 6502, I guess), the 6566 graphics controller, a 6581 sound interface device, and a 6526 PIA. Don't expect to see these chips at your local parts shop for awhile. Commodore plans to use every one they can make. While neither new computer will be on the market immediately (about June for the Ultimax – so *please* don't bug your dealer yet!), Commodore's marketing wizard, Kit Spencer, boldly predicted that Commodore would sell more computers in 1982 than were sold by all manufacturers in 1981.

While the Ultimax (with its game-like price) may lead the sales into the homes, both machines will probably penetrate the school market as well. The reason for this is that they both have a serial port capable of communicating with up to 30 other computers. Just what the teachers ordered!

Commodore wasn't the only booth sporting ear-to-ear grins. Panasonic introduced the 6802-based JR-100 – a \$199.95 compact computer which comes with 16K of RAM and an 8K BASIC. The system can be expanded to 48K RAM. While this monochrome computer has only a character-based display (32 characters by 24 lines), the user is free to define his or her own character set. A color version of this computer will be available for \$299.95 at some future date. While I was impressed by the overall physical layout of this computer, one aspect of the keyboard bothered me. The space bar was located where the right SHIFT key should be. Perhaps this will be changed by the time the product gets to market. The JR-100 was designed (and will be built) by a different group than the one respon-

DTL BASIC COMPILER

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DTL-BASIC is a Basic compiler for Commodore machines designed to convert existing programs to machine code and run them without modification. Compiled programs will run much faster and operate in exactly the same way as the un-compiled versions. Compiled code is typically 20 to 50% smaller than source code. For large programs this saving will more than offset the 4K run-time library appended to each compiled program, providing additional internal memory space.

The compiler implements true integer arithmetic as well as real arithmetic. Use of integers can lead to significant speed improvements. Special compile time options make identification and conversion of real variables to integers a simple task.

A 'Compiler' security key, which plugs into

either cassette port, is supplied together with the DTL-BASIC compiler. This key must be used in order to compile a program or to run the compiled version. In order to allow for the distribution of compiled versions of user developed programs, a second type of key known as a 'Run-Time' key is available in any required quantities. Software developers can obtain private security key sets with unique serial numbers providing comprehensive protection of their products while allowing customers to make backup copies of compiled programs.

DTL-BASIC is a disk based system requiring a 32K PET/CBM and comes complete with an in-depth user manual and a Compiler Security Key. Three versions of the compiler exist for CBM 3032, CBM 4032, and CBM 8032 machines. Please specify machine type and disk type (4040 or 8050) on which compiler is to be supplied.

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sible for the 6502-based hand held computer being sold by Panasonic and Quasar. The JR-100 will be sold to the home market – primarily the hobbyist and home study market at first. A full line of peripherals is planned – modems, floppy disks, etc.

Astrovision demonstrated the Bally Arcade with a plug-in expansion unit housing a full-stroke keyboard and running the language ZGRASS. This graphics language was developed (if memory serves) by Tom Defanti at the University of Illinois in Chicago. The goal is to allow artists and other non-technical types to create breathtaking real-time animations without having to learn machine language programming. The result is beautiful. Since the Z80-based Astrovision game machine has the same multi-chip display controller used in Bally's coin operated arcade games, high quality graphics is possible. What makes it practical is the ease with which figures drawn on a tablet can be saved as procedures, located anywhere on the screen, and can be magnified and rotated at will.

Astrovision seems intent on aggressively pursuing this project, but it isn't clear how effectively they will be able to compete. As with the other machines mentioned so far, don't expect to see the ZGRASS machine next week.

For those who take their graphics seriously, Toshiba was pleased to announce the T100 computer. When used with a high resolution color monitor, the user has access to 8 colors on a 640 by 200 dot array. A multi-line liquid crystal display was shown as an alternative. The packaging of this CP/M machine reminded me of the NEC PC-8000 – very stylish and business-like. Equipped with a Z80, 32K of ROM and 64K of RAM, this computer should appeal to those who are interested in doing some serious work.

Sharp had a surprise of its own. The original PC-1200 hand-held computer (available from Radio Shack for some time) has been joined by an 8-bit brother: the PC-1500. While this new machine is much faster than its predecessor, the most amazing feature was the availability of a color graphic printer. For a total price of \$550, Sharp users will have access to a computer with a pocket-sized drum plotter that lets you draw pictures with any of four automatically selected pens (red, green, blue, black). This is one product that has to be seen to be believed – and even then you won't believe it.

The PC-1500 is available now. (Of course I ordered one!)

At long last, the Casio FX-9000 desktop computer is on the market. This computer has a built-in 5" monochrome display with the ability to show graphics images with a 256x128 resolution. The sleek styling is reminiscent of the Hewlett Packard HP-85, but the price (under \$1800, fully loaded) is

more in keeping with Casio's products. The FX-9000 uses a Z80 compatible processor and gives the user access to two types of RAM. Front panel accessibility to RAM cartridges lets the user choose between 16K dynamic RAM cartridges, and 4K CMOS cartridges. The 4K byte RAM module contains its own battery, so that programs which are saved on this module can be removed and saved for instant reloading later.

Texas Instruments developed and showed a similar 4K RAM cartridge for the 99/4. Since TI also showed a new Assembler/Editor system, the ability to let users make their own cartridges is quite appealing. My, what a difference a year makes.

TI also showed a nicely designed expansion box which does much to reduce the clutter associated with fully loaded systems.

Atari's booth was almost impossible to enter. It was as if everyone who attended the show decided to check them out at the same time. The official authorized Atari Pac Man program was introduced. The action is a little different from the previous version done for the Atari computer (Jawbreaker) by OnLine Systems. Compared to the Pac Man games also shown by Magnavox, Astrovision, Texas Instruments, and others, Atari did a very nice job at software development. Coleco's hand-held version of the game was not as exciting, but then it doesn't use a color display screen either.

While my emphasis has been on hardware, it should be noted that software was on display as well. Automated Simulations displayed some of their newer programs for the Apple and Atari computers. While they are known primarily for their adventure games, Automated Simulations has developed a line of educational games (such as Jabbertalky) which are terrific.

The fact that a few dedicated people are willing to make the effort to generate educational games which teach as well as entertain should not go unrewarded. These people are doing an excellent job and are to be congratulated.

Both Activision and IMAGIC showed cartridges for the Atari video game which demonstrated exceptionally high quality graphics. Not surprisingly, these booths were well attended as well.

So much to see, and too little time! I was so busy getting all this information for you dear readers that I barely got to examine the solar-rechargeable flashlights, underwear with built-in loudspeakers, and ball point pens with built-in clocks and music synthesizers.

But that is why there are two shows a year. So until the next CES this June in Chicago, I'll just have to be content with what I saw.

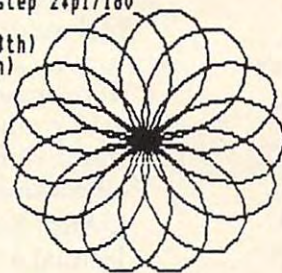
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```
5 !frame 0,0 to 639,199
10 open 4,4:recall "cmd logo",8,1
20 k=2.1:z=50:t=7:pi=3.14159:a=4:b=4
30 for th=0 to 2*pi step 2*pi/180
40 r = z*sin(th*t)
50 x = 280+k*r*cos(a+th)
60 y = 120+r*sin(b*th)
70 if th<>0 then 100
80 !move x,y
90 goto 110
100 !draw x,y
110 next th
120 !hard#4
130 close 4: end
```



commands in rom include:

```
dot x,y      move x,y
cplot x,y    draw x,y
test x,y,a

line x1,y1 to x2,y2
cline x1,y1 to x2,y2
dline x1,y1 to x2,y2
frame x1,y1 to x2,y2
cframe x1,y1 to x2,y2
fill x1,y1 to x2,y2
clear x1,y1 to x2,y2
displ x,y,a$ - for user
defined shapes
gsav "filename",8
recall "filename",8
```

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Basically Useful BASIC

Tabulation

Paul Lilly
Pelham, AL

If you have ever written a program that output a wide range of numbers, you probably noticed the numbers were left justified (first digit of number printed at next print location regardless of the size of the number). Additionally, if you wanted to print a number such as \$9.20, it would be printed as 9.2, omitting the trailing zero.

So what do you do if you want to write a nice clean program that would balance your checkbook, list expenses, or otherwise output a series of numbers, right justified, in a nice straight column? Answer: use a short subroutine to measure, add trailing zeros if needed, and right justify the number when it is printed.

The Subroutine

The key to the subroutine is to convert the number to a string using the STR\$ command. After the number is a string, we can add or subtract to its length, adjust it to our desired format, and control where it is printed by using the TAB and LEN commands together.

Program 1 is an example of such a subroutine. The instructions are written starting on line 5000 so it could be inserted in most programs without interfering with the existing instructions. We also have created two variables and one string that should be reserved from the rest of the program.

RJ – the print position for the rightmost digit in the number we want to print.

N – the number we want to format and print.

N\$ – the ASCII string of N.

The subroutine can be entered at four different locations, depending on our needs.

1. If we want our number formatted with two digits to the right of the decimal point (as when dealing with dollars and cents figures), we can call the subroutine at 5010. Prior to calling the subroutine we must set N to the number we want to print, and RJ to the print location where we want the rightmost located.

2. If we call this subroutine several times throughout our program, and our print locations vary, we can call subroutine 5000. Line 5000 will set RJ to seven positions past our last print location. This will reduce the pro-

gramming steps needed in our main program. With seven positions (past last print position) we can print numbers up to 9999.99. For larger numbers, line 5000 can be changed accordingly.

3. If we do not want any decimals in our number, we can call the subroutine at 5090. Here again, N must be set to the number we want printed, and RJ to the print location of our rightmost digit, prior to calling the subroutine.

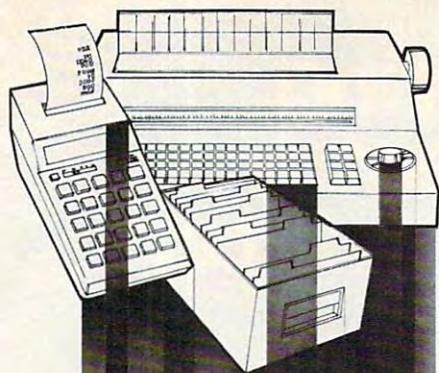
4. And, finally, if we want to print a non-decimal number, and would like to save programming steps, we can enter the subroutine at 5085 and let the subroutine figure RJ for us.

The Method

Suppose we enter at line 5000 with N set to the number we would like printed. Line 5000 will set RJ to six print positions past our current (last printed) print position. Line 5010 will strip away any more than two digits right of the decimal point (it is still possible at this point to have only one or no digits right of the decimal). Let's look at lines 5040 and 5050. These statements look for the decimal (".") to determine if N\$ has a decimal point, and how many digits (one or two) are to the right of it. Line 5040 finds the decimal point one position back from the rightmost character, meaning there is only one digit to the right of the decimal point. Therefore, the statement adds the necessary trailing zero, then jumps ahead to 5070.

Line 5050 finds the decimal point two positions back from the rightmost character, meaning there are already two digits to the right of the decimal point. In this case, no modification is needed to N\$, so the statement simply jumps ahead to 5070. Now the only possible configuration left for N\$ is for it to have no decimal in it. In this case line 5060 tacks on the required ".00", to maintain the standard format. Now let's go back to 5030. If N equaled 0-9, the LENth of N\$ would be only two and would bomb the program at 5050. So, since any string with less than a length of three can't have a decimal point in it anyway, 5030 will catch it and route it around 5040 and 5050. (By the way, the STR\$ command (at least in my machine) puts a leading space in front of the ASCII representation of the number, thus the number 1 has a string LENth of two.)

That brings us to line 5070, which strips the leading space so it doesn't interfere with our print position calculations. Finally on line 5075 we TAB the difference between RJ and LEN(N\$), and print our number. Line 5085 is where we would enter if we wanted to print integers. Line 5090 would strip the number to an integer, then change it to a string. Line 5095 would jump back to where we remove



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the leading space and print the number.

Considerations

Line 5075 uses the semicolon after printing N\$ to suppress the LF/CR. This is because you may want to print several numbers on one line. Once you have printed the last number on a line, have the main program execute a PRINT command so you will get your carriage return. If you only want to print one number per line and no further printing will be done after the number, you may remove the semicolon from line 5075.

Also, be careful not to set RJ to a number smaller than N\$ would be after the modifications were made to it, otherwise you will not space properly with the TAB command on line 5075 and, possibly, generate an error that will bomb your program.

Program 2 will show a comparison between two different interest rates, of 15 different loan amounts. The user is asked to enter two rates, principal for first comparison, increment of principal for succeeding comparisons, and the term of the loan in months. The program will output the results neatly.

Figure 1.

Sample Run #1

INITIAL PRINCIPAL
? 50000

INCREMENT PRINCIPAL BY
? 2000

INTEREST RATE 1
? 10

INTEREST RATE 2
? 14

TERM OF LOAN IN MONTHS
? 360

FOR 360 MONTHS

| LOAN | 10 % | 14 % |
|-------|--------|--------|
| 50000 | 438.79 | 592.44 |
| 52000 | 456.34 | 616.13 |
| 54000 | 473.89 | 639.83 |
| 56000 | 491.44 | 663.53 |
| 58000 | 508.99 | 687.23 |
| 60000 | 526.54 | 710.92 |
| 62000 | 544.09 | 734.62 |
| 64000 | 561.65 | 758.32 |
| 66000 | 579.20 | 782.02 |
| 68000 | 596.75 | 805.71 |
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Program 1. Microsoft Version (Apple, PET, etc.)

```

5000 RJ=POS(RJ)+7
5010 N=INT(N*100+.5)/100
5020 N$=STR$(N)
5030 IFLEN(N$)<3GOTO5060
5040 IFMID$(N$,LEN(N$)-1,1)=", "THENN$=N$+"0";
      GOTO5070
5050 IFMID$(N$,LEN(N$)-2,1)=", "GOTO5070
5060 N$=N$+",00"
5070 N$=RIGHT$(N$,LEN(N$)-1)
5075 PRINTTAB(RJ-LEN(N$));N$;
5080 RETURN
5085 RJ=POS(RJ)+6
5090 N$=STR$(INT(N))
5095 GOTO5070

```

Program 2. Microsoft Version

```

100 PRINT:PRINT"INITIAL PRINCIPAL";INPUTLI
110 PRINT:PRINT"INCREMENT PRINCIPAL BY";INPUTLI
120 PRINT:PRINT"INTEREST RATE 1";INPUTI1
125 IFI1<10RI1>100GOTO120
130 PRINT:PRINT"INTEREST RATE 2";INPUTI2
135 IFI2<10RI2>100GOTO130
140 PRINT:PRINT"TERM OF LOAN IN MONTHS";INPUTNM
150 PRINT:PRINT:PRINT:PRINT
160 PRINT"      FOR";NM;"MONTHS"
170 PRINT:PRINT"LOAN      ";I1;"%      ";I2;"%";
      PRINT
180 FORJ=LATOLA+(14*LI)STEPLI
190 I3=I1/1200;I4=I2/1200
200 P1=J*(I3/(1-(1/(1+I3)^NM)))
210 P1=INT(P1*100+.5)/100
220 P2=J*(I4/(1-(1/(1+I4)^NM)))
230 P2=INT(P2*100+.5)/100
240 N=J;GOSUB5085
250 PRINTTAB(8);N=P1;GOSUB5000
260 PRINTTAB(16);N=P2;GOSUB5000
270 PRINT:NEXTJ
280 END

```

Program 3. Atari Version

```

5000 RJ=PEEK(85)+7
5010 N=INT(N*100+0.5)/100
5020 GOSUB 5100:N$=STR$(N)
5030 IF LEN(N$)<3 THEN 5060
5040 IF N$(LEN(N$)-1,LEN(N$)-1)="." THEN
  N$(LEN(N$)+1)="0":GOTO 5070
5050 IF N$(LEN(N$)-2,LEN(N$)-2)="." THEN
  5070
5060 N$(LEN(N$)+1)="00"
5070 POKE 85,RJ-LEN(N$)+7:N$
5080 RETURN
5085 GOSUB 5100:RJ=PEEK(85)+6
5090 N$=STR$(INT(N))
5095 GOTO 5070
5100 TRAP 5110:DIM N$(15):TRAP 40000
5110 RETURN

```

Program 4. Atari Version

```

100 PRINT:PRINT "INITIAL PRINCIPAL":INP
UT LA

```

```

110 PRINT:PRINT "INCREMENT PRINCIPAL BY
":INPUT LI
120 PRINT:PRINT "INTEREST RATE 1":INPUT
I1
125 IF I1<1 OR I1>100 THEN 120
130 PRINT:PRINT "INTEREST RATE 2":INPUT
I2
135 IF I2<1 OR I2>100 THEN 130
140 PRINT:PRINT "TERM OF LOAN IN MONTHS
":INPUT NM
150 PRINT:PRINT:PRINT:PRINT:PRINT
160 PRINT "    FOR ";NM;" MONTHS"
170 PRINT:PRINT "LOAN    ";I1;"%    ";
I2;"%":PRINT
180 FOR J=LA TO LA+(14%LI) STEP LI
190 I3=I1/1200:I4=I2/1200
200 P1=J*(I3/(1-(1/(1+I3)^NM)))
210 P1=INT(P1*100+0.5)/100
220 P2=J*(I4/(1-(1/(1+I4)^NM)))
230 P2=INT(P2*100+0.5)/100
240 N=J:GOSUB 5085
250 POKE 85,8:N=P1:GOSUB 5000
260 POKE 85,16:N=P2:GOSUB 5000
270 PRINT:NEXT J
280 END

```

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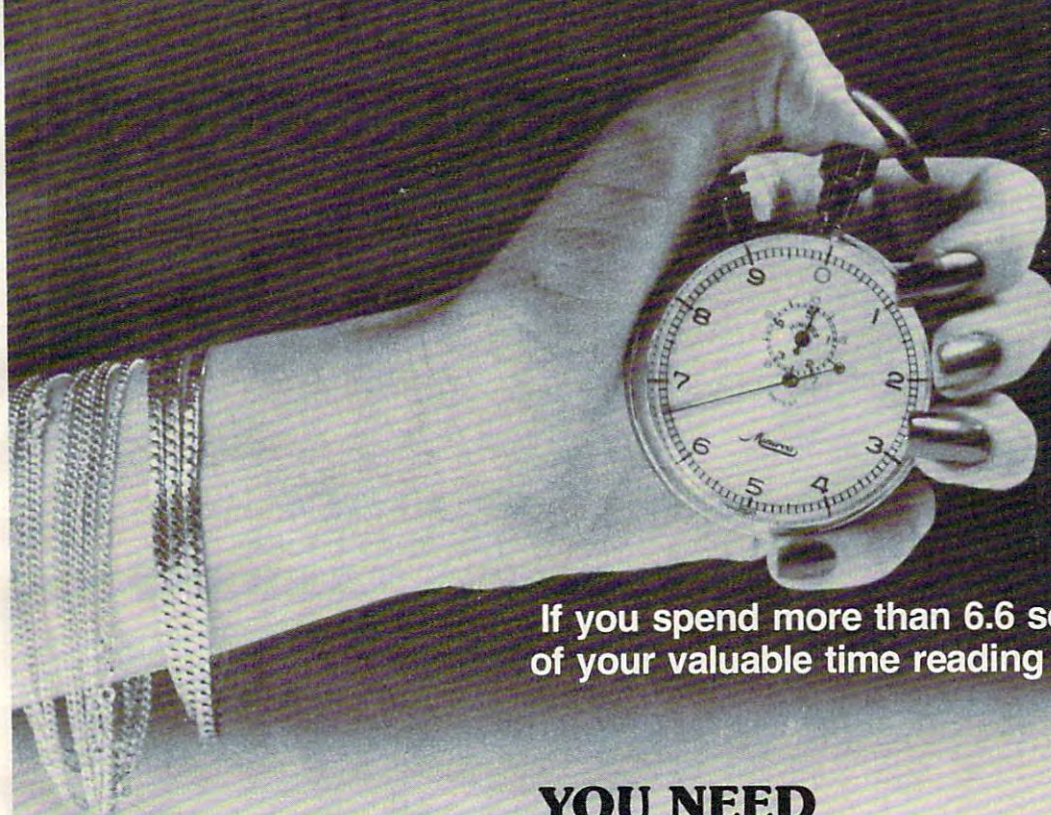
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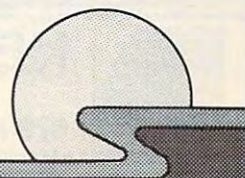
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Twenty Questions Revisited

Elizabeth Deal
Malvern, PA

*Editor's Note: In the September, 1981 Computers And Society column, David Thornburg presented a fascinating program called Twenty Questions. Both versions (Microsoft BASIC and Atari BASIC) are repeated at the end of this article. Here, Liz Deal, a long time contributor to **COMPUTE!**, presents an unedited transcript of her young son and a friend exploring the intrigues of Twenty Questions. — RCL*

In **COMPUTE!** #16, pgs. 12 and 16, there appeared a program called "Twenty Questions." Robert Lock asked for readers' response to the program. I think the reactions of two ten-year old boys might amuse you.

They liked the game, went through many rounds, obviously had some goal in mind, kept changing the rules and conclusions, and gave up feeling somewhat cheated at the end.

They religiously took turns between the typing and thinking tasks every few minutes, supplementing their typing with some loud thinking. I began recording several minutes into the game and noted words present on the screen. The kids' conversation is preceded by P and R to identify who is saying what. What they typed on the screen and what PET answered is in capital letters (shown on one line). Draw your own conclusions from a sample of two people.

RIGHT? NO
WRONG? NO

R: It's supposed to be an object
P: Ok

BIKE? YES

R: Is it an animal?
ANIMAL? NO
VEHICLE? YES

P: Is it a vehicle?

R: Yeah, try it, that's what it was before
IS IT A PERSON? NO

P: Is it an object? o-b-j-e...

R: I know how to spell it
IS IT AN OBJECT? NO

P: If it's not an object it's not anything...

R: I know
IS IT A NAME?

P: Name not an object, erase it
IS IT A VEHICLE? YES

R: That's what we should have tried before... again?

P: Try vehicle again, it's a lucky question

R: What if it's not?
IS IT A VEHICLE? YES

R: I bet it's always vehicle, let's try this
VEHICLE? YES

R: It's going to be always vehicle

P: Let's try vegetable
VEGETABLE? YES

R: I think if it begins with V is right.
Try viking v-i-k-i-n-g

IS IT VIKING? NO
P: Let's see what happens if we go for all twenty...try one word and question mark on it

PAPER? NO
INVENTION? NO
IS IT AMPLIFIER? NO
GLUESTICK? NO
BIG BRICK? NO
HORSE? YES

P: aha...

R: I like horses, they are my favorite animal
CAT? NO
DOG? NO
ANIMAL? NO

P: Put shark

R: No can't be anything that's animal. I'll try tape, we haven't tried that yet
TAPE? YES

P: Try table
TABLE? YES

R: First guess again. This is good!

P: No it is not...it's like trying to eat a live pig without fork and a knife
DOG? NO

P: Do animal instead of certain word
ANIMAL? NO
TAPE? YES

P: Tape again, don't do it again, try t words
TREE? YES

P: Let's try c's

R: No cat didn't work... try h

HOUSE? YES
SNAK? NO
HOUSE? YES

R: I told you to put house before...

P: Well, I can do my own words...from my mind...

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R: Try gas
 P: Gas isn't an object...it's a thing...well, it's an object in a way
 R: We have to spell 'em right
 ROCKET? NO
 R: Try shuttle
 P: No, it's a name
 PIG? NO
 R: Can't be an animal?!
 P: I have to devise something in my head...
 (total silence several seconds, followed by
 STOP key somebody forgot to turn off)
 LIST
 P: OK, looking for the words...
 R: Don't they have...
 P: ...don't worry, we'll find the words...(reached
 end of listing)...all they have is that?! Not
 fair! No words. Only goes to 410. Where
 did it get the words? Has to have memory
 where to get the words...
 R: Let's do something else.

My PET will *think* when this conversation occurs:

ME: IS IT AN ANIMAL?
 PET: NOPE
 ME: IS IT A HORSE?
 PET: I TOLD YOU IN PREVIOUS QUESTION IT'S NOT AN ANIMAL, STUPID

Program 1: Microsoft Version

```
100 REM *TWENTY QUESTIONS
110 PRINT CHR$(147); "WELCOME TO THE GAME
115 PRINT "OF TWENTY QUESTIONS. BY
120 PRINT "ASKING QUESTIONS WHICH HAVE
130 PRINT "YES OR NO ANSWERS, TRY TO
140 PRINT "GUESS THE OBJECT WHICH HAS
150 PRINT "BEEN SELECTED."
155 PRINT
160 PRINT "BE SURE TO END EACH QUESTION WITH A
170 PRINT "QUESTION MARK."
180 PRINT
190 PRINT
195 B$="AEIOUY"
200 C=0
210 REM *ROUND
220 C=C+1
230 REM *QUESTION
240 PRINT "ENTER QUESTIONS #";C
250 INPUT A$
260 IF RIGHT$(A$,1)="/" THEN 290
270 PRINT "THAT ISN'T A QUESTION.
275 PRINT "PLEASE ASK A QUESTION."
280 GOTO 230
290 YES=0:NO=1
300 FOR I=1 TO 6
310 IF MID$(A$,LEN(A$)-1,1)=MID$(B$,I,1) THEN YES=1:NO=0
320 NEXT I
```

```
330 FOR PAUSE=1 TO 50:RND(1):NEXT PAUSE
340 IF YES THEN PRINT "YES"
350 IF NO THEN PRINT "NO"
360 PRINT
370 IF C<20 THEN 210
380 PRINT "END OF TWENTY QUESTIONS."
390 PRINT "PRESS RETURN TO START AGAIN."
400 GET A$:IF A$="" THEN 400
410 RUN
420 END
READY.
```

Program 2: Atari Version

```
100 REM *20 QUESTIONS
105 DIM A$(40),B$(6)
110 PRINT ">WELCOME TO THE GAME OF TWENTY
Y"
120 PRINT "QUESTIONS. BY ASKING QUESTIONS WHICH"
130 PRINT "HAVE YES OR NO ANSWERS, TRY TO GUESS"
140 PRINT "THE OBJECT WHICH HAS BEEN SELECTED."
150 PRINT
160 PRINT "BE SURE TO END EACH QUESTION WITH A"
170 PRINT "QUESTION MARK."
180 PRINT
190 PRINT
195 B$="AEIOUY"
200 C=0
210 REM *ROUND
220 C=C+1
230 REM *QUESTION
240 PRINT "ENTER QUESTION #";C
250 INPUT A$
260 IF A$(LEN(A$))="/" THEN 290
270 PRINT "THAT ISN'T A QUESTION. PLEASE ASK A QUESTION."
280 GOTO 230
290 YES=0:NO=1
300 FOR I=1 TO 6
310 IF A$(LEN(A$)-1,LEN(A$)-1)=B$(I,1) THEN YES=1:NO=0
320 NEXT I
330 FOR PAUSE=1 TO 50:RND(0):NEXT PAUSE
340 IF YES THEN PRINT "YES"
350 IF NO THEN PRINT "NO"
360 PRINT
370 IF C<20 THEN 210
380 PRINT "END OF TWENTY QUESTIONS."
390 PRINT "PRESS RETURN TO START AGAIN."
400 INPUT A$
410 RUN
420 END
```

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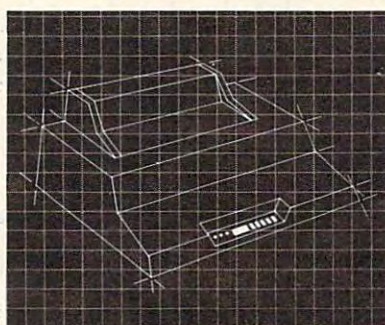
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*Data Source: Epson MX-80 Operation Manual

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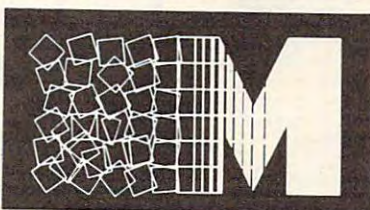
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COMPUTE!'s Listing Conventions

Many of the programs which are listed in **COMPUTE!** use special keys (cursor control keys, color keys, etc.) To make it easy to tell *exactly* what should be typed in when copying a program into the computer, we have established the following listing conventions.

For The Atari

All the editing and cursor control characters are spelled out and surrounded by brackets in the program listings: {CLEAR} for "clear screen." Other characters, such as CTRL-T (the "ball" character) will be listed as the "normal" character, but it will be within brackets: {T}. A series of identical control characters will be indicated by a number within the brackets: {3DOWN} means type ESC CURSOR-DOWN three times; {12 R} would mean type CTRL-R twelve times. Remember to press the ESC (escape) key before each cursor control key. If you should see {ESC} itself in a program listing, you would press ESC *twice*.

Two of the control characters, {=} and {-}, should be shifted. Any reverse field text will be enclosed within vertical lines. (In other words, any time you see a vertical line within a program listing in **COMPUTE!**, press the Atari logo key {A}.)

Atari Conventions

