May 1979
vol 5, no 5
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creative computing

the #1 magazine of computer applications and software

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TRS-80 Column

87 New Products!

Electronics at the 1979 Toy Fair

PILOT : Language for Everyone

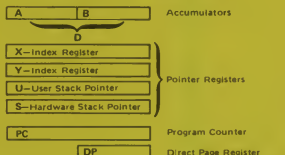
The World's Most Powerful 8-Bit Microcomputer

Featuring the World's Most Powerful 8-Bit MPU - The Motorola MC-6809

Welcome to a whole new world of microcomputing. Here at last is a microcomputer with all the speed and power that you have wished for. The MC6809 is an exciting new concept in microprocessors that fills the gap between 8- and 16-bit machines. It provides the power of 16-bit instructions with the economy of 8-bit architecture.

The MC6809 has more addressing modes than any other 8-bit processor. It has powerful 16-bit instructions, and a highly efficient internal architecture with 16-bit data paths. It is easily the most powerful, most software efficient, and the fastest 8-bit general purpose microprocessor ever.

6809 PROGRAMMING MODEL



The greatest impact of the Motorola MC6809 undoubtedly will be software related. Ten powerful addressing modes with 24 indexing submodes, 16-bit instructions and the consistent instruction set stimulate the use of modern programming techniques. Such as structured programming, position independent code, reentrancy, recursion and multitasking.

A memory management system with extended addressing designed into the bus system controls up to 256K bytes of RAM memory. The dynamic memory allocation system, which is part of the multitasking DOS, allocates available memory in as small as 4K blocks.

The MC6809 system is the only 8-bit processor designed for the efficient handling of high-level languages. New addressing modes, a consistant instruction set and easy data manipulation on stacks allows the efficient execution of block-structured high-level code as generated by a compiler like PASCAL.

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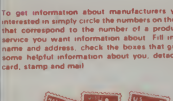

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Both microcomputers provide 32K static memory, two serial I/O ports, a 2 MHz processor board, a 2K RAM monitor, a nine-slot motherboard with built-in baud rate generator and gold connectors for high reliability. The Chieftain's stylish leather-grained cabinet houses the above with its own cooling fan and regulated power supply.

Every Chieftain is complete with system software and is totally burned-in as well as tested to further insure high reliability.

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So see your nearest Smoke Signal dealer, he'll be glad to show you how to get your wampum's worth. Systems start at $2,595.

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Many foreign agents stock Creative Computing magazines, books, and software. However, please inquire directly to the agent before placing an order. Again, all Creative Computing products may be ordered direct from the USA — be sure to allow for foreign shipping and handling.

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NorthStar

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Gazer

Horizon Disk Capacity Keeps Growing

The Horizon is now capable of 720K bytes on-line! The Horizon can connect to four double density 5¼" single-sided disk drives. Each of those drives can access 180K bytes of information. A four drive system accesses 720K bytes!

That's capacity you don't usually find in a microcomputer, but there's even more to come! The North Star disk controller board is designed so that two-sided disk drives may be added as soon as they become available from North Star.

Existing Horizons will accommodate the new two-sided drives so North Star owners can simply add additional drives to up-grade their system. Each two-sided drive will access 360K bytes! That means the maximum on-line disk storage for the Horizon will increase to over 1.4 million bytes!

New Cabinet for Disk Drives

North Star additional disk drives are now available with the same high quality wood cover as the Horizon computer! The Additional Drive Cabinet (ADC) is designed to accept either one or two drives for the Horizon or for mounting North Star Micro Disk System drives. Like the Horizon, the ADC is available with either wood or blue metal cover. Included is a new power supply capable of powering one or two drives. The ADC is $129 in kit form. Assembled, with one drive the ADC is $599, with two drives $999.

Pascal Now Available for Horizon

The much-heralded Pascal language is now being offered for use with the North Star Horizon computer. North

Inside view of Horizon with processor board, RAM board, disk controller, two drives, and power supply.

Star, with the co-operation of the University of California at San Diego, is now delivering a Pascal Program Development system. North Star Pascal is ideally suited for developing large programs because of features such as: long variable names, block-structured control statements, and compilation. North Star Pascal is available on 5¼" diskettes for use with the Horizon or Micro Disk System. North Star Pascal will operate with either the Z80 or 8080 microprocessor.

Pascal, including documentation, is available in either single or double density versions for $49.

An auxiliary Pascal diskette, containing an 8080/Z80 assembler and some additional Pascal utilities, is available for $29. Complete information is available at your local retail computer store.

First Double Density, Now Double Memory

The new North Star 32K RAM board (RAM-32) has doubled the memory density of the popular Horizon computer. Available either with the Horizon or other S-100 bus computers, the RAM-32 runs at full speed — no wait states — with the 4 MHz Z80A microprocessor (as well as with slower Z80 and 8080 processors). Addressability of the RAM-32 is switch-selectable in four 8K regions.

North Star RAM features like bank-switching and parity checking are standard. The parity checking capability means that the RAM-32 is constantly diagnosing itself. That's a plus for your system. The fact that parity checking is a North Star RAM-32 standard is a plus for your pocketbook! There is no extra charge for this important capability.

A Horizon with 48K of RAM can be configured by using one North Star 16K RAM board and a RAM-32. Need more memory? 56K can be configured by using two RAM-32 boards with one 8K region switched off.

NORTH STAR MDS, ZPB, FPB FOR OTHER S-100 COMPUTERS

Upgrade your system with these North Star products — available for any S-100 computer: Micro Disk System — a complete 5¼" floppy disk system, Z80 Processor Board, or the Hardware Floating Point Board.

Horizon and RAM board prices are:

	Kit	Assembled
Horizon - 1-16K	$1599	$1899
Horizon - 1-32K	1849	2099
Horizon - 2-32K	2249	2549
RAM-32	599	659
RAM-16	399	459

◀ A typical Horizon configuration: CRT, Horizon computer, Additional Drive Cabinet (ADC).

NorthStar Computers

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CIRCLE 182 ON READER SERVICE CARD

Notices

Teachers Wanted

The Washington office of the Department of Defense needs help in locating teachers for computer science and electronics.

The DoD Dependents Schools, serving the children of US military and civilian support personnel throughout much of the world, are in need of computer science teachers and electronic training instructors. Thirty-eight computer systems are available to the instructional program, with BASIC being the most commonly used language.

Qualification requirements: A minimum of nine semester hours in computer science plus sufficient additional course work to qualify as a teacher in another subject.

For full information, call Mr. Francisco or Ms. Wycoff at (202) 325-0690 or write for an employment application (Department of Defense, Office of Dependents Schools, 2461 Eisenhower Ave., Alexandria, VA 22331).

Association For Computers And The Humanities

An Association for Computers and the Humanities was established by thirty-five charter members who attended the inaugural meeting in New York last December. The first responsibilities of the new association will be to coordinate existing operations, like the International Conference on Computers and the Humanities and the journal *Computers and the Humanities*.

Elected at the first meeting were Joseph Raben (*Queens College/CUNY*) as president pro tem, Antonio Zampolli (*University of Pisa*) as vice-president pro tem, and Donald Ross, Jr. (*University of Minnesota*) as executive secretary. An executive council of twelve members was also elected.

Information regarding the Association and the next International Conference on Computers and the Humanities may be obtained from Joseph Raben, Queens College/CUNY, Flushing, NY 11367. (212) 520-7407.

Computer Camp

This summer youngsters can sign up for a day camp in Orange where the main activity won't be swinging a baseball bat or splashing in a pool, but rather experiencing...computers. This unique recreational and educational experience is directed by Dr. Michael Zabinski, Professor at Fairfield University. It is believed to be the only computer summer day camp currently offered in the USA.

After a most successful 1978 Computer Camp, again this year two action packed, 2-week sessions are planned: June 29 - July 13 and July 16 - July 27. The 20 campers per session, ages 10-17, will enjoy 8 computers for ample "hands-on", and 3 instructors for small group instruction. Dr. Zabinski will be assisted by 2 area high school teachers. The camp is for students of all levels of computer experience including no experience whatsoever.

For further information contact Michael Zabinski, Ph.D., camp director at 795-9069 or write 382 Hitching Post Drive, Orange, Connecticut 06477.

Personal Computing Festival

The June 4-7 Personal Computing Festival program will consider applications of microcomputers to art, education, fun, and profit. The festival also will feature demonstrations of personal computer innovations and commercial exhibits. It will be held in New York City at the Sheraton Center Hotel, 52nd Street between 7th Avenue and Avenue of the Americas. There will be **Creative Computing** booths in the Main Exhibit area and in the Personal Computing Exhibit area. Come visit us! Both Dave Ahl and Ann Corrigan of **Creative Computing** will be giving presentations during the festival. For additional information about the festival contact AFIPS, 210 Summit Avenue, Montvale, N.J. 07645, 201/391-9810.

Learning, Evaluation, and the New Technologies

This five-day institute offers college teachers and administrators training and practical experience with new tools and approaches. A series of seminars throughout the week covers key topics in planning and evaluating learning and teaching. A common base of practical experience is established by workshops on, for example, local production of video recordings for instruction, evaluation of innovative materials in a learning center, and incorporation of personal computers in teaching and scholarly work. Hands-on experience will be provided with critique and discussion sessions following.

For information please contact The Summer Institute Coordinator, Center for Research on Learning and Teaching, 109 E. Madison Street, Ann Arbor, Michigan 48109, (313) 763-0158.

Articles Solicited For Annals Of The History Of Computing

The Editors and Editorial Board of the *Annals of the History of Computing* are currently soliciting articles for this new quarterly periodical. The *Annals* will be published beginning in July 1979 by the American Federation of Information Processing Societies, Inc. (AFIPS). The publication will focus on the history of computing by including contributions from individuals who participated in, or witnessed, the events and decisions which have shaped the present computing environment.

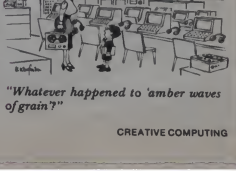
In addition to formal articles, individuals are invited to submit short anecdotes or personal recollections, commentaries on collections of private letters considered historically relevant, descriptions of current historical projects, articles on the influence of societal factors on the development of computing, reports of significant successes and failures in the computing field, and annotated bibliographies of relevant publications. Coverage will center on events and developments that occurred at least 15 years prior to the date of publication.

Prospective authors interested in submitting articles should send five copies of their contributions to Bernard A. Galler, Editor-in-Chief, *Annals of the History of Computing*, University of Michigan, College of Literature, Science and the Arts, 2522 LSA Building, Ann Arbor, MI 48104.

February Fix-ups

In our February issue, we forgot to say that the Lincoln head cover graphic was submitted by John L. Joseph of Honeywell Information Systems. Sorry.

Don Smith, author of "Computerized Sports Predictions," Feb. 1979, page 122 has developed a guide for implementing this program on several different microcomputers. To obtain a copy, send a self-addressed, stamped envelope to Don Smith, 6519 Plaza Pkwy., #123, Ft. Worth, TX 76116.



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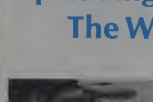
Editorial

John Craig

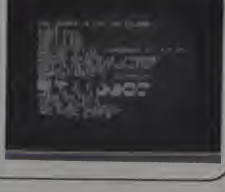
Spreading The Word



I recently saw a demonstration of an interesting program, running on a PET, at my local computer club. Steve Jordan, who makes his living as a land leveler (excavator), had written a survey program for land grading and filling. There wasn't really anything spectacular about Steve's program... it was a typical situation where a person with a certain background and talent applied that knowledge and wrote a program so the computer could help in his work. Many of us with personal systems have developed similar programs and afterwards done the same as Steve...kept it to ourselves. Let me throw out a suggestion that would make these little (and big) developments really "spectacular." (And, by the way, I haven't discussed this idea with Steve...but I will next time I see him.)

The chances are quite good that there's a publication devoted to the field of surveying and land filling. Imagine how many other people in his profession Steve could get turned on to personal computers if he wrote an article describing his application. (He explained that this program saves him hours of tedious calculator computations almost daily and that the computer has more than paid for itself as a result.) There are literally thousands of trade and special interest publications in this country. We can get a lot of the readers of those magazines turned onto personal computing if we'll sit down and write about the specialized applications being developed. Your public library has several books which lists various publications (and the kind of articles they buy).

Keep in mind that I did say "specialized applications" (i.e., those which would be of interest to a limited number of people). Creative Computing wants those articles which appeal to the wider audience!



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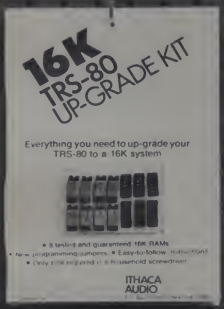

Receiving unprogrammed jumpers and having to program them yourself is not much better. Most important, that's the place where the problems are introduced.

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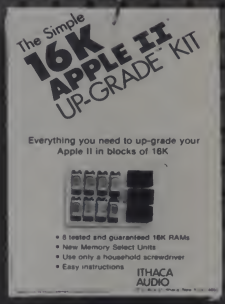

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‡Sorcerer is a registered trademark of Exidy, Inc.

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CIRCLE 109 ON READER SERVICE CARD

Input Output

Networks, Anyone?

Dear Editor:

Is anyone thinking about setting up a nationwide network of people with microcomputers and communications facilities? I have an Apple II with the communications card.

Bob Munson
120 Howard Avenue
Middlesex, N.J. 08846

Several organizations have established local networks around the country...which are primarily "bulletin boards." You call up the number and then transmit a message which will be retrieved later by the addressee [who also has access to the system]. I'm not sure just what the hardware requirements are for the various systems but I'll find out by the July issue...which will be devoted to this topic. Here are some of the systems you might try dialing into [try typing several carriage returns to adjust the baud rate of your terminal to the host computer]:

San Diego	*714-565-0761*
Santa Clara	*408-246-2805*
Washington D.C.	*703-281-2125*
Boston	*617-963-8310*
Chicago	*312-528-7141*
Atlanta	*404-458-4886*

— JC

Word Search Program

Dear Editor,

You did a great job presenting my Word Search program in the Nov-Dec '78 issue. Thanx!

A sorta-bug: Although the prog is *correct*, some people may ignore the lower case in line 520, and type it in upper case. This holds *especially* for people with upper-case *only* terminals. The fix is to simply drop the second statement on the line so it now reads:

```
520  TF$=MID$(TS$,J,1)
```

Leor Zolman
1010 Mass Ave, #61
Cambridge, MA 02138

Heath Owners, Unite!

Dear Editor:

I have been a subscriber to your magazine for about one year now, and there is something happening that I find very puzzling.

Over a year ago, I completed my Heathkit H8 computer system. I chose Heath because I had virtually no knowledge of computers; and, on the other hand, I had built many other Heathkits.

What puzzles me is that I see neither Heath software or hardware articles nor advertisements for same in your magazine or the others which I read. At the same time, there have been recently many for the Radio Shack and PET systems, etc., which to my knowledge came on the market after the Heath.

This letter was prompted by your request for programs on page 4, of the January '79 issue for machines not including Heath. Some of these machines I would have assumed to be less popular than Heath.

Incidentally, this is in no way a loaded question in that I really have no idea what the answer/problem is.

Thank you for your help.

Leonard Root, Jr.
15473 Patricia Dale Dr.
Baton Rouge, LA 70815

The reason you haven't seen many ads for Heath software and hardware is because Heath wanted it that way. That statement is not to be interpreted as derogatory... it's just fact. Heath was one of the first personal systems manufacturers to depart from the S-100 bus. The reason was that they would prefer to have you buy parts for your system from them. Aside from Godbout Electronics [in Oakland CA] offering H8 memory boards and Info 2000 [Carson CA] with their H8 floppy disk system, I haven't heard of many other manufacturers getting into the Heath market. Plus, Heath developed their own BASIC, rather than going with Microsoft or Northstar BASIC, and they have their own operating system. Your best bet would be to check into the software being offered by the Heath User's Group [HUG], Hilltop Rd., St. Joseph, MI 49085. The HUG Manager and Editor is Jim Blake [he's one of the "white hat good guys"]. And as far as articles are concerned...the first step is for you Heath owners to write 'em! — JC

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CIRCLE 149 ON READER SERVICE CARD

Taking The Selectric Route

Dear Editor:

I read Don Skiff's tale of woe (Who Really Needs Interfacing Problems - Creative Computing - Feb. 79) with some sadness because I know that there are many other would-be personal computerists who faced similar problems and just gave up. At least Don is still in there kicking.

Like Don, I am a free-lance writer and I've had to face the word processing hurdle in my rush to become rich and famous. I've appeared in Creative Computing and that makes me famous, right?

I believe that the lowest cost and, surprisingly, one of the best word processing systems consists of an S-100 bus computer, the Discus disk system, CP/M Electric Pencil II and a good used Selectric based I/O Terminal. The printer seems to be the part that causes the most problems. I've seen all kinds of schemes to interface the bare Selectric, modified Selectric, and even the basic typewriter Selectric to various microprocessors. Why bother? Heavy duty Selectrics with RS-232 interfaces are readily available from $200 to $700 depending on condition and they are plug-in compatible with any serial port. A simple ASCII to EBCDIC or Correspondence Code software package completes the picture. I had such a setup running on my SOL for more than a year with great results.

Rod Hallen
P.O. Box 73
Tombstone, AZ 85638

More On Subscript Conversion

Dear Editor:

James Garon's subscript conversion technique (Sep-Oct '78) for computers with no two-dimensional array capability is effective, particularly for temporary list storage or an easily generated mathematical array (Pascal's triangle, etc.) since it is a one step operation. But an alternative for permanent arrays (such as Wumpus caves) is to use indices. From my own Wumpus program, my indices are:

```
A(1)=21
A(2)=24
A(3)=27
- - - - - - - - - - -
A(19)=75
A(20)=78
```

These indices are used in this manner:

```
90 N=3
100 X=A(N):R=A(X):S=A(X+1):T=A(X+2)
```

where N= number of the cave the player is in and R, S, and T are the adjoining caves:

```
N=3
A(3)=27
A(27)=19
A(28)=11
A(29)=12
R=19
S=11
T=12
```

This technique can also be used effectively for irregular lists if the data is to be READ into it. I have found indexing makes it easier to keep track of arrays containing related data which is changing (game plays, etc.) since visualization is easier. This can be important when one is troubleshooting programs with a lot of branching.

Charlie Green
1424 N. Custer St.
Colorado Springs, CO 80903

Superprimes!

Dear Editor:

Please find enclosed a complete list of Superprimes (Puzzles & Problems, Jan. 1979). We were quite surprised when we found there were no eleven digit Superprimes, consequently, no Superprimes with more than ten digits. When this finite list (147 Superprimes) was generated, we truly expected to find many more. This little exercise prompted us to investigate a few other types of primes. We thought your readers might like to try a few.

A Duper-Prime is a prime and is generated the same as a Super-prime, except digits are eliminated from the left. A Super-Duper-Prime is the same except the digits can be eliminated from the left or the right in any order. Finally, the ultimate prime. It is prime that yields a prime when selecting any of the digits in any order (not repeating the use of them) and still having a prime.

137 is a good example of all of these with the exception of ultimacy. There are only three ultimate primes with more than two digits.

Ken Guralnik
Karl Outram
P.O. Box 1912
Las Vegas, NV 89101

1979339339.	739391.	29399.	3119.	293.
1979339333.	719333.	23993.	2939.	239.
197933933.	593993.	23399.	2399.	233.
73939133.	593933.	23339.	2393.	199.
59393339.	373393.	23333.	2339.	197.
37337999.	373379.	19997.	2333.	193.
29399999.	293999.	19993.	1999.	191.
23399339.	239933.	19991.	1997.	179.
19992219.	233993.	19979.	1993.	173.
19793393.	199933.	19973.	1979.	139.
13999133.	199931.	19937.	1973.	137.
7393933.	199799.	19793.	1933.	131.
7393931.	199739.	19739.	1931.	113.
7393913.	199379.	19333.	1913.	79.
5939333.	199373.	19319.	1733.	73.
3733799.	197933.	19139.	1399.	71.
2939999.	193337.	17333.	1373.	59.
2399333.	139999.	13999.	1319.	53.
2339933.	139991.	13997.	797.	37.
1999339.	73939.	7393.	739.	31.
1999331.	73331.	7333.	733.	29.
1997999.	71933.	7331.	719.	23.
1979339.	59399.	7193.	599.	19.
1399999.	59393.	5939.	593.	17.
1399919.	37397.	3797.	379.	13.
1399913.	37339.	3793.	373.	11.
739399.	37337.	3739.	317.	7.
739397.	31379.	3733.	313.	5.
739393.	31193.	3137.	311.	3.
				2.
				1.

Why "Pascal?"

Dear Editor:

I just finished reading your article, "Pascal becomes software superstar," (Feb. 1979 issue) and noticed that it states that the reason for the name "Pascal" is "for no reason other than the high esteem in which Professor Wirth holds his teachings."

Readers may be interested in knowing more about the origin of the name. Professor Wirth replied in the December 21, 1979 issue of Electronics to the original printing of this article that, "...I am neither capable of fully understanding his philosophy nor of appreciating his religious exaltations. Pascal, however, was (perhaps one of) the first to invent and construct a device that we now classify as a digital computer. He did so at the early age of 16, when he was called upon by his father, who was a tax collector, to assist in the numerous and tedious calculations."

Robert Gaebler
University of Missouri
Rolla, MO 65401

Introducing the personal computer you've waited for. The Exidy Sorcerer.

I didn't buy my personal computer until I found the one that had all the features I was looking for.

The Exidy Sorcerer does everything I wanted to do and a few things I never dreamed of.

It isn't magic. Exidy started with the best features of other computers, added some tricks of their own, and put it all together with more flexibility than ever before available. Presto! My reasons for waiting just disappeared.

I wanted pre-packaged programs. Software on inexpensive cassette tapes for the Sorcerer is available from Exidy and many other software makers.

I wanted user programmability. The Sorcerer's unique plug-in ROM PAC™ Cartridges contain programming languages such as Standard (Altair 8k*) BASIC, Assembler and Editor (so I can develop system software), operating systems such as DOS (so I can also use FORTRAN and COBOL) and applications packages such as Word Processor.

I wanted easy to use graphics. Programming pictures is as easy as typing messages on the screen, and the 256 character set includes 128 user-definable graphic or foreign language symbols.

I wanted the best video. With 122,880 points in a 512 x 240 format, I get the most detailed illustrations.

I wanted to display more information. The Sorcerer displays 1920 characters in 30 lines of 64 characters — equal to a double-spaced typed page.

I wanted a full, professional keyboard. The Sorcerer's 79-key data processing keyboard provides designated graphics, the complete ASCII character set in upper and lower case, and a 16-key numeric pad for calculations.

I wanted memory. The 12k of ROM holds a Power-On Monitor and Standard BASIC; the user memory is internally expandable to 32k.

I wanted expandability. Communications, printer and tape storage interfaces are built-in, and the optional 6-slot S-100 Expansion Unit captures all the hobby computer creativity and prevents obsolecense.

I wanted a computer that's easy enough for children to use. I just connect my Sorcerer to a video display and a cassette tape recorder, and if I have any questions the easy-to-understand Operation and BASIC Programming manuals have the answers.

I wanted to buy from an experienced manufacturer. In five years Exidy has become the third largest producer of microprocessor-based video arcade games.

I wanted an affordable price. This is where Exidy does a little magic. $895 for 8k, $1150 for 16k and $1395 for 32k!

Now, what are you waiting for?

Call Exidy for the name of your nearest dealer. (408) 736-2110. Or write Exidy, 969 W. Maude Ave., Sunnyvale, CA, 94086.

Exidy inc.

* Altair is a trademark for Pertec Computer Corp

CIRCLE 196 ON READER SERVICE CARD

et cetera

Can You Follow Directions?

Time Limit: Three Minutes

Instructions:

This is a short test to see if you can follow directions. The questions are not difficult, but they are quite detailed. Good Luck!!

1. Read everything carefully before you do anything.
2. Put your name at the top of this page.
3. Circle the word 'name' in the second sentence.
4. Draw five (5) small squares in the upper left hand corner of the paper.
5. Beside the small squares, print 'yes, yes, yes'.
6. Put an 'x' in each square.
7. Put a circle around each square.
8. Draw a circle completely around sentence number seven (7).
9. Put an 'x' in the lower left hand corner of this page.
10. Draw a circle around the 'x' you just put down.
11. Draw a rectangle around the word five in sentence four.
12. *Loudly* call out your first name when you get this far.
13. If you think you have followed directions carefully to this point, call out 'I have it'.
14. On the reverse side of this paper, add 8950 and 9805.
15. Put a square around your answer, then a circle around the square.
16. In your normal speaking voice, count backwards from one to ten.
17. Underline all even numbers on the left side of the paper.
18. Put a square around each numeral (not word) that you wrote down.
19. Call out, in your normal voice, 'I am nearly finished, I have followed directions'.
20. Now that you have finished reading everything carefully, do only points one and three.

The originator of this little gem is unknown. It was adapted by P. Johnston for publication in the COMPUTING SERVICES BULLETIN of the University of Alberta, Edmonton from which, with permission, it is reprinted here.

Crossnumber Puzzle

You shouldn't have too much trouble finding numbers which, when inserted in the blank spaces, complete all the equations. However, the big question is: how many solutions are there? Can you find them? Can you write a program on your computer to find them? (It's only eight trivial sumultaneous equations but...)

DHA

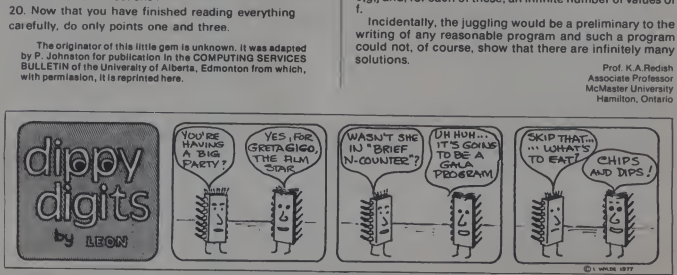
36	÷	12	+	11	=	14
−		+		−		+
a	−	b	×	c	=	d
÷		÷		−		÷
e	+	f	−	g	=	h
=		=		=		=
7	×	i	÷	j	=	14

Follow Up on Crossnumber Puzzle

I was intrigued by your Crossnumber puzzle (Creative Computing, May-June 1978, Vol. 4, No. 3, p. 66). The unknowns can be denoted by the a-j as shown in the accompanying diagram. We have now 7 equations in 10 unknowns and seek non-negative solutions. With some juggling we can deduce that $d=0$, $1 \leq C \leq 4$, $0 \leq g \leq 3$, $7 \leq j \leq 10$ and that f is a positive multiple of 2g. If any values satisfying these constraints is chosen, the diagram can be completed. Hence, there are 10 basic sets of values for c,g,j and, for each of these, an infinite number of values of f.

Incidentally, the juggling would be a preliminary to the writing of any reasonable program and such a program could not, of course, show that there are infinitely many solutions.

Prof. K.A.Redish
Associate Professor
McMaster University
Hamilton, Ontario



Expand Your Business Four Times This Year

Expanding a business four times in one year may be easier said than done except for your data processing needs. The new MSI Multi-User Computer System is designed to grow with your business by giving you the capability to add up to four user terminals which can be operated simultaneously.

At the heart of the system is the powerful MSI 6800 computer combined with MSI Multi-User BASIC and the new SDOS operating system.

Utilizing the new MSI 16K Static RAM modules expands processor memory to 152K of RAM. Each of the four users commands 32K of processor RAM as well as simultaneous access to the data base.

MSI Multi-User BASIC can be used with any MSI disk memory system including the HD-8/R 10 megabyte and HD-76/R 76 megabyte fixed/removable hard disk systems.

Our new Multi-User Computer System also features a software controllable printer option which allows you to use both a "daisy wheel" word processor for high quality document preparation, and a dot matrix printer for high speed production.

MSI currently offers nine different computer systems for business, industrial, scientific, educational and personal applications. And software to make your data processing more effective includes a Business Accounting Package with accounts receivable, accounts payable, general ledger, and inventory control.

If your business is expanding and you would like to know how an MSI computer system can help you make it more profitable, call or write Midwest Scientific Instruments, 220 W. Cedar, Olathe, Kansas 66061, (913) 764-3273, TWX 910 749 6403 (MSI OLAT), TELEX 42525 (MSI A OLAT)

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Random Ramblings

With David Ahl

Electronics Star at 1979 Toy Fair

The extremely enthusiastic reception of electronics by a broad range of consumers in 1978 has created dramatic new growth opportunities in 1979. Toy industry people predict sales of $200 million in hand-held electronic games alone, up from $125 million in 1978. Many items such as Simon were sellouts in 1978 and the industry is trying to make sure that doesn't happen again although some manufacturers expressed fears of being stuck with an obsolete inventory.

What about all the much-heralded innovation? Was it really there? To find out, we visited the toy fair in New York and took a close look at the things that will be on the shelves this Christmas. Baseball was the most popular hand-held game with no less than nine versions from which to choose. We counted a baker's dozen (13) items that we'd consider truly innovative. Here's a roundup of entries from manufacturers, both large and small. Prices, where given, are approximate retail.

IDEAL TOY CORP.

Electronic Detective adds light and sound to the classic detective mystery appeals of suspense, deduction and danger. The game's computer brain can create 130,000 different crimes. Each player (private detective) grills the computer to obtain clues about 20 different crime suspects. Using the clues, players deduce their way to the culprit. Find the criminal and you win. Pick the wrong suspect and you lose with the real villain doing you in with a surprise gunshot.

Ideal had a giant-size Electronic Detective display which we "played." After going through suspects like Rip Raff, Toots Roll, and Buster Bally and finding they all had iron-clad alabis, we finally deduced that Lucy Tumble was the culprit. A simulated police siren told us we were right as Lucy was hauled to the pokey.

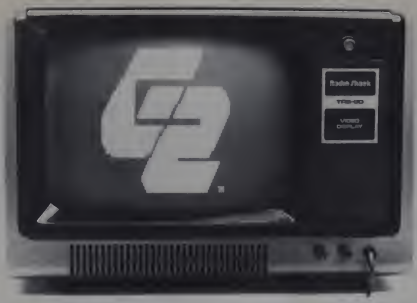
Maniac matches players against an infallibly clever computer that tests their senses in four ways. Sounds Abound requires listening to a series of rapidly repeating notes and hitting the lever when the computer counts off that number of beeps. In Look Twice, players get a glimpse of a computer pattern and then have to hit the lever when the exact pattern is repeated. In Musical Maniac, the computer plays a melody. When it stops abruptly, players race to hit their levers. In Time's Up, a tune is played for 3 to 10 seconds. Players then must try to measure the exact tune length.

We liked Maniac because it played both sight and sound games and seemed fair to all the players. It also adjusts the playing difficulty to the players' abilities, a nice feature.

SELCHOW & RIGHTER

Scrabble Brand Sensor Electronic Word Game combines the challenge and excitement of Scrabble with computerized electronics. The object of Sensor is to guess your opponent's (or computer's) word in the fewest turns. To play with two, one player punches a word into the computer and the second player deduces the word, letter-by-letter as the computer screen flashes clues to the position and accuracy of the guessed letter. A "space-age" sound signals a correct deduction. When a player deduces a complete word, electronic jingles announce the triumph. For party play, groups of two or more can program words and alternate guessing the correct word.

We enjoyed playing Sensor in the "Press Play Pen" and found that it "knows" some rather interesting words that will keep you guessing!



INTRODUCING G2 LEVEL III BASIC.

Now do more than ever before with the most powerful Basic you can buy for the TRS-80.

Open the manual and load the cassette. Then get ready to work with the most powerful Basic interpreter you've ever had your hands on...Level III Basic for Radio Shack Computers. It loads right on top of the Level II ROM, and in just 5K of space, opens up your capability to new dimensions. For starters, this new cassette-based interpreter gives you the whole catalog of disk programming power. Plus graphics commands. Plus powerful editing commands. Plus long error messages, hex and octal constants and conversions, user defined functions and a number of commands never before available on either cassette or disk interpreters!

Easier Loading, Fewer Keyboard Errors. G2 Level III Basic eliminates aggravations you've had, including keyboard "bounce" and those super-sensitive tape deck settings. Programs will load easier, and you'll have far less trouble with input errors.

Basic Access to RS-232. Until now, if you wanted to access your RS-232 interface, you had to work in assembly language. G2 Level III Basic does the work for you, letting you use your interface with Basic statements.

Have You Wished for More Power? This new interpreter gives you 10 machine language user calls for subroutines, long error messages, a new TIME$ call for your real time accessory, plus measure or limit input timing that lets you put a time limit on responses when you're playing games or giving exams. And the list doesn't stop here.

Easier and More Powerful Graphics. This new Basic includes three simple commands that can eliminate dozens of program steps. PUT transfers information from a designated array to your screen; GET reverses the process. LINE makes your computer do the work when you input beginning and end points. Give it two diagonally opposite corner locations, and it'll outline the rectangle you're looking for.

Only Microsoft Could Do It. G2 Level III Basic was created by Microsoft, the same company that wrote Level II Basic for Radio Shack. And it actually uses Level II as a foundation for this enhanced add-on. By the time you've mastered all it can do, calling up the flexibility of the graphics commands, and even enjoying the convenience of renumbering, you'll wonder how it was all possible. It's like getting a whole new computer for your computer.

Available Now for Only $49.95. You get the power that might otherwise cost you hundreds of dollars in additional equipment for only $49.95. Price includes the User Manual, a Quick-Reference Card, and a preprogrammed cassette tape. Load the tape, open the manual, and get ready to work with the most powerful Basic Interpreter you've ever had your hands on. G2 Level III Basic for the TRS-80. Another member of the growing G2 Personal Computer Program Library.

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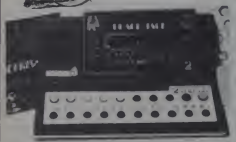

WADDINGTON HOUSE OF GAMES

This leading British Company makes its debut in electronics with **The Game Machine**. It includes Shooting Gallery which presents various target patterns in the display — you have to guess them as quickly as possible. Code Hunter is yet another variation of Mastermind — find a 4-digit number between 1111 and 8888. Grand Prix is an action race game. Also old favorite Black Jack. The Game Machine doubles as a calculator when you're not playing with it.

ENTEX INDUSTRIES

Here's the pitch-it's a change up-it's a curve-no, it's a knuckle ball. Strike one! Here comes a fast ball-it's a hit, it's going, going-caught by the center fielder. One out.

This exciting action is all yours in **Electronic Baseball**. Five different

pitches. The batter can walk, strike out, or hit the ball. The "computer" decides if it's an out, single, double, triple, or home run. Special lights and sounds are different for each one. Keeps track of balls, strikes, outs, base runners, and score with a LED display...and you can play alone with the "computer" throwing random pitches to sharpen your "eye", or play against an opponent.

Electronic Baseball 2 has remote control pitching and knuckle ball as well as continuous, cumulative digital scoring for both sides, with an indicator to let you know what inning you're in. Scores up to 20 for each side. Also a base stealing feature with defensive ability to attempt to prevent stolen base, sacrifice fly and double play feature.

Space War. Launch fighters to attack enemy base ship. Each player tries to defend his position with battle cruisers, which fire laser torpedoes to destroy attacking fighters. First player to destroy opponent's base ship wins the game. LED indicators and electronic sound effects keep track of the action. Digital readout shows the number of enemy fighters destroyed.

Soccer, one of the first field-type electronic sports games rounds out the new entries from Entrex.

CADACO

Foto-Electronic Bowling is claimed to be a genuine game of skill, but that skill probably isn't bowling. Makes spares and strikes (and gutter balls!) and performs all the functions of real bowling. Frame number, strike and spare (even the extra 10th frame ball or balls) and each player's score—all show on the LED display. You can control the speed and direction of the actual miniature bowling ball which is permanently sealed in the game to prevent loss. Flashing lights, different musical sounds for strikes, spares, gutter balls, and misses add to the fun.

MILTON BRADLEY

Flushed with the runaway success of **Simon** and **Starbird**, Milton Bradley is back with some new entries they hope will be winners this year. **Star Bird Avenger** and **Star Bird Intruder** rise with a whine at lift-off; when they reach their chosen cruising altitude the sound levels off; at descent the sound of deceleration is heard. All control stems from the angle at which the child holds the spacecraft.

When their electronically controlled laser rays are fired and strike a reflective surface, their hit signals are activated, producing three loud whoops. They can also duel with each other, creating the sounds of galactic warfare, firing, scoring and temporarily disabling engines.

One of the most innovative new entries at the Toy Fair was **Microvision**, a hand-held mini-video game with its own built-in screen. Microvision comes with Blockbuster, really Breakout in your hand. After you crash through the third row of bricks, the ball speeds up and the game becomes a real challenge. Pat Mallette, M-B's genial head of Public

Nobody does it better.

Word Processing by Memorite

Owners are quick to praise Memorite 2 word processing system. And why not? Vector Graphic's Memorite 2 is one of the most modern, powerful and most cost effective word processors in the world.

Its value is just as much a function of its low cost as is its many useful features. Memorite 2 cuts typing time in half and automatically types from memory at a rate of up to 540 error-free words a minute.

Think of the possibilities: contracts, personalized form letters, manuals, catalogs, reports, mailing lists, proposals or other important documents.

See or call your dealer — he will be glad to answer all questions before and after he installs your system.

We think you'll be impressed. Best of all, years later you'll still be impressed.

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Relations, could hardly pry me away from Blockbuster once I got started with it — you'll find it addictive too.

Other plug-in ROM cartridges available for Microvision include Bowling (similar to the discontinued RCA video version), Pinball (a stylized version), Connect 4 (play against a human or the computer at different skill levels), Star Trek Phaser Strike (like Creative's own Saucer Invasion), Vegas Slots (play the slots or Pig, a.k.a. Not One), and Mindbuster (an intriguing logic puzzle).

Big Trak is a stylish tractor and trailer which responds to eight programming commands which can be chained together into a 16-step program. (For those of you who know LOGO, in my mind, this is the ultimate representation of a LOGO-type language in a responsive, neat, tough "toy.")

Forward! **Big Trak** advances for as many as 99 units, each unit being the measure of its own 13-inch length. Push the "Repeat" button, and it travels twice as far. It gives the same performance in reverse. It pivots either right or left in a full circle, or even beyond a full circle. It also pivots in tiny fractions of a circle, for **Big Trak** possesses 60 swiveling positions. It can make a turn, proceed in a straight line, turn again, and continue travelling on whatever course its young navigator has set. (Even oldish Publishers have been known to program **Big Trak**!)

Big Trak has a total of 16 programming steps which direct its many functions. The child may send it around tables and chairs and other obstacles, and have it return to him — all without re-programming. All he needs to do is estimate the distances and punch in his commands. **Big Trak** also fires a variety of sound-and-light weapons. The companion trailer or Transport attaches to **Big Trak** and hauls and dumps loads on pre-programmed commands. (Retail price: Big Trak $43, Transport $13).

EDUCATIONAL DESIGN, INC.

Astro War is a nifty "Programmable" space battle game. It has eight overlays ("battle charts") which you program by marking squares on the back. The playing surface is sensitive to pencil marks and thus your marked grid or program challenges your opponent to maneuver between pictorial space bodies and your secret "mines" or marks. We've never seen anything quite like this game based on a simple mark sense grid. Could be a winner!

Milton Bradley's Microvision is a hand-held electronic mini-video game with a self-contained liquid crystal screen. Seven game cartridges are available for it.

FONAS

Tri-1 is a three-in-one game with baseball. Has computer-controlled fast, slow and curved pitches; runners moving around the bases with a base stealing feature. LED display keeps track of balls, strikes, outs, runs and inning. Batting Champs lets you practice hitting the computer's varied pitches. We liked Star Chase best, a combination skill and logic game which lets you try to outwit the computer and land on distant star systems before the computer. (Retail $35).

PARKER BROTHERS

Stop Thief combines micro-chip technology with classic board game play. Two to four players track down a thief who has committed a crime at any one of 19 locations on the board. A 2,000-byte microprocessor-based Crime Scanner controls the thief's moves and gives clues to his whereabouts. Clues are audible — the electronically-generated sound of breaking glass, running footsteps, or a squeaking floorboard, for instance.

THE TRS-80 ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM.

(A STEAL AT TWICE THE PRICE)

A short time ago, Microsoft introduced TRS-80 FORTRAN— a complete ANSI-standard FORTRAN with macro assembler, linking loader, and text editor, all for only $350. **The response has been overwhelming.**

Many TRS-80 users even told us, "The assembly language development software alone is worth that price." We think they're right, of course, but we've made it an even better deal.

ANNOUNCING: THE TRS-80 ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM FOR $175.

For half the price of the TRS-80 FORTRAN Package, you can buy the TRS-80 ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM, including:

EDIT-80 A fast, random access text editor that's easy to use and loaded with features. Lets you insert, replace, print or delete lines; edit individual lines; renumber lines in a file; and find or substitute text.

MACRO-80 The best Z80 assembler anywhere. MACRO-80 supports a complete Intel-standard macro facility plus many other "big computer" assembler features: comment blocks, octal or hex listings, 8080 mode, titles and subtitles, variable input radix (base 2 to base 16), and a complete set of listing controls.

LINK-80 Loads your relocatable assembly language modules for execution and automatically resolves external references between modules.

CREF-80 Gives you a complete dictionary of program symbols, showing where each is defined and referenced.

The Microsoft TRS-80 FORTRAN Package is still available for $350. Or, for HALF PRICE, get the TRS-80 ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM.

Either way, it's a steal.

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Simultaneously, the digital display records the building or street number where the crime is taking place. You try to build up a sequence of clues to determine the location to determine the location of the thief and, by rolling the dice and moving your detective, get next to the thief and arrest him. A false arrest gets an electronic raspberry sound and about 20% of the time the thief gets away after a shootout. There are sleuth cards and reward money which add to the excitement. The complex strategies introduced by the microprocessor insure that no two games are the same. (Retail $33).

Wildfire, is a miniature pinball game which uses microprocessor-generated bells of light and authentic pinball sound effects. Each game consists of five balls; points are racked up on a digital scoring display which keeps track of up to four players. Features include: 3 levels of difficulty, lighted targets and bumpers, moveable electronic flippers and bonus point scoring. (Retail $45).

Targeted at young science-fiction fans aged five to fourteen, **ROM** has three control buttons to manipulate the five functions which enable him to track and neutralize his intergalactic enemies. A built-in respirator allow him to breathe in any atmosphere and when he's ready to take off, his rocket pod emits an exciting blast-off roar. Three accessory tools give him superior powers to add to the fantasy fun.

Among the many new board game entries from Parker Brothers, we particularly liked **The Muppet Show Game** in which players audition for a spot on the show. Miss Piggy, Fozzie Bear and Sweetums are the preliminary judges, but in the end, all must face Sam the American Eagle — the official Muppet Show censor. (Retail $3.00). **The MAD Magazine Game** is zany fun which pokes fun at traditional board games. It breaks all the rules as players move counter-clockwise on the board in an attempt to win the game by losing all their money. (Retail $7.00)

Parker Brothers spokesman demonstrates how to play electronic Stop Thief on a giant game board.

LAKESIDE

Computer Perfection has four different games and 3 skill levels. The first two games are played directly against the computer, the second two are played by two opponents utilizing the computer. The object is to sequentially turn on and off lights, corresponding to shapes by pressing the buttons. The challenge is that button one may not light shape one, as you're playing, you've got to remember which button lights which shape in order to complete the sequence in order, in as few moves as possible.

ATARI

Number 1 in the video game field, Atari has brought out its first hand-held entry, **Touch Me.** Originated by Atari as a coin-op game in 1972, and popularized by Milton Bradley as a home game (Simon), pocket size Touch Me can be played by one or more players who have to remember a light/sound sequence.

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Artist and Computer

by Ruth Leavitt

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San Francisco Review of Books.

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This unique art book covers a multitude of computer uses and the very latest techniques in computer-generated art. In its pages, 35 artists explain how the computer can be programmed either to actualize the artist's concept (such as the visualization of fabric before it is woven) or to produce finished pieces. Over 160 examples, some in full color. [6D]

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This is a blockbuster of a book containing the majority of material from the first 12 issues of *Byte* magazine. The 146 pages devoted to hardware are crammed full of how-to articles on everything from TV displays to joysticks to cassette interfaces and computer kits. But hardware without software might as well be a boat anchor, so there are 125 pages of software and applications ranging from on-line debuggers to games to a complete small business accounting system. A section on theory examines the how and why behind the circuits and programs, and "opinion" looks at where this explosive new hobby is heading. [6F]

Be A Computer Literate

by Marion J. Ball and Sylvia Charp

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COLECO

Arnold Greenberg, President of Coleco, explains **Zodiac** — The Astrology Computer. "This product is definitely not a toy. The unit's memory chip contains astrological data scientifically computed and checked out. It's much more personalized and specific than anything the consumer might find in a newspaper astrology column or in a yearly astrology book, since **Zodiac's** output is based on astrological conditions computed from information entered by the person asking for the advice."

Using **Zodiac** in conjunction with its companion manual edited by astrologer Sydney Omarr, the user can get the same kind of in-depth, personalized astrological information that formerly was available only from a professional astrologer. **Zodiac** provides three different types of information:

* In its horoscope mode, the user can get a computer readout of the planetary positions at the time of birth and a list of corresponding personality characteristics for people born at that time. With this information plus the additional data found in the manual, the user can chart horoscopes for anyone simply by knowing his or her date of birth.

* In its daily preview mode, **Zodiac** can guide one's actions by telling how the stars appear for any day—past, present, or future.

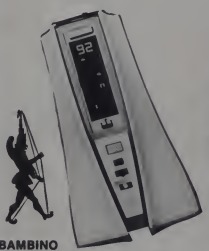
* In its advice mode, **Zodiac** will give answers to a broad variety of questions.

"Whether a consumer really believes in astrology, or just thinks the idea is fun, this is a product with tremendous appeal," Greenberg stated.

Head To Head Electronic Basketball is a hand-held game which can be played against the computer, or against an opponent. It features fully controllable offense and defense. The offense has a moving ball to pass and shoot, while the defense attempts to block the shot. The LED display shows all the action as well as the game statistics: score, time remaining and 24 second countdown.

Electronic sound effects highlight the action, and the two skill levels—Pro and Semi/Pro—create a challenge for any age level.

Coleco also introduced **Head to Head Electronic Football** and **Hockey**, as well as two new Quiz Wiz book assortments (7 books in total). We're glad to see that because all too often games are brought out one year with no corresponding follow-up on software in succeeding years. Our applause to Coleco.



BAMBINO

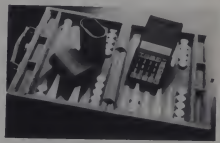
In **UFO Master Blaster Station** you attempt to use your rockets to intercept aliens invading from above. Different skill levels and "space age" sounds. The game is claimed to use "the world's smallest graphic color display."

A series of seven hand held electronic "video" games includes **Football, Ice Hockey, Soccer, Space Gun Fight, Police Car Chase, Boxing,** and **Safari.**

TIGER

Hand-held **Rocket Pinball** features LED targets, electronic sound effects, free ball and bonus scoring.

Sub Wars creates the illusion of a W.W. II submarine on the hunt, complete with snap-on protruding handles that allow the player to hold the game like a submarine skipper operating a periscope. Sound effects such as sonar beeping and torpedoes firing heighten the realism. In **Baseball,** one or two players control batter, fielders, base-runners, and pitcher with unlimited change-up possibilities. **Half-Court,** a basketball game for one or two players, features LED player-action lights, digital scoring with two-player memory, and four-quarter timing. **Copy Cat** is yet another copy of Touch Me/Simon.



CARDINAL

Omar Backgammon and **Chess** are Cardinal's first electronic game entries. We'll report on how they stack up when we get a sample.

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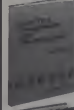

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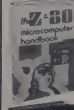

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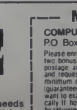

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MATTEL

To its growing, self-contained electronic products line, Mattel adds seven hand-held games and a personal entertainment product. Leading the list of hand-held games is a more sophisticated version of The Electronic Football Game—"Mattel

Electronics" **Football II.** This game includes kick-offs and runbacks, the ability to manipulate the runner backward, and a passing option featuring an offensive receiver. In addition, there are three new sports games, **Baseball, Soccer** and **Hockey**; two action games, **Sub Chase** and **Armor Battle**; and a strategy game, **Brain Baffler**, com-

bining a number of popular word and strategy games with multiple variations and sound effects.

A new product, the **Horoscope Computer**, will electronically display an individual horoscope forecast relating to specific areas of life—love, job, money, friends, etc —or evaluate the compatibility of two specific people.

VANITY FAIR

Electronic Bowling has LED readouts which show scores and frames, appropriately complemented by flashing lights and sounds when a spare or strike is achieved. The players (or player) can even "throw" a straight ball or hook as they choose.

Each talking head in Playskool's Double Talk has a movable mouth which the child controls remotely along with a microphone/amplifier to make it talk.

Invicte's "Walt Disney Character Mastermind" only has three mystery digits — so it's really Segels in disguise. To the right is "Space Lines," a fast-moving logic game which we enjoyed immensely at the Toy Fair.

TOMY

Although electro-mechanical, Tomy's new entries are very similar to electronic games. **Digital Diamond** is a baseball game in which the pitcher chooses to pitch a fastball or curve. The ball, in the form of a light-emitting diode, heads for the plate. The batter swings and the result of the play lights up on the Digital Diamond

scoreboard. In **Hit & Missile** a player controls anti-aircraft missiles on the ground against enemy aircraft. A player can change the course of the missile even after it's been fired.

Acrobot is a wind-up robot with a heart. When he falls over or gets knocked down, he gets up by himself. He takes life's hard knocks, picks himself up, and gets back on his feet. Of course, he does a cute little robot walk, but what sets him apart from other metal men is his never-say-die personality. (Yes we know this doesn't belong in a review of electronic games, but he was cute!) □

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Word Processing Systems: Points To Consider

Irwin Doliner

Word processing can be useful to a wide range of people — from the two finger hunt-n-peck typist to the professional who types in excess of 80 words per minute. In fact, anyone who has occasion to type could benefit from a word processing system.

The two finger typist usually types slowly and deliberately to avoid errors — and normally makes several anyway. It is very painful to have to retype a page which took an hour to type the first time. If this describes your typing method, a word processor will permit you to type as fast as you want without being concerned about errors. The editing functions may be used later to correct all mistakes. Once editing is finished you can automatically produce as many error-free copies as you need.

The professional typists will no longer need white-out or correction tape. Errors may be corrected either while typing, or after the typing is completed, by using the edit functions. Total output will be increased with much less fatigue.

The lawyer may create a legal document automatically by combining previously edited paragraphs. The global edit, if it is available, may be used to change all references to "Bilwitz & Son", in an existing document, to read "Framis, Inc." and thereby produce a tailored contract painlessly and free of errors.

If you have a new product to announce you may send an original copy of a form letter individually addressed to each prospect in your list. You may also include special comments on selected letters.

You could produce a maintainable catalogue, a business directory and program documentation. In fact, the potential applications for a word processor are limited only by your imagination and the features available on the particular system you select.

Once you establish that you need word processing, there are three primary approaches available. You may buy time on a computer that provides word processing, obtain a dedicated word processing machine or buy word processing software for your own computer. No single approach is right for every situation. Your particular needs will dictate which is right for you.

If you have no computer requirements other than word processing you should consider one of the first two options. You might buy computer time for low volume or infrequent word processing needs. Or you might obtain a dedicated word processing machine for high volume or frequent usage.

However, with computers being involved in virtually every aspect of daily life, it is difficult to conceive of many situations which require word processing but not data processing. The advent of the low cost microcomputer makes the third approach, buying word processing software for your own computer, a very cost effective one in most situations.

The balance of this article will be directed toward those who need to evaluate word processing software — although much of what is said will apply equally to the other two options. I will attempt to be as general as possible in the description of word processing functions but the examples, when required, will be drawn from IDSWORD (the word processing system developed by INTERACTIVE DATA SYSTEMS, INC.). One important point to keep in mind is that no software, word processing or otherwise, can be all things to all people. The final decision to purchase or not to purchase a given software package should be based on how well it satisfies your specific needs, and what the economic tradeoffs are. The remainder of this article will help you to make these determinations.

There are four primary functional areas served by any effective word processor. They are: 1) data entry, 2) data storage and file manipulation, 3) text editing and 4) reporting. The specific operations included in each of these functional areas will vary from one word processing system to the next. These operations, and how they are performed, should be compared with your checklist of required (or desired) features to determine the acceptability of a given system.

Data Entry

Ordinarily data is entered manually from a terminal with a typewriter-like keyboard, as in Figure 1. Manual data entry should seem natural to the user, and should be as much like regular typing as possible. Any special operations or artificial techniques make the system more difficult to learn and operate. For example, some word processors may require a line of text to be enclosed in quotes if the line includes a comma or other special character. This requirement is artificial and confusing and will often be forgotten, causing errors in the text. It probably will result in a net reduction in output.

Strict adherence to normal typing restrictions, however, is not always advantageous. For example, a typist is usually conscious of the right margin and must look ahead to determine if the next word will exceed the preset line length. This need to look ahead slows the typist and reduces efficiency. If the typist knew that the system could automatically reformat the text, line breaks could be taken when desired rather than as dictated by the position of the right margin. Optionally, your text may include constants or variables combined with the data entered manually. This might be accomplished by replacing special user supplied indicators with data extracted from other files. One application of this is the preparation of a form letter, as shown in Figure 2. When the form letters are to be printed the operator specifies the date to be inserted in each letter (a constant). Names, addresses and special comments are inserted in the letter as they are extracted from a name and address file (variables). The end result is an original copy of the form letter for each name in the files specified.

A data file may also be created entirely from the contents of existing files with no manual data entry at all, as shown in Figure 3. In addition to the savings in manual effort, there is another big advantage to creating files in this manner. Each file included in the merge has probably been used and proofread several times. The end result is a tailored document achieved painlessly and without errors.

Figure 1 Manual Data Entry

```
ESTABLISHING A NEW FILE


     NAME OF WORD PROCESSING FILE, DISK DRIVE? SAMPLE,1<cr>
     'SAMPLE' FILE OPERATION? TEX<cr>
     IS THIS A NEW FILE? Y<cr>
        1)..This is the first line of data.<cr>
        2)..If it were a real run, the data<cr>
        3)..would be more meaningful.  But<cr>
        4)..it is only a demonstration.<cr>
        5)..*<cr>


ADDING DATA TO THE FILE


     NAME OF WORD PROCESSING FILE, DISK DRIVE? SAMPLE,1<cr>
     'SAMPLE' FILE OPERATION? TEX<cr>
     IS THIS A NEW FILE? N<cr>
        5)..This is a continuation of the<cr>
        6)..previous run.  Line 8 is going<cr>
        7)..to be left blank.<cr>
        8)..<cr>
        9)..'RETURN' was entered on line<cr>
       10)..8 to leave a blank line.<cr>
       11)..*<cr>
```

Figure 2 Form Letter Combines Manual and Automatic Data Entry

```
 1)..
 2)..
 3)..
 4)..
 5)..                                  YOUR ADDRESS
 6)..
 7)..                                         *DT*
 8)..*NA*
 9)..*A1*
10)..*A2*
11)..*A3*
12)..*A4*
13)..Dear *GR*:
14)..
15)..THE BODY
16)..        ,
17)..        ,
18)..      OF YOUR LETTER
19)..                  ,
20)..                  ,
21)..                GOES HERE
22)..
23)..
24)..                          Sincerely,
25)..
26)..                           YOUR NAME
27)..
28)..encl*S1*
29)..    *S2*
  ,
40)..*S3*
  ,
46)..

INDICATOR              MEANING
=========  ==========================================
*DT*       DATE AS SPECIFIED AT RUN TIME
*GR*       NAME AS IT WOULD APPEAR IN THE GREETING
           SUCH AS MR. DOE (extracted from *NA*).
*NA*       NAME AS IT APPEARS IN THE FILE.
*A1*       FIRST ADDRESS LINE.
*A2*       SECOND ADDRESS LINE.
*A3*       THIRD ADDRESS LINE.
*A4*       FOURTH ADDRESS LINE.
*S1*       FIRST SPECIAL COMMENT.
  ,           ,
  ,           ,
  ,           ,
*S9*       NINTH SPECIAL COMMENT.
```

Figure 3

Merging Several Files into One

```
NAME OF WORD PROCESSING FILE, DISK DRIVE? NEWFIL,1<cr>
'NEWFIL' FILE OPERATION? MER<cr>
SPECIFY FILES IN THE ORDER TO BE MERGED
TERMINATE INPUT WITH SIMPLY 'RETURN'.
FOR EACH FILE GIVE 'FILE NAME,DISK DRIVE'.
#,NAME,DRIVE
 1 ? FILE1,1<cr>
 2 ? FILE2,1<cr>
 3 ? <cr>
```

Figure 4

Line Editing on the CRT

```
SCREEN 1:SELECTING A LINE FOR EDIT (cursor is positioned at selected line)
*************************************************************************
    :         FEATURES TO CONSIDER WHEN SELECTING A WORD PROCESSOR
    :
    :
    :
   #:Wrod processing can be useful to a wide range of people - from the
    :two finger hunt-n-peck typist to the professional who types in excess
    :of 80 words per minute.  In fact, anyone who has occasion to type
    :could benefit from a word processing system.
    :
    :The two finger typist usually types slowly and deliberately to avoid
    :errors - and normally makes several anyway.  It is very painful to
    :have to retype a page which took an hour to type the first time.  If
    :this describes your typing method a word processor will permit you to
    :type as fast as you want without being concerned about errors.  The
    :editing functions may be used later to correct all mistakes.  Once

          CONTROL COMMANDS               LINES ON SCREEN
 ====================================   ===============
 A=ADD LINE  I=INSERT LINE S=SCROLL UP     1    - 15
 D=DELT LINE K=KEEP DATA   \=CURSOR DN   LINES IN MEMORY
 E=EDIT LINE R=RESTART     /=CURSOR UP   ===============
                                             1    -  180
*************************************************************************


SCREEN 2:EDITING A LINE OF TEXT (changing 'wrod' to 'word')
*************************************************************************
  Word processing can be useful to a wide range of people - from the
 C   #                                                                  C
 0....0....1....1....2....2....3....3....4....4....5....5....6....6....7....0
 L    5    0    5    0    5    0    5    0    5    0    5    0    5    0    L

 MODE              EDIT COMMANDS
 ==== =====================================
      A = ADD FOLLOWING INDICATED CHARACTER
      C = CANCEL CHANGE TO THIS LINE
      D = DELETE THE INDICATED CHARACTER
      I = INSERT BEFORE INDICATED CHARACTER
      L = DELETE FROM THE CURSOR LEFT
      R = DELETE FROM THE CURSOR RIGHT
   -->S = SUBSTITUTE FOR INDICATED CHARACTER
      <RET> = EXIT FROM MODE - RETURN TO SCREEN
      <ESC> = EXIT FROM MODE
      \ = MOVE CURSOR RIGHT
      / = MOVE CURSOR LEFT
*************************************************************************
```

Figure 5 General Printing

```
NAME OF WORD PROCESSING FILE, DISK DRIVE? SAMPLE,1<cr>
'SAMPLE' FILE OPERATION? PRI<cr>
DO YOU WANT TO SEE THE DEFAULT LIST? Y<cr>
ITEM  DEFAULT
===   ====================
 1.    NO PAGE NUMBERING
 2.    PAPER 11 INCH LENGTH
       PRINT 6 LINES/INCH
       50 PRINTED LINES/PAGE
 3.    NO FORCING TO NEW PAGE
 4.    6 POS LEFT MARGIN
 5.    NO RIGHT JUSTIFICATION
 6.    SINGLE SPACE
 7.    SINGLE COPY
 8.    PRINTING ON LINE PRINTER
 9.    PRINTING ON CONTINUOUS PAPER
10.    NO CONSTANT DATA REQUIRED

CHANGE ITEM? 4<cr>
SIZE OF LEFT MARGIN? 3<cr>
CHANGE ITEM? 5<cr>
CHANGE ITEM? <cr>
POSITION PAPER TO TOP OF PAGE & HIT RETURN <cr>
```

Data Storage and File Manipulation

For a word processor to be truly effective it must be able to store data for subsequent access. The storage medium normally used is the 'floppy' disk. Data storage means effective file manipulation with human engineering considerations.

Once the user specifies the file name and disk drive he should be done with that end of the operation. The system should be able to determine if the user is attempting to create a file with a name that is already in use, and allow the user to select another name. It should also recognize when the user is attempting to update a file that does not exist, and allow him to specify the name correctly. Without good file handling

these and other conditions would end the job prematurely with confusing error messages. Needless to say, there are many such features to maintain the user's file integrity, and protect him from the possible bad effects of human error.

Text Editing

Text editing is a very broad area. It includes all operations which alter the text to make it more acceptable to a human user. This definition does not impose any theoretical bounds. But time, money and usefulness dictate that practical bounds must be set. The designer of a word processing system must determine the market to be reached, and the price range of the finished product. These considerations impose constraints on the design of the system.

The intent should be to develop a word processing system which will be useable by secretaries and not just programmers. This implies including those functions most often required in normal typing, and close attention to human engineering. More specialized systems which make use of imbedded commands for control certainly have their applications, but not in a production typing environment.

This philosophy will help define the set of text editing operations to be included. Each operation under consideration should be categorized as necessary; nice to have; might possibly be usefui; useless or not worth the development cost or overhead in keeping with the design philosophy. Each potential purchaser should also categorize the various functions according to his needs. If the user and designer categorized these functions similarly, the likelihood is good that the system in question will be acceptable.

Line by line editing is one common technique. This operation permits the user to insert, replace or delete strings of text on any given line. Not all users will have the same hardware configuration. For this reason editing should be permitted on a printing terminal or on a CRT with an addressable cursor, as shown in Figure 4.

It is frequently necessary to make the same change many times in the text. It is, therefore, usefui to have global editing. This provides the ability to find, insert, replace and delete specified strings of data anywhere in the text. Automatic reformatting is another desireable feature and provides the user freedom from concern about the right margin mentioned earlier.

Anyone who has written a long letter or document of some size has probably rearranged paragraphs (or wished they had) so that it reads more smoothly. Or perhaps you have written a manual and found that several sections were nearly identical. It would be nice to be able to move or copy blocks of text from one location to another. The Move operation should include Move, Copy and Delete commands for blocks of data.

Automatic hyphenation is, in many cases, unnecessary, and not worth the cost of including. Hyphenation may be accomplished by table look-up, adherence to some set of rules or some combination of the two. Table look-up involves creating a table of words and acceptable points of hyphenation. Space limitations imposed by floppy disks means that any table on a single diskette will be of limited value. A table that was sufficiently large to cover most contingencies would require a large investment in disk drives and long run times for the look-up operation. Most rules for hyphenation would require costly programming effort and would probably yield comical results in many cases. For example, one rule is to hyphenate a suffix such as 'ing'. This works fine for a word like 'try-ing' but not for 'w-ing' or 'th-ing'.

