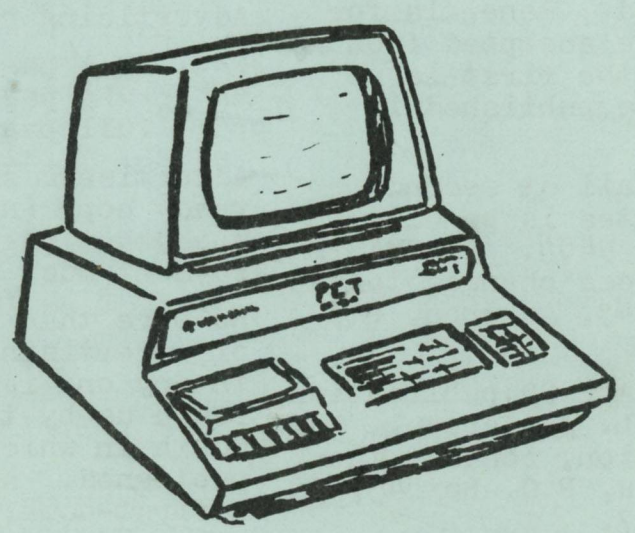
An ARESCO Publication

THE PAPER



$2.00

NOVEMBER 1978

ISSUE 9
VOLUME I

SUBSCRIPTION, ADVERTISING, & MISCELLANEOUS INFORMATION

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Application to mail at second-class postage rates is pending in Norristown, PA, 19403. POSTMASTER: Please send address changes to THE PAPER, P.O. Box 43, Audubon, PA, 19407.

THE PAPER is an ARESCO publication, edited by Terry L. Laudereau. For further information, contact the Editor, THE PAPER, P.O. Box 43, Audubon, PA 19407.

Manufacturers of hardware, software, and paperware for the PET personal computer are encouraged to send us a sample of their products for review. The product will be returned after 30 days, but before 120 days, when accompanied by a letter requesting return.

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Readers are encouraged to submit articles of interest to PET owners. (See comments regarding copyrights, above.) THE PAPER is copyrighted by ARESCO.

PET PROSE

There are many people who want specialized application programs to use on their PETs, but who are not knowledgeable enough to design or to write them.

If you can write significant software in some specialized field, and are willing to do so, we may be able to help you find the people who are willing to pay you to write programs for them. Send $25. with your name, address, and field of expertise. The information will be published in all the remaining issues of this volume.

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1420 Centre Ave #1907
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* Education, Engineering, Business
* Games, Photographic applications

Because we missed printing PET PROSE in issues #7 and #8, we will print the names of PET PROSErs in the first two issues of Volume 2 or refund each of them 1/5 of the money they paid for insertion.

FLEA MARKET EXCHANGE

See Issues #1 through #8 for descriptions of the programs.

SNAKE	RENUMBER & UNLIST	KLIDISKOP	HANGMAN-G
DOGFIGHT	DIGITAL CLOCK	EMPEROR	PRIME NUMBER
SPADES	MORSE TUTOR	SPIRAL	RND CHAR
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CORE DUMP	TIC-TAC-TOE	CLOCK-12	TOMMY TERMITE
TI$ TUTOR	DAY OF THE WEEK	NUMBER TRAP	DAY/DATE/TIME
MAZE DEMO	CHECKERBOARD DEMO	ODD MAN	ARRAYS
FLEA PAK I	FLEA PAK II	FLEA PAK III	FLEA PAK IV
FLEA PAK V	FLEA PAK VI	FLEA PAK VII	FLEA PAK VIII

Flea Market programs sell for $5.00 each. You can send us a program of your own, however, and we'll exchange one of the Flea Market tapes for your program (please include $2.00 with exchanges for our costs). Flea Market programs are guaranteed to load and run. No documentation accompanies any tape except HIMONDIS (we send along a command summary).

PET PARADE .....