```
{CLEAR}= SHIFT-< (Clear Screen)
{UP}= CTRL-minus (Cursor Up)
{DOWN}= CTRL-equals (Cursor Down)
{LEFT}= CTRL-plus (Cursor Left)
{RIGHT}= CTRL-asterisk (Cursor Right)
{BACK S}= BACK S (Back space)
{DELETE}= CTRL-DELETE (Delete character)

{DEL LINE}= SHIFT-DELETE (Delete Line)
{INSERT}= CTRL-INSERT (Insert character)

{INS LINE}= SHIFT-INSERT (Insert line)
{ESC}= ESC (ESCAPE key pressed twice)
{TAB}= TAB (Tab key)
{CLR TAB}= CTRL-TAB (Clear tab setting)
{SET TAB}= SHIFT-TAB (Set tab stop)
{BELL}= CTRL-2 (Ring buzzer)
```

For PET/CBM/VIC

Generally, any PET/CBM/VIC program listings will contain bracketed words which spell out any special characters: {DOWN} would mean to press the cursor-down key; {3DOWN} would mean to press the cursor-down key three times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing the other key), the key would be underlined in our listing. For example, S would mean to type the S key while holding the shift key. This would result in the "heart" graphics symbol appearing on your screen.

Sometimes in a program listing, especially within quoted text when a line runs over into the next line, it is difficult to tell where the first line ends. How many times should you type the SPACE bar? In our convention, when a line breaks in this way, the ~ symbol shows exactly where it broke. For example:

```
100 PRINT "TO START THE GAME ~
    YOU MAY HIT ANY OF THE KEYS
    ON YOUR KEYBOARD."
```

shows that the program's author intended for you to type two spaces after the word *GAME*.

For The Apple

Programs listed as "Microsoft" are written for the PET/CBM,

Apple, OSI, etc. Although the programs are general in nature, you may need to make a few changes for them to run correctly on your Apple. Microsoft BASIC programs written for the PET/CBM sometimes contain special cursor control characters. The following table shows equivalent Apple words. Notice that these Apple commands are *outside* quotations (and even separate from a PRINT statement). PRINT "[RVS]YOU WON" becomes INVERSE: PRINT "YOU WON":NORMAL

```
[CLEAR] (Clear Screen) HOME
[HOME] (Home cursor) VTAB 0:HTAB 0
[DOWN] (Cursor down)
    POKE 37,PEEK(37)+(PEEK(37)<23)
[UP] (Cursor up)
    POKE 37,PEEK(37)-(PEEK(37)>0))
[LEFT] (Cursor left) PRINT CHR$(8);
[RIGHT] (Cursor right)
    POKE 36,PEEK(36)+(PEEK(36)>(PEEK(32)
    +PEEK(33)))
[RVS] (Inverse video on. Turns off automatically after a
carriage return. To be safe, turn off inverse video after
the print statement with NORMAL unless the PRINT
statement ends with a semicolon.)
    INVERSE
[OFF] (Inverse video off) NORMAL
```

Shifted characters can represent either graphics characters or uppercase letters. If within text, just use the non-shifted character, otherwise substitute a space. Some "generalized" programs contain a POKE such as POKE 59468,14. Omit these from the program when typing it in. One final note: you will probably want to insert a question mark or colon within an INPUT prompt. PET/CBM and many other BASICs automatically print a question mark:

```
INPUT "WHAT IS YOUR NAME?";N$
    becomes
INPUT "WHAT IS YOUR NAME?";N$
```

All Commodore Machines

| | |
|----------------------|-------------------------|
| Clear Screen {CLEAR} | Cursor Left {LEFT} |
| Home Cursor {HOME} | Insert Character {INST} |
| Cursor Up {UP} | Delete Character {DEL} |
| Cursor Down {DOWN} | Reverse Field On {RVS} |
| Cursor Right {RIGHT} | Reverse Field Off {OFF} |

VIC Conventions

| | |
|---------------------------|---------------------|
| Set Color To Black {BLK} | Function Two {F2} |
| Set Color To White {WHT} | Function Three {F3} |
| Set Color To Red {RED} | Function Four {F4} |
| Set Color To Cyan {CYN} | Function Five {F5} |
| Set Color To Purple {PUR} | Function Six {F6} |
| Set Color To Green {GRN} | Function Seven {F7} |
| Set Color To Blue {BLU} | Function Eight {F8} |
| Set Color To Yellow {YEL} | Any Non-implemented |
| Function One {F1} | Function {NIM} |

8032/Fat 40 Conventions

| | |
|-----------------------------|--------------------------------|
| Set Window Top {SET TOP} | Erase To Beginning {ERASE BEG} |
| Set Window Bottom {SET BOT} | Erase To End {ERASE END} |
| Scroll Up {SCR UP} | Toggle Tab {TGL TAB} |
| Scroll Down {SCR DOWN} | Tab {TAB} |
| Insert Line {INST LINE} | Escape Key {ESC} |
| Delete Line {DEL LINE} | |

Energy Workbook

David E. Pitts
Houston, TX

If your heating or cooling costs have increased by 30% or more last year like mine, then you are probably considering installing some energy saving measures such as: storm windows, a clock thermostat, more insulation, caulking, or weatherstripping. Since everyone's home is different and there is a wide diversity of climatic conditions in the United States, it is difficult to determine which of the many choices is the best investment. The program described here utilizes the characteristics of the house together with the estimated climate to determine a projected savings for the homeowner for a wide variety of energy improvements at locations within the contiguous 48 states. The homeowner may utilize this savings, together with the projected cost and the economic outlook, to determine if the payout period meets his criteria for a successful investment.

The energy workbook program allows for a wide variety of fuels for both heating and cooling: oil, natural gas, electricity, wood, liquid petroleum, gas, and coal. The savings due to installing storm windows, changing thermostat settings, caulking and weatherstripping, or adding ceiling or floor insulation are calculated for the homeowner. The required inputs are shown in Table 1. Repetitive calculations involving future energy cost can easily be made using the program, thus improving the homeowner's estimate of the accrued energy savings.

The program was written in Microsoft BASIC on an OSI 4PMF using simple I/O so that the program could be easily converted to other systems such as PET, Apple, and TRS-80. Atari owners will have to modify the program by adding PRINTs to the prompted INPUT statements, adding dimension statements for each string variable and changing the string concatenation and splitting as per page 39 of their user's guide. *[Atari owners: make the changes in the lines indicated in Program 2. — Ed.]* The program is based on an algorithm from the Federal Energy Administration (Reference 1) which divides the 48 contiguous states into climatic regions for cooling and heating for average housing, fuel, and climatic conditions. If the user's situation is unusual in terms of home construction, altitude, etc. additional advice from government offices or utility companies may be advisable.

String variables are used to read the table of states, cities, and heating (H) and cooling (C) factors. Commas are used for delimiters separating the states from the cities and their factors. Because of this, cities comprised of two or more words have had the interior blanks removed. Statements 20-45 decode the city and factors from the string B\$(I). The heating zone and the cooling zone each range from zero to five, with five being the most severe winter climate and zero being the most severe summer climate. The heating and cooling zones are used to calculate a heating factor and a cooling factor. The fuel factors FH(I) and FC(I) are read from the data statements for the fuel chosen by the user and a heating index (HI) or cooling index (CI) is calculated by the product of the heating (or cooling) factor times the fuel factor times the price per fuel unit.

The fuel index (FI) is calculated by the sum of the heating index and cooling index. The annual heating fuel cost is taken from the total energy cost for the heating season times .85 to account for use of other uses of fuel (e.g. hot water heating). The annual cooling cost is calculated from total cooling season fuel cost times .6 to account for other use such as lighting. These ratios can be checked by determining average off season to average in season usage. The appropriate ratios should be used in statements 175 and 200. The ratios in my home were .56 and .88 for cooling and heating respectively, quite close to the Energy Administration's estimate.

Annual heating saving due to changing the thermostat setting is calculated from the product of the number of degrees turned down times the annual heating cost (HS) times a savings factor (Y) calculated in lines 240-247. Additional savings due to setting back the nighttime temperature are calculated using a similar procedure, but with an added factor .3 (due to the reduced time the set back temperature is in effect). Cooling seasons savings are calculated from the annual cooling cost times .02 times the number of degrees the thermostat is turned up. The annual savings from caulking and weatherstripping is calculated from a draft factor times the total floor area times the fuel index. The draft factor is the sum of the factors for windows,

for fast development of fast, tight programs... step beyond FORTH, to RPL



High speed, low memory requirements, and user-friendly development tools are no longer mutually exclusive. **Reverse Polish Language**, a FORTH-like language now available for the PET and CBM computers, is faster than FORTH, easier to debug than BASIC, and more space-efficient than any other language known, including assembly language. Here's what **Loren Wright**, MICRO magazine's PET Vet, says about it:

"RPL is generally faster and more conservative of memory than FORTH... RPL will serve well the need for a language that is faster than BASIC yet easier to program than assembly language. The package is well-thought-out and well-documented."

RPL uses the ordinary Commodore BASIC screen editor for program entry and editing. And the full power of BASIC, in both immediate and program modes, remains available to the user throughout a development session. The RPL Compiler and Symbolic Debugger reside in the top 8K of memory, ready to be invoked at any time, directly from BASIC, via the commands "compile" and "debug". RPL source code is saved to disk or cassette just like BASIC source, and is compiled memory-to-memory for quick compilation turnaround and instant source accessibility. RPL supports separate compilation of program modules through the use of the compiler's "global symbol" features, which also permit the development of true "subroutine libraries".

The language itself is concise and straightforward, making it much easier to learn and master than most other computer languages. A total of only 47 special keywords and symbols provide the following capabilities:

- Nestable, multi-line IF... THEN... ELSE constructs.
- Nestable FOR... NEXT loops.
- Named subroutines and functions of arbitrary length.
- Compile-time constants and code ORGability.

- Full 16-bit integer arithmetic and logical manipulations.
- Built-in character-string handling.
- Stack-management directives including n-index, n-rotate.
- GET, INPUT, and PRINT operators
- Forward and backward symbolic references, including GOTO.
- Easy access to machine language.
- Predefined arrays with numeric and/or string contents.
- Local and global symbols.

... and much more. The 60-page RPL manual is clear and well-organized, making the language easy to learn and easy to use: **Loren Wright** says that **"the documentation is about the best I have ever seen."**

The Samurai RPL Symbolic Debugger is a screen-oriented, object-level debug facility using a soft-key-driven command syntax for ultra-ease of use. Features included are:

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- Address specification using expressions with symbols.
- Stack-edit capability on both stacks.
- Debugger video usage is transparent to target program.
- Extra run-time error-checking during debugging only.

... and, of course, much more. Here's what **Robert Baker**, author of the PET-pourri column in Kilobaud Micro-computing, says about it:

"RPL offers an unbeatable combination of speed, memory space efficiency, and ease of use. It is well-designed, well-implemented, and well-documented, and it deserves the serious consideration of every PET/CBM programmer. The Samurai RPL Symbolic Debugger, in particular, must be seen to be believed."

The compiler includes a special option making it very easy for you to create "execute-only" object modules from which all development-utility software and memory allocations have been excluded. The price you pay for the compiler also includes an unlimited license to resell the RPL "run-time library" (not the compiler) in conjunction with "execute-only" application object modules of your own.

The Samurai RPL Compiler is now available at the special introductory price of \$49.95, which includes the manual in a nice 3-ring binder and First Class postage within the continental U.S. Media supplied is of top quality, and is not copy-protected (this permits you to make backups for yourself without hassles). Compiler and debugger together are **\$80.91, complete**. Manuals are available separately at \$10.00 and \$4.00, respectively, and will be credited toward software purchase. Please specify machine type, memory size, ROM version, and media type (cassette, 4040, or 8050 diskette) when ordering.

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CARD GAMES

- BACCARAT (Atari only)** Price: \$18.95 Cassette/\$22.95 Diskette
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- GIN RUMMY (Apple only)** Price: \$18.95 Cassette/\$22.95 Diskette
This is the best micro computer implementation of GIN RUMMY existing. The computer plays exceptionally well, and the HIRES graphics are superb. What else can be said?
- POKER PARTY (Available for all computers)** Price: \$17.95 Cassette/\$21.95 Diskette
POKER PARTY is a draw poker simulation based on the book, POKER, by Oswald Jacoby. This is the most comprehensive version available for microcomputers. The party consists of yourself and six other (computer) players. Each of these players (you will get to know them) has a different personality in the form of a varying propensity to bluff or fold under pressure. Practice with POKER PARTY before going to that expensive game tonight! Apple cassette and diskette versions require a 32 K (or larger) Apple II.
- GO FISH (Available for all computers)** Price: \$14.95 Cassette/\$18.95 Diskette
GO FISH is a classic children's card game. The opponent is a friendly computer with user inputs that are simple enough for small children to easily master. The Apple and Atari versions employ high resolution graphics for the display of hands. A must for children!

THOUGHT PROVOKERS

- MANAGEMENT SIMULATOR (Atari, North Star, OSBORNE and CP/M only)** Price: \$19.95 Cassette/\$23.95 Diskette
This program is both an excellent teaching tool as well as a stimulating intellectual game. Based upon similar games played at graduate business schools, each player or team controls a company which manufactures three products. Each player attempts to outperform his competitors by setting selling prices, production volumes, marketing and design expenditures etc. The most successful firm is the one with the highest stock price when the simulation ends.
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- VALDEZ (Available for all computers)** Price: \$15.95 Cassette/\$19.95 Diskette
VALDEZ is a computer simulation of a tanker navigation in the Prince William Sound/Vulder Narrows region of Alaska. Included in this simulation is a realistic and extensive 256 x 256 element map, portions of which may be viewed using the ship's alphanumeric radar display. The motion of the ship itself is accurately modeled mathematically. The simulation also contains a model for the tidal patterns in the region, as well as other traffic (outgoing tankers and drifting icebergs). Chart your course from the Gulf of Alaska to Valdez Harbor! See the software review in 80 Software Critique and Personal Computing.
- BACKGAMMON 2.0 (Atari, North Star, OSBORNE and CP/M only)** Price: \$14.95 Cassette/\$18.95 Diskette
This program tests your backgammon skills and will also improve your game. A human can compete against a computer or against another human. The computer can even play against itself. Either the human or the computer can double or generate dice rolls. Board positions can be created or saved for replay. BACKGAMMON 2.0 plays in accordance with the official rules of backgammon and is sure to provide many fascinating sessions of backgammon play.
- CHESS MASTER (North Star and TRS-80 only)** Price: \$19.95 Cassette/\$23.95 Diskette
This complete and very powerful program provides five levels of play. It includes casting, en passant captures and the promotion of pawns. Additionally, the board may be preset before the start of play, permitting the examination of "book" plays. To maximize execution speed, the program is written in assembly language (by SOFTWARE SPECIALISTS of California). Full graphics are employed in the TRS-80 version, and two widths of alphanumeric display are provided to accommodate North Star users. See review in onComputing.
- SUPER SUB CHASE (Atari only)** Price: \$19.95 Cassette/\$23.95 Diskette
SUPER SUB CHASE simulates a search and destroy mission. Set your course and keep an eye on the sonar readings as you hunt for the hidden submarine. Set the depth charge explosion depth and watch them sink towards the sub. This is an addictive game which takes advantage of the Atari's graphics and sound capabilities. One or two players. Joystick(s) required.
- FOREST FIRE (Atari only)** Price: \$15.95 Cassette/\$19.95 Diskette
Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not predicting valuable structures can result in startling penalties. Life-like variables are provided to make FOREST FIRE very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty.
- BLACK HOLE (Apple only)** Price: \$14.95 Cassette/\$18.95 Diskette
This is an exciting graphical simulation of the problems involved in closely observing a black hole with a space probe. The object is to enter and maintain, for a prescribed time, an orbit close to a small black hole. This is to be achieved without coming so near the anomaly that the tidal stress destroys the probe. Control of the craft is realistically simulated using side jets for rotation and main thrusters for acceleration. This program employs Hi-Res graphics and is educational as well as challenging.
- SPACE EVACUATION! (Apple, Atari and TRS-80 only)** Price: \$15.95 Cassette/\$19.95 Diskette
Can you colonize the galaxy and evacuate the Earth before the sun explodes? Your computer becomes the ship's computer as you explore the universe to relocate millions of people. This simulation is particularly interesting as it combines many of the exciting elements of classic space games with the mystery challenge of ADVENTURE.
- MONARCH (Atari only)** Price: \$11.95 Cassette/\$15.95 Diskette
MONARCH is a fascinating economic simulation requiring you to survive an 8-year term as your nation's leader. You determine the amount of acreage devoted to industrial and agricultural use, how much food to distribute to the populace and how much should be spent on pollution control. You will find that all decisions involve a compromise and that it is not easy to make everyone happy. Runs in 16K Atari.
- CHOMPELO (Atari only)** Price: \$11.95 Cassette/\$15.95 Diskette
CHOMPELO is really two challenging games in one. One is similar to NIM; you must bite off part of a cookie, but avoid taking the poisoned portion. The other game is the popular board game REVERSI. It fully uses the Atari's graphics capability, and is hard to beat. This package will run on a 16K system.
- SPACE LANES (Available for all computers)** Price: \$10.95 Cassette/\$14.95 Diskette
SPACE LANES is a simple but exciting space transportation game which involves up to four players (including the computer). The object is to form and expand space transportation companies in a competitive environment. The goal is to amass more net worth than your opponent. The economics include stock purchases and company mergers. Watch your wealth grow!

AVAILABILITY

DYNACOMP software is supplied with complete documentation containing clear explanations and examples. Unless otherwise specified, all programs will run within 16K program memory space (ATARI requires 24K). Except where noted, programs are available on ATARI, PET, TRS-80 (Level II) and Apple (Apple II) cassette and diskette as well as North Star single density (double density compatible) diskette. Additionally, most programs can be obtained on standard (IBM 3740 single density/double density compatible) 8" CP/M floppy disks for systems running under MBASIC (for example, Altos, Xerox 820 and many others). 5 1/4" CP/M diskettes are available for the North Star and Osborne computer systems.

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**Except where noted, all TRS-80 Model I software is available on cassette (only) for the TRS-80 Model III. Exceptions: VALDEZ, CRIBBAGE, GRAFIX, CHESSMASTER. TRS-80 diskettes are not supplied with either DOS or BASIC.
***For most North Star disk-based systems, DYNACOMP presently does not support the new North Star Advantage.
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- LIL' MEN FROM MARS (Atari only)** Price: \$19.95 Cassette/\$23.95 Diskette
Defend yourself! The little men from Mars are out to get you if you don't get them first. This is a hilarious high resolution animated graphics (arcade) game which exercises much of the Atari's power. Requires one joystick.
- SPACE TILT (Apple and Atari only)** Price: \$10.95 Cassette/\$14.95 Diskette
Use the game paddles to tilt the plane of the TV screen to "roll" a ball into a hole in the screen. Sound simple? Not when the hole gets smaller and smaller! A built-in timer allows you to measure your skill against others in this habit-forming action game.
- ESCAPE FROM VOLANTUM (Atari only)** Price: \$15.95 Cassette/\$19.95 Diskette
Bring the action and excitement of an arcade into your home with ESCAPE FROM VOLANTUM! To escape you must maneuver your space ship around obstacles and later blast the dragon (without being eaten). If he is killed with a direct shot (not just a leg lopped off), a door opens to the outside. However, the door does not stay open indefinitely. If you fail to escape in time, the door closes and a new dragon appears. Sometimes you can smash through the door by repeatedly chipping away at it. Other times it is impervious. At the higher levels of play more obstacles and dragons appear, adding to the excitement. Uses high resolution graphics and sound. Runs in 16K.
- ALPHA FIGHTER (Atari only)** Price: \$13.95 Cassette/\$17.95 Diskette
Two excellent graphics and action programs in one! ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems.
- THE RINGS OF THE EMPIRE (Atari only)** Price: \$15.95 Cassette/\$19.95 Diskette
The empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. This exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players.
- INTRUDER ALERT (Atari only)** Price: \$15.95 Cassette/\$19.95 Diskette
This is a fast paced graphics game which places you in the middle of the "Dreadnaught" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems.
- MIDWAY (Atari only)** Price: \$14.95 Cassette/\$18.95 Diskette
MIDWAY is an exciting extension of the game of Battleship. It mixes the challenges of strategy and chance. Your opponent can be another human or the computer. Color graphics and sound are both included. Runs in 16K.
- TRIPLE BLOCKADE (Atari only)** Price: \$14.95 Cassette/\$18.95 Diskette
TRIPLE BLOCKADE is a two-to-three player graphics and sound action game. It is based on the classic video arcade game which millions have enjoyed. Using the Atari joystick, the object is to direct your blockading line around the screen without running into your opponent(s). Although the concept is simple, the combined graphics and sound effect lead to "high anxiety".
- GAMES PACK I (Available for all computers)** Price: \$10.95 Cassette/\$14.95 Diskette
GAMES PACK I contains the classic computer games of BLACKJACK, LUNAR LANDER, CRAPS, HORSESHOE, SWITCH and more. These games have been combined into one large program for ease in loading. They are individually accessed by a convenient menu. This collection is worth the price just for the DYNACOMP version of BLACKJACK.
- GAMES PACK II (Available for all computers)** Price: \$10.95 Cassette/\$14.95 Diskette
GAMES PACK II includes the games CRAZY EIGHTS, JOTTO, ACEY-DEUCEY, LIFE, WUMPS and others. As with GAMES PACK I, all the games are loaded as one program and are called from a menu. You will particularly enjoy DYNACOMP's version of CRAZY EIGHTS.
- Why pay \$7.95 or more per program when you can buy a DYNACOMP collection for just \$10.95?
- MOON PROBE (Atari and North Star only)** Price: \$11.95 Cassette/\$15.95 Diskette
This is an extremely challenging "lunar lander" program. The user must drop from orbit to land at a predetermined target on the moon's surface. You control the thrust and orientation of your craft plus direct the rate of descent and approach angle. Runs in 16K Atari.
- SPACE TRAP (Atari only, 16K)** Price: \$14.95 Cassette/\$18.95 Diskette
This galactic "shoot 'em up" arcade game places you near a black hole. You control your spacecraft using the joystick and attempt to blast as many of the alien ships as possible before the black hole closes about you.
- CHIRP INVADERS (PET/CBM only)** Price: \$14.95 Cassette/\$18.95 Diskette
CHIRP INVADERS is an addictive game using arc graphics. A Federation space station must be reached before the Chirps conquer the Earth. Stationary obstacles, moving meteors, and the attacking Chirps must all be avoided for a successful journey. Good luck.

ADVENTURE

- CRANSTON MANOR ADVENTURE (North Star and CP/M only)** Price: \$19.95 Diskette
At last! A comprehensive Adventure game for North Star and CP/M systems. CRANSTON MANOR ADVENTURE takes you into mysterious CRANSTON MANOR where you attempt to gather fabulous treasures. Lurking in the manor are wild animals and robots who will not give up the treasures without a fight. The number of rooms is greater and the associated descriptions are much more elaborate than the current popular series of Adventure programs, making this game the top in its class. Play can be stopped at any time and the status stored on diskette. Not available in 5 1/4" CP/M format.
- GUMBALL RALLY ADVENTURE (North Star only, 48K)** Price: \$21.95 Diskette
Take part in this outlaw race from the east coast to the west coast. The goal is to find your way to the finish line while maintaining the highest possible speed. You may choose one of five cars available at the garage. The choice will affect your speed and range. Remember to take spare parts and don't get caught speeding!
- UNCLE HARRY'S WILL (North Star only, 40K)** Price: \$24.95 Diskette
Uncle Harry has died and has left you everything. However, he has neglected to mention where everything is! Instead, his will consists of a poem which contains clues. You will have to travel all over the United States both by car and on foot to solve the puzzle, and there are over 300 locations to probe. Be careful and watch out for red herrings!

SPEECH SYNTHESIS

DYNACOMP is now distributing the new and revolutionary TYPE-N-TALK™ (TNT) speech synthesizer from Votrax. Simply connect TNT to your computer's serial interface, enter text from the keyboard and hear the words spoken. TNT is the easiest-to-program speech synthesizer on the market. It uses the least amount of memory and provides the most flexible vocabulary available anywhere.

List price \$375. DYNACOMP's price \$319.95 plus \$5.00 for shipping and handling.

- TALK TO ME (TNT Atari only, 24K)** Price: \$14.95 Cassette/\$18.95 Diskette
This program presents a superb tutorial on speech synthesis using the Atari 800 and TYPE-N-TALK™. TALK TO ME will illustrate normal word generation as well as phoneme generation. The documentation includes many helpful programming tips. TALK TO ME has been demonstrated on network (CBS) TV!

MISCELLANEOUS

- CRYSTALS (Atari only)** Price: \$ 9.95 Cassette/\$13.95 Diskette
A unique algorithm randomly produces fascinating graphics displays accompanied with tones which vary as the patterns are built. No two patterns are the same, and the combined effect of the sound and graphics are mesmerizing. CRYSTALS has been used in local stores to demonstrate the sound and color features of the Atari. Runs in 16K Atari.
- NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY**
DYNACOMP now distributes the 21 volume NSSE library. These diskettes each contain many programs and offer an outstanding value for the purchase price. They should be part of every North Star user's collection. Call or write DYNACOMP for details regarding the contents of the NSSE collection.
Price: \$9.95 each/\$7.95 each (4 or more)
The complete collection may be purchased for \$149.95

BUSINESS and UTILITIES

MAILMASTER (Atari diskette only)

MAILMASTER is a versatile software package for managing and manipulating mail lists and mini data bases. Each disk can hold over 700 customer entries containing name, address, three-letter key words and a phone number. The display is marked so that entries may be made and edited with ease. The status (e.g., disk space left, options, etc.) is shown at all times. Labels may be printed 1.2 or 3 up, and all sorting (zip code and alphabetically) is performed by a fast machine language program.

Price: \$39.95 Diskette

PERSONAL FINANCE SYSTEM (Atari and North Star only)

PFS is a single diskette, menu-oriented system composed of ten different programs. Besides recording your expenses and cash deductible items, PFS will sort and summarize expenses by payer, and display information on expenditures by any of 26 user-defined codes by month or by payer. PFS will even produce monthly bar graphs of your expenses by category! This powerful package requires only one disk drive, minimal memory (24K Atari, 32K North Star) and will store up to 600 records per disk (under 1000 records per disk by making a few simple changes to the program). You can record checks plus cash expenses so that you can finally see where your money goes and eliminate tedious hand calculations. Contains high speed machine language sort. PFS has been demonstrated on network (CBS) TV!

Price: \$39.95 Diskette

FAMILY BUDGET (Apple and Atari only)

FAMILY BUDGET is a very convenient financial record-keeping program. You will be able to keep track of cash and credit expenditures as well as income on a daily basis. You can record tax deductible items and charitable donations. FAMILY BUDGET also provides a continuous record of all credit transactions. You can make daily cash and charge entries to any of 21 different expense accounts as well as to payroll and tax accounts. Data are easily retrieved giving you complete control over an otherwise complicated (and unorganized!) subject.

Price: \$34.95 Diskette

INTELINK (Atari only)

This software package contains a menu-driven collection of programs for facilitating efficient two-way communications through a full duplex modem (required for use). In one mode of operation you may connect to a data service (e.g., the SOURCE or MicroNet) and quickly load data such as stock quotations onto your diskette for later viewing. This greatly reduces "connect time" and thus the service charge. You may also record the contents of a communications session. Additionally, programs written in BASIC, FORTRAN, etc. may be built off-line using the support text editor and later "uploaded" to another computer, making the Atari a very smart terminal. Even Atari BASIC programs may be read by the editor and processed. In fact, text files can be built using ED and later formatted using TEXT EDITOR II. All in all, TEXT EDITOR II is an inexpensive, easy to use, but very flexible editing system.

Price: \$49.95 Diskette

TEXT EDITOR II (CP/M)

This is the second release version of DYNACOMP's popular TEXT EDITOR I and contains many new features. With TEXT EDITOR II you may build text files in chunks and assemble them for later display. Blocks of text may be appended, inserted or deleted. Files may be saved on disk/diskette in right justified/centered format to be later printed by either TEXT EDITOR II or the CP/M ED facility. Further, ASCII CP/M files (including BASIC and assembly language programs) may be read by the editor and processed. In fact, text files can be built using ED and later formatted using TEXT EDITOR II. All in all, TEXT EDITOR II is an inexpensive, easy to use, but very flexible editing system.

Price: \$29.95 Diskette/\$33.45 Disk

PAYFIVE (Apple II plus diskette, two drives required)

This is an enormously flexible employer payroll system with extraordinarily good human engineering features. PAYFIVE prints checks and computes the required federal, state and local forms for up to 148 employees. The pay methods may be hourly, salary, commission or any combination. There are multiple options for pay periods, and they also can be used in any combination. PAYFIVE includes many other features and comes extremely well documented with a 200 page manual. The manual may be purchased separately for \$30, and that payment later applied to the software purchase.

Price: \$149.95

SHOPPING LIST (Atari only)

SHOPPING LIST stores information on items you purchase at the supermarket. Before going shopping, it will remind you of all the things you might need, and then display (or optionally print) your shopping list and the total cost. Adding, deleting, changing and storing data is very easy. Runs with 16K.

Price: \$12.95 Cassette/\$16.95 Diskette

TAX OPTIMIZER (North Star only)

The TAX OPTIMIZER is an easy-to-use, menu-oriented software package which provides a convenient means for analyzing various income tax strategies. The program is designed to provide a quick and easy data entry. Income tax is computed by all tax methods (regular, income averaging, maximum and alternate minimum tax). The user may immediately observe the tax effect of critical financial decisions. TAX OPTIMIZER has been thoroughly field tested in CPA offices and comes complete with the current tax tables in its data files. TAX OPTIMIZER is a tax deductible!

Price: \$59.95

UTIL (Apple only, 48K)

UTIL is a disk oriented utility system which permits examining and changing of the contents of DOS 3.1 and 3.3 diskettes at the bit (nibble or byte) level. With UTIL you can easily examine the contents of a diskette sector by sector, restructure the sector pointers, reallocate sectors (e.g., bad sectors may be "hidden"), and perform many other sophisticated operations. For the experienced programmer.

Price: \$19.95 Diskette

TURNKEY and MENU (Atari only)

TURNKEY is a utility program which allows you to create autoboot/autorun diskettes easily. Simply load and run TURNKEY, load the program diskette to be modified, and answer the questions! The TURNKEY diskette also comes with DOS 2.0 and includes another program, MENU, which lists the contents of your diskette alphabetically, and permits the running of any BASIC program on the diskette by typing a single key. TURNKEY and MENU provide you with the ability to run any program on your diskette by simply turning on the computer and pressing a single key.

Price: \$17.95 Diskette

STOCKAID (Atari only)

STOCKAID provides a powerful set of tools for stock market analysis. With STOCKAID you can display point and figure charts, as well as bar charts with oscillators. You can also examine long term moving averages and on-balance volume features. STOCKAID allows you to input daily data with a single diskette storage capability of 259 days x 16 stocks. Included are stock dividend and split adjustment capabilities. A very professional package!

Price: \$29.95 Diskette

SHAPE MAGICIAN (Apple II, 48K, diskette only)

At last! An utility for painting graphics shapes for the Apple. Create, edit and save up to 30 shapes which can then be used to develop arcade games or to simply enhance your programs. Add that professional touch!

Price: \$29.95

EDUCATION

HODGE PODGE (Apple only, 48K AppleSoft or Integer BASIC)

Let HODGE PODGE be your child's teacher. Pressing any key on your Apple will result in a different and intriguing "happening" related to the letter or number of the chosen key. The program's graphics, color and sound are a delight for children from ages 1 to 7. HODGE PODGE is a non-intimidating teaching device which brings a new dimension to the use of computers in education. See the excellent reviews of this very popular program in INFOWORD and SOFTALK.

Price: \$14.95 Cassette/\$18.95 Diskette

TEACHER'S AIDE (Atari only)

TEACHER'S AIDE consists of three basic modules contained in one program. The first module provides addition and subtraction exercises of varying levels of difficulty. The second module consists of multiplication problems in which the student may be tested both on the final answer and/or on the subtotal answers in the long hand procedure. Several levels of complexity are provided here as well. The third module consists of division problems; one particularly nice feature of the division module is that the long hand divisor steps can be displayed along with the remainder in order to clearly demonstrate the procedure by which the remainder is derived. Using TEACHER'S AIDE is not merely a drill, but rather a learning experience.

Price: \$13.95 Cassette/\$17.95 Diskette

PHARMACOLOGY UPDATE (PET only)

This is DYNACOMP's first educational software entry for the medical profession (more to come!). PHARMACOLOGY UPDATE was written by a R.N. as a masters project, with the aid of a practicing pharmacologist and an electronics instructor. This package comes in two parts. The first part is a 200 page manual which is divided into 10 sections. Each of these sections provides both concise information and probing questions. The second part consists of 10 programs that are keyed to the text and which test the degree of your understanding of the text material. This package has great educational value for the beginning student as well as the professional interested in an efficient way to review and update his or her knowledge.

Price: \$149.95 Cassette/\$153.95 Diskette

ORDERING INFORMATION

All orders are processed and shipped within 48 hours. Please enclose payment with order and include the appropriate computer information. If paying by VISA or MasterCard, include all numbers on card. Purchase orders accepted.

Shipping and Handling Charge
Within North America: Add \$2.00
Outside North America: Add 15% (Air Mail)

Delivery
All orders (excluding books) are sent First Class.

Quantity Discounts
Deduct 10% when ordering 3 or more programs. Dealer discount schedules are available upon request.

8" CP/M Disks
Add \$2.50 to the listed diskette price for each 8" floppy disk (IBM soft sector CP/M format). Programs run under Microsoft MBASIC or BASIC-80.

5 1/4" CP/M Disks
All software available on 8" CP/M disks is also available on 5 1/4" disks, North Star and Osborne format.

Ask for DYNACOMP programs at your local software dealer. Write for detailed descriptions of these and other programs from DYNACOMP.

DYNACOMP, Inc. (Dept. E)

1427 Monroe Avenue
Rochester, New York 14618
24 hour order phone: (716) 442-8731 recording
Office phone (9AM-5PM EST): (716) 442-8960
New York State residents please add 7% NYS sales tax.



STATISTICS and ENGINEERING

DIGITAL FILTER (Available for all computers)

DIGITAL FILTER is a comprehensive data processing program which permits the user to design his own filter function or choose from a menu of filter forms. The filter forms are subsequently converted into non-recursive convolution coefficients which permit rapid data processing. In the explicit design mode the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. In the menu mode, ideal low pass, high pass and bandpass filters may be approximated to varying degrees according to the number of points used in the calculation. These filters may optionally also be smoothed with a Hanning function. In addition, multi-stage Butterworth filters may be selected. Features of DIGITAL FILTER include plotting of the data before and after filtering, as well as display of the chosen filter function. Also included are convenient data storage, retrieval and editing procedures.

Price: \$39.95 Cassette/\$43.95 Diskette

DATA SMOOTHER (Not available for Atari)

This special data smoothing program may be used to rapidly derive useful information from noisy business and engineering data which are equally spaced. The software features choice in degree and range of fit, as well as smoothed first and second derivative calculation. Also included is automatic plotting of the input data and smoothed results.

Price: \$19.95 Cassette/\$23.95 Diskette

FOURIER ANALYZER (Available for all computers)

Use this program to examine the frequency spectra of limited duration signals. The program features automatic scaling and plotting of the input data and results. Practical applications include the analysis of complicated patterns in such fields as electronics, communications and business.

Price: \$19.95 Cassette/\$23.95 Diskette

TFA (Transfer Function Analyzer)

This is a special software package which may be used to evaluate the transfer functions of systems such as hi-fi amplifiers and filters by examining their response to pulsed inputs. TFA is a major modification of FOURIER ANALYZER and contains an engineering-oriented decibel versus log-frequency plot as well as data editing features. Whereas FOURIER ANALYZER is designed for educational and scientific use, TFA is an engineering tool. Available for all computers.

Price: \$19.95 Cassette/\$23.95 Diskette

HARMONIC ANALYZER (Available for all computers)

HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, editing and retrieval as well as data and spectrum plotting. One particularly unique facility is that the input data need not be equally spaced or in order. The original data is sorted and a cubic spline interpolation is used to create the data file required by the FFT algorithm.

Price: \$24.95 Cassette/\$28.95 Diskette

FOURIER ANALYZER, TFA and HARMONIC ANALYZER may be purchased together for a combined price of \$49.95 (three cassettes) and \$59.95 (three diskettes).

REGRESSION I (Available for all computers)

REGRESSION I is a unique and exceptionally versatile one-dimensional least squares "polynomial" curve fitting program. Features include very high accuracy; an automatic degree determination option; an extensive internal library of fitting functions; data editing; automatic data, curve and residual plotting; a statistical analysis (e.g. standard deviation, correlation coefficient, etc.) and much more. In addition, new fit may be tried without reentering the data. REGRESSION I is certainly the cornerstone program in any data analysis software library.

Price: \$19.95 Cassette/\$23.95 Diskette

REGRESSION II (PARAFIT) (Available for all computers)

PARAFIT is designed to handle those cases in which the parameters are imbedded (possibly nonlinearly) in the fitting function. The user simply inserts the functional form, including the parameters (A11, A12, etc.) as one or more BASIC statement lines. Data, results and residuals may be manipulated and plotted as with REGRESSION I. Use REGRESSION II for polynomial fitting, and PARAFIT for those complicated functions.

Price: \$19.95 Cassette/\$23.95 Diskette

MULTILINEAR REGRESSION (MLR) (Available for all computers)

MLR is a professional software package for analyzing data sets containing two or more linearly independent variables. Besides performing the basic regression calculation, this program also provides easy to use data entry, storage, retrieval and editing functions. In addition, the user may interrogate the solution by supplying values for the independent variables. The number of variables and data size is limited only by the available memory.

Price: \$24.95 Cassette/\$28.95 Diskette

REGRESSION I, II and MULTILINEAR REGRESSION may be purchased together for \$119.95 (three cassettes) or \$63.95 (three diskettes).

ANOVA (Not available on Atari cassette or for PET/CBM)

In the past the ANOVA (analysis of variance) procedure has been limited to the large mainframe computers. Now DYNACOMP has brought the power of this method to small systems. For those conversant with ANOVA, the DYNACOMP software package includes the 1-way, 2-way and N-way procedures. Also provided are the Yates 2²-factorial design. For those unfamiliar with ANOVA, do not worry. The accompanying documentation was written in a tutorial fashion by a professor in the subject and serves as an excellent introduction to the subject. Accompanying ANOVA is a support program for building the data base. Included are several convenient features including data editing, deleting and appending.

Price: \$39.95 Cassette/\$43.95 Diskette

BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 (Not available for Atari)

DYNACOMP is the exclusive distributor for the software key to the popular text BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 by F. Ruckdeschel (see advertisements in BYTE magazine). These subroutines have been assembled according to chapter. Included with each collection is a menu program which selects and demonstrates each subroutine.

Volume 1
Collection #1: Chapters 2 and 3 - Data and function plotting; complex variables and functions.
Collection #2: Chapter 4 - Extended matrix and vector operations.
Collection #3: Chapters 5 and 6 - Random number generators (Poisson, Gaussian, etc.); series approximations.
Price per collection: \$14.95 Cassette/\$18.95 Diskette
All three collections are available for \$39.95 (three cassettes) and \$49.95 (three diskettes).

Volume 2
Collection #1: Chapter 1 - Linear, polynomial, multidimensional, parametric least squares.
Collection #2: Chapter 2 - Series approximation techniques (economization, inversion, reversion, shifting, etc.).
Collection #3: Chapter 3 - Functional approximations by iteration and recursion.
Collection #4: Chapter 4 - CORDIC approximations to trigonometric, hyperbolic, exponential and logarithmic functions.
Collection #5: Chapter 5 - Table interpolation, differentiation and integration (Newton, Lagrange, splines).
Collection #6: Chapter 6 - Methods for finding the real roots of functions.
Collection #7: Chapter 7 - Methods for finding the complex roots of functions.
Collection #8: Chapter 8 - Optimization by steepest descent.
Price per collection: \$14.95 Cassette/\$18.95 Diskette
All eight collections are available for \$99.95 (eight cassettes) and \$129.95 (eight diskettes).
Because the texts are a vital part of the documentation, BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 are available from DYNACOMP.

BASIC SCIENTIFIC SUBROUTINES, Vol 1 (319 pages): \$19.95 + 75¢ postage
BASIC SCIENTIFIC SUBROUTINES, Vol 2 (290 pages): \$23.95 + \$1.50 postage

See reviews in KILBOAUD and Dr. Dobbs.

SOFTNET (Apple II 48K, diskette only)

SOFTNET may be used to create models of liquid pipeline systems to evaluate their flow performance. Up to 150 nodes with up to 150 connecting elements may be simulated, and models may be combined to form yet larger models. If you are involved in water distribution systems, chemical fluid flow problems, building plumbing, or similar situations, this is an ideal analysis tool.

Price: \$129.95

ACTIVE CIRCUIT ANALYSIS (ACAP) (48K Apple only)

ACAP is the analog circuit designer's answer to LOGIC SIMULATOR. With ACAP you may analyze the response of an active or passive component circuit (e.g., a transistor amplifier, band pass filter, etc.). The circuit may be probed at equal steps in frequency, and the resulting complex (i.e., real and imaginary) voltages at each component junction examined. By plotting the magnitude of these voltages, the frequency response of a filter or amplifier may be completely determined with respect to both amplitude and phase. In addition, ACAP prints a statistical analysis of the range of voltage responses which result from tolerance variations in the components. ACAP is easy to learn and use. Simply describe the circuit in terms of the elements and their placement, and execute. Circuit descriptions may be saved onto cassette or diskette to be recalled at a later time for execution or editing. ACAP should be part of every circuit designer's program library.

Price: \$25.95 Cassette/\$29.95 Diskette

LOGIC SIMULATOR (Apple only, 48K RAM)

With LOGIC SIMULATOR you may easily test your complicated digital logic design with respect to given set of inputs to determine how well the circuit will operate. The elements which may be simulated include multiple input AND, OR, NOR, EXOR, ENOR and NAND gates, as well as inverters, J-K and D flip-flops, and one-shots. The response of the system is available every clock cycle. Inputs may be clocked in with varying clock cycle lengths/displacements and delays may be introduced to probe for glitches and race conditions. At the user's option, a timing diagram for any given set of nodes may be plotted using HIRSH graphics. Save your breadboarding until the circuit is checked by LOGIC SIMULATOR.

Price: \$24.95 Cassette/\$28.95 Diskette

NUMBERRUNCHER (TRS-80 only)

This program is the most complete numerical analysis system available for the TRS-80. It can handle up to 25 data sets, each set having a six character name. It includes complete data editing facilities and convenient data input/output capability. The analyses available are multiple linear regression and correlation determination of residuals, data transformations and extensive graphics generation, including axis naming, and more. The supporting documentation is extremely well written and well organized, and includes appendices which describe the numerical procedures used in the program.

Price: \$69.95 Cassette/\$73.95 Diskette

STATSORT (TRS-80 only)

STATSORT consists of several menu selected programs which allow the user to create (build, edit, merge), format and print files, (machine) sort them on any field, and numerically analyze (maximum, minimum, average, variance, standard deviation) tabulated data. STATSORT is well documented and easy to use. The cassette version can also be employed to create a data type which can be read by the Radio Shack Advanced Statistical Package.

Price: \$39.95 Cassette/\$43.95 Diskette

STATTEST (TRS-80 only)

This is a statistical inference package which helps you make wise decisions in the face of uncertainty. In an interactive fashion you can build and edit data files and test the differences in means, variances and proportions. STATTEST will also perform data analysis as well as do linear correlation. This menu-driven statistical package is rounded out with a chi-square contingency test and a (uniform and normal) random sample generator. The documentation is written by a college professor who guides you through the various tests.

Price: \$19.95 Cassette/\$23.95 Diskette

ABOUT DYNACOMP

DYNACOMP is a leading distributor of small system software with sales spanning the world (currently in excess of 50 countries). During the past three years we have greatly enlarged the DYNACOMP product line, but have maintained and improved our high level of quality and customer support. The achievement in quality is apparent from our many repeat customers and the software reviews in such publications as COMPUTRONICS, 80 Software Critique, A.N.A.L.O.G., Softalk, Creative Computing and Kilobaud. DYNACOMP software has also been chosen for demonstration on network television. Our customer support is as close as your phone. It is always friendly. The staff is highly trained and always willing to discuss products or give advice.

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The Most Spectacular Extravaganza Ever... For Apple Users

At Applefest '82 hundreds of manufacturers, distributors and dealers will showcase the entire spectrum of Apple-compatible products including computers, components, peripherals, plug-in cards, publications, gifts, magazines, services, accessories and software for home, office and school.

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You'll meet thousands of other Apple owners and find the newest of everything for your Apple under one roof... and for sale at super show prices.

So if you use an Apple... or are thinking about buying one, you won't want to miss a minute of Applefest '82.

Ticket & Hotel Information

Send your check and a note indicating the specific show you wish to attend. Tickets and hotel information will be mailed back to you. Tickets can also be purchased at the show. Make all checks payable to Northeast Expositions Inc. 824 Boylston Street, Chestnut Hill, Mass. 02167 Tel: 617 739 2000.

Applefest/Boston

Fri-Sun May 14-16, 1982
Hynes Auditorium
Show Hours: 11AM to 6PM Daily
Admission: \$6 per day or \$10 for 2 days,
\$15 for 3 days

Applefest/Chicago

Fri-Sun Nov 5-7, 1982
Arlington Park Racetrack/Exposition Center
Arlington Heights, Ill.
Show Hours: 1PM to 10PM Daily
Admission: \$5 per day or \$8 for 2 days, \$12 for 3 days

Applefest/Houston

Fri-Sun Nov 19-21, 1982
Albert Thomas Convention Center
Show Hours: 1PM to 10PM Daily
Admission: \$5 per day or \$8 for 2 days, \$12 for 3 days

Applefest/San Francisco

Fri-Sun Dec 3-5, 1982
Moscone Center
Show Hours: 1PM to 10PM Daily
Admission: \$5 per day or \$8 for 2 days, \$12 for 3 days

Applefest is produced by Northeast Expositions Inc. and is sanctioned by Apple Computer Inc. and The Boston Computer Society. Apple and Applefest are registered trademarks.

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120 INPUT "COST PER UNIT FOR HEATING FUEL (CENTS)"; S: S=S/100
125 HI=S*FH(J)*HF: REM HEAT INDEX
126 PRINT: PRINT: INPUT "CHOOSE # FOR COOLING FUEL"; J
127 INPUT "COST PER UNIT FOR COOLING FUEL (CENTS)"; S: S=S/100
130 CI=S*FC(J)*HC: FI=HI+CI: REM COOL AND FUEL INDEX
135 PRINT: PRINT: PRINT: PRINT
145 PRINT "INPUT # OF SQUARE FT OF SINGLE GLASS WINDOWS, DO NOT"
150 INPUT "COUNT STORM WINDOWS OR SLIDING GLASS DOORS"; X
170 X=INT(X*100*FI*.65)/100
175 PRINT "ANNUAL SAVINGS DUE TO STORM WINDOWS = $"; X: X=.85: GOSUB 800
180 PRINT: PRINT "IS HEATING FUEL USED FOR OTHER PURPOSES, E.G. COOKING ";
190 INPUT B$: IF ASC(B$)=78 THEN X=1
200 INPUT "ANNUAL HEATING FUEL COST (DOLLARS)"; HS: HS=HS*X: PRINT: PRINT: X=.6
210 PRINT "IS COOLING FUEL USED FOR OTHER PURPOSES, E.G. LIGHTING";
220 INPUT B$: IF ASC(B$)=78 THEN X=1
230 INPUT "ANNUAL COOLING FUEL COST (DOLLARS)"; CS: CS=CS*X
240 PRINT: PRINT: Y=.05: FOR I=1 TO 3: IF I=H THEN 247
245 Y=Y-.01: NEXT I: IF H=4 THEN Y=.025
246 IF H=5 THEN Y=.02
247 GOSUB 800
250 PRINT "THE FOLLOWING SECTION EVALUATES THE SAVINGS OBTAINED BY TURNING"
255 PRINT "THE THERMOSTAT DOWN IN WINTER OR UP IN SUMMER FROM THE SETTING"
256 PRINT "YOU HAVE BEEN USING.": PRINT: PRINT "HEATING": PRINT
260 INPUT "DEGREES TURNED DOWN DURING DAY"; X: S=INT(100*Y*HS*X)/100
265 PRINT "SAVINGS = $"; S: PRINT "ADDITIONAL DEGREES TURNED DOWN DURING NIGHT";
270 INPUT X: I=INT(100*Y*HS*X*.3)/100: PRINT "SAVINGS = $"; I
280 S=S+I: PRINT "ANNUAL TOTAL HEATING SAVINGS = $"; S: PRINT: PRINT "COOLING": PRINT
285 INPUT "DEGREES THERMOSTAT TURNED UP DURING COOLING"; X
290 I=INT(100*CS*X*.02)/100: PRINT "SAVINGS = $"; I
300 PRINT: PRINT "TOTAL ANNUAL SAVINGS = $"; S+I: GOSUB 800
310 PRINT: PRINT: PRINT "ANNUAL SAVINGS FROM CAULKING AND WEATHERSTRIPPING"
315 PRINT "CHECK DRAFTS HOLDING CANDLE NEAR CRACK ON WINDY DAY"
320 PRINT "CHOOSE ONE OF FOLLOWING": PRINT "      1) WINDOWS WITH GOOD FIT"
340 PRINT "      2) SOME LEAKAGE": PRINT "      3) RATHER DRAFTY"
350 INPUT Y: PRINT: PRINT "CHOOSE ONE OF FOLLOWING": PRINT "      1) DOORS FIT GOOD"
360 PRINT "      2) SOME LEAKAGE": PRINT "      3) DRAFTY": INPUT I
370 PRINT: PRINT: PRINT "CHOOSE ONE OF FOLLOWING": PRINT
380 PRINT "      1) CAULKING AND WEATHERSTRIPPING GOOD": PRINT "      2) NEED REPAIR"
390 PRINT "      3) NO CAULKING OR WEATHERSTRIPPING": INPUT S
400 INPUT "FLOOR AREA OF HOUSE - SQ FT"; X
410 X=X*(Y+I+S-3)/100*FI: X=INT(X*100)/100: PRINT
420 PRINT "ANNUAL SAVINGS FOR CAULKING AND WEATHERSTRIPPING = $"; X: GOSUB 800
440 PRINT: PRINT: PRINT "ANNUAL SAVINGS FROM CEILING INSULATION": PRINT: PRINT
450 Y=38: INPUT "CEILING R VALUE"; X: IF H<3 THEN Y=26
455 IF H=3 THEN Y=30
460 IF H=4 THEN Y=33
465 INPUT "FIRST FLOOR AREA OF HOUSE (SQ FT)"; F
470 R=Y: GOSUB 900: I=R: R=X: GOSUB 900: X=R: X=INT(100*(X-I)*F*FI)/100
475 IF X<0 THEN X=0
480 PRINT "ANNUAL SAVINGS BY BRINGING CEILING R UP TO"; Y: " = $"; X: GOSUB 800
550 INPUT "IS THE HOUSE ON PILLARS OR HAVE AN UNHEATED BASEMENT"; B$
555 IF ASC(B$)=78 THEN 799
560 PRINT "CHOOSE FOUNDATION FACTOR FROM LIST BELOW": PRINT
565 PRINT "      FACTOR      FOUNDATION CHARACTERISTICS": PRINT
570 PRINT "      0.5 BUILDING WITH TIGHT CRAWL SPACE"
580 PRINT "      0.5 BUILDING WITH TIGHT BASEMENT (UNHEATED)"
590 PRINT "      0.8 STONE WALL BASEMENT (UNHEATED)"
600 PRINT "      0.8 2 FT OR MORE OF BASEMENT WALL EXPOSED (UNHEATED)"
610 PRINT "      0.8 CRAWL SPACE SKIRTED"
620 PRINT "      1.0 BUILDING ON PILLARS WITH NO SKIRTS"
625 PRINT: INPUT "FLOOR FACTOR FROM ABOVE TABLE"; J
627 Y=11: IF H>1 THEN Y=13: IF H>2 THEN Y=19: IF H>3 THEN Y=22
628 R=Y: GOSUB 900: Q=R: INPUT "CURRENT R FACTOR FOR FLOOR"; R

```

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T.M. LJK

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ATARI VERSION 2.0 #2001

Uses proportional font, right justified with Atari 825/Centronics* 737, 739 printers. Uses EPSON MX* Series + Grafrax/italicized font. Can mix type fonts on same page; mix boldface and enhanced font in same line with justification. Can be used with 16K Atari/400.

"Compared to the price of many other word processors, this package is a steal. It does everything the advertisement claims and more. On top of this the software is very easy to use." A.N.A.L.O.G. MAGAZINE

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DOS 3.3 compatible — Use 40 or 80 column interchangeably (Smarterm — ALS; Videoterm-Videx; Full View 80 — Bit 3 Inc.; Vision 80 — Vista; Sup-R-Term — M&R Ent.) Reconfigurable at any time for different video, printer, or interface. USE HAYES MICROMODEM II*LCA necessary if no 80 column board, need at least 24 K of memory. Files saved as either Text or Binary. Shift key modification allowed. Data Base Merge compatible with **DATA PERFECT*** by LJK.

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DATA PERFECT T.M. LJK

Complete Data Base System. User orientated for easy and fast operation. 100% Assembly language. Easy to use. You may create your own screen mask for your needs. Searches and Sorts allowed, Configurable to use with any of the 80 column boards of Letter Perfect word processing, or use 40 column Apple video. Lower case supported in 40 column video. Utility enables user to convert standard files to Data Perfect format. Complete report generation capability. **Much More!**

EDIT 6502 T.M. LJK

This is a cosident — two pass ASSEMBLER, DIS-ASSEMBLER, TEXT EDITOR, and MACHINE LANGUAGE MONITOR. Editing is both character and line oriented. Disassemblies create editable source files with ability to use predefined labels. Complete control with 41 commands, 5 disassembly modes, 24 monitor commands including step, trace, and read/write disk. Twenty pseudo opcodes, allows linked assemblies, software stacking (single and multiple page) plus complete printer control, i.e. pagination, titles and tab setting. User can move source, object and symbol table anywhere in memory. Feel as if you never left the environment of BASIC. Use any of the 80 column boards as supported by LETTER PERFECT, Lower Case optional with LCG.