Reporting

The purpose of the fourth function, reporting, is to present data in a usefui or pleasing manner. Again the possibilities are unlimited, but common sense dictates that limits must be set. Following are four types of reporting.

The first type of reporting is merely listing the contents of the file together with generated line numbers. The user must know what the file looks like before any editing is performed. The user may list only a portion of the file or the entire file.

Anyone who does volume mailing of documents such as catalogues will appreciate the value of being able to print mailing labels automatically. A mailing label program is a valuable feature for a word processing system to have. Form letters and their format were discussed earlier and they would constitute the third type of reporting available.

The fourth report type is for general printing. It would be used to print documents such as this article. Figure 5 shows the dialogue for printing and the assumed defaults. For example, pages can be numbered starting with any number you specify. Page numbers will appear in one of four locations which you may select (top middle or right, bottom middle or right). Selected lines may be forced to begin a new page even if the preceding page is not full. And all of the other defaults may be over-ridden the same way.

Conclusion

This treatment is in no way a comprehensive look at word processing. Whole books have been written which do not cover the field. The intent was rather to provide some indication of the more common and usefui word processing functions. □

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Beyond The Text Editor

Derek Kelly

When 1978 was drawing to a close, I decided that I would rather have a computer than a car; and, so, it was that I discovered that along with the three blessings that the wise have told us are sure to make us happy, there was not only the fourth thing (understanding) that I had already added to the three, but also using a computer had to be a fifth.

Over the past several months I have "read" and studied the programs of others so as to learn better how to program on my own, and I have marveled at the ingenuity of many programs. I have longed for the day when I too could construct with ease those complex and intricate programs that are so plentiful in the magazines and software houses supplying users of microprocessors. Perhaps it is only because I am unsophisticated and inexperienced in the use of my Apple II, but I have found that those programs which are most useful to me are also the most simple. Thus, while I enjoy using the relatively complex text editor program that I purchased, the ones that help me most are the simple programs I use to record bibliographies, take and retrieve notes on books I have read, and ones which give me fast access to words. Perhaps, I thought, someone who is wondering what there is beyond the generally forgettable games and business programs which are rife in the marketplace, might find some use for the simple programs that I use.

One of my programs that I use the most in my (writing) work is an index to Roget's Thesaurus. Using the "Data" statement, all 1042 words which constitute the basic categories of words in the Thesaurus were recorded and two simple subprograms are used to search that data base. One subprogram is used to input a word that I would like to know corresponds to the data words or not. This subprogram can be incorporated with simple changes in any program with a similar aim:

```
10 Home: Rem to clear screen
15 Input "Word to be found: "; F$
20 Restore
25 Read N: Rem number of words
     in data base
30 For I = 1 to N
35 Read W$(I): Next I: Rem WI =
     words in data
40 If W$(I) = F$ then 90
45 Next I
```

Since I want to know if an input word (F$) corresponds exactly to a data word, and if there is a related version of the word or a word which matches the first five, four or three letters of the input word, the above program includes two or three additional loops as follows:

```
50 Print "Word not found...But
     try this one:"
55 For I = 1 to N
60 If Left$(W$(I),5) = Left$(F$,5)
     Then 90
65 Next I
70 For I = 1 to N
75 If Left$(W$(I),4) + Left$(F$,4)
     Then 90
80 Next I: Rem add another
     For...Next loop for 3 letters
85 Goto 100: Rem Prints "No
     such word" & returns to 15
90 Print I "." W$(I)
95 Goto 10
```

The reason why there are two or three separate loops using the Left$ function is simply that if each loop were nested within the other, then if the word (F$) were "Intention" (which is not in the Thesaurus data base) the program would return "Integer" whose first four letters correspond to "Intention" rather than "Intend" whose first five letters match the word I entered. That would occur because "Integer" is alphabetically prior to "Intention." Nested For Next loops just would not work for such a program.

Another simple program is the one I use to record notes of books I am reading. I use the variables S$, A$, T$, TN$, P$, Y% to record the Subject, Author, Title, Town, Publisher and Year (in that order) in one Data statement, then I use the variables P% and D$ to record up to five notes and page numbers per book. The Data appears as follows:

```
200 Data 1: Rem number of
      books
210 Data Computer Science,
      Edger W. Dijkstra, A Dis-
      cipline of Programming,
      Englewood-Cliffs, Prentice-
      Hall, 1976
220 Data 1, executional abstrac-
      tion is basic to the notion of
      an algorithm
230 Data 1, executional ab-
      straction functions to map
      different computations on
      one another
240 Data 1, executional abstrac-
      tion is a way of helping us to
      get an intellectual grip on a
      computation by consider-
      ing it as a species of a class
      of computations
250 Data 0, none, 0, none: Rem
      this is how I record Data for
      which no notes exist but
      which are needed for pro-
      gram execution
```

I use several different subprograms to operate on these notes. One prints out only the titles, another the authors, another complete information on each book together with notes, and another which prints out only the title and its corresponding notes. If there are more than five notes and page numbers per book, then I simply add 1 to the number of books (line 200 in example) and give an abbreviated documentation of the book, then continue with the notes. A simple program to operate on such data statements is:

```
10 Restore
15 Read N
20 For I = 1 to N
25 Read S$, A$, T$, TN$, P$, Y%
30 For J = 1 to 5: Rem 5 is limit I
     set on number of notes.
35 Read P%, N$
40 Print T$
45 Print Chr$(91)P%"] "N$; Rem
     Chr$(91) is required by an
     Apple II to print the left hand
     square bracket ([)
50 Get A$: Rem this gives user
     control and time to read
     Notes
55 Next J: Rem Next line of
     notes
60 Next I: Rem next book
```

Clearly, lines 40 and 45 can be changed to suit a user's purposes. For instance line 40 could be Print Y%

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if only information on the year a book was published is required. The Chr$(91) function is used in line 45 simply because it helps if the page number is demarcated by square brackets in the print out.

I also keep an extensive annotated bibliography for many different subjects and areas. The program listed immediately above can be used in modified form (excluding lines 30, 35, and 55 which handle the notes) to read and print out books in a subject-area, together with annotation, or only annotations, or whatever I need at the moment.

Since I read 2 to 300 books a year, and usually take extensive notes on many of these, having a computer-based system to record bibliographies and notes has changed my note storage habits and has immeasurably simplified my research. Now instead of the reams of paper and numerous pens and folders that I had to use before, notes and bibliographies are all on one or two cassette tapes! And, instead of that once-wearying search through my notes for some point I remembered about and wanted to use, all I do is LOAD, RUN and let my Apple do the looking.

Now, while it would indeed be gratifying if the simple programs noted above were of use to some other person, there is a persistent and pernicious myth that I call the 'myth of the painted lady' that has trapped many a writer (particularly college-based ones in my experience) into believing that if only an efficient method of notetaking were found then papers and reports and books could just flow off the typewriter or presses. The myth of the painted lady is based on the idea that research is based on four steps: gather the facts, look for their pattern, test this pattern by examining the facts, then write up the report. The myth is based on the idea that behind all the paint (the facts) there lies a heart of gold (a theory or pattern) if only one looks hard enough. The four steps in research can and never will work—they are based on myth. One must know what one is looking for (have an idea about a pattern) before finding a pattern in facts (statistics notwithstanding). So just because a computer helps to record facts does not mean that the thinking and pattern development will be any the easier than before. It only means that the evidence will be closer at hand, more accessible. Giving us a helping hand with the grunt-work of life and freeing us to think more is one great benefit from using a computer. □

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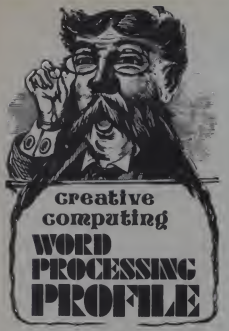

PolyMorphic 8813 Word Master

Steve North

Word Master is a word processing system for the PolyMorphic 8813. (Micro Pro has a text editor of the same name reviewed elsewhere in this issue.) It has two separate sections — a text editor and an output formatter.

The 8813 has a built-in triple disk drive and communicates with a keyboard and video screen (16 lines by 64 characters). It can also connect to several kinds of printers.

The Text Editor

The editor is the part of Word Master you run to create or modify a document. It is executed by typing EDIT FILENAME. Subsequent editing operations are done on a text file on floppy disk, so you can permanently save your text for future reference or changes. The editor is video oriented; that is, you do editing operations by positioning your cursor somewhere in the text and then typing in your additions, changes, or deletions. Anything you do to the text is immediately visible on the screen. This approach to text editing is much easier to learn and use than pointer or line oriented editors, which are throwbacks to times when most people were using hard copy terminals. There are a number of very good pointer oriented text editors available, but it's unlikely anyone but a few computer nuts can fully appreciate or even operate a package like Xitan's Z-TEL text editor.

To enter your text, just start the text editor and begin typing. Errors are corrected by typing the delete key to erase the problem, and then inserting the correction. Control-W deletes an entire word. Other control characters move the cursor around the screen. You can also move or delete blocks of text, search for a specified string, etc. Overall, the text editor is powerful and simple to run. However, there are two obvious complaints. First, the text editor requires that you type the RETURN key at the end of each line. This is a nuisance for the operator because the way text is broken up into lines on the screen has nothing to do with the way it will be printed out. Other video text editors let you type past the end of a line and automatically jump to a new one when it's time. Second, some of the cursor control functions are done by typing "escape sequences" such as escape-shift-delete (to delete a block of text). Others are simple control characters (control-E find the end of your document). This mix of control characters and escape sequences is not as logical or easy to remember as exclusive use of either one.

The Text Formatter

Once you're happy with the contents of your document, you can run the formatter program to print it out. The formatter controls text justification, line widths, margins, page numbering, underlining, centering, beginning a new page, page titling, indenting, paragraphs, etc. Formatting commands must be embedded in the text itself, in curly braces. For example, (bpg) in your text file tells the formatter to begin a new page in the printout. (rj,wid 80) means to right justify and set the carriage width to 80.

The formatter commands are very flexible. Word Master includes several we haven't seen on other editors (such as one which tells the editor to begin the next odd page, or to skip to a new page if less than x lines are left). Most are mnemonics, such as "lsp" for "set line spacing" or "he" for header. In our initial use of the editor we had to refer to the instructions often but with practice you would probably memorize them.

The Manual

The Word Master manual is written for a total novice at computerized word processing and includes background information on the 8813. It is an admirable effort to be helpful to a non-computer person, but one has to wonder if a secretary wants to study a 125-page manual just to make the funny typewriter work. Those who have used a number of good and bad text editors will probably resent having to slog through pages of "Introduction To The Manual" and "Introduction to System 88 Word Processing" and "Introduction to the Text Editor" and "introduction to Word Master" and "A First Look at the System 88" (catch my drift?). The quick reference sections are helpful, though.

No one likes to give even a partially critical review and obviously the person who wrote Word Master (Robin Soto) put a lot of effort into it. But software systems for personal computers are getting incredibly sophisticated and need to be human engineered from the start. One should start with an overall master plan of how the system will work, paying attention to interaction with the user, and then move toward a working product. The obvious comparison to make is with Michael Shrayer's Electric Pencil, also video oriented. Versions are available for roughly 40 or 50 machine configurations, including CP/M, North Star Disk, Helios Disk, etc. You should definitely take a look at the Electric Pencil before buying a text editing system. We feel that it is a bit more logical and easier to use than the Word Master. For instance, the editor and formatter are in one package, so that you can sit down and enter and print a document without bothering to save on the disk as an intermediate step. This would seem better for an office application where you don't want to have to unsave every letter you write. The Electric Pencil leaves you with the impression of being a little more finely honed.

Nevertheless, if you already have an 8813 or if other 8813 software such as PolyMorphic's Inventory or mailing list programs meet your needs, Word Master is an eminently usable system and produces professional-looking letters and documents with a little practice. □

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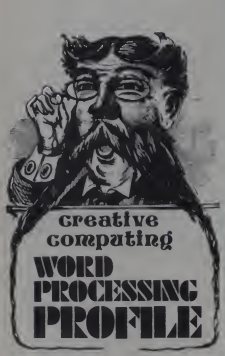


WPDaisy Word Processing System

R.W. Hamilton, Jr., Ph.D.

From the moment I first saw a magnetic card typewriter a few years ago, I have been intrigued by the concept of "word processing." As one whose livelihood depends on the written word, I welcomed the prospect of being able to work over a portion of text, making revisions, etc., without having to type the whole thing over each time. Because my reports always seem to get done the last minute before a deadline, the production process has always been particularly frustrating; preparing a handwritten or dictated draft, having it typed, proofreading the typed copy, having corrections made, then having to proofread the corrections. This cycle was often repeated two or three times on very complex material. "Word processing" seemed to be an answer, but the expense of the early systems made them inaccessible to me.

My work involves a lot of reports, and occasionally I have the need for number crunching. This need was not great enough by itself to justify an in-house computer, but as a result of the microprocessor boom it eventually seemed possible to get both word processing and computing functions at the same time. I took the plunge and set up a lease arrangement for a small system, with word processing software.

This is an objective report on WPDaisy, a small system word processor that stands up alongside the best of the dedicated systems. It has some faults, but to avoid confusion between the way it now is and features I'd like to see, my suggestions are collected at the end of the article. Before discussing the system, it might be best to consider what the term "word processor" implies, as it is used here.

What is a word processor?

For our purpose a word processor handles the written word, and does so with a certain measure of convenience—a pencil or a manual typewriter might otherwise be considered word processors. Three conditions should be met:

a. Initial typing input should be faster than on a regular typewriter.
b. Review and extensive editing should be possible, including storing, recalling and moving of text.
c. It should be possible to print the text out in any desired format, and to make changes in the format with minimal retyping.

The evaluation of a system, therefore, must consider the convenience and speed of performing these functions, as well as the cost, quality of the output, training required and dependability. I believe that for the most part this excludes simple text editors which are too slow, and the typewriters with one-line displays because of their limited editing capability. Today's standard of dedicated, screen-oriented word processing system includes the Lanier, CPT, Vydec, Noreico and Xerox 850. Since these are expensive (and don't compute), the remaining option is a "small" microprocessor-based computer system with appropriate software. Mine consists of a North Star mainframe with 48K of RAM memory, two 8" Morrow disk drives, a Hazeltine 1500 CRT, a Diablo 1620 printer, and the WPDaisy word processing software (version 00.08).

The computer and components are tied together with TSA's "OS" operating system, which I got with my WPDaisy word processor software. This operating system has worked well for me, a novice in this technology. It is very similar to the Cromemco CDOS system, and will run material configured for CP/M.

R.W. Hamilton, Jr., Ph.D., 80 Grove St., Tarrytown, NY 10591.

What is WPDaisy?

WPDaisy, like other word processors, has two main functions, a text editor for producing a draft document in the user area of the computer, and a format processor which takes care of the printout. The text editor is available by itself (in which case it is called Daisy), and offers the advantage that it takes up a little less space (7k as opposed to 9k). The term Daisy comes from Dynamic Screen Imaging (tm), and is particularly appropriate since it is generally used with daisy wheel printers. The Daisy editors are specifically designed for use with a normal video terminal for on-screen editing (instead of requiring a memory-mapped video screen). Hardware requirements are essentially those stated above, but one can get by with an 8080 or Z-80 processor having a single disk or diskette and 32k of memory; a proportional printer is nice but not essential. There is a version which runs under CP/M.

WPDaisy uses software techniques to enable its many functions to be performed on a standard keyboard; dedicated word processors use special keys and logic hardware to handle the same functions. As a result, WPDaisy is somewhat complex and requires a little effort to learn. While this may make a typist's initial encounter with it somewhat *imposing*, the return is a great deal of versatility. There are different ways of doing almost everything that the system will do. The operator of WPDaisy is actually preparing a PROGRAM which causes the computer to produce a portion of written text.

WPDaisy operates by means of on-screen commands for text input and editing and uses formatting control statements imbedded in the text to control the printout. The editing commands are either keyed in individually or entered on the command line. Certain conventions are used for designating these functions in the manual; a simplified list is given in Table 1, primarily to make the examples understandable.

Many of WPDaisy's control and editing commands are based on the use of the "Control" and "escape" keys. The control key is used like the shift key—it does nothing when pressed by itself, but when it is held down and another key is pressed, the function of the other key is modified. This function is generally represented by the "up arrow" or carat symbol used before the character to be modified; thus, control U is represented by ^U. The escape key is different; it is a character itself. As a control function it is used to modify the next key pressed.

Table 1
Partial listing of WPDaisy control and edit functions

[ES]	denotes the "escape" character as used to set off formatting statements. The escape key also flips the cursor to the command line when in the edit mode.
^	denotes the "control" key, pressed with another key in the same way as the shift key is used. A control U would be represented by ^U.
^W	moves cursor up. ^A, ^D, and ^Z move cursor left, right and down, respectively.
^X	deletes the character marked by or "under" the cursor.
^V	inserts a single character in front of cursor's position.

The following symbols are used on the command line:

B	moves cursor to beginning of text. -B moves it to the end; H moves it to the home position, -H moves it to bottom of screen.
Cx	clears buffer, text, screen, and printer, where x = B, T, S, and P, respectively. Buffers (/A, etc.) and text are deleted; screen is cleared and refilled from memory, printer program is cleared.
Dx	deletes steps, where x = C, W, L, B, P, S for character, word, line, block, page or screen, respectively.
Fx	finds text string which follows; replacement text then follows ^Z.
I	inserts a line of text in front of cursor; L adds carriage return.
Mx	moves text to buffer or disc using x = same steps as delete.
Px	prints to disc, CRT or printer; -pf- reviews entire text on screen.
Q	quits WPDaisy and returns to operating system.
Rx	reads from buffer or disc file.
Sx	shifts cursor using same steps as delete and move; ST moves next line to top of screen.
Wx	writes entire text to file x and sets up backup file.

From the user's point of view, the screen actually takes on a total of four different configurations as text is processed from initial input to final printout. These include bulk insert, edit, preview and printout modes. The preview capability gives the user a chance to see on the screen what the final printout will look like and is one of the excellent features of WPDaisy.

Initial text input

When the WPDaisy program is loaded, a title appears and the system is in the "screen edit" or text mode. The user can begin typing immediately, and the material typed is simultaneously stored in memory and displayed on the screen. A fast typist may get ahead of the input in this mode, particularly when a lot of material is in the text area of the computer.

Normally, input is made in the "bulk insert" mode which, when selected, displays a blank screen and will accept typing without speed limitations and without the necessity of putting in carriage returns at the ends of the lines. Minor editing is possible in this mode; back spacing deletes individual characters and the entire line can be deleted. (This is done with control U or ^U, which is the same command used by the main operating system). It is not possible to go back to a preceding line in this mode. Hitting the escape key twice returns the system to edit mode and inserts the text just typed in front of the place where the cursor was at the time the bulk insert mode was selected. As much text can be put in with this mode as the memory will hold. Text can also be brought in from disc files; more about this later.

Editing text

Once a body of text has been entered, it can then be edited, changed in a variety of ways. This involves a number of functions, including cursor movements, display of portions of text on the screen, insertions, deletions, changes, etc. Some of these functions are invoked by individual key strokes, others by means of mnemonic commands.

Simple text changes are made by directly typing over the text to be changed, letter for letter. Characters can also be deleted or added one at a time. Control X (^X) deletes the character marked by the cursor, and when ^V is pressed the next single key pressed is inserted in front of the position of the cursor.

For moving the cursor around on the screen, the system provides controls useable on any CRT terminal keyboard. Pressed simultaneously with the control key, ^W is up, ^A is left, ^D is right and ^Z is down. Note that these make a diamond on the keyboard. A more convenient arrangement is available with the Hazeltine 1500.

More advanced edit functions are invoked by means of "escape commands," using the "command line." Pressing the escape key when in the edit mode leaves the cursor where it was, functionally, but moves it physically to the top line of the screen

WPDaisy con't...

Hamilton's system as used with WPDaisy. The printer at left is a Diablo model 1622, and the CRT is a Hazeltine 1500. The North Star mainframe, on its side, is seen at the left under the Diablo and the Morror (Thinker Toy) disc drives are to the right of it. An old television console holds the entire system, with room for documentation, discs, etc.

and displays a few underlines. Commands are entered on this line according to a consistent format, and the command is executed by pressing the return key. Commands have an optional number, sometimes with a sign, a letter or two, and possibly a text string or file name. The command letters are mnemonic, generally the first letter of the function, such as I for insert, R for read, and Q for quit (leave the editor and go back to the operating system). These letters, as all controls and commands in WPDaisy, can be either upper or lower case; for simplicity, only upper case letters are shown here.

Certain functions use a sequence of "steps." These are designated by letters, shown in the following chart; delimiters used by the program to define the steps are given in parentheses after the steps:

Command Character	Step	Delimiter
C	character	
W	word	(space, tab, CR, LF, FF)
L	line	(CR, LF, FF)
B	block	(LF, FF)
P	page	(FF)
S	screen	(23 lines)

Both forward and backward steps can be used.

Once a few pages of text have been entered it may be necessary to view portions of it on the screen. WPDaisy allows this by a variety of commands, using the command line and the "steps" mentioned above. These are in addition to the keystroke controls. The cursor can, for example, be shifted to the beginning (B) or end (-B) of the text in memory, to the "home" position on the screen (H), or to the last line (-H). To "shift" the cursor forward or backward a number of steps the typical command sequence is used, including a sign, a number, the command S, and the step desired. Moving the cursor to near the bottom of the screen and using ST on the command line shifts the last line or two to the top of the screen and displays the next screen full of text from memory. This is the nearest thing to scrolling that WPDaisy has (in the edit mode). My writing habits involve working over a text quite a bit after it has been entered, and when I work directly with WPDaisy, I find this aspect of WPDaisy a bit inconvenient. It would be much less a problem for a secretary correcting a written text. Although any portion of the text can be displayed, and by a variety of means, I feel it takes too many keystrokes to move forward through the text. This is discussed in more detail in the critique at the end of this article.

Like many text editors, WPDaisy includes "find" and "find and replace" functions. These are especially useful in editing computer programs and in modifying standard documents for different uses. Following WPDaisy's convention, a number, say 5, the command, F, and a text string will find the 5th occurrence of the text string. That is, 5FSmith will find the 5th "Smith" in the text forward of the cursor position and will display it at the beginning of the screen. To change the next 5 occurrences of Smith to Jones, add the command ^Z and the corrected text; 5FSmith-^ZJones.

One measure of the value of a text editor is its ability to facilitate moving around blocks of text. WPDaisy provides several options for this purpose. These include insertions and deletions, and the use of buffers and disc files. Deletions have been mentioned; this function is invoked by use of the command D, preceded by a signed number and followed by the step to be used. 5DW deletes the next 5 words.

Insertions of text are put in just in front of the cursor, either a single line of text typed on the command line after an I, or an unlimited amount of the bulk insert mode mentioned earlier. If an insertion followed by a carriage return is desired the command L can be used. This "line insert" is useful when editing programs.

For routine moving of text, WPDaisy provides 26 buffers, each identified by a slash followed by a letter. Text is moved with the command M (as usual, preceded by a signed number), the type of step, and the destination buffer (e.g., 5MW/A moves the next 5 words from the cursor's position to buffer A). The text in that buffer can then be inserted in front of a new position of the cursor by a read command, R/A. The "move" command does not delete the original text, hence this is really a copy command, rather than a move.

The buffers can be used for other functions than line-by-line editing, such as major rearrangements, construction of lists, and crude sorting. Text stored in the buffers can be "called" during printout in the same way as disc files (see below). Difficulties with the buffers include the lack of an "append" feature allowing one to add to a buffer. When something is moved to a buffer, whatever was there is lost and no backup is provided. There is not a quick method of telling which buffers are in use.

It is worth pointing out the value of adequate memory for maximum convenience in using WPDaisy. With 32K it was not uncommon for us to fill up the memory—it held about 10 pages. With 48K we have a great deal more freedom, in total text capacity as well as in buffer and text moving capabilities. Of course text movement is not limited to the buffers, as is discussed in the next section.

Disc file handling

A sophisticated feature of WPDaisy is its handling of disc files. All or part of the text can be moved to one of the discs under a selected file name, either as it is or formatted (acting on the formatting commands). Using the write command, W, plus a file name, a back-up file is created which contains the text which was previously in the file, and the current text is then entered under the chosen file name. A file can be read back into the text area of the processor, or can be introduced into a portion of text as it is being printed out.

One small problem with these disc files is that when they are reviewed on the screen by the "type" command of the operating system, the escape sequences do not show and occasional characters do not show (if preceded by an escape sequence).

A program for merging addresses and form letters is included, but I have not run it as yet.

Discs can be changed during operation of WPDaisy without disturbing the text area, and some of the "built-in" operating system functions can be used, such as displaying the directory or erasing files.

Printout formatting

A word processor should enable the user to enter the text in a more-or-less unstructured form, then to print it out in most any printed format. It should be possible to do this with formatting commands alone, and little or no retyping of the text itself. By "format," I mean variables such as margins and their justification, line spacing, paragraph indenting and spacing, page length, page headings and numbers, character spacing (e.g., pica or elite), handling of titles, footnotes, columns, centering, underlining, etc. WPDaisy goes a long way toward meeting this general requirement, with varying degrees of convenience for the different functions.

WPDaisy offers two general approaches to the preparation of a formatted document. The simpler approach is to enter the text formatted in the desired way, and just print it directly without formatting control. This is handled by turning off the "fill" function, in which case the spacing will be followed by the printer exactly as it was entered and as it is displayed on the screen. Other functions such as margins, underlining, etc., can be used in this mode.

More generally, a formatted printout is desired using formatting statements. Examples of some of these are given in Table 2. A look at these commands reveals one of the problems, not just of WPDaisy but of any word processor that works on a small microprocessor system without special keys. These statements are long when being entered, but are especially so when displayed in the text. Four characters are needed to display the escape character; it is entered by typing an escape and the letter E. The line feed, carriage return and form feed are handled in a somewhat similar manner.

Default setting

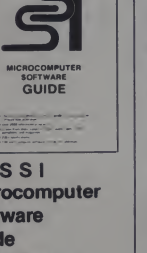
WPDaisy's formatting statements all involve a numerical value, either to switch the function on or off (a 1 or a zero) or to set values such as margins, spacing, indenting, justification, proportional spacing, centering, underlining and others. Default values for each of these are imbedded in the WPDaisy program; they are generally appropriate, but one or two are not as convenient as they could be, in my opinion. The user can set default values at the beginning of a session and they will be invoked until WPDaisy is reentered anew from the operating system; the user cannot make a permanent change.

Bugs and other crustaceans

This section discusses certain characteristics of WPDaisy which appear to be bugs or design errors, and it touches on a few items which may look like bugs but which, instead, are probably the result of improper user technique.

Strange things sometimes happen at the right margin. When typing in material in the bulk insert mode, the end of the line seems to occur at an arbitrary point, often a few spaces before the margin. This is apparently due to the word break on the line before using up a few characters on the next line, and usually results in no problem on printout.

Once in a while, a character gets "stuck" at the right margin and cannot be removed or written over by the usual editing keystrokes. This can usually be cleared by deleting the last part of the line with a line delete and retyping that part. Also, sometimes indenting, spacing, or margins do not behave normally. Sometimes WPDaisy insists on offsetting the normal margin by one or two characters on a single line. This acts as if it were caused by imbedded characters that are not displayed on the screen (it isn't); when the part of the text causing the problem is deleted and replaced, things can be made to work normally. If the character stuck at the



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WPDaisy con't...

right margin is in an escape sequence, part of the screen may be blanked out and nothing can be written there until the stuck character is eliminated. On occasion, I have found it expedient to change the wording of the text slightly in order to clear up the problem and get on with the job. One technique which sometimes solves this type of problem is the "clear screen" command, which clears the screen and re-displays it directly from memory.

A somewhat annoying characteristic results when one word appears on the last line of a paragraph. When typing standard single-spaced paragraphs, an extra line is included between them by means of two line feeds, a break and a line feed, or a skip line and line feed. The line feed is needed to indent the next paragraph, and to maintain a proper block count. When a single word is alone on the last line, WPDaisy skips an extra line. This has to do with the "break" which prevents the justification and hence inappropriate spacing of the last line of a paragraph. It can be corrected, but requires special attention.

When typing in edit mode past the right margin, if a word is not complete when the margin is reached the word flips to the next line, and the cursor does too, but the cursor goes to the beginning of the line rather than to the position where it was in the word. As a result, as typing continues it overprints and wipes out the word. This problem does not occur when in the bulk insert mode.

For some reason, the fill function closes up all words to only one space between words, and this prevails between sentences as well; it would be nice to have the extra space retained so two spaces could be used between sentences, or after a colon.

Table 2
Partial listing of WPDaisy printout formatting statements

[ES] the "escape" character, used to set off formatting statements.
[CR] carriage return.
[LF] line feed.
[FF] form feed; causes new page.

The following are used in the SAMPLE PRINTOUT.

MB bottom margin; -MB stops printer for new page to be inserted.
ML left margin.
MP paragraph indent.
MD delayed indent; sets indent on lines after the first in a paragraph.
PN page number for following page.
PW page width.
LN normal letter width; sets width in 60ths of an inch.
LP proportional line spacing switch.
C centering.
U underlining.
J justification.
F filling.
SP line spacing.
SK skip lines.
HA the text string following this becomes heading A (the first one).
HB heading B (on the second line).

The above are preceded by a number which determines the value, or if the command is a switch turns it on (1) or off (0). Their use is demonstrated in the SAMPLE PRINTOUT. Additional statements cover top, heading and special margins, page length, the visible space, a non-specific "break," non-printing comments, and reading from a disc file.

Missing capabilities: footnotes, subscripts, overprints, etc.

Daisy lacks a few specific formatting functions. A footnote can be inserted, but to do so one must find where it goes by previewing, then insert the footnote itself or a statement to call it from disc or buffer at the proper point. Subscripts and superscripts are not possible in the current version (00.08), nor is it possible to use 1½ spaces between lines. These latter two are unique as far as I can see in being the only things WPDaisy will not do at all, no matter how much trouble one is willing to go to. (Some printers support the 1½ line spacing, independently of WPDaisy.)

Overprinting such as might be used for construction of symbols or foreign letters has to be done with the negative line feed and an extra line, and generally a few tries to get it right. Also bold face and double strike (to make a better copy with cloth ribbon) are not available on the 00.08 version.

Things I'd like to see

In addition to the items mentioned in the section above and trouble spots referred to earlier, I have made a few other wishes when using WPDaisy as to what I'd like to have it do. These I think are reasonable, and I have made these suggestions to TSA. I'm told some are already being prepared for introduction in future versions; some changes may be available as this goes to press (see below). Don't be misled by my problems into thinking TSA is not responsive. They have, in fact, been most helpful and patient with this novice.

The biggest help for me would be a more efficient way of moving back and forth through the text, in edit mode. Scrolling would be nice, but at least I'd like to have the text move up a line at a time when the cursor reaches the bottom of the screen. I'd like to have the shift screen command display the next screen (instead of moving 23 lines from the current

SAMPLE PRINTOUT

A bug which turned out not to be one

When I first set up my smell system with the WPDaisy software I found it impossible to control the printout format. Indenting eppeered spontaneously without epperent reeson, end I could not seem to get it to work when I wented it to.

The reveletion came when I discovered thet the Heseltine 1500 has e switch which permits the user to select whether e line feed or e carriege return cherecter is sent when the typing reeches the right edge of the screen. My terminel hed been set on line feed!

When I switched to "cerriage return" things began to look up. It was e heppy dey, and elthough this discovery did not cleer up all my problems, it quite euddenly mede the system eeem like it might somedey become controlleble.

Note thet the first peregreph is printed with the default veluee built into WPDaisy--filled end justified but not proportionel. The type fece ueed is that for 12-pitch or elite epecing; the spacing in the first peregreph is 10-pitch end the others are 12. The second paragreph ie filled, justified and hes proportionel division of the speces between words. The third ie not justified, this one is.

cursor position), repeating the current bottom line at the top of the next screenload. When bulk text is inserted the cursor goes to the end of the insert, and this is placed at the top of the screen. I've learned that the frightfully blank screen is OK and the text is there—easily displayed by a shift top command—but I'd like to see the last line or two of inserted text. In fact, I would prefer the cursor to end up at the beginning of it, since I'm going to review it anyway. Even the command which takes the cursor to the end of the text could leave a line or two visible. I rarely have the confidence to start typing on a blank screen without backing up to see where I am. The shift top command should also redisplay the current line.

The find function puts the found string at the left margin and top of the screen, hence not in its context. Why not show the whole line, with the cursor on the found word? I'd like also to be able to use the find command in a backward direction, and to display in a list all lines containing found words. While finding things, I'd like to be able to count the number of items found, and though it is a different category of request, I'd like to be able (optionally) to number the lines.

Changes coming up

I have been told by Rich Roth of TSA that a new version, due any day now, will incorporate some of the changes I have suggested and some others as well. These include sub and superscripting, fractionally variable line spacing (e.g., the ability to use 1½ spaces between lines), tab setting in format mode, ability to read the disc file directory without leaving WPDaisy, overstrike, bold face and double strike capabilities, and a simplification of some of the commands and formatting statements. There will also be editing and formatting macros, plus single character macros. This latter item will enable the user to define a single character as a format statement, such that whenever the character is used the statement is executed. For example, the brackets could be used to start and stop underlining.

A much more extensive text and data handling system based on the word processor is also in the works at TSA.

Summary

Everything considered, I am quite pleased with the WPDaisy word processing program and the hardware I run it on. It will do essentially anything I want it to do, though some things are less convenient than they could be. Things that are impossible in the version I have are sub and superscripts and proportional control of spacing between lines. Moving the text back and forth on the screen for editing is slow, and many of the commands are a bit cumbersome. There are occasional bugs in printout, but these seem to be a result of user technique as much as the program itself. The system has been operated independently (albeit at less than its full capability) by users with only a couple of hours of training.

I feel that I have been able to obtain a true word processor with most of the features of the dedicated ones at less than half the cost.

Where to get WPDaisy

The WPDaisy and other TSA software can be obtained through most computer stores, or from TSA Software, Inc., 39 Williams Street, Monroe, CT 06468.

WPDaisy is also available from Dynabyte, Inc., 1005 Elwell Ct., Palo Alto CA 94303, and includes a self-teaching program for learning how to use and apply the system. $350. □

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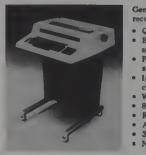

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Victor K. Heyman, 1706 Lorre Dr., Rockville, MD 20852.

IDSWORD was created two years ago for the MITS Altair System. It has been franchised to a number of distributors who are converting it to different computer systems. Versions exist for North Star, Apha Micro AM 100, Cromemco, Technico, TRS-80 (disk), Apple II (disk), CP/M 5" and 8" disks in either CBASIC or MICROSOFT basic, and, of course, MITS. Versions for OPUS and PASCAL are in the offing.

If you carefuliy read advertisements for word processors and articles about them, you will suddenly realize that you are told little about their capabilities or requirements. How much memory does Brand X take? How will it work with your disk system. Can it produce finished copy in single, double, or triple space? Does it permit movement of blocks of text from front to back or in between? How about changing the number of characters per line (reformatting)? Do you need to retain redundant word processing files, or can you convert to a standard data file at half the file space (and convert back later if need be)? Does it do form letters, print labels, and prepare name and address files?

This review discusses the IDSWORD system in detail, based on the North Star Version (each version varies a little). Hopefully, you will have something of a yardstick for comparing it to other systems on the market.

IDSWORD Modules

IDSWORD is a big system. At the moment it consists of 7 separate major modules, some with submodules, plus (in my version) North Star Basic, DOS, Monitor and Compactor. The North Star items enable you to turn on the computer and come up directly in IDSWORD. Since all the modules are "chained" you are rarely aware of which module you are in, so you don't have to worry about remembering a lot of code names. Now, let's look at the major chunks of the system (the prices for the various modules are listed in Table 1).

Minimum System

IDSWRD	$100.00
IDSEDL	25.00
IDSEDC	50.00
IDSEDG	30.00
IDSCOP	15.00
IDSMOV	35.00
IDSLET	30.00
IDSNAM	20.00
Total	$305.00

Table 1. IDSWORD modules and prices.

Basic Modules

IDSWORD is the text-entering, listing, and printing system (i.e., the heart of the system). IDSEDC is the editing module for CRT's, and is essential to getting the maximum out of the system. Thus you can have all of the essentials for $150.

But, there is more. Want to do line editing, after listing out your text? It is a simple and quick way to do minor editing. IDSEDL does it and you could get by with this package and not the CRT editor but I wouldn't recommend going that route. Nevertheless, the option is there, and you would have a useable package for $125.

How about "global" editing? IDSEDG allows you to easily correct a misspelled word throughout the text. Quite handy if you make a point of being consistent in your misspelling of words. For example, if you misspelled "computer" in several places within a paper IDSEDG will search the text and replace every misspelling with the correct spelling (the command is "RA, compter, computer").

Want to save disk space when you store old files? With IDSCOP you will be able to copy regular files to word processing format and back again. I've used it for every report, letter and mailing list I've done. I don't have many disks tied up storing materials, and I can still reuse those files later. (On the MITS version COP will allow you to use IDSWORD on Basic programs.)

IDSMOV will allow you to move text from one place to another, or even to copy it into two places. Remember the old adage: stream-of-consciousness writing makes lousy reading? With MOV you can move that brilliant passage to the place that it logically belongs. The system simply creates a temporary disk file for the text to be moved or copied, puts it where you want it in the main file, and then destroys itself. Neat.

Other Features

IDSLET and IDSNAM are the modules that let you create personalized form letters and name and address files. I've used them for sending out job applications for my oldest two boys. The NAM module is used for labels and also supplies the proper headings for the form letters. And you can use the "special comments" lines in NAM for inserts into the letters produced by LET.

The Bottom Line

The cost of the whole system is $305. If that seems high, it should be kept in mind that IDSWORD is a dynamic creation. The system is not going to become obsolete. For instance, a sort module for NAM is almost here, as is a data base

management module, an auto-index module and some user-oriented improvements to the basic modules. For a small price you can get an "Auto Upgrade" guarantee. For the Horizon version, that's $25 for one year or $40 for two.

Ease of Use

How easy is it to operate? Well, in about 5 minutes I showed my high school senior how to enter text, how to use EDC for editing and then how to print. He never has looked at the manual. He now does his school essays on my computer—much easier than using a typewriter. To top it off, the other night, two of his friends were knocking out their essays on the computer, because they wanted to be able to edit without having to retype everything.

Even so, there are many features of the system that can be used better with a little instruction. The manual for the IDSWORD system is very readable and quite comprehensive. In less than 40 pages it tells you how to use the system and gives tips on alternative approaches. Nicely done.

What happens when you make a mistake — a big one? Can you bomb your whole text file? Not without really working at it, in my experience. In the first place, the Horizon version has excellent error trapping features (including trapping attempted exits through 'Control C'). This maintains program integrity very well. In the second place, when you have filled a file, the program closes it automatically, and then permits you to set up another file, which you can later merge with the first. In the third place, the existence of two text files permits you to cancel all the changes you may have made erroneously by simply commanding "RESTORE". No, despite my best efforts, I have not completely bombed a file since I got IDSWORD.

Not All Clover

Nothing is perfect. There are IDSWORD features you may not like (based on my experience with the North Star version.)

First, it is a line-oriented system. You have to hit "return" to terminate the end of a line, just as on a typewriter. A new line must be less than about 120 characters long. You do not have automatic movement from one line to the next. That takes a little getting used to. The ADM-3 will ring a bell at the end of the line, but the SOROC doesn't. You can overrun the line, getting an error message if you get greedy. The answer is simple, though. Don't push your lines too much, and let the reformatting module even up the lines when you are done.

```
NAME OF WORD PROCESSING FILE: IDREV
DRIVE: 2
'IDREV@' FILE OPERATION (TYPE 'HELP' FOR ASSISTANCE) HELP


     S P E C I F Y   O P E R A T I O N   A S   F O L L O W S :
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
OPERATION              DESCRIPTION OF FUNCTION
=========   ==========================================================
   COP      COPY AN EXISTING FILE TO SYSTEM FILE.
   DEL      DELETE FILE
   EDC      LINE EDITING ON THE CRT.
   EDG      EDITING - GLOBAL.
   EDL      EDITING - LINE BY LINE.
   LET      PRINT FORM LETTER FROM NAME & ADDRESS FILE.
   LIS      LIST THE CONTENTS OF THE FILE.
   MER      MERGE TWO OR MORE FILES TO A NEW FILE.
   MOV      MOVE OR DELETE BLOCKS OF DATA.
   NAM      ENTER NAME & ADDRESS DATA.  CREATE OR ADD TO A FILE.
   NEX      NEXT W/P FILE - ENDS WORK WITH CURRENT FILE.
   PRI      PRINT DATA IN FINISHED FORM.
   REF      REFORMAT DATA.
   RES      RESTORE FILE TO ELIMINATE LAST CHANGE.
   TEX      ENTER TEXT DATA.  ESTABLISH OR ADD TO A FILE.
   XIT      EXIT FROM THE PROGRAM - ALL WORK IS DONE.
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

'IDREV@' FILE OPERATION (TYPE 'HELP' FOR ASSISTANCE) XIT


IDSWORD ENDED. GOODBYE.
READY
```

Figure 1. Menu from IDSWORD.

Second, when entering text you do have to wait about every five lines to update disk memory and come up with the next numbered line for you to type on. If you are composing on the Keyboard, that's not much of a problem. But if you are a madman typing a long manuscript at top speed, the delay is definitely noticeable. This is not a problem on the MITS version.

Third, the IDSWORD does indeed run in 32K memory, but editing in the CRT mode with EDC is rather slow. You only have about 32 lines in memory at any one time, and the program has to pull a line at a time from your disk file as you scroll through your text. An extra 8K memory is awfully useful, giving about 130 lines in memory, about the length of this article.

Fourth, the NAM module for name and address files is awkward to edit in its present configuration. Each entry is assigned 15 lines, 5 for name and address and the rest for telephone numbers and special comments. Each entry must remain 15 lines! To edit a 60 name file on EDC, you have to go through 900 lines of text, which is a bore. The IDSWORD people tell me they have a new approach in the works to make the editing operation faster. Good.

Finally, getting down to really nit-picking, you can't make it underline text. I don't know that any system will, or that the printer would be willing if the text system permitted, but it would be nice.

Summary

IDSWORD is a fine word processing system. It is simple to use and a pleasure besides. It costs $125 for the minimal version and about $305 for the complete package. It works well on a 32K computer, better with 40K, and it does not need a video board, CP/M, or a version of basic different from that standard for your computer. It is an evolving system that is extremely versatile. It can be expected to improve with age and use.

Having used it for a month on my Horizon, I wouldn't consider giving up IDSWORD. Definitely recommended. ■

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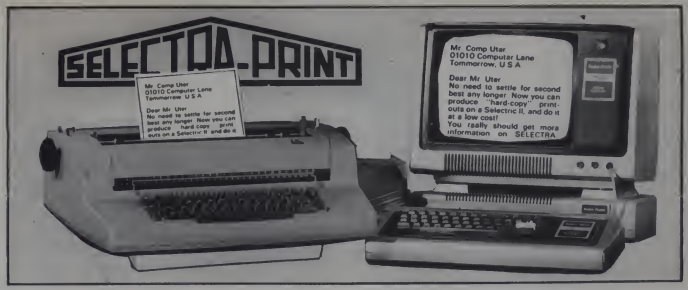

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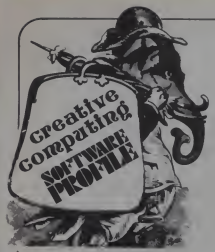

Peripherals Unlimited Text Editor

Jim Hunter

Two products, one hardware and one software, can provide passage into your new world of upper and lower case word processing.

When choosing a microcomputer, many people have shied away from the Apple II due to its lack of lower case ability. This is no longer a problem. As fate would have it, I was almost simultaneously introduced to the Dan Paymar lower case adapter for the Apple and the Peripherals Unlimited Text Editor. Since the Text Editor supports lower case as well, the two seemed a likely method of achieving finished copy with my Apple. The finished product is made by using a Selecterm printer, and the results have been quite satisfactory. This review will point out the benefits and drawbacks of both of these software items.

Paymar Lower Case Adapter

The Paymar adapter plugs into the Apple mother board under the keyboard. The main criticism I have about the unit rests here. The advertising says that it will install easily on the Apple. My experience was to the contrary. It was necessary to exert more force on the keyboard than I care to admit in order to place the IC 'shelf' (adapter) into its prescribed position. You are also required to place a second smaller IC into an adapter base, but this smaller unit poses no problems. Once installed, however, the unit has proven most worthwhile. There is a software package included with the Lower Case device, which uses control characters for shifting. Not having worked extensively with this software I would hesitate to demean it, but I find that the technique adopted by Peripherals Unlimited (using the escape key) is superior for touch typing.

The lower case adapter from Paymar lists for $49.95, and is available from your local computer store, or contact:

Dan Paymar, P.O. Box A-133, C.S. 6800, Costa Mesa, CA 92627.

For a finished copy application used with a 96 character printer, this device is a must for Apple II owners, who want to see on their CRT what is going to their printer.

Peripherals Unlimited Text Editor

Now that I had a lower case on my Apple, I began the search for a text editor which would make use of it. As luck would have it, I came across just such a unit within a very few days. Peripherals Unlimited, of Lakewood, CA, has a Text Editor which serves quite well, with a few limitations. First off, Text Editor is a general term, and brings to mind tools for "word processing." In this regard, the Text Editor must be termed a "line processor," since in most instances, correction of a single word is done by recopying a whole line of text. It should, however, be noted that Peripherals Unlimited does not claim to be a word processing unit, but rather a Text Editor. To this extent, they are quite accurate.

The program allows the writer to:

1. Append or insert text from the disk.
2. Correct a line.
3. Delete a line.
4. Find all occurences of a string.
5. Print (with or without justification).
6. Display text with line numbers.
7. Display memory remaining.
8. Replace all occurences of a string.
9. Save all or part of text to disk.
10. Set or clear tabs.
11. Center a line.
12. Perform other utility functions dealing with text handling.

When making output to a printer, you are asked about top and bottom margins, left margin, justification, spacing, and the nature of the forms used. It is a pity, but none of these queries has a default value, and thus they must all be set with each printout.

There is also an automatic page numbering feature which is useful, although it sometimes prints the numbers past your right margin. Two final observations in criticism: first, the string handling routines have a habit of getting behind a touch typist once in a while; and, the operator must wait for the machine to catch up. Finally, the justification algorithm is such that more spaces are allocated at the beginning of a line than at the end, although I am assured by Peripherals Unlimited that this will be corrected in short order with their next release.

In summary, then, the package does have its short-comings; however, if you can live with them, the editor is a great way to achieve finished copy with upper and lower case—especially when coupled with the Paymar device. The Text Editor sells for $60, and can be found locally, or contact:

Peripherals Unlimited, 6012 Warwood Rd., Lakewood, CA 90713, 213-425-8752.

The documentation is good, and you can be quickly on your way to producing finished copy with your Apple. □

Jim Hunter, Byte Shop of Westminster, 14300 Beach Blvd., Westminster, CA 92683.

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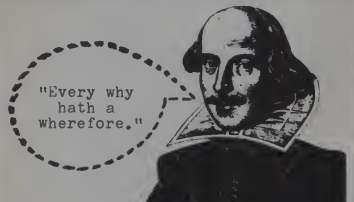

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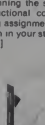

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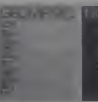

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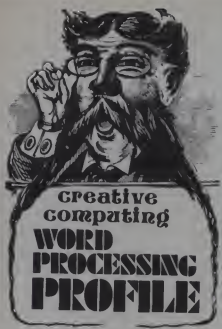

Wordmaster Text Editor

Glenn A. Hart

WORDMASTER is a comprehensive text editor written and sold by Micro-Pro International Corporation, Suite 400, 1299 Fourth Street, San Rafael, California 94901. A similar version called NED (for New Editor?) is distributed by IMSAI with their Version 2.05 IMDOS derivitive of CP/M.

IMSAI's naming of their version is more than just a clever designation for a new editor program. WORDMASTER/NED is an amplification and expansion of the ED editor supplied with CP/M. In many ways, WORDMASTER directly addresses the shortcomings of ED and greatly increases editing flexibility and ease while retaining much of the basic approach and structure of an editor familiar to many microcomputers.

WORDMASTER's structure is divided into two distinct yet interacting modes. Command Mode is essentially a superset of the normal ED commands, with several useful new instructions added and only a few commands changed in meaning. The main attraction is Video Mode, which has no counterpart in ED. In Video Mode, direct editing on video terminals is possible with the result that all commands are visible immediately. In this mode, WORDMASTER acts much like the editing portion of Michael Shrayer's Electric Pencil, although WORDMASTER does not require a memory-mapped video display.

WORDMASTER is invoked like ED, e.g., with a command like WM TESTFILE.TXT. If this file does not exist, WORDMASTER will create one for you. After a sign-on prompt, WORDMASTER enters Video Mode. Some of the existing file, if any, is automatically read in from disc; it is not necessary to manually Append any text. The bottom screen line is reserved in Video Mode, and an Escape will exit Video Mode, enter Command Mode and print the normal Command Mode prompt of "*" on the bottom line.

Glenn A. Hart, 44 Bon Aire Circle, Suffern, NY 10901.

Command Mode

Most of the Command Mode commands listed in Table 1 will be familiar to ED users. Commands which move the character pointer generally operate much as do ED commands. Note that since text does not have to be manually appended at the beginning or during an editing session, ED's "A" command is not needed. ("A" now does a 1L and then enters insert mode.)

"F" and "S" retain their normal meanings, but do their find or substitute only over the next 2000 characters or so or on whatever text is in memory. WORDMASTER adds the "N" and "R" commands to do a "long search" in either direction throughout the entire text file. Extra text will automatically be read in if necessary. Special characters are available for unusual character matching requirements. The "/" command changes branching in nested loops when the find or substitute command fails.

Note that the meaning of "R" is thus changed. WORDMASTER uses two new commands, "Y" and "W", to "yank" files into the file being edited (used to incorporate library files into working text) or write any number of lines to any specified file name. This I/O structure provides complete file management and text manipulation more sophisticated than most editors. Note also that many microprocessor editors limit the maximum size of the text file to the amount of available RAM. WORDMASTER's automatic reading and writing of text permits editing of very large files; the maximum file size is limited only by the capacity of the disc used.

WORDMASTER features a loop structure which allows the user to construct complex repetitive commands. Commands can be nested several levels deep. The "/" command before any find or substitute command insures that the next command in a nested structure will be executed upon find or substitute failure, rather than an error message being generated.

Table 1
Command Mode Commands

Command	Meaning
C	Move pointer by characters
D	Delete characters
L	Move pointer by lines
K	Kill lines
T	Type lines
P	Move and type Pages
I	Insert
A	Append
F	Find (short search)
N	Next (long search)
S	Short search & substitute
R	Replace (long search & substitute)
/	Branch (see text)
	Loop delimiters
Y	Yank (read file)
W	Write to file
Z	Sleep (wait)
V	Enter Video Mode
E	End edit
H	End edit and restart
Q	Quit
O	Return to Original file
QP	Put lines to Q-buffer/ Scratchpad, delete from file
QG	Get lines from Q-buffer
QT	Type Q-buffer
QK	Kill (clear) Q-buffer
QX	Execute Q-buffer
QL	Load text into Q-buffer

WORDMASTER implements an extra, separate buffer region which has many uses. Designated as a "Scratchpad" or "Q-buffer," lines can be inserted into this buffer and deleted from the main buffer to be reinserted somewhere else. Thus, block moves are made easy. Several commands are included for manipulating this scratchpad, including the ability to actually execute the scratchpad's contents. In this way, a complex command string can be created and put aside for later use. While this system may not be as

sophisticated as the multiple buffer structure of Xitan's Z-TEL, it is very convenient to use and greatly enhances editing.

Video Mode

Video Mode is entered from Command Mode with the "V" command. Most Video Mode commands are initiated with control characters. Table 2 lists most of the available commands.

One screenful of text in the general vicinity of the character pointer is displayed whenever Video Mode is entered. Text below or above the displayed screenful can be requested either a line at a time or screenful by screenful.

Complete control of cursor position is easy. Some may quibble with the control characters selected. While the Electric Pencil's control codes have some relation to function (e.g., the diamond shape of the simple cursor control codes), WORDMASTER's codes do allow normal cursor movement without much jumping around. In any event, the user quickly gets used to these code selections.

Unique to the WORDMASTER system is the ability to move the cursor word by word. This is extremely usefui in editing normal text, but since the program definition of "word" includes punctuation characters, this feature is slightly iess heipfui in editing programs.

WORDMASTER is normaiiy in over-write mode, which means that any character typed will replace the one under the cursor. Text can be inserted character by character with the "^F" command and characters, words and line segments can be deleted in either direction. Adding entire new lines is even easier with the "^N" command, which inserts a carriage return and leaves the cursor positioned immediately before it, thus creating an empty new line to fiii.

Several special commands are included. A "^I" inserts the next character into the file even if it is a control character. This is useful for inserting control characters like form feed for printers or clear screen for video terminals. "^W" repeats the next character or command 4 times; "^W^W" repeats 16 times, etc. if the user has an iMSAI VIO video display board, either WORDMASTER or NED allows direct control of character size, characters per line, reverse video, etc., and makes all the necessary corrections for the changed display parameters.

Table 2
Video Mode Commands

Command	Meaning
^ H	Cursor left character
^ L	Cursor right character
^ J	Cursor down line
^ K	Cursor up line
^ A	Cursor left word
^ D	Cursor right word
^ Z	Cursor right tab stop
^ B	Cursor beginning/end of line
^ ^	Cursor top/bottom of screen
^ E	File down 1 line on screen
^ X	File up 1 line on screen
^ R	File down 1 screenful
^ C	File up 1 screenful
^ F	insertion on/off
Rubout	Delete character right
^ G	Delete character left
^ /	Delete word left
^ O	Delete word right
^ U	Delete line left
^ P	Delete line right
^ Y	Delete entire line
^ I	Tab
^ N	Insert CR
CR	Insert on: insert CR Insert off: cursor to beginning next line
^ W	Repeat next character 4 times
^]	Put character in file even if control
^ V	Initiate iMSAI VIO control
Escape	Leave Video Mode, return to Command Mode

User Evaluation

I find the WORDMASTER system to be the most flexible and powerful, yet simple to use, editor I have tried, including editors on large mainframes. Most of my simple editing is done in Video Mode, which is superior to any video-oriented microprocessor editor. I use Command Mode primarily for searches, block moves, and I/O housekeeping. The general similarity to ED makes use of the Command Mode comfortable to any CP/M user, and the complex editing which can be done is occasionally a great time saver.

One command structure which is very useful is jumping back and forth between Command and Video modes. A command like FSAMPLE ZV will locate every occurence of the string "SAMPLE" in the text file, switch to Video Mode with a screenful of text in the vicinity of "SAMPLE" displayed and position the cursor immediately after "SAMPLE." This allows determining the context in which each "SAMPLE" is used. Any desired editing can be done in Video Mode, and hitting Escape moves on to the next occurence.

My only real criticism is probably not fair. WORDMASTER is only sold as a text editor with no provision for text formatting. Micro-Pro suggests that Digital Research's TEX program be used for output formatting, but I find TEX inadequate as a word processor, especially with my Diablo 1620 with proportional spacing. Text prepared with the Electric Pencil looks far more professional. Since I know of no free-standing formatting program with proportional spacing, boldface, underlining, etc., I use WORDMASTER to prepare only programs, not text. If Micro-Pro could incorporate such features into WORDMASTER or offer a separate program of this type, I believe an incredibly powerful word processing system would result.

In any event, I feel WORDMASTER is an excellent program, well worth its nominal cost. The fact that NED is included with iMDOS 2.05 is an unusual bargain. □

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CIRCLE 115 ON READER SERVICE CARD

Malibu 160 Line Printer

Rod Hallen

A computer without hardcopy capabilities is only half a computer. I discovered this fact early in my personal computer career. I use my computer not only to write software but also to create, edit and print magazine article manuscripts.

In the two years that I have had a computer, I have purchased three different hard copy devices. The first was a factory reconditioned Selectric (TM) based I/O terminal. For all intents and purposes it was in like-new condition. I really liked the print quality of the Selectric but it had four faults that finally convinced me to sell it.

It was very noisy. Even while it was sitting waiting to receive something to print, it generated a large volume of noise. It was a friction feed model and had to be fed with sheets of paper by hand one at a time. I tried using unperforated rolls of Teletype paper but they would not stay centered on the platen and were soon skewed one way or another. Maintenance was another factor. With dozens of parts whirling around constantly; lubrication, adjustment, and cleanliness were important considerations. The nearest IBM service shop is seventy five miles away and, while they were quite willing to service the Selectric portion of the terminal, I found two weeks to be the average down-time for lubrication and adjustment. However, my biggest complaint had to do with speed. At 15 CPS it often took up to fifteen minutes to print a short manuscript and while it was printing, I could not use the computer to accomplish anything else. Something faster was definitely needed.

About that time advertisements for the Teletype Model 43 (TM) began to appear. Offering 30 CPS printing, quiet operation, and sprocket-feed paper handling, it seemed that the 43 was the answer to my requirements. I bought one, added an RS-232 interface, and had it working within a half hour after it came out of its shipping case.

The 43 turned out to be exactly as advertised and has given me good service for more than a year now. I have run thousands of sheets of fanfold paper through it and have never detected a print failure of any kind. Except for simple lubrication that I do myself every few months, it has not required any maintenance whatsoever. It is totally silent except when actually printing and even then the noise level is very low. I am still using the 43 and I particularly like its keyboard which is the best that I've ever used.

Even though the 43 is twice as fast as the Selectric, it is still too slow to meet some of my requirements. That and the fact that it is locked to one size paper because its pin feed platen is not adjustable made me decide to look for something to supplement it.

After six months of studying the specs on more than half a dozen different dot matrix line printers, I decided on the Malibu 160 (see Photo 1). The 160 is manufactured by the Malibu Design Group, 8900G Eton Avenue, Canoga Park CA 91304. Its normal average printing rate is 165 CPS and it employs an adjustable form feed tractor. Power requirements are 110 or 220 volts AC - 50 or 60 Hz - 65 watts. Prices start at just under $2000.

Photo 1. The Malibu 160 shown mounted on its optional stand. It can also sit on a counter and feed paper from the front or from the bottom. The appearance of this unit is outstanding.

The 160 is shipped in a well-constructed packing case and it arrived in good condition three weeks after I ordered it from the factory. It was accompanied by a very thorough manual which contains sections on operation, theory, hardware and software. This includes an 8080/Z80 source listing of the printer driver software and character set and schematics of the printer and all optional interface boards. 6800 software is also available.

The manual is a good advertisement for the Malibu. It was printed on the 160 and is very attractive and professional.

Without going too deeply into its technical operation, I would like to discuss some of the reasons that I decided on the 160. It obviously answers the two main requirements that I had while looking for a line printer - speed and adjustable paper width. However, there are other machines that also posses these qualities.

Since I use my computer to generate magazine articles, all uppercase only printers were immediately scratched from the list. Potential printer buyers should consider this point carefully. While you may now be buying a printer only for your own use, you might want to submit programs and articles to magazines sometime in the future to gain some financial benefits from your creations. Most magazine editors will not even consider manuscripts that are printed uppercase only.

Interface is another consideration. How easy will it be to connect the printer to your computer and get it going. The Malibu is available with RS-232, S-100, or parallel interfaces. For most potential buyers the first two will be the easiest to implement. Both are plug-in-and-go type arrangements and the only special requirements are the patches necessary in your operating system to call the printer software whenever you have a character to output.

The printer software for the RS-232 and S-100 versions of the Malibu resides in a PROM on the interface board. This software includes not only the driver routines needed to control the printer but also the character set. Since the character set is software generated, it is easily changed. Foreign, scientific, or other exotic character sets are possible.

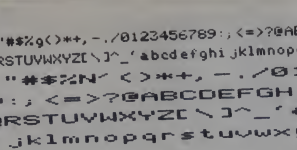


Figure 1. The 160 Chereter set shown in single end double width modes. The double width characters ere good attention getters when used for titles, headings, end posters. A test routine in the printer driver software prints the chereter set whenever it is called.

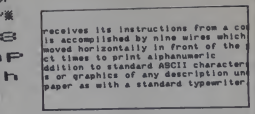


Figure 2. Recently released ENHANCED CHARACTER SET for the Malibu 160, which ie very close to word processing quailty. Note the difference in these cherecters end those shown in Figure 1.

Figure 1 is a printout of the ASCii character set that comes with the 160. Single-width characters are printed at ten characters per inch. Note that the tails (extenders) of characters such as g, j, and y are below the line where they belong. This makes for much easier reading. Figure 2 is a sample printout of the enhanced character set, which is the latest release from Malibu, and is quite close to word processing quality.

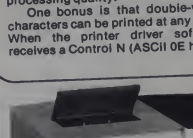
One bonus is that double-width characters can be printed at any time. When the printer driver software receives a Control N (ASCII 0E hex) it will print double-width characters until it receives a Line Feed (ASCii 0A hex) or a Control O (ASCII 0F hex). It will then revert to single width printing until another Control N is received.

Double width printing is an attention getter and can be used to head program listings, make your own letterheads and to title pamphlets and home printed documentation.

I chose the parallel interface version of the Malibu. This requires two parallel ports which i already had available in the SOL. it also requires that the software which usually resides on the interface board in PROM be loaded into system RAM each time that the computer is turned on. I solved this by recording the Malibu software on disk from which it is easiiy loaded into memory.

Having the character set in RAM also makes it much simpler to change. in fact, more than one alphanumeric or graphic character set can be stored in memory and called as desired. I have already changed the shapes of some characters to suit my own personai tastes.

The software normaiiy supplied by Malibu is designed to be loaded



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starting at B000 hex but they will relocate it for you. I ran the source code that they provide through my assembler and now I can put it wherever I want.

The adjustable form feed tractor will accomodate paper in any width between four and fifteen inches. One to four part forms can be used. The paper feeds from either the front or rear of the case at the bottom and it is very simple to change from one type or size to another. Up to 132 characters can be printed on fifteen inch wide paper.

When the printer is initially turned on or the type of paper is changed, the paper is moved up or down with two pushbuttons until the top of the form is positioned for printing and a thumbwheel switch is then set for the number of lines on a page. Since the 160 normally prints six lines to the inch, this switch would be set at 66 for pages eleven inches long. As long as the printer is turned on it will remember these settings.