Terry - I was elated over Russell Martin's article about interfacing an ordinary cassette player to the PET - until I built it. The recorder works fine, and tapes will play back on the built-in unit. But I can't get anything to read on the regular recorder unit. I tried troubleshooting the circuit and the playback signal is present all the way to the read line at the I/O port. I gave up and tried again, from scratch. Using new components, I built another interface, making double sure to heat sink all components and using a socket for the IC. The signal is definitely present at the read line - but PET won't read the tapes. My PET works fine with Commodore's tape deck (borrowed), hooked in at the cassette I/O port. I've heard that earlier PETs have trouble with the current aux. cassette deck. Could the problem lie here? Another thing - when the relay drops out, the back EMF plays havoc with the video display and sometimes the cursor disappears. Placing a diode across the coil (polarity reversed to DC applied to coil, of course) adequately shorts out the back EMF and saves the 5vDC power supply future problems. - R. Dale Connely

Dale - Yours is about the 10th letter reporting similar results from attempting to build Russell's interface. When I was with Commodore, the word there would be no way to use an ordinary cassette deck with the PET - but, of course, we were told a lot of strange things early on. I've also heard from ten others that they had great success. Maybe someone else has tried to build the circuit and has made some mods to permit reading from the second (ordinary) cassette and will let us know. Our PET won't even read, on the built-in unit, any thing we write on the other deck. We haven't had time to hack around with it much, so I don't have any answers for you. Sorry. - Terry

Terry - Just a quick note to tell you something I discovered with my PET. Try this:

```
10 REM TEST PROGRAM
20 END
```

Be sure to include all the spaces as I've shown. After typing it, LIST it to be sure it's there, then type NEW. Think it's gone? LIST it again. Not there, right?

WRONG! POKE 1025,20:POKE1026,4

Now LIST again. And there it is. Explanation: The NEW command only changes the pointer of the first BASIC statement to zero. The storing of the BASIC is described briefly in issue #3. - Ed Berry

Ed - Everytime someone finds out something about his PET that's new to him, it's like a light dawning! Thanks for sharing it with us. - Terry

Terry - There seems to be some kind of an internal heat problem with my PET that Commodore hasn't been able to fix. When I first got it, I turned it on and within 2 minutes it crashed (the cursor disappeared). It wouldn't run more than a few minutes at a time. I found that by taking the plate off the back of the display and

placing a small household fan there to blow air into the unit I could keep it running. I finally sent it in, and each time it comes back it will run okay for a short while. Soon it develops the same problem. This last time, in addition to this problem, the cassette unit wouldn't save the progams. It would load all right, but not save. It's working all right now, but I don't know how long it will last.

Although Commodore has been slow about sending the manual and other material, I have no complaint about their service department. They have been very nice and tried to help me everytime I have called on the telephone. The turn-around time in their plant has been only three or four days. I no know they're probably under-staffed, but they seem to want to give good service and are doing their best to accomplish it. - James C Morehead

Jim - Yeah, but does your PET work when you get it back? How often have you had to send it in for the same problem? But I agree with you - the service people (notably Rick Lehr) are trying their best. - Terry

Terry - Why would people want a second cassette unit? You carried information on how to interface one, but I don't see any use for it. Can you tell me? - Richard C Prestien

Rick - A second cassette is very useful if you're trying to do any business applications work. For example, if you have a master file on one tape and a lot of transactions to enter from the keyboard, it is possible to "merge" the transactions with the master file <u>if</u> you have a second cassette on which to store data. Then the data on the second tape becomes the new master file. Tomorrow, when you want to enter more transactions, you can create still another tape <u>if</u> you have a second cassette. Another good reason is to copy multiple programs from one tape to another without having to remove the tapes after every load and save. - Terry

Terry - Why do you reprint so many articles from SPHINX, the PET User Notes, etc.? - L. Nickel

Larry - This is issue #9 - we've printed only 21 pages of information in <u>all</u> <u>nine</u> issues to date. And there are two reasons: 1) very few of my readers are "expert" enough to write in-depth articles about the PET. 2) The readers who <u>are</u> experts prefer to write for other experts - it isn't easy for some of them to speak in English, since they've been communicating in Computerese for so long. We have only reprinted those articles we felt would be of interest to more than $\frac{1}{4}$ of our readership. We are just now beginning to receive articles from people who not only know a lot, but who can write it in easy-to-understand terms. Remember, THE PAPER is geared for beginners, not for experts, so we can't print many of the articles we <u>do</u> receive.-Terry

Terry - I read that you can hook up a selectric typewriter to the PET - yet you wrote to me that it isn't a good idea. Why? - R.C.P.