LJK DISK UTILITY APPLE \$29.95

This menu driven program allows the user to manipulate a variety of different file types. Binary, Text, and Source files may be easily converted into each other. The program may be used with APPLESOFT*, VISICALC*, and other programs. These program files may be readily adapted for multiple use including editing with LETTER PERFECT word processings.

APPLE & ATARI INTRODUCTORY PRICE DATA BASE MANAGEMENT \$99.95

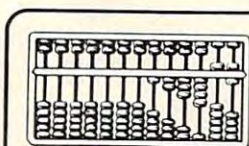
MAIL MERGE/UTILITY ATARI \$29.95

This menu driven program combined with LETTER PERFECT allows user to generate form letters and print mailing labels. With the Atari, you may CONVERT ATARI DOS FILES, or Visicalc files compatible for editing with LETTER PERFECT. Utility creates Data Base files for Letter Perfect.

LOWER CASE CHARACTER GENERATOR \$24.95

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~

Lower Case Character Generator for the Rev. 7, Apple II or II+ computers. When installed, this Eprom will generate lower case characters to the video screen. Lower case characters set has two dot true descenders. Installation instruction included. Manual includes listing of software for full support and complete instructions for shift key modification. Compatible with LETTER PERFECT.



COMPUTER BASED SOFTWARE



LJK ENTERPRISES INC.
P.O. Box 10827
St. Louis, MO 63129
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```

630 GOSUB900:X=J*(R-Q)*F*FI:PRINT:PRINT:X=INT(X*100)/100:IFX<0THENX=0
640 PRINT"ANNUAL SAVINGS BY INCREASING FLOOR R VALUE TO ";Y;" = $";X
645 GOSUB800
799 RESTORE:PRINT:PRINT:GOSUB800:PRINT:PRINT:L=96:GOTO14
800 PRINT"=====
801 RETURN
828 R=Y:GOSUB900:I=R
899 REM CONDUCTION FACTOR SUBROUTINE
900 IFR<11THEN920
901 IFR<12THENR=.077:RETURN
902 IFR<15THENR=.066:RETURN
903 IFR<20THENR=.048:RETURN
904 IFR<24THENR=.042:RETURN
905 IFR<28THENR=.036:RETURN
906 IFR<34THENR=.031:RETURN
910 R=.025:RETURN
920 R=.5-.0385*R:RETURN
1000 DATA CALIFORNIA,LOSANGELES 1 4 SAN FRANCISCO 3 4 SACRAMENTO 1 3
1010 DATA COLORADO,DENVER 3 4 DURANGO 4 4 ASPEN 4 5
1020 DATA ALABAMA,MONTGOMERY 1 2 BIRMINGHAM 1 3 HUNTSVILLE 2 3
1030 DATA ARIZONA,PHOENIX 1 3 FLAGSTAFF 3 3,CONNECTICUT,HARTFORD 3 5
1040 DATA NEW MEXICO,ROSWELL 2 3 ALBUQUERQUE 3 3 SANTA FE 4
1050 DATA UTAH,SALT LAKE CITY 3 4 MOAB 4 4,IDAHO,BOISE 3 5 POCA TELLO 4 4
1070 DATA MONTANA,BILLINGS 4 5,OREGON,PORTLAND 2 5 BAKER 3 5
1090 DATA WASHINGTON,SEATTLE 3 5,NEVADA,RENO 3 3 LAS VEGAS 1 3
1110 DATA NORTH DAKOTA,GRANDFORKS 5 5,OKLAHOMA,OKLAHOMA CITY 2 3
1120 DATA SOUTH DAKOTA,SIOUX FALLS 4 4 PIERRE 4 5
1130 DATA NEBRASKA,OMAHA 3 4,KANSAS,WICHITA 2 4 TOPEKA 3 4
1160 DATA TEXAS,DALLAS 1 3 HOUSTON 1 2 BROWNSVILLE 0 1 AMARILLO 2 3
1170 DATA LOUISIANA,NEW ORLEANS 1 2 SHREVEPORT 1 3
1180 DATA ARKANSAS,LITTLE ROCK 1 3 FAYETTEVILLE 2 3
1190 DATA MISSOURI,SPRINGFIELD 2 3 ST LOUIS 2 4 KANSAS CITY 3 4
1200 DATA IOWA,DES MOINES 3 4 SIOUX CITY 4 4,VERMONT,MONTPELIER 4 5
1210 DATA MINNESOTA,MINNEAPOLIS 4 5 DULUTH 5 5,NEW HAMPSHIRE,CONCORD 4 5
1220 DATA WISCONSIN,MADISON 4 4 EAUCLAIRE 4 5,RHODE ISLAND,PROVIDENCE 3 5
1230 DATA ILLINOIS,CHICAGO 3 4 SPRINGFIELD 2 4,VIRGINIA,RICHMOND 2 4
1240 DATA MICHIGAN,DETROIT 3 4 GRAND RAPIDS 4 5 SAULT ST.MARIE 5 5
1270 DATA INDIANA,INDIANAPOLIS 3 4 EVANSVILLE 2 4,WYOMING,CASPER 4 5
1290 DATA TENNESSEE,MEMPHIS 2 3 KNOXVILLE 2 4 CHATTANOOGA 2 3
1300 DATA MISSISSIPPI,JACKSON 1 2 TUPELO 1 3,KENTUCKY,LOUISVILLE 2 4
1320 DATA WEST VIRGINIA,CHARLESTON 3 4,MASSACHUSETTS,BOSTON 3 5
1330 DATA FLORIDA,MIAMI 0 1 JACKSONVILLE 1 2,OHIO,COLUMBUS 3 4
1340 DATA GEORGIA,SAVANNAH 1 3 ATLANTA 2 3,MAINE,PORTLAND 4 5
1350 DATA SOUTH CAROLINA,CHARLSTON 1 3,NEW JERSEY,NEWARK 2 4
1360 DATA NORTH CAROLINA,RALEIGH 2 3 ASHEVILLE 2 4 WILMINGTON 1 3
1390 DATA PENNSYLVANIA,PITTSBURGH 3 4,MARYLAND,BALTIMORE 2 4
1410 DATA NEW YORK,NEW YORK 3 4 ALBANY 4 5,DELAWARE,WILMINGTON 2 4
1480 DATA ERROR
1500 DATA OIL/GALLON,1,0,NAT GAS/CUFT,120,150,ELECTRICITY/KWH,30,15
1510 DATA WOOD/ORD,.01,0,LPG/CUFT,50,60,LPG/LBS,6,7,LPG/GALLON,1.3,1.5
1520 DATA COAL/TON,.006,0
2000 END

```

Program 2.

Change these lines for Atari:

```

0 DIM B$(20),C$(20),D$(20),BB$(4*10),BBL
(4),X(10),Y(10),FK(10),FC(10)
14 ? :? :? :? "STATE (DON'T ABBREVIATE)"
: INPUT B$:FOR I=1 TO L:READ C$
15 IF B$(1,7)=C$(1,7) THEN B$=C$:READ D$
20 NEXT I:FOR I=1 TO 4:BBL(J)=0:NEXT I:I
=1:Y=LEN(D$):J=1
25 X=ASC(D$(I,I)):IF X=32 THEN 45
30 BBL(J)=BBL(J)+1:BB$(J-1)*10+1,(J-1)*
10+BBL(J)=CHR$(X):GOTO 55

```


- 3 ELECTRICITY/KWH
- 4 WOOD/CORD
- 5 LPG/CUFT
- 6 LPG/LBS
- 7 LPG/GALLON
- 8 COAL/TON

CHOOSE # FOR HEATING FUEL? 2
COST PER UNIT FOR HEATING FUEL(CENTS)? .45

CHOOSE # FOR COOLING FUEL? 3
COST PER UNIT FOR COOLING FUEL(CENTS)? 6.

INPUT # OF SQUARE FT OF SINGLE GLASS WINDOWS, DO NOT
COUNT STORM WINDOWS OR SLIDING GLASS DOORS? 190
ANNUAL SAVINGS DUE TO STORM WINDOWS= \$ 116.7
=====

IS HEATING FUEL USED FOR OTHER PURPOSES, E.G. COOKING ? Y
ANNUAL HEATING FUEL COST (DOLLARS)? 175.

IS COOLING FUEL USED FOR OTHER PURPOSES, E.G. LIGHTING? Y
ANNUAL COOLING FUEL COST (DOLLARS)? 800.

=====

THE FOLLOWING SECTION EVALUATES THE SAVINGS OBTAINED BY TURNING
THE THERMOSTAT DOWN IN WINTER OR UP IN SUMMER FROM THE SETTING
YOU HAVE BEEN USING.

HEATING

DEGREES TURNED DOWN DURING DAY? 5
SAVINGS =\$ 37.18
ADDITIONAL DEGREES TURNED DOWN DURING NIGHT? 5
SAVINGS=\$ 11.15
ANNUAL TOTAL HEATING SAVINGS =\$ 48.33

COOLING

DEGREES THERMOSTAT TURNED UP DURING COOLING? 5
SAVINGS =\$ 48

TOTAL ANNUAL SAVINGS =\$ 96.33
=====

ANNUAL SAVINGS FROM CAULKING AND WEATHERSTRIPPING
CHECK DRAFTS HOLDING CANDLE NEAR CRACK ON WINDY DAY
CHOOSE ONE OF FOLLOWING

- 1) WINDOWS WITH GOOD FIT
- 2) SOME LEAKAGE
- 3) RATHER DRAFTY

? 2

CHOOSE ONE OF FOLLOWING

- 1) DOORS FIT GOOD
- 2) SOME LEAKAGE
- 3) DRAFTY

? 2

CHOOSE ONE OF FOLLOWING

- 1) CAULKING AND WEATHERSTRIPPING GOOD
- 2) NEEDREPAIR
- 3) NO CAULKING OR WEATHERSTRIPPING

? 2

FLOOR AREA OF HOUSE - SQ FT? 2000

ANNUAL SAVINGS FOR CAULKING AND WEATHERSTRIPPING= \$ 56.7

ANNUAL SAVINGS FROM CEILING INSULATION

CEILING R VALUE? 19

FIRST FLOOR AREA OF HOUSE (SQ FT)? 2000

ANNUAL SAVINGS BY BRINGING CEILING R UP TO 26 = \$ 22.68

IS THE HOUSE ON PILLARS OR HAVE AN UNHEATED BASEMENT? Y

CHOOSE FOUNDATION FACTOR FROM LIST BELOW

| FACTOR | FOUNDATION CHARACTERISTICS |
|--------|--|
| 0.5 | BUILDING WITH TIGHT CRAWL SPACE |
| 0.5 | BUILDING WITH TIGHT BASEMENT (UNHEATED) |
| 0.8 | STONE WALL BASEMENT (UNHEATED) |
| 0.8 | 2 FT OR MORE OF BASEMENT WALL EXPOSED (UNHEATED) |
| 0.8 | CRAWL SPACE SKIRTED |
| 1.0 | BUILDING ON PILLARS WITH NO SKIRTS |

FLOOR FACTOR FROM ABOVE TABLE? 1.

CURRENT R FACTOR FOR FLOOR? 7

ANNUAL SAVINGS BY INCREASING FLOOR R VALUE TO 11 = \$ 290.11

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Two Short Programs Of CAI For Teaching BASIC

R. Hiatt
Dept. of Chemistry
Brock University
St. Catharines, Ontario

While much is written about, and many programs are produced for, CAI in diverse subjects and disciplines, there seems to be very little about CAI applied to learning about computation itself.

To be sure, the computer itself is the best CAI for individual self-paced effort. But for the classroom, demonstration programs are useful. By CAI, however, I don't mean simple routines that are merely examples, but rather, programs that make their point by manipulation and/or simulation of a process. I venture to present two examples.

1. PEEKPROG – A BASIC program that PEEKs itself.

At some point in teaching a course in BASIC, it seems useful to PEEK out to the screen a page or so of a program. This can be in response to a question as to why conserving line numbers conserves memory space, or a similar query suggesting that a brief digression into actual program storage would be illuminating. (In my experience, it is wise to postpone any mention of bits, bytes, hex or ASCII until this kind of curiosity evinces itself.)

While it's easy enough to PEEK out a page from immediate mode, (for I=2049 to 2304: Print PEEK (I) " "; NEXT), and fill the screen with numbers, this is more astounding than useful. It takes a trained eye to discern any pattern at all.

Program 1 organizes the PRINT PEEK – so that each line number starts off a new line on the screen. By keeping the program short and the line numbers below 256 it is possible to pseudo list the whole program and have the line numbers easily recognizable (Figure 1). The line terminators can be pointed out, as can the linking bytes and the

program terminator.

BASIC tokens can be mentioned, and the students can practice their ASCII by reading the REM statement, etc.

The program itself illustrates READ...DATA – partly because the questions seem to arise about the time we're dealing with that subject, and partly because it seemed an easy way to control the position of carriage returns in the loop.

Actually, this turned up something about the Apple that I hadn't realized; that is, each time a DATA statement is edited, an additional space, actually another byte with value 32, is inserted between this DATA token and the first byte of the data. This, of course, changes the length of the program and the byte at which a new print line is wanted. In other words, the datum just corrected has been made erroneous by the process of correction. The only way out seems to be to retype the line.

2. READ/RESTORE – (Program 2) is a routine that simulates a small portion of program which reads data into two arrays, one numeric and the other string. The displayed portion of the program, (lower screen, Figure 2), consists of two FOR I = ... READ A (I) ..., separated by a RESTORE, the whole followed by a FOR I = ...READ A\$(I)... . Two pseudo cursors are employed, one flashing the current value of I at the end of the FOR I ... NEXT I loop, the other acting as a data pointer.

Action is controlled by the instructor, via the programmed "invisible GET"; i.e. IF PEEK - 16384 < 128 THEN The first (any) key depression causes a datum to be "READ"; its index and value appear in the table. This second key depression moves the data pointer and movements "I".

Progression of the program being entirely in the hands of the instructor, there is unlimited time to point out the salient features, to comment on indices, the differences between numeric and string data, etc., and to run the program two or three times for emphasis.

For Atari Users...

Program 3 will provide a dump of an Atari BASIC program, similar to Program 1. To merge it with another program, LIST it to tape or disk (with LIST"C:" or LIST"D:BDUMP"), load the program to be viewed, and then use ENTER"C:" or ENTER"D:BDUMP". Start the routine with GOTO 20000.

Program 4 is called "BASIC in Action." It is a display of a BASIC program (the "Atarized" version of Figure 1) as it RUNs. Just type it in and RUN it. A program will be listed at the bottom of the screen with an arrow pointing to the first line. When you press a key, the line will be executed. The action of the program, including the DATA statement pointer,

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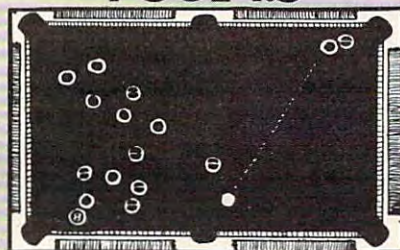
WizArD AND THE Princess

Ken & Roberta Williams from On-Line
HI-RES adventuring comes to Atari! Armed only with bread, water, a knife and a blanket, you set off in search of Princess Priscilla. She has been abducted from the kingdom by the dread Wizard, Harlin. If you can return her safely, half the kingdom is yours! Each scene is depicted in color and you can even get close-up views of important objects. Not for beginners.

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POOL 1.5



By Hoffman, St Germain & Morock from IDS
The pressure is on: if you can just get enough english on the ball to bank it into the corner pocket... In POOL 1.5, you can! A remarkable action-simulation of the real thing, this program allows full control of your "cue-stick" for aim and control. Play four different types of pool at your choice of table speed, with "instant replay" of any shot! HI-RES color graphics are used throughout this real-time game.

48K Disk...\$34.95

CYPHER BOWL



From ArtSci

The most impressive 2-player football game we've seen for the Atari. Using five players per side instead of 11 keeps the game manageable while providing all the action you can handle. Each player uses a joystick to call formations and plays -- 256 possibilities -- then the players are maneuvered after the ball is hiked. Skill improvements come gradually and you can plan on many hours of excitement & enjoyment with CYPHER BOWL.

16K tape or disk...\$49.95

MISSION: ASTEROID HI-RES ADVENTURE #0

From On-Line
An introduction to HI-RES adventures, it is designed to acquaint beginning adventurers with this exciting genre of games. An asteroid is about to hit earth. Your job as a novice astronaut is to blow it up before it destroys earth. On your way you must cut through red tape impeding your plan, learn to fly the rocket, and follow a flight plan that will put you in striking distance.

40K disk...\$24.95

RICOCHET

DeKoven & Connelley from Mind Toys
A unique new approach to computer gaming. RICOCHET combines diabolical strategy with fast action to yield a game that satisfies your intellect as well as your senses. You have 6 playing pieces to move around, plus 2 ball launchers. Each turn consists of either repositioning the pieces or launching a ball. Points are scored each time the ball ricochets. Simple? Deceptively so. Easy to master? Definitely not! 1 or 2 players.

32K disk...\$19.95



HOCKEY

From Gamma Software

A high-speed video action game for 2, 3, or 4 players. You use joysticks to control the players. The offensive player with the puck and the nearest defensive player are automatically assigned to a joystick. Players not so controlled become "smart" players who play automatically. The action is fast and furious, the color graphics and sound are realistic. Perfect for family entertainment.

16K disk or tape...\$29.95

LUNAR LANDER



By Wall, Moncrief & Jessee from A.I.
Grab your joystick and sweat out the touchdown of your LEM. Choose from four lunar landscapes, with many choices for landing sites. Select a more difficult site and get more points -- if you can land successfully. You have complete control of your LEM via main engines and small side thrusters, and five successful landings are heralded with a patriotic event. Great fun!

24K tape (disk compatible)...\$14.95

REAR GUARD

By Neil Larimer from Adventure Int.
A space battle between your cruiser and wave-after-wave of enemy ships. You can destroy them with your energy darts or you can ram them -- as long as your shields are intact. The action takes place on a continuous horizontal landscape. You control the altitude and speed of your craft as you pursue the enemy. Skill level 1 is exciting, and there are four more levels available.

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variables, strings, DIMensioning, and FOR/NEXT loops are visually and audibly demonstrated.

Figure 1.

```

20 8
10 0 178 32 80 69 69 75 32 80 82 79 71 8
2 65 77 0 27 8
20 0 135 65 0 41 8
30 0 129 73 208 50 48 52 57 193 65 0 53
8
40 0 173 73 209 66 196 54 48 0 62 8
50 0 135 66 58 186 0 76 8
60 0 186 226 40 73 41 34 32 34 59 0 83 8
70 0 130 73 0 89 8
80 0 128 0 115 8
100 0 131 32 50 50 51 50 44 50 48 53 49
44 50 48 55 48 44 50 48 55 55 0 141 8
110 0 131 32 50 48 57 49 44 50 49 48 51
44 50 49 49 50 44 50 49 50 54 0 167 8
120 0 131 32 50 49 51 51 44 50 49 51 57
44 50 49 54 53 44 50 49 57 49 0 183 8
200 0 131 32 50 50 50 49 55 44 50 51 48 48
0 0 0

```

Figure 2.

```

40 for I=1 to 3: Read A(I): Next I
50 Restore
60 For I=4 to 6: Read A(I): Next I
70 For I=1 to 5: Read A$(I): Next I
80 Data 76,40,67
90 Data "SUE","ANN","JOE","KIM","JIM"

```

Program 1.

```

10 REM PEEK PROGRAM
20 READ A
30 FOR I = 2049 TO A
40 IF I < B THEN 60
50 READ B: PRINT
60 PRINT PEEK (I) " "
70 NEXT I
80 END
100 DATA 2232,2051,2070,2077
110 DATA 2091,2103,2112,2126
120 DATA 2133,2139,2165,2191
200 DATA 2217,2300

```

Program 2.

```

10 REM DATA READ-RESTORE DISPLAY
20 GOTO 50
30 IF PEEK ( - 16384) < 128 THEN 30
40 POKE - 16368,0: RETURN
50 DIM A(10),A$(10)
60 B$(0) = "INDEX":B$(1) = "DATA":C$ = CHR$(34):B$ = C$ + "," + C$
70 HOME
80 PRINT TAB(6)"A(I)" TAB(25)"A$(I)"
90 PRINT B$(0) TAB(10)B$(1) TAB(20)B$(0) TAB(30)B$(1)
100 VTAB 15
110 PRINT "40 FOR I = 1 TO 3 : READ A(I) : NEXT I"
120 PRINT "50 RESTORE"
130 PRINT "60 FOR I = 4 TO 6 : READ A(I) : NEXT I"
140 PRINT "70 FOR I = 1 TO 5 : READ A$(I) : NEXT I"
150 PRINT : PRINT "80 DATA 76,40,67"
160 PRINT : PRINT "90 DATA "C$"SUE"B$"ANN"B$"JOE"B$"KIM"B$"JIM"C$
199 REM START THE DISPLAY
200 V1 = 1871:V2 = 1621:VT = 3:A1 = 1:B = 3: GOTO 220
210 V1 = 1143:V2 = 1621:VT = 6:A1 = 4:B = 6
220 FOR I = A1 TO B: POKE V1,I + 112
230 VT = VT + 1:V2 = V2 + 3: POKE V2,96
240 GOSUB 30: READ A(I)
250 VTAB VT: PRINT " I: SPC(7)A(I): GOSUB 30
260 POKE V2,160: NEXT I: POKE V1,160: IF I > 4 THEN 300
270 POKE 1971,96: FOR I = V2 TO V2 - 5 STEP - 1
280 POKE I,160: POKE I - 1,96: FOR J = 1 TO 300: NEXT : NEXT : GOSUB 30:
290 POKE 1971,160: RESTORE : GOTO 210
300 V2 = 1875:V1 = 1271:VT = 3
310 FOR I = 1 TO 5:V2 = V2 + 6:VT = VT + 1

```

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Thursday-Sunday
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Minneapolis
Minn. Auditorium
& Convention Hall
Third Avenue

Thursday-Sunday
September 16-19, 1982
11 AM to 6 PM Daily

DIRECTIONS: HWY 94 to
11th St. Exit to Third Ave.

THE MID-WEST COMPUTER SHOW

Chicago
(Arlington Heights)
Arlington Park Racetrack
Exhibition Center

Thursday-Sunday
November 5-7, 1982
11 AM to 6 PM Daily

DIRECTIONS: EUCLID AVE &
WILKE RD. TAKE NW TOLLWAY
TO RTE 53 EXIT AT
EUCLID AVE EAST

THE NORTHEAST COMPUTER SHOW

Boston
Hynes Auditorium/
Prudential Center

Thursday-Sunday
November 11-14, 1982
11 AM to 6 PM Daily

DIRECTIONS: TAKE MASS
PIKE TO PRUDENTIAL
CENTER EXIT

THE SOUTHEAST COMPUTER SHOW

Atlanta
Atlanta Civic Center

Thursday-Sunday
December 9-12, 1982
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DIRECTIONS:
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```

320 POKE V1,I + 112: POKE V2,96: GOSUB 30: READ A$(I)
330 VTAB VT: HTAB 22: PRINT I SPC( 8)A$(I): GOSUB 30
340 POKE V2,160: NEXT
350 POKE V1,160
400 END
500 DATA 76,40,67
510 DATA "SUE","ANN","JOE","KIM","JIM"

```

Program 3.

```

20000 REM ATARI BASIC LINE DUMP
20010 REM TYPE GOTO 20000
20020 CLR
20030 BEGIN=PEEK(136)+256*PEEK(137)
20040 LINE=PEEK(BEGIN)+256*PEEK(BEGIN+1)

20050 IF LINE=20000 THEN PRINT "LAST LINE":END
20060 PRINT LINE,
20070 LENGTH=PEEK(BEGIN+2)
20080 FOR I=1 TO LENGTH
20090 PRINT PEEK(BEGIN+2+I); " ";
20100 NEXT I
20110 PRINT :PRINT "-----"
20120 BEGIN=BEGIN+LENGTH
20130 GOTO 20040

170 ? " 70 DATA SUE,ANN,JOE,KIM,JIM"
180 ? " 80 END";
190 REM START THE DISPLAY
200 FOR I=1 TO 8
210 POSITION 2,14+I+(I>5)
220 PRINT "(ESC)(RIGHT)";
240 GET #1,A
250 ON I GOTO 260,290,300,400,410,600,60
0,600
260 POSITION 2,1:FOR J=1 TO 6:?"A";J;"
)=?":SOUND 0,PEEK(53770),10,8
265 FOR W=1 TO 50:NEXT W:NEXT J:SOUND 0,
0,0,0
270 ? "A=";CHR$(34);CHR$(34);"(LEFT)";
FOR J=1 TO 15:?"(INSERT)";SOUND 0,J,8,
8:FOR W=1 TO 30:NEXT W:NEXT J
275 ? :?"T=";CHR$(34);CHR$(34);"(LEFT)
";:FOR J=1 TO 3:?"(INSERT)";SOUND 0,J,
8,8:FOR W=1 TO 30:NEXT W:NEXT J
280 SOUND 0,0,0,0:GOTO 600
290 FOR J=1 TO 10:POSITION 6,21:?"IDATA
I(4 LEFT)";:SOUND 0,50,12,8:FOR W=1 TO 2
0:NEXT W:SOUND 0,0,0,0:?"DATA":NEXT J
295 GOTO 600
300 OFF=0
310 FOR J=1 TO 3:READ T$
320 POSITION 2,9:?"I=";J+3*OFF:POSITION
19,17+OFF:?"I READ T"
330 POSITION 8+3*(J+OFF*3),21:?"T$":READ
T$
340 POSITION 2,10:?"T=";T$
345 GET #1,A:POSITION 8+3*(J+OFF*3),21:?"
T$
350 POSITION 19,17+OFF:?"READ T":POSITI
ON 26,17+OFF:?"I A(I)=T"
360 FOR K=1 TO 15:POSITION 9+K,10:?" ";
T$;:GOSUB 50:NEXT K:?"(2 LEFT) "
370 FOR K=1 TO J+OFF*3:POSITION 24,10-K:
?"T$;:GOSUB 50:?"(2 LEFT) ";:NEXT K
380 POSITION 24,J+OFF*3:?"T$;:POSITION 7
,J+OFF*3:FOR K=1 TO 17:?"(DELETE)";:POK
E 53279,0:NEXT K

```

Program 4.

```

10 GRAPHICS 0:POSITION 12,0:?"I BASIC I
n Action I"
20 POKE 752,1
30 OPEN #1,4,0,"K:"
40 DIM L$(40),T$(20):GOTO 100
50 REM CLICK/PAUSE SUBROUTINE
60 POKE 53279,0:FOR W=1 TO 10:NEXT W:RET
URN
100 POSITION 2,14:?"(37 R)":?
110 ? " 10 DIM A(6),A$(3*5),T$(3)"
120 ? " 20 RESTORE"
130 ? " 30 FOR I=1 TO 3:READ T:A(I)=T:NE
XT I"
140 ? " 40 FOR I=4 TO 6:READ T:A(I)=T:NE
XT I"
150 ? " 50 FOR I=1 TO 5:READ T$:
A$(I*3-2,I*3)=T$:NEXT I"
160 ? " 60 DATA 76,40,67,29,14,33"

```

```

390 GET #1,A:POSITION 26,17+OFF:? "A(I)=
T"
395 NEXT J:POSITION 2,9:? "I=";J+OFF*3:G
OTO 600
400 OFF=1:GOTO 310
410 FOR J=1 TO 5:POSITION 2,9:? "I=";J
420 POSITION 19,19:? "I READ T$I":READ T$
:POSITION 7+J*4,22:? T$
430 READ T$:POSITION 6,8:? T$:GET #1,A
440 POSITION 19,19:? "READ T$":POSITION
6,20:? "I A$(I*3-2,I*3)=T$I":POSITION 7+J
*4,22:? T$
450 FOR U=15 TO 0 STEP -1:SOUND 0,10+20*
RND(1),10,U:NEXT U
470 POSITION 3+J*3,7:? T$
480 GET #1,A:POSITION 6,20:? "A$(I*3-2,I
*3)=T$":NEXT J:POSITION 2,9:? "I=";J:GOT
O 600
600 POSITION 2,14+I+(I>5):? " ";
610 NEXT I
620 POSITION 2,10:POKE 752,0:END
1000 DATA 1761,76,1401,40,1671,67,1291,2
9,1141,14,1331,33
1010 DATA ISUEI,SUE,IANNI,ANN,IJOEI,JOE,
IKIMI,KIM,IJIMI,JIM

```

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Infinite Precision Multiply

G. H. Watson
Newark, DE

$123 \times 456 = 56088$. Right? Sure! Just ask a young student and he/she will quickly work out something similar to:

```

  123
x 456
-----
 738
 615
 492
-----
56088

```

If you are near a microcomputer, you may verify this result by entering `?123*456 <CR>`.