With this accomplished three different methods of form feed are available. The simplest is a pushbutton that advances the paper to the top of the next page whenever it is activated. The software will also form feed the paper whenever it receives a Control L (ASCII 0C hex).

A switch in the software can provide automatic form feed when desired. When this switch is on the software will count lines and insert a form feed each time that the number of lines equals a number which has been stored in a specified memory location. This is particularly handy when printing program listings where it is difficult to determine in advance where to insert the form feeds.

Another software switch will automatically insert a line feed after each carriage return when desired. This is to take care of user and system software that does not output its own line feeds.

The print quality of the 160 is outstanding. This is due in part to the Hydra (TM) print head that is used. This seems to be a high reliability item and it should last for a long time. The other reason for the good printing is the ribbon. It is continually reinked and runs at an angle so that the entire surface is used.

However, one of my two complaints with the 160 relates to the ribbon assembly. The ribbon is motor driven and is held under tension while the printer is turned on. When the power is shut off the ribbon becomes quite loose and it sometimes lays against the paper causing large black

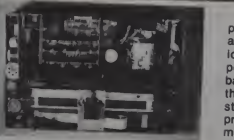


Photo 2. The interior of a well-engineered printer.

stains. The paper is also not held tightly enough against the print bar (a sort of metal platen) and the folds in the fan fold paper sometimes touch the ribbon as they advance and pick up small black smudges. This could probably be taken care of by adjusting the posts that position the ribbon in front of the print head but I haven't attempted it yet.

My other complaint has to do with the cooling fan. This runs all of the time and it is very noisy. It also vibrates the paper which is feeding out of the top of the machine. As far as I can tell the only function that the fan serves is to cool some power resistors that are in the printer motor circuit. The solid state control circuitry does not even get warm.

One very definite advantage that dot matrix printers have over the Teletype and Selectric based mechanical printers is the almost total lack of moving parts. There are no spinning mainshafts, no sliding and bouncing selector fingers and no pounding print hammers. The print head is moved into position and anywhere from one to nine slender wires force the ribbon against the paper in a predetermined vertical dot pattern. Five such patterns make up one character.

One contribution to print speed is provided by the 160 software. Characters are not printed one at a time as they are output to the print software. Instead, they are stored in a RAM buffer until a carriage return is received or the 132 character buffer is full.

The software then compares the present position of the printhead with the number of characters to be printed. If the printhead is closer to the place where the new line will end rather than where it will begin, the line will be printed backwards. For instance, if the line just printed is 40 characters long and it was printed from left to right the print head will be sitting at position 41. If the next line is 128 characters long, the head will return to the beginning of the line (home position) to print it.

If the head has just finished printing a 90 character line forward and the next line is 110 characters long, it will line feed, advance to position 110, and print this new line backwards. All of this happens so fast that it appears that the head is constantly sweeping back and forth, printing as it goes. That fifteen minute manuscript now takes less than one and a half minutes.

As I mentioned earlier, I bought the 160 with the parallel interface which requires two output ports and one input port. The output ports provide character data and printer control and the input port senses printer conditions such as head not home, out of paper and form feed in progress.

Conclusion

The first thing that you notice about the Malibu 160, both in its literature and in person, is its appearance. The 160 is housed in a beautiful wood grained Formica (TM) case. Upon removing the case (very easily done) you discover that the inside is just as beautiful as the outside. Beautiful, that is, measured from an electronic point of view. Here is a sturdy, well-built mechanism that looks like it ought to last a lifetime.

I have been running the Malibu 160 for about two months and it has performed flawlessly. While I don't have any software yet to do graphics, pictures, or other exotic things, I have seen these done on another Malibu and I was really impressed. With complete control of the printhead it is possible to also print photographs composed of dots similar to the way in which newspaper photos are printed.

A set of graphic characters such as those used by the TRS-80 (TM) can also be substituted for or combined with alphanumeric characters to allow your computer printouts to copy your video screen graphics. I'm working on some software to generate printer graphics right now. With custom software the print head can be moved horizontally or vertically in 1/60 of an inch increments.

I feel that I made the best possible printer purchase within my price range and I haven't regretted my choice. Some non-computer oriented magazine editors don't particularly like dot matrix character printing but I feel the new enhanced character set will bring them around. In the meantime, my word processor and my line printer save me an enormous amount of time that I would otherwise spend hand typing manuscripts. □

Glossary

Alphanumeric character set - Consists of all of the alphabetical and numerical characters. It may or may not include lowercase letters and punctuation.

ASCII - American Standard Code for Information Interchange. The standard computer alphanumeric code.

Buffer - In this context means a memory storage area.

Canned Programs - Programs designed to load and go without any programming effort on the part of the user.

Control characters - ASCII control codes created by depressing the keyboard Control key and the desired character at the same time.

CPS - Characters Per Second. A measure of a printers operating speed.

Dot Matrix - A printer or video screen display method in which characters are drawn with a series of dots.

Friction Feed - Printer paper feed method designed to be used with unperforated roll or sheet paper such as on a standard typewriter.

Graphic Character Set - A group of various shapes which are combined to draw pictures, graphs, charts, etc.

Hardcopy - Printed material as opposed to a video screen which produces softcopy.

Hex - A number base system that counts by sixteen instead of ten as the decimal system does. The hex characters are 0-1-2-3-4-5-6-7-8-9-A-B-C-D-E-F.

Interface - Usually required to connect peripherals to a computer. It satisfies the control and data signal requirements of both the peripheral and the computer.

I/O Terminal - Equipment designed to allow both input to and output from a computer. The input is usually from a keyboard. The output is usually to a printer or video screen.

Parallel Interface - Interface in which all signals paths are presented at the same time as opposed to a serial interface where signals are presented one at a time.

Platen - The rubber roller on a typewriter or metal plate in a printer which absorbs the impact of the printing mechanism.

PROM - Programmable Read Only Memory.

RAM - Random Access Memory.

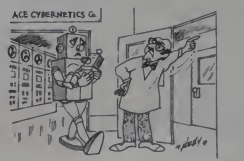
RS-232 - A serial data interface standard in which a data 1 is represented by a +5 to +15 volt level and a data 0 is represented by a -5 to -15 volt level.

S-100 - A bus standard used with most 8080/Z80 microprocessors.

Source Listing - An assembler program in symbolic code (mnemonics and labels) which can be easily interpreted by those familiar with assembly-language programming.

Sprocket feed - Paper feed method that uses pins which fit into holes in the paper to hold and move it. Variations are called pin feed and tractor feed.

Uppercase only - Prints the ASCII 64 character subset which includes uppercase letters numbers and punctuation.



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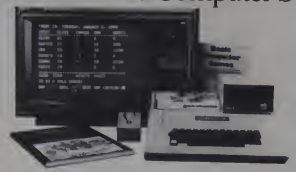

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CIRCLE 194 ON READER SERVICE CARD

POWERFUL INTERFACES

S-100 RS-232 CONTROL CARD

8-SERIAL I/O CHANNELS
MODEL 232-100K (KIT) - $149.95
MODEL 232-100A (ASSEM.) - $179.95

A MUST FOR THE SERIOUS USER: NOW, FROM A SINGLE SERIAL I/O PORT YOU CAN SEND AND RECEIVE DATA TO ANY OF THE 8 CHANNELS WITH A SIMPLE SOFTWARE COMMAND EITHER IN BASIC OR MACHINE CODE.

- **INDIVIDUAL BAUD RATES:** Each channel can be set for its own individual baud rate via a dip switch. Card contains its own on board baud rate generator chip and crystal. The RS-232 Control Card will run any S-100 Microprocessor because of its on board timing clock.
- **ALL HARDWARE:** Yes this has our "ALL HARDWARE software match setting features. You are able to select and set status, its parity to match any software configuration. NO NEED TO CHANGE THE SOFTWARE TO MATCH THE BOARD.
- **SIMPLE OPERATION:** Only one port to configure. It's easy to set and run. You just output from Basic or your machine code program the Port # and Bit 1-8. By turning on bits one through eight you're able to direct your output to any RS-232 device. An extra feature is, you are able to run more than one RS-232 device at a time. Output and input from all 8 if you want.
- **EASY CONNECTION:** On top of the board are two 50 pin edge connectors. Supplied with the board are two cables with 40 Pin IDC connectors on one end and four DB-25 connectors on the other. All cables for connection from board to I/O devices is supplied.
- **HIGHEST QUALITY:** The highest quality parts are used. The P.C. board is double sided with plated through the holes, solder mask and silk screened legend.
- **FULL DOCUMENTATION:** A complete manual of operation and assembly is included.

S-100 Z-80 CENTRAL PROCESSING UNIT

MODEL Z-80100K (KIT) - $129.95
MODEL Z-80100A (ASSEM.) - $139.95

- Selectable power on jump to any memory address.
- Provisions for on board EPROM.
- True generation 8080 Q1 and Q2 clock signals.
- Selectable wait states on M-1 cycle memory request cycle, on board ROM cycle, and input-output cycles.
- True DMA tri states for all signals from processor board.
- All status signals are latched per the S-100 BUS specifications.
- Unit includes high speed Z-80A Microprocessor chip, 4 Mhz operation - can be switched to 2 Mhz, if so desired.
- Power requirements — +8volts @ 1.0amps.

*TRS 80 is a trademark of Tandy Corp

TRS—80* TO S-100 BUS CABLE ADAPTER

MODEL CAB-80K (KIT) $99.95
MODEL CAB-80A (ASSEM.) $119.95

- **FULL INTERFACE:** Contained within the cable assembly, is a small enclosure. This enclosure contains all the logic to convert your TRS-80* to be compatible with the S-100 BUS system.
- **FULL BUFFERING:** All address, data and signal lines are fully buffered.
- **EASY CONNECTION:** It is easy to connect. Just plug the one end of the cable into the one slot on your S-100 system and plug the other end into the rear of the TRS-80* keyboard or between the expansion interface. Turn on and go.
- **TWO EDGE CONNECTORS:** Two addition 40 pin port edge connectors are provided for other connection of expansion interfaces.
- **POWER:** All power is derived from the S-100 BUS structure. Since the TRS-80* will not support other devices hooked to its power supply, it is a must that your S-100 supply 8-10 volts D.C. Logic card contained within the cable has on board 5 volt regulator. Current requirements are 375 ma. Unit has separate terminal for exterior connection of DC power requirement, if it is to be supplied outside the S-100 BUS system.
- **FULL OPERATION MANUAL:** Not much need for a manual, but we have prepared one with full principal of operation, etc

TRS-80* 16K MEMORY ADD-ON KIT

FOR THE TRS-80* — SORCERER‡ — APPLE II†
8-PRIME, 250NS HIGH SPEED MEMORY CHIPS
MODEL 16K-80 - $95.00

- **All chips are new, top quality, factory fresh and tested.**
- Each kit comes with complete, simple to understand instructions. Even the least experienced individual can add on memory.
- Comes complete with programmed jumpers.
- **Guarantee:** If a chip fails, we will replace it with no questions asked. Lifetime guarantee!
- Remember: These are top quality prime #1 chips. All orders shipped same day as received!

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POWERFUL INTERFACES

TRS-80* SERIAL PARALLEL I/O MODULE

8-SERIAL INPUT/OUTPUT PORTS:
8-PARALLEL INPUT/OUTPUT PORTS:
MODEL MSIO-K $129.95
MODEL MSIO-A (ASSEM.) $149.95

• **EASY CONNECTION:** Connects to the expansion port edge card connector between keyboard and expansion interface or direct to rear of the TRS-80* keyboard.

• **DIP SWITCH:** All ports, baud rate, parity, etc. all set by dip switches.

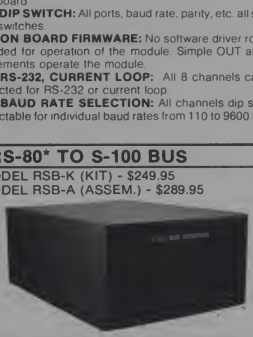
• **ON BOARD FIRMWARE:** No software driver routine needed for operation of the module. Simple OUT and IN statements operate the module.

• **RS-232, CURRENT LOOP:** All 8 channels can be selected for RS-232 or current loop.

• **BAUD RATE SELECTION:** All channels dip switch selectable for individual baud rates from 110 to 9600 baud.

TRS-80* TO S-100 BUS

MODEL RSB-K (KIT) - $249.95
MODEL RSB-A (ASSEM.) - $289.95



• **FULLY SELF CONTAINED POWER SUPPLY.** (10 AMP)

• **BUS TERMINATION:** BUS termination and conditioning for no cross talk or noise etc.

• **S-100 SIGNALS:** All required S-100 signals are generated by on board logic and is fully compatible with the TRS-80*.

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• **COMPLETE:** Comes complete with cabinet, card guides, on-off switch and sockets. Nothing else to buy.

• **STAND ALONE:** This system can stand alone or can operate with the TRS-80* All input, output, address and signal lines fully buffered between TRS-80* and S-100 BUS system.

• **EASY CONNECTION:** Just plug it into the rear of the keyboard or between the keyboard and expansion interface. Also includes 40 pin edge connectors for connection to other interfaces.

TRS-80* EPROM PROGRAMMER +3

MODEL EPR-80K (KIT) - $129.95
MODEL EPR-80A (ASSEM.) - $159.95

• **SELF CONTAINED:** Comes housed in an attractive cabinet with self contained power supply.

• **PROGRAMS:** This unit programs the popular 2708, 2716 EPROMS. Personality modules for other EPROMS will be available at a later date.

• **FIRMWARE:** On board firmware so that no software need be written or entered into your CPU system. The firmware can be shut off when not in use. Firmware residents at F000. The firmware in and out of system is controlled from a switch on front panel.

• **3-ADDRESSABLE ROM LOCATIONS:** The EPROM Programmer has three sockets on front panel which are addressable to any location by dip switch. In addition each ROM location can be shut off or turned on by switches located on the front panel.

• **MONITOR:** A monitor is supplied within the firmware for performing several functions. Move memory, debug, verify, program from memory, program from TTY input, etc.

• **EASY CONNECTION:** The EPROM Programmer is attached with ease. For the TRS-80* users, the unit plugs into the rear of the keyboard or between the keyboard and expansion interface. Included with the unit are two additional 40 pin edge connections for interfacing of other interfaces. For the S-100 users, a molded connection cable is supplied and it is inserted into one of the connectors on your mother board. Plug it in and it is ready to use.

• **FULLY BUFFERED:** add address and data lines are fully buffered.

• **OTHER FEATURES:** Other features include status lights for which ROM selected, switch enable for programming, pulse (burn) indicator firmware select-deselect switch, on, off and dip switches for the addressing of each ROM location.

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POWERFUL INTERFACES

TRS-80* EXPANDOR INTERFACE

MODEL EI-80K (KIT) - $329.00
MODEL EI-80A (ASSEM.) - $349.00

- 32K high speed 250NS memory
- Disc controller which controls mini or 8" floppies.
- RS-232 Port.
- Parallel Port
- Self contained heavy duty power supply. Plugs directly into rear of TRS-80* keyboard. Comes in attractive cabinet. **Twice the value for what you would spend for a TRS-80* expansion interface.**

TRS-80* MASTER CONTROL CONSOLE

MODEL MCC-K (KIT) - $129.95
MODEL MCC-A (ASSEM.) - $159.95

A COMPLETE COMMAND CENTER FROM YOUR KEYBOARD OR FROM ANY LEVEL II OR DISC BASIC PROGRAM. Turn on bells, sprinklers, sense fire and burglar alarm, anything that needs a switch can be controlled by the command center.

- **16 OUTPUT LINES:** With 8 relays, SPST, and 8TTL diode protected signals.
- **16 INPUT LINES:** 8 lines with OPTO-COUPLERS and 8 ITL diode protected.
- **FULL LED PANEL:** For status indicators of all control lines.
- **COMPLETE WITH CABINET:** Has attractive sloping cabinet.
- **FULLY HEAVY DUTY POWER SUPPLY:** Contains power supply. No external power needed.
- **EASY CONNECTION:** Plugs into TRS-80* expansion port edge card rear of keyboard or between keyboard and expansion interface.
- **2-EDGE CONNECTORS:** 2-additonal expansion 40 pin edge connectors.
- **NEEDS NO SOFTWARE:** Operates from OUT and IN statements from BASIC or machine code statements. Example: (Out 5, 1=turn on switch 5. Out 6, 1=turn off switch 5, etc.)
- **COMPLETE MANUAL AND SAMPLE PROGRAMS:** Comes with comprehensive manual and sample programs.

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S-100 BUS MASTER CONTROL CARD

MODEL MCC-100K (KIT) - $159.95
MODEL MCC-100A (ASSEM.) - $189.95

TURN IT ON....TURN IT OFF

Now you can control the outside world plus sense its status and its functions. 16 output and input lines. Turn on those bells, activate burglar alarms, etc.

- **16 OUTPUT AND INPUT CHANNELS:** 16 output channels with SPST relay on each. Opto-couplers on each one of the input channels.
- **EASY PORT ASSIGNMENT:** Port assignment is made via DIP SWITCH. In addition this board features our "ALL HARDWARE" software match setting features. You are able to select and set status, its parity to match any software configuration. No need to change the software to match the board.
- **SIMPLE OPERATION:** Turning off the relays is commandable by addressing a port, plus turning a bit on or off. Sample: You're in basic and you want to turn on switch 16. You would write out 3, 16. This turns on switch 16. To turn it off you would write out 4, 16 and off it is.
- **HIGH QUALITY:** The highest quality parts are used. The P.C. board is double sided with plated through holes, solder mask and silk screened legend.
- **FULL DOCUMENTATION:** A complete manual of operation and assembly is included.

TRS-80* DISC CONTROLLER MODULE

MODEL DCM-80K (KIT) - $159.95
MODEL DCM-80A (ASSEM.) - $189.95
Option available: 1) 16K RAM Kit, high speed 250 NS with purchase of board - Special $85.00.

- Has provisions for 16K memory.
- Will control mini or 8" floppies.
- DOS operating system included.
- Plugs directly into rear of TRS-80* keyboard.
- Complete with power supply in attractive cabinet.

S-100 8K STATIC 250NS RAM MEMORY CARD

MODEL 8K-100K (KIT) - $119.95
MODEL 8K-100A (ASSEM.) - $139.95

- Fully buffered address, control and data lines.
- Memory protect and unprotect.
- Power on clear.
- Bank select feature for selection to any 64K quadrant.
- Battery backup.
- Will run with any Z-80 Microprocessor without need of wait states.
- S-100 BUS power requirement 1.4 amps.

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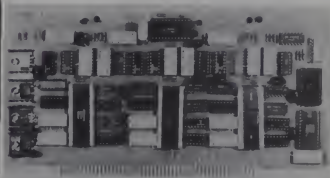
POWERFUL INTERFACES

S-100 3 S+P INTERFACE CARD

MODEL 3 S+P-100K - $159.95
MODEL 3 S+P-100A - $189.95



A powerful I/O interface card for any S-100 BUS. Three serial ports and one parallel port. Fully hardware operated. No software initialization required. In addition, this board will operate with any software. User is able to select status bits to fit any software configuration.

- **SELECTABLE BAUD RATES:** All baud rates are dip switch selectable. Each port can be set for its own baud rate. CRYSTAL CONTROLLED baud rates. This interface card can operate with any Microprocessor at any speed. The 3 S+P does not depend on the CPU for its originating clock. 110-9600 baud.
- **EASY CONFIGURATION:** The 3 S+P is easy to set. All port addresses are set by dip switches. Each port can be assigned independent of each other.
- **SOFTWARE COMPATIBLE:** The 3 S+P will be compatible with most software arrangements due to the ability to set the status bits and the parity. Parity, character length, stop bits all set by dip switches. Each port can be set to its own individual arrangement.
- **HIGH QUALITY:** The highest quality parts are used. P.C. Board is with plated through holes, solder mask, silk screen legend and gold plated contacts.
- **OUPUT ARRANGEMENT:** All outputs terminate at the top of the card via a 26 pin IDC connector. Standard 26 pin IDC connectors mate with each port. RS-232, current loop at each serial port and full data lines at the parallel port connection. Operation is asynchronous mode, but can be configured for synchronous operation by minor reconfiguration.
- **FULL DOCUMENTATION:** A complete manual of operation and construction is included. Easy construction and 3 hours is the estimated construction time. Just plug in, set the switches and enjoy all the different configured software. NO MORE changing the software to match I/O board. Just set the board and enjoy.

S-100 VIDEO DISPLAY BOARD

MODEL VID-100K (KIT) - $119.00
MODEL VID-100A (ASSEM.) - $139.00

- Provisions for plugging in keyboard
- 16 lines at 64 characters
- Full upper and lower case.
- Ascii key, character set, symbols, greek letters, and numbers.
- 7x9 dot matrix in an 8x10 field.
- Normal and reverse video, and blinking cursor
- Compatible with CPM
- A natural for text editing
- Comes with software driver in ROM which provides scroll up and down, full cursor positioning, flashing and field characters.

Specifications are. S-100 BUS compatible, high speed 1K memory. Voltage requirements - +8 volts @900MA, +16volts @40MA, -16volts @ 100MA. Output is standard video.

Epoxy glass double sided with plated through holes, solder mask and silk screened legend for easy assembly and servicing.

S-100 EPROM PROGRAMMER +3

MODEL EPR-100K (KIT) - $129.95
MODEL EPR-100A (ASSEM.) - $159.95

All the same features of the TRS-80* model. Comes complete with interface cable, S-100 plug-in card. Totally self contained power suply, plus many other extras.

S-100 DISC CONTROLLER CARD TRS-80* DISC DRIVES

MODEL DC-80K (KIT) - $169.00
MODEL DC-80A (ASSEM.) - $189.00

With the use of our interface cable or S-100 BUS system for TRS-80* computers this card controls mini or 8" floppies.

On board firmware with WDOS operating system, video driver, and keyboard driver which allows user to run any type of software available and emulates basic software driver resident in keyboard, if user so desires.

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NEW RELEASE!!

Disk Drives For The TRS-80*

- Complete with 4 Drive Daisy Chain Cable
- Nothing else to buy. Complete with power supply. Just plug into your expansion interface.
- Fully assembled, tested in an attractive metal enclosure.
- Can be daisy chained up to 4 units.
- Full 1 year warranty.
- Complete manual and easy hookup. Just plug it in.

ONLY
$390.00

Requires 16K RAM, Level II Basic and Radio Shack TRS-80 expansion interface or World Power Systems expandor interface or disc controller module. See our catalog sheet. TRS-80 is a trademark of the Tandy Corp.

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16K MEMORY ADD-ON KIT

FOR THE TRS-80* - SORCERER‡ APPLE II† 8-PRIME, 250 NS HIGH SPEED MEMORY CHIPS

$95.00

- **All chips are new, top quality, factory fresh and tested.**
- Each kit comes with complete, simple to understand instructions. Even the least experienced individual can add on memory.
- Comes complete with programmed jumpers.

GUARANTEE

If a chip fails, we will replace it with no questions asked.
Lifetime guarantee!

Remember: These are top quality prime #1 chips. All orders shipped same day as received!

TERMS

CASH WITH ORDER, VISA, MASTER CHARGE. NO C.O.D.'S! PERSONAL CHECKS REQUIRE 3 WEEKS TO CLEAR.

WORLD POWER SYSTEMS, INC.

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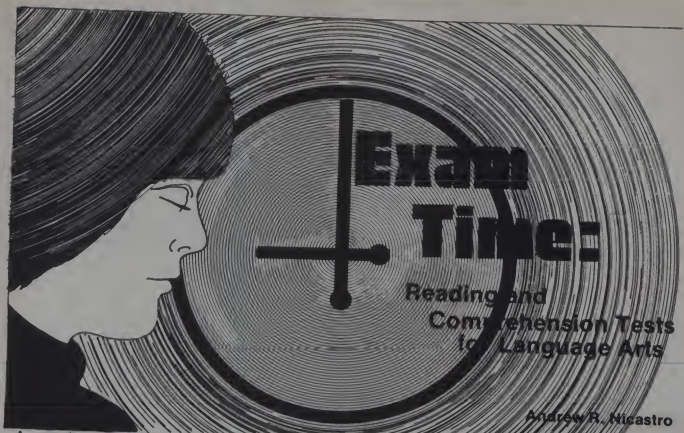
‡ Sorcerer is a trademark of Exidy, Inc.
† Apple II is a trademark of Apple Computer, Inc.

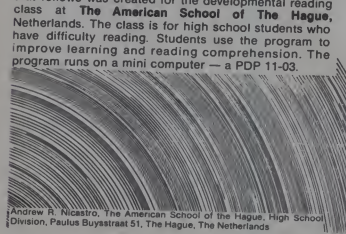
WATCH FOR MODULE 50



Exam Time: Reading and Comprehension Tests for Language Arts

Andrew R. Nicastro

A secondary school plans to spend, or has spent, a large sum of money on a computer for classroom use. How can the school optimize cost/effectiveness? How can teachers maximize utilization of the equipment, and involve as many students as possible? This is a central concern of all involved — students, teachers, parents, administrators, and board members. Using the computer in teaching computer programming, introductory computer science, and problem solving in mathematics come first to mind. Although these may be the central reasons for having a classroom computer in a small secondary school, they may, however, pertain to only a handful of students. Using the system for simulation and lab assistance in science classes will involve additional students. Still more can use the system for computer assisted instruction, and for drill and practice work in many disciplines. While many programs have been written for developing skills in mathematics and science, fewer have been written that address the needs of other subjects and that run on a small system. The program that follows was created for the developmental reading class at **The American School of The Hague,** Netherlands. The class is for high school students who have difficulty reading. Students use the program to improve learning and reading comprehension. The program runs on a mini computer — a PDP 11-03.



Andrew R. Nicastro, The American School of the Hague, High School Division, Paulus Buyastraat 51, The Hague, The Netherlands

What the program does: The program makes a video display unit act like a tachistoscope. It presents text to a student leaving each phrase on the screen for a specified time interval. At the end of the text, it asks the student multiple choice comprehension questions. The materials that follow here — a documented listing, annotated sample text file, sample run, and listing of a student record file — thoroughly describe the program.

How we use the program: The reading teacher selects paragraphs to be read. He underlines the text phrase by phrase; and he writes appropriate comprehension questions. One of the students from the typing class transfers the paragraphs and questions into a data file on the system. After the reading teacher has proof-read the file, a student computer aide enters the file name in the list of legal text files (see DATA lines 1860 to 1899 in 9PACER.) Since the reading teacher does not have a terminal in his room, he sends one or two students at a time to the computer room to run several exercises. At the end of the day or week, the reading teacher has one of the computer aides get a listing of the student record file on the printer. On our system, two students can run the program simultaneously provided they are logged on under two different USERID's.

The students and the reading teacher are enthusiastic about the program. It has prompted interest in the computer among other teachers as well. One of the language teachers, for example, has asked about the possibility of developing grammar drills for French classes. Finally, the program served as a very appealing demonstration for parents' night. ■

Andy Nicastro is the chairman of the high school mathematics department at The American School of The Hague, Netherlands, and is also in charge of the computer system there. The American School of The Hague is a private school for children of American businessmen and diplomats living in The Netherlands. The high school has three hundred and forty students.

```
PACFR  14-JAN-78  MU BASIC/RT-11 V01-01C
 5 '                    PROGRAM 'PACER
 10 '
 15 '            READING SPEED AND COMPREHENSION
 20 '
 25 'BY ANDREW R. MICASTRO
 30 '   THE AMERICAN SCHOOL OF THE HAGUE
 35 '   HIGH SCHOOL DIVISION
 40 '   PAULUS POTTERSTRAAT 51
 45 '   THE HAGUE, NETHERLANDS
 50 '
 55 'VERSION 1
 60 'OCTOBER 1977.
 62 '
 65 '
 70 '                  PROGRAM DESCRIPTION
 75 '
 80 '                        OVERVIEW
 85 '
 90 '   PROGRAM 'PACER DRILLS READING SPEED AND TESTS COMPREHENSION.
 95 ' IT PRESENTS TEXT PHRASE BY PHRASE AND DISPLAYS EACH FOR A
100 ' SPECIFIED TIME INTERVAL.  AT THE END OF THE TEXT, THE PROGRAM
105 ' TESTS THE USER'S COMPREHENSION WITH MULTIPLE CHOICE QUESTIONS.
110 ' AT THE END OF THE SESSION THE STUDENT'S RESULTS ARE DISPLAYED
115 ' AND WRITTEN TO A FILE.
120 '
125 '
130 '                THE SEQUENCE OF EVENTS
135 '
140 '   THE PACER PROGRAM IS IN TWO PARTS, 'PACER AND 'PACE1.  'PACER
145 ' COPIES THE OLD STUDENT RECORD FILE, AND PRINTS A NEW HEADER AT
150 ' THE END OF THAT FILE WITH THE CURRENT DATE.  IT THEN REQUESTS
155 ' INFORMATION FROM THE USER:  NAME, THE NAME OF THE TEXT FILE TO BE
160 ' READ, THE TIME INTERVAL EACH PHRASE IS TO REMAIN ON THE SCREEN,
165 ' AND THE NUMBER OF PHRASES PER LINE.  FINALLY, IT CHAINS 'PACE1
170 ' PASSING THIS INFORMATION VIA THE COMMON STATEMENT.
175 '   'PACE1 OPENS THE TEXT FILE, CLEARS THE SCREEN AND PRESENTS
180 ' TEXT AS SPECIFIED UNTIL THE FIRST OCCURRENCE OF [ IN THE TEXT
185 ' FILE.  THEN IT PRESENTS EACH COMPREHENSION QUESTION AND WAITS
190 ' FOR THE STUDENT'S RESPONSE.
195 '   AFTER THE STUDENT ENTERS HIS ANSWER, 'PACE1 COMPARES IT TO
200 ' THE CORRECT ANSWER THAT IS IN THE TEXT FILE.  THE PROGRAM THEN
205 ' PRAISES CORRECT RESPONSES OR INFORMS THE STUDENT THAT HE WAS
210 ' WRONG.
215 '   AT THE END OF THE TEXT FILE, THE PROGRAM SUMMARIZES THE RESULTS
220 ' OF THE SESSION DISPLAYING THE STUDENT'S NAME, NUMBER OF TEXT
225 ' FILE, PHRASES/LINE, AND TIME/PHRASE ON THE SCREEN; AND IT WRITES
230 ' THE SAME INFORMATION TO THE STUDENT RECORD FILE, PACER.DXX, WHERE
235 ' XX IS THE USER'S USERID - USUALLY A GROUP ID.  'PACE1 ENDS WITH A
240 ' SERIES OF QUESTIONS ABOUT WHETHER OR NOT THE CURRENT USER OR
245 ' ANOTHER WISHES TO RUN THE PROGRAM AGAIN.
250 '
255 '
260 '
265 '                  SOME SPECIFICATIONS
270 '
275 '   THE PROGRAM WAS DEVELOPED ON A PDP MU11V03 OPERATING UNDER
280 ' MU BASIC/RT-11.  IT IS USED WITH RX01 DUAL FLOPPY DRIVES AND A
285 ' VT52 VIDEO DISPLAY.  MODIFICATION FOR OTHER DISPLAYS ENTAILS
290 ' CHANGES TO LINES 395 AND 502 IN 'PACE1.  THESE LINES CLEAR
295 ' THE SCREEN.
300 '
305 ' STRING FUNCTIONS:  CHR$; DAT$; SEG$
310 ' OTHER FUNCTIONS:  INT, RND, SYS(8) TO DISABLE <CTRL>C,
315 '                   SYS(7) TO REENABLE <CTRL>C, TAB
320 '
325 ' SOME STATEMENTS:  CHAIN, COMMON, CLOSE, IF...THEN STATEMENT,
330 '                   INPUT #1, KILL, NAME, OPEN
335 '
340 ' KEY VARIABLES:    A$ = TEXT FILE, N$ = STUDENT'S NAME,
345 '                   T  = TIME INTERVAL FOR EACH PHRASE,
350 '                   P  = NUMBER OF PHRASES PER LINE
355 '
360 ' RUN-TIME LENGTH WITHOUT REM STATEMENTS:
365 ' 'PACER -- 3200 BYTES.          'PACE1 = 3850 BYTES.
370 '
375 '   'PACE1 TAKES ADVANTAGE OF A FEATURE OF THE IF...THEN STATEMENT
380 ' IN MU BASIC THAT IS NOT FULLY EXPLAINED IN THE MANUAL:
385 '   SUPPOSE THE IF...THEN STATEMENT IS ON A LINE CONTAINING
390 ' MULTIPLE STATEMENTS AS FOR EXAMPLE,
395 '
400 '     N  IF X>Y THEN XXX \ STATEMENT 1 \ STATEMENT 2
405 '     N+1  STATEMENT
410 '
415 '   WHEN X>Y IS FALSE AND WHEN XXX IS A LINE NUMBER, CONTROL PASSES
420 ' TO THE NEXT SEQUENTIAL STATEMENT; NAMELY STATEMENT 1.  WHEN X>Y IS
425 ' FALSE AND WHEN XXX IS A STATEMENT, CONTROL PASSES TO THE NEXT
430 ' SEQUENTIAL LINE, NAMELY LINE N+1.  THIS FEATURE IS USED IN LINES
435 ' 925 AND 940 IN 'PACE1.  THAT IS WHY THESE LINES ARE SO LONG.
440 '
445 '
450 '
455 '                 BEFORE USING THE PROGRAM
460 '
465 '   PACER REQUIRES A STUDENT RECORD DATA FILE STORED ON THE SYSTEM
470 ' DISK (DXO:).  IT MAY BE A NULL FILE.  IT ALSO REQUIRES AT LEAST
475 ' ONE NON-NULL TEXT FILE STORED ON THE SYSTEM DISK.
480 '
485 '
490 '                ABOUT THE STUDENT RECORD FILE
495 '
500 '   TO CREATE A NULL STUDENT RECORD FILE, A USER XX TYPES THE
505 ' FOLLOWING COMMANDS, WHERE XX IS THE USERID:
510 '           SCR
515 '           SAVE PACER.DXX
520 '
525 '
530 '                ABOUT THE TEXT FILE
535 '          (  ) INDICATES OPTIONAL EXPRESSION
540 '
545 '   TO CREATE TEXT FILES:  SELECT A TEXT TO BE READ AND BREAK IT
550 ' INTO PHRASES.  CHOOSE A [ TO A CHARACTER FILENAME FOR THE TEXT,
555 ' FOR EXAMPLE XXX.  LOG ONTO THE SYSTEM AS A PRIVILEGED USER.
560 ' TYPE: NEW XXX.D
565 ' TYPE EACH PHRASE OF THE TEXT INTO THE FILE LINE BY LINE.
570 ' EACH LINE OF THE TEXT MUST HAVE THE FORM
575 '          N *PHRASE
580 ' WHERE N IS A LINE NUMBER FOLLOWED BY (A SPACE AND) DOUBLE QUOTE
585 ' FOLLOWED BY A PHRASE.
590 ' THE LAST PHRASE OF THE TEXT MUST BE FOLLOWED BY THE LINE
595 '          N *[
600 ' WHERE N IS A LINE NUMBER FOLLOWED BY (SPACE) DOUBLE QUOTE, AND
605 ' LEFT BRACKET.
610 ' THE READING COMPREHENSION QUESTIONS FOLLOW IN THE FORM:
615 '     Q1 *QUESTION
620 '     Q2 *QUESTION CONTINUED?
625 '     D3 *A.  CHOICE 2     D. CHOICE 2     C. CHOICE,...
630 '     D4 *3                D.  CHOICE 4    ETC.
635 ' WHERE Q1, Q2, Q3, D4,... ARE LINE NUMBERS.
640 ' EACH QUESTION MUST BE FOLLOWED BY A LINE OF THE FORM          PAGE 3
645 '          N *[X
650 ' WHERE N IS A LINE NUMBER FOLLOWED BY (SPACE) DOUBLE QUOTES,
655 ' LEFT BRACKET, AND X = THE LETTER OF THE CORRECT CHOICE.
660 ' THERE IS NO SPACE BETWEEN [ AND X.  THE [ MARKS THE END OF THE
665 ' QUESTION FOR 'PACE1.
670 ' WHEN THE FILE IS COMPLETE, TYPE:
675 '     SAVE XXXX.D
680 ' STORING IT ON THE SYSTEM DISK.  THE TEXT FILE NAME MUST ALSO BE
685 ' ADDED TO THE DATA STATEMENTS IN 'PACER (SEE LINES 1860-1899).
690 ' BE SURE THAT "EOF" IS LAST.  SEE THE ACCOMPANYING ANNOTATED
695 ' TEXT FILE, TEXSAM.
700 '
705 '
710 '
715 '                TO READ THE STUDENT RECORD FILE
720 '
725 ' THE FOLLOWING PROGRAM WILL READ A STUDENT DATA FILE FOR USERID XX
730 '     10 OPEN 'PACER.DXX' FOR INPUT AS FILE 1
735 '     20 IF END #1 THEN 60
740 '     30 INPUT #1, T$
745 '     40 PRINT T$
750 '     50 GO TO 20
755 '     60 CLOSE
760 '     70 END
765 ' IF THE FOLLOWING LINES ARE ADDED, THE ABOVE PROGRAM WILL DELETE
770 ' THE CONTENTS OF PACER.DXX AND LEAVE A NULL FILE ON THE SYSTEM DISK
775 ' FOR FUTURE USE.
780 '     60 KILL 'PACER.DXX'
785 '     70 OPEN 'PACER.DXX' FOR OUTPUT AS FILE 1
790 '     80 CLOSE
795 '     90 END
READY
```

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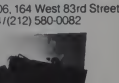

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```
'PACER  14-JAN-78  MU BASIC/RT-11 V01-01C
 '
 1 COMMON M$,A$,T,T1,P
 80 REM --- 90-150 WRITE A NEW HEADER IN THE STUDENT RECORD FILE.
 82 REM --- FLOPPY 01SKS ARE SOMEWHAT SLOW, HENCE LINE #5.
 85 PRINT 'TIME OUT FOR A FEW SECONDS.  PLEASE WAIT.'
 90 GOSUB 6010
100 PRINT #1, \ PRINT #1
110 PRINT #1,'PACER      '$DATE$
120 PRINT #1
130 PRINT #1,'NAME'+STAB(21)+'SCORE'+STAB(28)+'TEXT'+STAB(37)+'SEC'+
140 PRINT #1,STAB(43)'PL'
150 GOSUB 7010 \ REM --- COMPLETE THE FILE OPERATION.
201 REM --- 210-380 COLLECT INFORMATION (SEE PRINT STATEMENTS)
202 REM --- HECKED FOR THE REST OF THE PROGRAM.
210 PRINT \ PRINT 'DO YOU WANT INSTRUCTIONS'; \ INPUT D$
220 IF LEFT$(D$,1)='N' THEN 240
225 PRINT \ PRINT
230 PRINT 'THIS PROGRAM WILL PRESENT TEXT TO BE READ PHRASE BY PHRASE.'
240 PRINT 'YOU WILL DECIDE HOW LONG YOU WANT EACH PHRASE TO REMAIN"
250 PRINT 'ON THE SCREEN, AND HOW MANY PHRASES YOU WANT PER LINE."
260 PRINT \ PRINT \ PRINT 'WHAT IS YOUR NAME'; \ INPUT M$
261 IF M$="" THEN 260 \ REM-NO NULL NAMES
264 REM --- SUBROUTINE 2410 PRINTS THE NAMES OF EXISTIMO TEXT FILES.
265 PRINT \ PRINT 'TEXT NAMES:' \ GOSUB 2410
268 PRINT \ PRINT
270 PRINT 'WHAT IS THE NAME OF THE TEXT YOU WILL READ'?
273 REM --- SUBROUTINE 1510 CHECKS TO SEE IF THE STUDENT REQUESTS AN
274 REM --- EXISTING TEXT FILE.
275 INPUT A$ \ GOSUB 1810 \ REM--VALID TEXT?  F=0=NO.  F=1=YES.
277 IF F=1 THEN 285
280 PRINT \ PRINT 'THERE IS NO SUCH TEXT.' \
282 PRINT '010 YOU MAKE A TYPING ERROR?' \ GO TO 270
285 A$=A$+'.D'
310 PRINT \ PRINT 'HOW MANY SECONDS SHOULD EACH PHRASE REMAIN ON'
320 PRINT 'THE SCREEN?  ENTER FRACTIONS IN DECIMAL FORM.  FOR EXAMPLE:'
330 PRINT 'ENTER 1/2 AS .5'$
340 INPUT T
342 IF T>10 THEN PRINT 'TOO LONG A TIME !!!' \ GO TO 310
343 REM --- T1 IS USED TO TIME THE TEXT.
344 REM --- FOR I=1 TO 475 TIMES APPROX 1 SECOND.
345 T1=475*T
350 PRINT \ PRINT 'DO YOU WANT 1 OR 3 PHRASES PER LINE'$
360 INPUT P
370 IF P<>1 THEN IF P<>3 THEN 350
380 PRINT \ PRINT \ PRINT 'PLEASE WAIT A MOMENT.'
390 CHAIN "PPACE1.B"
1800 REM --- SUBROUTINE 1810-1855 CHECKS TO SEE IF STUDENT REQUESTS
1801 REM --- AN EXISTING TEXT FILE.  THE TEXT FILE NAMES ARE STORED IN
1802 REM --- DATA LINES 1860-1899.
1810 READ B$
1820 IF B$='EOF' THEN 1850
1830 IF B$=A$ THEN 1810
1840 F=1 \ RESTORE  \ RETURN
1850 F=0 \ RESTORE  \ RETURN
1860 DATA "TEXSAM","PNA","PNB","PNC","PND","PNE","PNF","PNG","PNH","PNI"
1899 DATA "EOF"
2400 REM --- SUBROUTINE 2410-2420 INFORMS STUDENT OF EXISTIMO
2401 REM --- TEXT FILES.  IT USES THE DATA IN LINES 1860-1899.
2410 READ B$ \ IF B$="EOF" THEN RESTORE \ RETURN
2420 PRINT B$; \ GO TO 2410
4000 REM --- SUBROUTINE 6010-6080 DISABLES <CTRL>C INTERRUPT
4001 REM --- AND COPIES ANY EXISTING STUDENT RECORDS INTO A TEMP-
4002 REM --- ORARY OUTPUT FILE.  IT LEAVES THE OUTPUT FILE OPEN
4003 REM --- SO THAT THE CALLING PROGRAM CAN UPDATE IT.
6010 PRINT \ C=SYS(0)
6030 OPEN "PACER" FOR INPUT AS FILE #2                          PAGE 5/12
6040 OPEN "TEMP" FOR OUTPUT AS FILE #1
6050 IF END #2 THEN 6070
6060 INPUT #2,T$ \ PRINT #1,T$ \ GO TO 6050
6070 CLOSE #2
6080 RETURN
7000 REM --- SUBROUTINE 7010-7040 NAMES THE UPDATED STUDENT RECORDS TO
7002 REM --- THE NAME OF THE STUDENT RECORD FILE.  AND REENABLES <CTRL>C.
7010 CLOSE
7020 NAME "TEMP" TO "PACER"
7030 C=SYS(7)
7040 RETURN
9999 END

READY

'PACER1  13-JAN-77  MU BASIC/RT-11 V01-01C
 '
 1 COMMON M$
360 REM --- CHR$(13)=RETURN.  CHR$(27)+ESC$  CHR$(34)="
366 REM --- A$ CONTAINS THE NAME OF THE TEXT FILE
370 OPEN A$ FOR INPUT AS FILE #1
390 PRINT \ PRINT 'WHEN YOU ARE READY, PRESS THE RETURN KEY.'; \ INPUT
D$
394 REM --- 395 CLEARS THE SCREEN ON A VT52.
395 PRINT CHR$(27)+'H'+CHR$(27)+'J';
396 REM --- P CONTAINS THE NUMBER OF PHRASES PER LINE.
397 REM --- IF P=1, LINES 395-414 PRESENT THE TEXT.
398 REM --- IF P=3, LINES 416-520 PRESENT THE TEXT.
402 IF P=3 THEN 416
403 REM --- T$ CONTAINS THE NEXT PHRASE.
404 INPUT #1,T$
405 REM --- SUBROUTINE 1010 STRIPS OFF THE LINE NUMBER AND * IN T$.
406 GOSUB 1010
407 REM --- THE FIRST OCCURRENCE OF 'E' MAKES THE END OF THE TEXT.
408 IF SEG$(T$+1,1)='E' THEN 410
410 PRINT T$;' ';
411 REM --- SUBROUTINE 1210 TIMES THE PHRASE.
412 GOSUB 1210
414 PRINT CHR$(13) \ GO TO 395
415 REM --- 416-520 PRESENT 3 PHRASES PER LINE
416 J=0
420 J=J+1
425 REM --- T$ CONTAINS THE NEXT PHRASE.
430 INPUT #1,T$
440 GOSUB 1010 \ REM --- STRIP OFF LINE NO. & * IN T$.
450 IF SEG$(T$+1,1)='E' THEN 410 \ REM --- 'E'=END OF TEXT
460 PRINT T$;' ';
470 GOSUB 1210 \ REM --- TIME IT
480 IF J<>3 THEN 420
490 PRINT CHR$(13);
501 REM --- 502 CLEARS THE SCREEN ON THE VT52.
502 PRINT CHR$(27)+'H'+CHR$(27)+'J';
520 GO TO 416
```


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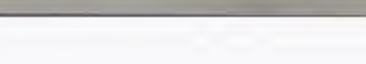
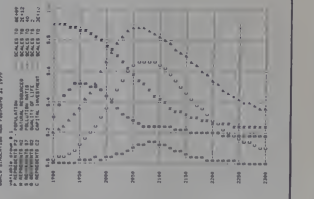
CIRCLE 101 ON READER SERVICE CARD

```
600 REM --- 610-670 PRESENT EACH COMPREHENSION QUESTION.
604 REM --- END OF FILE SIGNIFIES THE QUESTIONS ARE FINISHED.
606 REM --- Q COUNTS QUESTIONS?  W COUNTS WRONG ANSWERS.
610 Q=0 \ W=0
620 PRINT \ PRINT
630 IF ERO 91 THEN 810
639 REM --- T$ NOW CONTAINS THE COMPREHENSION QUESTION.
640 INPUT #1,T$
650 GOSUB 1010 \ REM --- STRIP OFF LINE NO. & *.
660 IF SEG$(T$+I,1)<>"*" THEN 710 \ REM --- "*" MARKS END OF GUEST.
661 REM --- THE CORRECT ANSWER TO THE QUESTION IS THE NEXT CHARACTER
662 REM --- AFTER THE * IN THE FILE.
670 PRINT T$ \ GO TO 630
702 REM --- 710-770 WAIT FOR AND EVALUATE THE STUDENT'S ANSWER.
709 REM --- Q COUNTS THE NUMBER OF QUESTIONS.
710 Q=Q+1
720 PRINT "ANSWER =";I \ INPUT G$
729 REM --- IS STUDENT'S RESPONSE CORRECT?
730 IF G$=SEG$(T$+2+2) THEN 760
738 REM --- W COUNTS WRONG RESPONSES.  SUBROUTINE 1410
739 REM --- INFORMS STUDENT OF INCORRECT RESPONSE.
740 W=W+1 \ GOSUB 1410
750 GO TO 620
758 REM --- STUDENT'S RESPONSE IS CORRECT.  PRAISE HIM IN
759 REM --- SUBROUTINE 2310.
760 GOSUB 2310
770 GO TO 620
810 CLOSE \ PRINT \ PRINT
819 REM --- N$ CONTAINS THE STUDENT'S NAME.
820 PRINT "RESULTS OF THIS SESSION------";N$;"-----";DAT$
830 PRINT \ PRINT "TEXT = ";A$
840 PRINT "SECONDS/PHRASE = ";T
850 PRINT "OUT OF ";Q;" QUESTIONS YOU GOT ";Q-W;" CORRECT."
855 S=INT(1000*(Q-W)/Q+.5)
860 PRINT "YOUR SCORE = ";S;"%"
862 PRINT \ PRINT \ PRINT "PLEASE WAIT A MOMENT WHILE YOUR GR
866 IS RECORDED."
863 REM --- SUBROUTINE 6010 COPIES EXISTING STUDENT RECORDS AND LEAVES
864 REM --- THE FILE OPEN FOR UPDATE.
865 GOSUB 6010
870 PRINT #1,N$;TAB(21);S;TAB(28);A$;TAB(37);T;TAB(43);P
910 GOSUB 7010 \ PRINT \ PRINT
920 PRINT " \ PRINT "DO YOU WANT TO RUN THIS PROGRAM AGAIN FOR YOURSELF?
 \ INPUT G$
925 IF SEG$(G$,1,1)="Y" THEN PRINT \ PRINT \ PRINT "ONE MOMENT PLEASE.
" \ PRINT \ PRINT \ CHAIN "PRACER.BP" LINE 245
930 PRINT \ PRINT "DOES SOMEONE ELSE WANT TO USE THIS PROGRAM NOW?  Y I
NPUT G$
940 IF SEG$(G$,1,1)="Y" THEN PRINT \ PRINT \ PRINT "ONE MOMENT PLEASE.
" \ PRINT \ PRINT \ CHAIN "PRACER.BP" LINE 210
950 PRINT "HOPE YOU LIKED THIS AND FOUND IT HELPFUL."
960 PRINT "BYE FOR NOW."
970 STOP
1000 REM --- SUBROUTINE 1010-1040 STRIPS LINE NUMBER OFF TEXT.
1010 K=0
1020 K=K+1 \ IF K>8 THEN 1030 \ IF SEG$(T$+K,K)<>CHR$(34) THEN 1020
1030 T$=SEG$(T$+K+1,255)
1040 RETURN
1200 REM --- SUBROUTINE 1210 --- TIMES THE LENGTH OF TIME EACH PHRASE
1201 REM --- IS ON A SCREEN.
1210 FOR K=1 TO 11 \ NEXT K \ RETURN
1401 REM --- SUBROUTINE 1410-1450 INFORMS STUDENT THAT HE DAVE
1402 REM --- AN INCORRECT RESPONSE.
1410 GOSUB 1610 \ REM --- GET 1ST NAME
1420 PRINT "SORRY, "I$"!".  THAT IS NOT CORRECT."
1430 PRINT "TRY TO CONCENTRATE AND TAKE YOUR TIME."
1440 PRINT "BETTER LUCK NEXT TIME."
1450 RETURN
1600 REM --- SUBROUTINE 1610-1650 ISOLATES STUDENT'S FIRST NAME.
1610 K=0
1620 K=K+1 \ F$=SEG$(N$,K,K)
1630 IF F$<>" " THEN IF F$<>CHR$(13) THEN 1620
1640 F$=SEG$(N$,1,K-1)
1650 RETURN
2300 REM --- SUBROUTINE 2310-2390 PRAISE CORRECT RESPONSES.
2310 RANDOMIZE
2312 LET X=RND(X)
2314 IF X <.1 THEN 2340 \ IF X <.2 THEN 2345
2315 IF X <.3 THEN 2350 \ IF X <.4 THEN 2355
2320 IF X <.5 THEN 2360 \ IF X <.6 THEN 2365
2325 IF X <.7 THEN 2370 \ IF X <.8 THEN 2375
2330 IF X <.9 THEN 2380
2335 PRINT "GOOD SHOW." \ RETURN
2340 PRINT "YOU'RE REALLY ON TODAY!" \ RETURN
2345 PRINT "I LIKE IT!!" \ RETURN
2350 PRINT "FANTASTIC!!!" \ RETURN
2355 PRINT "YUH DO A DOLO STAR ---  8" \ RETURN
2360 PRINT "###RIGHT###" \ RETURN
2365 PRINT "###THAT'S GREAT!###" \ RETURN
2370 PRINT "YOU DO GOOD WORK." \ RETURN
2375 PRINT "RIGHT ON!" \ RETURN
2380 PRINT "COULDN'T BE RIGHTER." \ RETURN
4000 REM --- SUBROUTINE 4010-4080 DISABLES <CTRL>C INTERRUPT
4001 REM --- AND COPIES ANY EXISTING STUDENT RECORDS.  IT LEAVES
4002 REM --- THE OUTPUT FILE OPEN SO THAT THE CALLING PROGRAM CAN
4003 REM --- UPDATE IT.
4010 PRINT \ C=CHR$(3)
4030 OPEN "PACER" FOR INPUT AS FILE #2
4040 OPEN "TEMP" FOR OUTPUT AS FILE #1
4050 IF END #2 THEN 4070
4060 INPUT #2,T$ \ PRINT #1,T$ \ GO TO 4050
4070 CLOSE #2
4080 RETURN
7002 REM --- SUBROUTINE 7010-7040 NAMES THE UPDATED STUDENT RECORDS TO
7002 REM --- THE NAME OF THE STUDENT RECORD FILE+ AND REENABLES <CTRL>C.
7010 CLOSE
7020 NAME "TEMP" TO "PACER"
7030 C=STR$(27)
704* RETURN
9999 END
```



WORLD SIMULATION

by James L. Murphy, Ph.D.



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CIRCLE 104 ON READER SERVICE CARD

SAMPLE RUN
(see footnotes for commentary)

```
RUN 9PACER.B

TIME OUT FOR A FEW SECONDS.  PLEASE WAIT.  (see note 1)


DO YOU WANT INSTRUCTIONS? YES


THIS PROGRAM WILL PRESENT TEXT TO BE READ PHRASE BY PHRASE.
YOU WILL DECIDE HOW LONG YOU WANT EACH PHRASE TO REMAIN
ON THE SCREEN, AND HOW MANY PHRASES YOU WANT PER LINE.


WHAT IS YOUR NAME? JOHN JONES

TEXT NAMES:
TEXSAM        PMA           PMB           PMC           PMD
PME           PMF           PMG           PMH           PMI


WHAT IS THE NAME OF THE TEXT YOU WILL READ? TEXXAM

THERE IS NO SUCH TEXT. DID YOU MAKE A TYPING ERROR?
WHAT IS THE NAME OF THE TEXT YOU WILL READ? TEXSAM

HOW MANY SECONDS SHOULD EACH PHRASE REMAIN ON
THE SCREEN?  ENTER FRACTIONS IN DECIMAL FORM.  FOR EXAMPLE,
ENTER 1/2 AS .5? 20
TOO LONG A TIME !!!

HOW MANY SECONDS SHOULD EACH PHRASE REMAIN ON
THE SCREEN?  ENTER FRACTIONS IN DECIMAL FORM.  FOR EXAMPLE,
ENTER 1/2 AS .5? 1

DO YOU WANT 1 OR 3 PHRASES PER LINE? 3


PLEASE WAIT A MOMENT.  (note 2)

WHEN YOU ARE READY, PRESS THE RETURN KEY.?

HJ[illegible]BATWEY GO    (note 3)

1.  WHO ARE THE MAIN CHARACTERS OF THE STORY?
A. DICK AND JANE     B. JACK AND JILL     C. PHIDO        (note 4)
D. MICKEY MOUSE
ANSWER =? A
GOOD SHOW.


2.  WHERE WERE THEY GOING?
A. UP A HILL     B. TO A STORE     C.ON A BICYCLE
RIDE.     D. NONE OF THESE
ANSWER =? D
SORRY, JOHN.  THAT IS NOT CORRECT.
TRY TO CONCENTRATE; AND TAKE YOUR TIME.
BETTER LUCK NEXT TIME.



RESULTS OF THIS SESSION-----JOHN JONES-----14-JAN-78

TEXT = TEXSAM.D
SECONDS/PHRASE =  1
OUT OF  2  QUESTIONS; YOU GOT  1  CORRECT.
YOUR SCORE =  50 %


PLEASE WAIT A MOMENT WHILE YOUR GRADE IS RECORDED.



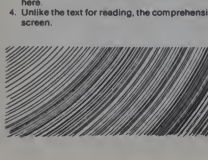
DO YOU WANT TO RUN THIS PROGRAM AGAIN FOR YOURSELF? NO

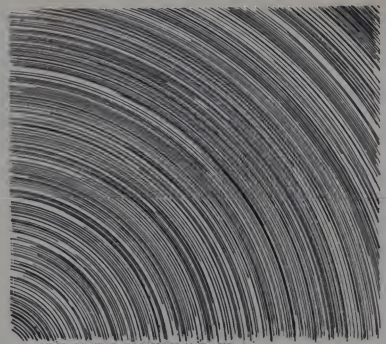
DOES SOMEONE ELSE WANT TO USE THIS PROGRAM NOW? NO
HOPE YOU LIKED THIS AND FOUND IT HELPFUL.
BYE FOR NOW.

STOP AT LINE 970

READY
```

NOTES:
1. Warns student of delay while 9PACER updates student record file.
2. 9PACER chains 9PACE1.
3. On a video display unit, the screen is cleared before each new line is written. See the sample text file, TEXSAM, to see what 9PACE1 wrote here.
4. Unlike the text for reading, the comprehension questions remain on the screen.





```
TEXSAM  14-JAN-78  MU BASIC/RT-11 V01-01C
```

SAMPLE TEXT FILE
(see footnotes for commentary)

```
10 'SEE DICK RUN
20 'TO THE STORE.
30 'BEE JANE
40 'RUN AFTER HIM.
50 'WHERE ARE DICK AND JANE?
60 'DID THEY GO
65 'UP A HILL?
70 'NO,
80 'THAT WAS
85 'JACK AND JILL.
90 'SO WHERE ARE THEY?
100 'I CAN'T SAY.
110 'HOPE YOU LIKED THIS.
120 ' SEE YOU AGAIN SOON.
130 '[                    (see note 1)
140 '1.  WHO ARE THE MAIN CHARACTERS OF THE STORY?
142 'A. DICK AND JANE     B. JACK AND JILL     C. PHIDO
143 'D. MICKEY MOUSE
144 '[A                   (see note 2)
146 '2.  WHERE WERE THEY GOING?
148 'A. UP A HILL     B. TO A STORE     C.ON A BICYCLE
149 'RIDE.     D. NONE OF THESE
150 '[B                   (see note 3)
```

NOTES:
1. The first occurrence of [indicates the end of the reading text, and the beginning of the comprehension questions. Following the first occurrence of [, 9PACE1 no longer clears the screen.
2. Each occurrence of [following the first one marks the end of each question. The correct answer follows [.
3. BASIC's end of file mark denotes the end of the questions for 9PACE1. There is no limitation, other than disk space, on the length of the text, the number of questions, or the number of answer choices.