R.C.P. - Because the Selectrics aren't <u>built</u> for printer duty. They'll wear out quick! - Terry

Micro Software Systems of Woodbridge, VA announces the availability of BILLBOARD, a commercial quality display and advertising program for the 8K PET.

The program comes with one pre-programmed message. The message is either a standard PET ad or a customized message specified at the time the order is placed. The messages may include any letter or digit or the characters ! ? $ ' ( ) * + - + — , . : ; in addition to spaces. By including control characters, the message can be made to pause, or pause and flash on and off before resuming movement. Up to 254 characters, including the spaces, pauses, and delays, may be included in a message.

One-inch high letters glide across the screen from right to left, without the annoying "snow" or static observed on other graphic display programs. When the program is run, the operator may choose to type in a new, temporary message instead of the standard ad - and the standard ad is not lost, but will be available next time the program is run. An extraordinary security module prevents pilferage of the program while it is running unattended in your store.

Write for information regarding delivery before ordering. BILL BOARD sells for $49.95 from Micro Software Systems, P.O. Box 1442, Woodbridge, VA 22193

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Muskegon MI 49441

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PET NET
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Independent PET Group
22 Firs Walk, Tewin Wood
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Detroit MI 48223

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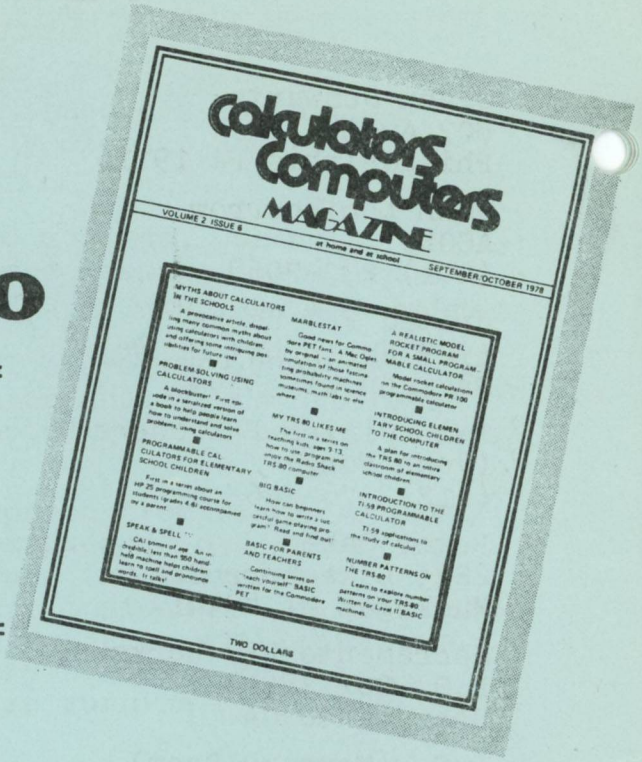

We know that some magazines tend to ignore the computer novice. Some magazines assume you are a trained computer expert or a veteran "hacker"! Well, we're different...

At **CALCULATORS/COMPUTERS Magazine** we know these things and understand your needs. We like to call ourselves a how-to-do-it magazine for people like you—— beginners and intermediates who want to learn how to use, program and enjoy all kinds of calculators and computers. We especially want to help you get more of everything out of your Commodore PET.

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LIMITATION IN THE DIMENSION STATEMENT

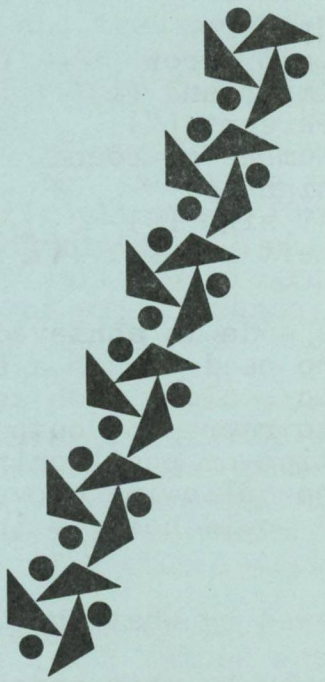
by Michael Baltay

The limitation in the DIM(ension) statement is not clearly defined in the User's manual. The note that the "number of arrays is limited by memory" does not refer to the number of arrays at all, but to the number of elements within each array. PET limits each array to no more than 256 elements.