How about 123123×456456 ? At this point your young student may balk and suggest "Let's let the computer do it!" Unfortunately the computer may also balk at such a request. Entering `?123123*456456 <CR>` into a PET yields the following result: $5.62002321E+10$. With some further encouragement the student may work out 56200232088 as the correct product. Why the difference?

In PET BASIC most numbers are represented in floating-point format, which allows convenient handling of real numbers which may be positive or negative, integer, fractional, or mixed, and of greatly varying magnitude. The format in the PET is such that numbers have nearly nine digits of precision. This means that 123456789 may be represented exactly in this format, but something will have to be done for 1234567891 . That something is called scientific notation — 1234567891 will be handled as $1.23456789E+09$, where $E+09$ means that the decimal would be moved 9 spaces to the right. On the PET enter `X=1234567891 <CR>` and then enter `?X <CR>`. Notice that the trailing digit "1" has been dropped; it would have been the tenth digit and only nine digits of precision are possible.

Scientific notation has great utility and nine digits of precision will be plenty for many cases of numerical calculation. Occasionally, though, you may run up against a calculation which requires infinite precision — you need the answer exactly (no lost digits). Recently I needed to know the exact product of several large numbers. Working the problem by hand and finding several errors, I

decided to write a short infinite precision multiply routine to check my answer. INFINI-MULT is the resulting BASIC program.

Using strings to represent the numbers is the trick for extending the precision. By operating on each string with the string function `MID$(.,.)`, each digit of the number may be isolated and an arithmetic operation performed. Only single digit operations are performed in INFINI-MULT. The microcomputer is doing only second grade arithmetic — addition and multiplication of two numbers between zero and nine.

The result of the operation on two single-digit numbers may be a double-digit number. Here enters the carry digit. Most of the errors I make when doing arithmetic by hand involve the carry digit. Care must also be taken when programming for the carry digit. The subroutine at line 500 separates the double-digit number P into the carry digit C and adds the remaining digit onto the string D\$ from the left. For example, if `P=25` and `D$="456"` then line 500 will return with `C=2` and `D$="5456"`.

In order to simplify handling the carry digits and make the program as straightforward as possible, the strings involved in the addition routine are made the same length by padding from the left with zeros (line 380). For instance, if `Z$="123"` and `A$="45600"` then we will pad Z\$ so that `Z$="00123"`. We also pad strings with zeros from the right in the multiplication routine so that the proper power of ten is obtained (line 330).

INFINI-MULT handles 123×456 as follows:

| lines 250-330, | 370-440 |
|----------------|---------|
| 123 | 000 |
| x 6 | + 738 |
| 738 | 738 |
| 123 | 0738 |
| x 5 | + 6150 |
| 6150 | 6888 |
| 123 | 06888 |
| x 4 | + 49200 |
| 49200 | 56088 |

If the two numbers to be multiplied differ in the number of digits, the multiplication routine will be faster with the smaller number as the multiplier (456 in example) and the larger number as the multiplicand (123 in example) — just as you learned in grade school. The digits "0" and "1" are treated preferentially in lines 270 and 280 so time will be saved if the number with many ones and zeros is used as the multiplier. It will be faster to multiply 456 by 123 in INFINI-MULT than 123 by 456.

I have made no provision for handling decimal points: this would be an interesting modification for you to make. To sidestep this limitation use the same trick that you learned in school: count the number

chips...chips...chips...chips...chips...chips...

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of places to the right which the decimal point must be moved to reach the last digit in the multiplicand and multiplier, add, and move that many places to the left in the product. For example, consider $1.23 \times .456$:

$$\begin{array}{r} 1.23 \quad 2 \text{ right } \rightarrow \quad 123 \\ \times .456 \quad +3 \text{ right } \rightarrow \quad \times 456 \\ \hline .56088 \quad \leftarrow 5 \text{ left} \quad 56088 \end{array}$$

INFINI-MULT follows the simple rules of arithmetic which you learned early in school. There may be faster or more sophisticated ways of getting the extra precision you desire. The PET/CBM PERSONAL COMPUTER GUIDE contains some interesting double-precision routines for addition, subtraction, and multiplication. Play around with INFINI-MULT and some evening when you feel like writing a quick program take a shot at INFINI-DIVI.

Program 1: Microsoft Version

```
100 REM INFINITE PRECISION MULTIPLY
110 REM G.H.WATSON 6/25/81
120
130 REM INITIALIZATION
140
150 DIM P,C,D$,J,Z,A,X,Y,X$,Z$,A$
160 DIM I,AL,ZL,XL,YL,Y$
170 INPUT "X = ";X$:INPUT "Y = ";Y$
180 XL=LEN(X$):YL=LEN(Y$)
190 I=XL+YL:DIM N$(9),Q$(I),C$(8)
200 FOR J=1TOI:Q$(J)="0"+Q$(J-1):NEXT J
210 FOR J=0TO9:N$(J)=CHR$(J+48):NEXT J
215 FOR J=1TO8:C$(J)=N$(J):NEXT J
220
230 REM MULTIPLICATION ROUTINE
240
250 FOR I=YLTO1 STEP-1:C=0:D$=""
260 Y=VAL(MID$(Y$,I,1))
270 IF Y=0 THEN 450
280 IF Y=1 THEN D$=X$:GOTO 330
290 FOR J=XLTO1 STEP-1
300 X=VAL(MID$(X$,J,1))
310 P=X*Y+C:GOSUB 500
320 NEXT J
330 A$=C$(C)+D$+Q$(YL-I)
340
350 REM ADDITION ROUTINE
360
370 ZL=LEN(Z$):AL=LEN(A$)
380 Z$=Q$(AL-ZL)+Z$:C=0:D$=""
390 FOR J=ALTO1 STEP-1
400 Z=VAL(MID$(Z$,J,1))
410 A=VAL(MID$(A$,J,1))
420 P=Z+A+C:GOSUB 500
430 NEXT J
```

```
440 Z$=C$(C)+D$
450 NEXT
460
470 PRINT "Z = ";Z$
480 END
490
500 C=INT(P/10):D$=N$(P-C*10)+D$:RETURN
READY.
```

Program 2: Atari Version

```
130 REM : INITIALIZATION
140 REM
150 DIM D$(99),X$(99),Z$(99),A$(99)
160 DIM Y$(99),T$(99)
170 PRINT "X=";INPUT X$
175 PRINT "Y=";INPUT Y$
180 XL=LEN(X$):YL=LEN(Y$)
190 I=XL+YL:DIM N$(10),Q$(I),C$(10)
200 FOR J=1 TO I:Q$(J,J)="0":NEXT J
210 N$="0123456789":C$=" 12345678 "
220 REM
230 REM : MULTIPLICATION ROUTINE
240 REM
250 FOR I=YL TO 1 STEP -1:C=0:D$=""
260 Y=VAL(Y$(I,I))
270 IF Y=0 THEN 450
280 IF Y=1 THEN D$=X$:GOTO 330
290 FOR J=XL TO 1 STEP -1
300 X=VAL(X$(J,J))
310 P=X*Y+C:GOSUB 500
320 NEXT J
330 A$="":IF C THEN A$=C$(C+1,C+1)
335 A$(LEN(A$)+1)=D$:IF YL-I THEN A$(LEN(A$)+1)=Q$(1,YL-I)
340 REM
350 REM : ADDITION ROUTINE
360 REM
370 ZL=LEN(Z$):AL=LEN(A$)
380 T$=Z$:Z$="":IF AL-ZL THEN Z$=Q$(1,AL-ZL)
385 Z$(LEN(Z$)+1)=T$:C=0:D$=""
390 FOR J=AL TO 1 STEP -1
400 Z=VAL(Z$(J,J))
410 A=VAL(A$(J,J))
420 P=Z+A+C:GOSUB 500
430 NEXT J
440 Z$="":IF C THEN Z$=C$(C+1,C+1)
445 Z$(LEN(Z$)+1)=D$
450 NEXT I
460 REM
470 PRINT "Z=";Z$
480 END
490 REM
500 C=INT(P/10):T$=D$:D$=N$(P-C*10+1,P-C*10+1):D$(LEN(D$)+1)=T$:RETURN
```

VARIABLE TABLE FOR INFINI-MULT

| | |
|--------|--|
| X\$ | multiplicand |
| Y\$ | multiplier |
| Z\$ | product |
| A\$ | intermediate addend |
| D\$ | working string for creating A\$ and Z\$ from digits |
| X,Y | value of selected digit of X\$,Y\$ |
| Z,A | Z\$,A\$ |
| XL,YL | length of X\$,Y\$ |
| ZL,AL | Z\$,A\$ |
| C | carry digit |
| P | result formed by numerical operations on digits |
| J,I | indices for selecting digits from strings |
| Q\$() | zeroes for padding strings |
| N\$() | decimal numerals |
| C\$() | carry numerals, same as N\$() except that C\$(0)=" " and N\$(0)="0" and C\$(9) is unneeded. |

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More About Numbers

Edmund N. Ricchezza

Certain numbers when acted upon in a certain manner will converge to a definite number. There are many of these, though the best known are Ulam's Conjecture, The 6174 Problem, and The Golden Mean.

Ulam's Conjecture states that any positive integer will always converge to "1" if acted upon as follows:

- 1) If it is even, divide by 2.
- 2) If it is odd, multiply by 3 and add 1.

For example, consider 15:

| | |
|--|-----|
| Since it is odd we multiply by 3 and add 1 obtaining | 46 |
| 46 is even so we divide by 2 and obtain | 23 |
| Multiply 23 by 3 and add 1 | 70 |
| Divide 70 by 2 | 35 |
| Multiply 35 by 3 and add 1 | 106 |
| Divide 106 by 2 | 53 |
| Multiply 53 by 3 and add 1 | 160 |
| Divide 160 by 2 | 80 |
| Divide 80 by 2 | 40 |
| Divide 40 by 2 | 20 |
| Divide 20 by 2 | 10 |
| Divide 10 by 2 | 5 |
| Multiply 5 by 3 and add 1 | 16 |
| Divide 16 by 2 | 8 |
| Divide 8 by 2 | 4 |
| Divide 4 by 2 | 2 |
| Divide 2 by 2 | 1 |
| Q E D | |

Programming this is elementary but it will reveal many curious situations. Consider this: 50,000,000 requires 106 operations to converge to

1 while the much smaller 63 requires 107 operations to converge to 1.

The "6174 Problem" states that any positive 4-digit integer except those with all the same digits will converge to "6174" when acted upon as follows:

1. Arrange the number in descending order.
2. Arrange the number in ascending order.
3. Subtract. Take this subtracted number as the new 4-digit number and repeat the process.

After not more than five iterations the difference will always be 6174. For example consider 4389:

| | | | |
|-------|-------|-------|-------|
| 9843 | 6543 | 8730 | 8532 |
| -3489 | -3456 | - 378 | -2358 |
| 6354 | 3087 | 8352 | 6174 |

This makes for an interesting and not too difficult program exercise.

Quotients of successive terms of the Fibonacci Sequence will converge to .61803398. The ancient Greeks called this the "Golden Mean" because it expressed the ideal ratio of width to length that gave the most aesthetically appealing building or room.

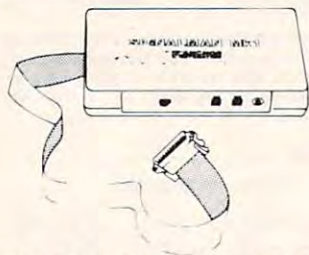
I found this relationship fascinating considering that Fibonacci was born c. 1170, centuries after the Greeks discovered this number.

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Word Hunt

Robert W. Baker
Atco, NJ

This game is designed to test your ability to find specific words or letter sequences hidden in a 10 by 10 letter matrix. Scoring is based on the time it takes to enter your correct answer within a given time period determined by the skill level selected. The program uses very little memory and will easily run in 8K.

To play the game, first select the skill level you want to play at, between 1 and 5. One is the easiest, allowing the maximum time of approximately 1.5 minutes to find each word. Skill level 5, however, will only allow about 20 seconds to find each word.

Next enter a list of ten words, each being three to eight characters long. Only the letters A to Z may be entered, but they really do not have to be words. You can even use the game to make learning foreign languages more fun. If two people are playing, let one player enter the words for the other to find. Try to mix the word lengths, entering both long and short words for best results. If too many long words are entered it may take a while for the puzzle to be generated. If any word will not fit into the matrix, enter a new list of words when asked.

When the puzzle is ready, hit any key to start the game. Timing will start when the first word is shown.

Scoring for a correct answer is based on the amount of time it takes to respond, with 100 points maximum for each of ten words. If a correct answer is given in five seconds, you score 100 points. After that, your possible score decreases with time to a minimum of ten points for a correct answer. A wrong answer does not score any points and you only get *one* try for each word.

To enter your answer, you give a row and column number of the first character of the word followed by the direction code (see the diagram in the game!). Any invalid entries are discarded and you only type numbers, you do not type a comma or RETURN.

Before looking at how the program actually works, let's take a look at the major variables used in the program:

S – defines the size of the letter matrix to be created.

W – defines the number of words to be entered and used in the matrix.

M(S,S) – is the actual letter matrix, note that a floating point numeric matrix is used instead of a string matrix. More about this later.

W\$(W) – contains the word list.

L(W,3) – remembers the starting location and direction of each word after it has been placed in the letter matrix. Each entry directly corresponds to the entry in the same position in the word matrix.

P(S,S) and F(8) – are working matrices used to create the actual letter matrix used in the game.

Now let's take a look at how the program works. First the program gets the desired skill level (SL) as a number between 1 and 5. The program sets a default value of 3 on the input line that the user can change before hitting the RETURN key. Lines 130-290 then get the list of words and check each is a valid character string (A-Z). The words are put into the word list in alphabetical order as each word is entered by the user. This avoids the time consuming process of sorting the entire word list at the end. In this way, there is a short delay as each word is entered. This short delay is not even noticeable by the user!

Line 340 initializes the latter matrix to all *'s (decimal value 42). Now each word in the word list is inserted randomly in the letter matrix in the following fashion:

- 1) The point matrix is cleared (line 360) so we can remember what points in the matrix have been tried for a particular word in the word list.
- 2) Lines 400-440 check that there is still at least one point in the letter matrix that has not been tried (entry in P is still 0). If all points have been tried, the user is asked to enter a new list of words since this list will not fit properly in the letter matrix.
- 3) A random starting point (that has not been tried) is chosen in line 450.
- 4) The starting point is flagged as having been tried (P value now 1) and then a check is made to see if the matrix position is open (still *) or matches the first letter of the word (lines 460-470).
- 5) Now the direction matrix (F) is cleared to remember what directions have been tried from this starting point (line 490).
- 6) A check is made that at least one direction still hasn't been tried from this point (lines 500-510).
- 7) A random direction (that has not been tried) is chosen in line 520.

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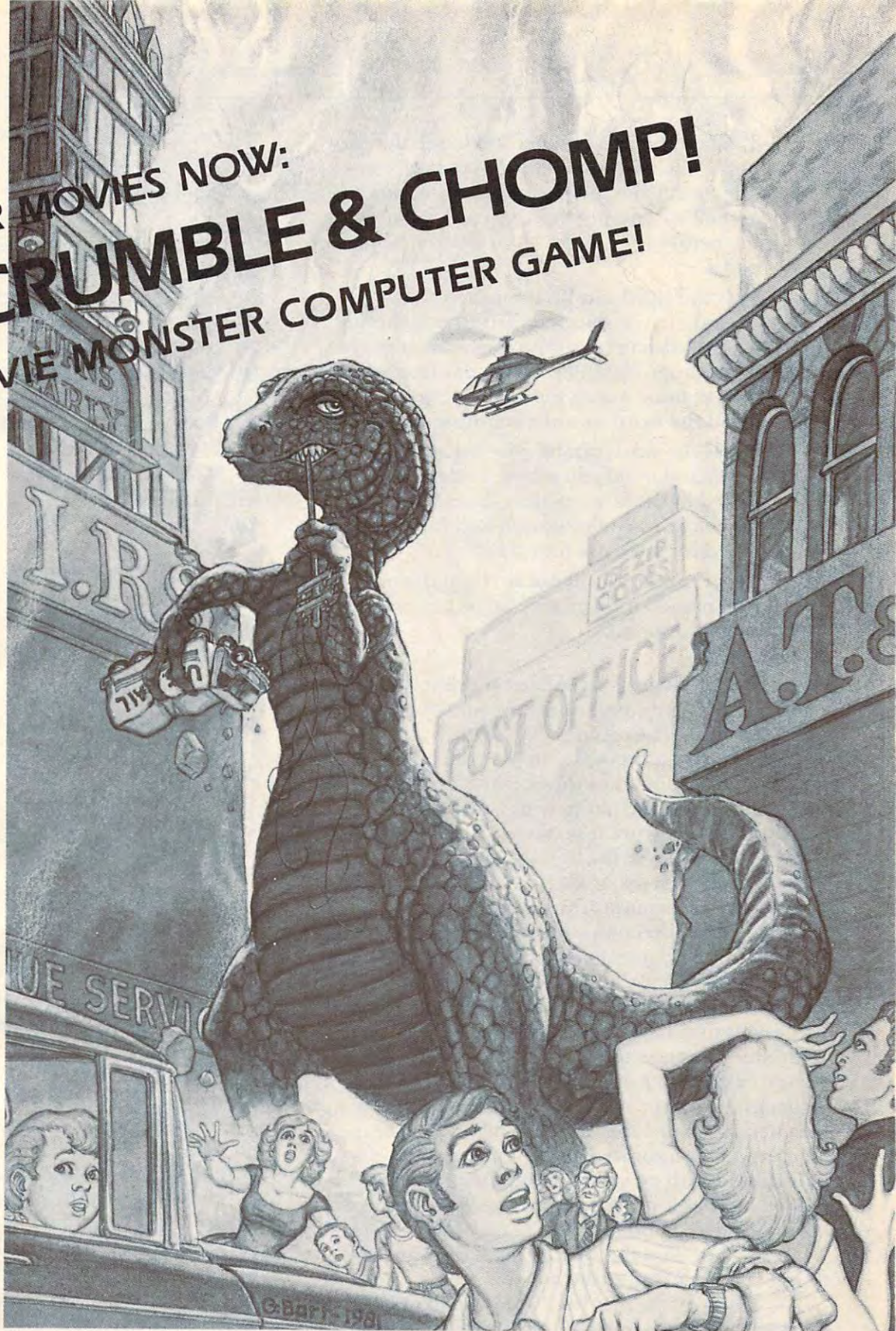
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8) Then the word is checked to see if it can physically fit in the matrix in the selected direction from the current starting point (lines 530-650). This insures the word will not exceed the boundaries of the letter matrix from this point.

9) If the word can fit, then each character position in the selected direction is checked against the corresponding character of the word (lines 760-690). Each character in the matrix must match the corresponding character in the word or must be unused (still *).

10) If the word can be entered at this starting point and in this direction, each letter is inserted in the latter matrix (lines 710-720).

Then the starting location and direction are saved for later use (line 740).

11) If the word will not fit, then the next direction is tried until all directions are exhausted from this point.

When all words have been put into the matrix, the remaining unused positions (still *) are filled in with random letters (lines 760-770).

Everything is now set to play the game, as soon as the player hits a key (lines 780-800). The letter matrix is displayed along with a direction code diagram and a score box (lines 820-960). A word is given to the player for him to find in the matrix and the timer is restarted (lines 970-1000). Then the program prompts the player for the starting location and direction code (lines 1020-1170). The values entered are then checked to see if correct, first against the values saved when the word was put into the matrix (lines 1190-1210). If the value does not match, then the program checks to see if a "double" was created when the unused positions were filled with random letters. Thus the program checks the player's answer again to insure it is right or wrong (lines 1230-1280). If a bad answer is entered, it is indicated and the correct answer is displayed with no score added (lines 1360-1430). A good answer is indicated and the appropriate score displayed and added to the player's total. The score is based on the selected skill level and the time it takes to enter the answer.

That's all there is to it! I should explain that a numeric vector was used for the actual letter matrix since it was easier and faster to use. Most people who have tried this game have found it to be very interesting and fun to play. At times it can even be educational. I only hope it's as much fun for you!

For those who might not want to type in the program, I'll supply copies on cassette tape for \$2. Be sure to send requests to me and not through the magazine.

Program 1: Atari Version

```

10 REM **** WORD HUNT ****
20 REM
30 REM BY: ROBERT W. BAKER
40 REM ATCO, NJ
50 REM *****
60 REM
70 OPEN #1,4,0,"K:"
80 S=10:W=10:DIM M$(S,S),W$(W*10),LNK(W),P
  (S,S),L(W,3),F(8),R$(10),T$(10)
85 T$=""
  "FOR I=0 TO 9:W$(I*10+
  1,I*10+10)=T$:NEXT I
90 POKE 752,0:PRINT "(CLEAR) (DOWN) WHAT S
  KILL LEVEL"
100 ? :? "1 (EASY) - TO - 5 - (HARD)?3(2
  LEFT)";
110 INPUT X:IF X<1 OR X>5 THEN 100
120 SL=6-X
130 ? "(2 DOWN)ENTER ";W;" WORDS,"
140 ? "Each 3 to 7 characters long(2 DOWN)";
150 REM *** GET WORDS & PUT IN ORDER
160 REM *** LONGEST TO SHORTEST
170 FOR X=1 TO W:L(X,1)=0:L(X,2)=0:L(X,3
  )=0
180 PRINT "WORD ";X:INPUT R$
190 Q=LEN(R$)
200 IF Q<3 THEN ? "% TOO SHORT *":GOTO 1
  80
210 IF Q>7 THEN ? "% TOO LONG *":GOTO 1
  80
220 X9=0:T$=""*:T$(2)=R$:T$(LEN(T$)+1)="
  *":FOR Y=1 TO Q:A=ASC(T$(Y+1,Y+1))
230 IF A<65 OR A>90 THEN X9=1:Y=Q
240 NEXT Y:IF X9=1 THEN PRINT "% BAD WOR
  D *":GOTO 180
250 IF X=1 THEN T$=R$:T$(Q+1)="*":W$(X*1
  0-9,X*10)=T$:LNK(X)=Q+1:GOTO 290
260 X9=0:FOR Y=1 TO X-1:IF Q<LNK(Y)-1 TH
  EN 280
270 FOR B=X TO Y+1 STEP -1:T$=W$((B-1)*1
  0-9,(B-1)*10):W$(B*10-9,B*10)=T$:LNK(B)=L
  NK(B-1):NEXT B
275 T$=R$:T$(Q+1)="*":W$(Y*10-9,Y*10)=T$
  :LNK(Y)=LEN(T$):Y=X-1
280 NEXT Y:IF X9=0 THEN T$=R$:T$(Q+1)="*
  ":W$(X*10-9,X*10)=T$:LNK(X)=LEN(T$)
290 NEXT X
300 POKE 752,1:?"(CLEAR) (7 DOWN)That's
  enough words!"
310 PRINT "(6 DOWN)Please be patient....
  ."
320 ? "(3 DOWN) I'm now makin
  g the puzzle!"
330 REM *** INITIALIZE LETTER MATRIX ***

```

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```

340 FOR X=1 TO S:FOR Y=1 TO S:MKY,X)=42:
NEXT Y:NEXT X:Q=0
350 REM *** INIT POINT MATRIX & GET NEXT
WORD
360 FOR X=1 TO S:FOR Y=1 TO S:P(Y,X)=0:N
EXT Y
370 NEXT X:Q=Q+1:IF Q>W THEN 760
380 G=LN(Q)-2
390 REM *** TRY ALL POINTS FOR EACH WORD
400 X9=0:FOR X=1 TO S:FOR Y=1 TO S:IF P(
Y,X)=0 THEN X9=1:X=S:Y=S
410 NEXT Y:NEXT X:IF X9=1 THEN 450
420 REM *** WORD WILL NOT FIT, TRY AGAIN
430 ? "(CLEAR)This list of words will no
t all fit."
440 ? :? "Please enter another list of w
ords!":GOTO 130
450 A=INT(S*RND(1)+1):B=INT(S*RND(1)+1):
IF P(B,A)>0 THEN 450
460 P(B,A)=1:IF MKB,A)=42 THEN 490
470 IF MKB,A)>ASC(W$(Q*10-9)) THEN 400
480 REM *** TRY ALL DIRECTIONS FROM THIS
POINT
490 FOR X=1 TO 8:F(X)=0:NEXT X
500 X9=0:FOR X=1 TO 8:IF F(X)=0 THEN X9=
1:X=8
510 NEXT X:IF X9=0 THEN 400
520 D=INT(8*RND(1)+1):IF F(D)=1 THEN 520
530 F(D)=1:ON D GOTO 550,590,580,620,610
,650,640,560
540 REM *** CHECK WORD WILL FIT
550 IF (A+G)>S THEN 500
560 IF (B-G)<1 THEN 500
570 GOTO 670
580 IF (B+G)>S THEN 500
590 IF (A+G)>S THEN 500
600 GOTO 670
610 IF (A-G)<1 THEN 500
620 IF (B+G)>S THEN 500
630 GOTO 670
640 IF (B-G)<1 THEN 500
650 IF (A-G)<1 THEN 500
660 REM *** CHECK WORD MATCHES INTO MATR
IX
670 X=A:Y=B:X9=0:FOR N=2 TO G+1:GOSUB 15
50:IF MKY,X)=42 THEN 690
680 IF MKY,X)>ASC(W$((Q-1)*10+N)) THEN
X9=1:N=G+1
690 NEXT N:X=A:Y=B:IF X9=1 THEN 500
700 REM *** ENTER WORD
710 FOR N=1 TO G+1:IF MKY,X)=42 THEN MKY
,X)=ASC(W$((Q-1)*10+N))
720 GOSUB 1550:NEXT N
730 REM *** SAVE START & DIRECTION INFO
740 L(Q,1)=A-1:L(Q,2)=B-1:L(Q,3)=D:IF D<

```