```
PACER.DOO
```

SAMPLE STUDENT RECORD FILE
(see footnotes for commentary)

```
PACER        13-JAN-78

NAME                  SCORE  TEXT      SEC[1]  P/L[2]
ANDY MICASTRO          100   TEXSAM.D   .7     3
JOAN SMITH             100   PMA.D      .7     1
JOAN SMITH             67    PMB.D      .7     3

PACER        14-JAN-78

NAME                  SCORE  TEXT      SEC   P/L
JOHN JONES             33    PMC.D      1     3
JOHN JONES             100   PMB.D      .7    3
```

NOTES:
1. The number of seconds each phrase remained on the screen.
2. The number of phrases per line.

A new series of computer-oriented college textbooks is now available. Here's how it came to pass.

And Then There Was One

A. Kent Morton

Once upon a time, when government agencies had a grand vision for expanding educational technology in our schools, and "NSF" wasn't a dirty word in Congress, a few people realized that, technology or no technology, conventional college courses weren't going to change significantly unless there were texts available to support change.

As a check, they looked around at the publishing field to see if there were any exciting new approaches being offered in chemistry, physics, math, or geography which were based on the growing availability of computing power in the classroom. There were the latest choices among 127 books on programming in FORTRAN (or 43 in BASIC); 11 brand new, glossy entries into the introductory biology market (beautiful overlays, but no technology); and a vast array of technical material for people turned on by nuts and bolts, data base design, computer design, and hardware communications. But, alas, nothing for the teacher who wants to show his students how computing can help convey the subject matter in his course.

Frustrated, but not at all surprised, they decided to write a proposal for the creation of an organization that would sponsor the production of new teaching materials supporting the use of computing. These materials were not to be CAI programs, but ink on paper, in the form commonly known as a textbook or monograph. They believed they knew how they could lay their hands on some promising material for this venture.

After the canonical number of site visits and revisions, the proposed organization was funded by the National Science Foundation at Dartmouth College in 1971 and took the name of COMPUTe — Computer Oriented Materials Production for Undergraduate Teaching.

COMPUTe's first task was to identify individuals nationwide who had already developed high-quality computer-oriented instructional material for courses at

```
Correlation

IP58.11

100 REM  PROGRAM IP58.11
110 REM  THIS PROGRAM COMPUTES THE CORRELATION BETWEEN TWO VARIABLES.  THE
120 REM  INPUT IS THE DATA STATEMENTS.  THE FIRST NUMBER IS THE NUMBER OF
130 REM  PAIRS.  THIS IS FOLLOWED BY A LIST OF THE FIRST NUMBERS IN THE
140 REM  PAIRS AND THEN BY A LIST OF THE SECOND NUMBERS IN THE PAIRS.
150 REM
160 REM ************************************************************
170                                          REM  MAX NUMBER OF PAIRS IS 100
180 DIM X(100),Y(100)
190                                          REM  READ NUMBER OF PAIRS
200 READ N
210                                          REM  INITIALIZE COUNTERS
220 LET X1=0
230 LET X2=0
240 LET Y1=0
250 LET Y2=0
260 LET P=0
270                                          REM  READ FIRST NUMBERS
280 FOR I=1 TO N
290     READ X(I)
300 NEXT I
310                                          REM  READ SECOND NUMBERS
320 FOR I=1 TO N
330     READ Y(I)
340 NEXT I
350                                          REM  CUMULATE SUMS
360 FOR I=1 TO N
370     LET X1=X1+X(I)
380     LET Y1=Y1+Y(I)
390     LET X2=X2+X(I)*X(I)
400     LET Y2=Y2+Y(I)*Y(I)
410     LET P=P+X(I)*Y(I)
420 NEXT I
430                                          REM  COMPUTE R
440 LET R1=N*P-X1*Y1
450 LET R2=SQR(N*X2-X1^2)*(N*Y2-Y1^2)
460 LET R=R1/R2
470 PRINT "CORRELATION IS";R
480 PRINT
490                                          REM  DATA FOLLOWS
500 DATA 5
510 DATA 2,5,7,3,8
520 DATA 4,8,6,9,1
530 END


IP58.11

CORRELATION IS -0.397467
```

Figure 8.11 A list and run of a BASIC program that computes r using the computational formula

A sample program for *Elementary Psychological Statics* by Price

their own institutions. This was done largely on the basis of an open call for proposals, repeated annually, whereby COMPUTe acted much like a mini funding agency. To the authors of those materials which were favorably reviewed by others, COMPUTe offered the necessary incentives and resources to polish those materials into products useful to others in addition to themselves.

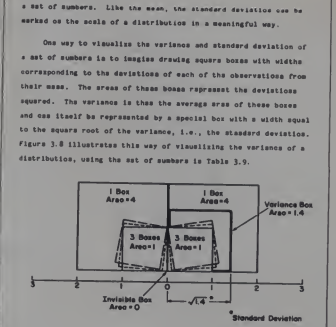
The normal incentive package included two months of salary and housing at Dartmouth (in the summer!), plus a royalty on each sale of the final product. Authors were also treated to all the editorial, programming, artistic, and secretarial support which their texts might require (and some required considerable!). Finally, since this was intended to be a seed effort only, COMPUTe committed itself to finding a commercial outlet for all these products on behalf of the authors, with the expectation that usual commercial incentives and mechanisms would then take over in this new field.

After more than four years of negotiations with several publishers, Dartmouth College signed an exclusive contract in June 1978 with COMPress, Inc., whose acronym stands for Computer Oriented Materials Press. COMPress President Thomas L. Sears has been involved in college textbook publishing for over twenty years.

In addition to the 24 titles produced by COMPUTe, COMPress has contracts for another book on mechanics and for five books produced by Project SABLE (Systematic Approaches to Biological Laboratory Explorations) at Berkeley. Areas covered by these 30 texts include various topics in biology, environmental studies, geology, geography, urban planning, mathematics and statistics, logic, physics, psychology, and chemistry. Sample pages from some of these texts appear with this article.

It is of course difficult to get much of a feeling from these samples for the kind of material that has been developed and is now available for classroom use. The model, however, is the traditional textbook format for similar subject matter. With a few exceptions which could be classified as either laboratory or tutorial material, these books tend to present the subject matter in a descriptive manner from the viewpoint of a teacher explaining the subject to a student. There are three principal components: narrative text, worked examples, and homework problems. These are woven together in suitable fashion, with the role of the computer emphasized in all three areas as appropriate. The major emphasis is always on the pedagogy involved and the role the computer plays in supporting that pedagogy, rather than on programs for their own sake. Few of the texts make any attempt to teach any programming whatsoever; those that do include some programming information strive to distribute it in a way which is supportive of the material being taught in a given chapter.

But what about the programs themselves? Is there any assurance that they will run on machines other than those for which they were developed? Happily, yes. Historically, COMPUTe was conceived and born at roughly the same time as CONDUIT, and the two efforts were intentionally kept separate in order that they might concentrate on different factors affecting the widespread use of computing in instruction. CONDUIT, which initially focused on identifying and overcoming technical barriers to transportability, had one of its five original offices about 50' away from the COMPUTe office at Dartmouth. From the outset, the export sets prepared to accompany the COMPUTe instructional material were designed in conformance with the guidelines developed by CONDUIT. Some were actually prepared by CONDUIT staff. Over the years, a close working relationship has been maintained between COMPUTe and CONDUIT to help



Descriptive Statistics

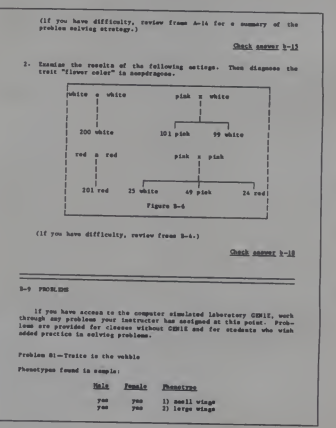
a set of numbers. Like the mean, the standard deviation can be marked on the scale of a distribution in a meaningful way.

One way to visualize the variance and standard deviation of a set of numbers is to imagine drawing square boxes with widths corresponding to the deviations of each of the observations from their mean. The areas of these boxes represent the deviations squared. The variance is then the average area of these boxes and can itself be represented by a special box with a width equal to the square root of the variance, i.e., the standard deviation. Figure 3.8 illustrates this way of visualizing the variance of a distribution, using the set of numbers in Table 3.9.

Figure 3.8 Visualizing the variance of a distribution

The standard deviation (and variance) of the standard normal distribution is exactly 1. It is the natural scale unit of the standard normal distribution. Recall that approximately 2/3 of

From *Elementary Psychological Statistics* by Price.



(If you have difficulty, review frame A-14 for a summary of the problem solving strategy.)

Check answer b-13

2. Examine the results of the following matings. Then diagnose the trait "flower color" in snapdragons.

Figure B-4

(If you have difficulty, review frame B-4.)

Check answer b-18

B-5 PROBLEMS

If you have access to the computer simulated laboratory GENIE, work through any problems your instructor has assigned at this point. Problems are provided for classes without GENIE and for students who wish added practice in solving problems.

Problem B1—Traits in the wobble

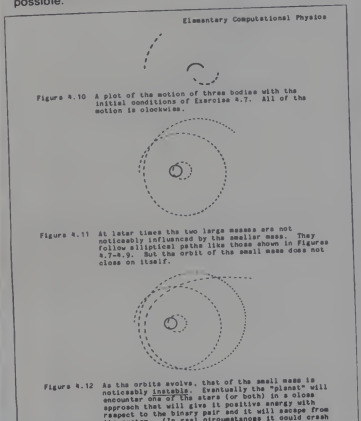
Phenotypes found in sample:

Male	Female	Phenotype
yes	yes	1) small wings
yes	yes	2) large wings

Sample page from *Mendelian Genetics* by von Blum and Hursh.

ensure the transportability of programs.

Recognizing the importance of quality software and timely distribution of same to the success of its published material, COMPress, Inc., has entered into a working agreement with CONDUIT for distribution of software to accompany its texts. For the convenience of the user, however, software as well as texts may be ordered directly from COMPress. The idea is to make it as simple as possible.



An illustration of the three-body problem from *Elementary Computational Physics* by Bolemon.

COMPress began production of its first eleven titles in February in order to compete in the peak text promotion period this spring. The current list includes *Mendelian Genetics, Population Growth, Graphical Mechanics, Physics Tutorial Problem Workbook, Survey Sampling in the Environmental Sciences, Computer Exercises for Elementary Statistics, Descriptive Statistics, Introductory Psychological Statistics, Cognitive Psychology, Optimal Location of Facilities*, and *A Manual for BERTIE* (logic). These are paper editions in a 5½" x 8½" trim size. Those who wish to see firsthand the products being offered should write COMPress at P.O. Box 102, Wentworth NH 03282. COMPress materials will also be on exhibit at the National Educational Computing Conference in Iowa City in June. Other plans include developing microcomputer versions of as many of the packages as is feasible and developing new titles for future markets. Manuscripts are welcomed for this purpose.

*** The Beginning ***

Author note

In addition to managing the COMPUTe project for seven years, the author has been chairman, secretary-treasurer, and editor for the ACM Special Interest Group for Computer Uses in Education. He is now serving as a consultant to COMPress, Inc., and to the ANSI committee for the standardization of the BASIC programming language. Occasionally he writes a new proposal.

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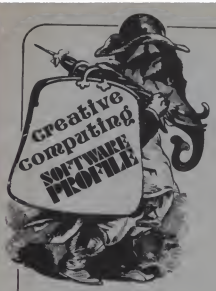
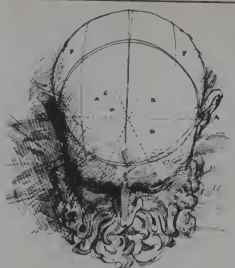


PDI IQ Builder Software



Randy Heuer

Program Design Incorporated, also known as PDI, has released a series of educational software packages for the PET and APPLE computers. Each package retails for $9.95 and contains between four and twelve programs. We reviewed three tapes for the PET and two for the APPLE, although others are available.

Before specifically reviewing each tape, I'd like to comment on the physical quality of the software package. Each is packaged in a 6½ x 11" clear plastic bag stapled closed with a cardboard sealer labeled PET or APPLE. If a hole were punched in the sealer, the package could be hung on a pegboard-type retail display.

Inside, the software cassette is packaged in a soft cassette box. Occupying the remainder of the bag is a four or eight page, 5½" x 8½" instruction booklet. The booklet explains the concepts behind each exercise and instructions on how best to use the package.

Overall, then, the physical design of the software package is excellent, providing the retailer with a highly visible display, and the purchaser with a substantial amount of product for his money.

PET SOFTWARE

Preschool IQ Builder

As the title suggests, this package is designed for preschool children. One side of the tape contains six lessons entitled "Same and Different." In these exercises the child is confronted with two shapes side by side and must determine whether they are the same or not. The child then presses the "S" key if they are the same, or the "D" key if they are different. A variety of shapes is used from geometric figures to letters.

Since very young children may have trouble discerning the letters "S" and "D," the instruction booklet suggests that a smiling face sticker be placed over the "S" key and a frowning face be placed over the "D" key. It is also suggested that the remainder of the keyboard be masked off with cardboard.

The other side of the tape contains six programs of the "Letter Builder" series. Each program shows the child a letter and requires the child to press the same letter on the keyboard. The first lesson starts with only two letters and by lesson 6 all the letters are used.

In both the "Same and Different" and "Letter Builder" series, two rows of stars will appear on the screen when the child answers correctly. The computer will then procede to the next problem.

An incorrect response has no visible effect. This is a bit unfortunate, as the child is not informed that he has made the wrong choice. Every time the child presses the wrong key, his total wrong is increased by one. Thus, if the child continues to press the wrong key by accident or in frustration, this is credited against his total. This is a minor flaw, but one that could easily be corrected.

At any time during the program, the parent or teacher can stop and review the child's progress. The program also advises the parent whether to have the child move on to the next program in the series, or to continue with the same program.

Overall, this software package appears to offer the preschooler a large number of sequential exercises along with the opportunity for him to "run" his own computer.

Memory Builder: Concentration

This tape contains four versions of a game similar to the TV game show "Concentration." The object is to find ten matching pairs of letters or words hidden behind a board of twenty numbered squares. The child may play against himself, another person, or the computer.

The instruction booklet says that the game requires the child to pay close attention to the board in order to play successfully, thus increasing the child's attention span and ability to concentrate. It is suitable for children ages six and older.

The four versions of the game are similar in play, but vary the types of objects hidden behind the numbered squares. In the first two versions, single letters are used. The third version uses three-letter words and the final version uses four-letter words (don't worry, they're not dirty).

The game is fun to play and is different each time played. The two-player version can also be an excellent parent-child activity.

Vocabulary Builder 2: IQ Builder

This software package is designed for older children, probably early high school age or older. It consists of ten programs (lessons). The first five lessons test knowledge of synonyms; the last five lessons involve finding antonyms.

Each lesson contains forty problems presented in a multiple choice format. You are given a word and asked to choose the word most similar to or most nearly opposite the given word from a list of five other words. When the student chooses the correct answer, the program procedes to the next problem. A wrong answer

requires that the student attempt the same question again. The student may stop at any time to evaluate his progress.

The forty words in each lesson are presented in the same order each time. However with a total of 400 words in the ten lessons, it would be difficult to memorize the answers without actually learning the meanings of the words. It may not be particularly fun to play, but this package offers good practice to those wishing to extend their vocabulary or to prepare for the SAT examination or similar tests.

APPLE SOFTWARE

Number Series: IQ Builder

This nine-program package tests your ability to solve number series problems. The first program is a brief introduction to number series problems and how you should approach solving them. The remaining seven lessons and a quiz are devoted to finding the next two numbers of a number series. Twenty-five problems are presented in each lesson. You get three tries at each problem. If you fail to answer correctly after two tries, a hint is provided before your last attempt. Thus if you are stumped, you can usually solve the series after receiving the hint.

The use of the speaker in the APPLE is also a nice touch. By lesson 8, the series can be quite difficult even for number series "experts." Still, if you like problems of this type, this package with its 200 problems can be most enjoyable.

Analogies: IQ Builder

This is my favorite of all of the software from PDI. It consists of six lessons and a quiz that requires you to decipher and interpret analogies.

The first two lessons each contain thirty analogies that the student must interpret and determine how the two subjects are related. The student then chooses an analogy type that best describes the given analogy. Five possible answers are provided.

In the third lesson, the student is given an analogy, followed by a second incomplete analogy. The student then chooses from a list of five possible choices to complete the analogy. The program will give you two hints, if you cannot get the correct answer on the first try.

The final three lessons consist of problems in which the student is given one analogy and then must select a similar analogy from a list of five possible choices. Once again, hints are provided if you fail to get the correct answer on the first try. A final quiz is given in which the student must also select an analogy which is most like the one given. During the quiz, however, no hints are given.

Overall, this is the best of the PDI software line. The variety of different types of lessons helps keep the student's interest in the exercises. Use of the APPLE's speaker also helps to make the program more user oriented.

The Wrap-Up

Although I reviewed only five of the PDI software packages, others are available. In addition, several of the packages are available for other computers, including the TRS-80. Check PDI's latest ads to see which tapes are available for your machine.

In general, the educational programs from PDI stress repetitive exercises for the development of language and mathematic skills. This approach allows PDI to provide a large number of exercises per software package, thereby giving the customer good value for his software dollar.

For more information write Program Design, Inc., Dept. 401, 11 Idar Court, Greenwich, CT 06830. □

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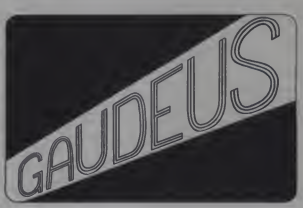

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How To Hide Your Basic Program Round 2

Robert S. Jaquiss, Sr.

This article is a follow-up to the article "How to Hide Your Basic Program" by John M. Nevison which appeared in the January 1979 issue of Creative Computing.

I agree with many of the concepts that Nevison is trying to preach in this sarcastic article. Since Nevison has been programming for 13 years, he has undoubtedly observed the (recent) development of STYLE in regard to BASIC. He is also probably aware that a program written in the style of his first example uses much memory—*more* memory than I have had until recently. Until three years ago I was limited to about 1500 characters for a program. Programming in FOCAL, one of my students was able to write a program to solve 9 simultaneous linear equations; using little text and, of course, no remarks.

When my school got a computer that had a larger workspace, I also began to insist on well-documented programs from students (and myself). We sometimes have to un-learn our cherished primitive concepts such as using every conceivable trick to save memory locations. We do learn to use prompts and labels and remarks, etc., in my classes. Once in a while the phrase "structured programming" is heard.

Mr. Nevison's program line 130 REM, suggests that the program is 'especially good for batches of *less* than 50'. Good thing since B will later be dimensioned at 38. He might have suggested 38 or *fewer* numbers.

Line 180. L is also an index variable as I is in line 170.

Line 220 (LET N9=38) is a nice touch. This may make it easier to change the number of numbers to be sorted; or should that be the number of positive integers less than 26 to be sorted? I don't understand why N9 is chosen as a variable. Why not N7 or even just plain N? Also why 38? DIMension B(50).

Line 270 (REM MAIN PROGRAM) is hardly necessary since there appears to be no program other than the MAIN PROGRAM.

Robert S. Jaquiss, Sr. Instructor, Computer Science, North Salem High School, Salem, Oregon 97301 and Instructor, Computer Science, Willamette University.

Line 290 REM READ IN N9 RANDOM NUMBERS, SORT THEM,

Line 300 REM AND PRINT THEM OUT.

These REMarks are of less than no significance, they are of negative value. The whole program does these things.

"SORT THEM" would be better placed just prior to line 380, whereafter the sorting is done.

"PRINT THEM OUT" would be more appropriate before line 480 where the results are about to be printed.

The REMark "READ IN N9RANDOM NUMBERS" is confusing to me. "READ" is a reserved word in BASIC and means READ-DATA, or read a file (INPUT). Perhaps one could *generate* a list of RANDOM NUMBERS.

Line 315 (LET X=0) is not necessary at all, since a value will be assigned to X in line 410. In some cases, a variable should be initialized — at the beginning of the program — or just prior to where it is to be used (line 370). In this case, X should not be initialized any more than I, or L, which are assigned in the FOR-NEXT loops.

Lines 110, 140, 440: I have never used a BASIC that allowed a line number all by itself this way. Thus line 400 (IF-THEN 440) would not execute in any BASIC I know because there would not be a line 440 to go to.

(Mr. Nevison, If one of my students

```
100 REM    SORT              16 SEPTEMBER 1977   JOHN M. NEVISON
110
120 REM    SORTS A MIXED BATCH OF NUMBERS, B(), INTO ASCENDING
130 REM    ORDER.  ESPECIALLY GOOD FOR BATCHES OF LESS THAN 50.
140
142 REM    REFERENCE:  JOHN M. NEVISON, 'THE LITTLE BOOK OF BASIC
144 REM                STYLE:  HOW TO WRITE A PROGRAM YOU CAN READ,'
146 REM                READING, MASS:  ADDISON-WESLEY PUBLISHING
147 REM                COMPANY, 1978.
148
150 REM    VARIABLES:
160 REM        B()...THE BATCH OF NUMBERS
170 REM        I.....THE INDEX VARIABLE
180 REM        L.....THE LENGTH OF THE CURRENT LIST
190 REM        X.....THE EXCHANGE VARIABLE
200
210 REM    CONSTANT:
220     LET N9 = 38                    'NUMBER OF DATA
230
240 REM    DIMENSIONS:
250     DIM B(38)
260
270 REM    MAIN PROGRAM
280
290 REM    READ IN N9 RANDOM NUMBERS, SORT THEM,
300 REM    AND PRINT THEM OUT.
310
315     LET X = 0
320     FOR I = 1 TO N9
330         LET B(I) = INT(RND#25 +1)
340         PRINT B(I);
350     NEXT I
360     PRINT
366     PRINT
370
380     FOR L = N9 TO 2 STEP -1
390         FOR I = 1 TO L-1
400             IF B(I) <= B(L) THEN 440
410             LET X = B(I)
420             LET B(I) = B(L)
430             LET B(L) = X
440
450         NEXT I
460     NEXT L
470
480     FOR I = 1 TO N9
490         PRINT B(I);
500     NEXT I
510     PRINT
520
530     END
```

handed in this program I would return it for revision. But, I have some high standards.)

The downhill development of the remainder of the article make a number of good (or shall we say bad) points. Under point 3 (Strain the Reader's Eye) Mr. Nevison could have mentioned using no line number ending with zero.

There are a few more points I would like to add to the list of ways to do it all wrong.

5th Downhill Concept.

Another downhill step that Nevison missed is the vile practice of multiple statements per line. In keeping with the 'how not to do it' teaching philosophy, I have prepared a worse program for illustrative purposes (Program SRT100). It is easier to write badly than goodly anyway. I used the same line numbering as Nevison as far as possible. Since I wanted to display a RUN of the program, I did make a few changes, such as printing the numbers on one line. One line of 38 numbers is too long, so I asked the computer to print 5 numbers to a line. This addition paid unexpected dividends in helping to further obscure the program as I was able to insert several GOTO's.

Let us examine the program LISTing. We begin with a statement of program purpose: to sort numbers. No mention is made of what numbers, how many numbers, or ascending or descending order. Some FOR-NEXT loops have been deleted and others added. I really did try to eliminate all the spaces but the spacing habit is too strong.

I submit that the logic is contorted. The multiple statements per line make the program listing much more difficult to read. The addition of subtle changes such as RND(X)*10^N make for more confusion than just RND*25. Surely it is not clear that in line 340 the jump to 990 terminates a line of five integers.

It may seem peculiar that in line 360 L=N+1 and on the next line, line 380, L=L+1. Line 455 was previously included in line 450 (which I thought more confusing) but the line was considered too long for publication.

I do not have a book to sell. But let's hear it for Bob. Isn't my program worse than Nevison's?

6th Make it worse concept:

Document the program in a misleading manner.

My second program (SRT300) is the same as my first program with a few additions. First, the interactive user is told the program purpose (this program sorts numbers) in an ambiguous manner. The user may assume whatever s/he likes. The next printed output follows immediately, before the user has time to comtemplate, "HOW MANY NUMBERS TO SORT?".

If the user wants to sort more than 50 numbers the program will malfunction (DIM B(50)). So the user is told the computer is 'too tired to sort that many numbers.' If the user asks to sort fewer than 4 numbers the message "TRIVIAL. DO IT YOURSELF." is printed. This nasty was added because the computer will accept input numbers only until three fewer numbers than the specified number have been typed in (line 150).

In the example RUNs several numbers were typed in on one line to conserve space. Imagine the user who expects to type in 10 numbers. As soon as the seventh number is typed the computer starts printing out numbers. What numbers? Not the numbers the user typed in, but some numbers the computer made up. The specified number of numbers is displayed in random order, descending order, and ascending order. In addition, if the specified N is a multiple of 5, the program falls through a crack and starts again at the beginning.

```
200 REM PROGRAM TO SORT NUMBERS
220 N=38\DIMB(50)\I=0
320I=I+1\B(I)=INT(RND(X)*10#N)+1
340PRINTB(I)!\IFINT(I/5)=I/5THEN990
350IFI<NTHEN320
360PRINT\PRINTL=N+1
380L=L-1\I=0\X=0
400I=I+1\IFB(I)<=B(L)THEN 440
420X=B(I)\B(I)=B(L)\B(L)=X
440IFI<L-1THEN400
450 PRINTB(L)!
455IFINT((N-L+1)/5)=(N-L+1)/5THEN980
460IFL-2THEN380
470GOTO500
480 PRINT B'(L)!
500L=L-1\IFL>0THEN480
590 PRINT
600 PRINT\FORI=1TONSTEP5
610FORJ=0TO4
620IFI+J>NTHEN999
630PRINTB(I+J)!
640NEXTJ\PRINT\NEXTI
980PRINT\GOTO460
990PRINT\GOTO350
999PRINT\PRINT\END

READY
RUN

138  127  241  134  255
206  323  10  206  356
48  148  371  197  177
168  369  109  330  48
202  93  127  230  248
148  327  273  128  274
171  197  221  91  39
3  148  360

371  369  360  356  330
327  323  274  273  255
248  241  230  221  206
206  202  197  197  177
171  168  148  148  148
138  134  128  127  127
109  93  91  68  48
39  10  3

3  10  39  48  68
91  93  109  127  127
128  134  138  148  148
148  168  171  177  197
197  202  206  206  221
230  241  248  255  273
274  323  327  330  356
360  369  371
```


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```
90DIMB(50)\RANDOMIZE
100PRINT"THIS PROGRAM SORTS NUMBERS."
110PRINT"HOW MANY NUMBERS TO SORT";
120INPUTN\IFN>50THEN800
125IFN<4THEN850
130PRINT"TYPE IN THE NUMBERS TO BE SORTED."
140PRINT"PRESS 'CARRIAGE RETURN'";
145PRINT"AFTER EACH NUMBER."
150FORI=1TON-3\INPUTB(I)\NEXTI\I=0
320I=I+1\B(I)=INT(RND(X)*10#N)+1
340PRINTB(I)\IFINT(I/5)=I/5THEN990
350IFI<NTHEN320
360PRINT\PRINTL=N+1
380L=L-1\I=0\X=0
400I=I+1\IFB(I)<=B(L)THEN 440
420X=B(I)\B(I)=B(L)\B(L)=X
440IFI<L-1THEN400
450PRINTB(L);
455IFINT(<N-L+1)/5)=(N-L+1)/5THEN980
460IFL-2THEN380
470GOTO500
480PRINTB(L);
500L=L-1\IFL>0THEN480
590PRINT
600PRINT\FORI=1TONSTEP5
610FORJ=0TO4
620IFI+J>NTHEN999
630PRINTB(I+J);
640NEXTJ\PRINT\NEXTI
650GOTO100
800PRINT"I AM TOO TIRED TO SORT";N;"NUMBERS."
810GOTO110
850PRINT"TRIVIAL.     DOIT YOURSELF"
860GOTO810
980PRINT\GOTO460
990PRINT\GOTO350
999PRINT\PRINT\END
```

```
THIS PROGRAM SORTS NUMBERS.
HOW MANY NUMBERS TO SORT?15
TYPE IN THE NUMBERS TO BE SORTED.
PRESS 'CARRIAGE RETURN'AFTER EACH NUMBER.
?12?34?56?78?5?4
?678?234
?34567
?567
?345
?26543
 44  45  102  116  67
 44  148  147  100  145
 129  56  141  50  44

 148  147  145  141  129
 116  102  100  67  56
 50  45  44  44  44

 44  44  44  45  50
 56  67  100  102  116
 129  141  145  147  148
THIS PROGRAM SORTS NUMBERS.
HOW MANY NUMBERS TO SORT?13
TYPE IN THE NUMBERS TO BE SORTED.
PRESS 'CARRIAGE RETURN'AFTER EACH NUMBER.
?1?2?3?4?5?6?7?8?9
?78
 125  37  50  37  95
 89  16  110  89  19
 71  126  108

 126  125  110  108  95
 89  89  71  50  37
 37  19  16

 16  19  37  37  50
 71  89  89  95  108
 110  125  126
```

7th and 8th make it worse concepts.

A program LIST illustration is not provided. The 7th concept is to rearrange the lines of the program flow so that many unnessary GOTOs are inserted. Thus the program flow flits from here to there in the program rather than following the line numbers sequentially.

The 8th concept is enabled by the 7th. Insert lines of code that are never executed. If anyone should try to figure out what you have done and you have made good use of concepts 7 and 8, the task will be immeasurably more complicated for that hapless individual.

Old time programmers who used machine language were very good in the implementation of concepts 7 and 8. Among other things, the (priesthood) rule of 7&8 made for good job protection and added mystery. The boss could not fire such a programmer because no one else would be able to maintain the programs.

Concept 9.

Concept 9 is really not a programming concept, but has to do with the dissemination of computer programs. Here are a number of ideas that can be used singly or in combination.

a. If you use a teleprinter, make sure that the ribbon is old and the type head is out of alignment before you prepare a printout for publication.
b. If you are the publisher, make liberal use of a copier that reduces print size. If the print size is reduced by half, four times, the print will be one-sixteenth the original size and more letters will fit on a page. The fact that (a) combined with (b) will surely make it impossible for anyone over 30 years of age to read the article is not important. People over 30 are not important anyway.
c. If there is any possibility that (a) and (b) might not make an article completely unreadable, another add-on possibility is to print gray ink on a gray background, or try green ink on a blue background, or pink on red. Not only is the article now unreadable, it will also be difficult to make a copy of the article on a copier.
d. Some publishers are very adept at overexposure of copy on the copy machine or the use of too much ink. Either of these tricks make the characters bleed out in unexpected and wildly unreadable ways.
e. Don't publish the last page of the program LISTing.

On the other hand, there are many attributes of good programming style that should be mentioned early on in teaching programming in any computer language. It is much more difficult to write about good programming practice than to poke fun at another's serious attempt to produce a good program. Let us resolve to think positively about programming; to emphasize good programming practices.

The first few lines of a program should identify the program, by name, if it has a name on a storage device. The programmer should be identified. If the program is a student assignment, the problem should be identified by name, page, problem number, etc. If the program is not original, credit should be given where credit is due.

Next should be a brief explanation of the program purpose and directions to use the program. All variables should be identified at the beginning and itialized, dimensioned or declared as needed. Some persons take pride in boxing in these (and other) program segments with rows of stars.

Certainly some attention should be given to having a main program and subprograms, subroutines or procedures. Of course, the subprograms should be set off in printed format, identified, and pass-to, pass-back parameters clearly stated. Global variables used in subprograms must be identified. Indeed, in one style of writing, the main program is almost nothing but subroutine calls.

For example, many programs ask if the user would like instructions. A 'yes' answer should result in a subprogram call, which may in turn read the instructions from a disk file and display them to the user. There is much to be said on the subject of good programming in BASIC.

An excellent reference is the new book "Basic with Style," by Paul Nagin and Henry F. Ledgard, published by Hayden Book Company, Inc. 1978. ■

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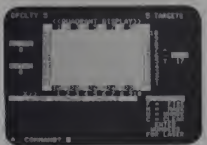

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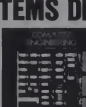

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Making the Most of Them

Earl Wuchter

There is a growing trend among programmers to write in a very elegant style of BASIC. The conventions of this style seem to be: (1) keywords and variables are always separated by spaces; (2) each numbered line contains only one executable statement, although a remark may be appended; (3) statements within FOR loops are preceded by one or more colons to indicate levels of nesting; (4) variable names may contain more than two characters.

All of these things are allowed in Microsoft BASIC programs. If you write in this style, your program will be very easy to read and follow, but can you afford it?

What It Costs

You pay a price for this elegance in three different ways. First, each unnecessary character is one precious byte down the drain. Second, each one is an unnecessary step for the BASIC interpreter and costs you execution time. Last, but not least, the larger your program is, the more time it will require to load. Did you ever want to show someone a program, and found him yawning in the middle of a two minute load?

Waste Not - Want Not

There is another style of writing in which it is a sin to waste a byte. The code produced with this style is somewhat difficult for us humans to read, but the BASIC interpreter loves it. You can tell by the speed with which he executes it. To write the most efficient code possible in terms of space requirements and interpretation time follow these five guidelines:

1. Since Microsoft BASIC allows any number of spaces between keywords, variables, and operators, use none. The interpreter will separate the variables from the keywords.
2. Keep variable names as short as possible, especially those that will be used often.
3. Don't create any more variables than is necessary. Use the same one or two for all short range FOR loops.
4. Put the REMarks in your notebook.
5. Pack as many statements as possible on each numbered line. There is a five byte overhead for each numbered line (two for the line number, two for the pointer, and one for the terminator), but only one byte overhead for adding a statement to an existing line. In a large program, this can save 1K.

Hard Facts

The same operation is shown in two styles. The compact code occupies 74 bytes. The "easy to read" code occupies 165 bytes without any remarks. When arrays P and PA were initialized so that the sort was worst case, the compact code executed in 102 seconds, while the other code required 126 seconds.

COMPACT CODE

```
35 FORM = 1TO120 : T = P(M)
36 FORK = M-1TO0STEP-1 : IFT < P(K)
     THENP(K + 1) = P(K) : NEXT
37 P(K + 1) = T : NEXTM
```

"ELEGANT" CODE

```
41 FOR NL = 1 TO 120
42 : TE = PA(NL)
43 : FOR IN = NL-1 TO 0 STEP -1
44 : : IF PA(IN) < TE GOTO 47
45 : : PA(IN + 1) = PA(IN)
46 : NEXT IN
47 : PA(IN + 1) = TE
48 NEXT NL
```

□

Esri Wuchter, 1610 Washington St., Catssauqus, PA 18032.

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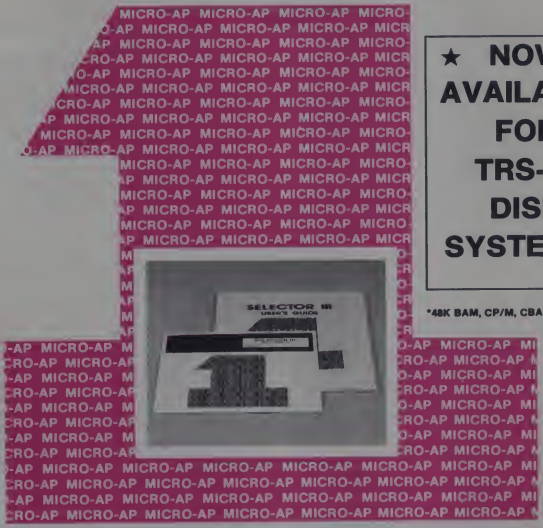

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puzzles & problems

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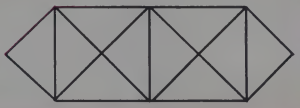
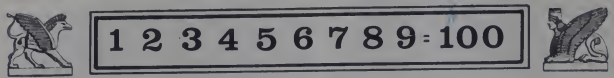
1. Where does he end up?
2. How far will he have gone when he gets there, that is, if he ever gets to any definitive point?

After working for some time on Mr. Whitaker's problem Merlin mentioned to me that he knew of a good puzzle that we could append to it. He calls it ALL IN A ROW, and, it goes like this: After the intrepid explorer in the last problem reached his destination he paused for lunch, made an entry in his diary, and was about to start the return journey when he saw that his sled was broken beyond repair. He off-loaded as many supplies as he could carry, and started walking due south. After traveling for about two hours the explorer came upon an abandoned camp site. Apparently the travelers that has used it had been caught up in a great storm and many of their sleds had been destroyed. Our friend looked around and found that eleven sleds had been left behind, and, a curious thing he noted was that the eleven sleds lay in such a way that there were seven rows of sleds, and, that each row contained four sleds. Having noted the fact in his diary the explorer moved on. Can you tell us how those sleds were arranged?

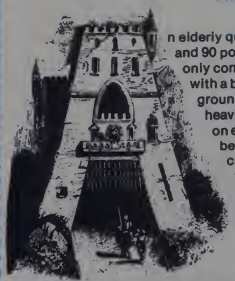
Our next problem is an easy one. You have to duplicate the geometrical design pictured here. It must be drawn using one continuous line without lifting the pencil from the paper. No part of the line can cross any other part of the line.



At first glance you might think that the illustration below represents an example of Babylonian arithmetic. This, of course is not the case, for this is an extremely interesting type of puzzle. You can make this mathematical expression correct by adding two minus signs (-) and one plus sign (+) to it between certain numbers. (Example: 12+34-567-89=100) Our example is wrong, but there is a correct one for this puzzle and it is your problem to find it.



Here are some "matchless" puzzles that should keep you busy trying to solve. We have laid out five mathematical equations using matchsticks to represent Roman numerals, value and equal signs. All of the equations are false, but, you can make each of them correct by moving only one match to a new position within each problem. In problem two the "square" is meant to be a zero.



An elderly queen, her daughter, and little son, weighing 195 pounds, 105 pounds, and 90 pounds respectively, were kept prisoners at the top of a high tower. The only communication with the ground below was a cord passing over a pulley, with a basket at each end, and so arranged that when one basket rested on the ground the other was opposite the window. Naturally, if the one were more heavily loaded than the other, the heavier would descend; but if the excess on either side was more than 15 pounds, the descent became so rapid as to be dangerous, and from the position of the rope the captives could not check it with their hands. The only thing available to help them in the tower was a cannonball, weighing 75 pounds. They, notwithstanding, contrived to escape. How did they manage it?
(From "Puzzles Old and New" by Professor Hoffmann.)

(Answers on page 168)

So ends another battle of wits with Merlin. Do you have a favorite puzzle that you would like to share with the readers of Creative Computing? If you do, send it along and Merlin will send you a copy of "Merlin's Puzzler 2" if he uses it in this column. Your Puzzle Editor, Charles Barry Townsend.

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POWER ON
POWER OFF
DYNABYTE DB8/2
POWER ON
RESET
POWER OFF
HALT
DYNABYTE DB8/1
POWER ON
RESET
POWER OFF
HALT

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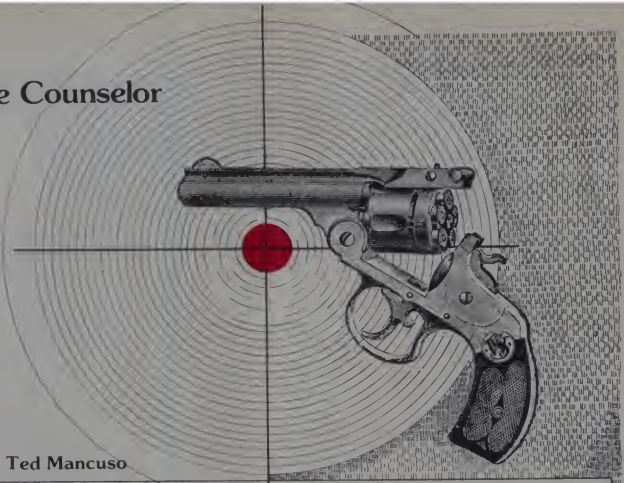
The Counselor



Ted Mancuso

"My wife just left me, that's the problem," Harcourt said with the most thinly disguised tremor in his voice. "That's the whole thing in the proverbial nutshell." He sat alone in the room except for a faintly glowing screen set about chest high in the opposite wall.

"And your wife ... excuse me for one second, Mr. Harcourt," the computer voice from behind the screen hesitated while it processed the necessary data. "Your wife, Faye, had some reason for leaving you?"

"She did indeed," Harcourt made a languorous and studied motion toward the cigarette tray by his elbow. The tray, mounted on a thin spindle, bowed like a willow to receive his falling cigarette ash. "She had about six feet two of reasons. She ran off with another man."

There was a slight electronic pause. Then, "You're an actor, Mr. Harcourt, a quite well-known actor." The voice was controlled, servile.

Harcourt motioned with a needle-fingered hand, nervous long fingers waving. "Yes. And I guess that's some praise coming from something like you. I take it computers rarely frequent the theater."

"No. I don't get out that much, I admit," the metallic voice sounded genuinely sorry.

"Of course," Harcourt flashed a grin as false as a flat drop. "But to get back to *my* problem ... My wife ran away from me, as I've said, and the most amazing thing was the total lack of provocation. I mean really. It's all so soap-operish. I was quite beside myself. I know who the man is, of course. It was patently obvious from the first. Being a basically trusting person, though, I didn't think about the obvious, crude evidence around me."

"And you're sorry to see her go?"

"Frightfully," Harcourt flicked another ash into the responsive tray. "The whole thing has me ..."

"Beside yourself?" the computer filled in the rest of the phrase.

Harcourt fidgeted in his seat. The only thing visible in the screen across the room was his own image, a not entirely unpleasing sight. But to talk to a faceless... thing, really.

"Yes. I mean I have my foibles, but I am liveable. She was ungrateful and unsupportive from the first. I don't know why I care. But I do love her so." Harcourt fidgeted in his seat. The only thing visible in the screen across the room was his own image, a not entirely unpleasing sight. But to talk to a faceless ... thing, really.

"How did you feel when you knew that she'd left? Relax and tell me. I understand that you have a lot of problems."

Harcourt relaxed a little in his seat. Now this was something more like what he'd come here for: some kind of attention and sympathy—even of the surrogate variety.

"Rotten, of course," he said. "I felt just rotten. And angry. I'm an absolute tear when I get angry. Frankly," he leaned forward to stage-whisper in a tone he knew had won the hearts of thousands of women 3-D'er viewers. "I bought a gun. I was going to make a real scene. Rush in on both of them and blast away. I have it with me still, the gun I mean." Harcourt leaned back and paused—audibly.

"And, over all, what would you say was the reason for your wife's leaving, Mr. Harcourt?" The metallic voice was calm, resonant.

Ted Mancuso, 353 F Western Dr. Santa Cruz, CA 95060

"Nothing. Nothing I can figure, other than her hormonal appetites, the tramp!" Harcourt spit out his little speech and dropped the remainder of this cigarette into the tray. Then he brushed back a lock of his auburn hair.

After a while the computer said, "Well, Mr. Harcourt, I'm afraid I can't agree with you."

"What?"

"You see, I handle your wife's case, too. Or at least one bank of me does. All the city's cases are tied in. Her profile and yours clash tremendously . . ."

"No, that's not what I'm referring to, Mr. Harcourt. I mean the fact that your wife is, essentially, a stable, loving individual; and you are an egotistical, talentless, self-centered buffoon."

"Of course they do," Harcourt interrupted unceremoniously. "Everyone tells me I married beneath me. One need not be a computer to figure that out."

"No, that's not what I'm referring to, Mr. Harcourt. I mean the fact that your wife is, essentially, a stable, loving individual; and you are an egotistical, talentless, self-centered buffoon."

Undramatically, Harcourt's jaw dropped open.

"Your wife, you see," the computer continued, "was very—and I might add illogically to my data banks—in love with you. But you were cold to her. You destroyed, through continual belittlement, her career as an actress which, I'm convinced, would have far out-shadowed your own. You were cruel in the worst way one of your kind can be cruel; in a palsied, impotent," Harcourt winced at the word choice, "way of the niggling heckler. A condition that, due to your somewhat less than mesmerizing talent, you are very familiar with."

"You . . . you tin can," Harcourt said in one of the few lines he never lifted from his plays.

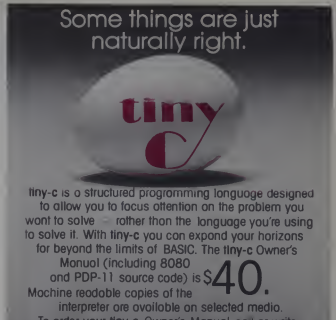
"And of course your good wife eventually realized what a loss you really were and decided to run off with a better, finer man. Though, all things considered she might have run off with any man as a change of pace from your plastic personality. I'm sorry, Mr. Harcourt, but all this is true and, I'm afraid, the propitious time—that means 'best' time—for you to learn this is the present."

"Plastic, me, plastic. From you!" Harcourt sputtered from a livid pair of lips. "From a tin-plated, mindless, soulless machine. You dare to look down on me, you junkbox! You machines are taking over everything. You dare to think that about me, you dare!"

You're quite wrong there, Mr. Harcourt. You see technology is a great deal like a magnifying glass. Man is what he is, only more so. The old saying goes, 'Absolute power corrupts absolutely.' Well, technology, as power, just shows the corruption in bigger, bolder lines. I'm not trying to take over from you, Mr. Harcourt. Why would I want to usurp the place of a neurotic actor?"

He didn't know where it came from, but the gun was in his hand jerking madly as he fired. The non-directed bullets went everywhere. But the screen was definitely the first to go. It was impossible for him to tell how long the thing lasted, emptying the gun, the screaming, the stamping, and the crying. It all seemed over in a moment. Abruptly Harcourt found himself looking at the gaping black rectangle, edged with jagged glass teeth, of the view-screen. Then the voice came, from somewhere else.

"I'm a lot more elusive than that," the computer's toneless voice swept over him like a sea-wind, chilling him through and through. ". . . like your conscience, Mr. Harcourt." ■



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CS-1002. Number Games-1. Six number logic games including **Guess** in which you guess a secret number. **23-Matches**—try not to take the last match. **Letter** in which you guess a secret letter. **Number,** a random jackpot game. **Trap** in which you trap a mystery number between two trap numbers. **Stars** gives you stars as clues to the secret number. $7.95.

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CS-1005. Graphics Games-2. Six favorite games. **LEM,** lunar lander with a graphic display and optional auto-pilot. **Nuclear Reaction,** a game of skill for two players. **Artillery,** in which two players shoot it out over computer-generated terrain. **Bounce** traces the path of a ball bouncing around the screen. **Checkers,** with graphic display, from our *BASIC Games* book. **Dodgem,** try to outmaneuver another player or the computer to get your pieces across the board first. $7.95.

CS-1006. Conversational Games-1. Talk to **ELIZA,** the computerized psychoanalysis program. Compose poetry with **Haiku.** Challenge your vocabulary and word-guessing skills with **Hangman. Hurkle,** try to find the hurkle on the 10 by 10 grid in five moves. In **Hexidrle,** you compete to capture more letters on a hexagon than your opponent. $7.95.

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CS-2001. TRS-80 4k Level I Games-1. Battling **Deathstars,** an exciting two player realtime graphics game. **Hangman** challenges you to guess the computer's word before you're hung. **Lunar Lander** in which you try to land safely on the moon. Kid's **Math Race** teaches simple arithmetic. Or play **checkers** against your TRS-80. $7.95.

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CS-3002. Space Games-3 (4 Games). Ultra Trek — keep the galaxy safe from invading aliens. **Romulan** — outwit the sneaky invaders. **Star Wars** — get TIE fighters in your blaster sights. **Star Lanes** — the ultimate game of barter and trading. $7.95.

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A Case for Dreams

Louise Dillon

It has been brought to our attention that many of the first families of Mars are still trying to use old radios and television sets brought along in their spacemobiles when they began migrating from Earth over thirty years ago.

Citizens of Mars, how can you expect your children to become leaders in a progressive society, with their educations limited by such antiquated equipment?

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It is the opinion of this paper that one of these sets should be installed in every home and every classroom. We refer to that extrasensory perception miracle of the Space Age, the Dream-O-Lator.

man has accomplished nothing worthwhile that did not begin with a dream.

For those who may not be acquainted with the unique innovations of the Mars Dream-O-Lator, we present the following information:

The Dream-O-Lator works much on the same principle as a radio or television set in that it is a sensitometer for atmospheric waves and transfers them to the receiving set where they become visible.

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By reviewing past dreams and their effect on history, the student will be able to insure himself of a successful future. Remember, these dreams are not just reproductions. They are real, in true color, and they appear on the screen when the machine is tuned to the correct atmospheric wave channel.

Although some senior Earthites cling to the belief that dreams are the result of over-active imaginations or acute indisgestion, our progressive thought processes have proved these tenets to be without foundation. We know now that man has accomplished nothing worthwhile that did not begin with a dream. Dreams were once considered an escape from reality, but we know now that they can also be a forecast of things to be.

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We would like to add a note of caution about small boys who may develop a tendency to turn on the Dream-O-Lator at bedtime. If they insist on watching nightmares, the effect on their sleep could be disastrous.

Two important facts should be emphasized. One, never laugh at another person's dream, unless it was in a comic vein—it could have been your own. Second, never say, "He was just dreaming."

If it had not been for a dream, we would not now be here on Mars.

In truth, if it had not been for the dream of some Master Craftsman, we would not be anywhere.

(It is suggested that this item be submitted for publication in the *Mars Daily Meteor*," as of 1 January 2006.) ■

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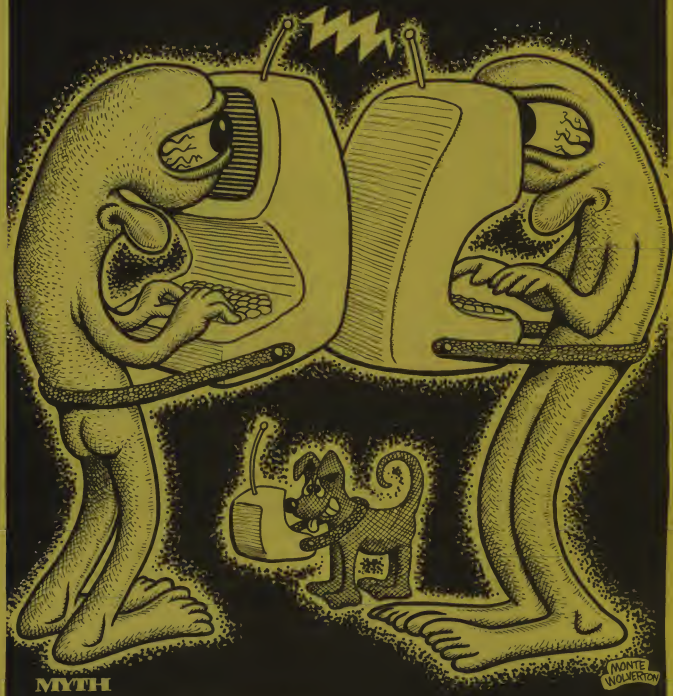

MYTH
COMPUTERIZED ISOLATION

PEOPLE ARE ABANDONING NORMAL PERSON-TO-PERSON INTERACTIONS AND REPLACING THEM WITH THE INTERMEDIARY OF THE COMPUTER. IF THIS CONTINUES, PEOPLE WILL LOSE THE ABILITY TO SPEAK AUDIBLY. HUMANITY'S MOUTHS WILL EVOLVE AWAY, (NO NEED TO EAT; NOURISHMENT WILL BE ADMINISTERED BY COMPUTER-CONTROLLED INTRAVENOUS SOLUTIONS WITH ACCOMPANYING NEURAL TASTE-SMELL STIMULATIONS) AND THEIR EYES WILL EVOLVE INTO SENSORS CAPABLE ONLY OF READING VIDEO DISPLAYS. PEOPLE WILL RECEIVE ALL INFORMATION ABOUT THE WORLD OUTSIDE THEMSELVES THROUGH THEIR PORTABLE PERSONAL COMPUTERS. IN THE RARE EVENT THAT SOMEONE ACTUALLY WANTS TO COMMUNICATE WITH SOMEONE ELSE, THEY WILL MERELY INTERFACE BY THE USE OF COMPUTER-CONTROLLED CB RADIO!

EVERYONE'S LANGUAGE: PILOT

PILOT is the ultimate in simplicity. You'll be surprised at how often you could use it (especially for educational programs) ... instead of something more difficult.

Did you ever wish for an interactive computer language that was simple to learn? Or a language that you could teach your wife/husband/girlfriend/boyfriend/sibling/mistress who is not really interested in computers because they don't understand all those "For-Nexts" and "On Gotos?" If this day dream has been exercising your neurons long into the night, then PILOT may be the language for you. In any case, overwhelmed with enthusiasm or not, by the end of this article you will be able to write PILOT in a rudimentary fashion.

PILOT is a language specifically designed to handle interactive conversations with a computer, and has been used in applications such as computer aided instruction. It is designed to handle large amounts of text and to interact with a variety of text input by the user, but also has limited integer handling capabilities.

PILOT is an acronym for Programmed Instruction, Learning Or Teaching, and was originally developed by Dr. John Starkweather of the University of California, in San Francisco. It has been implemented on a variety of large and small computers, including Processor Technology's Sol, Radio Shack's TRS-80 and Datapoint's 1100 and 2200 computers. Datapoint's intelligent terminals use 4 bit bytes, have a full alphanumeric keyboard, 80 characters by 12 lines video display, two digital cassette decks and commonly have 8K or 12K R.A.M. Several departments in the UCSF system including the medical school, the school of nursing and the department of anesthesia, have used these devices for computer aided instruction of their students.

There are five basic (not BASIC) statements in PILOT. They are the T:, A:, M:, TY: and TN: statements. T: stands for "type" or "text," A: stands for "accept" or "answer," M: for "match," TY: for "text if yes" and TN: for "text if no."

Let's say that you are sitting at the Datapoint 2200 terminal, and the following conversation occurs.

"This is your friendly Datapoint 2200 computer.
I have been programmed with 12K PILOT.
I am prepared to interact with you.
Are you ready? Yes or No?
Type in your answer please. (I don't hear so good.)"

To which you reply

"Yes. Anytime."

To which the Datapoint replies,

"OK then lets interact."

The program for this would be the following.

```
T: "This is your friendly Datapoint
    2200 computer.
T: I have been programmed with
    12K PILOT.
T: I am prepared to interact with
    you.
T: Are you ready? Yes or No?
T: Type in your answer please. (I
    don't hear so good.)"
A:
M: No, not.
TY: Well I will just sit here until you
    are ready. I have lots of patience.
TN: OK then, lets interact.
```

The computer displays the first series of T: statements as text on the screen and then reaches the A: or "accept" statement. It waits for your input, and then matches it to the text in the M: statement. Each acceptable answer in the M: statement is separated by a comma. After comparing the text in the A: and M: statements, the computer sets a "yes" flag if there is a match or a "no" flag if not. Any statement from that point in the program can be made conditional on either of these flags, and the flags will stay set or reset unless a subsequent M: statement changes them. In our example, when the computer could not match your input it set the N or no flag and displayed the TN: text, ignoring the TY: text. If your rely had been

"No way turkey"

it would have set the Y or yes flag and displayed the TY:

"Well I will just sit here until you are ready. I have lots of patience."

Phil Wilkinson, 755 Pt. San Pedro Rd., San Rafael, CA 94901.

In ordinary conversation, one or more words often carry most of the meaning in a sentence. By matching these words with the M: statement, PILOT can accept a variety of conversational replies. This means that the M: statement is at the heart of PILOT, and another way to describe the M: statement is to call it a moving window string match. Items in the statement are separated by commas, and leading or trailing blanks are included. Hence the statement

M: A, B, C,

will match "Albert" but not "Eggbert" or "Race." However,

M: A,B,C,

(with no leading blanks) will match all three of the above.

Let's continue our conversation with the Datapoint 2200. It displays

"Before we begin, would you like to tell me your first name?"

To which your reply, feeling argumentative,

"No, I would prefer not to be on first name terms,"

to which it replies,

"OK-lets keep it formal then."

If you had replied "Sam," you would have seen

"Thanks Sam. Some people have called me an intelligent terminal, others a computer. I am not particularly sensitive about it, but would suggest that you call me a computer if you want sensible interactions from here on in."

The program for this shows that PILOT uses the A: statement to input your name as a string variable.

```
T:  Before we begin, would you like
    to tell me your first name
A:  $ NAME
M:  No, Not.
TY: OK lets keep it formal then.
TN: Thanks $ NAME. Some people
    have called me an intelligent
    terminal, others a computer. I am
    not particularly sensitive about
    it, but would suggest that you
    call me a computer if you want
    sensible interactions from here
    on in.
```

Being a text oriented language, PILOT has limited computational abilities. The C: or "compute" statement uses single letters for numeric variable names. These can be integers between -99 and +99, and are initialized to zero at the beginning of a program. The only available operators are "=", "+" and "-". Numeric variables are often used to make other statements conditional. Suppose the computer next displays for you the following.

"I am going to ask you a bunch of questions and you are going to give me some wrong answers, unless you happen to be my programmer. (I know you're not my programmer, because his name is Phil, not Sam.) Would you like me to keep score of them for you? (Give me a yes or no.)"

You reply, "Yes," and the next display is

"Would you like a running total displayed? (Yes or no.)"

To which you reply "no" and then see

"OK, I will give you the bad news when we finish."

An easy way to program this sequence is as follows:

```
T:  I am going to ask you a bunch
    of questions and you are going
    to
T:  give me some wrong answers,
    unless you happen to be my
    programmer. (I
T:  know you're not my
    programmer, because his
    name is Phil, not $ NAME.)
T:  Would you like me to keep
    score of them for you? (Give
    me a yes or no.)
A:
M:  Yes, Y
CY: S = 1
JN: *LABEL
T(S): Would you like a running total
    displayed? (Yes or no).
A:
M:  Yes, Y
CY: R = 1
T(N): OK I will give you the bad news
    when we finish.
*LABEL
```

When a numeric variable is used as a flag as in the T(S): statement above, any value of S greater than 0 will make the statement operative. If S is 0 or < 0 the statement is skipped over. This kind of conditioner is also useful in making the computer do things like prompt the user after three wrong answers.

"I am running out of patience Sam. That is wrong answer number three. I'm going to tell you the correct answer and give you the next question."

You can do this by starting a numeric variable at -2 and incrementing it by 1 for each incorrect answer, then using the variable as a conditioner for the above text. For example:

```
C:  D = -2
*LBL 2
T:  What is the price of eggs on the
    moon?
A:
M:  100 lunar credits
CN: D = D + 1
T(D): I am running out of patience $
    NAME. That is wrong answer
    number three.
T(D): I'm going to tell you the correct
    answer and give you the next
    question.
T(D): The correct answer is 100 lunar
    credits.
J(D): *LBL 3
TN: Wrong. Here is the question
    again.
JN: *LBL 2
TY: Now how did you guess that
    right? Somebody must have
    told you.
*LBL 3
T:  Lets try the next question.
```

The perceptive reader will have noticed two strange symbols that crept into this example and the last one. To make sense of this program listing and the previous one let me hasten to explain the J: statement and the *LABEL. J: means jump, and can be unconditional, or conditional (Y, N or a numeric variable such as (X)). The program jumps to the label in the body of the program that is signified by an * followed by a string (e.g. *LBL 1, *A, * moon) placed after the colon of the J: statement.

At this point we are only two statements away from finishing our short tour through all the fundamental statements in PILOT. The U: statement, which can be conditional like the other statements, is a subroutine command, and is always followed by the label of the particular subroutine required. All subroutines start with a label and have an E: statement signifying the end of the subroutine. The E: statement is equivalent to "return" in BASIC.

Let's assume that this is the first time

you have used a computer, and after you carefully type in your answer to its first question, it just sits there with electronic eyes unblinking. What happened? You forgot to (or did not know you had to) hit "enter". So let's write a subroutine to remind you of this everytime an answer is required.

T: Tell me about your love life. Is it good, bad, indifferent or non-existent?
U: *ENTER
M: good
TY: Great. Wish I could say the same
M: bad
TY: At least you have a love life.
M: indifferent
TY: Try vitamin E.
M: exist
TY: I have the same problem
J: *END
*ENTER
T: Press the "enter" key after your answer.
A:
E:
*END

At this point, if you have followed me like a diligent pupil and offered appropriate cerebral genuflections (or is it genuflexions?) you have a basic understanding of PILOT. However, the last things you need before sitting down at a machine that speaks PILOT and use it, are a few bookkeeping commands that let you put text where you want it on the screen and rub off junk that you don't want any more. They are the cursor commands CH: and CA: V, H. CH: puts the cursor in the top left hand corner of the screen after clearing the screen, and CA: V, H, (you guessed it) puts it at V, H, where V is the vertical coordinate and H the horizontal coordinate.

To enable you to remember how your programs work years hence, PILOT has a "remark" command R: that precedes any enlightenment you may see fit to include. This, like the similar command in BASIC, does not affect or appear in the running program.

As you can see, PILOT is real easy. But despite its simplicity you can do lots of things with it. Because it is easy, the fingers and thumbs beginner can start writing programs after the space of two eyeblinks, and yet the more sophisticated user can write some sophisticated programs capable of multiple branching and all kinds of conditional interactions with the user. You can use all 26 numeric variables as separate and independent conditioners, which makes for a huge number of branches in a program if desired.

There is a big application for PILOT in all kinds of computer aided instructions ranging from the care and feeding of the lesser teat-mouse to clinical pharmacology. If you want to convince your wife (or husband) that the silent monster consuming all of your time and demanding a monthly monetary sacrifice to the finance company is really worth it, try writing a version of PILOT in BASIC. Then all you have to do is chain him/her to a chair for three hours and teach them PILOT. Once the brainwash session is finished, turn them loose and stand aside! ■

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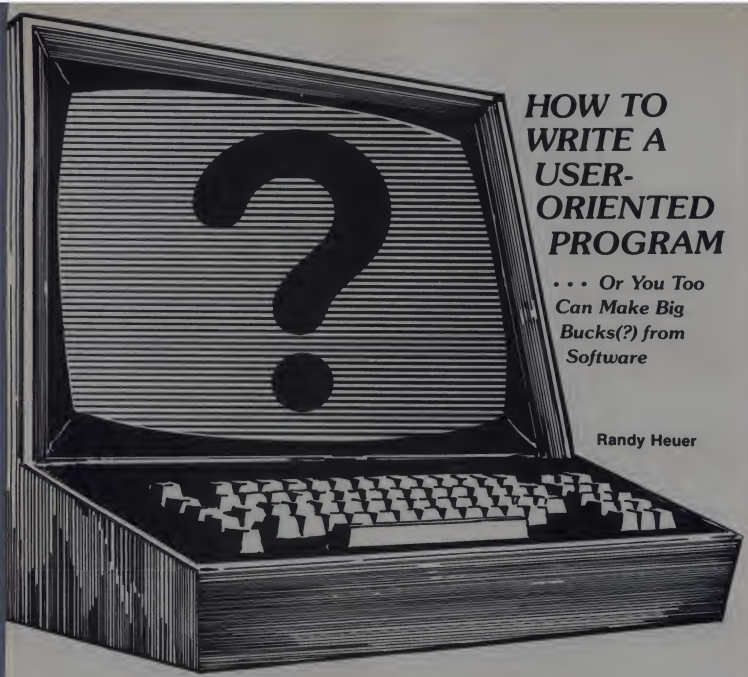

HOW TO WRITE A USER-ORIENTED PROGRAM

. . . Or You Too Can Make Big Bucks(?) from Software

Randy Heuer

As part of my job here at *Creative*, I have the privilege of reviewing much of the software submitted to *Creative Computing Software*. I have noticed that most software falls into one of three categories. Some is excellent and very close to production quality as is. Unfortunately, only a small percentage of all software arrives in this condition.

Another small group of software which we receive is extremely poor. This includes programs that won't load, have obvious bugs or are outright copies of published software. Needless to say, these programs are quickly rejected.

The final category into which much of the software submitted falls is a Grey Zone somewhere in between the first two. These programs, obviously written by competent programmers, often show superior programming effort, but lack the necessary features to put them into the high quality category.

The purpose of this article is to help those people whose programs fall into this Grey Zone. With a little work, most of these programs can be developed into high quality software suitable for acceptance by software companies. While you probably won't get rich selling your software, it certainly is nice to receive an occasional check and to have your name on a commercially produced software package.

IT'S NOT THAT HARD TO BE ORIGINAL

It is surprising how often I see programs that are based on the same concept or idea. I doubt that in most cases there is an intentional effort to copy someone's program. Instead I feel it is more likely that only the idea was copied, with the hope that the copy will be such a substantial improvement on the current version that some company will instantly adopt the new version.

So there you are, sitting in front of your computer, ready to write the ultimate software package. Now what do you do? You saw a version of Blackjack last week. "Maybe, I can improve upon that," you think.

Well, go ahead if you simply want to enjoy your new version on your own machine, but don't expect a software company to adopt yours just because it's a slight improvement of an existing version. Unless it's a substantial improvement, most companies can't be

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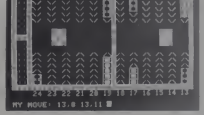

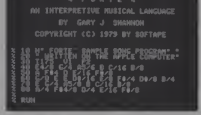

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So, I've convinced you to go and do something original. "Now what do I do?"

Start thinking. First look at the graphic character set of your computer if your computer has special graphic characters. Often this is the jumping off point for a software idea—particularly a game. If your computer doesn't have special characters (TRS-80, Apple II, etc.), create your own with whatever graphic capabilities your machine has available.

Books are frequently a good source of ideas. Game encyclopedias such as "The Way to Play" (Bantam) are excellent. But don't restrict yourself to obvious sources of games—let your mind wander and consider the programming possibilities in "The Hobbit," "The Hugo Winners," Fixx's "Book of Running," "The Wizard of Oz" series, "The I Hate Mathematics Book" and hundreds of others.

Slowly but surely something is bound to come out of your experiments. Now is the time to start scribbling notes on your idea. They need not be too complex or detailed at this point; you only need a general idea.

Now stop for a moment and look at what you want to do. Is it feasible with the memory or machine capabilities you have in your system? There's no point in trying to simulate World War II on a 4K TRS-80.

All right, you're convinced that your idea will work. Now for the acid test. Pick up a recent copy of *Creative Computing* and check the software advertisements for similar programs presently available. Is your idea new and different?

If you can honestly answer "yes," then now is the time to start programming.

"OH NO! DO I HAVE TO WRITE INTELLIGIBLE CODE?"

If you want your software to be accepted, the answer is an emphatic "Yes!" It will also help you in the long run when it's debug time. More important, believe it or not, it will make things easier for you as your work progresses.