This program checks the limits in the DIM statement. Some PETs will not allow even 256 elements if the array is of more than one dimension, and the program checks specifically for the limits of a two-dimensional array (much like a bus fare schedule or tax tabl).

The displayed values should begin with 1 and continue to the value specified in "TOTAL". It won't be fascinating reading! When the capacity of the array is exhausted, the data in the beginning elements are overwritten. Start checking your PET's DIM limitations by setting N1 to 60 and N2 to 4. If your PET has that much capacity, try setting N1 to 70 and N2 to 4. If the first attempt exceeds your PET's capacity, set N1 to 50 and N2 to 4. Keep changing the values of N1 and N2 until you determine the DIM capacity of your particular PET - then keep track of that capacity for future reference.

```
10 REM CHECK CAPACITY OF DEMENSION
20 REM BY MICHAEL BALTAY
100 REM
110 INPUT"N1= ";N1:INPUT" N2= ";N2
130 NN=N1*N2:?"TOTAL=";NN
140 ?"BYTES FREE BEFORE EXECUTING
      DIM=";FRE(Ø)
150 DIM A(N1,N2)
160 ?"BYTES FREE AFTER EXECUTING
      DIM=";FRE(Ø)
170 N=Ø:FOR I=1 TO N1
180 FOR J = 1 TO N2
190 N=N+1:A(I,J)=N
200 NEXT J:NEXT I
210 REM ==========PRINTING
220 L=1:IF N2 > 5 THEN L=2
230 N=Ø:FOR I=1 TO N1
240 FOR J=1 TO N2
250 PRINT A(I,J);:NEXT J
260 N=N+L:PRINT"ROW = ";I
270 REM===PAUSE AT EVERY 20TH LINE
280 REM===HIT ANY KEY FOR CONTINUE
290 IF INT(N/20)*20 <> N GOTO 310
300 GET Q$:IF Q$ = "" GOTO 300
310 NEXT I
320 END
```



PET SYMBOLS

by John D. Hirsch

In an attempt to represent PET graphic symbols and commands which are not easily represented on the conventional typewriter or set by a printer, each of the various PET-oriented publications has adopted a different system.

Programs in PET BASIC would be much more readable with a standard set of mnemonics, easily used and easy to understand. I therefore propose the following:

/CH/	Cursor home	/ST/	Stop (the key, not the BASIC keyword)
/CL/	Cursor left		
/CR/	Cursor right	/RET/	Return
/CU/	Cursor up	/SPC/	Space
/CD/	Cursor down	/RUN/	Run (the key again)
/CLR/	Clear Screen	/DEL/	Delete
/RV/	Reverse field on	/INS/	Insert
/RO/	Reverse field off	/-/	Shift

The /-/ command would normally be used with the lowercase symbol on the key desired. For example, /-A/ would stand for the shifted symbol on the A key (a spade), and /-Z/ would represent a diamond (which is the uppercase graphic obtained by the shifted Z key).

Some of the unshifted symbols on the PET keyboard may not be available, too, in which case, the following substitutions could easily and understandably be made:

/UA/	Up arrow	/RB/	Right bracket ( ])
/LA/	Left arrow	/LT/	Less than (<)
/AND/	Ampersand (&)	/GT/	Greater than (>)
/PER/	Percent (%)	/ADD/	+
/NUM/	Number or pound sign (#)	/EQ/	=
		/X/	*
/AT/	AT sign (@)	/XP/	Exclamation point (!)
/LB/	Left bracket ([ )	/PI/	Pi sign (π)

Lower case mode is achieved by a POKE statement in PET BASIC, and there is no need to use a special representation in the listing. Perhaps /lc/, along with some of the mnemonics given above, would be handy to represent output. There is no simple way to represent the animation or positioning possible with the PET's CRT, but perhaps the following convention (used in the TIS series of PET workbooks) would help to indicate the interaction between user and computer:

T: (followed by what the USER types in at the keyboard)

R: (followed by what appears on the screen; PET's responses)

I hope all PET owners will seriously consider this system. It can be made flexible by explaining any modification with a REM statement at the beginning of the program.