```

W THEN 360
750 REM *** FILL IN SPACES
760 FOR Y=1 TO S:FOR X=1 TO S:IF MKY,X)=
42 THEN MKY,X)=INT(25*RND(1)+65)
770 NEXT X:NEXT Y:WP=0:TS=0
780 ? "(CLEAR)(10 DOWND                                IR
EADY!"
790 ? "(6 DOWNDDepress any key when read
y to play!"
800 IF PEEK(764)=255 THEN 800
805 POKE 764,255
810 REM *** SET UP DISPLAY
820 ? "(CLEAR)(DOWND      I COLUMNI)":POKE
85,26:?"IW O R DI"
830 REM *** PRINT 'ROW' DOWN LEFT COLUMN
840 REM *** START OUT DOWN 4
850 REM *** LATER DO 5 UP & 3 RIGHT
860 ? "(4 DOWND IRI (DOWND (LEFT) I OI (DOWND (
LEFT) IWI (5 UP) (3 RIGHT)":
870 FOR X=0 TO S-1:?"X":NEXT X:?"Y=1:GO
SUB 1650
880 FOR Y=1 TO S:?"(2 RIGHT)":Y-1:?"(="
;
890 FOR X=1 TO S:?"CHR$(MKY,X)":NEXT X
900 ? "(=":NEXT Y:Y=0:GOSUB 1650
910 ? :?"IDIRECTIONS:I":?"(DOWND 7 8
1"
920 ? "      (G) (=) (F)":?" 6(R) (T) (R) 2":?
"      (F) (=) (G)":?" 5 4 3"
930 G=16:GOSUB 1700:?"      I SCORE I"
:POKE 85,25:?"(U      (B)"
940 POKE 85,25:?"(U 0      (B)"
950 POKE 85,25:?"(U      (B)"
955 POKE 85,25:?"(9 MD"
960 G=0:GOSUB 1700:?"
":REM <-- 19 SPACES
970 WP=WP+1:IF WP>W THEN 1450
980 Q=LN(WP)-1
990 REM *** NEXT WORD
1000 GOSUB 1700:POKE 85,29-(Q/2):?"W$((W
P-1)*10+1,(WP-1)*10+Q)
1005 POKE 20,0:POKE 19,0:REM KILL RTCLK
1010 REM *** GET START LOC
1020 G=3:GOSUB 1700:?"STARTING LOCATION
":POKE 85,20:?"(ROW,COLUMN):"
1030 FOR G=6 TO 14:GOSUB 1700
1040 ? "      ":NEXT G:G=6:
GOSUB 1700:REM <-- 19 SPACES
1050 GET #1,B:IF B=155 THEN 1050
1070 PRINT CHR$(B):";":IF B=48 THEN B=0
:GOTO 1090
1080 B=B-48:IF B<1 OR B>9 THEN PRINT "(2
BACK S)":GOTO 1050
1090 GET #1,A
1100 IF A=155 THEN 1090
1110 PRINT CHR$(A):";IF A=48 THEN A=0:GOT

```

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```

0 1140
1120 A=A-48:IF A<1 OR A>9 THEN 1030
1140 G=8:GOSUB 1700:PRINT "DIRECTION:":?
:POKE 85,20:?" (LEFT)";
1150 GET #1,D
1160 IF D=155 THEN 1150
1170 PRINT CHR$(D):D=D-48:IF D<1 OR D>8
THEN 1140
1180 REM *** CHK IF GOOD INFO INPUT
1190 WT=PEEK(20)+256*PEEK(19):IF B<>L(WP
,2) THEN 1230
1210 IF D=L(WP,3) THEN 1360
1220 REM *** CHK IF A DOUBLE MAY EXIST
1230 X=A+1:Y=B+1:G=L(WP)-1:IF M(Y,X)<>A
SC(W*(WP*10-9)) THEN 1300
1240 X9=0:FOR N=2 TO G:GOSUB 1550:IF X<1
OR X>10 THEN 1270
1250 IF Y<1 OR Y>10 THEN 1270
1260 IF M(Y,X)=ASC(W*(WP-1)*10+N)) THEN
1280
1270 X9=1:N=G
1280 NEXT N:IF X9=0 THEN 1360
1290 REM *** BAD START/DIR - NO SCORE
1300 G=6:GOSUB 1700:PRINT "
";B=L(WP,2):A=L(WP,1):REM 14 SPACES
1310 ? B:",";A
1320 G=10:GOSUB 1700:?" ";L
(WP,3):REM 13 SPACES
(WP,3):REM 13 SPACES
1330 G=12:GOSUB 1700:?"(ESC)(UP)
(ESC)(UP)":REM 13 SPACES
1340 G=13:GOSUB 1700:?"(Z) INOI, CORREC
T (C)":GOTO 1420
1350 REM *** GOOD ANSWER - GET SCORE
1360 IF WT<(SL*60) THEN WS=100:GOTO 1390
:REM <- MAX SCORE
1370 IF WT>(SL*1200) THEN WS=10:GOTO 139
0:REM <- MIN SCORE
1380 WS=5+INT(((SL*1200)-WT)/60)
1390 G=12:GOSUB 1700:?"(ESC)(UP)"
1400 G=13:GOSUB 1700:?"(Z) IYESI, ";WS;
" POINTS":TS=TS+WS
1410 REM *** UPDATE TOTAL SCORE
1420 G=18:GOSUB 1700:?"(8 RIGHT)":TS
1430 FOR X=1 TO 500:NEXT X:GOTO 960
1440 REM *** END GAME ***
1450 POSITION 2,15
1460 FOR X=1 TO 8:?" "":NEXT
X:REM <- 12 SPACES
1470 FOR G=-2 TO 14:GOSUB 1700
1480 PRINT " "":NEXT G:RE
M 17 SPACES
1490 POSITION 2,15:?"PLAY AGAIN (Y OR N
)? "
1500 GET #1,R
1510 IF R=ASC("Y") THEN 90

```

```

1520 IF R<>ASC("N") THEN 1500
1530 END
1540 REM *** SUBR TO INC COORDINATES IN
DIR
1550 ON D GOTO 1560,1570,1580,1590,1600,
1610,1620,1630
1560 Y=Y-1
1570 X=X+1:RETURN
1580 X=X+1
1590 Y=Y+1:RETURN
1600 Y=Y+1
1610 X=X-1:RETURN
1620 X=X-1
1630 Y=Y-1:RETURN
1640 REM *** SUBR FOR BOT TOP/BOTTOM
1650 PRINT "(3 RIGHT)":IF Y=1 THEN ? "(
0)":GOTO 1670
1660 PRINT "(Z)";
1670 FOR X=0 TO 9-1:?"(R)":NEXT X:IF Y
=1 THEN PRINT "(C)":RETURN
1680 ? "(C)":RETURN
1690 REM *** SUBR TO POSITION
1700 POSITION 20,G+2:RETURN

```

Program 2: Microsoft Version

```

10 REM ***** W O R D   H U N T ***
**
20 REM
30 REM BY: ROBERT W. BAKER, ATCO, ~
NJ
40 REM
50 REM *****
**
60 :
70 FOR X=1 TO VAL(RIGHT$(TI$,2)) :
R=RND(1) :NEXT :POKE 59468
,12
80 S=10 :W=10 :DIM M(S,S),W$(W),P(
S,S),L(W,3),F(8)
90 PRINT "{CLEAR}{DOWN}WHAT SKILL L
EVEL"
100 PRINT :PRINT"1 (EASY) - TO - 5 ~
(HARD) 3{03 LEFT}";
110 INPUT R$ :X=VAL(R$) :IF X<1 OR ~
X>5 THEN 90
120 SL=6-X
130 PRINT "{02 DOWN}ENTER"W"WORDS,"
140 PRINT :PRINT"EACH 3 TO 8 CHARAC
TERS LONG{02 DOWN}
150 REM **** GET WORDS & PUT IN ORD
ER
160 REM **** LONGEST TO SHORTEST
170 FOR X=1 TO W :L(X,1)=0 :L(X,2)=
0 :L(X,3)=0
180 PRINT"WORD";X;TAB(8);"{02 RIGHT

```

```

RIGHT}?{03 LEFT}";
190 INPUT R$:Q=LEN(R$)
200 IF Q<3 THEN PRINT TAB(26);"{UP}
* TOO SHORT *":GOTO 180
210 IF Q>8 THEN PRINT TAB(26);"{UP}
* TOO LONG *":GOTO 180
220 X9=0:FOR Y=1 TO Q:A=ASC(MID$(
R$+Y,1))
230 IF A<65 OR A>90 THEN X9=1:Y=Q
240 NEXT Y:IF X9=1 THEN PRINT TAB(
26);"{UP}* BAD WORD *":G
OTO 180
250 IF X=1 THEN W$(X)=R$+"*":GOTO ~
290
260 X9=0:FOR Y=1 TO X-1:IF Q<=LEN
(W$(Y))-1 THEN 280
270 FOR B=X TO Y+1 STEP -1:W$(B)=W
$(B-1):NEXT B:W$(Y)=R$+"
*":X9=1:Y=X-1
280 NEXT Y:IF X9=0 THEN W$(X)=R$+"
*"
290 NEXT X
300 PRINT"{CLEAR}{07 DOWN}";SPC(8);
"THAT'S ENOUGH WORDS!":RE
M<-- 7 DOWN
310 PRINT"{06 DOWN}PLEASE BE PATIEN
T.....":REM<-- 6 DOWN
320 PRINT"{03 DOWN}";SPC(12);"I'M N
OW MAKING THE PUZZLE!
330 REM **** INITIALIZE LETTER MATR
IX
340 FOR X=1 TO S:FOR Y=1 TO S:M(Y
,X)=42:NEXT Y:NEXT X:Q=
0
350 REM **** INIT POINT MATRIX & GE
T NEXT WORD
360 FOR X=1 TO S:FOR Y=1 TO S:P(Y
,X)=0:NEXT Y
370 NEXT X:Q=Q+1:IF Q>W THEN 760
380 G=LEN(W$(Q))-2
390 REM **** TRY ALL POINTS FOR EAC
H WORD
400 X9=0:FOR X=1 TO S:FOR Y=1 TO ~
S:IF P(Y,X)=0 THEN X9=1:
X=S:Y=S
410 NEXT Y:NEXT X:IF X9=1 THEN 45
0
420 REM **** WORD WILL NOT FIT, TRY
AGAIN!
430 PRINT"{CLEAR}THIS LIST OF WORDS
WILL NOT ALL FIT
440 PRINT:PRINT"PLEASE ENTER ANOTH
ER LIST OF WORDS!":GOTO ~
130
450 A=INT(S*RND(1)+1):B=INT(S*RND(
1)+1):IF P(B,A)<>0 THEN 4
50
460 P(B,A)=1:IF M(B,A)=42 THEN 490
470 IF M(B,A)<>ASC(LEFT$(W$(Q),1)
)GOTO 400
480 REM **** TRY ALL DIRECTIONS FRO
M THIS POINT
490 FOR X=1 TO 8:F(X)=0:NEXT X
500 X9=0:FOR X=1 TO 8:IF F(X)=0 T
HEN X9=1:X=8
510 NEXT X:IF X9=0 THEN 400
520 D=INT(8*RND(1)+1):IF F(D)=1 GO
TO 520
530 F(D)=1:ON D GOTO 550,590,580,6
20,610,650,640,560
540 REM **** CHECK WORD WILL FIT
550 IF (A+G)>S THEN 500
560 IF (B-G)<1 THEN 500
570 GOTO 670
580 IF (B+G)>S THEN 500
590 IF (A+G)>S THEN 500
600 GOTO 670
610 IF (A-G)<1 THEN 500
620 IF (B+G)>S THEN 500
630 GOTO 670
640 IF (B-G)<1 THEN 500
650 IF (A-G)<1 THEN 500
660 REM **** CHECK WORD MATCHES INT
O MATRIX
670 X=A:Y=B:X9=0:FOR N=2 TO G+1 ~
:GOSUB 1550:IF M(Y,X)=42 ~
GOTO 690
680 IF M(Y,X)<>ASC(MID$(W$(Q),N,1))
THEN X9=1:N=G+1
690 NEXT N:X=A:Y=B:IF X9=1 THEN ~
500
700 REM **** ENTER WORD
710 FOR N=1 TO G+1:IF M(Y,X)=42 TH
EN M(Y,X)=ASC(MID$(W$(Q),N
,1))
720 GOSUB 1550:NEXT N
730 REM **** SAVE START & DIRECTION
INFO
740 L(Q,1)=A-1:L(Q,2)=B-1:L(Q,3)=
D:IF Q<W THEN 360
750 REM **** FILL IN SPACES
760 FOR Y=1 TO S:FOR X=1 TO S:IF ~
M(Y,X)=42 THEN M(Y,X)=INT(
25*RND(1)+65)
770 NEXT X:NEXT Y:WP=0:TS=0
780 PRINT"{CLEAR}{10 DOWN}";TAB(15)
;"{REV}READY":REM<-- 10 ~
DOWN
790 PRINT"{06 DOWN} DEPRESS ANY KE
Y WHEN READY TO PLAY!":R
EM<-- 6 DOWN

```

```

800 R$="" :GET R$ :IF R$="" THEN 800
810 REM **** SET UP DISPLAY
820 PRINT "{CLEAR}{DOWN} {REV} COLUMN"; TAB(25); "{REV}WORD"
830 REM *** PRINT 'ROW' DOWN LEFT COLUMN
840 REM *** START OUT DOWN 4
850 REM *** LATER DO 5 UP & 3 OVER
860 PRINT "{04 DOWN}{REV}R{DOWN}{LEFT}O{DOWN}{LEFT}W{05 UP}{03 RIGHT}{OFF}";
870 FOR X=0 TO S-1 :PRINT RIGHT$(STR$(X),1); :NEXT X :PRINT :
Y=1 :GOSUB 1650
880 FOR Y=1 TO S :PRINT "{02 RIGHT}" ; RIGHT$(STR$(Y-1),1); "]" ;
890 FOR X=1 TO S :PRINT CHR$(M(Y,X)) ; :NEXT X
900 PRINT "]" :NEXT Y :Y=0 :GOSUB 1650
910 PRINT :PRINT "{REV}DIRECTIONS:" ~
:PRINT "{DOWN} 7 8 1"
920 PRINT " M]N" :PRINT " 6@Q@2" :
PRINT "N]M" :PRINT " 5 4 3"
930 G=16 :GOSUB 1700 :PRINT " {R
REV} SCORE " :PRINT TAB(
25); "5 6"
940 PRINT TAB(25); "5 0 6"
950 PRINT TAB(25); "5 6" :PRINT
T TAB(25); "8888888888"
960 G=0 :GOSUB 1700 :PRINT " ~
" :REM <-- 19 S
PACES
970 WP=WP+1 :IF WP>W THEN 1450
980 Q=LEN(W$(WP))-1
990 REM **** NEXT WORD
1000 GOSUB 1700 :PRINT TAB(29-(Q/2))
; LEFT$(W$(WP),Q) :TIS="000
000"
1010 REM **** GET START LOC
1020 G=3 :GOSUB 1700 :PRINT "STARTING
LOCATION" :PRINT TAB(20);
" (ROW,COLUMN):
1030 FOR G=6 TO 14 :GOSUB 1700
1040 PRINT " " :NEXT
G :G=6 :GOSUB 1700 :REM
<-- 20 SPACES
1050 B$="" :GET B$ :IF B$="" THEN 1050
1060 IF ASC(B$)=13 THEN 1050
1070 PRINT B$; ", "; :IF B$="" THEN B
=0 :GOTO 1090
1080 B=VAL(B$) :IF B<1 OR B>9 THEN]P
RINT "{02 LEFT} {02 LEFT}"
; :GOTO 1050
1090 A$="" :GET A$ :IF A$="" THEN 1090
1100 IF ASC(A$)=13 THEN 1090
1110 PRINT A$ :IF A$="" THEN A=0 :G
OTO 1140
1120 A=VAL(A$) :IF A<1 OR A>9 THEN 1
030
1130 REM **** GET DIRECTION
1140 G=8 :GOSUB 1700 :PRINT "DIRECTIO
N:" :PRINT :PRINT TAB(20);
" {LEFT}";
1150 GET D$ :IF D$="" THEN 1150
1160 IF ASC(D$)=13 THEN 1150
1170 PRINT D$ :D=VAL(D$) :IF D<1 OR ~
D>8 THEN 1140
1180 REM **** CHK IF GOOD INFO INPUT
1190 WT=TI :IF B<>L(WP,2) THEN 1230
1200 IF A<>L(WP,1) THEN 1230
1210 IF D=L(WP,3) THEN 1360
1220 REM **** CHK IF A DOUBLE MAY EX
IST
1230 X=A+1 :Y=B+1 :G=LEN(W$(WP))-1 :
IF M(Y,X)<>ASC(LEFT$(W$(WP
),1)) THEN 1300
1240 X9=0 :FOR N=2 TO G :GOSUB 1550 ~
:IF X<1 OR X>10 THEN 1270
1250 IF Y<1 OR Y>10 THEN 1270
1260 IF M(Y,X)=ASC(MID$(W$(WP),N,1))
THEN 1280
1270 X9=1 :N=G
1280 NEXT N :IF X9=0 THEN 1360
1290 REM **** BAD START/DIR - NO SCO
RE
1300 G=6 :GOSUB 1700 :PRINT SPC(14);
:B$=STR$(L(WP,2)) :A$=STR
$(L(WP,1))
1310 PRINT RIGHT$(B$,LEN(B$)-1); ", ";
RIGHT$(A$,LEN(A$)-1)
1320 G=10 :GOSUB 1700 :PRINT SPC(13)
; L(WP,3)
1330 G=12 :GOSUB 1700 :PRINT "^"; SPC(
13); "^"
1340 G=13 :GOSUB 1700 :PRINT "J {REV}
NO{OFF}, CORRECT K" :GOTO ~
1420
1350 REM **** GOOD ANSWER - GET SCOR
E
1360 IF WT<(SL*60) THEN WS=100 :GOTO
1390 :REM <-- MAX SCORE
1370 IF WT>(SL*1200) THEN WS=10 :GOT
O 1390 :REM <-- MIN SCORE
1380 WS=5+INT(((SL*1200)-WT)/60)
1390 G=12 :GOSUB 1700 :PRINT "^"
1400 G=13 :GOSUB 1700 :PRINT "J {REV}

```

```

YES{OFF},";WS;"POINTS" :TS
=TS+WS
1410 REM **** UPDATE TOTAL SCORE
1420 G=18 :GOSUB 1700 :PRINT"{07 RI
G RIGHT}";TS
1430 FOR X=1 TO 1000 :NEXT X :GOTO
960
1440 REM **** END GAME ****
1450 PRINT"{HOME}{15 DOWN}" :REM <-
- DOWN 15
1460 FOR X=1 TO 6 :PRINT"
~ " :NEXT X :REM <-- 12 SPA
CES
1470 FOR G=-2 TO 13 :GOSUB 1700
1480 PRINT"
" :NEXT
~ G :REM 17 SPACES
1490 PRINT"{HOME}{20 DOWN}PLAY AGAI
N (Y OR N) ?" :REM <-- DOWN
20
1500 R$="" :GET R$ :IF R$="" THEN 1
500
1510 IF R$="Y" THEN 90
1520 IF R$<>"N" THEN 1500
1530 END
1540 REM **** SUBR TO INCR COORDINA

```

```

TES IN DIR
1550 ON D GOTO 1560,1570,1580,1590,
1600,1610,1620,1630
1560 Y=Y-1
1570 X=X+1 :RETURN
1580 X=X+1
1590 Y=Y+1 :RETURN
1600 Y=Y+1
1610 X=X-1 :RETURN
1620 X=X-1
1630 Y=Y-1 :RETURN
1640 REM **** SUBR FOR BOX TOP/BOTT
OM
1650 PRINT"{03 RIGHT}"; :IF Y=1 THE
N PRINT"0"; :GOTO 1670
1660 PRINT"-";
1670 FOR X=0 TO S-1 :PRINT"@"; :NEX
T X :IF Y=1 THEN PRINT"." :
RETURN
1680 PRINT"=" :RETURN
1690 REM **** SUBR TO POSITION
1700 PRINT"{HOME}"TAB(20); :FOR X9=
1 TO G+3 :PRINT"{DOWN}"; :N
EXT X9 :RETURN

```

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WARLOCK'S REVENGE

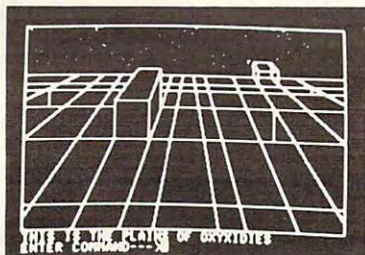


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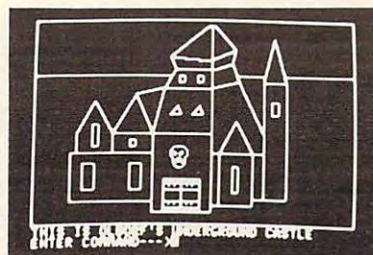


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Count The Hearts

Christopher J. Flynn
Herndon, VA

"Count the Hearts" is a VIC program which will help you to develop your child's counting skills. VIC will display a certain number of hearts on your television screen. Ask your child to count them. If your child can correctly count the hearts, he or she will be rewarded by a duet of chirping birdies. Otherwise, ... To challenge older children, you can place a limit on the time VIC allows for a response.

Once it is set up, no reading is required to play "Count the Hearts." However, preschoolers will probably need you to help them with the keyboard.

Setting Up

When you first start "Count the Hearts," it will ask you for a range of numbers and a time limit.

You can tailor the game to your child's counting skills by trying different number ranges. For example, you may want to start with numbers between one and five. Gradually, a child will work up to counting up to ten. If you notice difficulties with some numbers, you might want to work within that range (say from six to nine).

Here is how VIC will ask you to set the number range:

1. VIC will display:
ENTER NUMBER RANGE
LOW NUMBER (1) ?
2. You should type in the low number in the range (don't forget to hit RETURN). If you just hit RETURN, VIC will use one as the low number.
3. Next VIC will ask:
HIGH NUMBER (9) ?
4. Now type in the high number. Again, if you just hit RETURN, VIC will use nine as the high number.

VIC will make sure that your low number is really lower than your high number. It will also make sure that neither number is greater than 484. Why 484? Well, that's how many spaces are left on the screen for displaying the hearts.

The time limit gives you a way to speed up "Count the Hearts." If you don't take a guess at how many hearts there are within the time limit, then VIC will let you know that time's up. VIC will then just start another game.

VIC will ask you for the time limit:

5. VIC will display:
TIME LIMIT PER SET
SECONDS (120) ?

6. Type in the number of seconds you want to use for the time limit. If you just type RETURN, VIC will set the time limit to 120 seconds or two minutes.

By the way, if, in any of the above steps, VIC didn't understand your response, it will either ask the question again or ask you to repeat your response.

Counting Hearts

O.K. The television screen goes blank for just an instant. In that brief instant VIC is deciding how many hearts it will ask you to count. Then, one by one, VIC displays the hearts at random locations on the television screen. As it shows each new heart, VIC says in a deep voice, "BEEP!". Notice how VIC paints the hearts in different colors.

Now VIC will ask:

HOW MANY HEARTS ?

Ask your child to count them. Type in the number (don't forget RETURN!) and see what happens. What happens if your child gives the right answer? How about a wrong answer? What is your child's reaction?

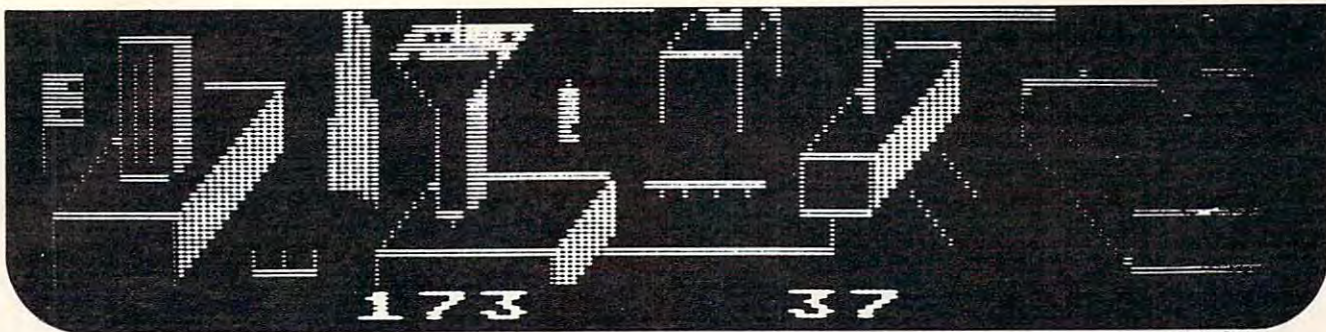
VIC will start a new game when the right answer is typed in or when time runs out and nothing has been heard from the keyboard. VIC is very patient with small folks learning to count. When a wrong answer is given, VIC just resets its timer and gives you another try.

Scoring

When you are finished playing "Count the Hearts", just hit the F1 key in reply to the "HOW MANY HEARTS ?" question. VIC will promptly clear the screen and tell you:

- how many games were played
- how many correct answers there were
- how many wrong answers there were
- how many times the player ran out of time

By keeping track of the number range (VIC shows you the range you used) and the scores, you can note your child's progress. For example, do you notice a little slowness in your child's learning to count past ten? We did. That seems to be the upper limit for our three year old for a while.



Rocket Raiders

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□ PM EDITOR: by Dennis Zander (Atari, 16K)

Create your own fast action graphics game for the Atari 400 or 800 using its player missile graphics features. By using player data stored as strings, players can be moved or changed (for animation) at machine language speed. All this is done with string variables (POV(Y)=SHIP4). This program is designed to permit creation of up to 4 players on the screen, store them as string data and then immediately try them out in the demo game included in the program. Instructions for use in your own game are included. PM EDITOR was used to create the animated characters in ARTWORX, RINGS OF THE EMPIRE and ENCOUNTER AT QUESTAR IV.

PRICE \$29.95 cassette \$33.95 diskette

□ ROCKET RAIDERS by Richard Petersen (Atari 24K)

Defend your asteroid base against pulsar bombs, rockets, lasers, and the dreaded "stealth saucer" as aliens attempt to penetrate your protective force field. Precise target sighting allows you to fire at the enemy using magnetic impulse missiles to help protect your colony and its vital structures.

PRICE \$19.95 cassette \$23.95 diskette

□ INTRUDER ALERT! by Dennis Zander (Atari, 16K)

This is a fast paced action game in which you must escape from the "Dreadstar" with the secret plans. The droids are after you and you must find and enter your ship in order to escape. If you fail, the rebellion is doomed. PRICE \$16.95 cassette \$20.95 diskette

□ THE RINGS OF THE EMPIRE: by Dennis Zander (Atari 16K)

The Empire has developed a series of battle stations protected by one or more rings of energy. You must destroy these weapons by attacking them in your Y-wing fighter armed with Zydon torpedoes. Each time you blast through the rings and destroy the station, the Empire develops a new station with more protective rings. PRICE \$16.95 cassette \$20.95 diskette

□ FOREST FIRE! by Richard Petersen (Atari 24K)

Using excellent color graphics, your Atari is turned into a fire scanner to help you direct operations to contain a forest fire. You must compensate for changes in wind, weather and terrain. Not protecting valuable property can result in startling penalties. Life-like variables make FOREST FIRE a very suspenseful and challenging simulation. PRICE \$16.95 cassette \$20.95 diskette

□ PILOT: by Michael Piro (Atari, 16K)

Pilot your small airplane to a successful landing using both joysticks to control throttle and attack angle. PILOT produces a true perspective rendition of the runway, which is constantly changing. Select from two levels of pilot proficiency. PRICE \$16.95 cassette \$20.95 diskette

□ ALPHA FIGHTER: by Douglas McFarland (Atari, 16K)

Consisting of two different programs, ALPHA FIGHTER requires you to destroy the alien starships. As you become more successful, the games get harder and harder. PRICE \$14.95 cassette \$18.95 diskette

□ GIANT SLALOM: by Dennis Zander (Atari, 16K)

Bring the Winter Olympics to your computer anytime of the year! Use the joystick to guide your skier's path down a giant slalom course consisting of open and closed gates. Choose from three levels of difficulty. Take practice runs or compete against from two to eight additional skiers. PRICE \$15.95 cassette \$19.95 diskette

□ HODGE PODGE: by Marsha Meredith (Apple 48K, Applesoft or Integer BASIC)

This captivating program is a marvelous learning device for children from 18 months to 6 years. HODGE PODGE consists of many cartoons, animations and songs which appear when any key on the computer is depressed. A must for any family containing young children and an Apple. PRICE \$19.95 diskette

□ STUD POKER: by Jerry White (Atari, 16K)

This is the classic gambler's card game. You will find the computer to be a worthy opponent who occasionally bluffs but never cheats! STUD POKER employs all of the Atari's sound, color and graphics capabilities. PRICE \$14.95 Cassette \$18.95 diskette

TYPE-N-TALK*

ARTWORX is offering the fantastic TYPE-N-TALK* from Vortrax*. This easy-to-use unit connects to your computer's serial port. Text is automatically translated into electronic speech enabling the TYPE-N-TALK* hobbyist to use and enjoy it immediately.