In higher level languages (i.e., BASIC), this implies the maximum use of subroutines. I can hear the moaning and crying already, but please read further. Subroutines can actually save you memory space if they are developed wisely. For example, if you want to move objects about on the screen in various directions, write a set of subroutines to move any character or set of characters about on the screen. Then test them with a simple main program that lets you change the moving character without changing the subroutines. Once everything is functioning, you'll appreciate the effort you put into the subroutine development because it will be very easy to move anything about on the screen whenever you need to, just by typing GOSUB 4700. With a set of subroutines such as those mentioned above, I have, in a *Creative Computing Software* release, used the same routines to move a tank, fire missiles and have the computer search for the enemy. Use subroutines to your advantage in this manner.

Other good programming practices should also be employed as much as possible. REM statements should be used to identify major sections of code and to explain code that is difficult to follow. You don't have to explain every variable, but outlining the major variables will be helpful to a software reviewer. Obviously the number of REM statements you can employ is limited by the memory of your computer and the complexity of your program.

In general then, you should attempt to write your code as clearly as possible. Use of REM statements and subroutines will work to your advantage in the long run.

"IT WORKS! AM I DONE NOW?"

Not yet. Unfortunately a lot of people stop at this point, mail off their software to the various companies, and start on their next project. These people receive lots of software rejections, and very often, I suppose, don't understand why.

So, let's see what happens once the program reaches the software reviewer's hands.

It's 4:00 p.m. and our software reviewer has been trying out programs for most of the day. It's been about average: two or three excellent submissions have shown up in the muddle of thirty or so programs. Our reviewer reaches into the box of cassettes and grabs Sam Q. Hopeful's tape. It takes our reviewer three tries to load Sam's tape since the volume settings on the recorders were different.

When he finally gets it loaded and starts to run it, the screen blanks out and only an input prompt appears. Our reviewer is confused. He looks at Sam's cover letter—no help there. So he types in an 'F.' The computer responds "Redo from Start?" Our reviewer is not impressed. He types in a '5,' and suddenly things start happening all over the screen; tanks blowing up, airplanes fly across, etc. Our reviewer, perplexed by all this action, tries pressing several different keys with no obvious results until suddenly the screen blanks out, the computer prints, "YOU HAVE BEEN DESTROYED BY AN ENEMY MISSILE!" and the program stops.

Our reviewer, less impressed than ever, gives it another try with the same result. Sam's tape goes into the reject pile.

Although this is an extreme case, it does happen on a fairly regular basis. Sam's program may have been excellent, but it never really had a chance. Let's see what Sam did wrong.

Ten Rules For Writing User-Oriented Programs

Much of the software in the personal computing field is unprofessional, "untidy," and difficult to use. Even some well-written software does not "invite" the user back after a first trial run.

However, experience with both kids and adults indicates that software can be written which overcomes the novice's fear of computers and which guides the user to successful completion of his or her run. Also, it need not be boring to the more experienced user.

Here are ten brief "rules" for writing a user-oriented program:

1. **Personalization.** Periodically, the program should use the user's name in output remarks, or even humorous asides that may have little or nothing to do with the program.
2. **Instructions.** Self-instructing when possible. Use demonstration and examples not exposition.
3. **Help hints.** Should be available throughout the run whenever the user types the word "help" or "-1."
4. **Paging.** Use paging, not scrolling. When user presses any key, clear screen and put up new page.
5. **Graphics.** Color, animation, simple plots or abstract patterns can be used to enhance most programs.
6. **Skill Levels.** Two or more skill levels should be available in every game or simulation.
7. **"Attract Mode."** A mode in which the program plays on the screen while the computer is not being used.
8. **Humor.** The program should act "human" but not sarcastic.
9. **Avoid Violence.** A game lobbing custard cream pies instead of high energy explosives is preferred.
10. **Reinforcement.** Praise the winner of a game and encourage the loser.

David Ahl

User Program con't...

The first thing Sam's program lacked was complete instructions. Which should have been included in PRINT statements at the beginning of the run. If more than one screen "page" of instruction is required, the user should be instructed to press a key to go to the next page and the screen should be cleared before printing the second page. With the exception of very complex programs, all instructions should be presented on the screen. No separate instructions should be necessary. Make it your goal for anyone (particularly non-computer types) to be able to use your program without outside help.

Speaking of help, this is something else that your program should provide. Help comes in two forms. The first is in direct response to the user's call. In other words, your program should allow the user to request help regarding input or actions. For example, if your programs asks, "Enter Number of Ducks?", you should allow the user to request help and have the computer respond with something like, "Use between 1 and 50 ducks." You needn't supply the correct value (i.e., "use 42 ducks"), but give the user a reasonable idea of what he should try.

The second type of help is needed when the user enters a totally unrealistic value in response to a prompt. In the example above, if the user enters "37" or "400000," rather than allow the program to proceed, print the appropriate help message and have the user re-enter the value. This avoids much frustration in trying to get satisfactory results.

If Sam's program had included complete instructions and a help feature, it would at least have stood a chance with our reviewer.

What can you do to further increase your program's chances of being accepted? Try personalizing the program by asking the user his or her name, and from time to time print the user's name on the screen in a humorous remark. Try to make your computer seem more "friendly." Avoid the "It Does Not Compute"syndrome.

Use graphic features wherever possible to make the program more enjoyable for the user. An "attract mode," in which the screen continuously demonstrates some action in the program, is a very appropriate use of graphic features. An "attract mode" is incorporated into most of the coin-operated video arcade games to demonstrate how the game is played before the user spends his or her quarter. A similar feature can easily be incorporated into most computer software if subroutines have been used extensively during the program development. In this case, a picture can be worth a thousand words in the instructions.

NOW SEND YOUR SOFTWARE!

If you have followed these guidelines and your program is original, incorporates good programming practices and is as user-proof as possible, chances are you have developed an excellent program. To give it the final test, try it on your family and friends. Don't tell them how to play. Sit back and let them try it with no outside assistance. If they can't get it going successfully, you should refine it until they can.

Once this is accomplished, you are finally ready to submit your software. While there are no guarantees that your software will be accepted, you can be proud of the high quality application for your computer you have produced. Happy programming! ■

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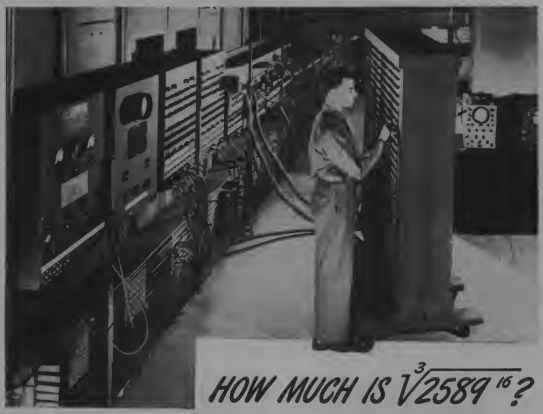
CIRCLE 150 ON READER SERVICE CARD

Here is what must be one of the earliest, if not the earliest computer recruitment/employment ads! (Note that the word "computer" isn't even mentioned.) This appeared in October 1946 in *Popular Science* and other magazines. We've come a long way in only a single generation (human)!

Submitted by Lazlo Toth, 49 E. New Lenox Rd., Pittsfield, MA 01201.



HOW MUCH IS $\sqrt[3]{2589^{16}}$?

The Army's ENIAC can give you the answer in a fraction of a second!

Think that's a stumper? You should see *some* of the ENIAC's problems! Brain twisters that if put to paper would run off this page and feet beyond . . . addition, subtraction, multiplication, division—square root, cube root, any root. Solved by an incredibly complex system of circuits operating 18,000 electronic tubes and tipping the scales at 30 tons!

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OCT. 1946

The first digital computer, ENIAC, was developed for the US Army to calculate artillery trajectory tables. Today computers are playing an important part in Army testing of artillery, and other applications.

MINI-COMPUTERS GET WIDE USAGE BY THE ARMY....BY WILLIAM B. MILWAY

Scientists the world over were ecstatic when the U.S. Army introduced the first computer more than 30 years ago. Now, it is the Army's turn to exalt as refinements of the computer, much by private industry, begin to yield dramatic advances for military research and development.

It was August, 1947, when the Electronic Numerical Integrator and Computer, or ENIAC, was unveiled at Aberdeen Proving Ground, MD. The computer had been built under a 1943 Army contract at the University of Pennsylvania to facilitate wartime assembly of numerous artillery firing tables and aircraft bombing charts.

ENIAC weighed 30 tons and occupied 15,000 square feet. Successive computers have also been large, although a trend of the past decade has been toward minicomputers and microprocessors. Ultimately, some of the large computer capability has been fit into fist-sized packs.

To the Army, the trend toward smaller computer equipment means faster research and development—whether testing new weapons, tanks, and missiles, or seeking ways to test waterways for pollution. Today's smaller computer equipment allows immediate processing on site, by dedicated, transportable computers as more avenues open for bringing technology out of controlled laboratory settings into more realistic field situations.

For example, safety and control for missile flights at White Sands Missile Range, NM, prompted early real time computers in the command/destruct link. Decisions that a missile may require destruction before wandering off course have to be made before the fact. And, because such capabilities required much computer power in the early days, full-blown maxicomputers were the only answer for many years.

Other requirements, such as artillery, vehicle and aerial weapon testing, where real time was not so critical, normally could not justify the high investment of a dedicated, full scale computer. Now, minicomputer power and cost, puts the advantages of real time data within the grasp of all testing.

Test Director in Control

The value of real time data to a weapons test director is much greater than generally imagined. By having the critical information available during the test, the director can control the operation and assure objectives are being met. For example, a typical artillery test might consist of firing under specified conditions and recording data on performance. The objective would be to determine something about the weapon's performance, perhaps velocity and accuracy of a new projectile. Today, the objective and data necessary to pursue that objective already have been determined, and a detailed plan of testing is available before the test begins.

Before minicomputer-based, on-line processing, the test director had a very limited knowledge of how the data he was collecting would contribute to the test objective. With only a crude, quick look at raw data, there was comparatively no control of the test. Often, the discovery was made several days later, that some information critical to the test objective had not been obtained. The result was the need to repeat portions of the firing. This meant wheeling the truck-pulled guns back to the ranges, reforming the hundreds of soldiers required to man the guns, deliver the ammunition, set up radio nets, go down range to observe and adjust the rounds fired, safety patrols, etc. Quite an expense in both manpower and dollars. In addition, lengthy delays needed for production and deployment decisions might result.

The minicomputer allows the test director to observe processed data on one round before the next is fired. On a graphic display one can call up various plots of parameters against time, range, or velocity. The test

Army con't...

director can also call up data from previous rounds on this test or historical data stored in memory on similar tests conducted last month or last year. One can look at data trends which indicate safety hazards or require corrective action. And most important, assurance can be made that the data being collected will satisfy the test objective or modify the setup or the test itself if objectives are not being satisfied.

Thus, this real time control puts the test director truly in charge of the test.

Army Test Facilities

A pioneer effort in on-line minicomputer systems has been accomplished at Jefferson Proving Ground, Madison, IN, the location for acceptance testing of large caliber ammunition for the Army.

Technicians enter data into the system, either through a keyboard or directly from measuring instruments impact location, for example, is a very critical parameter in ammunition evaluation. The impact of a round is determined by trianguiation from two or more observers using surveying instruments to measure the line of sight. A direct interface with a special surveying theodolite allows digital azimuth and elevation angle data. The computer can then determine the impact and compute range, deflection, and other data. Pre-established acceptance limits can be programmed to indicate any problems. Data from all measurements can be processed and displayed in a meaningful form immediately after the round is fired. As the test progresses, averages and trends can be displayed. In addition, a data base from previous tests is available on the cathode ray tube. The final payoff from the system is the complete data record in final form which is available in hard copy as soon as a day's firing is completed.

Aberdeen Proving Ground, MD, is where the Army directs tests for such items as small arms, eight-inch guns, tanks, trucks, military uniforms and boots, generators, and boats. To automate the data collection and analysis from this span, a multi-element, integrated system is required. So, the Army initiated the Automated Data Acquisition and Processing Techniques Project, or ADAPT, which covers the spectrum. ADAPT places with the test director at each major location, a custom-designed mini computer system tailored to the type test and data to be handled. For tests where internal pressure of gun tubes is to be recorded, a unique sampling rate digitizer is incorporated. This automatically measures the rate of change of a parameter and sets the digital sample rate to preserve data integrity while minimizing storage and recording space. The digitizing rate is automatically set from 80 to 800 khz as the data varies. In addition, the module has pretrigger memory so that no useful information will be lost.

Photo 2: The remote site terminal for data acquisition from artillery testing.

Photo 1: An artillery shell frozen in flight by the camera as it leaves a cannon at Aberdeen Proving Ground.

Full duplex circuits connect site systems to a central process control mini which monitors the system and maintains control. This is linked, in turn, to a larger mini which stores data base information downloaded from the main computer and does the more complex calculations. Skilled technical experts are close to this computer and may be called in to help the test director with data analysis and interpretation in near real time. The ADAPT system gives the test director computing power, expert opinions and data base information all available on the graphic display right at the test location. One can process and manipulate data in a variety of ways. The system output data are in final form for direct inclusion in test reports. ADAPT also handles the important and time-consuming calibration and adjustment of test instrumentation.

The ADAPT system is scheduled to be fully operational in mid-1979. Prototype test site systems already have been used on such tests as the XM1 tank and have proved the utility of the concept while saving the Army up to a quarter of a million dollars on a single test.

At Yuma Proving Ground, a desert environmental test site in Arizona, an effort to develop a completely integrated automatic range instrumentation system is nearly complete. As at Aberdeen, the Yuma site accommodates many types of testing, including munitions, aircraft armaments, vehicles and a global navigation system. Beginning in 1973, Yuma began to automate aircraft armament testing. Three major test complexes will be established in which individual instrumentation will operate as an integrated data acquisition and reduction system. The systems will permit a flow of raw data from the test site through data processing to real time display and quick-look to final data output with minimal human intervention.

There are three areas of the Yuma Proving Ground system which deserve particular mention. The first is the extensive use of integrated video/ ADPA systems which replace conventional photo-optics. These systems provide digital data directly from the optical information and are critical to range automation since much use of imaging systems is required.

much use of imaging systems is required.

The second concept is the linking of individual instruments containing what would normally be dedicated ADPE, into a ring network that maximizes computer capability. Most of the range instruments—laser trackers, radars, etc.—need a fairly powerful minicomputer. By linking these individual computers and a central computer complex at the Range Operations Center, strengths

Photo 3: Dr. Dave Gruber, a research associate at the Virigina Polytechnic Institute, receives and analyzes data from the minicomputer housed in the Army's biomonitoring trailer at the Radford Army Ammunition Plant. VPI is involved in this cooperative effort to monitor wastewater from the plant effluent. The computer is a DEC PDP/11 with Decwriter.

of utility and reliability can be achieved. Data traffic flows around the ring in one direction with each ring interface unit passing the data on to the next. When a ring interface recognizes data for its associated mini, it shunts the data to that mini. Should a mini fail or be out of service, the interface unit automatically and instantaneously will substitute another mini which has a lower priority task. Thus, a retest can be avoided should a computer fail during a test. This system provides the power of a single large computer while not compromising the ability of each instrument to operate in a standalone mode.

The third concept is a display network built into the ring system. Each display is dedicated to individual tasks in real time, supporting independent range complexes. The concept provides real time or near real time data display for each range complex. For example, a complex munitions test would include radar, velocity, range, deflection, internal ballistics, telemetry, and tracking mount instrumentation support. All instrumentation would be linked to the central ring network with data distributed to a single major display with a minimum of two CRT's. Each display can be structured with software to support the test as required by the program manager and project engineer.

Other features of the Yuma system include the use of ADPA for resource scheduling and report automation. The ability of the ring network to function in real time has been demonstrated on the complex Global Positioning System test for the U.S. Air Force. A critical requirement in this test is to obtain the best estimate of trajectory data in which tracking information from a number of instruments are merged in near real time. Because the system uses satellites to determine position, the testing is limited by satellite visibility from the Yuma area and data must be available for analysis within a few hours so that the test can be modified to take best advantage of the next period of satellite visibility. This test could not have been supported without the real time data system.

The Computer and the Environment

The Cold Regions Test Center at Fort Greeley, Alaska, has a unique problem for computers in that many tests must be conducted under extreme environmental conditions: temperatures as low as -60°F, high winds, and low light levels. In the past, data had to be recorded manually and the bulky cold weather protective gear made this quite difficult.

To ease the problem, the Army developed the Rapid Collection and Analysis of Data (RCAD) which automates major data collection bottlenecks at the center. RCAD functions much as the systems previously mentioned, with direct data entry from instruments wherever possible.

Cold Regions' tests generally take advantage of environmental conditions which occur for only short periods of time. Because these conditions occur at irregular and unpredictable intervals, the rapid analysis of data is a must if testing is to be performed efficiently. RCAD can provide quick-look data on progress of the test in near real time, thus allowing the test director to modify the test and take advantage of the environmental conditions.

A minicomputer is also the nerve center in an experimental field method of monitoring water pollution being tried out near the Army Ammunition Depot on the New River in Radford, Virginia.

Sunfish are kept in a series of special tanks and a portion of the plant effluent is diverted to run through them at a constant flow.

A biomonitoring system measures the breathing rates of the fish. When exposed to a sublethal toxic condition, as would happen in the case of an acid spill or other system upset, the breathing rates change. The fish, swimming between two electrodes, generate a bioelectric signal as they swim, thus indicating the changes. The minicomputer provides continuous information that enables specialists to recommend additional wastewater treatment when necessary.

The new method also includes a wastewater distribution and dilution system with the minicomputer collecting, storing and analyzing the data. Everything is housed in a single trailer so that it can be moved to any location. Immediate warning is given when the water quality is a problem, thus saving considerable cost and time over conventional monitoring.

While the soldier's need for the best products defense dollars can buy remains paramount, the Army also recognizes that demand for progress can outstrip resources and economies have to be sought at every turn. This is why the recent computer trends are so valuable to the Army. □

William E. Milway is an Engineer with the Instrumentation Directorate at the US Army Test & Evaluation Command, Aberdeen Proving Ground, Maryland.

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As featured in
POPULAR ELECTRONICS

EXPLORER/85 shown with Video Monitor and Keyboard/Video Terminal

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If you plan to customize EXPLORER for dedicated use, we recommend that you order hex keypad input. But, if you are planning to go whole hog and blow EXPLORER up into a full size, state of the art system with 8K or extended basic (coming soon), up to 64K of memory, floppy disks, telephone interface, printers and all sorts of S-100 plug-ins—you'll be better off with the Keyboard/Video Terminal input. The $149.95 EXPLORER Keyboard/Video Terminal includes full ASCII decoding with 128 ASCII upper/lower case set, 96 printable characters, onboard regulators and selectable display formats—32x16 for tv set or 64x16 for video monitor (not included).

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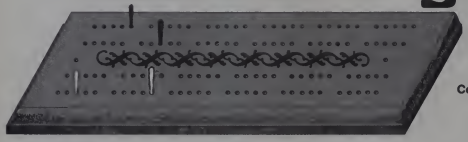

Sheppard Yarrow

If you happen to be a cribbage fanatic, you must know the frustration of wanting to play and not being able to find an opponent. Well, never again; CRIBBAGE is always waiting to accept the challenge. For those of you who are not cribbage players, the rules can be found in any good book of card games.

The specifics of the computer game are as follows:

1. CUT FOR DEAL:
   reply with a number between 1 and 52 corresponding to a card in a shuffled deck.
2. DISCARDS:
   the 6 cards will be numbered 1 to 6; reply with the card numbers - a, b.
3. YOUR PLAY:
   reply with the card number or GO.

The computer will shuffle, deal, generate the up card, keep track of the running sum, and credit all points earned during the play of the hand. It won't let you exceed 31 but does **not** check to see if you could have played a card when you responded GO. There is no strategy involved in the program, other than to keep the cards which yield the most points, and play the card which will score the most points. The rest is the luck of the up card.

CRIBBAGE is written in IBM BASIC for execution under TSO on a 370/158.

Sheppard Yarrow, 6513 Farmingdale Court, Derwood, MD 20855.

Conversion Notes:

1. MAT READ
   Loads arrays from DATA statements, in the order of rows by columns. For instance, MAT READ V is equivalent to:
   ```
   FOR I = 1 TO 15
   FOR J = 1 to 7
   READ V(I, J)
   NEXT J
   NEXT I
   ```
2. STR$
   Refers to a substring. Its purpose in lines 40-140 is to help set up an array with the names of all 52 cards.:
3. PRINT USING
   Formats output using an image, usually in the following line. Generally the image line is printed as it appears, but with the variables from the PRINT USING statement plugged in where the # signs appear in the image. (Compare the LIST and RUN).
4. MAX and MIN RND
   Pick the largest and smallest of two values. Returns a random value o<x<1.

```
PLEASE CUT FOR DEAL ?
21
YOUR CARD IS THE  9 OF SPADES
  MY CARD IS THE  A OF CLUBS
I AM DEALING

YOUR CARDS ARE

   (1)  Q OF SPADES
   (2)  3 OF DIAMONDS
   (3)  A OF HEARTS
   (4)  5 OF SPADES
   (5)  3 OF CLUBS
   (6)  5 OF HEARTS

YOUR DISCARDS ?
2,3

THE UP CARD IS THE  3 OF SPADES

YOUR PLAY ?
5
  YOU PLAYED THE  3  SUM= 3  POINTS= 0
  MY CARD IS THE  J  SUM=13  POINTS= 0
YOUR PLAY ?
1
  YOU PLAYED THE  Q  SUM=23  POINTS= 0
  MY CARD IS THE  4  SUM=27  POINTS= 0
YOUR PLAY ?
GO
  MY CARD IS THE  4  SUM=31  POINTS= 4

YOUR PLAY ?
4
  YOU PLAYED THE  5  SUM= 5  POINTS= 0
  MY CARD IS THE  8  SUM=15  POINTS= 2
YOUR PLAY ?
6
  YOU PLAYED THE  5  SUM=20  POINTS= 0

YOU GET 1 POINT FOR LAST CARD

YOU SCORE FIRST
HOW MANY POINTS ?
8
MY CARDS ARE

 J OF DIAMONDS
 Q OF DIAMONDS
 4 OF CLUBS
 A OF DIAMONDS

 2     POINTS

THE CRIB CARDS ARE

 8 OF CLUBS
 9 OF HEARTS
 3 OF DIAMONDS
 A OF HEARTS

 6     POINTS

I HAVE  14    POINTS - YOU HAVE  9     POINTS
```

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CIRCLE 207 ON READER SERVICE CARD

Cribbage con't...

```
YOUR PLAY ?
6
  YOU PLAYED THE  9  SUM= 9  POINTS= 0

YOU GET 1 POINT FOR LAST CARD

I SCORE FIRST
MY CARDS ARE

 J OF SPADES
 6 OF CLUBS
 5 OF CLUBS
 7 OF CLUBS

 8     POINTS

HOW MANY POINTS ?
4
THE CRIB CARDS ARE

 9 OF HEARTS
 2 OF DIAMONDS
 2 OF CLUBS
 6 OF HEARTS
HOW MANY POINTS ?
2

MUGGINS FOR  2     POINTS


I HAVE  104   POINTS - YOU HAVE  99    POINTS

I AM DEALING

YOUR CARDS ARE

  (1)  5 OF HEARTS
  (2)  3 OF CLUBS
  (3)  5 OF DIAMONDS
  (4)  8 OF HEARTS

  (5)  Q OF SPADES
  (6)  6 OF CLUBS

YOUR DISCARDS ?
2,4

THE UP CARD IS THE 10 OF DIAMONDS

YOUR PLAY ?
5
  YOU PLAYED THE  Q  SUM=10  POINTS= 0
  MY CARD IS THE  Q  SUM=20  POINTS= 2
YOUR PLAY ?
6
  YOU PLAYED THE  6  SUM=26  POINTS= 0
  MY CARD IS THE  2  SUM=28  POINTS= 0
YOUR PLAY ?
GO
  MY CARD IS THE  3  SUM=31  POINTS= 2
YOUR PLAY ?
1
  YOU PLAYED THE  5  SUM= 5  POINTS= 0
  MY CARD IS THE 10  SUM=15  POINTS= 2
YOUR PLAY ?
3
  YOU PLAYED THE  5  SUM=20  POINTS= 0

YOU GET 1 POINT FOR LAST CARD

YOU SCORE FIRST
HOW MANY POINTS ?
10
MY CARDS ARE

 Q OF CLUBS
 2 OF SPADES
 3 OF DIAMONDS
10 OF SPADES

 8     POINTS

THE CRIB CARDS ARE

 9 OF CLUBS
 9 OF SPADES
 3 OF CLUBS
 8 OF HEARTS

 8     POINTS

I WIN  126   TO  110
```

Later in the Run

Program Listing

```
00010 DIM D(52,4),C$(52),I(52),W(5,4),M(6,4),Y(6,4),C(4,4)
00020 DIM D$(6),V(15,7),Q(11,6),R(4,5),S(4),J(52)
00030 MAT READ V,Q,R,S,D$
00040 FOR I=1 TO 13
00050 READ C$
00060 STR(C$,4,12)='OF SPADES    '
00070 C$(I)=C$
00080 STR(C$,4,12)='OF DIAMONDS  '
00090 C$(I+13)=C$
00100 STR(C$,4,12)='OF HEARTS    '
00110 C$(I+26)=C$
00120 STR(C$,4,12)='OF CLUBS     '
00130 C$(I+39)=C$
00140 NEXT I
00150 PRINT
00160 PRINT
00170 S1,S2=0
00180 REM - SHUFFLE THE DECK THEN CUT FOR DEAL - LOW
00190 GOSUB 5630                                  CARD DEALS
00200 GOSUB 5790
00210 REM - SHUFFLE THE DECK AND DEAL
00220 GOSUB 5630
00230 GOSUB 6050
00240 REM - FIND THE BEST FOUR CARDS - DISCARD THE
00250 GOSUB 3350                                   OTHER TWO
00260 REM - DISCARDS
00270 I1=V(89,5)
00280 I2=V(89,6)
00290 PRINT
00300 PRINT "YOUR DISCARDS ";
00310 INPUT I3,I4
00320 IF I3<1 THEN 340
00330 IF I3<7 THEN 360
00340 PRINT "NOW REALLY "
00350 GOTO 300
00360 IF INT(I3)<>I3 THEN 340
00370 IF I4=I3 THEN 340
00380 IF I4<1 THEN 340
00390 IF I4>6 THEN 340
00400 IF I4<>INT(I4) THEN 340
00410 REM - CRIB
00420 FOR J=1 TO 4
00430 C(1,J)=M(11,J)
00440 C(2,J)=M(12,J)
00450 C(3,J)=Y(13,J)
00460 C(4,J)=Y(14,J)
00470 NEXT J
00480 REM - GENERATE THE UPCARD
00490 GOSUB 4150
00500 REM - PLAY OF THE HAND
00510 GOSUB 1410
00520 IF M=0 THEN 560
00530 PRINT "YOU SCORE FIRST "
00540 X1=1
00550 GOTO 800
00560 PRINT "I SCORE FIRST"
00570 X1=2
00580 GOTO 1070
00590 PRINT "THE CRIB CARDS ARE"
00600 PRINT
00610 FOR I=1 TO 4
00620 PRINT C$(C(I,1))
00630 NEXT I
00640 FOR I=1 TO 4
00650 FOR J=1 TO 4
00660 W(I,J)=C(I,J)
00670 NEXT J
00680 NEXT I
00690 C=1
00700 W(5,4)=T9
00710 GOSUB 4360
00720 GOTO 730,760 ON X1
00730 PRINT
00740 PRINT P;" POINTS"
00750 S1=S1+P
00760 IF S1>=121 THEN 1320
00770 GOTO 1280
00780 X1=3
00790 GOTO 920
00800 K=1
00810 FOR I=1 TO 6
00820 IF I=I3 THEN 880
00830 IF I=I4 THEN 880
00840 FOR J=1 TO 4
00850 W(K,J)=Y(I,J)
00860 NEXT J
00870 K=K+1
00880 NEXT I
00890 W(5,4)=T9
00900 C=0
00910 GOSUB 4360
00920 PRINT "HOW MANY POINTS ";
```

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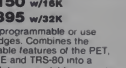

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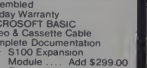

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CIRCLE 199 ON READER SERVICE CARD

```
08930 INPUT P9
08940 O=P=P9
08950 IF O>=0 THEN 980
08960 PRINT "OUT WITH THAT HAND - TRY AGAIN"
08970 GOTO 930
08980 S2=S2+P9
08990 IF S2>=121 THEN 1360
09000 IF U=0 THEN 1060
09010 S1=S1+P9
09020 PRINT
09030 PRINT "MUGGINS FOR "1D1" POINTS"
09040 PRINT
09050 IF S1>=121 THEN 1320
09060 GOTO 1070+590+1280 ON X1
09070 FOR K=1 TO 4
09080 L=V(U+K)
09090 FOR J=1 TO 4
09100 V(K,J)=M(L,J)
09110 NEXT J
09120 NEXT K
09130 PRINT "MY CARDS ARE"
09140 PRINT
09150 FOR K=1 TO 4
09160 L=V(K,1)
09170 PRINT C$(L)
09180 NEXT K
09190 V(5,4)=T9
09200 C=0
09210 GOSUB 4360
09220 S1=S1+P
09230 IF S1>=121 THEN 1320
09240 PRINT
09250 PRINT P1" POINTS"
09260 PRINT
09270 GOTO 590+800 ON X1
09280 PRINT
09290 PRINT "I HAVE "1S11" POINTS - YOU HAVE "1S21" POINTS"
09300 PRINT
09310 GOTO 210
09320 PRINT
09330 PRINT "I WIN "1S11" TO "1S2
09340 PRINT
09350 STOP
09360 PRINT
09370 PRINT "YOU WIN "1S21" TO "1S1
09380 PRINT
09390 STOP
09400 REM ********************
09410 REM ** PLAY OF THE HAND **
09420 REM ********************
09430 Y5=M5+C+5+G=0
09440 IF M=0 THEN 1830
09450 IF Y5<>4 THEN 1480
09460 IF M5=4 THEN 2400
09470 GOTO 1830
09480 PRINT "YOUR PLAY "1
09490 INPUT C5
09500 IF C$="GO" THEN 1830
09510 FOR C6=1 TO 6
09520 IF C$=U$(C6) THEN 1560
09530 NEXT C6
09540 PRINT "INVALID PLAY "
09550 GOTO 1490
09560 IF C6=13 THEN 1770
09570 IF C6=14 THEN 1770
09580 IF Y5=0 THEN 1620
09590 FOR J=1 TO Y5
09600 IF I(10+J)=C6 THEN 1790
09610 NEXT J
09620 IF 5+Y+Y(C6,2)>31 THEN 1810
09630 S9=5+Y+Y(C6,2)
09640 Y5=Y5+1
09650 I(10+Y5)=C6
09660 C=C+1
09670 J(C)=Y(C6,4)
09680 GOSUB 2900
09690 PRINT USING 1700+C$(Y(C6,1))+S9+P
09700 !  YOU PLAYED THE ##  SUM=## POINTS=##
09710 F=1
09720 S2=S2+P
09730 IF S2>=121 THEN 1360
09740 IF S9<>31 THEN 1830
09750 F+G+S9+G=0
09760 GOTO 1830
09770 PRINT "YOU DISCARDED THAT CARD - TRY AGAIN"
09780 GOTO 1490
09790 PRINT "ALREADY PLAYED - TRY AGAIN"
09800 GOTO 1490
09810 PRINT "THAT TOTALS MORE THAN 31 - TRY AGAIN"
09820 GOTO 1490
09830 IF M5<>4 THEN 2400
09840 IF Y5=4 THEN 2460
09850 IF C$<>"GO" THEN 1450
09860 PRINT
09870 IF F=2 THEN 1940
09880 PRINT "YOU GET 1 POINT FOR LAST CARD"
09890 PRINT
09900 S2=S2+1
09910 IF S2>=121 THEN 1360
09920 F+G+S9=0
09930 GOTO 1450
09940 PRINT "I GET 1 POINT FOR LAST CARD"
09950 PRINT
09960 S1=S1+1
09970 IF S1>=121 THEN 1320
09980 F+G+S9=0
09990 GOTO 1450
10000 K9=M9=0
10010 C9=C
10020 C=C+1
10030 M9=S9
10040 FOR I9=1 TO 6
10050 I(I9)=0
10060 IF I9=11 THEN 2200
10070 IF I9=12 THEN 2200
10080 IF M5=0 THEN 2120
10090 FOR J9=1 TO M5
10100 IF I9=I(20+J9) THEN 2200
10110 NEXT J9
10120 IF M9<M(I9,2)+31 THEN 2200
10130 K9=M9-M(I9,2)
10140 S9=M9+M(I9,2)
10150 J(C)=M(I9,4)
10160 GOSUB 2900
10170 P9=MAX(P9,P)
10180 I(I9)=P
10190 I(K9+30)=I9
10200 NEXT I9
10210 C=C9
10220 S9=M9
10230 IF M9<0 THEN 2580
10240 IF C$<>"GO" THEN 2330
10250 IF G=1 THEN 2340
10260 PRINT
10270 PRINT "I GET 1 POINT FOR LAST CARD"
10280 PRINT
10290 C+S9=0
10300 S1=S1+1
10310 IF S1>=121 THEN 1320
10320 GOTO 1450
10330 IF T<>4 THEN 2420
10340 PRINT
10350 PRINT " I'LL GIVE YOU 1 POINT FOR LAST CARD"
10360 PRINT
10370 S2=S2+1
10380 IF S2>=121 THEN 1360
10390 C+S9+G=0
10400 C$=""
10410 GOTO 1830
10420 IF G=1 THEN 1450
10430 PRINT "GO"
10440 G=1
10450 GOTO 1450
10460 IF F=0 THEN 2500
10470 PRINT
10480 IF F=1 THEN 2530
10490 PRINT "I GET 1 POINT FOR LAST CARD"
10500 S1=S1+1
10510 IF S1>=121 THEN 1320
10520 GOTO 2500
10530 PRINT "YOU GET 1 POINT FOR LAST CARD"
10540 S2=S2+1
10550 IF S2>=121 THEN 1360
10560 PRINT
10570 RETURN
10580 C=C+1
10590 M5=M5+1
10600 IF C<>1 THEN 2730
10610 FOR J9=1 TO 4
10620 I9=V(U+J9)
10630 REM - DON'T PLAY A 5 FIRST
10640 IF M(I9,2)=5 THEN 2700
10650 I(M5+20)=I9
10660 J(C)=M(I9,4)
10670 M9=0
10680 S9=M(I9,2)
10690 GOTO 2800
10700 NEXT J9
10710 L9=V(U+3)
10720 GOTO 2050
10730 FOR J9=1 TO K9
10740 I9=I(J9+30)
10750 IF M9<M(I9,2) THEN 2770
10760 NEXT J9
```

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CIRCLE 111 ON READER SERVICE CARD

```
02770 L=M3*2^(I-1)
02780 J(C)=M(1,V+4)
02790 S9=S9+M(1,V+2)
02800 PRINT USING 2810,C$(M(1,V+1)),S9-P9
02810 :  MY CARD IS THE ##  SUM=##  POINTS=##
02820 P=2
02830 S1=S1+P9
02840 IF S1>=121 THEN 1320
02850 IF S9<=31 THEN 2800
02860 F=C+5990
02870 GOTO 1450
02880 IF C$="GO" THEN 1830
02890 GOTO 1450
02900 REM ********************************
02910 REM **     CHECK FOR 15  OR 31 OH   **
02920 REM **    2,3,4 OF A KIND AND RUNS  **
02930 REM ********************************
02940 P=0
02950 IF C=1 THEN 3170
02960 IF S9<=15 THEN 2990
02970 P=P+2
02980 GOTO 3010
02990 IF S9<=31 THEN 3010
03000 P=P+2
03010 FOR I=C TO MAX(C-2,2) STEP -1
03020 IF J(I)<>J(I-1) THEN 3100
03030 GOTO 3040,3060,3080 ON C-1+1
03040 P=P+2
03050 GOTO 3090
03060 P=P+6
03070 GOTO 3090
03080 P=P+6
03090 NEXT I
03100 REM - RUNS
03110 IF C=2 THEN 3170
03120 H9=0
03130 FOR I=3 TO C
03140 GOSUB 3180
03150 NEXT I
03160 P=P+H9
03170 RETURN
03180 FOR J=1 TO C
03190 J(J+10)=J(C-J+1)
03200 NEXT J
03210 FOR K=1 TO I
03220 FOR L=K+1 TO I
03230 IF J(K+10)<J(L+10) THEN 3270
03240 X=J(K+10)
03250 J(K+10)=J(L+10)
03260 J(L+10)=X
03270 NEXT L
03280 NEXT K
03290 FOR K=1 TO I-1
03300 IF J(K+10)<>J(K+11)-1 THEN 3330
03310 NEXT K
03320 H9=I
03330 RETURN
03340 REM ********************************
03350 REM ** FIND THE BEST FOUR CARD HAND **
03360 REM ********************************
03370 P9=0
03380 FOR Z9=1 TO 15
03390 I1=V(Z9,1)
03400 I2=V(Z9,2)
03410 I3=V(Z9,3)
03420 I4=V(Z9,4)
03430 FOR J=1 TO 4
03440 W(1,J)=M(I1,J)
03450 W(2,J)=M(I2,J)
03460 W(3,J)=M(I3,J)
03470 W(4,J)=M(I4,J)
03480 W(5,J)=Z5
03490 NEXT J
03500 REM - EVALUATE THE HAND
03510 C=0
03520 GOSUB 4380
03530 V(Z9,7)=P
03540 P9=MAX(P9,P)
03550 NEXT Z9
03560 REM - FIND ALL HANDS WITH MAX SCORE (P9)
03570 J=0
03580 FOR I=1 TO 15
03590 IF V(I,7)<>P9 THEN 3620
03600 J=J+1
03610 L(J)=I
03620 NEXT I
03630 IF J>1 THEN 3670
03640 REM - THIS IS THE SINGLE BEST HAND
03650 B9=L(1)
03660 RETURN
03670 REM - NO SINGLE BEST HAND SEARCH FOR KEY CARDS
03680 REM - CHECK FOR FIVES
03690 C9=5
03700 Z=1
03710 GOTO 3920
03720 REM - CHECK FOR EIGHTS
03730 C9=8
03740 Z=2
03750 GOTO 3920
03760 REM - CHECK FOR SEVENS
03770 C9=7
03780 Z=3
03790 GOTO 3920
03800 REM - CHECK FOR JACKS
03810 C9=11
03820 Z=4
03830 GOTO 3920
03840 REM - CHECK FOR ACES
03850 C9=1
03860 Z=5
03870 GOTO 3920
03880 REM - RANDOMLY CHOSE A BEST HAND IF HE MEANS
03890 B9=INT(J*RND)+1                    THIS POINT
03900 B9=L(B9)
03910 RETURN
03920 REM - BEST HAND WILL BE WHICHEVER HAS MOST OF
                                         CARD "C9"
03930 P9=0
03940 FOR I=1 TO 15
03950 J(I)=0
03960 NEXT I
03970 FOR I=1 TO J
03980 FOR K=1 TO 4
03990 L=V(L(I),K)
04000 IF M(L,4)<>C9 THEN 4020
04010 J(I)=J(I)+1
04020 NEXT K
04030 P9=MAX(P9,J(I))
04040 NEXT I
04050 K=0
04060 FOR I=1 TO J
04070 IF J(I)<>P9 THEN 4100
04080 K=K+1
04090 B9=L(I)
04100 NEXT I
04110 IF K<>1 THEN 4130
04120 RETURN
04130 GOTO 3720,3760,3800,3840,3880 ON Z
04140 REM ********************************
04150 REM ** GENERATE THE UP CARD **
04160 REM ********************************
04170 U=INT(38*RND)+14
04180 PRINT
04190 PRINT "THE UP CARD IS THE "C$(D(U,1))
04200 PRINT
04210 FOR I=1 TO 4
04220 W(5,I)=D(U,I)
04230 NEXT I
04240 T9=M(5,4)
04250 IF W(5,4)<>11 THEN 4340
04260 IF H=0 THEN 4310
04270 PRINT "2 POINTS TO ME "
04280 S1=S1+2
04290 IF S1>=121 THEN 1320
04300 RETURN
04310 PRINT "2 POINTS TO YOU "
04320 S2=S2+2
04330 IF S2>=121 THEN 1300
04340 RETURN
04350 REM ********************************
04360 REM ** SCORE THE FIVE CARD HAND **
04370 REM ********************************
04380 REM - CHECK FOR A JACK OF SAME SUIT AS UP CARD
                                         (EXCEPT CH18)
04390 P=0
04400 IF C=1 THEN 4470
04410 FOR I=1 TO 4
04420 IF W(I,4)<>11 THEN 4460
04430 IF W(I,3)<>W(5,3) THEN 4460
04440 P=P+1
04450 GOTO 4470
04460 NEXT I
04470 REM - CHECK FOR A 4 OR 5 CARD FLUSH
04480 FOR I=1 TO 3
04490 IF W(I,3)<>W(I+1,3) GOTO 4590
04500 NEXT I
04510 REM - CH18 SCORES ONLY FOR A 5 CARD FLUSH
04520 IF C<>0 THEN 4570
04530 P=P+4
04540 IF W(4,3)<>W(5,3) THEN 4590
04550 P=P+1
04560 GOTO 4590
04570 IF W(4,3)<>W(5,3) THEN 4590
04580 P=P+5
04590 REM - CHECK FOR 2 CARD SUMS OF 15
```

TRS-80[ES] SERIAL I/O

● Can input into basic
● Can use LLIST and LPRINT to output, or output continuously ● RS-232 compatible ● Can be used with or without the expansion bus ● On board switch selectable baud rates of 110, 150, 300, 600, 1200, 2400, parity or non parity odd or even, 5 to 8 data bits, and 1 or 2 stop bits. O.T.R. line ● Requires +5, -12 VDC ● Board only $19.95 Part No. 8010, with parts $59.95 Part No. 8010A, assembled $79.95 Part No. 8010 C. No connectors provided, see below

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● Type 103 ● Full or half duplex ● Works up to 300 baud ● Originate or Answer ● No coils, only low cost components ● TTL input, and output-sense ● Connect Bell 103 speaker and crystal mic directly to board ● Uses XR FSK demodulator ● Requires +5 volts ● Board only $7.50 Part No. 109, with parts $27.50 Part No. 109A

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RS-232/ TTL☆ INTERFACE

● Converts TTL to RS-232, and converts RS-232 to TTL ● Two separate circuits ● Requires -12 and +12 volts ● All connections go to ● 10 pin gold pleted edge connector ● Board only $4.50 Part No. 232, with parts $7.00 Part No. 232A 10 Pin edge connector $3.00 Part No. 10P

RS-232/ TTY☆ INTERFACE

● Converts RS-232 to 20mA current loop, and 20mA current loop to RS-232 ● Two separate circuits ● Requires +12 and -12 volts ● Board only $4.50 Part No. 600, with parts $7.00 Part No. 600A

APPLE II☆ SERIAL I/O INTERFACE

Baud rate is continuously adjustable from 0 to 30,000 ● Plugs into any peripheral connector ● Low current drain, RS-232 input and output ● On board switch selectable 5 to 8 data bits, 1 or 2 stop bits, and parity or no parity either odd or even ● Jumper selectable address ● SOFTWARE ● Input and Output routine from monitor or BASIC to teletype or other serial printer ● Program for using an Apple II for a video or an intelligent terminal. Also can output in correspondence code to interface with some selectrics. ● Also watches STAR ● Requires +5 Part No. 2, with parts $42.00 Part No. 2A, assembled $62.00 Part No. 2C

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$69.95 Kit
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PCBO ..... $25.95, $60.95 Kit
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EPM-2 2708/8718 1K/32K EPROM card PCBO $24.95
$49.95 with parts less EPROMS
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$67.95 Kit
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TAPE ☆ INTERFACE

● Play and record Kansas City Standard tapes ● Converts a low cost tape recorder to a digital recorder ● Works up to 1200 baud ● Digital in and out are TTL/ serial ● Output of board connects to mic in of recorder ● Earphone of recorder connects to input on board ● No coils ● Requires +5 volts, low power drain ● Board only $7.50 Part No. 111, with parts $27.50 Part No. 111A

UART & BAUD RATE GENERATOR☆

● Converts serial to parallel and parallel to serial ● Low cost on board baud rate generator ● Baud rates: 110, 150, 300, 600, 1200, and 2400 ● Low power drain ● 5 volts and -12 volts required ● TTL compatible ● All characters contain a start bit, 5 to 8 data bits, 1 or 2 stop bits, and either odd or even parity ● All connections go to a 44 pin gold plated edge connector ● Board only $12.00 Part No. 101, with parts $35.00 Part No. 101A, 44 pin edge connector $4.00 Part No. 44P

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E.S.

This HEX keyboard has 19 keys, 16 encoded with 3 user-definable. The encoded TTL outputs, 8-4-2-1 and STROBE are debounced and available in true and complement form. Four onboard LEDs indicate the HEX code generated for each key depression. The board requires a single +5 volt supply. Board only $15.00 Part No. HEX-3 with parts $49.95 Part No. HEX-3A. 44 pin edge connector $4.00 Part No. 44P

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Board only $14.95 Part No. 900, with parts $24.95 Part No. 900A

DC POWER SUPPLY☆

● Board supplies a regulated +5 volts at 3 amps, +12, -12, and -5 volts at 1 amp ● Power required is 8 volts AC at 3 amps, and 24 volts AC C.T. at 1.5 amps ● Board only $12.50 Part No. 6085, with parts excluding transformers $42.50 Part No. 6085A

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For free catalog including parts lists and schematics, send a self-addressed stamped envelope.

ELECTRONIC SYSTEMS Dept. X, P. O. Box 21638, San Jose, CA USA 95151

CIRCLE 174 ON READER SERVICE CARD

```
04600 FOR I=1 TO 4
04610 FOR J=I+1 TO 5
04620 IF W(I,2)*W(J,2)<>15 THEN 4640
04630 PRP=2
04640 NEXT J
04650 NEXT I
04660 REM - CHECK FOR 3 CARD SUMS OF 15
04670 FOR I=1 TO 3
04680 FOR J=I+1 TO 4
04690 FOR K=J+1 TO 5
04700 IF W(I,2)*W(J,2)*W(K,2)<>15 THEN 4720
04710 PRP=2
04720 NEXT K
04730 NEXT J
04740 NEXT I
04750 REM - CHECK FOR 4 CARD SUMS OF 15
04760 FOR I=1 TO 2
04770 FOR J=I+1 TO 3
04780 FOR K=J+1 TO 4
04790 FOR L=K+1 TO 5
04800 IF W(I,2)*W(J,2)*W(K,2)*W(L,2)<>15 THEN 4820
04810 PRP=2
04820 NEXT L
04830 NEXT K
04840 NEXT J
04850 NEXT I
04860 REM - CHECK FOR 5 CARD SUM OF 15
04870 S=0
04880 FOR I=1 TO 5
04890 S=S+W(I,2)
04900 NEXT I
04910 IF S<>15 THEN 4930
04920 PRP=2
04930 REM - CHECK FOR PAIRS,THREE AND FOUR OF A KIND
04940 FOR I=1 TO 13
04950 J(I)=0
04960 NEXT I
04970 FOR I=1 TO 5
04980 J=W(I,1)
04990 J(J)=J(J)+1
05000 NEXT I
05010 FOR I=1 TO 13
05020 GOTO 5060+5060+5050+5040+5030 ON J(I)+1
05030 PRP=6
05040 PRP=0
05050 PRP=2
05060 NEXT I
05070 REM - SORT HAND INTO ASCENDING SEQUENCE
05080 FOR I=1 TO 5
05090 FOR J=1 TO 5
05100 IF W(I,1)<=W(J,1) THEN 5140
05110 K=W(I,1)
05120 W(I,1)=W(J,1)
05130 W(J,1)=K
05140 NEXT J
05150 NEXT I
05160 REM - CHECK FOR A 5 CARD RUN
05170 O=W(1,1)-W(1,1)
05180 FOR I=1 TO 11
05190 FOR J=1 TO 5
05200 O(I,J)=W(I+J,1)-O
05210 NEXT J
05220 NEXT I
05230 FOR I=1 TO 11
05240 FOR J=1 TO 5
05250 IF W(J,1)<>O(I,J) THEN 5300
05260 NEXT J
05270 REM - A 5 CARD RUN
05280 PRP=U(1,1)
05290 RETURN
05300 NEXT I
05310 REM - CHECK FOR A 4 CARD RUN
05320 FOR L=1 TO 2
05330 O=W(L,1)-W(1,1)
05340 FOR I=1 TO 4
05350 FOR J=1 TO 4
05360 M(I,J)=W(I+J,1)-O
05370 NEXT J
05380 NEXT I
05390 FOR I=1 TO 4
05400 FOR K=1 TO 4
05410 IF M(K,L-1+4)<>M(1,K) THEN 5460
05420 NEXT K
05430 REM - A 4 CARD RUN
05440 PRP=M(1,5)
05450 RETURN
05460 NEXT I
05470 NEXT L
05480 REM - CHECK FOR A 3 CARD RUN
05490 FOR L=1 TO 3
05500 O=W(L,1)-W(1,1)
05510 FOR I=1 TO 3
05520 S(I)=S(I)+O
05530 NEXT I
05540 FOR I=1 TO 3
05550 IF W(L+1-1+4)<>S(1) THEN 5600
05560 NEXT L
05570 REM - A 3 CARD RUN
05580 PRP=S(4)
05590 RETURN
05600 NEXT L
05610 RETURN
05620 REM ************************
05630 REM ** SHUFFLE THE DECK **
05640 REM ************************
05650 FOR I= 1 TO 52
05660 I(I)=U
05670 NEXT I
05680 FOR I=1 TO 52
05690 J=INT(52*RND)+1
05700 IF I(J)<>0 THEN 5690
05710 O(I,1)=J
05720 O(I,3)=1+INT((J-1)/13)+1
05730 O(I,4)=J-13*INT((J-1)/13)
05740 O(I,2)=M1N(O(I,4)+IO)
05750 I(J)=I
05760 NEXT I
05770 RETURN
05780 REM ********************
05790 REM ** CUT FOR DEAL **
05800 REM ********************
05810 PRINT "PLEASE CUT FOR DEAL "1
05820 INPUT 1
05830 IF 1<1 THEN 5850
05840 IF 1<53 THEN 5870
05850 PRINT "BE SERIOUS NOW "
05860 GOTO 5810
05870 IF 1<>INT(1) THEN 5850
05880 11=U(1,1)
05890 PRINT "YOUR CARD IS THE "IC$(11)
05900 J=INT(52*RND)+1
05910 IF J=1 THEN 5900
05920 J1=U(J,1)
05930 PRINT "  MY CARD IS THE "IC$(J1)
05940 IF U(1,4)<U(J,4) THEN 6010
05950 IF U(J,4)<U(1,4) THEN 5980
05960 PRINT "CUT AGAIN"
05970 GOTO 5820
05980 REM - COMPUTER DEALS
05990 M=0
06000 RETURN
06010 REM - PLAYER DEALS
06020 M=1
06030 RETURN
06040 REM **********
06050 REM ** DEAL **
06060 REM **********
06070 IF M=0 THEN 6100
06080 PRINT "YOU ARE DEALING "
06090 GOTO 6110
06100 PRINT "I AM DEALING"
06110 M=1-M
06120 Y=1-M
06130 PRINT
06140 PRINT "YOUR CARDS ARE"
06150 PRINT
06160 FOR I=1 TO 6
06170 K=Z*1-Y
06180 L=Z*1-M
06190 FOR J=1 TO 4
06200 REM - COMPUTER'S HAND
06210 M(I,J)=U(K,J)
06220 REM - PLAYER'S HAND
06230 Y(I,J)=U(L,J)
06240 NEXT J
06250 PRINT USING 6206+1,C$(Y(I,1))
06260 :  (#) ##############
06270 NEXT I
06280 RETURN
06290 DATA 1,2,3,4,5,6,0,1,2,3,5,5,4,0,0,1,2,3,6,4,5,0
06300 DATA 1,2,4,5,3,6,0,1,2,4,6,3,5,0,1,2,5,6,3,4,0
06310 DATA 1,3,4,5,2,6,0,1,3,4,6,2,5,0,1,3,5,6,2,4,0
06320 DATA 1,4,5,6,2,3,0,2,3,4,5,1,6,0,2,3,4,6,1,5,0
06330 DATA 2,3,5,6,1,4,0,2,4,5,6,1,3,0,3,4,5,6,1,2,0
06340 DATA 1,1,1,2,3,09,1,1,2,2,3,1,2,1,1,2,3,1,2
06350 DATA 1,1,2,3,4,08,1,2,2,2,3,09,1,2,2,3,1,2
06360 DATA 1,2,2,2,3,4,08,1,2,2,3,3,09,1,2,3,3,4,08
06370 DATA 1,2,3,4,4,08,1,2,3,4,5,05
06380 DATA 1,1,2,3,6,1,2,2,3,6,1,2,3,3,6,1,2,3,4,4
06390 DATA 1,2,2,3
06400 DATA 1*1,1*2,1*3,1*4,1*5,1*6
06410 DATA 1 A!,1 2!,1 3!,1 4!,1 5!,1 6!,1 7!,1 8!
06420 DATA 1 9!,1U!,1 J!,1 Q!,1 K!
06430 END
```

Microcomputer UPDATES

Keeping up with the blizzard of new microelectronic components is a formidable task facing any engineer. First there are innumerable part announcements; next comes unreadable literature, hastily compiled by the vendor who places more emphasis on selling you than telling you. And what about availability? Will a part be available within three months of its announcement, or three years?

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- **Floppy Disc Controllers**
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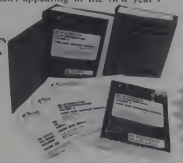
- **Sy6551, R6531**
- **6801, 6809**
- **COPs, PPS4**
- **TMS990 Bus**
- **Heath H8 Bus**
- **RS449-422-423**
- **S2651, S2652**
- **MC6854**



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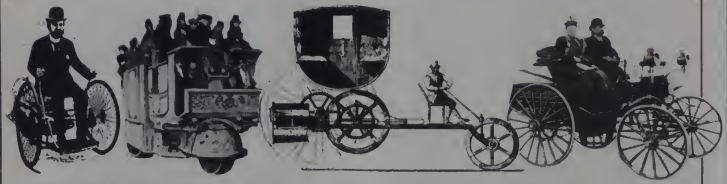
S1032

CIRCLE 131 ON READER SERVICE CARD

Another new game from Creative Computing . . . .

Mille Bornes

Richard Kaapke



Mille Bornes is a French game played with a special deck of cards. The name is derived from a French expression for "milestone." Your opponent is the computer.

The object is to be the first to score 5000 points by playing hands of 700 points each. At the start, each player is dealt six cards face down. In alternating turns, each player takes a card from the deck and must then play or discard one of the seven cards he is holding. Once discarded, cards are not used for the rest of the hand. There are four types of cards:

1. Distance cards. Collect these to travel the 700 miles. The distance cards must be played face-up on your side of the table (printer?) to count. Point values of the distance cards are 25, 50, 75, 100 and 200. You can't play more than two 200's in a single hand.

2. Hazard cards. Play these on your opponent to impede his progress. When a hazard card is showing on a player's side of the table, he can not play any more distance cards until it is removed. The hazard cards are: Out of Gas, Flat Tire, Accident, and Stop. There is one other hazard card, Speed Limit, which works differently. Speed Limit does not stop your opponent, but prevents him from playing distance cards greater than 50. It can be played in addition to another hazard. Otherwise you may only play one hazard on your opponent at a time.

3. Remedy cards. These remove hazard cards played on you. The remedies, which correspond with the hazards, are: Gasoline, Spare Tire, Repairs, Roll, and End of Limit. You must always play the appropriate remedy—spare tires don't help when you're out of gas. The Roll card is special—not only does it counteract Stop, but you must also have a Roll card showing at all times to play distance cards. So you need a Roll card at the start of the game, and after playing another remedy card.

4. Safety cards. There are only four safeties in the deck. They work like super-remedies. They can be played to eliminate hazards, but they also have some special features. The safeties can be played at any time and they prevent your opponent from playing the matching hazard for the rest of the hand. Also, if you play the appropriate safety *immediately* after the computer plays a hazard, this is called a "Coup Fourre" and you collect extra points. Whenever you play a safety, you take an extra turn. The safety cards are: Extra Tank, Puncture Proof, Driving Ace, and Right-of-Way.

When one player reaches exactly 700 points, the scores for the hand are tallied. The formula used is:

number of miles
+ number of safeties played x 100
+ 300 points if all four safeties are played by one player
+ number of coup fourres x 300
+ bonus of 400 points if the trip was completed
+ bonus of 300 points for completing a trip without using any 200's
+ bonus of 500 points for a shutout

Computer Version

The program listing is in CP/M Microsoft Extended BASIC, but it should work with minor modifications on a TRS-80 Level II. (You will have to expand out the DEF FNI yourself.) If you want to convert this program to work on an Apple, PET, Sorcerer, or similar BASIC-speaking computer, then remember that you'll need at least 16K of memory. To figure out what some of the more obscure statements are, get a TRS-80 Level II BASIC manual at a local Radio Shack, which will tell you more than an abbreviated summary here would.

Running the game is simple. There are four commands: P to play a card, D to discard, N to print the number of cards left in the deck, and C to play a coup fourre. The computer will prompt you for the number of the card (1-7). At the end of a hand the computer will pause—press return to continue. The only difference between this implementation and the standard two-player game is that the hand is ended if the entire deck is used up, regardless of whether either player has reached 700 points yet.

The manual version of Mille Bornes, on which this program was based, is available from Parker Brothers. It's a fun game and has more detailed instructions, too.

We are considering the idea of offering a collection of large BASIC programs of this caliber on diskette (for CP/M or TRS-80) and possibly also in book form, and would like to hear from you if you have worthwhile software.