SOFTWARE

DATA RETRIEVAL $10.00
Create unlimited numbers of data files of unlimited length. Each record in each file consists of up to 256 characters in as many fields as required; the first three fields are keyed for selection and sorting purposes. Up to 50 records at a time from any combination of existing data files can be selected and sorted in either ascending or descending order. Listing provided. Eight pages of documentation.

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c. 1wayanova performs analysis of variance on two or more sets of data, each set being the responses of a group of cases to a treatment (for example, two drugs and a control - three treatments). The number of cases for each treatment may be the same or different. In the special case of two treatments, it is identical with the well-known T-test.
d. 2wayanova is similar to 1wayanova, but each case is subjected to two treatments A and B simultaneously. For example, treatment A might be different drugs (or different dosages of the same drug) and treatment B different diets; alternatively, the treatment B can be blocks of a block design.
e. Anova2wayr is the same as 2wayanova, but there are two or more cases (replicates) for each treatment combination. All the analyses of variance programs including tests of significance.
f. Slr calculates linear regression, correlation coefficients, and coefficients of determination and tests the significance of all statistics. Designed for grouped data, i.e., several values of Y (the dependent variable) for each value of X (the independent variable).
g. Xyslr is similar to Slr, but the X and Y values are in pairs.

SPACE FIGHT $10.00
A two player game in which each

which make PET the #1 personal computer available. Over 400 screensful of information are presented in 20 lessons, provided on both sides of each of two C-45 cassette tapes, five lessons per side. All the major BASIC keywords, plus exercises, quizzes, and a few wisecracks. A must for all beginners.

PET BASIC COMPLEAT $29.95
This 170+ page manual is the companion for the TUTOR tapes. The manual is drilled for a standard 3-hold binder, is indexed for easy reference, and reproduces (so far as is possible without a PET printer) exactly the data presented in the tape and displayed on the screen.

PET TUTORIAL PACKAGE $39.95
Because we feel that the TUTOR' tape and the PET BASIC COMPLEAT manual constitute an unbeatable learning tool for beginning PET person, we offer the set as a package deal - you get the 170+ page manual (as of this writing, there are 183 pages) plus the two C-45 cassette tapes, for under $40. Save almost $10.00 on the set.

CMC/WPP $29.50
The Connecticut Microcomputer Word Processing Program turns your PET into a powerful text-processing system. You can enter text in upper and lower case letters, edit the text, and format the text for finished printing. Due to the limit of available memory, you can enter approximately 2000 characters in an 8K PET - about the length of a full page letter. Complete input and editing features: enter text, delete lines, insert lines between the lines of existing text, do substitutions within a line, or replace one line with another. You can also move a block of lines from one place to another in the text. You can alter the left margin for indentation, or adjust the right margin (although there is no provision for right-hand justification). There are provisions for filling a line with a specified character, or centering a repeated character on a line. twenty-five pages of documentation provided.

THE PAPER guarantees that each of these programs will perform as claimed herein. If your copy of any program fails to load, send it back to us - we'll ship you a new copy. Record a program of your own on the back of the tape, however, so we can check the tape head alignment.

Each of the Software Shelf programs is copyrighted, and THE PAPER pays royalties to the authors. If you receive a program tape that is not sealed in plastic (from any other source) it may be a "bootleg" copy, and may not be the latest version of the program. Please report such "software thieves", and help us keep our authors' rights intact.

When you receive a Software Shelf tape, a "conditions of sale" card is enclosed, outlining your rights and ours. If you feel that you cannot agree to refrain from selling, giving, trading, etc. a copy of any program you might purchase from us, you may return the tape to us unopened for a full refund. No refund is available (except for failure to load and/or failure to perform as claimed) if the package is opened.

Payment in full must accompany all orders (BAC/MC/VISA okay).

player tries to destroy the other player's spacecraft by firing bursts of energy. If a player fires - and misses - he's in danger of running in to his own energy burst and destroying himself instead! Written instructions.

CHASE $10.00
A real-time version of the popular Chase game, in which the robot guards can be as intelligent or as dumb as the user wishes. Try to escape!

MICROMAZE $7.95
A maze is drawn randomly on the screen - your job is to find your way out in the shortest possible time! No two mazes alike. Documented sound is available.

BLACKJACK $10.00
Excellent graphic game. Displays the cards as they are turned up, keeps track of your winnings (and losses), and wises off when you lose. It's the best version of Blackjack we've seen. No instructions, since all instructions are incorporated into the program itself.