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The following ARTWORX programs are available for TYPE-N-TALK:

STUD POKER (Atari, 24K) \$16.95 cassette \$20.95 diskette

TEACHER'S PET (Atari, 24K; North Star) \$16.95 / \$20.95

BRIDGE 2.0 (Atari, 24K; North Star) \$19.95 / \$23.95

NOMINOES JIGSAW (Atari, 24K) \$17.95 / \$21.95

Please specify "TNT" version when ordering programs.

□ CRANSTON MANOR ADVENTURE: by Larry Ledden (Atari, North Star and CP/M)

You must enter mysterious Cranston Manor and attempt to collect its many treasures. This extremely challenging program will provide you with many hours (days?) of adventure. The program may be interrupted at will and your status saved onto the diskette.

PRICE \$21.95 diskette

□ BLOCKADE: by Edward Schneider (Atari, 16K)

Every games library needs Blockade program, and this is one of the best. Choose from three levels of difficulty and play against another person or by yourself against the clock.

PRICE \$14.95 cassette \$18.95 diskette

□ TEACHER'S PET: by Arthur Walsh (Atari, Apple, TRS-80, PET, North Star and CP/M (MBASIC) systems)

This is an introduction to computers as well as a learning tool for the young computerist (ages 3-7). The program provides counting practice, letter-word recognition and three levels of math skills.

PRICE \$14.95 cassette \$18.95 diskette

□ FORM LETTER SYSTEM: (Atari, North Star and Apple)

This is the ideal program for creating personalized form letters! FLS employs a simple-to-use text editor for producing fully justified letters. Addresses are stored in a separate file and are automatically inserted into your form letter along with a personalized salutation. Both letter files and address files are compatible with ARTWORX MAIL LIST 3.0 and TEXT EDITOR programs.

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□ TEXT EDITOR: (Atari and North Star)

This program is very "user friendly" yet employs all essential features needed for serious text editing with minimal memory requirements. Features include common sense operation, two different justification techniques, automatic line centering and straightforward text merging and manipulation. TEXT EDITOR files are compatible with ARTWORX FORM LETTER SYSTEM.

PRICE \$39.95 diskette

□ MAIL LIST 3.0: (Atari, Apple and North Star)

The very popular MAIL LIST 2.2 has now been upgraded. Version 3.0 offers enhanced editing capabilities to complement the many other features which have made this program so popular. MAIL LIST is unique in its ability to store a maximum number of addresses on one diskette (typically between 1200 and 2500 names!). Entries can be retrieved by name, keyword(s) or by zip codes. They can be written to a printer or to another file for complete file management. The program produces 1, 2 or 3-up address labels and will sort by zip code (5 or 9 digits) or alphabetically (by last name). Files are easily merged and MAIL LIST will even find and delete duplicate entries! The address files created with MAIL LIST are completely compatible with ARTWORX FORM LETTER SYSTEM.

PRICE \$49.95 diskette

□ THE VAULTS OF ZURICH: by Felix and Ted Herlihy (Atari, 24K, PET)

Zurich is the banking capital of the world. The rich and powerful deposit their wealth in its famed impenetrable vaults. But you, as a master thief, have dared to undertake the boldest heist of the century. You will journey down a maze of corridors and vaults, eluding the most sophisticated security system in the world. Your goal is to reach the Chairman's Chamber to steal the most treasured possession of all: THE OPEC OIL DEEDS!

PRICE \$21.95 cassette \$25.95 diskette

□ BRIDGE 2.0 by Arthur Walsh (Atari (24K), Apple, TRS-80, PET, North Star and CP/M (MBASIC) systems)

Rated #1 by Creative Computing, BRIDGE 2.0 is the only program that allows you to both bid for the contract and play out the hand (on defense or offense!). Interesting hands may be replayed using the "duplicate" bridge feature. This is certainly an ideal way to finally learn to play bridge or to get into a game when no other (human) players are available.

PRICE \$17.95 cassette \$21.95 diskette

□ ENCOUNTER AT QUESTAR IV: by Douglas McFarland (Atari, 24K)

As helmsman of Rikar starship, you must defend Questar Sector IV from the dreaded Zentarians. Using your plasma beam, hyperspace engines and wits to avoid Zentarian mines and death phasers, you struggle to stay alive. This BASIC/Assembly level program has super sound, full player missile graphics and real time action.

PRICE \$23.95 cassette \$27.95 diskette

□ THE NOMINOES JIGSAW PUZZLE:

by C. Minns/B. Brownlee (Atari, 24K, TRS-80, and Apple)

We quote "...A brainteaser supreme... the concept of NOMINOES JIGSAW is brilliant... this video jigsaw game is so clever and completely original that only the most hardhearted puzzle hater could fail to be charmed..."—ELECTRONIC GAMES MAGAZINE.

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Hints

You probably don't need to be reminded that the attention span of preschoolers is not long. Try to move on to another activity before your child gets bored and begins to act silly. You want your child to remember counting as something that is fun to do.

One way for you to help beginners is for you to point to the hearts very slowly one by one. Let your child count them as you point to them. Gradually your child will take over the pointing. And, before you know it, your child will be typing in the numbers on the keyboard! Experiment. Try out different arrangements. What works best for you?

The program will run on a standard VIC without memory expansion. If you need to, you should be able to modify Count the Hearts without too much trouble.

Now you're ready to play "Count the Hearts"! But remember, to stop the game and see your score, all you need to do is press the F1 key. Have fun.

Program 1: Microsoft Version

```

100 REM VIC-20
110 REM COUNT THE HEARTS
120 REM V1.0 7/81
130 REM
200 REM
210 REM HEARTS.BEGIN
220 GOSUB 30000
230 REM PLAY GAMES
240 GOSUB 1000
250 IF Q=0 THEN 240
260 REM HEARTS.END
270 GOSUB 31000
280 END
1000 REM PLAY GAMES
1010 PRINT CHR$(147)
1020 REM DISPLAY HEARTS
1030 N=LO+INT((HI-LO+1)*RND(1))
1040 FOR I=1 TO N
1050 P=INT(484*RND(1))
1060 CL=INT(8*RND(1)):IF CL=1 THEN 1
    060
1070 IF PEEK(VA+P)=83 THEN 1050
1080 POKE VA+P,83
1090 POKE CA+P,CL
1100 POKE VL,15
1110 POKE S2,200
1120 FOR Z=1 TO 400:NEXT
1130 POKE S2,0:POKE VL,0
1140 NEXT I
1150 G=G+1:REM GAMES
1160 PRINT CHR$(19);
1170 FOR I=1 TO 21:PRINT " ";:NEXT
1180 PRINT CHR$(19);"HOW MANY HEARTS ~
    ? ";

1190 REM GET RESPONSE
1200 GOSUB 3000
1210 IF R$="QUIT" THEN Q=1:RETURN
1220 IF R$="TIME" THEN GOSUB 9000:RE
    TURN
1230 REM O.K.?
1240 R=VAL(R$)
1250 IF R<>N THEN GOSUB 5000:GOTO 11
    60
1260 IF R=N THEN GOSUB 7000
1270 RETURN
3000 REM TIMED RESPONSE
3010 T1=TI+SC*60
3020 R$=""
3030 REM TRY A KEY
3040 GET A$
3050 IF TI>T1 THEN R$="TIME":RETURN
3060 IF A$="" THEN 3040
3070 IF ASC(A$)=133 THEN R$="QUIT":R
    ETURN
3080 IF ASC(A$)=13 THEN RETURN
3090 IF ASC(A$)=20 AND LEN(R$)>0 THE
    N GOSUB 3300:R$=LEFT$(R$,(
    LEN(R$)-1)):GOTO 3040
3095 IF ASC(A$)=20 THEN 3040
3100 PRINT A$;
3110 IF A$<"0" OR A$>"9" THEN GOSUB ~
    3300:GOTO 3040
3120 R$=R$+A$
3130 GOTO 3040
3300 REM BACKSPACE
3310 PRINT CHR$(157);
3320 PRINT " ";
3330 PRINT CHR$(157);
3340 RETURN
5000 REM WRONG
5010 WR=WR+1
5030 REM UFO-VARIATION
5040 POKE VL,15
5050 FOR L=1 TO 15
5060 POKE SB,42
5070 FOR M=200 TO 220+L*2
5080 POKE S3,M
5090 NEXT M
5100 POKE SB,25
5110 FOR Z=1 TO 25:NEXT Z
5120 NEXT L
5130 POKE VL,0:POKE S3,0
5140 POKE SB,27
5150 RETURN
7000 REM RIGHT
7010 RI=RI+1
7020 REM BIRDS VARIATION
7025 PRINT CHR$(19);:FOR Z=1 TO 21:P
    RINT " ";:NEXT Z
7030 POKE VL,15
7040 FOR L=1 TO 20
7050 PRINT CHR$(19);SPC(5);CHR$(106)
    ;CHR$(113);CHR$(107);

```

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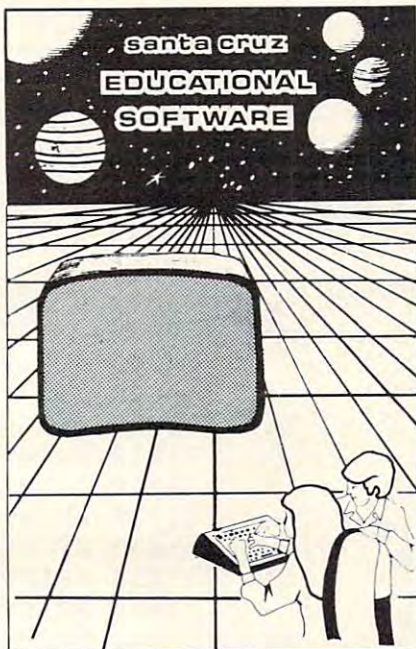
#4: BASICS OF ANIMATION — Shows you how to animate simple shapes using the PRINT and PLOT commands, and also has nice little PLAYER/MISSILE Graphics demo to learn. This would be an excellent way to start making your programs come alive on the screen. Recommended for new owners.

#5 PLAYER MISSILE GRAPHICS — This complex subject is demonstrated by starting with simple examples, and building up to a complete game and also an animated business chart on multiple pages! As always, the computer does most of the calculations. Requires 32K disk or tape and costs **\$29.95**

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Tricky Tutorials (except #5) require 16K memory for cassette orders and 24K for disk. The price is \$19.95 each. You may order 1,2,3, & 4 for \$64.95. All six in a colorful binder cost \$99.95.

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MINI-WORD PROCESSOR — This is for those of you who have a printer, but don't want to spend \$100 or more for a fancy word processor. It is suitable for simple editing of text, accepts most control characters for your printer, and text is stored on disk for easy retrieval. Holds 2 1/2 typed pages at a time. Requires 32K, disk or tape. **\$19.95**

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KID'S #1 — Includes the following: 1) TREASURE — search for the lost treasure while trying to keep from falling into the sea. Nice graphics if you find it! 2) DIALOGUE — talk back to the computer about four subjects: 3) MATH QUIZ — Nice musical and graphical rewards for good scores. Parents input the level of difficulty.

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MINI-DATABASE/DIALER — This unique new program stores and edits up to 8 lines of information such as name, address, and phone numbers, or messages, inventories or anything you want. It has the usual sort, search, and print options, but it also has an unusual feature: If your files include phone numbers and you have a touch-tone phone, the program will DIAL THE PHONE NUMBERS FOR YOU! This is perfect for those who make a lot of calls like salesmen, teens, or those trying to get through to busy numbers (acts as an auto-redialer). It is also a lot of fun to use. Requires 16K cassette or 24K disk and costs **\$24.95**

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By the time you read this all computers (400/800) being produced should have the fabled GTIA chips included. ATARI service may upgrade older computers...call and ask (it's easy to do yourself). We have one and the improvements that graphics modes 9, 10, and 11 offer are great!! To help you figure out what to do with the new modes a new Tricky Tutorial will be offered in March on Modes 9 to 11. Either give us a call or write around that time.

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```

7055 PRINT SPC(5);CHR$(117);CHR$(113
);CHR$(105);
7060 FOR M=254 TO 240+RND(1)*10 STEP
-1
7070 POKE S3,M
7080 NEXT M
7090 POKE S3,0
7100 FOR M=1 TO 100:NEXT M
7110 PRINT CHR$(19);SPC(5);CHR$(117)
;CHR$(113);CHR$(105);
7115 PRINT SPC(5);CHR$(106);CHR$(113
);CHR$(107);
7120 FOR M=1 TO 120*RND(1):NEXT M
7130 NEXT L
7140 POKE S3,0:POKE VL,0
7150 RETURN
9000 REM TIME
9010 TM=TM+1
9020 VM=VA+253:CM=CA+253
9030 REM TONE
9040 POKE S3,240:POKE VL,15
9050 J=0
9060 FOR L=15 TO 0 STEP -2
9070 POKE VM+J,81:POKE CM+J,2
9080 POKE VM-J,81:POKE CM-J,2
9090 POKE VM+22*J,81:POKE CM+22*J,2
9100 POKE VM-22*J,81:POKE CM-22*J,2
9110 FOR Z=1 TO 50:NEXT Z
9120 POKE VM+J,32
9130 POKE VM-J,32
9140 POKE VM+22*J,32
9150 POKE VM-22*J,32
9160 FOR Z=1 TO 50:NEXT Z
9170 POKE VL,L
9180 J=J+1
9190 NEXT L
9200 POKE VM-2,20:POKE CM-2,4
9210 POKE VM-1,9:POKE CM-1,4
9220 POKE VM,13:POKE CM,4
9230 POKE VM+1,5:POKE CM+1,4
9240 POKE S3,0:POKE VL,0
9250 FOR Z=1 TO 2000:NEXT Z
9260 RETURN
30000 REM HEARTS.BEGIN
30010 REM CONSTANTS/VARS
30020 VA=7702
30030 CA=38422
30040 SB=36879
30050 VL=36878
30060 S2=36875
30070 S3=36876
30080 S4=36877
30090 LO=1
30100 HI=9
30110 SC=120
30120 G=0
30130 TM=0
30140 RI=0
30150 WR=0
30160 Z=RND(-TI)
30170 PRINT CHR$(147);
30180 PRINT SPC(8);"VIC-20"
30190 PRINT
30200 PRINT"    COUNT THE HEARTS"
30210 PRINT:PRINT
30215 PRINT CHR$(158);
30220 PRINT"    COPYRIGHT 1981"
30230 PRINT"    HOMESPUN SOFTWARE"
30235 PRINT CHR$(31);
30240 PRINT:PRINT
30250 PRINT"ENTER NUMBER RANGE"
30260 INPUT"LOW NUMBER (1)";LO
30270 LO=ABS(INT(LO))
30275 IF LO<1 OR LO>484 THEN PRINT "S
ORRY":LO=1:GOTO 30260
30280 INPUT"HIGH NUMBER (9)";HI
30290 HI=ABS(INT(HI))
30300 IF HI<=LO OR HI>484 THEN PRINT"
SORRY":HI=9:GOTO 30260
30310 PRINT
30320 PRINT"TIME LIMIT PER SET:"
30330 INPUT"SECONDS (120)";SC
30340 SC=ABS(INT(SC))
30345 IF SC<1 THEN PRINT "SORRY":SC=1
20:GOTO 30330
30350 PRINT:PRINT
30360 PRINT"KEY F1 TO STOP"
30370 PRINT:PRINT
30380 PRINT"THANK YOU. HAVE FUN!"
30390 FOR Z=1 TO 2000:NEXT
30400 RETURN
31000 REM HEARTS.END
31010 PRINT CHR$(147)
31020 PRINT"COUNT THE HEARTS"
31030 PRINT:PRINT
31032 PRINT"LOW #",LO
31034 PRINT"HIGH #",HI
31036 PRINT:PRINT
31040 PRINT "# GAMES",G
31050 PRINT "# RIGHT",RI
31060 PRINT "# WRONG",WR
31070 PRINT "# TIME OUTS";TM
31080 RETURN

```

Program 2: Atari Version

```

100 REM ATARI 400/800
110 REM COUNT THE HEARTS
120 REM V1.1 7/81
130 REM
200 REM
210 REM HEARTS.BEGIN
220 GOSUB 30000
230 REM PLAY GAMES
240 GOSUB 1000
250 IF G=0 THEN 240

```

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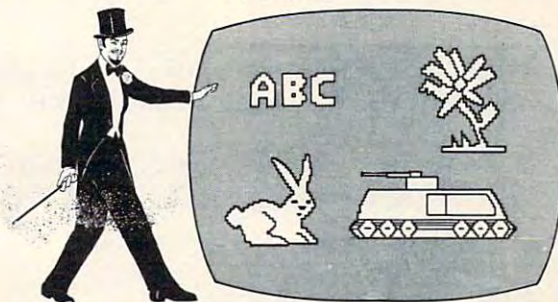
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```

260 REM HEARTS.END
270 GOSUB 31000
280 END
1000 REM PLAY GAMES
1010 GRAPHICS 1+16:SETCOLOR 0,0,0:POKE 7
56,226:DL=PEEK(560)+256*PEEK(561)+4:POKE
DL-1,66
1015 UA=PEEK(88)+256*PEEK(89)+40
1020 REM DISPLAY HEARTS
1030 N=LO+INT((HI-LO+1)*RND(0))
1040 FOR I=1 TO N
1050 P=INT(440*RND(1))
1060 CL=INT(3*RND(1)+1)
1070 T=PEEK(UA+P):IF T=64 OR T=128 OR T=
192 THEN 1050
1080 POKE UA+P,64*CL
1090 REM
1100 SOUND 0,100,10,8
1110 REM
1120 FOR Z=1 TO 100:NEXT Z
1130 SOUND 0,0,0,0
1140 NEXT I
1150 G=G+1:REM GAMES
1160 POKE 87,0:POSITION 1,0:?"
":REM 19 SPACES
1180 POSITION 1,0:?"How many hearts?";
1190 REM GET RESPONSE
1200 GOSUB 3000
1210 IF R$="QUIT" THEN Q=1:RETURN
1220 IF R$="TIME" THEN GOSUB 9000:RETURN

1230 REM O.K.?
1240 P=10^(LEN(R$)-2):R=0:FOR I=2 TO LEN
(R$):R=R+(ASC(R$(I))-48)*P:R=INT(R+.0
5):P=P/10:NEXT I
1250 IF R<N THEN GOSUB 5000:GOTO 1160
1260 IF R=N THEN POKE DL-1,70:GOSUB 7000

1270 RETURN
2000 STOP
3000 REM TIMED RESPONSE
3010 T1=PEEK(20)+256*PEEK(19)+SC*60
3020 R$=""
3030 REM TRY A KEY
3040 IF PEEK(20)+256*PEEK(19)>T1 THEN R$
="TIME":RETURN
3050 IF PEEK(53279)<7 THEN R$="QUIT":RET
URN
3060 IF PEEK(764)=255 THEN 3040
3070 GET #1,A
3080 IF A=155 THEN RETURN
3090 IF A=126 AND LEN(R$)>1 THEN GOSUB 3
300:R$=R$(1,LEN(R$)-1):GOTO 3040
3095 IF A=126 AND LEN(R$)=1 THEN 3020
3097 IF A=126 THEN 3040
3100 IF A<48 OR A>57 THEN 3040

```

```

3110 PRINT CHR$(A);
3120 R$(LEN(R$)+1)=CHR$(A)
3130 GOTO 3040
3300 REM BACKSPACE
3310 PRINT CHR$(30);" ";CHR$(30):RETURN

5000 REM WRONG
5010 WR=WR+1
5030 REM UFO-VARIATION
5040 FOR L=1 TO 15
5050 FOR M=100 TO 140+L*2 STEP 2
5060 SOUND 0,M,10,8:POKE 712,PEEK(53770)

5070 NEXT M
5080 FOR Z=1 TO 10:NEXT Z
5090 NEXT L
5100 SOUND 0,0,0,0:POKE 712,0
5110 RETURN
7000 REM RIGHT
7010 RI=RI+1:POKE 87,1
7020 REM BIRDS VARIATION
7025 COLOR 32:PLOT 0,0:DRAWTO 19,0
7040 FOR L=1 TO 5
7050 POSITION 5,0:?"#6:CHR$(17);CHR$(20)
";CHR$(5);
7055 POSITION 10,0:?"#6:CHR$(26);CHR$(20)
";CHR$(3);
7060 FOR M=50 TO 10+10*RND(1) STEP -1
7070 SOUND 0,M,10,8
7080 NEXT M
7090 SOUND 0,0,0,0
7100 FOR M=1 TO 50:NEXT M
7110 POSITION 5,0:?"#6:CHR$(26);CHR$(20)
";CHR$(3);
7120 POSITION 10,0:?"#6:CHR$(17);CHR$(20)
";CHR$(5);
7130 FOR M=1 TO 60*RND(1):NEXT M
7140 NEXT L:POKE 87,0
7150 RETURN
9000 REM TIME
9005 POSITION 1,0:?"
TIME
OUT
";
9010 TM=TM+1
9020 UM=UA+229
9030 REM TONE
9040 SOUND 0,100,12,8
9050 J=0
9060 FOR L=15 TO 0 STEP -1
9070 POKE UM+J,148
9080 POKE UM-J,148
9090 POKE UM+20*J,148
9100 POKE UM-20*J,148
9110 FOR Z=1 TO 50:NEXT Z
9120 POKE UM+J,0
9130 POKE UM-J,0
9140 POKE UM+20*J,0

```

```

9150 POKE VM-20*J,0
9160 FOR Z=1 TO 50:NEXT Z
9170 SOUND 0,L*5,12,L
9180 J=J+(L/2<>INT(L/2))
9190 NEXT L
9200 RETURN
30000 REM HEARTS.BEGIN
30010 REM CONSTANTS/VARS
30090 LO=1:HI=9:SC=120:G=0:TM=0:RI=0:WR=
0
30100 DIM R$(20):OPEN #1,4,0,"K:"
30170 GRAPHICS 0
30180 ? CHR$(125):POSITION 12,0:?" ATA
RI 400/800"
30190 POSITION 11,2:?"Count the Hearts"

30210 ? :?
30220 ? "          Copyright 1981"
30230 ? "          HOMESPUN SOFTWARE"
30240 ? :?
30250 ? "Enter number range:"
30260 TRAP 30250:?"Low number (1)":INP
UT LO:TRAP 40000
30270 LO=ABS(INT(LO))
30275 IF LO<1 OR LO>440 THEN ? "SORRY":L
O=1:GOSUB 30260
30280 ? "High number (9)":TRAP 30280:IN

```

```

PUT HI:TRAP 40000
30290 HI=ABS(INT(HI))
30300 IF HI<=LO OR HI>440 THEN ? "SORRY"
:HI=9:GOTO 30260
30310 ?
30320 ? "TIME LIMIT PER SET:"
30330 ? "Seconds (120)":TRAP 30330:INPU
T SC:TRAP 40000
30340 SC=ABS(INT(SC))
30350 ? :?
30360 ? "PRESS [OPTION] TO STOP"
30370 ? :?
30380 ? "THANK YOU. Have fun!"
30390 FOR Z=1 TO 100:NEXT Z
30400 RETURN
31000 REM HEARTS.END
31010 GRAPHICS 0
31020 ? "COUNT THE HEARTS"
31030 ? :?
31032 ? "LOW #",LO
31034 ? "HIGH #",HI
31036 ? :?
31040 ? "GAMES",G
31050 ? "RIGHT",RI
31060 ? "WRONG",WR
31070 ? "TIME OUTS ",TM
31080 RETURN

```

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Family: A Simulation In Genetics

Andy Gamble
Columbia College
Vancouver, Canada

Biology teachers know only too well the practical problems of illustrating the effects of gene selection. Mendel struck it lucky with his pea plants, but even they are a little too complicated for an introductory class. Besides, any meaningful experiment would take months, even years, to conduct. Barring a few thousand fruit-flies, what can one do?

Once again the mild-mannered computer steps into the nearest telephone booth and saves the day. This program lightheartedly illustrates the genealogy of a Martian couple.

Mars Genetics

A subject was clearly needed which could be easily displayed on the PET screen, with control over a few features. In this case, the Martians have either white or gray hair (green or light green on some PETs) and round or slanted eyes. The gene for white hair is dominant, as is the gene for round eyes. Male and female Martians are represented by square and round jawlines respectively.

The usual method of denoting dominant and recessive genes by upper and lower case letters is not used here, as the PET cannot display both with the graphics characters at the same time.

The program can be used in two ways. First, merely as a demonstration of the effects of gene selection. Genes are chosen at random from the parents, and control the facial features of their 24 children. The sexes are also randomly assigned. The genes for the parents can be picked at random by the program, or chosen by the user.

Alternatively the user may choose to have the faces of the parents and children displayed, but not their genes. The parents' genes can therefore be determined from the features, giving practice of a more experimental kind.

The instructions and the RUN of the program should be self-explanatory. There are several techniques used in the program which I think are quite interesting. I believe very strongly in making programs as user-friendly as possible, and this is particularly important when dealing with INPUT

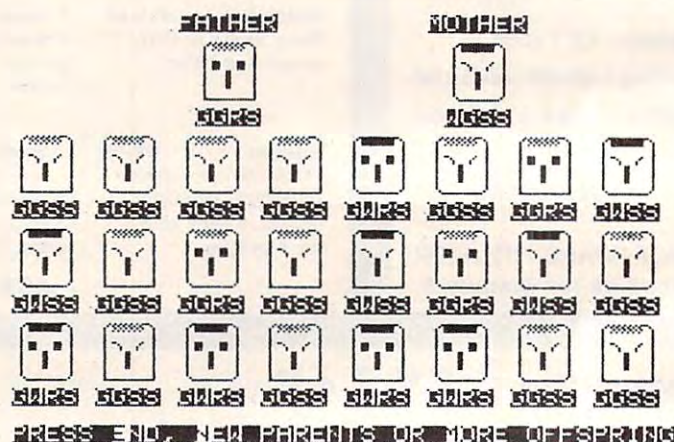
statements. When a yes/no answer is needed, the easiest method is to use a trick INPUT statement (see lines 280-410).

Parts of this program need input which is less obvious to the user: namely, the genes R,S,W and G. It's perfectly possible to remind the user of this when necessary, but here a different method is used. When that input is called for, the genes are displayed on the screen, as for example:

WG
↑

The arrow is moved left or right by the < and > keys; the genes are picked by pressing return. This is foolproof as far as I can tell, and there is the added advantage of it being obvious which genes are to be chosen (see lines 510-1080).