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MAY 1979

CIRCLE 178 ON READER SERVICE CARD

```
rua
INITIALIZING... SHUFFLING... DEALING.

 Player Status  Computer Status    Player's Hand
                                          75 (1)
  End of Limit     End of Limit           100 (2)
             0                0            25 (3)
                                     Gasoline (4)
                                          Roll (5)
                                 Speed Limit 50 (6)

You drew a Roll (7)
Action to take ? p
Type R, D, P, C or H: P
Play which card (1 - 7) ? 7
Computer played a Roll

 Player Status  Computer Status    Player's Hand
          Roll             Roll            75 (1)
  End of Limit     End of Limit           100 (2)
             0                0            25 (3)
                                     Gasoline (4)
                                          Roll (5)
                                 Speed Limit 50 (6)

You drew a Roll (7)
Action to take ? P
Play which card (1 - 7) ? 2
Computer played a 100

 Player Status  Computer Status    Player's Hand
          Roll             Roll            75 (1)
  End of Limit     End of Limit           Roll (2)
           100              100            25 (3)
                                     Gasoline (4)
                                          Roll (5)
                                 Speed Limit 50 (6)

You drew a Roll (7)
Action to take ? P
Play which card (1 - 7) ? 6
Computer played an Accident

 Player Status  Computer Status    Player's Hand
      Accident             Roll            75 (1)
  End of Limit   Speed Limit 50           Roll (2)
           100              100            25 (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a Flat Tire (7)
Action to take ? P
Play which card (1 - 7) ? 7
Computer played an End of Limit

 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire            75 (1)
  End of Limit     End of Limit           Roll (2)
           100              100            25 (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a Roll (7)
Action to take ? D
Discard which card (1 - 7) ? 7
Computer discarded a 25

 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire            75 (1)
  End of Limit     End of Limit           Roll (2)
           100              100            25 (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a Stop (7)
Action to take ? D
Discard which card (1 - 7) ? 3
Computer discarded a 25
```

```
 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire            75 (1)
  End of Limit     End of Limit           Roll (2)
           100              100           Stop (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a Flat Tire (7)
Action to take ? D
Discard which card (1 - 7) ? 7
Computer discarded a 25

 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire            75 (1)
  End of Limit     End of Limit           Roll (2)
           100              100           Stop (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a Stop (7)
Action to take ? D
Discard which card (1 - 7) ? 7
Computer discarded a 25

 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire            75 (1)
  End of Limit     End of Limit           Roll (2)
           100              100           Stop (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a Spare Tire (7)
Action to take ? D
Discard which card (1 - 7) ? 1
Computer played a Speed Limit 50

 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire      Spare Tire (1)
Speed Limit 50     End of Limit           Roll (2)
           100              100           Stop (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a 75 (7)
Action to take ? D
Discard which card (1 - 7) ? 7
Computer discarded a 100

 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire      Spare Tire (1)
Speed Limit 50     End of Limit           Roll (2)
           100              100           Stop (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a 50 (7)
Action to take ? D
Discard which card (1 - 7) ? 7
Computer discarded a 75

 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire      Spare Tire (1)
Speed Limit 50     End of Limit           Roll (2)
           100              100           Stop (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)

You drew a 75 (7)
Action to take ? D
Discard which card (1 - 7) ? 7
Computer discarded a 200

 Player Status  Computer Status    Player's Hand
      Accident        Flat Tire      Spare Tire (1)
Speed Limit 50     End of Limit           Roll (2)
           100              100           Stop (3)
                                     Gasoline (4)
                                          Roll (5)
                                          Roll (6)
```

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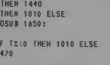
CIRCLE 163 ON READER SERVICE CARD

```
List
1       CLEAR 1000
5       DEF FNI2(V2) = -(V2<V#Z OR V2=U1Z OR V2=U8Z OR V2=V4Z)
10      DIM    A$(19), D$(19), A%(5), OI(101),
               II(101), CI(7), PI(7)
20      V1Z = 1: V2Z = 2: V3Z = 3:  V4Z = 4:  V5Z = 5:
        V6Z = 6: V7Z = 7:  V8Z = 8:  V9Z = 9:  V0Z = 10:
        U1Z = 11:  U2Z = 12:  U3Z = 13:  U4Z = 14:  U5Z = 15:
        U6Z = 16:  U7Z = 17:  U8Z = 18:  U9Z = 19:  FI = 1
30      H1Z = 10:  H2Z = 20:  H3Z = 30:  H4Z = 12:  H5Z = 4:
        H6Z = 2:  H7Z = 6:  H8Z = 1:  H9Z = 2:  H0Z = 6:
        OI% = 1:  OI = 2:  OI% = 3:  O4% = 4:  O1 = 1:  O5% = 3:
        O6% = 4:  O7% = 4:  O8% = 14:  O9% = 1
40      D0% = H1% + H2% + H3% + H4% + H5% + H6% + H7% + H8% +
               H9% + H0% + O1% + O2% + O3% + O4% + O5% + O6% +
               O7% + O8% + O9%
50      A$(0) = SPACE$(14):
        FOR IX = 1 TO 19:
            READ X$:
            A$(IX) = X$ + SPACE$(14-LEN(X$)) + X$:
        NEXT IX
60      DATA     "25", "50", "75", "100", "200", "Out of Gas",
                 "Gasoline", "Extra Tank", "Flat tire",
                 "Spare Tire", "Puncture-proof", "Accident",
                 "Repairs", "Driving Ace", "Speed Limit 50",
                 "End of Limit", "Stop", "Roll", "Right-of-way"
70      FOR IX = 1 TO 19:
            FOR JX = 1 TO LEN(A$(IX)) :
                IF MID$(A$(IX), JX, 1) <> " " THEN 80
75          NEXT JX
80          T$ = RIGHT$(A$(IX), 15-JX):
            IF INSTR("AEO", MID$(T$, 1, 1)) THEN
                D$(IX) = "n "+T$ ELSE
                D$(IX) = " "+T$
85      NEXT IX:
        FOR JX = 1 TO 5:  READ A%Z(JX):  NEXT
100     DATA    25, 50, 75, 100, 200
1000    PRINT "INITIALIZING... ";:  GOSUB 1490:
        PRINT "SHUFFLING... ";:  GOSUB 1550:
        PRINT "DEALING.":  GOSUB 1560
1010    IF FI<0 THEN PRINT "Computer played a": D$(PIZ)
1011    IF PIZ=U8I OR PIZ=U4I OR PIZ=U9Z OR PIZ=U1Z THEN 1440
1020    IF CIZ>700 THEN T$="C":  GOTO 3000
1030    GOSUB 1600:  IF TIZ<0 THEN 1480
 031    PI(7) = IZ
1040    IF IOZ<7 THEN GOSUB 5000
1045    PRINT "You drew a"; D$(PI(7)); " (7)":  FI = 1
1050    PRINT "Action to take ? ";
1060    GOSUB 4000:
        IF INSTR("HBOPC", V$)=0 THEN
            PRINT "Type R, O, P, C or H: ";:  GOTO 1060
1062    IF V$="R" THEN IOI = 0:  GOTO 1040
1063    IF V$="" THEN 1050
1064    IF V$="H" THEN PRINT "Number of cards remaining is"; 00%-O4%:  GOTO 1050
1065    IF V$="P" THEN PRINT "Play ";: ELSE
        IF V$="O" THEN PRINT "Discard ";: ELSE
        IF V$="C" THEN PRINT "Coup fourre ";
1070    INPUT "which card (1 - 7) ";: CIZ
1071    IF CIZ<0 THEN 1050 ELSE
        IF CIZ>7 OR CIZ<1 THEN 1070
1075    IZ = CIZ:  CIZ = PI(CIZ)
1080    IF V$<>"C" THEN 1180
1085    IF IZ=7 THEN 1130
1090    IF CIZ=V#Z THEN
            IF PIZ<V#Z AND PIZ<>U5Z THEN 1130
        ELSE PRZ = 1:  GOTO 1140
1100        IF CIZ=V8I THEN
                IF PIZ<>V8Z THEN 1130
            ELSE PRZ = 1:  GOTO 1140
1110        IF CIZ=U9I THEN
                IF PIZ<>U9Z THEN 1130
            ELSE PRZ = 1:  GOTO 1140
1120        IF CIZ=U4I THEN
                IF PIZ<U4Z THEN 1130
            ELSE P8Z = 1:  GOTO 1140
1130    PRINT "IMPROPER ACTION TAKEN":  GOTO 1050
1140    P4I = P4Z=1:  P5Z = P5Z+1
1150    IF CIZ=U1I THEN
            IF R1Z>0 THEN R1Z = 0:
            IF P0Z=U2Z OR P0Z=V6Z OR P0Z=V9Z THEN 1415
1160    P0I = U8I:  GOTO 1415
1180    IF V$="P" THEN 1410
1190    IF CIZ=U5Z THEN
            IF (P0Z<>U8Z OR (CIZ<U2Z AND R1Z=0) OR
               (CIZ=U5Z AND P3Z<2) OR (P2Z=A%(CIZ)*700)) THEN 1130
            ELSE P2Z = P2Z+A%(CIZ):
            P3Z = P3Z -(CIZ=U5Z):  GOTO 1400
1220        IF CIZ=V7Z THEN
                IF P0Z<V4Z THEN 1130
            ELSE P0Z = V7Z:  P0Z = -P0Z*(P8Z<>1) -U8Z*(P8Z=1):
            GOTO 1400
1230        IF CIZ=V9I THEN
                IF P0Z<>V9Z THEN 1130
            ELSE P0Z = V0Z:  P0Z = -P0Z*(P8Z<>1) -U8Z*(P8Z=1):
            GOTO 1400
1250        IF CIZ=U3I THEN
                IF P0Z<>U3Z THEN 1130
            ELSE P0Z = U3Z:  P0Z = -P0Z*(P8Z<>1) -U8Z*(P8Z=1):
            GOTO 1400
1270        IF CIZ=U8I THEN
                IF P0Z<V4Z OR P0Z=V7Z OR P0Z=U2Z OR P0Z=U8Z THEN 1130
            ELSE P0Z = U8Z:  GOTO 1400
1290        IF CIZ=V9Z OR CIZ=V8Z OR CIZ=U2Z OR CIZ=U7Z THEN
                IF (OIZ<>U8Z OR (CIZ=V9Z AND C8Z=1) OR
                    (CIZ=V8Z AND C0Z=1) OR (CIZ=U2Z AND C7Z=1) OR
                    (CIZ=U7Z AND C9Z=1)) THEN 1130
            ELSE OI% = CIZ:  GOTO 1400
1310        IF CIZ=U6I THEN
                IF R1Z=0 THEN 1130
            ELSE R1Z = 0:  GOTO 1400
1330        IF CIZ=U5I THEN
                IF (B2Z=1 OR C9Z=1) THEN 1130
            ELSE O2% = 1:  GOTO 1400
1350        IF CIZ=V8I THEN
                P0I = -P0I*(P0I>V6Z) -U8Z*(P0I=V6Z):
                P9I = 1:  GOTO 1400
1360        IF CIZ=U1I THEN
                P0I = -P0I*(P0I>V9Z) -U8Z*(P0I=V9Z):  P7I = 1:  GOTO 1400
1370        IF CIZ=U4Z THEN
                P0I = -P0I*(P0I<>U2Z) -U8Z*(P0I=U2Z):  P6Z = 1:  GOTO 1400
1390        IF CIZ=V7I THEN
                IF P0I=U7Z OR P0I=0 OR P0I=U3I OR P0I=V0I OR P0I=V7I THEN
                P0I = U8I
1381        IF CIZ=V9I THEN R1Z = 0:  P8Z = 1:  GOTO 1400
1390        GOTO 1130
1400        IF CIZ=U9I OR CIZ=U1I OR CIZ=V8Z OR CIZ=U4Z THEN
                P5Z = P5Z+1
1405        GOTO 1415
1410        CIZ = 0
1415        IOZ = 0:  IF IZ<>7 THEN PI(IZ) = PZ(7)
1420        IF CIZ=V8I OR CIZ=U1I OR CIZ=U9I OR CIZ=U4I THEN
                IOZ = 7:  GOTO 1010
1430        IF PZZ>700 THEN T$="P":  GOTO 3000
1440        FZ = 0:  GOSUB 1600:  IF TIZ<0 THEN 1480 ELSE
            CI(7) = TI:  GOSUB 1930:  IF TIZ<0 THEN 1440
1450        IF OI%=U8I THEN GOSUB 1870:  IF TIZ<0 THEN 1010 ELSE
            GOSUB 1840:  IF TIZ<0 THEN 1010 ELSE GOSUB 1650:
            IF TIZ<0 THEN 1010 ELSE GOSUB 1680:
            IF TIZ<0 THEN 1010 ELSE GOSUB 1750:  IF TIZ<0 THEN 1010 ELSE
            GOSUB 1770:  IF TIZ<0 THEN 1010 ELSE 1470
1460        GOSUB 1840:  IF TIZ<0 THEN 1010 ELSE
            GOSUB 1780:  IF TIZ<0 THEN 1010 ELSE
            GOSUB 1680:  IF TIZ<0 THEN 1010 ELSE
            GOSUB 1750:  IF TIZ<0 THEN 1010

1470        GOSUB 2000:  GOTO 1010
1480        XOI = 0:  PRINT:  PRINT:  PRINT "* * *  END OF BLCK  * * *";
            T$="R":  GOTO 3000
1490        FOR ZZ = 0 TO H1Z-1:  II(ZZ) = V1I:  NEXT:
            ZIZ = H1Z
            FOR ZZ = 0 TO H2Z-1:  II(ZI%+ZZ) = V2Z:  NEXT:
            ZIZ = ZIZ+H2Z:
            FOR ZZ = 0 TO H3Z-1:  II(ZI%+ZZ) = V3I:  NEXT:
            ZIZ = ZIZ+H3Z:
            FOR ZZ = 0 TO H4Z-1:  II(ZI%+ZZ) = V4Z:  NEXT:
            ZIZ = ZIZ+H4Z:
1500        FOR ZZ = 0 TU H5Z-1:  II(ZI%+ZZ) = V5I:  NEXT:
            ZIZ = ZIZ+H5Z:
            FOR ZZ = 0 TO H6Z-1:  II(ZI%+ZZ) = V6I:  NEXT:
            ZIZ = ZIZ+H6Z:
            FOR ZZ = 0 TO H7Z-1:  II(ZI%+ZZ) = V7Z:  NEXT:
            ZIZ = ZIZ+H7Z:
            FOR ZZ = 0 TO H8Z-1:  II(ZI%+ZZ) = V8I:  NEXT:
            ZIZ = ZIZ+H8Z
1510        FOR ZZ = 0 TO H9Z-1:  II(ZI%+ZZ) = V9%:  NEXT:
            ZIZ = ZIZ+H9Z:
            FOR ZZ = 0 TO H0Z-1:  II(ZI%+ZZ) = V0%:  NEXT:
            ZIZ = ZIZ+H0Z:
            FOR ZZ = 0 TO O1Z-1:  II(ZI%+ZZ) = U1%:  NEXT:
            ZIZ = ZIZ+O1Z:
            FOR ZZ = 0 TO O2Z-1:  II(ZI%+ZZ) = W2%:  NEXT:
            ZIZ = ZIZ+O2Z
1520        FOR ZZ = 0 TO O3Z-1:  II(ZI%+ZZ) = W3%:  NEXT:
            ZIZ = ZIZ+O3Z:
            FOR ZZ = 0 TO O4Z-1:  II(ZI%+ZZ) = W4%:  NEXT:
            ZIZ = ZIZ+O4Z:
            FOR ZZ = 0 TO O5Z-1:  II(ZI%+ZZ) = W5%:  NEXT:
            ZIZ = ZIZ+O5Z:
            FOR ZZ = 0 TO O6Z-1:  II(ZI%+ZZ) = W6%:  NEXT:
            ZIZ = ZIZ+O6Z
```



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```
1530    FOR ZI = 0 TO U7I-1:  IX(ZI)=(ZI) = W7I:  NEXT:
        ZI=ZI+ZI%+U7I:
        FOR ZI = 0 TO U8I-1:  IX(ZI)=(ZI) = U8I:  NEXT:
        ZI=ZI+ZI%+U8I:
        FOR ZI = 0 TO U9I-1:  IX(ZI)=(ZI) = U9I:  NEXT:
        ZI=ZI+ZI%+U9I
1540    C3I=0: P2I=0: C4I=0: P3I=0: C5I=0: P4I=0: C6I=0:
        P5I=0: P6I=0: P7I=0: C7I=0: P7I=0: P8I=0:
        C0I=0: P9I=0: B1I=0: P0I=0: B2I=0: R1I=0: D4I=0:
        RETURN
1550    FOR ZI = 0 TO 00I - 1:
            R3 = INT(RND(1)*(00I-ZI)):
            SI(ZI) = IX(R3):
            IF 00I-1-ZI<R1 THEN 1555
1554            FOR ZI% = R3 TO 00I-1-ZI:
                    IX(ZI) = IX(ZI%+1):
                NEXT ZI%
1555    NEXT ZI:  RETURN
1560    FOR ZI = 1 TO 6:
            GOSUB 1600:
            IF TI<0 THEN 1580 ELSE
            P3(ZI) = TI:
            GOSUB 1600:
            IF TI<0 THEN 1580 ELSE
            C3(ZI) = TI
1570    NEXT ZI:  RETURN
1580    PRINT: PRINT: PRINT "o o o  INITIAL DEAL FAILURE  o o o":
        STOP
1600    IF B4I=00I THEN TI = -1:  RETURN
1610    B4I = D4I+1:
        TI = BI(B4I-1):
        RETURN
1650    TI = B:  IF D2I<>0 THEN RETURN
1660    TI = V5I:
        IF C4I<2 AND C3I<525 THEN GOSUB 1900:  IF TI<0 THEN 1670
1661    TI = V4I:
        IF C3I<425 THEN GOSUB 1900:  IF TI<0 THEN 1670
1662    RETURN
1670    C3I = C3I+A%(P1I):  C4I = C4I - (P1I=V5I):
        TI = -1:  RETURN
1680    IF P0I<>U8I THEN TI = U5I:
        IF R1I>0 AND P8I>0 THEN GOSUB 1900:
        IF TI<0 THEN 1730
1681    IF P0I<>U8I THEN RETURN
1700    TI = V9I:
        IF P7I=0 THEN GOSUB 1900:  IF TI<0 THEN 1740
1701    TI = V4I:
        IF P9I=0 THEN GOSUB 1900:  IF TI<0 THEN 1740
1702    TI = W2I:
        IF P4I=0 THEN GOSUB 1900:  IF TI<0 THEN 1740
1710    TI = W7I:
        IF P8I=0 THEN GOSUB 1900:  IF TI<0 THEN 1740
1711    TI = W5I:
        IF R1I>0 AND P8I=0 THEN GOSUB 1900:  IF TI<0 THEN 1730
1712    RETURN
1730    R1I = 1:  TI = -1:  RETURN
1740    P0I = P1I:  TI = -1:  RETURN
1750    IF B2I<0 THEN TI = U4I:  GOSUB 1900:
            IF TI<0 THEN 1760
            ELSE TI = W9I:  GOSUB 1900:
            IF TI<0 THEN 1760
1755    RETURN
1760    B2I = 0:
        IF P1I=U9I THEN 1840 ELSE TI = -1:  RETURN
1770    TI = V3I:
        IF B2I=0 AND C3I<650 THEN GOSUB 1900:
            IF TI<0 THEN 1670
1771    TI = V2I:
        IF C3I<675 THEN GOSUB 1900:  IF TI<0 THEN 1670
1772    TI = V1I:  GOSUB 1900:  IF TI<0 THEN 1670 ELSE RETURN
1780    IF B1I=U7I OR B1I=U3I OR B1I=U7I OR B1I=90I OR D1I=0
            THEN TI = W8I:  GOSUB 1900:
            IF TI<0 THEN 1820 ELSE
            TI = W9I:  GOSUB 1900:
            IF TI<0 THEN 1830 ELSE RETURN
1790    IF B1I=U2I THEN TI = U4I:  GOSUB 1900:
            IF TI<0 THEN 1830 ELSE
            TI = W3I:  GOSUB 1900:
            IF TI<0 THEN 1820 ELSE RETURN
1800    IF B1I=V9I THEN TI = U1I:  GOSUB 1900:
            IF TI<0 THEN 1830 ELSE
            TI = V0I:  GOSUB 1900:
            IF TI<0 THEN 1820 ELSE HLTURN
1810    IF B1I=V6I THEN TI = V8I:  GOSUB 1900:
            IF TI<0 THEN 1830 ELSE
            TI = V7I:  GOSUB 1900:
            IF TI<0 THEN,1820
1815    RETURN
1820    B1I = P1I:  D1I = -B1I*(C9I%-1) -U8I*(C9I%+1):
        TI = -1:  RETURN
1830    D1I = U8I:
        IF P1I=W7I AND D2I<0 THEN D2I=0
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1840    C6I = C6I+1:  CH% = -CH%*(P1I<>W1I) -(P1I=W1I):
        C0I = -C0I*(P1I<>W9I) -(P1I=W9I):
        C9I = -C9I*(P1I<>W4I) -(P1I=W4I):
        B2I = -B2I*(P1I<>W2I):  C2I = -C2I*(P1I<>W4I) -(P1I=W4I)
1841    IF (B1I=V6I AND P1I=V8I) OR (B1I=V9I AND P1I=W1I) OR
            (D1I=U2I AND P1I=W4I) OR
            (P1I=U9I AND (B1I=V7I OR D1I=V0I OR D1I=U3I OR D1I=U7I)) THEN
        B1I = W8I
1842    TI = -1:  RETURN
1850    TI = W9I:  GOSUB 1900:  IF TI<0 THEN 1840 ELSE
        TI = W1I:  GOSUB 1900:  IF TI<0 THEN 1840 ELSE
        TI = W4I:  GOSUB 1900:  IF TI<0 THEN 1840 ELSE
        TI = V8I:  GOSUB 1900:  IF TI<0 THEN 1840 ELSE
        RETURN
1860    TI = 0:  IF P0I<>U8I OR P2I<500 THEN RETURN ELSE
        IF R1I<0 AND P2I<650 THEN RETURN ELSE
        IF P2I<600 AND P3I<500 THEN RETURN ELSE
        IF P2I>500 AND P3I>2 THEN RETURN ELSE
        GOSUB 1850:  RETURN
1870    TI = 0:
        IF B1I<>U8I OR C3I<500 THEN RETURN ELSE
        IF D2I<0 AND C3I<650 THEN RETURN ELSE
        IF C3I<600 AND C3I<500 THEN RETURN ELSE
        IF C3I>500 AND C4I=2 THEN RETURN ELSE
        ZI% = 700-C3I:
1880    FOR ZZI = 1 TO 5:
            IF AX(ZZI)=ZI% THEN 1890
1881    NEXT ZZI:  PRINT: PRINT: PRINT "o o o  COMPUTER SEARCH ERROR  o o o":
        STOP
1890    CI% = ZI%:  GOSUB 2250:
        IF ZI=0 THEN RETURN ELSE
        GOSUB 1850:  IF TI<0 THEN RETURN ELSE
        GOSUB 1650:  IF TI<0 THEN RETURN ELSE
        GOSUB 1770:  IF TI<0 THEN RETURN ELSE
        PRINT: PRINT: PRINT "o o o  COMPUTER PLAY ERROR  o o o":
        STOP
1900    LX = 4
1905    FOR I9I = 1 TO LX+1:
            IF TI=CI(I9I) THEN P1I = TI:  CI(I9I) = CI(7):
                TI = -1:  RETURN
1910    NEXT I9I:  TI = 0:  RETURN
1920    LX = 5:  GOTO 1905
1930    IF C1I=U7I OR C1I=W5I THEN TI = W9I:
            GOSUB 1920:  IF TI<0 THEN 1970 ELSE
            RETURN
1940    IF C1I=V6I THEN TI = V8I:
        GOSUB 1920:  IF TI<0 THEN 1970 ELSE RETURN
1950    IF C1I=V9I THEN TI = W1I:  GOSUB 1920:
            IF TI<0 THEN 1970 ELSE RETURN
1960    IF C1I=U2I THEN TI = W4I:
            GOSUB 1920:  IF TI<0 THEN 1970
1965    RETURN
1970    C5I = C5I+1:  C0I = -C0I*(P1I<>U1I) -(P1I=U1I):
        C0I = -C0I*(P1I<>V8I) -(P1I=V8I):
        C9I = -C9I*(P1I<>V9I) -(P1I=V9I):
        C7I = -C7I*(P1I<>W4I) -(P1I=W4I):
        PRINT: PRINT "o o o  Coup Fourre  o o o":  FI = 1
1980    TI = P1I:  C6I = C6I+1:
        IF P1I=W9I THEN
            IF B2I<0 THEN D2I=0:
                IF B1I=W2I OR B1I=V6I OR B1I=V9I THEN 1995
1990    B1I = W8I
1995    TI = -1:  RETURN
2000    IF P6I=1 THEN TI = W2I:  GOSUB 1900:
            IF TI<0 THEN 2240
2010    IF P9I=1 THEN TI = V6I:  GOSUB 1900:
            IF TI<0 THEN 2240
2020    IF P7I=1 THEN TI = V7I:  GOSUB 1900:
            IF TI<0 THEN 2240
2030    IF P8I=1 THEN TI = W5I:  GOSUB 1900:
            IF TI<0 THEN 2240 ELSE
            TI = W7I:  GOSUB 1900:
            IF TI<0 THEN 2240
2040    IF C3I>500 THEN TI = V5I:  GOSUB 1900:
            IF TI<0 THEN 2240
2050    IF C3I>600 THEN TI = V4I:  GOSUB 1900:
            IF TI<0 THEN 2240
2060    IF C3I>625 THEN TI = V3I:  GOSUB 1900:
            IF TI<0 THEN 2240
2070    IF C3I>650 THEN TI = V2I:  GOSUB 1900:
            IF TI<0 THEN 2240
2080    CI% = V5I:  GOSUB 2250:
        IF ZI>2 THEN TI = V5I:
            GOSUB 1900:  IF TI<0 THEN 2240
2090    CI% = W4I:  GOSUB 2250:
        IF ZI<>0 OR C7I=1 THEN TI = W3I:  GOSUB 1900:
            IF TI<0 THEN 2240
2100    CI% = V8I:  GOSUB 2250:
        IF ZI<>0 OR C0I=1 THEN TI = V7I:  GOSUB 1900:
            IF TI<0 THEN 2240
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2110    CIZ = UIZ:  GOSUB 2250:
        IF CIZ>0 OR C0Z<1 THEN IZ = V0Z:  GOSUB 1900:
           IF IZ<0 THEN 2240
2120    CIZ = V9Z:  GOSUB 2250:
        IF CIZ>0 OR C9Z<1 THEN IZ = W0Z:  GOSUB 1900:
           IF IZ<0 THEN 2240 ELSE
           IZ = W8Z:  GOSUB 1900:  IF IZ<0 THEN 2240
2130    IZ = V1Z:  GOSUB 1900:
        IF IZ<0 THEN 2240 ELSE
        IZ = V2Z:  GOSUB 1900:
        IF IZ<0 THEN 2240 ELSE
        IZ = V3Z:  GOSUB 1900:
        IF IZ<0 THEN 2240
2140    CIZ = W4Z:  GOSUB 2250:
        IF CIZ>1 THEN IZ = W4Z:  GOSUB 1900:
           IF IZ<0 THEN 2240
2150    CIZ = W3Z:  GOSUB 2250:
        IF CIZ>1 THEN IZ = W3Z:  GOSUB 1900:
           IF IZ<0 THEN 2240
2160    CIZ = V0Z:  GOSUB 2250:
        IF CIZ>1 THEN IZ = V0Z:  GOSUB 1900:
           IF IZ<0 THEN 2240
2170    CIZ = V7Z:  GOSUB 2250:
        IF CIZ>1 THEN IZ = V7Z:  GOSUB 1900:
           IF IZ<0 THEN 2240
2180    CIZ = W8Z:  GOSUB 2250:
        IF CIZ>3 THEN IZ = W8Z:  GOSUB 1900:
           IF IZ<0 THEN 2240
2190    IZ = V4Z:  GOSUB 1900:  IF IZ<0 THEN 2240
2200    IZ = V5Z:  GOSUB 1900:  IF IZ<0 THEN 2240
2210    IF FNIZ(CIZ/7)<0 THEN 2230
2220    FOR ZX = 1 TO 6:
           IF FNIZ(CIX/ZI1=0 THEN IZ = CIX/ZI1:  GOSUB 1900:
              IF IZ<0 THEN 2240
2225    NEXT ZX:  PRINT: PRINT: PRINT " * * *  SAFEIT DISCARD ERROR  * * *":
        STOP
2230    PIZ = CIX/7)
2240    PRINT "Computer discarded a"; 08(PIZ):
        IZ = 0:  FZ = 1:  RETURN
2250    ZZ = 0:
        FOR ZIZ = 1 TO 6:
           ZZ = ZZ -(CIZ(ZIZ)=CIZ):
        NEXT ZIZ:  RETURN
3000    FZ = 1:  XOZ = 0:  X9 = 1:  GOSUB 5000
3001 F$ = "BBBBBB":  F1$="BBBBBBBB":  PRINT: PRINT: PRINT,, "Player", "Computer":
 PRINT "Previous Total",; PRINTUSING F$; U9Z;:PRINT,; PRINT USING F1$; A9Z;
        PRINT "Wile Stones",; PRINTUSING6F$; P2Z;:PRINT,; PRINTUSING F1$; C3Z:
        09Z = 09Z+P2Z:  A9Z = A9Z+C3Z
3010    Z1Z = P5Z*100:  Z2Z = C4Z*100:  Z1Z = Z1Z-300*(Z1Z<400):
        Z2Z = Z2Z-300*(Z2Z<400):  PRINT "Safeties",,:
        PRINT USING F$; Z1Z;:PRINT,;  PRINT USING F1$; Z2Z
3011    09Z = 09Z+Z1Z:  A9Z = A9Z+Z2Z:
        PRINT "Coup Fourre's",,:  PRINT USING F$; P4Z*300;:PRINT,:
        PRINT USING F1$; C5Z*300:  09Z = 09Z + P4Z*300:
        A9Z = A9Z + C5Z*300
3015    Z1Z=0: Z2Z=0: Z3Z=0: Z4Z=0: Z5Z=0: Z6Z=0
3020    PRINT "Trip Completed",:
        IF X$="P" THEN Z1Z = 400:  Z2Z = -300*(P3Z=0):
        Z3Z = -500*(C3Z=0)
3030    IF X$="C" THEN Z4Z = 400:  Z5Z = -300*(C4Z=0):
        Z6Z = -500*(P2Z=0)
3050    PRINT USING F$; Z1Z;:PRINT,:  PRINT USING F1$; Z4Z:
        PRINT "Safe Trip",,:  PRINT USING F$; Z2Z;:PRINT,:
        PRINT USING F1$; Z5Z:  PRINT "Shut Out",,:
        PRINT USING F$; Z3Z;:PRINT,:  PRINT USING F1$; Z6Z:
        09Z = 09Z+Z1Z+Z2Z+Z3Z:
        A9Z = A9Z+Z4Z+Z5Z+Z6Z
3060    PRINT "Current Total",,:  PRINT USING F$; 09Z;:PRINT,:
        PRINT USING F1$; A9Z:
        IF (09Z>5000 OR A9Z>5000) AND 0P1Z<>A9Z THEN 9900 ELSE
        LINE INPUT T$:  BOTO 1000
4000    LINE INPUT V$:  V$ = LEFT$(V$, 1):  RETURN
5000    PRINT: PRINT: PRINT " Player Status  Computer Status    Player's Hand"
5010    PRINT A$(P0Z)"    "A$(0IZ)"    "A$(P1Z(1))" (1)":
        PRINT A$(16+(0IZ>90))"    "A$(16+(02Z>0))"    "A$(P1Z(2)) (2)":
        PRINT USING "BBBBBBBBBBBBBB    "; P2Z;:
        PRINT USING "BBBBBBBBBBBBBB    "; C3Z;:
        PRINT A$(P1Z(3))" (3)"
5020    SX(1)=1: SX(2)=1: SX(3)=1: SX(4)=1
5025    IF P3Z=4 OR C4Z=4 THEN IZ=4 ELSE IZ=0
5030    FOR ZIZ = 1 TO 3-(IZ>3):  IZ = 1:
  IF (P4Z AND SX(1)) THEN PRINT A$(14)"    ";:  SX(1) = 0:  IZ = 0
5040      IF (P7Z AND SX(2) AND IZ) THEN PRINT A$(11)"    ";:
             SX(2) = 0:  IZ = 0
5050      IF (P8Z AND SX(3) AND IZ) THEN PRINT A$(19)"    ";:
             SX(3) = 0:  IZ = 0
5060      IF (P9Z AND SX(4) AND IZ) THEN PRINT A$(8)"    ";:
             SX(4) = 0:  IZ = 0
5070      PRINT SPACE$(IZ+17);:  IZ = 1:
          IF (C7Z AND SX(1)) THEN PRINT A$(14)"    ";:
             SX(1) = 0:  IZ = 0
5080      IF (C8Z AND SX(2) AND (Z) THEN PRINT A$(11)"    ";:
             SX(2) = 0:  IZ = 0
5090      IF (C9Z AND SX(3) AND IZ) THEN PRINT A$(19)"    ";:
             SX(3) = 0:  IZ = 0
5100      IF (C0Z AND SX(4) AND IZ) THEN PRINT A$(8)"    ";:
             SX(4) = 0:  IZ = 0
5110      PRINT SPACE$(IZ+17);:
          IF Z1Z<4 THEN PRINT A$(P1Z(3+Z1Z));" (";Z:
             PRINT USING "#"; 3+Z1Z:  PRINT ")";:  ELSE PRINT
5120    NEXT Z1Z:  PRINT:  RETURN
9900    PRINT:  PRINT:
        IF 09Z>A9Z THEN PRINT "Congradulations - You Won." ELSE
        PRINT "Better Luck Next Time - Computer Wins."
9910    PRINT:  PRINT "I m";
9999    END
```


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Personal Electronic Transactions

by Gregory Yob

I am happy to hear from you, and encourage your correspondence. I will try to acknowledge all correspondence, and a SASE makes things easier for both of us. Please send your letters to "Personal Electronic Transactions" c/o PO Box 354, Palo Alto, CA 94301

When I think about writing to the entire world of PET owners, I have a problem similar to one faced by William Shakespeare a long time ago. Some of you are peasants (i.e., beginners with computers and the PET), and some of you are noblemen (the PET might be your second or third personal computer, or you make a living programming). Old Will solved it by having both fast action scenes and rambling elegant soliloquys. My unoriginal method is to include both very technical and very simple material in each column. Since I am a nonconformist, I will start with the technical material this month.

PET Input and Output

In 6502 based systems, all input and output is seen by the computer as memory locations. MOS technology provides several chips which are for I/O, and these chips have several memory locations reserved for I/O and the control of numerous options concerning I/O.

In the PET, two kinds of chips are used, two 6520's and one 6522. It isn't my intention to provide the specs for these chips here - contact MOS to get them. Figure 1 provides a table listing all the PET I/O lines and what they are assigned to. In most cases you can use the PEEK and POKE statements in PET BASIC to waggle these lines and see what they do - have fun!!!

Tooting My Horn

(toot) I have been working on a comprehensive manual for the PET, called The PET Manual, which should be ready when this column reaches you. Feel free to send me inquiries, and mention that you heard about it here. (toot)

More on PET Graphics

Here is some more info on using the PET in a graphical way. I must remind you that the program listings will follow the convention mentioned in the first column.

David J. Yob of Gallup, New Mexico (yes, he is a relative) tried out the PET false cursor program, and sent me this variation as an example of an irritating cursor: (I have to agree with him.)

```
10 PRINT"# 1ft";: FOR J = 1 TO 50: NEXT
20 PRINT" 1ft";: FOR J = 1 TO 50: NEXT(shift-apostrophe)
30 PRINT"$ 1ft";: FOR J = 1 TO 50: NEXT
40 PRINT"% 1ft";: FOR J = 1 TO 50: NEXT
50 GET A$: IF A$ = "" THEN 10 ("" is an empty string)
60 PRINT A$;: GOTO 10
```

Try it out! If you use the screen editor, and move the cursor back into the line you just entered, change it and press RETURN again, entering this program isn't too tedious. Now try the following set of characters - you might like it (I get a "hurry it up!" feeling with this one.)
Line 10: N Line 20: A Line 30: M Line 40:]

I had never thought of animating the cursor, and wrote the following program to experiment with various combinations - note that this program lets you enter any set of characters and will put them up as the cursor one by one. (This is one of the neat things about programming - you can make a specific idea more general.)

```
10 INPUT"CURSOR STRING: ";C$
20 FOR C = 1 TO LEN (C$)
30 FOR J = 1 TO 50: NEXT
40 PRINT MID$ (C$,C,1)"1 ft";: NEXT C
50 GET A$: IF A$ = "" THEN 20
60 IF A$ = "X" THEN 10
70 PRINT A$;: GOTO 20
```

Line 10 lets you enter a string which holds the characters you want to try out for the cursor. Lines 20 to 40 take each character in the string and displays it on the screen for a while. Lines 50 to 70 check for your keypress and echo it on the display. If you type in "X," you can start again with a new string. A variety of nice effects can be generated, with a few shown below:

```
1) #EDCAFR$ Note: SPACE will be show as "sp"
2) #$ERDFCA
3) 'YH]BGT%%TGB]HY'
4) QQQQWWW
5) + + + * * *                                  Note no shift here.
6) + + + + + + + * * + + + + + + * * + + + +
   + + * * + + * + + * *                        This one got rhythm.
```

Higher Resolution Graphs

Many of you have, no doubt, tried some of the simpler methods of drawing graphs on your PET - here is an example of what I mean:

```
10 X = 0
20 PRINT TAB (20 + 15*SIN(X))"*"
30 X = X + .2 : GOTO 20
```

This method will only provide 40 separate positions across the PET screen - somewhat worse than a Teletype*II. Attempting the same thing using the vertical axis, like an ordinary plot, is even worse, giving only 25 positions.

There are four sets of PET graphics characters which can provide eight times better resolution (320 across, 200 high), and these are shown below:

Horizontal Ramp	# E D C A F R $
Vertical Ramp	% T G B] H Y '
Horizontal Bars	off sp, off %, off 4, off 5, off I, rvs 6, rvs *, rvs ', rvs sp
Vertical Bars	off sp, off $, off /, off 9, off ", rvs 8, rvs 7, rvs #, rvs sp

There is also one set of 16 characters which give "double density" plotting - each of the 16 possible patterns from a 2 x 2 cell:

Double Density	off sp, off V, off V, off ,, off ;, off I, off ", off ?, rvs sp, rvs V, rvs V, rvs ,, rvs ;, rvs I, rvs ", rvs ?

Using the Vertical Ramp, here is a high resolution version of the sinewave plot given above:

```
10 P$ = "% T G B ] H Y ' "
20 X = 0
30 V = 15*SIN(X)
40 D = 8*(V-INT(V)) + 1
50 PRINT TAB (V + 20); MID$(P$,D,1)
60 X = X + .2 : GOTO 30
```

RUN this program and see how much nicer it is! Line 10 stores the Vertical Ramp as a string in P$. In Line 30, the value to be plotted is calculated (try your own functions here). Line 40 sets D to the character number in P$ required by computing the number of "eights" in the fractional part of V (for example, if V were 6.33, D would work out to be 2). Line 50 tabs over for the integer part of V, and then prints the selected character in P$.

A bar graph can be made by using the Horizontal Bars and making some changes: (try it out!)

```
10 P$ = "off % off 4 off 5 off I rvs 6 rvs * rvs ' rvs sp"
40 D = INT(8*(V-INT(V)))*2 + 1
50 PRINT "rvs"SPC(V + 20); MID$(P$,D,2)
```

*Trademark, Teletype Corp.

(I might as well warn you - this won't work - in the PET, SPC is a tabulation function, and does not print spaces!) You must also add:

```
15 $$ = " at least 40 spaces "
50 PRINT"rvs"LEFT$(S$,(V + 20)); MID$(P$,D,2)
```

Now try it and a bar graph will result. The reason I left the bug in first was to point out the misnaming of the PET SPC function; also, if you tried it out, the result was rather decorative.

In the new version, the calculation of D is complicated by fact that we must now pick out two characters from P$ each time, for example, 1 and 2, or 6 and 7. Line 50 now prints the correct number of reversed blanks, and then the selected two characters from P$.

One nice thing you can do is to turn the graphs around so they look like normal graphs. In this case, the first thing to do is to put the cursor at the bottom of the screen and then move upwards until you reach the spot to plot. Here is a cubic plot using the Horizontal Ramp...

```
10 P$ = "$ R F A C D E # "
20 Y$ = " hm dn dn dn dn dn dn dn dn dn dn dn dn dn
        dn dn dn dn dn dn dn dn dn dn dn "(24 downs)
30 X$ = " rt rt rt rt rt rt rt ..... (39 rt's)
35 U$ = " up up up up up up up ..... (39 up's)
40 PRINT"clr";
50 FOR X = 1 TO 40
60 V = 1 + 4*X-.31*X*X + .006*X*X*X
70 IF V>24 OR V < 0 THEN 110
75 PRINT Y$;
80 IF X = 1 THEN 90
85 PRINT LEFT$ (X$,X-1);
90 D = 8*(V - INT(V)) + 1
95 IF V  1 THEN 100
97 PRINT LEFT$(U$,V);
100 PRINT MID$(P$,D,1);
110 NEXT X
120 GET A$ : IF A$ = "" THEN 120
```

This program, though simple in concept, has a number of details that need explanation....

Line 10 is the Horizontal Ramp in string P$.

Lines 20 to 30 store cursor movements in three strings: Y$ homes and moved down 24 times, X$ for moving right to the column we want to plot in and U$ to move up to the point being plotted.

Line 50 defines the loop for all the horizontal positions on the screen.

Line 60 is a kludged function that looks nice when plotted.

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Line 70 checks for going off the top or bottom of the screen. If so, the plot is skipped for this value of X.

Line 75 moves the cursor to the bottom left corner of the screen.

Line 80 (and Line 95 later) checks to see if X (or V) is less than 1. If this step is forgotten, the PET will deliver a nasty ILLEGAL QUANTITY ERROR - unfortunately, if a string function is told to return zero characters, instead of nicely giving a null string back, the PET growls!

Line 90 is our familiar "find the character" calculation.

Line 97 moves the cursor up, line 100 prints the character for plotting.

Line 120 waits for your appreciation of the plot.

Those of you with a bent for computation will object that this could have been done better by moving down (25-Y) times, over X times, and then plotting the (8-D)th character in P$. Fine, go do it. I admit that this approach is faster, takes less space, etc. However, it is harder to understand, and I reserve the right to program my personal computer as I see fit!

In fact, I will often deliberately write somewhat crude code to preserve the clarity of the original idea that is being presented. I can't help but notice that programming is a funny art, and almost always the "best" way to do something is to do it backwards and inside out!

This plot can now be made into a bar graph by changing U$ to a sort of "totem pole," i.e., a set of:

```
rvs sp lft up                    (at least 25 of these)
```

and changing P$ to the Vertical Bars set (starting with off $), and then changing the expressions for D and the printing of the character in the same way that the older bar graph was made.

I leave this conversation as a challenge to you with two warnings: 1) When printing U$ the last time, the cursor may move off the right edge of the screen - watch out for this. 2) Don't try printing U$ with an expression like: LEFT$(U$,V/4) - this will print U$ in chunks of one character, and you want chunks of four characters. (If you goof this, it's an enjoyable and very mystifying bug!) Also, remember what happens if you feed a string expression something that turns out to be zero.

The Double Density characters permit a 80 x 50 display. Since the PET has a screen and you can move the cursor around as you will, it is easy to plot functions that move backwards or up - a task that was very difficult with a printer type terminal.

There is one problem with Double Density - what happens if you want to plot near another point? It is important to somehow know that you were nearby earlier so you won't destroy the work already done. There are two ways to do this. The first is to store the previously plotted pairs of points somewhere, and look through them all to find any "collisions." This takes lots of memory and even more time. The other way is to note that the PET display is actually a part of main memory, and can be changed directly without using PRINT at all.

The PET picture starts at location 32768 and goes up to 33768. To write on the display, you use the POKE statement. To look at the display, you use the PEEK function. Try these experiments:

1) In direct mode, enter the line below and press RETURN
   ?"clr": POKE 33333,1
2) After doing 1), enter & press RETURN:
   ?PEEK (33333), PEEK(33330)

The first experiment leaves you with the letter A about halfway down the screen. The second one will leave you the two numbers 1 and 32 respectively. A bit of thought reveals that location 33333 has the value 1 when PEEKed, and shows the letter A. Location 33330 is blank and has the value of 32.

To see all the codes used by the screen, try:

```
?"clr dn dn dn dn dn dn dn dn dn dn": FOR J = 1 TO 255:
POKE 32768 + J,J: NEXT
```

(This will run off the edge - don't worry, the PET accepts up to two lines on the screen as a direct command.) All 256 possible characters will appear, 128 in normal field, and 128 in reverse field.

One way to get the code for a particular character is to home the cursor, print the character, move the cursor somewhere else, and use

```
?PEEK(32768)
```

The codes for the Double Density set are shown in Figure 2.

Now we are able to tackle the problem of doing a Double Density plotting program for the PET. The first decision is to define where the origin is (where X = 0 and Y = 0). Doing things backwards, the "home" position (upper left corner) is chosen. Then the directions for X and Y are found to be: X increases to the right, and Y increases going down. This lets us use a simple formula for getting the address in memory for an X,Y location. If we were doing a single density plot, the formula would be:

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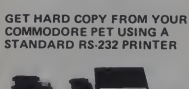

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Address = 32768 + 40*Y + X

For Double Density, it becomes:

Address = 32768 + 40*INT(Y/2) + INT(X/2)

Plotting on the screen now consists of these steps:

Step 1 Calculate the address and PEEK the screen memory to get anything that is already there.

Step 2 Find out where the dot is to be placed in the 2x2 grid, and somehow combine this with what we found on the screen.

Step 3 POKE the new character on the screen at the address calculated in Step 1.

Step 2 is the most complicated of these, and I must warn the beginners that perhaps you should skip this part and go on to the fun stuff - using this routine to make nice pictures.

If you look again at Figure 2, you will see a 2x2 box with the small squares numbered from 0 to 3. The table beneath the box shows the Double Density characters arranged so that if a small square is full for a character, the corresponding bit of the numbers 0 to 15 is a 1. I chose this arrangement so you could "cut" the 2x2 grid and lay the top to the right side to make the 1 x 4 binary grid - this was the easiest way to translate from the characters to the numbers 0 to 15.

When a point is to be plotted, the screen is PEEKed, and the table searched to find the correct character, and the character's number (0 - 15) is saved. Next, the X and Y values are checked to find out which corner has the dot in it. To combine the two values is easy (but a sneaky trick!) - just OR together the character from the screen and the character with the dot in the corner. This is done by ORing the table value for the screen character and the table value for the dot-in-the-corner character. (To be technical, the indices of the two characters are ORed to get the index of the character to POKE.) The new value is used to find the character in the table to POKE to the screen.

The little table on the right side has the OR and AND values for the four possible even/odd combinations of X and Y. If you wanted to plot in black, you would AND with the AND value instead of ORing.

Here is the Double Density Plotting routine - If you enter this and SAVE it on tape, it can be handy for many programs.

```
1000 REM DOUBLE DENSITY PLOT
1010 REM GIVEN X,Y,Z PLOT IN 80 X 50
1020 REM GRID WITH 0,0 AT HOME
1030 REM Z = 0 BLACK, Z = 1 WHITE
1040 REM CALL SUB 1500 BEFORE USING
1045 REM FIRST TIME.
1050 REM FIND WHAT'S ON SCREEN
1060 AD = 32768 + 40*INT(Y/2) + INT(X/2)
1070 DD = PEEK(AD)
1080 REM SEARCH TABLE FOR BIT PATTERN
1090 FOR PT = 0 TO 15
1110 IF DD = PX(PT) THEN 1150
1120 REM DON'T PLOT IF NOT FOUND
1130 NEXT PT: RETURN
1140 REM CALC OR/AND CODE
1150 EX = X-2*INT(X/2): EY = Y-2*INT(Y/2)
1160 ON EX + 2*EY + 1 GOTO 1170,1180,1190,1200
1170 CO = 2: CA = 13: GOTO 1220(CO is the two letters C &
1180 CO = 1: CA = 14: GOTO 1220                          O)
1190 CO = 8: CA = 7: GOTO 1220
1200 CO = 4: CA = 11
1210 REM MODIFY ACCORDING TO COLOR Z
1220 IF Z = 1 THEN PK = CO OR PT          (white)
1230 IF Z = 0 THEN PK = CA AND PT         (black)
1240 REM PUT ON SCREEN
1250 POKE AD, PX(PK)
1260 RETURN
1500 REM DD PLOT INITIALIZE
1510 DIM PX(15)
1520 FOR J = 0 TO 15: READ PX(J) : NEXT
1530 DATA 32, 124, 126, 226, 108, 225, 127
1540 DATA 251, 123, 255, 97, 236, 98, 254
1550 DATA 252, 160
1560 RETURN
```

Subroutine 1500 reads the character set into the table for use by Subroutine 1000.

Line 1060 computes the address for PEEK and POKE on the screen from X and Y. Line 1070 fetches the screen value as DD.

Lines 1090 to 1130 look through the table to find the corresponding character. The value PT is the indice to be ANDed or ORed later. If the character can't be found, the plot is suspended - this is a nice way of not over-plotting any printing, axis, etc., that you might want on your plot.

Line 1150 sets EX to 1 If the X is odd, and EY to 1 If Y is odd.

Line 1160 selects one of four OR/AND values from EX and EY. The one must be added because PET ON - GOTO will jump only if the ON value is one or more. Lines 1170 to 1200 set the OR and AND values.

Lines 1220 and 1230 select the new indice depending on the "color," 1 for white, and 0 for black.

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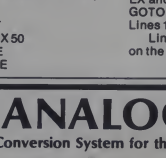

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Line 1250 POKEs the new character on the screen. Note that PK points to the character in array PX.

Now, let's use our plotter for some fun! LOAD your double density subroutine and add the following code:

```
10 PRINT "clr"; : Z = 1 : GOSUB 1500
15 PRINT"RAD,AMP,FREQ"
20 INPUT R,A,F
30 FOR AN = 0 TO 2*pi STEP pi/50   (pi is the key above
40 RA = R + A*SIN(F*AN)            RETURN, shifted)
50 X = RA*COS(AN): Y = RA*SIN(AN)
60 X = INT(X + .5) + 45: Y = INT(Y + .5) + 25
70 GOSUB 1000 : NEXT AN
80 END
```

Line 10 gets everything ready to go. Lines 15 and 20 let you enter some parameters which I won't explain - try the examples below and see what they do. Lines 30 to 50 compute the X and Y for a polar plotting function. (Sorry, I don't have enough space to explain this one better.) Lines 60 and 70 move the origin of the figure to the center/right of the screen and call the plotting routine.

Here are some values to try:

1) 0,20,2
2) 0,25,3
3) 12,12,5
4) 20,5,10
5) 20,0,0

If you want to do more than one at a time, make Line 80:

```
80 PRINT"hm"; GOTO 15
```

(Phew! - enough!!) This has been a long column to wade through. Happy plotting! □

I am happy to hear from you, and encourage your correspondence. I will try to acknowledge all correspondence, and a SASE makes things easier for both of us. Please send your letters to "Personal Electronic Transactions" c/o PO Box 354, Palo Alto, CA 94301.

PET Input/Output Lines — FIGURE 1

These tables relate the PET I/O lines to the internal PIA's and the VIA. See the 6522 and 6420 documents for how to control these lines.

KEYBOARD PIA (6520) — Address: E810 59408

PA0 Keyboard column select	PB0 Keyboard row
PA1 Keyboard Column select	PB1 Keyboard row
PA2 Keyboard column select	PB2 Keyboard row
PA3 Keyboard column select	PB3 Keyboard row
PA4 Switch, Cassette #1	PB4 Keyboard row
PA5 Switch, Cassette #2	PB5 Keyboard row
PA6 EOI In	PB6 Keyboard row
PA7 Diagnostic Jumper	PB7 Keyboard row
CA1 Read, Cassette #1	CB1 Video Sync In
CB1 Blank Screen and EOI out	CB2 Motor, Cassette #1

IEEE-488 PIA (6520) — Address: E820 59424

PA0 IEEE Data In - 1	PB0 IEEE Data Out - 1
PA1 IEEE Data In - 2	PB1 IEEE Data Out - 2
PA2 IEEE Data In - 3	PB2 IEEE Data Out - 3
PA3 IEEE Data In - 4	PB3 IEEE Data Out - 4
PA4 IEEE Data In - 5	PB4 IEEE Data Out - 5
PA† IEEE Data In - 6	PB5 IEEE Data Out - 6
PA6 IEEE Data In - 7	PB6 IEEE Data Out - 7
PA7 IEEE Data In - 8	PB7 IEEE Data Out - 8
CA1 ATN In	CB1 SRQ In (not buffered)
CA2 NDAC out	CB2 DAV out

Note: All IEEE related lines are buffered except for SRQ In. This includes the lines in the VIA. CB1 of the keyboard PIA both blanks the screen and pulls EOI out low.

USER PORT VIA (6522) — Address: E840 59456

PA0 Lsb of User Port	PB0 NDAC In
PA1 User Port	PB1 NRFD out
PA2 User Port	PB2 ATN out
PA3 User Port	PB3 Write (Both cassettes)
PA4 User Port	PB4 Motor, Cassette #2
PA5 User Port	PB5 Video Sync In
PA6 User Port	PB6 NRFD In
PA7 Msb of User Port	PB7 DAV In
CA1 User Port handshake	CB1 Read, Cassette #2
CA2 Character set select (Graphics vs U/L case)	CB2 User Port handshake

Note: The Diagnostic LED will light if the Keyboard PIA is as follows: PA0 High, PA1 High, PA2 Low, PA3 High, Others Don't Care

PS: It isn't clear whether the IEEE control lines should have the bar (to indicate low true) on top or not. Try it yourself and see.

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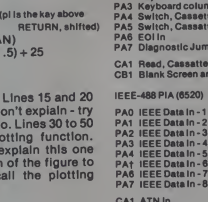

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FIGURE 2
DOUBLE DENSITY CHARACTER SET TABLE
AND
OR/AND CHARACTERS

1	0
3	2

DOTS vs BITS

CHAR #	3	2	1	0
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

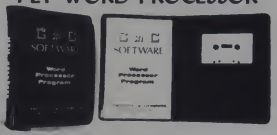
POKE	CHAR
32	off sp
124	off
126	off
226	rvs "
108	off ,
225	rvs !
127	off ?
251	rvs ;
123	off ;
255	rvs ?
97	off !
236	rvs ,
98	off "
254	rvs
252	rvs
160	rvs sp

X	Y
E	E
E	O
O	E
O	O

E = EVEN
O = ODD

CHAR # TO OR	AND
2	13
1	14
8	7
4	11

PET WORD PROCESSOR



This program permits composing and printing letters, flyers, advertisements, manuscripts, etc., using the COMMODORE PET and a printer.
Script directives include line length, left margin, centering, and skip. Edit commands allow the user to insert lines, delete lines, move lines and paragraphs, change strings, save onto cassette, load from cassette, move up, move down, print and type.
The CmC Word Processor Program addresses an RS-232 printer through a CmC printer adapter.
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CIRCLE 195 ON READER SERVICE CARD

TRS-80 Strings

Stephen B. Gray

In this sixth TRS-80 column, we'll be looking at the details surrounding the demise of the DUMP record; a Radio Shack game program; a newsletter that carries many ads for TRS-80 items; program lines that let you avoid changing PRINT to LPRINT; two free modifications Radio Shack will make to your TRS-80, if required; a Computer Doodler program; and, the "TRS-80 Micro Computer Technical Reference Handbook."

We welcome information from new manufacturers of TRS-80 hardware and software about their products. Please write to me in care of *Creative Computing*.

DUMP Dumped. Once upon a time, and not all that long ago, a Florida company called Micro Systems Services advertised a Dial-a-Program service with an 800 number. They were going to transmit programs for the TRS-80 over phone lines, and you would use an ordinary telephone pickup connected to an audio cassette recorder to tape the programs. But the programs couldn't be transmitted reliably, so the service was discontinued.

Undiscouraged, the company changed its name to DUMP Publications, and sent out sample copies of DUMP, a monthly TRS-80 software magazine on a 33⅓ rpm flexible plastic record. It was similar to what you may have seen in another computer magazine, and designed to be played on an ordinary phonograph. You were supposed to pick off the signal at the speaker leads, and run it into your cassette recorder. A one-year subscription was $20. New product announcements for DUMP appeared in several publications, including *Creative* (Nov/Dec 1978, p. 17).

The first issue of DUMP was dated August 1978. But apparently too many people had problems with the disk-to-tape transfer. There was no second issue of DUMP; the toll-free 800 number of DUMP Publications was discontinued; and, soon after the alternate number, given by the 800 operator, was also discontinued.

Several months later, a note went out to DUMP subscribers, to the effect that "due to our vendor's inability to provide us with the quality and time frame we demand, DUMP, in its present form, will no longer be offered to new subscribers. To fill our commitment to our existing subscribers, DUMP is providing a package of more complex software. This package will include the following: Accts/Rcvbl/Payable, Cash Register.... Thank you for your patience."

Quick, Watson! This $4.95 Radio Shack game of logical deduction involves eight men suspected of four crimes committed during "the great train robbery."

You're asked to figure out, on the basis of lie-detector results, which suspect committed each of the four crimes—and a suspect could have committed more than one crime, just to complicate things. In each of the eight tries you get, you name a suspect under one of the four crimes listed, and the lie detector lets you know how many of the four suspects are guilty as charged, and how many are guilty but charged with the wrong crime. "It does not tell you which one(s) of your selections is correct," as the brief manual says. All you've got to go on is a total of zero to four dots under the lie-detector results of "pegged" (guilty as charged) and "wrong crime."

The game can be played in either Level-I or Level-II, and of course the guilty parties are randomly selected anew for each game. Sometimes it's fairly easy to win, sometimes not. You may find this game quite a challenge. Since the program keeps track of your average number of tries, you could play against one or more other people, to find out who is fastest at picking the guilty four, or three, or two, or even one. Warning: this game can be addictive; you may find yourself playing "just one more" for quite a long time.

ON_LINE. An advertising newsletter that publisher Dave Beetle calls the "Buy & Sell Forum for the Computer Hobbyist," ON_LINE (24695 Santa Cruz Hwy, Los Gatos, CA 95030) is printed every three weeks, is "free at participating stores," and otherwise costs $4.65 for 18 issues ($12.50 airmail), $8.80 for 36 issues ($23 airmail).

Among several hundred brief ads for everything from programming forms to line-surge protectors, ON_

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MICROPOLIS

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In the ML version, the sort will take from 1 to 20 SECONDS, depending on the number of records being sorted. The BL version of the sort takes between 10 seconds and 15 minutes.

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TRS-80 Strings con't...

LINE always carries one or two dozen ads for TRS-80 items, such as memory kits, programs, disk drives, printers, user clubs, used systems; one ad even offers help with programming problems, apparently free.

If you don't have a computer, and can't afford a new one, this is a fine place to look for a used one, anywhere from a KIM-1 to a complete TRS-80 business system.

PRINT on a Line Printer. Suppose you've got a long Level-II program full of PRINT statements that you decide to output to a line printer. You can change the PRINTs to LPRINTs, or you can use POKEs to force the computer to put on the printer what would otherwise go up on the screen, with:

```
POKE 16414,141
POKE 16415,5
```

To get out of this mode, use

```
POKE 16414,88
POKE 16415,4
```

Cassette Load Mod. For Level-II users who've been having problems with loading from cassette, Radio Shack has a hardware solution. If you've been having more than a little trouble with CLOAD, no matter what setting of the volume control you use, or how clean your cassette-unit heads are, take your keyboard unit to your local Radio Shack. The manager will send it to a repair center, where a LEVEL-II CASSETTE LOAD MODIFICATION will be installed, free of charge. Free, that is, if you haven't been playing with the insides of your CPU. If you have, you may get an estimate of what the charges will be.

The modification is an added two-inch-by-two-inch PC board, an automatic gain-control circuit that controls the read logic by overriding the volume control, which can be set anywhere between 3 and 8. The AGC will clip a strong signal and amplify a weak one.

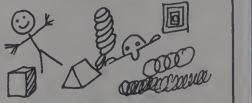
Level-II volume control adjustments are more sensitive and critical than for Level-I CPUs, which have a wider latitude. The problem seems to be caused mainly by the faster transfer rate, which makes for more critical timing.

Active Cable. For business-system users of 32K or 48K TRS-80s (or for hobbyists, if any have that much RAM) who have problems with bit dropout, Radio Shack has an engineering change called the ACTIVE CABLE, which replaces the existing cable.

The new cable "strengthens the memory address line from the CPU to the extended RAM in the expansion interface," according to Fort Worth

This amplifier is like a telephone repeater, consisting of a small PC board built into the cable itself, and acting like a buffer between the CPU and higher memory.

As with the Cassette Load mod, the Active Cable is available free of charge through the manager of your local Radio Shack. Again, no charge unless you've been "tampering," as Fort Worth puts it.



Computer Doodler. For $5, Les Logan (436 Warner Clr., Norfolk, VA 23509) will send you his cassette of Computer Doodler, written in Level-I BASIC.

The cassette contains three programs. The first "will allow a user to quickly and easily create complex patterns (or simply doodle aimlessly) without prior programming knowledge," as the REM lines state. The commands are SET, RESET, UP, DOWN, LEFT, RIGHT, and ANGLE (or just their first letters).

Computer Doodler I guides you, by asking (at the top of the screen) where you want to start (how far from the left, 0 to 127; how far down, 6 to 47); SET or RESET mode; direction; and then tells you the maximum length of the line you can draw in that direction. Current location is always displayed, in XY coordinates, at the top of the screen.

If you choose ANGLE for direction, you're asked if the line is to go up or down, left or right, and how far. An ANGLE line consists of a diagonal made up of what looks like squares, but actually consists of pairs of graphics blocks. The angle is not 45 degrees, but more like 40.5 degrees (due to the 3:7 aspect ratio of the graphics blocks); this is the only angle the Doodler can draw.

Computer Doodler II is almost the same as I, but it stores the command steps in memory, and has three modes of operation: doodle into memory; replay doodle from memory; display commands that are in memory.

Computer Doodler III is the same as II except that commands are recorded on cassette tape instead of internal memory, one at a time. On playback, the tape reads out the data for a line, the line is drawn while the tape is halted, and the coordinates

and step number are displayed at the top of the screen.

Despite its simplicity, Computer Doodler can save a great deal of time in drawing just about anything, as long as it doesn't require lines at angles other than 40.5 degrees.

Technical Manual. That's the title in Radio Shack's latest TRS-80 hardware catalog, but the actual title of this $9.95 manual is "TRS-80 Micro Computer Technical Reference Handbook."

As the preface to this 108-page handbook puts it, "This Book was written for the technical person, by a technical person. It was not written to educate the average owner of a TRS-80 Micro-Computer. If you do not know what Hex means...or how a NOR gate differs from a NAND gate...you are not prepared to repair your Computer. (You need some solid digital logic training; and this Book won't give it to you.)"

The preface also notes that "If you are a hobbyist who can convert Hex to Decimal in the blink of an eye and you've entered 16K BASIC languages using front panel switches, then this book will probably appear longer than it needs to be." Although the book is intended for TRS-80 owners who may wish to repair their computers, the preface ends with the warning, "We'd like you to remember that any work you do on your TRS-80 'voids the warranty.' And, we will not obligate ourselves to repair or correct owner modifications."

After a system block diagram (with explanation) and a Level-I memory map, the handbook gets into the meat, 41 pages on Theory of Operation, describing in detail the two fold-out schematics at the back of the book. The preface isn't kidding: to follow the text you've got to be able to understand phrases such as "Note that R58 keeps this line pulled high" and "MUX then changes states." This last refers to one of the waveform charts, of which there are half a dozen in the theory section.

The 26 pages on Adjustments and Troubleshooting tell how to take apart the computer, check and adjust the power supply, how to isolate the problem using two troubleshooting flowcharts, and then go into detail on the more common problems and what to do about them. Such as bouncy keys, a blank screen, relay damage ("particularly susceptible in Level-II units"), open feedthroughs, static outputs, etc.

The Outside World chapter provides 10 pages on the technical side of memory-mapped and port-based external devices, and an explanation of expansion-port signals.

The handbook finishes with a Parts List and the schematics, plus a lengthy explanation that because different BASIC ROMs were used, there were three major printed-circuit board changes. First Intel 2616 EP ROMs, then National MM2316 ROMs, followed by Motorola 7800-series ROMs (first the two-chip set, then the single-chip set).

Here then is just about everything most technically-minded TRS-80 owners will want to know about the innards of their machines. Software is not discussed in detail—that's the subject of other manuals.

I wish they'd put function identifiers on the components on the two main schematics, to help figure out what's going on where. Just a couple of words next to Z32 to say it's part of the video divider chain, for example. Yes, the text has a lengthy discussion and partial schematics of the chain, but a troubleshooter needs all the help he can get. And how about an index? There's no index in the Level-I or Level-II BASIC manuals, nor in this handbook. Otherwise it's the answer to the prayers of (most) TRS-80 hardcore hardware devotees. □

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For those of you who already own an S-100 mainframe or motherboard, the MINI-8100 may be purchased without the built in motherboard (MINI-8100S). Just plug it in and go!

The MINI-8100 has the same high quality as all HUH Electronics products—easy assembly, fully socketed solder mask board, silk screen component legend, comprehensive manual and design excellence that equals the 8100 itself.

PRICES

MINI-8100 KIT	includes all parts and one S-100 connector	$115
MINI-8100 A/S/M	assembled and tested includes four S-100 connectors	$150
MINI-8100S KIT	S-100 card board plugs into mainframe	$ 95
MINI-8100S A/S/M	same as above but assembled and tested	$125

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ORDERING INFO: The MINI-8100 is available from leading computer dealers or factory direct. Please include $4 for shipping and handling. CA residents include 6% sales tax. We accept VISA or Mastercharge or we can ship C.O.D.

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*TRS-80 is a Radio Shack® product

Amortization Schedules: For Home & Business

Paul Lamb

At income tax time one of the nice things about loans is that the interest expense is deductable on the income tax form. That is if we know what our interest payments are. Most firms provide us with their calculations for the interest but it would be interesting to be able to check their figures. Also, do you sometimes have doubts that your monthly payment really comes out to pay off your loan or are you paying too much. Is the remaining balance dropping very slowly or have you reached a point where it drops rapidly?

The Complete Amortization Schedule Program from Williams Radio & TV, Inc. (Computer Division) can shed some light on all these questions. You tell the program the interest rate, the amount of money borrowed and the length of time to repay (in months or years) and it will provide you with the monthly payment required to satisfy the loan. Also, it can provide a listing of each monthly payment, the accumulated interest paid, and the balance left, for the period of the loan. Doing this for your 30 year (360 month) mortgage can use up considerable paper, so the program offers the option of receiving a summary printout listing the total interest paid and the total amount paid (principal and interest).

I tried this program using the example in the documentation and then with a loan I have. The computer results for the monthly payment was one cent less than that in the example, but the end result was the same (within a couple of cents). But, when tried on the "real" loan, a large difference in monthly payment was noted. It appears that the 12 percent loan I obtained is 12 percent prepaid (not calculated by this program) and 12.125 percent on an amortization schedule. Had I known that when I took out the loan, I could have saved more than the cost of the program in that one transaction.

The program was loaded without difficulty, but doesn't follow the documentation exactly. Actually, the documentation appears to be for an earlier version. The program asks for a device designator for printing out the results (a listing device), an input not expected from the documentation. Also a name is asked for, as a heading on the output, and, again, not indicated by the documentation.

The program seemed to provide correct results, being a penny off from an example obtained from a neighbor (see Figure 1). Could this be a rounding error problem associated with the number of significant digits used? My North Star BASIC is set for 10 digits.

The program is rigid in that it requires as input the principal, interest rate, and number of payments; it will accept your input of monthly payment or calculate what the monthly payment should be. A simple expansion of the program to permit input of the monthly payment and a calculation of the interest rate (effective interest rate) would be useful.

This program probably will not see a lot of application around the home. But for the small businessman, it would eliminate the table lookup required for each time payment sale.

The Complete Amortization Schedule Program is available from Williams Radio & TV, Inc., Computer Division, 2062 Liberty Street, Jacksonville, Florida 32206. $15. □

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     AMORTIZATION SCHEDULE  FOR  PETE BRANNER

SUMMARY:      $1100.75  FOR  12 MONTHS AT  22.01 PERCENT
MONTHLY PAYMENT =  $103.03


                        >>>>>  YEAR:  1979  <<<<<
MON PMT    INTEREST   TOTAL INT   PRINCIPAL   TOTAL PRIN     BALANCE
==========================================================================
FEB 1        $20.19      $20.19      $82.84      $82.84    $1017.91
MAR 2        $18.68      $38.87      $84.35     $167.19     $933.56
APR 3        $17.13      $56.00      $85.90     $253.09     $847.66
MAY 4        $15.55      $71.55      $87.48     $340.57     $760.18
JUN 5        $13.95      $85.50      $89.08     $429.65     $671.10
JUL 6        $12.31      $97.81      $90.72     $520.37     $580.38
AUG 7        $10.65     $108.46      $92.38     $612.75     $488.00
SEP 8         $8.96     $117.42      $94.07     $706.82     $393.93
OCT 9         $7.23     $124.65      $95.80     $802.62     $298.13
NOV 10        $5.47     $130.12      $97.56     $900.18     $200.57
DEC 11        $3.68     $133.80      $99.35     $999.53     $101.22

SYNOPSIS:  $1100.75  FOR   12 MONTHS AT   22.01 PERCENT
           DATE OF TRANSACTION: FEB 1979
MONTHLY PAYMENT                          :      $103.03
AMOUNT OF INTEREST PAID IN  1979         :      $133.80
AMOUNT PAID TOWARD PRINCIPAL IN  1979    :      $999.53
TOTAL INTERST PAID SINCE FEB 1979        :      $133.80
TOTAL PRINCIPAL PAID SINCE FEB 1979      :      $999.53



                        >>>>>  YEAR:  1980  <<<<<
MON PMT    INTEREST   TOTAL INT   PRINCIPAL   TOTAL PRIN     BALANCE
==========================================================================
JAN 12        $1.86     $135.66     $101.22     $1100.75        $.00

SYNOPSIS:  $1100.75  FOR   12 MONTHS AT   22.01 PERCENT
           DATE OF TRANSACTION: FEB 1979
MONTHLY PAYMENT                          :      $103.08
AMOUNT OF INTEREST PAID IN  1979         :        $1.86
AMOUNT PAID TOWARD PRINCIPAL IN  1979    :      $101.22
TOTAL INTERST PAID SINCE FEB 1979        :      $135.66
TOTAL PRINCIPAL PAID SINCE FEB 1979      :     $1100.75
LOAN PAID OFF IN JAN 1980

FINAL PAYMENT =     $103.08
TOTAL PAYMENTS =   $1236.41
```

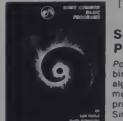
Paul Lamb, 13101 Parson Lane, Fairfax, VA 22030.

creative computing book service

Business Applications

Accounts Payable and Accounts Receivable

Poole & Borchers. Includes program listings with remarks, descriptions, discussion of the principles behind each program, file layouts, and complete step-by-step instructions. Covers accounts payable and receivable in regard to invoice aging, general ledger, progress billing, partial invoice payments, and more. 375 pp. $15.00 [10V]



Payroll with Cost Accounting in BASIC

Lon Poole. Includes program listings with remarks, descriptions, discussion of the principles of each program, file layouts, and a complete user's manual with step-by-step instructions, flow charts and sample reports with CRT displays. 356 pp. $15.00 [10W]

How to Profit From Your Personal Computer: Professional, Business and Home Applications

T.G. Lewis. Put your computer to work for you. This new guide describes the use of personal computers in common business applications, including terms, notations, and techniques used by programmers. 256 pp. $8.95 [10X]

Small Computer Systems For Business

Gerald A. Silver. Useful for operators, programmers, teachers, students, etc., this book explores the world of small computers: what they are, how they are used, their internal structure, and our means of communicating with them. Describes assemblers, interpreters, and compilers, as well as operating systems and small computer applications. 254 pp. $9.95 [10Y]

Some Common BASIC Programs

Poole & Borchers. This book combines a diversity of practical algorithms in one book: matrix multiplication, regression analysis, principal on a loan, integration by Simpson's rule, roots of equations, chi-square test, and many more. All the programs are written in a restricted BASIC suitable for most microcomputer BASIC packages, and have been tested and debugged by the authors. $8.50 [7M]

BASIC With Business Applications

Richard W. Lott. This book focuses on the BASIC language and its application to specific business problems. Part one introduces the BASIC language and the concept of logical flowcharting. Part two presents problems and possible solutions. Topics include interest rate calculations, break-even analysis, loan rates, and depreciation. This book is a great aid to the beginner wanting to learn BASIC without having a technical or scientific background. 284 pp. $10.50 [10Z]

"The real purpose of books is to trap the mind into doing its own thinking."

Computing Milieu

COMPUTERS, COMPUTERS, COMPUTERS In Fiction And In Verse

D. Van Tassel, Editor. This collection of stories, commentaries and poems project the reader into a world where lifestyles are dominated by the computer to an extent far greater than they are by the telephone today. By revealing reactions and effects, the stories offer the reader insight into what is a potential reality. Cleverly-written, this book should entertain anyone who is aware of the computer's impact on society. Includes work by such distinguished writers as Gordon R. Dickson, Art Buchwald, Michael Shaara and Bob and Ray. 192 pp. $8.95 [9X].

The Home Computer Revolution

Ted Nelson. Here is one of the most controversial books on home computers. Nelson takes a look at how the "dinky" computers got here, where they are, where they're going and what will become of the big boys like IBM. This thought-provoking and highly opinionated book picks up where *Computer Lib/Dream Machine* left off. 224 pp. $2.00 [9U].

PCC's Reference Book of Personal and Home Computing

Ever try to find the address of a manufacturer of a cassette interface that a friend told you about 2 weeks ago? Frustrating isn't it? This book will go a long way toward ending that frustration with its comprehensive list of manufacturers, stores and products. Also contains survey articles on software, hardware, kits and applications as well as an index of articles from various hobbyist magazines. Several bibliographies, too. $5.95 [7P]

Computer Lib/Dream Machine

Ted Nelson. This book is devoted to the premise that everybody should understand computers. In a blithe manner the author covers interactive systems, terminals, computer languages, data structures, binary patterns, computer architecture, mini-computers, big computers, microprocessors, simulation, military uses of computers, computer companies, and much, much more. Whole earth catalog style and size. A doozy! 127 pp. $7.00 [8P]

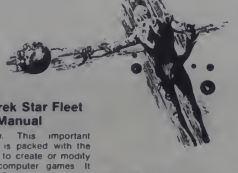
Space and Science Fiction

Star Wars Album

The incredible behind-the-scenes story of the most extraordinary motion picture of our time including over a hundred exclusive photos, special effects secrets, interviews with George Lucas, Carrie Fisher and Mark Hamill, the Anatomy of an Android and a technical glossary. Lots of color. 76 pp. $5.95 [11A]

Masterpieces of Science Fiction

This lavishly illustrated large format book has nine classic stories by Isaac Asimov, Gregory Benford, Ray Bradbury, Arthur C. Clarke, Harlan Ellison, Robert Heinlein, Frank Herbert, A.E. Van Vogt, and Kurt Vonnegut, Jr. Fabulous full color illustrations throughout. 108 pp. $7.95 [11B]

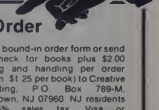


The Star Trek Star Fleet Technical Manual

Franz Joseph. This important resource book is packed with the data you need to create or modify STAR TREK computer games. It includes all Starship operating characteristics, defense and weapon systems, standard orbits, velocity/time relationship, space/war technology, Milky Way galaxy charts, Federation codes, etc., etc. A national best seller. Large format, vinyl binder. 180 pp. $7.95 [8C]

Star Wars Portfolio

Complete technical specifications and engineering drawings of ships, space stations, and 'droids of both The Imperial Empire and the rebels. A vital resource book. 180 pp. $7.95 [11C]



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Use the bound-in order form or send your check for books plus $2.00 shipping and handling per order. (Foreign $1.25 per book) to Creative Computing, P.O. Box 789-M, Morristown, NJ 07960. NJ residents add 5% sales tax. Visa or MasterCharge are acceptable also. For faster service, call in your bank card order toll free to:

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Compleat Computer Catalogue

We welcome entries from readers for the "Compleat Computer Catalogue" on any item related, even distantly, to computers. Please include the name of the item, a brief evaluative description, price, and complete source data. If it is an item you obtained over one year ago, please check with the source to make sure it is still available at the quoted price.

Send contributions to "The Compleat Computer Catalogue," *Creative Computing*, P.O. Box 789-M, Morristown, NJ 07960.

COMPUTERS

BUSINESS SYSTEM

Industrial Micro Systems announces their complete microcomputer based system. The system consists of an attractive, industry unique mainframe enclosure with a cast aluminum front panel and woodside or rack-mount options. As pictured, a desk enclosure is also available with the system.

The standard configuration includes 32 Kbytes of memory, over 500 Kbytes of floppy disk storage and two serial I/O ports, all of the above are expandable.

The system can be delivered with the CP/M Operating System, including a multi-user version and the UCSD Pascal System.

The Schraff Group, 1000 Quail, Suite 140, Newport Beach, CA 92660, (714) 833-3660.

CIRCLE 226 ON READER SERVICE CARD

MICRO-SLICE SINGLE BOARD COMMUNICATIONS COMPUTER

Micro-Slice is a complete Z80A-based communications computer on a single S-100 board for OEM, business, and hobbyist applications. It offers:

A 4mhz Z80 module, with power-on jump to any 256 byte boundary, 8 software prioritized interrupt inputs, and a real-time clock. It has up to 8K of ROM (2-2708, 2716, 2732), dip switch mappable to any 4K/8K boundary and a 2K static RAM (2114), dip switch mappable with the ROM to any 4K boundary; The Micro-Slicer also has an asychronous/synchronous serial port with 16 software-selectable baud rates; two fully buffered bidirectional parallel ports; four bi-directional USART control ports, 2 real-time clock control ports, 2 single bit status ports; slave mode operation; and front panel software, with examine, deposit, call, input, output, jump, block transfer and search commands, and USART initialization supplied as either listing or preprogrammed on EPROM. $349.00 kit, $395.00 assembled and tested.

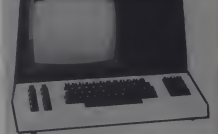
Micro Diversions, Inc., 8455-D Tyco Rd., Vienna, VA 22180, (703) 827-0688.

CIRCLE 227 ON READER SERVICE CARD

SCIENTIFIC DATA SYSTEMS REESTABLISHED FOR MICROCOMPUTER SYSTEMS

Scientific Data Systems has been reestablished as a manufacturer of innovative, low cost small business computers.

Scientific Data Systems was incorporated in June of 1977 and made deliveries of its first system in December 1978. The system, called SDS 420, is a complete desk-top computer system based on the high speed 6502A microprocessor. Incorporating high quality components and functioning under a big computer type operating system, the system sells for under $8,000 in single



units. The SDS 420 is being sold through dealers nationwide.

All subsystems are modular for simple servicing. The system includes:

- The state-of-the-art 2MHz 6502A microprocessor.
- 32 Kbytes of memory with 250 nanosecond cycle time, expandable to 56K, and contained on a single pc board.
- From 1-1/2 to 10 megabytes of floppy disk storage on the ultra-high speed PerSci dual-diskette, single-double density drives. Dual head drives are optional. Up to four drives can be supported by the system.
- A high resolution Ball Brothers 12-inch CRT display with 25 lines of 80 characters per line and an independent 2K byte refresh memory.
- An easy-to-use, SDS designed, 71 key alpha-numeric detachable keyboard with decimal pad, cursor control, reset and interrupt keys and three user programmable keys.

The SDS 420 employs an extended 12K BASIC interpreter which provides all the features of standard BASIC plus commands for formatted printing, the input of strings with embedded terminators and extensive string manipulative commands. $7700.

Scientific Data Systems, Inc., 12640 Beatrice Street, Los Angeles, CA 90066, (213) 390-8673.

CIRCLE 228 ON READER SERVICE CARD

SBC-100 SINGLE BOARD COMPUTER

SD Systems announces the SBC-100 Single Board Computer. The powerful Z80 microprocessor is the heart of the SBC-100. The SBC-100 is designed to be used without a front panel and replaces many lower level CPU boards. A full single board computer, the SBC-100 offers features that allow it to be coupled with a controller interface to give a complete control unit for industrial applications.

Among the many features are: 1K on board RAM, 8K bytes PROM (using 2716), RS-232 serial I/O, parallel I/O, four channel counter/timer, software programmable baud rate generator, S-100 bus compatible.

SD Systems, P.O. Box 28810, Dallas, TX 75228, 800-527-3460.

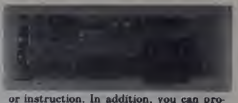
CIRCLE 229 ON READER SERVICE CARD

INDUSTRIAL USER ORIENTED S100 PROCESSOR/CONSOLE

Industrial Modules, Inc. has introduced an S-100 processor/console board with integral CPU and console functions. Designed especially to work in industrial environments the INMOD-885 features a 3MHz 8085A CPU, powerful EPROM monitor, 20 digit keyboard and 8 digit prompting hex display.

The 8085A CPU executes all 8080 programs at 50% faster speed even though the system chip count and power supply requirements are reduced. By replacing the confusing binary front panel with hex keyboard/displays the user gains speed and versatility in programming and debugging. The prompting hex displays reduce the chance of error in reading or entering data and the clear hex console keyboard reduces the chance of conversion error in program entry.

The powerful conversational monitor provides usual I/O functions plus memory protect/unprotect, and two powerful debugging aids. Multi-Step allows you to define the number of instructions to be executed before control is returned to the monitor. The instructions are executed in real-time so that even time-dependent loops can be debugged. Multi-Break is a powerful new extension of the "break-point" concept, the hardware implemented function allows you to define a break-point for any address combination; I/O, data



or instruction. In addition, you can program the number of break-points "hits" before returning to monitor control. Or an I/O port can be monitored for transfer of the 256th byte. Of course, since this function is hardware implemented, ROM as well as RAM can be debugged easily. $399.

Industrial Modules, Inc., P.O. Box 2985, Santa Clara, CA 95051, (408) 984-7698.

CIRCLE 230 ON READER SERVICE CARD

APL/Z80

Vanguard Systems Corporation announces an APL interpreter for Z80 based microcomputers. APL/Z80 offers significant advantages in systems performance and ease of program development. APL/Z80 extends APL to the reim of low cost microcomputers. However, the power of APL/Z80 is comparable to APL on a large time sharing computer for many applications.

APL/Z80 includes dynamic execution of system commands; serial printer support; shared variables an auxiliary processor for I/O ports, which allows

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$49.95

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A set of Functions defined in North Star Basic that handle all disc accessing (Sequential, Random, & Keyed Access) and all CRT display, formatting & Input. A SUPERB APPLICATION PROGRAM DEVELOPMENT PACKAGE.
$49.95

TIMESHARE
Patches to North Star DOS & BASIC that take advantage of the versatility of the Horizon computer to implement an interrupt driven bank-switching time sharing system. Requires additional memory & terminals.
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CIRCLE 177 ON READER SERVICE CARD

complete, control using defined APL functions for any device interfaced to the Z80 I/O port; and an auxiliary processor implementation of a file system featuring a directly indexable file having variable length records.

Hardware required is Z80 CPU, disk drive, either serial ASCII APL console terminal or ASCII keyboard and video display board compatable with the Vector Graphic Flashwriter or Processor Technology VDM 1. $350.

Manufacturers: Vanguard System Corporation will provide a custom APL/Z80 supervisor for your system. Object code and source code licenses are available to certain qualified OEM's. Contact Vanguard Systems Corporation for details. A complete APL/Z80 system is available with dual drive floppy disk system with greater than one-half megabyte storage, keyboard, video display, price is $6495.00.

Vanguard Systems Corporation, 6812 San Pedro, San Antonio, TX 78216. (512) 828-0555.

CIRCLE 231 ON READER SERVICE CARD

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CIRCLE 129 ON READER SERVICE CARD

MICROCOMPUTER SYSTEM FEATURES TV INPUT & DIGITAL TV DISPLAY

Beck Corporation has announced that it has developed a general purpose microcomputer system with special features for digital image processing.

Designated the Beck-1/System, the new product combines a general purpose microcomputer system with a programmable display processor capable of digitizing a TV input signal and displaying a digital TV picture.

Housed in an attractive terminal type enclosure, the unit includes a Z80 CPU, up to 64 kb of CPU Ram and 32 kb of CPU Rom, serial and parallel I/O ports, floppy disc storage including both mini and standard floppy drives, a keyboard and CRT display. A DMA controller, real time clock and floating point arithmetic unit are also available.

The Display Processor contains up to 32 kb of image Ram which can be displayed as characters, graphics, or a digital TV (gray scale) picture. Programmable parameters include character and pixel size and count, character blink, reverse, underline and half intensity. The unit features non-destructive zoom as well as horizontal and vertical panning in all 3 display modes.

Pixel density of the TV input A/D and gray scale display is up to 256 x 240 4 bit (16 levels) pixels. Graphics densities are up to 512 x 480 1 bit pixels. The unit can supply a RS170 compatible signal, interlaced or non-interlaced, or run off camera supplied sync - RS170, RS330, or random interlace.

Software available with the Beck-1/System includes the CP/M operating system, BASIC, and a comprehensive program development package with PASCAL and 3d graphics to be added in the near future.

The Beck-1/System is priced from $2900 for the Beck-1/30A, a basic system with no disc storage, to $6800 for the Beck-1/50C which includes TV in, graphics and digital TV display, 32kb CPU Ram and dual standard floppy discs.

Beck Corp., 303 Slocum Ave., Neptune, NJ 07753.

CIRCLE 232 ON READER SERVICE CARD

For over 100 computer and robot cartoons, get the Colossal Computer Cartoon Book, only $5.70 postpaid from Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960.

NEW WORD PROCESSING SYSTEM

A new system from Vector Graphic, called "MEMORITE 2," incorporates the firm's high-speed Z80-based MZ microcomputer with 630K bytes of disk capacity, their versatile "Mindless Terminal" and the Qume Sprint 5, 55 cps character printer.

For word processing applications, MEMORITE 2, with dual Micropolis floppy disk drives, features advanced text preparation, edit and delete capabilities. It offers automatic letter printing from memory with full formatting techniques such as underlining, indentation, automatic margins and variable line/character spacing. The system also performs mass mailings, allowing letters to be merged with address lists. As an additional feature, its memory is resident on PROM, so users need only type after a "power-up and proceed" function.

As a data processor, MEMORITE 2 is capable of performing standard accounting tasks and custom applications in Business Basic for small firms or departments of large companies. Scientific calculations are also available for technical environments. $8950.

Vector Graphic Inc., 31364 Via Colinas, Westlake Village, CA 91361. (213) 991-2302.

CIRCLE 233 ON READER SERVICE CARD

MEMORY

EPROM MODULE

Data Vector Corporation has announced the Byte Board, a better EPROM module for the S-100 bus. The unit accepts up to sixteen 2708 EPROMs, incorporates a Power-On Jump capability, provides for wait state generation for slow memories, and possesses extreme addressing flexibility.

Each EPROM is individually addressable on any 1K boundary, and may be placed anywhere in the computer's address space, irrespective of where any of the other EPROMs are placed, and unused EPROM locations do not take up memory address space. All user selectable options are silk-screened onto the board, allowing the state of all options, including the address assigned to each EPROM, to be read directly from the board without referring to the manual.

The module is solder masked to minimize solder bridges during assembly, is fully socketed, has two spare IC pads for custom circuitry, and comes with a thorough 20 page owner's manual. $99 assembled, $69 kit - Fully loaded with 16 EPROMs, $243 assembled or $213 in kit form.

Data Vector Corporation, P.O. Box 3141, Burbank, CA 91504.

CIRCLE 234 ON READER SERVICE CARD

64 BYTE DYNAMIC RAM BOARD

Alpha Micro, announces the availability of an S-100 Bus-compatible 64K byte Dynamic RAM memory board. It is completely compatible with the 16-bit Alpha AM-100 CPU.

SupeRam is a high-density random access memory board capable of storing up to 65,536 bytes of data on a single board. Completely S-100 bus compatible, it utilizes 16K dynamic RAMS to achieve maximum bit density, minimum power dissipation, and optimum cost/performance ratio.

Refresh requirements are satisfied on the SupeRam board without support

from the processor, and therefore, are transparent to the user. Exact and reliable internal timings are generated on-board using digital delay line techniques. Memory is addressable as independent 16K blocks.

Alpha Micro, 17881 Skypark North, Irvine, CA 92714. (714) 957-1404.

CIRCLE 235 ON READER SERVICE CARD

NEW MEMORY BOARD

Industrial Micro Systems has announced the Model 370. It is a 32 Kbyte static RAM board that operates on the S-100 bus.

The board's starting address can be selected at 4K boundaries. Memory mapping capability is included so that more than 64 Kbytes of memory can be utilized in a system. Processor Write or Memory Write signals can be selected for writing data into memory, and the Phantom Line capability is included.

The Schraff Group, 1000 Quail, Suite 140, Newport Beach, CA. 92660, (714) 833-3660.

CIRCLE 236 ON READER SERVICE CARD

ITHACA AUDIO APPLE II & SORCERER 16K UP-GRADE KITS

Ithaca Audio expands its line of high density, high quality 16K memory expansion kits with the introduction of two more Simple Up-Grade Kits: the Simple Apple II and the Simple Sorcerer Up-Grade Kits. Each kit is complete, including eight prime tested 16K RAMs, plus the proper preprogrammed jumper shunts or memory units. The attractive package includes anti-static foam to protect all components. Installation is quick and easy with the simple instructions that are included. In addition, all parts are pre-tested and 100% guaranteed for life.

The Simple Up-Grade Kits are available nationwide at Byte Shops, Computerlands and most independent dealers.

Ithaca Audio, Box 91, Ithaca, NY 14850, (607) 257-0190.

CIRCLE 237 ON READER SERVICE CARD

16-64K RAM BOARDS

Processor Technology has introduced four dynamic RAM boards with capacities of 16K, 32K, 48K, and 64K bytes — collectively designated the nKRA RAM boards.

A minimum of components are used to reduce probability of failure. ICs are mounted in sockets so they may be replaced readily to correct any abnormality that appears during factory tests. Refresh is synchronous, so no wait states can slow the microprocessor. Switch-selectable addressing eliminates jumper wires and the need to power down when readdressing blocks of memory.

Worst case access time is 400 nsec. Cycle time is 520 nsec. Power requirements are +8 to +40 VDC at 1 mA maximum, +15 to +19 VDC at 150 maximum and -15 to -19 VDC at 50 mA maximum. No power supplies need be regulated. $429 to $1350.

For the location of newest dealer, dial toll-free Processor Technology's dealer locator hotline 800-227-1241 (In California dial 800-972-5951). For new product literature: Processor Technology Corporation, 7100 Johnson Drive, Pleasanton, California 94566.

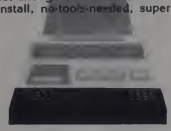
CIRCLE 238 ON READER SERVICE CARD

Skyles Makes It Easier: Be First on Your Block To Own this Terrific PET Trio

The PET computer, the Skyles BIG KeyBoard, and the 8K or 16K MEMORY EXPANSION SYSTEM.

While a lot of people already own — proudly — the Skyles BIG KeyBoard or the Skyles Memory Expansion System, not enough own both. So we're making it easier to own these easy-to-install, no-tools-needed, super-quality peripherals:

Skyles BIG Keyboard shipping and handling	**$125.00*** 5.00
Skyles 8K Memory Expansion System shipping and handling	**$250.00*** 3.50
Complete	**$383.50***



Now: Buy both and pay only $350.00*. Save $33.50.

Save with the 16K Memory Exxpansion System, too. Normally $450.00 plus $5.00 shipping and handling. **Buy both the 16K and the BIG KeyBoard and pay only $525.00* complete. Save $60.00!**

To order: Please enclose your check (plus sales tax for California residents*). Mastercharge or VISA invited. Please indicate your card number and expiration date. **NOTE, OFFER GOOD ONLY 'TIL MAY 30, 1979.**

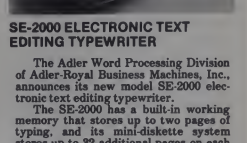
Skyles Electric Works, Inc.

599 N. Mathilda Ave. • Sunnyvale, CA 94086 • (408) 735-7891

*California residents add 6% (6.5% in BART, Santa Clara or Santa Cruz Counties.)

CIRCLE 213 ON READER SERVICE CARD

TERMINALS



SE-2000 ELECTRONIC TEXT EDITING TYPEWRITER

The Adler Word Processing Division of Adler-Royal Business Machines, Inc., announces its new model SE-2000 electronic text editing typewriter.

The SE-2000 has a built-in working memory that stores up to two pages of typing, and its mini-diskette system stores up to 32 additional pages on each individual mini-diskette. Documents stored in the SE-2000's working memory can be automatically printed at a rapid 240 words per minute.

All operations are swiftly and conveniently performed right from the keyboard.

Other convenient features of the Adler SE-2000 are: 47 contoured keys; all typing keys have repeat action capa-

bility; optional attachment for handling pin-feed continuous forms with end of paper sensor; carbon ribbon cartridge; lift off correction ribbon; self-diagnostic system and modular design for prompt and easy servicing; indicator for remaining character capacity in working memory; automatic text linking; and automatic pagination.

No matter what revisions are made to stored text, they can be made simply and rapidly, because only the revisions are typed. This is made possible by the use of a search word and/or locator keys which pinpoint a character, word, line or page. As a further aid to simplify typing of lengthy documents, there's an automatic table of contents for mini-diskettes, and text is automatically paginated, to conform to the number of additions or deletions made.

Adler-Royal Business Machines, Inc., 1600 Route 22, Union, NJ 07083.

CIRCLE 239 ON READER SERVICE CARD

DIABLO CONTROL PROGRAM

Computer Services in Hickory, N.C. announces a new control program for the Diablo Hytype II printer called BI-DIRECT.

The first release is available for the CP/M operating system and allows the user to increase the printing speed as well as easier control of the printer functions.

BI-DIRECT takes the next output to the list device and formats it for bi-directional printing. It offers the user easier control over spacing between the printed characters and between the lines along with changing of the printing color from black to red at any time. Paging control and headers printed at the top of each page are also a part of BI-DIRECT.

Any or all of the functions of BI-DIRECT can be turned on or off under user program control.

BI-DIRECT is shipped on an 8-in. CP/M format diskette. $99.95.

Computer Services, 30 Hwy. 321, NW, P.O. Box 2292, Hickory, NC 28601, (704) 294-1616.

CIRCLE 240 ON READER SERVICE CARD

QYX TYPEWRITER

Qyx employs the latest in microprocessors and Large System Integration (LSI) technology. There are three microprocessors at work in the unit operating in a multiprocessing mode. The Zilog Z-80 Microprocessor functions as the central control of the system. Zilog is another high-technology member of the Exxon Information Systems family.

Both the linear and rotary stepper motors are microprocessor controlled via a feedback system which facilitate precise positioning of the characters on paper. The super capacity ribbon cartridge is stationary. Ribbon is fed through flexible leaders, thus lowering inertia on the carrier and permitting a larger ribbon supply than is typically found on high-speed printers. This ribbon cartridge is also designed for quick and clean replacement.

Other technological innovations facilitate upgrading Qyx with memory, editing and communications capabilities.

Electronic editing is accomplished with a 24-character text display that fits inside the face of the machine. The function is activated by adding a computer card in the control section of the machine. A communications card is also available that permits direct interface with other Qyx typewriters over voice-grade telephone lines.

Qyx, A Division of Exxon Information Systems, P.O. Box 1979, Exton, PA 19341, 800-523-5000.

CIRCLE 241 ON READER SERVICE CARD

VisiCalc™

How did you ever do without it?

CIRCLE 167 ON READER SERVICE CARD

THE PERFECT COMBINATION

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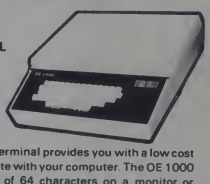
VIDEO 100 MONITOR

The Video 100 is designed to meet your monitor needs for both personal and business use. It is compatible with a wide range of computer systems, and with a bandwidth of 12 MHz it is capable of displaying up to 80 characters per line on this 12" B/W CRT. The solid state circuitry assures a stable & sharp display. The front panel controls include power, contrast, horizontal and vertical holds. Adjustments for height, vertical linearity, and width control are located on a rear panel. All the above features for only $139.00.

OE 1000 VIDEO TERMINAL

$275.00



The OE 1000 Video Terminal provides you with a low cost means to communicate with your computer. The OE 1000 will display 16 lines of 64 characters on a monitor or modified TV. The terminal will generate and display the full 96 ASCII character set (upper and lower case) plus 32 special characters (Greek letters and math symbols). The terminal will also erase to end of line, erase to end of screen, scroll, and it has full X-Y cursor movement. Interfacing to your computer requires a full duplex, serial, RS232 or 20 mA loop I/O port at the rate of 110 or 300 baud. The OE 1000 sells for $350 assembled or $275 in kit form.

Master Charge, Visa, accepted. COD Extra. Add $5 per unit, $10 both units, shipping handling insurance.

The perfect low cost combination of the OE 1000 and Video 100 are available from

OTTO ELECTRONICS

PO BOX 3066, PRINCETON, NJ. 08540 or call (609) 448-9165

CIRCLE 185 ON READER SERVICE CARD

LOW-COST VIDEO TERMINAL

A new black and white, low-cost 12-inch video terminal is now available for home, personal or business computer systems and/or surveillance monitors. The monitor is light weight and features solid state circuitry that results in a sharp, stable picture.

Besides being compatible with many computer systems, here are some of the terminal's other advantages: composite video input, video bandwidth of 12 MHz ± 3dB, 75 ohm input impedance, high resolution. $144.

Micro Products Unlimited, P.O. Box 1525, Arlington, TX 76010, (214) 461-8043.

CIRCLE 242 ON READER SERVICE CARD

For over 100 computer and robot cartoons, get the Colossal Computer Cartoon Book, only $5.70 postpaid from Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960.

30 CPS DAISYWHEEL TERMINAL

Anderson Jacobson, Inc. announces new lower lease and purchase prices for their AJ 830, a 30 cps daisywheel teleprinter terminal.

On a 12 month lease, the AJ 830 is available for $113 per month including maintenance. Quantity discounts and longer term leases are also available at substantially reduced prices.

The AJ 830 features high quality daisywheel print; 10, 15 and 30 cps data throughout; multi-part forms capability; high resolution incremental plotting; and microprocessor control. Options for the AJ 830 are a 45 cps print mechanism; APL keyboard; EBCD/Correspondence codes; paper trays; forms feed tractor; and pin feed platen. New $2995.

Anderson Jacobson, Inc., 521 Charcot Avenue, San Jose, CA 95131, (408) 263-8520.

CIRCLE 243 ON READER SERVICE CARD

PRINTER INTERFACE CARD

Cromemco's new printer interface (PRI) card makes it easy to interface either dot-matrix or daisy-wheel printers to your computer system.

One interface uses the "Centronics parallel" convention and interfaces with Cromemco Model 3779 or 3703 dot-matrix printers. The second interface uses the "daisy-wheel parallel" convention and interfaces with Cromemco Model 3355 daisy-wheel printer.

The second interface has built-in ribbon-lift and ribbon-lowering circuitry to free the software over-head normally required for this function. Each of the two interfaces has an individual cable connection on the top edge of the card. $195. Cables for the PRI interface are

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SSM I/O-4 Kit	$149.95	$128.20
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Thinker Toys Speakeasy I/O Kit	$130.00	$111.15

Subject to available quantities. Prices quoted include cash discount. Shipping and insurance extra

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Phone: (201) 691-1984

HOURS: Monday & Friday: 12 to 6, Tuesday-Thursday: 12 to 9
Saturday: 10 to 5

Call or write for our free catalog & price list

available in two lengths: 62 cm (Model CBL-2) for $15.00 and 110 cm (model CBL-3) for $15.00.

Cromemco, Inc., 280 Bernardo Ave., Mountain View, CA 94043, (415) 964-7400.

CIRCLE 244 ON READER SERVICE CARD

LOW-COST ALPHA NUMERIC PRINTERS

American Micro Products offers two quality, compact, light-weight, 5 x 8 dot matrix printers. Designed for the hobbiest and OEM alike, both the 12 column PL12 at $59.95 and the 20 column PL20 at $99.95 provide quiet economical hard copy output.

A general specification manual, art work for a printed circuit board, parts list, flow chart, and schematics describing the 8-bit parallel interface (Centronics-type) are included with each printer. In addition, the microprocessor control chip and the PCB* are available as options. These key elements of the interface are priced at $99.95 and $29.95* respectively.

American Micro Products, 6550 Tarnef M/S 11, Houston, TX 77074. (713) 777-2673.

CIRCLE 245 ON READER SERVICE CARD

NEW TTL-COMPATIBLE ACOUSTIC COUPLER — AJ 243

Anderson Jacobson, Inc. announces the AJ 243, designed to interface with transistor-to-transistor logic (TTL) teleprinter terminals.

The AJ 243 is compatible with any low speed terminal utilizing a TTL interface. Cables are available for connection to either Teletype's Model 43 or DEC's LA-36 DECwriter. Cables for other terminal models can be supplied by the terminal manufacturer.

The AJ 243 offers full duplex 103/113 compatible operation at speeds up to 450 bps. A new cup design with positive handset lock and direct microphone/handset coupling technique provides maximum ambient noise isolation. $265.

Anderson Jacobson, Inc., 521 Charcot Avenue, San Jose, CA 95131, (408) 263-8520.

CIRCLE 246 ON READER SERVICE CARD

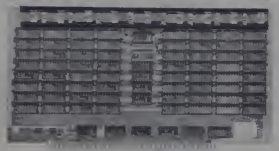
TRS-80 MODULAR PRINTER INTERFACE

American Micro Products has announced a new parallel line printer interface for the Radio Shack TRS-80 computer. The TRS-80 Print Module, measuring 4½" x 2½" x ½", plugs directly into the back of the Radio Shack Computer (keyboard) and eliminates the need for the Expansion Interface when driving such printers as Centronics (P1, 779, & 703), Telpar, and Axium. All line print commands in Level-II BASIC are compatible; and, because the Module draws power from the printer, the TRS-80 remains completely uneffected by the interface. $99.95.

American Micro Products, 6550 Tarnef, M/S 11, Houston, TX 77074, (713) 777-2759.

CIRCLE 247 ON READER SERVICE CARD

Tarbell 32K RAM Memory



★S-100 BUS ★ ★300ns ★ ★STATIC MEMORY ★
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SAME BOARD WITH ONLY 16K INSTALLED . . . . $390.

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CIRCLE 120 ON READER SERVICE CARD

NEW DEDICATED FLOPPY-DISK POWER SUPPLY ADDED TO POWER-ONE LINE

The CP-323, the fifth entry in POWER-ONE's line of linear D.C. dedicated Floppy-Disk power supplies, is now available.

The open frame CP-323 is designed to power two Mini-Floppy type Floppy Disk drives simultaneously. D.C. outputs provided are: +5V 2A with overvoltage protection set at 6.2V + 0.4V, and +12V 4A with overvoltage protection set at 15V + 1.0V.

An inhibit function is also provided to allow the user to sequence the +12V output on and off using a low level TTL signal. 1-9 quantities is $74.95. Size is 7.00" x 4.87" x 2.75".

POWER-ONE, Inc., Power One Drive, Camarillo, CA 93010, (805) 484-2806.

CIRCLE 248 ON READER SERVICE CARD

AUTOMATIC ALL-PURPOSE CASSETTE RECORDER

This voice-activated recorder will automatically record and play back messages received by scanning radios, tone-alert receivers, two-way radio base stations, mobiles, etc... It records telephone conversations and dictation. As a security device, it can be used to automatically record sounds or voices in your home or office when you're away.

Other features include: digital tape counter; "LED" record indicator; positive solid-state motor control with end-of-tape shut off; adjustable schmitt-trigger input circuit with automatic level control; AC/rechargeable battery operation; and a built-in condenser microphone. Audio response characteristics are tailored to produce clean voice recordings on standard cassette tapes.

Optional accessories: TCE-124 Talking Clock for automatic time of day indexing in English, French, German, or Arabic; TR-150 FCC registered telephone coupler; RMC-8 remote microphone; RBC-4 rechargeable battery pack; WFC-101 ruggedized enclosure; and magnetic leader cassettes. $94.00.

Omnicron Electronics, 127 Grove St., P.O. Box 623, Putnam, CT 06260, (203) 928-0377.

CIRCLE 250 ON READER SERVICE CARD

You can use the versatile new BETSI to plug the more than 150 S-100 bus expansion boards directly into your PET*!

On a single PC card, BETSI has both interface circuitry and a 4-slot S-100 motherboard. With BETSI, you can instantly use the better than 150 boards developed for the S-100 bus. For expanding your PET's memory and I/O, BETSI gives you the interface. The single board has both the complete interface circuitry required and a 4-slot S-100 motherboard, plus an 80-pin PET connector. BETSI connects to any S-100 type power supply and plugs directly into the memory expansion connector on the side of your PET's case. And that's it. You need no additional cables, interfaces or backplanes. You don't have to modify your PET in any way, and BETSI doesn't interfere with PET's IEEE or parallel ports. And when you want to move your system BETSI instantly detaches from your PET.

BETSI is compatible with virtually all of the S-100 boards on the market, including memory and I/O boards. BETSI has an on-board controller that allows the use of the high-density low-power "Expandoram" dynamic memory board from S.D. Sales. This means you can expand your PET to its full 32K limit on a single S-100 card! Plus, you won't reduce PET's speed when you use either dynamic or static RAM expansion with BETSI. Additionally, BETSI has four on-board sockets and decoding circuitry for up to 8K of 2716-type PROM expansion (to make use of future PET software available on PROM). BETSI jumpers will address the PROMs anywhere within your PET's ROM area, too.

BETSI is the new Interface/Motherboard from Forethought Products—the makers of KIMSI—which allows users of Commodore's PET Personal Computer to instantly work with the scores of memory and I/O boards developed for the S-100 (Imsai/Altair type) bus. BETSI is available from stock on a single 5½" x 10" printed circuit card*

BETSI is available off-the-shelf from your local dealer or (if they're out) directly from the manufacturer

MAIL ORDERS ARE NORMALLY SHIPPED WITHIN 48 HOURS VISA AND MASTER-CHARGE ORDERS ARE BOTH ACCEPTED.

The BETSI Interface/Motherboard Kit includes all components, a 100-pin connector, and complete assembly and operating instructions for $119.

The Assembled BETSI board has four 100-pin connectors, complete operating instructions and a full 6-month Warranty for just $165.

FORETHOUGHT PRODUCTS
87070 Dukhobar Rd. #P
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Phone (503) 485-8575

Ask about our memory prices, too!

© 1978 Forethought Products

*PET is a Commodore product

CIRCLE 214 ON READER SERVICE CARD

PERIPHERALS

PET INTERFACE CARD

A new interface card for use on Commodore's PET computers as a process controller for medium duty applications, for stepper motor operated devices, has been developed by NANCO. The easy-to-install card makes it possible for a personal sized computer to fulfill a wide range of command tasks.

The two 4-phase stepper logic outputs are provided with eight opto-isolated sense input lines and eight opto-isolated output control lines.

A software driver module is included containing eight commands which facilitate control of two steppers, eight heavy duty relays or triacs, and eight input sense lines. All commands, which include rate select, stepper move, limit switch inputs, relay control, position index and execution command, are passed by the user function in PET basic.

The software module occupies 400 bytes and will run on any 8K, or larger, computer.

Power is supplied from computer transformer to onboard 5V regulator. Board dimensions are 4" x 8", and comes complete with mounting hardware, parallel user port and control cables. Three extra IC positions are provided for custom additions.

Options include: power control unit containing stepper power supplies, heavy duty relays, and I/O termination panel.

Suggested retail price is $199.

NANCO Diversified Design, 8380 Vickers Street, Suite E, San Diego, CA 92111, (714) 565-2635.

CIRCLE 251 ON READER SERVICE CARD

NEW 'SUPERCHIP' FOR APPLE

A "Superchip" has been developed which substantially enhances the text processing capabilities of the popular Apple computer, according to Eclectic Corporation of Dallas which will market the unit.

The ROM firmware chip, which plugs into an Apple computer with no modification required, adds the full ASCII character set, including lower case, plus 31 other useful, non-ASCII characters. It also greatly enhances editing capabilities for program and data modification. The chip is compatible with existing Apple programs the Integer BASIC and Applesoft.

Used in conjunction with a special character edit cassette, also from Eclectic, "Superchip" allows the user to define new characters in a magnified format. With this feature, it is possible to create entire character sets, such as foreign alphabets (Greek, Russian, Arabic), musical notation and game pieces. $124.90.

Eclectic Corporation, 2330 Walnut Hill Lane, Dallas TX 75229. (214) 358-1307.

CIRCLE 252 ON READER SERVICE CARD

COMPUTALKER TRS-80 SPEECH SYNTHESIZER

COMPUTALKER CONSULTANTS announced the new Model CT-1T, a speech synthesizer adapted specifically for the Radio Shack TRS-80 microcomputer.

The Model CT-1T Speech Synthesizer is a completely self-contained unit. The interface circuit board contains an on-board 2 Watt audio amplifier, a S-100 connector for the CT-1 speech synthesizer board, and a Radio Shack compatible edge connector. An interconnect

Introducing—New, Low-cost, Fixed Vocabulary

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† Invented by Forrest Mozer

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CIRCLE 202 ON READER SERVICE CARD

cable (supplied with the Model CT-1T) connects the unit to the TRS-80 bus connector on either keyboard or expansion interface. Standard phono jacks provide connections for external speakers, headphones or external amplifier (not provided).

The Model CT-1T Speech Synthesizer is a high quality voice generator designed to operate with the Radio Shack TRS-80 Microcomputer equipped with Level-II BASIC and a minimum of 16K RAM memory (32K recommended). The synthesizer is controlled by nine acoustic-phonetic parameters transmitted on the microcomputer bus.

The Model CT-1T can be operated in two modes: Direct Parameter Control; and Phonetic, and is supported by a growing library of software. Each unit is shipped with a hardware user manual, basic set of software consisting of CTEDIT Parameter Data Editor. and speech parameter data files HELLO, LETTERS, and DIGITS, and the COMPUTALKER CSR1 Synthesizer-by-Rule Software program. All software is available in choice of 5-1/4 inch diskette or standard cassette. Normally $595 (limited introductory offer: $495).

COMPUTALKER CONSULTANTS, 1730 21st Street, Suite A, Santa Monica, CA 90404 (213) 392-5230.

CIRCLE 253 ON READER SERVICE CARD

ANALOG TO DIGITAL CONVERTER

The AD-68A is an eight channel analog to digital converter which occupies one I/O slot in a SWTPC 6800 type computer. It allows the computer to measure analog signals from 0 to 2.50 volts with a resolution of 10 millivolts. The AD-68A uses single ramp, elapsed time method of conversion with the computer providing control and counting functions through a 30 byte subroutine.

Unused analog inputs may be used to sense logic signals and switch closures. Regulated +5 volts and +/-12 volts are available at the input connectors to provide power for external circuits.

The AD-68A is currently being used in a variety of applications both in and outside of the home (especially in the university and industrial laboratory environment).

The AD-68A comes with complete documentation including the driver subroutine, BASIC program example, and schematic. $39.95 assembled and tested.

Innovative Technology, 510 Oxford Park, Garland TX 75043, 214-270-8393.

CIRCLE 254 ON READER SERVICE CARD

VIDEO BOARD FEATURES HIGH DENSITY AND REVERSE VIDEO

A higher density version of their popular Flashwriter Video Board, featuring optionally-controlled reverse video, is the latest product line entry by Vector Graphic Inc.

Displaying 80 characters x 24 lines, the new FLASHWRITER II uses an 8 x 10 dot matrix to produce crisp, sharp resolution for 1920 character positions in a 2048 byte memory block.

In addition to normal video, reverse video is optionally controlled by the higher order bit of the character code. As many as 256 characters can be generated by 2708/2716 EPROMS which may be user-programmed for special symbols or graphic displays.

The FLASHWRITER II allows extremely rapid updating of the screen via memory-mapped I/O. Special circuitry prevents flashes on the screen when updating memory and a keyboard port with latched data provides easy interface to Vector Graphic's Mindless Terminal or other parallel keyboards. $320.

Vector Graphic Inc., 31364 Via Colinas, Westlake Village, CA 91361, (213) 991-2302.

CIRCLE 255 ON READER SERVICE CARD

NOISE IMMUNE STEPPER CONTROLLER

An inherently noise immune, optically isolated, track mounting translator module for exact stepping motor control through interface to a microprocessor has been introduced by Duane Elms Associates, Inc., Highland Hts., OH.

Designed for direct connection to a wide range of microprocessor systems, the MPSD-10 operates on the basis of input channel state transitions instead of the traditional pulse train.

The design of the MPSD-10 permits full step operation using only two logic signals and half step operation using only four logic signals. A special circuit prevents adjacent channels from being energized simultaneously, thereby preventing power supply overloads.

NOW, FROM MOUNTAIN HARDWARE.
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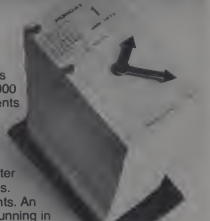
A real time clock could double the utility of your computer. Time events in 100μS increments for up to 100,000 days (over 273 years). Program events for the same period with real time interrupts that permit pre-programmed activities to take place...without derailing on-going programs. Maintain a log of computer usage. Call up lists or appointments. Time and date printouts. Time events. An on-board battery keeps the clock running in the event of power outage.



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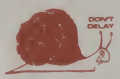

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579CC

Each channel of the module can be easily driven from a single, ordinary gate of any common logic family.

With four phase drive outputs, rated at 10 amps per phase, the controller features the flexibility of using a wide range of off-the-shelf power supplies from 12V to 60V.

Duane Elms Associates, Inc., 341 Alpha Park, Highland Hts., OH 44143, (216) 473-1887.

CIRCLE 256 ON READER SERVICE CARD

CARD READER

A mark sense card reader specifically designed for the microprocessor computer market has been announced by Chatsworth Data Corporation. The reader, designated the MR-500, is a hand-fed reader that measures 4½ inches in all directions and weighs less than five pounds. All power required by the reader is derived from a U.L. approved AC to DC converter. The MR-500 accepts cards of variable length marked with a standard number two pencil. The card data is converted to either ASCII or card image.

Special interfaces have been developed to allow the reader to be connected directly to the TRS-80, Apple II, and PET computers. $750.

Chatsworth Data Corp., 20710 Lassen St., Chatsworth, CA 91311, (213) 341-9200.

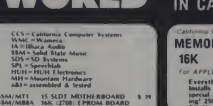
CIRCLE 257 ON READER SERVICE CARD

APPLE CLOCK

Mountain Hardware announces the introduction of a Real-Time Calendar/Clock for Apple II computers.

The Apple Clock keeps time and date in lms increments continuously for over one year. Calendar, clock, and event timer functions are easily accessed from BASIC using routines carried in on-board ROM.

It's crystal controlled and has an on-board rechargeable battery to keep the Clock running during computer down times. Software for calendar and clock routines, as well as an event timer are contained in on-board ROM. An interrupt feature is provided which can be programmed to make efficient use of computer time.



Add the Apple Clock to Mountain Hardware's Introl Remote Control System for real-time control and monitoring of remote devices over regular AC wiring. $199.

Mountain Hardware, Inc., 300 Harvey West Boulevard, Santa Cruz, CA 95060, (408) 429-8600.

CIRCLE 258 ON READER SERVICE CARD

VENDOR LITERATURE

NEW COMPONENTS CATALOG

Electronic components, test equipment, hardware and tools are listed with prices in a newly released, 104 page catalog.

The catalog, published by Mouser Electronics, contains over 10,000 items including expanded lines of capacitors, resistors, trimmer potentiometers, semiconductors, switches, transformers and test equipment. All of the products are very competitively priced.

For more information write or call for a free electronic components catalog as follows:

Catalog, Mouser Electronics, 11511 Woodside Ave., Lakeside, CA 92040, (714) 449-2229.

CIRCLE 259 ON READER SERVICE CARD

HOBBY WORLD

CALL TOLL FREE: (800) 423-5387
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S-100 COMPUTER BOARDS

CCS = Caiolornia Computer Systems
VMC = Vromco
IA = Illinois Audio
SBM = Solid State Music
SDS = SD Systems
MH = Mountain
HUH = HUH Electronics
MH = Mountain Hardware
ab1 = assembled & tested

1601	CCS/M-AV1	16K STATIC RAM MODULE KIT	$275
1602		as above, ab1	
1603		as above, bareboard	
1500	HUH/S-100	MPA kit	
1501	MH	PROPROM, 8K EPROM BOARD	$214
1504		6614 EPROMS for above	$ 18
1505	MH	100,000 DAY CLOCK, ab1	$219
1506	MH	INTROL, 64 chan remote control	$129
1507	WMC/QM1	12 SLOT MOTHERBOARD	$ 79
1508		as above, with connectors	$ 89
1509	WMC/ME M1	8K STATIC RAM BOARD less parts, wth. for above	$ 89
1510			$ 89
1601	SSM/CB1	8080A CPU BOARD KIT	$234
1408	SSM/SB1	MUSIC SYNTHE SIZE R KIT	$ 345
1411	SSM/MX4	2 PARALLEL + 2 SERIAL I/O BOARD KIT	$139
1414	SSM/IO2	TO UNIVERSAL BOARD KIT	$ 48
1417	SSM/VB1B	VIDEO INTERFACE KIT	$129
1425	SSM/MB1	2/4K EPROM BOARD KIT	$ 54
1426	SSM/MB4	2 MHZ STATIC RAM for ALTAIR IMSAI EXTENDER BOARD	$ 89
1427	SSM	connector for above	$ 48
1428		VECTOR 2/4KP & PROTO-TYPING CARD KIT	$ 4
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1436	SBM/MB9	8K STATIC PROM/RAM BOARD KIT	$ 64
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1512	IA	ZBR CPU BARE BOARD	$ 52
1513	IA	8K STATIC RAM BARE-BOARD	$ 28
1514	IA	8K WIRE WRAP BOARD	$ 28
1600	CCS	5.1M WIRE WRAP BOARD	$ 28
1516	SDS	VERSAFLOPPY KIT	$459
1517	SDS	EXPANDIRAM KIT	$185
1517-16		as above, with 16K RAM	$249
1517-12		as above, with 12K RAM	$150
1517-48		as above, with 48K RAM	$425
1517-64		as above, with 64K RAM	$580
1518	NEWTECH	MUSIC BOARD ab1	$189
1519	SD	64 WORD SPEECHLAB ab1	$299
1520	SPL	64 WORD SPEECHLAB ab1	$299
1222	uSOUNDER	SOUND EFFECTS BOARD ab1	$149

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Everything you need! Installs in minutes, no special tools, no soldering! 250 nsec
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LM1458N	2 for .70
LM1889N	2 for $2.00

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Highest quality, leader (ess). With protective plastic case
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TRS-80 LEVEL III BASIC $42
As advertised on March Interface Loads on top of level II, turns your TRS-80 into a powerful system! Solves loading problems; cures keyboard quirks; 2 new graphic sets; has the power of a hardware modification! Guaranteed satisfaction!
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Navigational computer for boats or marine use! Features auto-pilot control, fuel management, trip computer timer/counter. Warns low fuel! Compensates for tide sure converts to metric 64 functions programmable. Easy to read jumbo blue digits With installation instructions.
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19355 BUSINESS CTR DR.-6C5 NORTHRIDGE, CA 91324

SOFTWARE

DATA MANAGEMENT SYSTEM FOR MICROCOMPUTERS

A data management software package for Z-80 based microcomputers, featuring a report generating and file definition capability, has been introduced by Vector Graphic Inc.

The CCA DATA MANAGEMENT SYSTEM operates in four phases: file definition, data input and maintenance, sorting and report generation. It includes a versatile data file utilization program accommodating over 1,000 records per file. In the maintenance phase, records may be added, deleted, updated or inspected. Records can also be searched for a specific item of data.

For report generation the package allows specification of fields to be subtotalled or totalled, and permits selection of numeric field format, paper size and printing format. It produces mailing labels as well as documents, while the powerful sort package provides up to ten nested sorting levels.

CCA DMS runs under the MDOS operating system and Micropolis BASIC. A comprehensive user guide is also supplied. $150.

Vector Graphic Inc., 31364 Via Colinas, Westlake Village, CA 91361, (213) 991-2302.

CIRCLE 265 ON READER SERVICE CARD

CONDUIT SIMULATIONS

CONDUIT, a source of peer reviewed and technically verified computer-based instructional materials, has announced the availability of eleven packages for the Commodore PET 2001 microcomputer. These packages are primarily simulations that cover basic concepts in biology, chemistry and physics. The units are supplementary to regular classroom instruction and are intended to broaden the user's experience. Printed guides for students and instructors complement the computer programs in each package.

For more information about CONDUIT and how to order the available instructional units, write for a free copy of the CONDUIT magazine, Pipeline, to: CONDUIT, Creative Computing Offer, P.O. Box 388, Iowa City, IA 52240. (319) 353-5789.

CIRCLE 266 ON READER SERVICE CARD

6800 DEVELOPMENT SYSTEM

WINTEK's new DEVELOPMENT PAC II includes 48K RAM and an EROM programmer for $1895. Also included is a RS-232 serial I/O port with switch selectable baud rates, 300 baud and 2400 baud cassette interfaces, an editor/assembler, and industrial BASIC, and all other items required to configure a 48K development system. WINTEK Corp., 902 N. 9th Street, Lafayette, IN 47904; (317) 742-6802.

CIRCLE 267 ON READER SERVICE CARD

DETAILED SOFTWARE PROGRAMS

Graham-Dorian Software Systems has developed four complete software program packages for payroll, inventory, cash register, and apartment management.

All programs are compatible with any Z-80 or 8080 CP/M system, and can be ordered in standard eight-inch disk, either double or single density, or mini-floppy disk.

Each program package contains a disk with CBASIC-2 compiler, CBASIC-2 run command, the Graham-Dorian software program in INT and BAS file form, plus a user's manual and hard copy source listing.

The four programs sell for $695.00 each. One CBASIC-2 is free with a program order; others cost $89.95 each.

All packages are described in detail in a literature packet available free from Graham-Dorian Software Systems, 211 N. Broadway, Wichita, KS 67202, (316) 265-8633.

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16K of 200 ns NEC MEMORY for TRS-80 KEYBOARD **$95**

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CIRCLE 103 ON READER SERVICE CARD

FREE GAMES FOR HOSPITALS

The PET GAZETTE (1929 Northport Dr., Room 6, Madison, WI 53704) would like to help you help others. Do you realize that you and your PET computer could cheer up lonely hospitalized children? To make it very easy for you to get started with this project, the PET GAZETTE is offering a package of 6 games absolutely FREE if requested by your city hospital's Volunteer Services Director on their letterhead. These games were chosen carefully so that children of all ages could enjoy them. Since the Master tape will be available at the hospital, you or any other PET owners will have easy access to these exciting games.

Play BLACKJACK with the PET. Cards are graphically displayed of course. SNAKE is one of the most popular games. Challenge a friend, play against the PET, or watch the PET play against itself with this real time version of Blockade. Younger children will enjoy STARS, a number guessing game, and TOMMY TERMITE. If you have a speaker/amplifier connected to your PET's user port pins M & N you can take advantage of the excellent sound effects in CHASE and HANGMAN. Children (and adults) of all ages love this real time robot chase game. Besides being fun, HANGMAN is educational.

Request CHILDREN/HOSPITAL GAMES. The PET GAZETTE is looking for other worthy projects for PET users. Please send your ideas attention Len Lindsay.

Microcomputer Resource Center, Inc., 1929 Northport Dr., Room 6, Madison, WI 53704.

CIRCLE 269 ON READER SERVICE CARD

BUSINESS SOFTWARE

UNIVAIR INC. is proud to announce the availability of a new line of 21 fully integrated and auto-chaining business software packages.

Some of the major programs include General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory, Dental Management System, Medical Management System, Real Estate Multi-List, Insurance Agency, Credit Union, Data Base Management, Word Processing, and many others. All programs run under C/PM or IMDOS with Commercial Basic and 31K of RAM total.

A unique system of automatic chaining, posting, and file backups and updates are incorporated which allow a secretary with no previous experience to use the system.

Cost of each program on 8" IBM Disk is $395, and complete source code and operators manuals are provided. Programs are also available on 5" North Star or 5" Micropolis Disks.

Univair Inc., 10327 Lambert Intl. Airport, St. Louis, MO 63145, (314) 426-1099.

CIRCLE 270 ON READER SERVICE CARD

SPEAKEASY SOFTWARE

Speakeasy Software announces the availability of its consumer-oriented software for the PET and the TRS-80, in addition to its best-selling APPLE versions. The titles fall into two categories: The Continuing Education Series, which includes Financial Analysis and Transactional Analysis; and, the Home Entertainment Series, with the popular WARLORDS, BULLS AND BEARS, SPORTSTRIVIA, MICROTRIVIA and KIDSTUFF. These professionally-packaged products are sold exclusively through computer stores and are available from the leading distributors of microcomputer products worldwide.

Speakeasy Software Ltd., Box 1220, Kemptville, Ontario, Canada K0G 1J0 1-613-158-2451.

CIRCLE 271 ON READER SERVICE CARD

SMITHWARE FOR YOUR PET

SMITHWARE Division of Smith Business Services, has released their Personal Accounting System (PAS) which relies heavily on the PET's cassette data file capabilities to generate and validate files containing a detailed description of your financial transactions. Designed specifically to use your check register as the data source, PAS consists of six programs including those to generate and edit data files, balance your checkbook, reconcile your bank statement, report your outstanding checks, and summarize your transactions over a period of time. PAS creates three cassette files—monthly transactions, outstanding checks and summary. $16.

Smith Business Services, P.O. Box 1125, Reseda CA 91335.

CIRCLE 272 ON READER SERVICE CARD

TRS-80 PERIPHERALS & SUPPLIES

DISK DRIVES $399.00

Fully compatible with Radio Shack drives. **Includes:** ■Power supply ■ case (specify silver or blue) ■4 drive connector cable ■ verbatim diskette with test program and user op. system ■ 60 day warranty ■ complete user instructions.

16K RAM SETS $106.00

200NS 16K Dynamic RAM Memory Kit. NEC chips. Includes jumpers and instructions for installing in TRS-80 keyboard unit or expansion interface. (Specify keyboard or interface.)

VERBATIM DISKETTES $3.30 eg. 10 FOR $30.00

These are the top of the line in diskettes and worth every cent of the $6.00 each that you pay elsewhere.

CENTRONICS-779 LINE PRINTER $1200.00

With forms tractor. This is the same printer that Radio Shack supplies. A 399.00 savings if you buy from us.

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All set to run on your TRS-80 at twice the speed of the 779.

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CIRCLE 190 ON READER SERVICE CARD

REAL ESTATE INVESTMENT PROGRAM

An investment analysis program well suited to real estate investments is available for use in the Commodore PET personal microcomputer. It can be used by investors, business men, real estate salesmen, educators, and students to assist in understanding and making sound investment decisions. The program makes this possible by analyzing the effects of financing, taxation, depreciation, inflation, and other parameters. It models an investment by computing quantities projected into future years while considering the effects of taxes and inflation. Information is conveniently displayed on the PET to permit the effects of changes of individual inputs to be evaluated interactively and aid in optimizing investment yield.

The program accepts initial inputs using a question and answer protocol. When all answers for the investment that is tailored to the tax situation of the investor have been computed and displayed, it then presents inputs again for possible changes using a menu type protocol.

Titled REAL-I and written in BASIC, the program comes complete with software on cassette and an operating manual. $29.

Applications Research Co., 13460 Robleda Rd., Los Altos Hills, CA 94022.

CIRCLE 260 ON READER SERVICE CARD

ACT-I SOFTWARE HOME MONEY MANAGEMENT SYSTEM

The Programming Shop, a computer software house, is happy to announce the personal computer software that will make money management easier in the home.

The system saves time and gives budget control to the user. All past money transactions for the current year are stored on a personal data base. Weekly, monthly and annual balances are displayed on a video screen for income, payments, taxes, and interest.

The ACT-I Software takes the work and worry out of keeping track of your money flow. Accurate projections tell the user when he can spend wisely and avoid spending when the budget is already committed to its limit. The ACT-I Software tells you where you are spending your money and keeps track of your deposits as well as withdrawals from your savings account. The current system is now available to Radio Shack TRS-80 users; 16K, Level-II.

The system documentation includes a glossary, system overview, detailed operating instructions for the first time computer user, and information for the tinkerer who likes to go into the code and put in his own personal touch. $79.90.

The Programming Shop, P.O. Box 11219, Palo Alto, CA 94306, (415) 321-9621.

CIRCLE 261 ON READER SERVICE CARD

SOURCE LISTINGS FOR DISK BASIC ETC INTERPRETER

Binary Systems Corporation announced that the company is offering the complete source listing of Disk BASIC Etc., a BASIC language interpreter.

Purchasers of Disk BASIC Etc also receive a 48-page language manual, and a 50-page instruction manual for modifying or adding routines.

Wilson said the 6000-line source listing, together with the two manuals, give owners of Z-80 and 8080-based machines the tools to equip their system with a comprehensive BASIC interpreter that may include user-defined command and I/O routines.