The program uses over 8K as given so, to run it on 8K machines some editing is necessary. The instructions can be removed (lines 280-310, 1520-1870) and printed separately for student use. Removing all the REM statements also (none are referenced) brings the memory needed down to just over 6K. Family will run on all 40-column PETs.



```

100 REM FAMILY
110 REM ANDY GAMBLE JUNE 81
120 REM COLUMBIA COLLEGE, 1619 W10 ~
    AVE
130 REM VANCOUVER BC V6J 2A2
140 GOTO1430
150 REM HP<=35,VP<=19
160 VT$="{HOME}{25 DOWN}"
170 X=RND(-RND(0))
180 DEFFNR(X)=INT(2*RND(1)+1)
190 NOS="{ }'&}"
200 CH$(1)="{J@K}":REM FEM
210 CH$(2)="{-@=}":REM MALE
220 EY$(1)="{,;}"
230 EY$(2)="{IU}"
240 HA$(1)="{U""I}"
250 HA$(2)="{U{(I}"

```

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```

260 REM W OVER G, R OVER S
270 GE$="N"
280 INPUT "{CLEAR}{04 DOWN}DO YOU NEED INSTRUCTIONS _{03 LEFT LEFT}";ZZ$
290 IFZZ$="" THEN280
300 IFLEFT$(ZZ$,1)="Y" THEN1520
310 IFLEFT$(ZZ$,1)<>"N" THEN280
320 GE$="N":PRINT "{CLEAR}{03 DOWN}DO YOU WANT TO GUESS THE GENOTYPES";
330 INPUT "(Y/N) _{03 LEFT}";GE$
340 IFGE$="" THEN320
350 GE$=LEFT$(GE$,1):IFGE$="N" THEN370
360 GOTO430
370 PRINT "{CLEAR}{03 DOWN}ARE THE GENES FOR THE PARENTS TO BE CHOSEN RANDOMLY ";
380 INPUT "(Y/N) _{03 LEFT}";ZZ$
390 IFZZ$="" THEN370
400 IFLEFT$(ZZ$,1)="N" THEN500
410 IFLEFT$(ZZ$,1)<>"Y" THEN320
420 REM RANDOM
430 FORI=1TO2:FE$(I)="R":IFRND(1)>.5 THENFE$(I)="S"
440 FH$(I)="W":IFRND(1)>.5 THENFH$(I)="G"
450 NEXT
460 FORI=1TO2:ME$(I)="R":IFRND(1)>.5 THENME$(I)="S"
470 MH$(I)="W":IFRND(1)>.5 THENMH$(I)="G"
480 NEXT
490 GOTO1090
500 PA=33067
510 PRINT "{CLEAR}{02 DOWN}CHOOSE GENES FOR FATHER'S HAIR:"
520 PRINT "{03 DOWN}"TAB(19)"{REV}WG"
530 E$(1)="" : E$(2)=""
540 GOSUB2020
550 POKEPA,30
560 FORI=1TO2
570 GOSUB1960
580 FH$(I)="G":IFPA=33067 THENFH$(I)="W"
590 H$(I)=FH$(I)
600 NEXT
610 VP=10:HP=18:SEX=2
620 GOSUB1920
630 GOSUB1360
640 GOSUB2040
650 PRINT "{02 DOWN}":GOSUB1890
660 PRINT "{CLEAR}{02 DOWN}CHOOSE GENES FOR FATHER'S EYES:"
670 PRINT "{03 DOWN}"TAB(19)"{REV}RS"
680 GOSUB2020
690 POKEPA,30
700 FORI=1TO2
710 GOSUB1960
720 FE$(I)="S":IFPA=33067 THENFE$(I)="R"
730 E$(I)=FE$(I)
740 NEXT
750 VP=10:HP=18:SEX=2
760 GOSUB1920
770 GOSUB1360
780 GOSUB2040
790 PRINT "{02 DOWN}":GOSUB1890
800 PRINT "{CLEAR}{02 DOWN}CHOOSE GENES FOR MOTHER'S HAIR:"
810 PRINT "{03 DOWN}"TAB(19)"{REV}WG"
820 GOSUB2020
830 E$(1)="" : E$(2)=""
840 POKEPA,30
850 FORI=1TO2
860 GOSUB1960
870 MH$(I)="G":IFPA=33067 THENMH$(I)="W"
880 H$(I)=MH$(I)
890 NEXT
900 VP=10:HP=18:SEX=1
910 GOSUB1920
920 GOSUB1360
930 GOSUB2040
940 PRINT "{02 DOWN}":GOSUB1890
950 PRINT "{CLEAR}{02 DOWN}CHOOSE GENES FOR MOTHER'S EYES:"
960 PRINT "{03 DOWN}"TAB(19)"{REV}RS"
970 GOSUB2020
980 POKEPA,30
990 FORI=1TO2
1000 GOSUB1960
1010 ME$(I)="S":IFPA=33067 THENME$(I)="R"
1020 E$(I)=ME$(I)
1030 NEXT
1040 VP=10:HP=18:SEX=1
1050 GOSUB1920
1060 GOSUB1360
1070 GOSUB2040
1080 PRINT "{02 DOWN}":GOSUB1890
1090 PRINTCHR$(147)TAB(10)"{REV}FATHER{09 RIGHT}MOTHER"
1100 VP=1:HP=11:SEX=2
1110 FORI=1TO2:H$(I)=FH$(I):E$(I)=FE$(I):NEXT
1120 GOSUB1920
1130 GOSUB1360
1140 VP=1:HP=26:SEX=1
1150 FORI=1TO2:H$(I)=MH$(I):E$(I)=ME$(I):NEXT
1160 GOSUB1920
1170 GOSUB1360

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1180 REM OFFSPRING
1190 FORI=1TO3:FORJ=0TO7
1200 VP=1+5*I:HP=5*J
1210 H$(1)=FH$(FNR(1)):H$(2)=MH$(FNR
(1))
1220 E$(1)=FE$(FNR(1)):E$(2)=ME$(FNR
(1))
1230 HC=1:IF(H$(1)="G")AND(H$(2)="G"
)THENHC=2
1240 EC=1:IF(E$(1)="S")AND(E$(2)="S"
)THENEC=2
1250 SEX=FNR(1)
1260 GOSUB1360
1270 NEXTJ,I
1280 IFGE$="Y"THENGOSUB2070
1290 PRINT"{DOWN}{REV}PRESS {OFF}E{R
REV}ND, {OFF}N{REV}EW PARE
NTS OR {OFF}M{REV}ORE OFFS
PRING"
1300 GOSUB1900
1310 IFZZ$="N"THEN320
1320 IFZZ$="M"THEN1190
1330 IFZZ$<>"E"THEN1300
1340 PRINT"{HOME}";:END
1350 REM DRAW FACE
1360 PRINTLEFT$(VT$,VP+1)TAB(HP);
1370 PRINTHA$(HC)"{04 LEFT}{DOWN}";
1380 PRINTEY$(EC)"{04 LEFT}{DOWN}";
1390 PRINTNO$"{04 LEFT}{DOWN}"CH$(SE
X)"{04 LEFT}{DOWN}";
1400 IFGE$="N"THENPRINT"{REV}"H$(1)H
$(2)E$(1)E$(2)"{OFF}":RETU
RN
1410 IFGE$="Y"THENPRINT"
1420 RETURN
1430 PRINT"{CLEAR}":FORI=32768TO3280
7:POKEI,224:POKEI+960,224:
NEXT
1440 FORI=32808TO33688STEP40:POKEI,2
24:POKEI+39,224:NEXT
1450 PRINT"{HOME}{04 DOWN}"
1460 PRINTTAB(9)" O# $' L
1470 PRINTTAB(9)" L$:::MNLLLLNM
1480 PRINT"{HOME}{10 DOWN}"TAB(16)"{
REV}FAMILY"
1490 PRINT"{HOME}{12 DOWN}"TAB(25)"A
NDY GAMBLE"
1500 PRINT"{07 DOWN}";:GOSUB1890
1510 GOTO160
1520 PRINT"{CLEAR}{02 DOWN}"TAB(15)"
{REV}FAMILY{OFF}{02 DOWN}"
1530 PRINT"THIS PROGRAM SHOWS YOU A ~
TYPICAL FAMILY OF MARTIANS
: TWO PARENTS";
1540 PRINT" AND ";
1550 PRINT"THEIR 24 CHILDREN. YOU ~
CAN TELL THE DIFFERENCE"
1560 PRINT"BETWEEN MALE AND ";
1570 PRINT"FEMALE MARTIANS VERY EA
SILY. MALES HAVE SQUARE JA
WS AND"
1580 PRINT"FEMALES HAVE ";
1590 PRINT"ROUND ONES. OTHER THAN TH
ATTHEY HAVE WHITE OR GRAY ~
HAIR, AND ROUND
1600 PRINT"OR SLANTED EYES. THESE ~
TRAITS ARE";
1610 PRINT" CONTROLLED BY GENES ~
W AND G FOR ";
1620 PRINT"THE HAIRAND R AND S FOR T
HE EYES. W IS DOMINANT OVE
R G AND R IS ";
1630 PRINT"DOMINANT OVER S. HERE A
RE TWO TYPICAL MARTIANS:"
1640 VP=17:HP=15:SEX=1:H$(1)="G":H$(
2)="W":E$(1)="R":E$(2)="S"
:EC=1:HC=1
1650 GOSUB1360
1660 VP=17:HP=22:SEX=2:H$(1)="G":H$(
2)="G":E$(1)="S":E$(2)="S"
:EC=2:HC=2
1670 GOSUB1360:PRINT"{DOWN}";
1680 GOSUB1890
1690 PRINT"{CLEAR}{02 DOWN}YOU MAY C
HOOSE THE GENES FOR THE HA
IR"
1700 PRINT"AND EYES OF BOTH THE MOTH
ER AND THE"
1710 PRINT"FATHER WHEN THE PROGRAM R
EQUESTS IT,"
1720 PRINT"BY CHOOSING TWO GENES SU
CH AS 'GG'"
1730 PRINT"OR 'RR' - WHATEVER YOU LI
KE. YOU CAN"
1740 PRINT"ALSO LET THE PROGRAM CHOO
SE THE"
1750 PRINT"PARENTS' GENES RANDOMLY."
1760 PRINT"{DOWN}AFTER YOU ARE SHOWN
THE OFFSPRING, YOU"
1770 PRINT"WILL HAVE A CHOICE AS TO ~
MORE OFFSPRING"
1780 PRINT"BY THE SAME PARENTS, DIFF
ERENT PARENTS,"
1790 PRINT"OR ENDING THE PROGRAM.{02
DOWN}"
1800 GOSUB1890:PRINT"{CLEAR}{02 DOWN
DOWN}ALTERNATIVELY YOU CAN
CHOOSE TO BE SHOWN"
1810 PRINT"{UP}THE FACES, AND TRY TO
GUESS THE"
1820 PRINT"PARENTS' GENES (THEIR GEN
OTYPES)."
1830 PRINT"{DOWN}NOTE THAT THE COMPU
TER HAS IN MIND ONE"
1840 PRINT"PARTICULAR SET OF GENES: ~
OTHERS MAY BE"

```

```

1850 PRINT"POSSIBLE BUT WILL GIVE A ~
      WRONG ANSWER."
1860 PRINT"{03 DOWN}";:GOSUB1890
1870 GOTO320
1880 REM GET-CONT
1890 PRINTTAB(8)"{REV}PRESS ANY KEY ~
      TO CONTINUE"
1900 GETZZ$:IFZZ$=""THEN1900
1910 RETURN
1920 HC=1:IF(H$(1)="G")AND(H$(2)="G"
      )THENHC=2
1930 EC=1:IF(E$(1)="S")AND(E$(2)="S"
      )THENEC=2
1940 RETURN
1950 REM CHOOSE GENES
1960 GOSUB1900
1970 IFZZ$("<"ANDPA=33068THENPOKEPA,
      32:PA=33067:POKEPA,30
1980 IFZZ$(">"ANDPA=33067THENPOKEPA,
      32:PA=33068:POKEPA,30
1990 IFZZ$("<>")CHR$(13)THEN1960
2000 RETURN
2010 REM MESSAGE
2020 PRINTLEFT$(VT$,19);"{REV}PRESS ~
      < TO MOVE LEFT, > TO MOVE ~
      RIGHT "
2030 PRINTLEFT$(VT$,20);"{REV} PRE
      SS RETURN WHEN GENE IS CHO
      SEN ":RETURN
2040 PRINTLEFT$(VT$,19);" ~
      "
2050 PRINTLEFT$(VT$,20);" ~
      ":RETURN
2060 REM HAIR GENE GUESS
2070 PRINTLEFT$(VT$,22);"{REV}INPUT ~
      GENES FOR HAIR OF ONE PARE
      NT (W/G)"
2080 FG=0
2090 GOSUB1900
2100 IFZZ$="W"ORZZ$="G"THEN2130
2110 IFZZ$="E"THEN1340
2120 GOSUB1900
2130 HG$(1)=ZZ$
2140 GOSUB1900:IFZZ$="W"ORZZ$="G"THE
      N2160
2150 GOSUB1900
2160 HG$(2)=ZZ$
2170 PRINTLEFT$(VT$,22);" ~
      "
2180 IF FH$(1)=HG$(1) ANDFH$(2)=HG$(
      2)THEN2220
2190 IF FH$(1)=HG$(2) ANDFH$(2)=HG$(
      1)THEN2220
2200 GOTO2250
2210 REM FATHER GUESS CORRECT
2220 PRINTLEFT$(VT$,6);TAB(11)"{REV}
      "FH$(1)FH$(2)
2230 FG=1
2240 GOTO2340
2250 IF MH$(1)=HG$(1) ANDMH$(2)=HG$(
      2)THEN2290
2260 IF MH$(1)=HG$(2) ANDMH$(2)=HG$(
      1)THEN2290
2270 GOTO2320
2280 REM MOTHER GUESS CORRECT
2290 PRINTLEFT$(VT$,6);TAB(26)"{REV}
      "MH$(1)MH$(2)
2300 GOTO2340
2310 REM BOTH WRONG
2320 PRINTLEFT$(VT$,22);"{REV} AN
      SWER IS WRONG: TRY AGAIN O
      R {OFF}E{REV}ND "
2330 GOTO2090
2340 PRINTLEFT$(VT$,22);"{REV} INPU
      T GENES FOR HAIR OF OTHER ~
      (W/G) "
2350 GOSUB1900
2360 IFZZ$="W"ORZZ$="G"THEN2390
2370 IFZZ$="E"THEN1340
2380 GOSUB1900
2390 HG$(1)=ZZ$
2400 GOSUB1900:IFZZ$="W"ORZZ$="G"THE
      N2420
2410 GOSUB1900
2420 HG$(2)=ZZ$
2430 PRINTLEFT$(VT$,22);" ~
      "
2440 IFFG=1THEN2520
2450 IF FH$(1)=HG$(1) ANDFH$(2)=HG$(
      2)THEN2500
2460 IF FH$(1)=HG$(2) ANDFH$(2)=HG$(
      1)THEN2500
2470 IFFG=0THEN2590
2480 GOTO2520
2490 REM FATHER GUESS CORRECT
2500 PRINTLEFT$(VT$,6);TAB(11)"{REV}
      "FH$(1)FH$(2)
2510 GOTO2620
2520 IF MH$(1)=HG$(1) ANDMH$(2)=HG$(
      2)THEN2560
2530 IF MH$(1)=HG$(2) ANDMH$(2)=HG$(
      1)THEN2560
2540 GOTO2590
2550 REM MOTHER GUESS CORRECT
2560 PRINTLEFT$(VT$,6);TAB(26)"{REV}
      "MH$(1)MH$(2)
2570 GOTO2620
2580 REM BOTH WRONG
2590 PRINTLEFT$(VT$,22);"{REV} AN
      SWER IS WRONG: TRY AGAIN O
      R {OFF}E{REV}ND "
2600 GOTO2350
2610 REM EYE GENE GUESS
2620 PRINTLEFT$(VT$,22);"{REV}INPUT ~

```

```

GENES FOR EYES OF ONE PARE
NT (R/S) "
2630 FG=0
2640 GOSUB1900
2650 IFZZ$="R"ORZZ$="S"THEN2680
2660 IFZZ$="E"THEN1340
2670 GOSUB1900
2680 EG$(1)=ZZ$
2690 GOSUB1900:IFZZ$="R"ORZZ$="S"THE
N2710
2700 GOSUB1900
2710 EG$(2)=ZZ$
2720 PRINTLEFT$(VT$,22);"
~
"
2730 IF FE$(1)=EG$(1) ANDFE$(2)=EG$(
2)THEN2770
2740 IF FE$(1)=EG$(2) ANDFE$(2)=EG$(
1)THEN2770
2750 GOTO2800
2760 REM FATHER GUESS CORRECT
2770 PRINTLEFT$(VT$,6);TAB(13)"{REV}
"FE$(1)FE$(2)
2780 FG=1
2790 GOTO2890
2800 IFME$(1)=EG$(1)ANDME$(2)=EG$(2)
THEN2840
2810 IFME$(1)=EG$(2)ANDME$(2)=EG$(1)
THEN2840
2820 GOTO2870
2830 REM MOTHER GUESS CORRECT
2840 PRINTLEFT$(VT$,6);TAB(28)"{REV}
"ME$(1)ME$(2)
2850 GOTO2890
2860 REM BOTH WRONG
2870 PRINTLEFT$(VT$,22);"{REV} AN
SWER IS WRONG: TRY AGAIN O
R {OFF}E{REV}ND "
2880 GOTO2640
2890 PRINTLEFT$(VT$,22);"{REV} INP
UT GENES FOR EYES OF OTHER
(R/S) "
2900 GOSUB1900
2910 IFZZ$="R"ORZZ$="S"THEN2940
2920 IFZZ$="E"THEN1340
2930 GOSUB1900
2940 EG$(1)=ZZ$
2950 GOSUB1900:IFZZ$="R"ORZZ$="S"THE
N2970
2960 GOSUB1900
2970 EG$(2)=ZZ$
2980 PRINTLEFT$(VT$,22);"
~
"
2990 IFFG=1THEN3070
3000 IF FE$(1)=EG$(1)ANDFE$(2)=EG$(2)
)THEN3050
3010 IFFE$(1)=EG$(2)ANDFE$(2)=EG$(1)
THEN3050
3020 IFFG=1THEN3140
3030 GOTO3070
3040 REM FATHER GUESS CORRECT
3050 PRINTLEFT$(VT$,6);TAB(13)"{REV}
"FE$(1)FE$(2)
3060 GOTO3170
3070 IFME$(1)=EG$(1)ANDME$(2)=EG$(2)
THEN3110
3080 IFME$(1)=EG$(2)ANDME$(2)=EG$(1)
THEN3110
3090 GOTO3140
3100 REM MOTHER GUESS CORRECT
3110 PRINTLEFT$(VT$,6);TAB(28)"{REV}
"ME$(1)ME$(2)
3120 GOTO3170
3130 REM BOTH WRONG
3140 PRINTLEFT$(VT$,22);"{REV} AN
SWER IS WRONG: TRY AGAIN O
R {OFF}E{REV}ND "
3150 GOTO2900
3160 REM ALL CORRECT
3170 PRINTLEFT$(VT$,22);"{REV} ~
CORRECT! TRY AGAIN? (Y/N
)
"
3180 GOSUB1900
3190 IFZZ$="Y"THEN320
3200 IFZZ$<>"N"THEN3180
3210 GOTO1340

```

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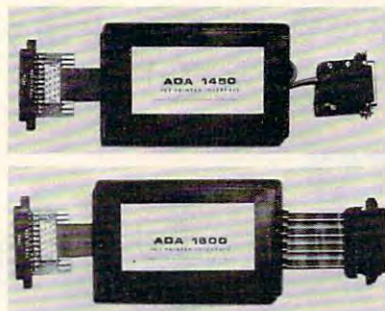
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Learning With Computers

Word Processing In The Classroom

Glenn Kleiman and Mary Humphrey
Teaching Tools: Microcomputer Services
P.O. Box 50065
Palo Alto, CA 94303

"All right, class. Load the word processing program and put your name at the top of a new file. We're all going to write thank you letters to the PTA for buying the computers for our class."

In recent months we have heard from a number of teachers, students and researchers who have been using computerized word processing in classrooms. All have found it to be a successful and valuable experience, even with children as young as second grade. In this month's column we focus on word processing – what it is, some ways it is being used in classrooms, its effects on children's writing, and how to get started with it.

What Is Word Processing?

Word processing is the use of computer-controlled writing systems. The computer system replaces not only the typewriter, pen or pencil, but also the scratch paper, eraser, scissors and tape, and, in some advanced systems, the dictionary.

Programs are available to turn almost every personal computer into a word processing system. For most computers there is a choice ranging from very simple word processing programs to programs so sophisticated they match the capabilities of the

word processors found in many offices. While there are important differences, even the simpler programs provide valuable writing aids.

Word processing programs make it easy to create and modify essays, notes, letters, outlines – any form of written material. The text is typed on the computer keyboard and appears on the screen. All word processors provide ways to correct typing errors, insert or delete words, save your writing for later work, and print it when you are finished. More advanced word processors can search for a given sequence of letters in the text and replace it with another sequence (great for correcting habitual spelling errors, or replacing all instances of "utilize" with "use"). They make it possible to move sections of text, such as when you decide a paragraph you put in the introduction would be better in the conclusion. They also let you format the print-out: setting margins and spacing between lines, centering headings, numbering pages and so on. Very advanced word processors add a dictionary so spelling can be checked automatically. An on-line thesaurus and systems that do some checking of sentence syntax are being developed. Perhaps some day we will have a computerized Strunk and White's *Elements of Style* program to point out the needless words we should omit.

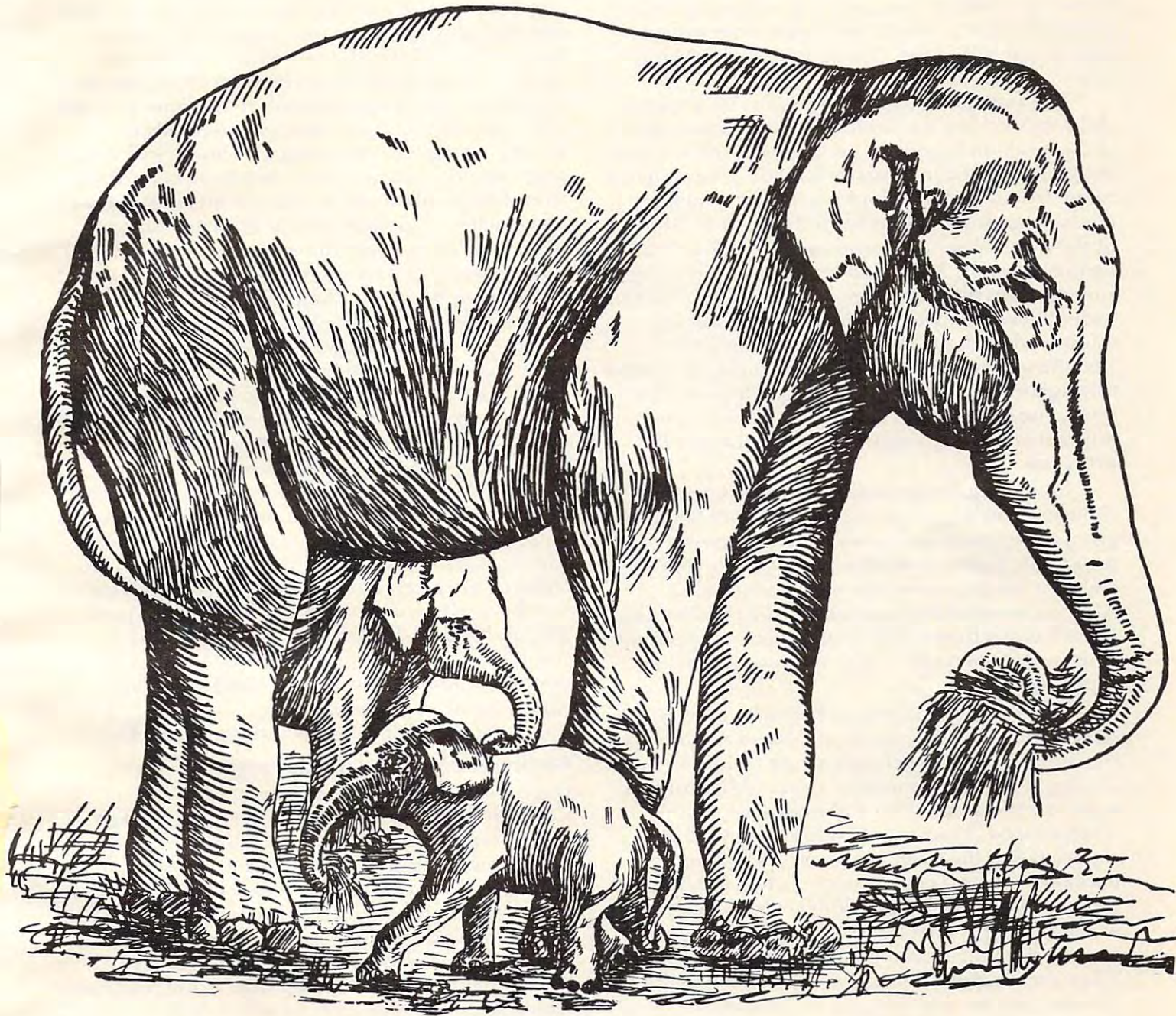
How Can Word Processing Be Used In Education?

Teachers often report that children are unwilling to write and even more unwilling to edit and revise what they have written. Writing requires both the mental processes of composing text and the physical processes of producing it. Computerized word processing makes the physical aspects of producing and editing text much easier, so more attention can be devoted to the mental aspects. Word processors can also be used to create situations which stimulate children's creativity with language and motivate them to write.

A fourth grade class in Oceanside, California, has produced a school newsletter with their word processing system. The well written, eleven page newsletter contains news stories, book reviews, jokes, original stories, and letters to the editor. The newsletter reflects careful use of the formatting capabilities of the word processing system. It has centered headlines and is neatly divided into pages with two columns of print on each page.

The children in this class did most of their writing in pairs, helping each other both in using the computer and in creating and editing text. The children could access each other's working drafts and offer comments on them. They used a word processing program developed by researchers at the University of California at San Diego. It contains some special features, such as a command that automatically arranges the text into a paragraph

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format or a sentence format. The ease of making changes made editing and revising fun rather than a chore. In a letter to the editor of the newsletter, two of the children reported that writing with the computer was "...funner and easier than writing with pencil and paper. Also it does not hurt your hand."

The potential of word processors to facilitate children's writing has been further demonstrated at the Trillium School, a special school for learning disabled children in Ontario, Canada. The students range from 7 to 16 years old, but their reading levels range from first grade to fifth grade. Many of these children had previously refused to do any form of writing. The school recently began using computers in the classrooms and found the children were eager to use them. When word processing was introduced, the teachers were delighted to find the students' enthusiasm for computers carried through to using them for writing. These students now write school reports, take essay exams and do creative writing assignments with the word processor.

In the East York schools in Ontario, Canada, children from second to eighth grade are being given the opportunity to use word processing programs. Teachers of all grades indicate that children are eager to write with the computer. After some initial typing practice, the children find it much easier than using a pencil, pen or typewriter. They write more, edit more, and produce better compositions.

The teachers and researchers who have observed children using word processors report very consistent patterns of change in the children's writing. The most immediate result is that students want to write more often and produce longer compositions. Teachers of young children have reported that the length of the average essay doubles. The next change occurs when the children become familiar with the editing capabilities of the word processor. First they start being more careful to correct typing, spelling and punctuation errors. Then they begin to change words and sentences. Finally, they learn to reorganize the material, moving, adding and deleting large sections of text. They no longer just edit for details but also pay more attention to the meaning of ideas and the order of presentation.

Overall, using word processors has been very beneficial in the classes we have seen. The children enjoy writing more, they are more willing to revise their work, and they produce better essays. They take pride in the quality of their writing, the final neat print-outs, and the fact that they know how to use a computer.

The potential of word processors as a creative

teaching resource is just beginning to be realized. We have heard of a number of interesting ideas that are now being developed or tested. The Department of Education has contracted with Bolt Beranek and Newman, Inc., a company in Cambridge, Massachusetts, to develop a writing curriculum using computer technology. The aims of the project are to develop tools to facilitate writing, and environments to encourage and motivate writing. One plan is to set up a within-school computer based message system. Students can use this to exchange information, take surveys of students' and teachers' opinions, ask for information, and other such uses. Using the message system will require learning to use a computer and text editor.

Researchers from the University of California at San Diego are developing a new use of computers in schools. They will have children in California exchange written messages with children in Alaska. All of the writing will be done on computers and the messages will be sent via an electronic communication system. This will allow immediate responses and on-line interactions.

Another possibility for using word processing is interactive stories in which the child helps create a story as he or she reads it. This can be done in various ways. In one use of interactive stories, the children are given incomplete stories. They then use the word processor to fill in the missing parts and perhaps change parts of the original story. Another possibility is to give children paragraphs describing various events. The children choose which events to put in their stories, and how these events should be sequenced and interrelated.

Getting Started With Word Processing

Once you have a computer, you need to add a word processing program and a printer to use it for producing and editing text. There are many word processing programs available for each of the widely sold computers. In a future column we may review some of them with an eye towards classroom rather than office use.

Two general points merit mentioning here. One is that children seem best able to use programs with what are known as *screen editors*. With a screen editor, what you see on the screen is what you get on the printer, and making a change on the screen automatically makes the same change in the computer's memory. The other point is to remember that for most classroom purposes you do not need as sophisticated and expensive a word processing program as you would want in an office.

There are three classes of printers. Thermal or electrostatic printers are the least expensive to buy. They print quickly and are relatively quiet. Their disadvantage is that they require special paper and, if they are to be used a great deal, this