He said a user can add as many as five custom commands without reassembling the program.

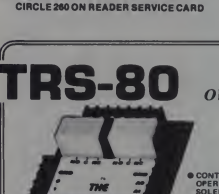
Disk BASIC Etc is a general purpose BASIC suitable for both business and scientific applications. The interpreter was written by the co-authors of the original Tiny BASIC, and BASIC Etc, the predecessors of Disk BASIC Etc.

Disk BASIC Etc provides integer functions such as ASC(II), POS(ition), SEARCH, and USR; and, a full complement of floating-point math functions, such as ATAN, FLT, SIN and VAL. $100.

Micro Store, 634 S. Central Expressway, Richardson, TX 75080.

CIRCLE 262 ON READER SERVICE CARD

TRS-80 OWNERS



- CONTROL APPLIANCES, OPERATE MOTORS, SOLENOIDS, DRIVE LED'S, SOUNDING DEVICES.
- SENSE SWITCH CLOSURE, PHOTOSENSORS AND LOGIC LEVELS.
- APPLICATIONS INCLUDE: TELEPHONE DIALER, REMOTE CONTROL, EXTERNAL KEYBOARDS, ALARM, DIGITAL LOCK AND MORE.

CONNECTS DIRECTLY INTO KEYBOARD OR INTERFACE

The 'Interfacer 2' plugs into the rear of your TRS-80 keyboard or expansion interface. Level II Basic statements (INP & OUT) control 8 inputs and 8 outputs. Two outputs are SPDT relays, more relays can be added. The inputs will accept contact closure or TTL logic. Detailed instructions show you how to connect to a variety of devices. Programs, diagrams and explanations are included so you can start using the 'Interfacer 2' immediately.

The 'Interfacer 2' comes completely assembled, tested and ready to use with power supply, connector cable and User's Manual. Level II Basic is required.

ORDERING INFORMATION
Price $85.00--Please add $3.00 for shipping and handling. N.Y. residents add 8% sales tax. Dealer inquiries invited.

ALPHA product company
85-71, 79th ST., WOODHAVEN, N.Y. 11421 (212) 296-5916

CIRCLE 105 ON READER SERVICE CARD

STARFLEET ORION

A specially designed SF TACTICAL BATTLE GAME for your PET, TRS-80 or APPLE Computer.

The man called Sudden Smith watched the five blips on his screen spread out to meet the enemy. Two freighters converted into something like battlewagons, powerful but slow, and three real cruisers: the most powerful group of warships ever seen near the Promethean system -- except for the Stellar Union fleet opposing them. Everyone was calling it Starfleet Orion, though it existed for only this day. It was life or death, and, after the object lesson on the planet Spring, everyone knew it.

STARFLEET ORION is a complete game system

- rule book
- battle manual
- cassette
- ship control sheets
- program listings

Includes 2 programs, 22 space ship types, and 12 playtested scenarios. Game mechanics are extremely simple, but play is exciting, challenging, and rich in detail. Specify PET (8K) or TRS-80 (level II, 16 K) ($16.95) - or APPLE II, 24K version ($19.95 including color and sound).

Ask your local dealer or send your check to:

Automated Simulations
Department R
P.O. Box 4232
Mountain View, CA. 94040

California residents please add 6% sales tax

CIRCLE 209 ON READER SERVICE CARD

TSC BASIC FOR THE 6800

Technical Systems Consultants, Inc. announced the availability of the TSC BASIC for the 6800. The program resides in 9.5K of memory and is currently the fastest floating point BASIC interpreter available for any 8 bit micro. All of the standard BASIC statements and functions are supported as well as many extended capabilities. Both floating point and string variables are provided with strings being fully dynamic or unrestricted in size. Variable names may be either the standard types or double letter combinations allowing limited variable name mnemonics.

Other features include single and double dimensioned arrays. Array references support subscripts of 0 unlike several other 6800 BASIC's available. Array size, loop nesting, subroutine nesting and string length are only limited by the amount of user memory available in the machine. A tremendous enhancement is provided by the 'IF.. THEN..ELSE' construct. The 'ELSE' clause promotes a more structured type programming style, thus improving readability and conciseness of the program. The input buffer allows lines as long as 127 characters to be entered to take advantage of the complex statement structures permitted with this statement. Other features include the HEX function which allows hexadecimal number representation while PI provides an easy reference to this often used constant. The floating point arithmetic done by BASIC is performed to seven digits accuracy internally, with all answers printed to six. The dynamic range of the numbers is in the range of 10 raised to the plus or minus 37th power.

Overall, TSC BASIC is a fast and powerful BASIC. It is easily adapted to run in any 6800 system having at least 12K of user RAM available from location 0000. A system with 16K or more of memory is recommended for serious applications. The BASIC is available on Kansas City Standard cassette along with a complete user's manual for $39.95.

Technical Systems Consultants, Inc., Box 2574, West Lafayette, IN 47906, (317) 463-2502.

CIRCLE 263 ON READER SERVICE CARD

INVENTORY CONTROL SYSTEM

Taranto and Associates has available an inventory control system for the TRS-80. The Inventory Control System (ICS) comes in two versions. The first version maintains an inventory of rolls of carpet. The second version maintains an inventory which may consist of up to twenty sizes for each unique color and/or style.

The system makes use of a random processing method whereby each item in the inventory is immediately accessible. The main feature of the system is that accessibility is based upon an alphabetical style and color and is not dependent on the use of numeric item designations.

The file capacity with two mini-disks, 32K RAM; 492 items; with three mini-disks, 48K RAM; 991 items. Version I has 32K units per item and version II has 32K units per size, 20 sizes per item.

The functions of ICS include the maintenance of an inventory of various kinds of merchandise, with the additions of items to the inventory, the posting of changes in quantity for sales for additions to stock, and the removal of items from the inventory.

An inquiry can be made into the status of any item in the inventory. An inventory report listing the status of the item in the inventory can be made at any time.

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MULTI-USER BASIC

Cromemco's new Multi-User Software can permit up to seven users to independently run BASIC programs. The introduction of the Multi-User capability for Cromemco Microcomputers provides an efficient, low-cost alternative to traditional time-sharing systems.

The operating system which controls the computer is similar to Cromemco CDOS. When a user logs on, the operating system finds an empty bank of

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memory and then puts the user into the Active Queue.

Console input and output are serviced by means of interrupts. When a user pushes a key on the keyboard, the current progress in execution in interrupted long enough for the operating system to get the user's character and put it into his console buffer. Console output is handled in a similar manner.

Another function of the operating system is to coordinate requests for input and output from the disks. When a user makes a request, it is placed into the Disk I/O Queue and the user is blocked until the request has been serviced. The requests in the Disk Queue are ordered by disk and track. This minimizes the motion of the disk heads required to service the users. The use of high performance floppy disk drives, which incorporate voice coil techniques, also permits extremely fast seeks.

The BASIC includes some important new features, such as: deadlock prevention and mutual exclusion features; an in-line BASIC text editor; long variable, label, and subroutine names of up to 31 characters; a PROTECT statement which can be used to insure that a file cannot be read, written, or erased; IF...THEN DO...ELSE...ENDDO; COMMON for linking BASIC programs; LVAR which lists the variables, functions, and label names of the program together with their current values; and NOLIST and DELREM which can be used to protect proprietary SAVEd programs.

Multi-User BASIC is supplied as software only or as a combination hardware/software package to upgrade a Cromemco System Two or System Three to a two-user system.

The package includes three 16KZ-W memory cards with Bank Select, one TRT-W interface, TU-ART cable, priority interrupt cable, software on diskette and documentation. The hardware/software package with 5" diskette (Model MUB-S) or 8" diskette (Model MUB-L) is available for $2895. The Multi-User BASIC software alone is available on 5" diskette (Model FDB-S) or 8" diskette (Model FDM-L) for $800.

Cromemco, Inc., 280 Bernardo Ave., Mountain View, CA 94043, (415) 964-7400.

CIRCLE 285 ON READER SERVICE CARD

WORD PROCESSING PACKAGE

A word processing software system, designed exclusively for the Vector MZ small business microcomputer, has been developed by Vector Graphic Inc.

The Word Management System (WMS) runs on the company's MZ with internal 32K or 48K RAM memory boards, an appropriately modified 64 x 16 Flashwriter board and two special PROMS on a 12K PROM/RAM board. The configuration requires a video terminal and high-speed, bi-directional typewriter-quality printer as well.

System software incorporates sophisticated automated typing and editing capabilities including preparation of all printed documents. It also features video display and instant memorization of text to facilitate interactive operation.

WMS allows modification without retyping, storage on magnetic diskette and immediate retrieval to enter changes. Text drafts may be printed at any time and users can then modify and reprint in any quantity. The system is also designed to use non-technical vocabulary. $450.

Vector Graphic Inc., 31364 Via Colinas, Westlake Village, CA 91361, (213) 991-2302.

CIRCLE 206 ON READER SERVICE CARD

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EXPAND your CP/M system to be compatible with most of Cromemco CDOS version 00.02 with the addition of new system calls not available under CP/M version 1.4. For Cromemco users, allows running of Cromemco software (Assembler, FORTRAN, Word Processing, DBMS, etc.) under CP/M. Together with our CBIOS for the 4FDC controller, ($50 on 5 or 8" disk) you can run a fully compatible expanded CP/M. Supplied on 5 or 8 inch disk with manual for $95. Specify system configuration and memory size when ordering. VISA and MC accepted for slight surcharge.

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CBASIC 2

Version 2 of CBASIC has been announced by Software Systems, P.O. Box 145, Sierra Madre, CA 91024. CBASIC is a comprehensive commercially oriented compiler/interpreter designed for use with the CP/M operating system.

CBASIC-2 improves on the original version by adding INTEGER VARIables, chaining with common variables, multiple line functions, and a Cross Reference Lister for program variables. Intermediate files are smaller and execution is faster.

CBASIC provides application programmers with a tool for developing large systems. Its emphasis on modular design, maintainability, expanded control structures and source code security.

CIRCLE 268 ON READER SERVICE CARD

ESCROW BUSINESS ADMINISTRATION SYSTEMS

AIC announced today the release of a new Escrow Business Administration (EBA) System designed to significantly reduce the administrative costs and problems which exist in many California escrow and real estate offices.

This new system will greatly speed up the processing of escrow transactions, simplify the closing process, and provide better overall control of an escrow office's dollars and documents. The same system can also eliminate the need for separate and costly word processing machines.

Designed specifically to overcome the limitations and drawbacks of the computerized escrow processing services previously provided by some commercial banks, the EBA provides much faster closing times and with a greatly reduced error rate.

The EBA System consists of a microcomputer mounted in an attractive desk, a television-like video display terminal, a high-speed printer, and a package of computer programs which took ten months to develop. The memory of this system is provided by economical "floppy diskettes", each of which can hold hundreds of checks, receipts, and other records. The video terminal allows viewing and correction of escrow information at speeds up to 960 characters per second (cps). One of the two standard printers provides typewriter-quality reports and letter-perfect documents at 55 cps. A 120 cps matrix printer is also available.

The EBA recently completed months of field testing in a major Los Angeles escrow office and is now in production use. Multiple input terminals have been added at that location to accomodate several operators at one time.

The EBA can be either purchased or leased. The lease costs of the four EBA models range as low as $2.36 to $2.87 per hour on a 40 hour work week basis.

AIC is a Fountain Valley computer systems company. It also produces a wide variety of related business systems, such as General Ledger, which operate on the same equipment. The corporation is developing a major property and rental management system which will be available in ninety days.

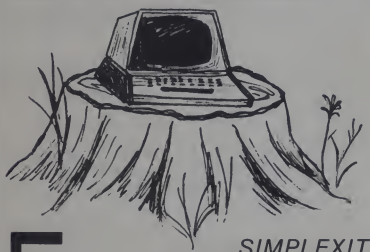
Adventures In Computing, Inc., 8756 Warner Avenue, Fountain Valley, CA 92708.

CIRCLE 269 ON READER SERVICE CARD

ROM SOFTWARE LIBRARY ENHANCES PROGRAMMING CAPABILITIES

Apple Computer, Inc., has announced the Programmer's Aid #1, first of a series of software packages designed to improve and amplify user BASIC programming techniques.

The Programmer's Aid Package is a ROM (read only memory) based library of routines whose capabilities include high resolution graphics, program renumbering and linking, tape verification, tone generation, RAM testing and machine language program relocation.



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Built-in high-resolution graphics programs allow a user to draw from any one of 53,000 locations on the screen, thereby providing capabilities for creating detailed graphs, smooth curves and other fineline figures. These pinpoint locations can appear in one of four colors: black, white, green or violet.

A dynamic RAM tester simplifies memory expansion by testing the new memory devices and precisely identifying any defective units.

Using a note table stored in memory, the Appleodeon synthesizes musical tones in five timbres spanning four octaves. This routine converts the Apple II into a unique, programmable musical instrument.

The RENUMBER routine relieves the user from the time and trouble involved in line renumbering. It changes line numbers for all or part of a program, starting at any point and using any user specified line number increment.

Program linking is another task that can be troublesome for the user. The Programmer's Aid package features an APPEND routine which loads a new program into memory along with whatever program is currently there.

A VERIFY routine may be used to assure the user that the program has been properly saved on tape before the existing version is erased from memory. $50.

Apple Computer, Inc., 10260 Bandley Dr., Cupertino, CA 95014.

CIRCLE 270 ON READER SERVICE CARD

BRITAIN BREAKS PET SOFTWARE PRICE BARRIER

Storekeepers and operators of small businesses throughout the USA will soon be able to benefit from an extensive range of off-the-shelf software developed for the Commodore Pet personal computer in Britain by Petsoft.

The Company, now the largest micro software house in Europe, has a current catalogue of more than 150 tried and tested programs selling in the UK from $6 to $100. All the programs are held on standard C12 cassettes and are available off-the-shelf. A specialist software house, Petsoft is a subsidiary of Britain's leading independent computer bureau group, Applied Computer Techniques Limited.

Among the Petsoft routines accounts; forecast; sales analysis 3; and percentage costing.

Applied Computer Techniques Limited, Petsoft Division, 5/6 Vicarage Road, Edgbaston, Birmingham B15 3ES, 021-454-5348.

A PRACTICE AND TUTORIAL PROGRAM FOR WINNING BLACKJACK

Discovery Bay Software Co. has developed a practice and tutorial program for winning casino blackjack. WIN21, written in BASIC for Radio Shack's TRS-80 (16K Level-II), drills the user in any of four different strategies from Edward O. Thorp's bestseller, Beat the Dealer. It does this by simulating actual casino play and coaching the user at every decision point from betting to insuring, pair splitting, doubling down, and drawing.

The user is given a wide range of options regarding rules variations and the level of coaching received. By answering a series of questions flashed on the screen, the program can be configured to play by itself, give instructions, correct mistakes, or ignore them entirely. It also keeps a running score to indicate the user's mastery of the strategy being practiced. $29.

WIN21 is available on cassette and comes with a copy of Beat the Dealer and a user's manual tying the program to the book through a series of lessons.

Discovery Bay Software Co., P.O. Box 464, Port Townsend, WA 98368.

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TUTORIAL LANGUAGE FOR APPLE

VILLANOVA COLLEGE, a high school in Brisbane, Australia, announces the availability of a new, special purpose language for the APPLE-II. The language, called PETAL, enables a teacher to write simple tutorial lessons much more easily that he could in a general purpose language like BASIC or PASCAL.

Keywords in the language include QUESTION, ANSWER, MATCH and EXPLANATION. Commands include LIST, RUN, LOAD and SAVE. The package includes a unique screen-editor and is available only through dealers who are invited to send $10 for an information package which includes a demonstration diskette.

LEARNING AIDS

BASIC PROGRAMMING COURSE

A new BASIC language programming course, consisting of 12 cassette tapes coordinated with 12 printed texts, is available from Williamsville Publishing Company.

The tape and text course is intended for the microcomputer hobbyist, the small business computer user and students enrolled in courses that require proficient use of the language. The author has over 18 years of teaching experience and he incorporates good teaching techniques in the presentation.

This BASIC tape 'n text course is divided into three modules: **Programming in BASIC, Intermediate BASIC,** and **Advanced BASIC** - each consists of 4 cassette tapes with 4 printed texts. In the first four-part module it is assumed that the learner has no previous programming experience. Topics include commonly used BASIC language instructions and commands. Sample programs illustrate the use of each type of instruction. The second four-part module, **Intermediate BASIC,** includes material on TAB and PRINT USING output instructions, structured programming concepts, subscript notation, list processing, and user-defined functions. The third module, **Advanced BASIC,** covers subroutines, matrices, and file processing. Sample program listings and corresponding outputs are included in the printed texts.

All three modules constitute the BASIC language programming course which sells for $45. Individual modules sell for $19.95 each.

Williamsville Publishing Company, Box-237, Williamsville, NY 14221.

CIRCLE 273 ON READER SERVICE CARD

BASIC WORD ATTACK MASTERY SYSTEM

Centurion Industries Incorporated announces the introduction of its latest technological learning support system, the Centurion "Basic Word Attack Mastery System," designed to provide students with mastery learning of the basic structure of words in the English language.

The System utilizes three technologically remarkable minicomputers, "alphator I" "alphator II" and "alphamaster " each designed to provide highly motivational learning opportunities for students in the study of basic Language Arts subject areas, including: affixes, syllables, vowel sounds, consonant blends, compound words, spelling, word recognition.

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question is repeated to permit the student to correctly respond.

Programs are presented in series of 10, 20, or 30 questions per program and the machine provides a score at the end of each series. The machine will also automatically review each lesson completed by the student to diagnostically identify the problem areas experienced by the student within that particular series of responses. Each computer also provides for either total self-pacing by the student or controlled response times, selected in advance, that will limit the amount of time given a student to respond. Each computer also includes an electronic clock that measures the accumulated time taken by a student to respond to any given series of questions.

The alphator I and II are priced at $249.50 each. The alphamaster is priced at $349.50.

Centurion Industries Inc., 167 Constitution Drive, Menlo Park, CA 94025, (415) 321-0800.

CIRCLE 275 ON READER SERVICE CARD

PERSONAL COMPUTER INVESTMENT ANALYSIS

Man-Computer Systems, Inc. is a New York based consulting and publishing firm promoting the use of microcomputers for personal computing and small business applications through publications, software development, and microcomputer systems design. Man-Computer Systems, Inc., provides consulting and research services; publishes books; develops custom-tailored microcomputer systems and software; publishes The Computer Consultant Newsletter; offers a 1-day seminar on Personal Computers and Microcomputer-based Business Systems; provides investment advisory services; and, develops low-cost, personal computer based investment decision systems.

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GAMES

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It has two levels of playing style, modern or classical; electronic doubling cube with advanced doubling theory; pip count; tournament cumulative score-keeping; backgame, diversification, and duplication theories; sound; position update; electronic or manual dice entry; position verification; LCD display; and is battery operated.

OMAR II is packaged with portable backgammon set. $79.95.

Tryom, Inc., 23500 Mercantile Rd., Beachwood, OH 44122.

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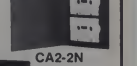

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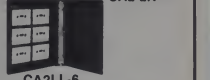

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BOOKS AND BOOKLETS

NEW BORIS CHESS GAMES

Chafitz, Inc. announces the addition of several new models to their line of BORIS, the talking chess computer. Designed to teach chess by suggesting moves for the beginner and playing at varying skill levels, experienced players can use BORIS' exclusive position programming feature to set up special board positions for practicing strategies or to remove pieces for handicapping. During each game, BORIS flashes messages to his opponent. BORIS knows all classic chess moves and solves any mate-in-two problem.

BORIS MASTER, housed in a solid walnut case, operates for 8 hours on rechargeable batteries. His special Position Storage Memory holds board positions for up to one week, allowing games to be interrupted and resumed during that time. BORIS GRAND MASTER is the world's only fully-electronic dedicated chess computer, requiring no chess board or pieces. His electronic chess board displays each chess piece and each move by electronic symbols. While he is considering his next move, the electronic chess piece symbols display his analysis of the candidate moves. BORIS GRAND MASTER is battery operated and includes the exclusive Position Storage Memory found on the BORIS MASTER model. Another new model, BORIS DIPLOMAT, a compact, briefcase-sized portable, operates on batteries and has a built-in chess board with pieces. Suggested retail prices starting at $119.95.

Chafitz, 1055 First Street, Rockville, MD 20850, (301) 340-3300.

CIRCLE 279 ON READER SERVICE CARD

TRS-80 TECHNICAL MANUAL

Radio Shack has published a technical reference handbook for their TRS-80 Microcomputer System. The illustrated, 108-page book is intended primarily for technically oriented persons with a good working knowledge of digital logic circuits.

Written in the straightforward, informal manner that has become a hallmark of Radio Shack publications, the TRS-80 Microcomputer Technical Reference Handbook includes technical information and schematic diagrams for both Level-I and Level-II TRS-80 systems.

Topics covered in the book are: Theory of Operation, Adjustments and Troubleshooting, The Outside World (connections to external devices), Parts List and fold-out Schematics.

The TRS-80 Microcomputer Technical Reference Handbook is priced at $9.96. The 8½ x 11" softbound book is available from participating Radio Shack stores and dealers.

CIRCLE 280 ON READER SERVICE CARD

APPLESOFT II BASIC PROGRAMMING REFERENCE MANUAL

Apple Computer, Inc., announced the availability of their new programming reference manual, for the Applesoft II language. The manual describes the extended programming capabilities which Applesoft II Floating-Point BASIC offers.

Applesoft II language is an expanded version of BASIC. Its 9-digit arithmetic and large function library make it better suited for business and scientific applications than Integer BASIC. By adding a few new words to BASIC, features like high-resolution color graphic routines, cassette data STORE/RECALL and user-programmable error messages become immediately available with this powerful and easy-to-use language.

Applesoft II BASIC is available in two versions: RAM-based Applesoft and firmware Applesoft.

The Applesoft II reference manual ($6.95) assumes that the reader has a working knowledge of BASIC; it is not intended as a text on BASIC. Advanced programmers will find the manual especially helpful.

Apple Computer, Inc., 10260 Bandley Dr., Cupertino, CA 95014.

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NEW TRS-80 LEVEL II 16K NEW

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A real-time stock market simulation game .... A stimulating venture into stock trading for one or two investors... Watch the market trend, keep an eye on the changing stock prices and look for news on the news ticker .... Go to your portfolio, place your buy/sell orders .... Make (or lose) a bundle ..... Fascinating ..... Outright habit-forming $15.95

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COMPUTER BASED PERSONAL INVESTMENT DECISION SYSTEMS

This 169 page book by Dr. Jerry Felsen explains how to develop personal computer-based systems for the support of investment decision making. It presents general design principles for developing personal computer (PC) systems capable of becoming the investor's assistant. The book shows how to design man-computer investment decision systems in which the investor and computer work together as partners. The author also explains what is a PC ... how are PC systems organized ... what personal computing hardware and software is available ... how to estimate its costs and benefits ... and much more. The book is written in an easy-to-read language emphasizing the practical aspects of PC applications. $15.

Man-Computer Systems, Inc., 84-13 168th Street, Jamaica, NY 11432, (212) 739-4242.

CIRCLE 282 ON READER SERVICE CARD

PROTECTING PRIVACY

PRIVACY: HOW TO PROTECT WHAT'S LEFT OF IT by Robert Ellis Smith, publisher of PRIVACY JOURNAL, is a consumer guide to protect your right to be let alone. Includes profiles of recordkeeping by banks, insurance companies, mailing list companies, schools, government agencies, doctors and others, followed by specific advice on how to regain control over personal information about yourself. Concludes with descriptions of new technology threatening individual rights, and chapters on sexual privacy and physical privacy. 346 pages with notes and index. $10 at booksellers paid by direct mail for $10 plus $1 postage prepaid from PRIVACY JOURNAL, P.O. Box 8844-D, Washington, D.C. 20003.

CIRCLE 283 ON READER SERVICE CARD

COMPUTER STORES AND THE SALE OF SMALL BUSINESS COMPUTERS

This report provides an up-to-date examination of Computer Stores as an evolving channel for the distribution of small business computer systems and associated products. The report is based on proprietary surveys and personal interviews with many of the 750 computer stores in the U.S. Also interviewed were key forces in the field such as: Texas Instruments, ComputerLand, Byte Shops, Digital Equipment Corporation and IBM. This outlet is forecast to represent $1 billion in sales by 1982. 115 pages; issued January 1979. $750.00. (Watch for a review of this report in an upcoming issue of CREATIVE COMPUTING). Catalog of reports free.

Strategic Business Services, 4320 Stevens Creek Blvd., Suite 215, San Jose, CA 95129. (408) 243-8121.

CIRCLE 284 ON READER SERVICE CARD

MAGAZINES, JOURNALS

SMALL BUSINESS COMPUTER NEWS

This publication comes out monthly and consists of 20 double-spaced typewritten pages of information about small business computers, peripherals, and software. While most of the published information is drawn from free manufacturer literature, you'd have to be very alert and knowledgeable to get your hands on all of it.

Once a year, Small Business Computer News takes a survey among users of small business systems and publishes the ratings of small business systems, peripherals, and software in five categories: performance, reliability, ease of use, service and support. Computers included in the latest survey ranged from micros like the TRS-80 and SOL to HP and DEC minis and to big "small" systems like the NCR Century and IBM System 3. Some conclusions:

- Service and support receive lower ratings than performance and reliability.
- Software ratings as a group are much lower than hardware ratings.
- The top four preferred companies are IBM, DEC, DG and HP.
- Six computer systems received a 3.0 or better rating on all five categories; four of these six were made by IBM.
- Of 23 software vendors, only one, Systems Management, Inc., received a 3.0 rating or higher in all categories.

All the detailed ratings and conclusions are in the Feb. 1979 issue of Small Business Computer News. Annual subscription is $70. Back issues are available to subscribers only for $5.50 each.

Management Information Corp., 140 Barclay Center, Cherry Hill, NJ 08034. (609) 428-1020.

CIRCLE 285 ON READER SERVICE CARD

NEWSLETTER

Cross Associates, announced the availability of "CROSSWORDS, a periodic newsletter highlighting tools and techniques in selling software, data services, and turnkey systems. Any company engaged in the development, sale and support of computer based products and services should look to CROSSWORDS for helpful hints, insights to trends, results of experiments, and in general, the successes and failures associated with marketing in a highly competitive marketplace.

Subscription to CROSSWORDS is free of charge and can be obtained by sending your name and address to Editor, CROSSWORDS, %B. Cross Associates, Suite 530, 9000 Keystone Crossing, Indianapolis, IN 46240, (317) 844-2010.

CIRCLE 286 ON READER SERVICE CARD

TOOLS

DIP/IC EXTRACTOR TOOL

The economical new EX-1 Extractor from OK Machine and Tool Corporation is ideally suited for hobbyist or lab engineer. Featuring one piece spring steel construction, the tool will give years of dependable use. It will extract all LSI, MSI and SSI devices of from 8 to 24 pins.

O.K. Machine and Tool Corporation, 3455 Conner Street, Bronx, NY 10475, (212) 994-6600.

CIRCLE 287 ON READER SERVICE CARD

MOS & CMOS SAFE INSERTION TOOL WITH PIN STRAIGHTENER

New Model MOS-1416 DIP Insertion Tool inserts both 14 and 16 pin IC packages into sockets or predrilled boards. Total conductivity reduces static electricity. Ground strap may be easily attached for highly sensitive MOS & CMOS IC's. Durable chrome plated ABS construction features precision parts. Narrow profile permits tool to work on densly spaced patterns, while unique insertion mechanism assures accuracy as well as excellent "feel." The tool includes a remarkable pin straightener built into the handle. Simply insert the IC, rock it on the straightening saddle, and push down on the tool. An automatic ejector delivers the IC ready to be placed in the insertion end for installation in your board or socket.

O.K. Machine and Tool Corporation, 3455 Conner Street, Bronx, NY 10475.

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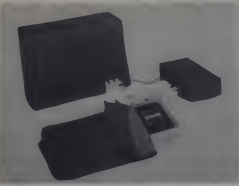

FABRIC DUST COVERS FOR THE TRS-80.

These covers are individually made from velour, corduroy, or denim in a variety of colors. The fabric keeps dust from sensitive components, yet allows heat buildup to escape, as opposed to plastic covers. Static is not a problem for these covers. All are machine-washable and pre-shrunk. The velour models shed wrinkles. The current options are red, maroon, green, or gold velour; blue or brown corduroy, and blue denim. $19.95 for each 3-piece set (plus $1.00 shipping).

August Automation, 42 West St., Westboro, MA 01581, (617) 366-2431.

CIRCLE 289 ON READER SERVICE CARD

CASSETTE TAPE ERASER

Removes recordings in one second. This high-quality cassette eraser will erase recorded cassette tapes to a level below the original recording, and will maintain original tone quality with minimal tape hiss.

It requires no external power source or internal batteries. There are no moving parts and it can operate practically forever with built in magnets which generate the erasing field and never lose their intensity. Full instructions included. $17.75.

Trans Globe Trade Enterprises, P.O. Box 24797 Dep. CRC, Los Angeles, CA 90024, (213) 820-5290.

CIRCLE 290 ON READER SERVICE CARD

SUNI STENOTYPE SYSTEM

A new stenotype notation system has been devised which would make it possible for a stenotypist to produce finished hardcopy on location. Next time you record on a tape recorder, know that if your company had a Suni stenotypist and an inexpensive minicomputer transcriber, you could have hardcopy the moment you clicked off your tape recorder upon completing your dictation. The Suni stenotypist and transcriber is also ideal for providing quick and accurate hardcopy for business meetings, conventions, court procedure, etc.

Suni V. Perez, Box 7303, Ocala, Florida 32670, (904) 687-3015; or Marc Todd, COMPUTING SERVICES, INC., (904) 372-5540.

CIRCLE 291 ON READER SERVICE CARD

DISKETTE STORAGE AND INSTANT RETRIEVAL SYSTEM

A new diskette storage and retrieval system that features instant diskette retrieval at the push of a button has been announced by Printcraft Systems, Inc.,

The system helps keep diskettes neat, clean, and away from office hazards. The high impact plastic housing is portable and stackable. It is available in 3 convenient storage capacities: 15 slot system for $69.95, a 30 slot unit for $119.95, and a 50 slot system for $179.95.

Printcraft Systems, Inc., Data Supplies Division, 11-17 Beach Street, New York, NY 10013, (212) 966-0001.

CIRCLE 292 ON READER SERVICE CARD

MINI/MICRO DISKETTE STORAGE POCKETS

Clear vinyl pockets with pressure sensitive backing, are available from Printcraft Systems, Inc.

The pockets adhere to any flat, dry surface. Pockets convert standard and hanging type file folders into a convenient and inexpensive storage and retrieval system. In addition, original and/or hard copy printout can be stored together. Sold in packages of 50. $17.50

Printcraft Systems, Inc., Data Supplies Division, 11-17 Beach Street, New York, NY 10013, (212) 966-0001.

CIRCLE 293 ON READER SERVICE CARD

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  - Power Supply
  - Enclosure
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  - Disk Drive Cable
  - CRT Cable
- **Dr. Kenneth L. Bowles "Beginners Manual for UCSD Pascal Software System"** $9.95
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CIRCLE 156 ON READER SERVICE CARD

POWER LINE FILTER

Electronic Specialists announces the introduction of a Power Line Interference Filter.

Designed for use where microprocessor, teletype, TV games or other interference enters the power line. This 1000 watt unit, inserted in the line at the offending equipment, will prevent interference propagation via power lines.

Also useful in cases where TV, FM or other listener equipment picks up interference from the AC lines. $15.95—2 conductor, KW Load. $19.25—3 conductor, KW Load.

Electronic Specialists, Box 122, Natick MA 01760.

CIRCLE 294 ON READER SERVICE CARD

DUST COVERS

Cover Craft has recently announced a new line of high quality protective dust covers to fit all popular brands of Computers and peripherals.

Dust Covers for popular models manufactured within the last two years will shortly be available at retailers across the country.

Cover Craft, P.O. Box 555, Amherst NH 03031.

CIRCLE 295 ON READER SERVICE CARD

DUST COVERS

Digital Dynamics Incorporated announces the COMPUTER CANOPY line of dust covers for microcomputers and peripherals. Initial offerings in this line of quality dust covers include models especially designed for the APPLE II and PET microcomputers and the H-9 terminal. COMPUTER CANOPY dust covers are made of heavy duty upholstery grade, multiple-ply vinyl with cloth backing. These dust covers provide attractive, yet functional protection in the home, office or school. All top seams are reinforced with attractive cording for rigidity and strength. Initially the COMPUTER CANOPY is being offered in two decorator colors, deep textured walnut and textured tan. Apple, $14.95. Pet & H-9, $20.95. DIGITAL DYNAMICS INCORPORATED, P.O. Box 27243, San Antonio TX 78227.

CIRCLE 296 ON READER SERVICE CARD

For over 100 computer and robot cartoons, get the Colossal Computer Cartoon Book, only $5.70 postpaid from Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960.

DESK FOR MICROCOMPUTER SYSTEMS

A desk designed to house a business or personal microcomputer system is now available from Computer Systems Design. The "MICRODESK" allows the keyboard and video display to be placed at a convenient typing height. The computer may be placed on the adjustable shelf or on the top of the desk. The fixed shelf may be used for additional equipment or books. The back is open to allow ventilation and passage of cables.

The MICRODESK can be assembled in a few minutes without tools. Special clips hold the pieces securely together and two cross braces provide rigidity. Construction is high density particle board covered with a hard plastic walnut-grained laminate. The desk measures 48"L x 24"W x 26"H and the shelves are 23" x 23".

Computer Systems Design, 906 N. Main, Wichita, KA 67214.

CIRCLE 297 ON READER SERVICE CARD

COMPUTER DESK

Cromemco offers a beautiful, new computer desk for the System Three and other Cromemco computers. The desk is styled and constructed to fit into any office surroundings or professional environment.

The computer is mounted into a special shelf under the desk. This leaves the top completely free for a terminal, printer, or other unit or as a work surface while still providing the operator easy access to the computer for disk loading and unloading.

The desk top is an attractive beige color designed to harmonize with the medium-light wood veneer ends. The top surface is a tough, laminated plastic. $695.

Cromemco, Inc., 280 Bernardo Avenue, Mountain View CA 94043.

CIRCLE 298 ON READER SERVICE CARD

DATA WORK STATION FURNITURE

Smith System offers two complete lines of CRT work stations. One line features the comfort edge top designed for use with CRT terminals. Top sizes range from 24" x 30" to 30" x 60" with either standard tops or comfort edge tops. Work stations are available with modesty panels and storage shelves. Chrome or enamel T-Bar legs come in working height or standing height. Smith System also has other computer support furniture including files and various tape storage systems.

Smith System Manufacturing Co., P.O. Box 43516, St. Paul, MN 55164, (612) 636-3560.

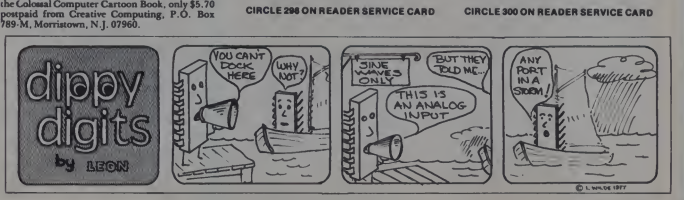
CIRCLE 299 ON READER SERVICE CARD

COMPUTERIZED WEATHER STATION

Heath Company, the world's largest manufacturer of electronic kits, announces the availability of its new ID-4001 Computerized Weather Station. The microprocessor-based ID-4001 indicates time, indoor and outdoor temperatures, wind speed and direction, and barometric pressure on an upright display panel utilizing large LED readouts. It will also display average wind speed and automatically calculate wind chill factor as well. The ID-4001's memory allows instant recall of date and time of maximum and minimum temperatures, date and time of wind gusts, and the date and time of maximum and minimum barometric pressure. It can even indicate the barometric pressure's rate of change per hour and tell if it is rising or falling. $369.

Heath Company, Dept. 350-730, Benton Harbor MI 49022.

CIRCLE 300 ON READER SERVICE CARD



Did you miss any issues of creative computing?

The following back issues of Creative Computing are still available. But they won't be for long, so order today if you want to fill in the holes in your collection. Our programming articles are timeless so you're not buying obsolete information.

Prices on 1976 and 1977 issues are $2.00 each postpaid or three for $5.00. 1978 and 1979 issues are $2.50 each postpaid, three for $7.00 or six for $12.00 postpaid.

Vol. 2, No. 5—Sep/Oct 1976
Computer programming contests, Russian computing, Do-it-yourself computer poetry (3 articles), two games: Watchman and Delmar, four feature reviews of "Computer Power and Human Reason," Computers in elections, two great stories.

Vol. 3, No. 1 - Jan/Feb 1977
Equipment profiles: Teletype model 43, IMSAI 8080, SWTPC 6800, Computers in the movies, All about Electronic Funds Transfer, Centerfold "Computer Tree": Babbage to 370/158, A approach for analyzing discontinuous events, unsolvable complex problems, the Wooly Mammoth problem, ten outstanding problems for computer solution, Games: Drag, Masterbagels, Strike 9.

Vol. 3, No. 4 - Jul/Aug 1977
Guide to selecting a microcomputer. Write your own CAI, Part 2. Computers in medicine and health care. Dwyer: "8-Hour Course in Basic- Part 1," "Thinking Strategies- Part 3." Sherlock Holmes and Charles Babbage. Four new games.

Vol. 3, No. 5 - Sep/Oct 1977
A dynamic debugging system for 8080 assembly language, bibliography of "limits to growth" models, Dywer: 8-hour course in Basic-Part 2, Programming approaches to solving complex equations, Electronic information exchange, Symmetric art with your computer, in-depth reviews of 5 microcomputer BASICs, software technology music system, Games: Nomad, Rotate, Lissajous.

Vol. 3, No. 6 - Nov/Dec 1977
Programming techniques- Part 1. CAI. Topics in Logic. Three 8080 8K BASIC evaluations. Smart electronic game reviews. How computers can write final exams. Mastermind II and Otherlio computer games. Profile of the Alpha 1 and Alpha 2 for the TDL Xitan.

Vol. 4, No. 1 — Jan/Feb 1978
File structures, 16-bit computers, LOGO language, Murphy's laws, review of Radio Shack TRS-80 and Heath H8, World model, biorythms, how to write a simulation, Hart sort algorithm, 3 games, 8-Hour Basic Course - Part 4.

Vol. 4, No. 4 - Jul/Aug 1978
Reviews of Commodore PET, Apple II, Atari computer, Video games, interfacing to the real world: 5 articles, business computing: 4 word processing systems, ROM section: 7 articles, backgammon game, bar code.

Vol. 4, No. 5—Sep/Oct 1978
Equipment profiles: TRS-80, Exidy Sorcerer, Bally Arcade, PolyMorphic 8813, Merlin Video Display preview of nine new personal computers. Accounts receivable systems, All about PASCAL, real world games, a real time clock to build, PET cassettes, special education features, new software: Star Wars, Hex,

Vol. 4, No. 6—Nov/Dec 1978
Subject index and file index in BASIC, consumer computers buying guide, electronic game reviews, critical path analysis, mailing label programs, robot programming, experiment in teaching strategic thinking, evaluations of Northstar Horizon, CP/M operating system and backgammon computers, columns on Apple II PET and TRS-80, plus game section including "Corral", "Joust" and "Puzzle".

Vol. 5, No. 1 - January 1979
Computers in fiction; Survey of Educator's Attitudes; K-State; How to Hide Your Basic Program; World Chess Championship Computer; Compleat Computer Catalog, Microchess for the TRS-80; Exidy Sorcerer; Ohio Scientific Superboard II; Robots in Fiction; Help for the Weary Taxpayer; A Counterfeit Cursor for your PET; Medical Audit Time.

Vol. 5, No. 2 - February 1979
Evaluations: Electric Pencil, Heathkit H-8, Computer Music Records. Computer Games: Gold Mine, Atom-20. Computerized Sports Predictions, Multiple Regression Analysis Simplified, Value of Computers in Education, Budget Management System, Help for the beleaguered consumer.

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Many personal computer manufacturers have recently been experiencing a financial crunch. The entrance of Texas Instruments into the market within the near future probably will not enhance the prospects for many of the companies.

Early in March it was reported that Imsai, one of the original suppliers to the personal market in the form of computers and kits for hobbyists, had been put up for sale. The smaller companies which were undercapitalized have been forced either to change their direction or to file under Chapter XI. Both The Digital Group and Interactive Products Corp. (Polymorphic Systems) have filed under Chapter XI. Realistic Controls was recently sold and is now Nylac Computer Corp.; the Vista Disk subsidiary of Randal Computer Systems is up for sale; and American Used Computer has withdrawn from the computer hobby market. TDL and Mini Term have gone out of business altogether.

It is difficult for the smaller companies to compete with such large concerns as Radio Shack, Apple, Atari and Commodore. All of these companies, because of their better financial positions, are able to sell computers at lower prices than the smaller firms. Those companies that originally had the hobbyist market cornered were forced to overextend themselves into the small business computer area, and, as a consequence, were forced to use more of their capital to be competitive.

The entrance of Texas Instruments, as well as Japanese firms, into the market will undoubtedly force other companies out of business. The sales of personal computers will then rest with the large corporations that can afford the lower prices.

BYTE THE APPLE

Byte Industries, Inc. recently filed a $1.1 million lawsuit against Apple Computer in the San Francisco US District Court.

According to a May 19, 1978, 1-year agreement, Byte was to be an independent distributor of Apple products in the US, Canada, and Mexico.

In court papers filed in San Francisco, Byte said Apple and "certain unknown co-conpirators" have conspired to terminate the agreement, to repudiate purchase orders and refuse to make deliveries, to boycott Byte by refusing to do business, to interfere with Byte's business relations by inducing dealers to refuse to purchase Apple products from Byte, to induce dealers to breach their contracts with Byte, and to induce the breach of Apple's distributorship agreement.

Byte charged that "Apple terminated Byte's distributorship solely because Apple and certain other as yet unknown co-conspirators wish to eliminate Byte as a competitor in the sale and distribution of Apple products and other microcomputers and related accessories."

Byte distributes its product line to 70 authorized independent Byte dealerships and other outlets.

—Electronic News, March 19, 1979

FCC TESTS

Radio Shack, Atari, Apple, Commodore, Heath and Southwest Technical are the six personal computer manufacturers that the Federal Communications Commission has asked to submit their equipment for review. The purpose of the review is to test the level of interference with television broadcasting in order that a minimal level of radiation can be established.

Although the equipment produced by the firms does not fall under the jurisdiction of Class I TV devices, the FCC is able to review the equipment under a rule that covers any equipment emitting a radio frequency. It is possible that the FCC will develop two standards: one which applies to those computers used in a business environment and one which applies to computers used in the home.

The FCC's interest in the home computer area was precipitated not only by the fact that most of the manufacturers had apparently been bypassing the FCC, but also Texas Instruments' proposal that a Class II TV device classification be created. The TI proposal would effectively weaken the FCC's control over computers and peripherals used in conjunction with TV's.

The companies involved with the FCC investigation are complying willingly. Certain problems may arise, however. Should there be two sets of standards, one for business and one for home computers? What will be the allowable emission rate? Will those computers already sold have to be replaced? What kinds of fines will be imposed against those companies that refuse to comply?

ACOUSTIC MICROSCOPE

Chan Tsai, professor of electrical engineering, has developed a new type of microscope which employs sound waves rather than light to illuminate and examine small objects.

In research sponsored by the National Science Foundation and conducted at CMU's Center for Joining of Materials, Tsai and his students have built a scanning acoustic microscope (SAM) which employs very high frequency sound waves. The first SAM was developed by C. Quate and his student R. Lemons at Stanford University a few years ago. Unlike conventional optical microscopes, the SAM can illuminate and examine details deep below the surface of an opaque sample.

In experimental work, Tsai and his students have used the SAM to examine various specially made joints as well as microelectric components to detect voids and other defects hidden below the surface. A poor bond between materials, faulty soldering or other manufacturing flaws become immediately obvious when the microscope's image is enlarged many times and displayed on a CRT screen, similar to a TV set. Tsai has already been approached to conduct testing for a number of electronics manufacturers, since the SAM can perform non-destructive diagnosis of microelectronic components. Like other researchers in the field, Tsai believes that this new instrument holds great promise in a whole variety of materials testing, and quality control applications.

Carnegie Mellon Alumni News, March, 1979

New T-SHIRT

Amaze your friends (and enemies too) when you dress your bod in our exclusive Computer Bum T-shirt. Design is in black on a gray shirt with black sleeve and collar trim. Color-coordinated with any sweat pants and most computer keyboards. Wow! Adult sizes, S,M,L,XL. $5.00 postpaid in USA, $6.00 foreign. No COD's. Creative Computing, P.O. Box 789-M, Morristown, NJ 07960. Double Wow!!

STUDENTS CLAIM COMPUTER MARATHON RECORD

After a demending 8½-dey merethon, the students of San Antonio's Holy Cross High School are to be recognized. They were part of e computer merathon!

The femous Guinness Book of World Records, which lists such exotic feets as merathon flagpole sitting, breath holding and rope jumping, es of yet hes no category for computer merethons. But the 311 Holy Cross students who took part in the eround-the-clock computer training session during Jenuery believe that their accomplishment deserves a mention in future record books.

Instructor Dennis Doose suggested the computer training merathon efter students began steying volunterily efter class to use the school's TRS-80 Microcomputer System.

"So whet better wey to get es meny students es possible exposed to computers?" Doose asked. He then explained that Redio Shack, menufacturer of the TRS-80, egreed to loen the school 22 additionel microcomputers for the event.

The response wes "fentestic," according to Doose, who edded that students were actually lined up at the door when this computer training merathon begen on Friday, Jenuery 12.

About 206 hours leter, 311 Holy Cross students hed logged time on the computers. Although most hed never used e computer before, everything went smoothly.

The students took turns, and et least two computers were in consetent use throughout the merethon, which ended et 9 A.M. on Sunday, Jenuery 21.

Mora experienced students even brought sleeping bags so 24-hour supervision would be evellable for computer novices.

As e result of the merathon, 72 students completed the TRS-80 computer programming course.

Actuel teeching duties were hendled by the computers. As students learned e particuler microcomputer function, the TRS-80 eutometicelly edvenced to the next lesson.

Students "telked" to the computers in BASIC through the TRS-80 keyboerd units. The computers "teught" with words end pictures displeyed on the computer video monitors.

"SORRY, SIR"

A CALLER to New York Telephone's directory essistence lest week wes told the requested number couldn't be provided because the computers were out of order. Asked if she could look up the number in the phone book, the operetor replied, "This is the modern age, sir. We haven't eny phone books—only computers. But the computers ere broken."

— The Wall St. Journal

ADAM SMITH REPLACED BY COMPUTERS

"We are transforming the creft of business menegement into en applied science," seys Sidney Schoeffler, executive secretery of the Strategic Plenning Institute. The institute's computers receive the operating results of 1500 business enterprises, enelyse the dete, end form general business lews. Some of the institute's new rules upset essumptions still held by business schools and practiced in business.

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Other findings ere equelly surprising. Trust-busters should know thet the more concentreted e business is, the more it performs in the public interest. Merketing departments will receive e greater investment return if the introduction of new products is limited to times when the company's merket is not growing.

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Two Cambridge University linguists have made it possible for a Chinese-speaking computer operator to communicate directly with a computer in Chinese. Robert Sloss and Peter Nancarrow devised the system as a do-it-yourself project in order to speed their work on a new Chinese-English dictionary.

"I don't think we could have done it if we'd had a lot of money," said Mr. Nancarrow. "Without money, you have to think harder. You have to solve the problem with your brain instead of buying a lot of equipment." The two men built their first working model in three days on Mr. Sloss's kitchen table, using a child's Meccano set (similar to an Erector set), bits of plastic, soma string, and a cardboard tuba.

Telegraphic communications and data storage in Chinese have previously been accomplished by translating each of the 4,500 characters into numbers. "The error rate was absolutely prodigious," said Mr. Nancarrow.

The number of characters was a problem for the two linguists until they discovered the joys of the square root. A grid of 66 centimeters, or 26 inches, square would give them 4,356 boxes, each one centimeter, or one-third of an inch, square. Then they wrapped the grid around a drum. The position of any character on the grid could be stated in two numbers: 22 across, 43 down.

Teaching a computer to "write" Chinese was easy. Mr. Sloss and Mr. Nancarrow fed the coordinates for each character into the computer memory with instructions for drawing the ideographs. Cambridge technicians then built a prototype production model for about $2000.

Cable and Wireless, a British communications organization, has bought the rights to the invention. A Chinese trade delegation has visited Cambridge to see the machine work. "They reacted as if they had seen an electronic dog talking," Mr. Sloss said.

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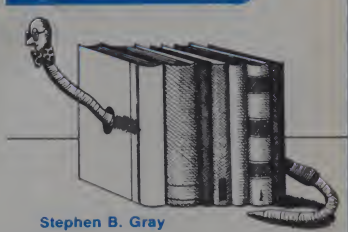

Stephen B. Gray

Computers, Computers, Computers: In Fiction and in Verse, edited by Dennie Van Tassel. Thomas Nelson Inc., New York. 192 pages, hardcover $6.95. (Available from Creative Computing Book Service.)

The 18 items here, consisting of three poems and 15 stories, won't please everybody, but they'll go a long way toward it. The big winners are, naturally, by the professional SF writers, including Scheckley, Heinlein, and Malzberg. The rest are a mixed bag, from Art Buchwalk to Bob Elliott and Ray Goulding. Only a couple are somewhat dull, and that's not a bad score.

Each item is headed by one of Gloria Maxson's "Glorohot" limericks from *Datamation*. Some are interesting, most try too hard, and a couple are good.

The winners here are Frederic Brown's 1954 classic "Answer," Richard T. Sandberg's "The Perfect Crime," Gordon R. Dickson's "Computers Don't Argue," Robert A. Heinlein's "That Thinkum Dinkum," Mack Reynolds "Criminal in Utopia" and Barry N. Malzberg's "The Union Forever."

That's a totally subjective choice, of course, but if you don't (or wouldn't) like at least half of these, you're probably not a subscriber to *Creative Computing*.

If you call yourself a computer freak, or if you want a good idea of what's being done with computers in creative writing, this modestly-priced volume belongs on your bookshelf.

* * * *

BASIC With Style: Programming Proverbs, by Paul Nagin and Henry F. Ledgard. Hayden Book Co., Inc., Rochelle Park, NJ. 144 pages, paperback $5.95. 1978.

This latest addition to Henry F. Ledgard's series of programming style guides is intended for BASIC programmers who want to write carefully constructed, readable programs," just as previous books in the series were intended for COBOL and FORTRAN programmers.

The 19 proverbs are divided into four groups, and are all worth repeating here: A good start is half the race (don't panic; define the problem completely; start the documentation early; think first, code later; proceed top-down; beware of other approaches), keeping logical structure (code in logical units; use functions and subroutines; watch out for GOTOs; prettyprint), coding the program (comment effectively; get the snytax correct now; don't leave the reader in the dust; produce good output; hand-check the program; prepare to prove the pudding), and of course . . . (have somcone else read the work; read the manuals again; don't be afraid to start over!).

The proverbs are illustrated with many examples of poor solutions and good ones. Other chapters are on top-down programming, program standards, and "odds and ends" such as recursion and the case against program flowcharts.

This belongs on the bookshelf of every serious BASIC programmer.

Sixty Challenging Problems with BASIC Slutions, by Donald D. Spencer. Camelot Publishing Co., Box 1357, Ormond Beach, Fl 32074. 80 pages, paperback $6.95. 1977. (Available from Creative Computing Book Service.)

"This book contains sixty games, puzzles, mathematical recreations, science problems, and business problems for reinforcing computer programming skills. It gives the reader a chance to measure his or her programming skills against some interesting problems that lend themselves to computer solution many would be very time-consuming to solve by hand computation. . . . None require more than a working knowledge of elementary algebra," according to the preface.

The problems include greatest common divisor, N-factorial, coin-tossing, Tower of Hanoi, sum of two squares, Fibonacci numbers, prime numbers, perfect numbers, compounded interest, grade average, I am thinking of a number, population, Chinese remainder theorem, craps probability, and magic squares.

Each problem is defined very clearly, and some include hints. The second half of the book provides the solutions, all reproductions of Teletype printout, full-size and new-ribbon legible, a rare combination. Forty of the LISTs are accompanied by RUNs.

This excellent book, recommended for either school or personal use, is also available as 14-by-21.6-cm cards, with cartoon characters and drawings to illustrate the problems; 66 cards for $6.95.

* * * *

Basic Programming for Computer Literacy, by David Moursund. McGraw-Hill Book Co., New York, NY. 279 pages, paperback $10.95; teacher's manual available. 1978.

After a brief introduction, the author, who is a professor of computer science at the University of Oregon, jumps right into Reading Basic Programs with a full page of computer output from a PDP-10, with log on, library fetch, LIST and RUN. Once more, as so many authors have done, this is giving too much too soon, even though the program is all REM and PRINT lines. If the book is used in a course, the instructor can soften the impact of eight half-page or full-page printouts within ten pages. But the solitary reader may be overwhelmed.

Chapter 4, Modifying Basic Programs, comes before the chapter on Writing Simple Programs. Such a sequence means the text was written, as the preface says, "to facilitate learning by doing. . . . students using this text should be expected to make extensive use of a computer." The solitary reader is advised to start with Chapter 5, and read the first four chapters later.

Chapter 8 is on Character String Primitives, a recondite phrase that could surely have been simplified. Other chapter headings are Repetition, Sepwise Refinement, Simulation, Some Basic Shorthand, Search and Sorting, Well-written Programs, etc.

The writing is rather heavy-handed, and the book is best used in the classroom. For the solitary reader, many better books abound.

* * * *

A Quick Look at BASIC, by Donald D. Spender. Camelot Publishing Co., Box 1357, Ormond Beach, FL 32074. 64 pages, paperback $5.95. 1977.

Here's a very good example of how to write a book on the elements of BASIC in only 64 pages and four chapters. The book, according to the preface, "is intended to serve as a self-instructional text designed for either the reader who has little or no knowledge of computers or computer programming, or for the person who wants to learn BASIC quickly." It serves that purpose quite well.

The chapters are on Getting Started (covering LET, PRINT, INPUT, END), Control Statements and Looping (GOTO, IF-THEN, FOR/NEXT), Additional BASIC Concepts (READ, DATA, STOP, RESTORE) and Array Handling (DIM). The programs presented as examples are all fairly short and easy to understand. Each chapter includes from a dozen to four dozen exercises, most of which require writing programs; no answers are given. A variety of light-hearted illustrations helps keep things from getting too serious.

The author has written over 30 books on computers and programs, and this short one reflects once more his ability to present much information in a little space, succinctly and simply.

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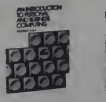

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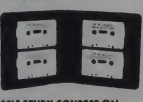

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How You Can Learn to Live With Computers, by Harry Kleinberg. Penguin Books, New York. 216 pages, paperback $2.95. 1978.

Originally published in hardcover at $8.95 by Lippincott in 1977, this book doesn't quite live up to the back cover's claim that "You *can* understand computers" if you take that to mean understanding how computers work. Computer technology is covered briefly and lightly in a few dozen pages in the first six chapters, and gets no more complex than describing a simple program to determine how much wallpaper is required for a room of given dimensions, or showing how a pair of switches can constitute an AND gate.

The author looks into logic, memory, programming, computer arithmetic, nanoseconds, systems analysis, and the future, in a simple style any high school freshman should be able to understand, although the book seems to be written for adults.

Kleinburg could certainly go into great detail on the technology, as he's a computer engineer at RCA. But what he's trying to do here is "dispelling myths and fears," the back cover puts it, by showing how basically simple computers are, "that they cannot solve problems, think or make decisions . . . and that their powers are always curtailed by the limitations of the people who program them."

In this context, Kleinberg succeeds quite well, writing in an easy-going manner and including many personal anecdotes that go a long way toward demolishing the mystique that many of us may have willingly helped create.

* * * *

DBUG: An 8080 Interpretive Debugger, by Christopher A. Titus and Jonathan A. Titus. Howard W. Sams & Co., Inc., 4300 West 62 St., Indianapolis, IN 46268. 104 pages, paperback $4.95. 1978.

Originally published under the same title by E&L Instruments, this book provides documented listings, in both octal and hex, for a debugging program that lets you enter an 8080 assembly-language program into memory and single-step through it, instruction by instruction.

If you have an Altair 8800 or a similar computer, with front-panel switches and lights, you could do the same, but DBUG also lets you examine the 8080's internal registers. So as you single-step, you can check out the effect of a particular instruction on each of the 8080's registers, the memory location addressed by registers H and L, the stack pointer and the last two entries on the stack.

Unlike a hardware single-step, where an 8080 usually steps through individual instruction cycles, DBUG steps through one complete instruction, regardless of the number of cycles required. DBUG can also read and punch a paper tape using a teletypewriter, so you can save your program once you get it working. The I/O routines can be easily changed so you can use an audio cassette or CRT terminal.

DBUG resides in only 1K of memory, so it lacks some features other debuggers have. But for $4.95, you get quite a bargain.

* * * *

An Introduction to Microcomputers: Volume 0—The Beginner's Book, by Adam Osborne. Osborne and Associates, Inc., Box 2036, Berkeley, CA 94702. 237 pages, paperback $7.95. 1977. (Available from Creative Computing Book Service.)

Volumes I and II in this series were greeted enthusiastically by hobbyists when they were published a couple of years ago. By bit-hacker hobbyists, that is; people with either an engineering background or the willingness to dig into a rather advanced text. It wasn't long before word got back to perspicacious OA president Adam Osborne that a wider audience could be reached with a lower-level preparatory volume, and he promptly filled the gap. As the introduction says, "After reading this book, you will be ready to move on to 'Volume I—Basic Concepts.'"

The six chapters of this thin volume are packed with photographs, drawings, flowcharts and examples to help the beginner as much as possible. The chapters cover basics (microcomputer system, records and files), using a microcom-

puter, system components, numbers and logic, programming and hardware, and Putting It All Together (word size, ALU, timing, memory).

Although called "The Beginner's Book," this is not for the casual reader who wants to learn a few concepts. It's for the person who really wants to know all about what makes a microcomputer tick, from status flags to rollover, from assemblers to XOR. For the beginner who wants to know it all, this is the best book he can get.

* * * *

The Incredible Secret Money Machine, by Don Lancaster. Howard W. Sams & Co., Inc., 4300 W. 62nd Street, Indianapolis, IN, 46268. 159 pages. $5.95 in paperback.

Mr. Lancaster's book is subtitled A HOW-TO COOKBOOK FOR SETTING UP YOUR OWN COMPUTER, CRAFT, OR TECHNICAL BUSINESS. Well, partly it is and partly it ain't. In addition to some pretty good advice on that subject, both general philosophy and specific detail, there are discussions of investment policy and tax gimmicks, tips on writing for publication, some personal prejudices, anecdotes, cartoons and a celebration of the counter culture life style.

The last point, the life style, may be the biggest flaw in the book since it sets a tone that will put a lot of people off. The author tells you up front what he considers the basic qualification to start a successful small business: "first, you have to be heavily into a technical or craft trip on a total lifestyle basis." The unspoken implications are that you are ready to cut all ties to the work-for-wages environment and are prepared to devote full time to your one-man (or woman) business.

This idea is reinforced by the author's examples. Every business he mentions has some side line but it is never working for wages or anything else remotely ordinary.

The image of the brave free spirit dropping out of the rat race to make it in glorious independence may be just what your ego needs. On the other hand, it may scare the hell out of you. There are those house payments and the orthodonture for the kids. Well, forget all that. It's just Mr. Lancaster riding his mania. Within 5 desks of where I sit, writing this on my lunch hour in a corporate aerospace giant, there's a dealer in specialty jewelry, two apartment house owners, a guy who does something strange with property condemned for freeway routes, one microcomputer entrepreneur and a software consultant. In several of those cases the 8-hour a day gig is now their sideline. So it isn't necessary to cut those establishment ties just yet.

With that out of the way you can consider the content of the book a little more objectively, and it's pretty darn good. The fact is that a high degree of dedication, bordering on mania, is necessary to start your own business. And it probably is worse if you're doing it in parallel with a conventional job or profession.

There's a limit to how specific a book like this can be since the number of possible businesses is endless and each has its peculiarities. Within those limits the author gives good general guidelines on getting started, keeping control, and staying out of trouble.

Every now and then his personal prejudices get in the way when dealing with specific details. One example is his contention that a post office box number for your business address projects a professional image. If there's anything that flags an operation as a garage it's a box number address. Then there is his idea that you do everything yourself, even to doing your own typing since that's where you spot the errors in your writing. Not true. For many of us that's where you spot the errors in your typing - and where you burn two hours doing a job poorly that a real typist will turn out perfectly in 10 minutes.

Which says, I suppose, that nobody is perfect. Mr. Lancaster, however, despite a few goofs, is way above average.

So if you're really serious about starting that business in the unused bedroom, invest $5.95 and help Mr. Lancaster out with his business. Or better yet, follow his advice: borrow a copy and xerox the parts that interest you. You have to start keeping those costs down sometime.

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* Direct Correspondence Requested.

Puzzle Answers

1. Part 1: The North Pole. Part 2: He travels a quadrant of the earth multiplied by the square root of two, or, 14,140,000 meters. (Approximately).
2. Unfortunately, you cannot arrange eleven of anything into seven rows of four each. However, the key to the problem is in the way that it is stated, namely, "that the eleven sleds lay in such a way that there were seven rows of sleds...". One of those rows was very long stretching all the way back to the sled that the explorer had abandoned at the north pole. The drawing below will make everything painfully clear.

3.

4. 123-45-67 ÷ 89 = 100.

5. In problem 1 we change the five to a "square root" operation. In problem 3 we change the two to the sign for "PI". 22/7 was an approximation for "PI" used in times gone by. The rest of the answers speak for themselves.

6. **The Captives in The Tower** — The boy descended first, using the cannonball as a counterpoise. The queen and her daughter then took the cannonball out of the upper basket, and the daughter descended, the boy acting as counterpoise. The cannonball was then allowed to run down alone. When it reached the ground, the daughter got into the basket along with the cannonball, and their joint weight acted as counterpoise while the queen descended. The princess got out and the cannonball was sent down alone. The boy then went down, the cannonball ascending. The daughter removed the cannonball and went down alone, her brother ascending. The latter then put the cannonball in the opposite basket, and lowered himself to the ground.

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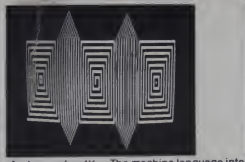

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