BLOCKADE $10.00
A two-person game in which each player tries to avoid the other while also avoiding the wall around their enclosure. Excellent graphics. Documentation.

DEFLECTION $10.00
A fast-paced, action game in which you attempt to hit all the targets. The ball moves horizontally and vertically until it runs into a deflection shield you place on the screen using the M an N key graphics. Timed success to encourage greater skills.

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A group of terrorists have seized a planeload of innocent people, holding them as hostages until their demands are met. You, as governor of the realm, are supposed to do something! But what? Your chances of re-election depend on your ability to make the correct decision in time. Non-graphic.

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America's favorite computer game is available with sound! It uses the sound circuit described in issue #1, Volume 1 of THE PAPER. And, even without sound, it's a fun game. Search through the galaxies for Klingons, refuel your ship at the starbases, and try to avoid being destroyed by the enemy. Documentation.

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Your naval fleet is at war with enemy aircraft! Will you destroy them before they sink your entire fleet? Good graphics.

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Machine language monitor and disassembler with an exciting difference: The user is actually encouraged to make use of the program. A "menu" is displayed after each command is executed, so you don't have to remember each of the commands. Each command prompts you for the correct entries. The entire program is written in BASIC, not in machine language, so you can see how it is done. Functions: Write to memory, read memory/disassemble, save memory on tape, load from tape to memory, execute a machine language program, exit to BASIC. Four pages of documentation.

TUTOR $19.95
A beginner's guide to PET BASIC and to the cursor control features

REVIEW — CURSOR

by Rick Simpson

CURSOR is advertised as "a cassette magazine for the PET", but it is really more like a "programs of the month club." Ron Jeffries, the editor of CURSOR, sent us a copy of issue #3 (September) for review. We received a tape and three sheets of paper. Two of the sheets were advertisements for other people's products (I guess one of the problems of running a cassette mag is that it's hard to put the ads right on the cassette.) The third sheet gives an overview of the programs on the tape and some general editorial comments. There was a note that any tape which failed to load would be replaced, although our copy loaded flawlessly on both our PETs (no small accomplishment in itself). Ron also instructs anyone returning a tape to record a program of their own on the back of his tape before sending it back, so it can be checked for head skew - a notorious problem. It's a very good suggestion, and one you might follow if you return a tape to THE PAPER, as well.

There were five programs on the tape (actually six, but two of them worked together). All of them loaded well, all were very well explained by their instructions, and all did exactly what they were supposed to do. Rather amazing, considering the current state of many programs being distributed! The authors of the programs have paid considerable attention to the user interface, and the programs could be considered models of the manner in which game programs should interact with the user.

The first program was COVER, which displayed the 'cover' of the magazine and listed the 'table of contents' for the tape. An excellent example of PET graphics, but, of course, all you can do is look at it. The second program, BAR, allows you to type in a series of positive integer numbers and labels, and get the numbers displayed as a vertical bar graph. The program does all the vertical axis scaling, but you do the fudging necessary to spread your bars across the screen. The program has a number of good features, but its major deficiency is that it doesn't allow you to save your data and labels for future use. When you exit the program, your work is lost.

The third program was DOTS, the old paper-and-pencil game, very neatly adapted for PET graphics. Its most novel feature is to display a 'wavy line' beneath the game board while PET considers its next move. Again, an excellent example of of user interface. The fourth program is QUIX, a game where the PET produces a sequence of numbers and you have to remember them - and type them back in the correct sequence. This simple game has been beautifully 'dressed up' with PET graphics and <u>sound</u>. By connecting two wires from a PET connector to any amplifier (following the instructions given on the 'editorial' sheet of paper), tones are produced as each number is flashed on the screen.

The last pair of programs (FLASH and CARDS) let you store 'flash cards' on tape, retrieve them, and do flash-card drills with them. As a test, I typed in a list of nouns and their French equivalents and let the program 'drill' me by displaying one half of the pair and asking me to type in the other half. I suspect that this might be quite effective as a learning tool, since you type each response as well as think of it or say it aloud. The CARDS program allows you to type in up to fifty word pairs, edit them, and store them on tape for later entry to the FLASH program. DATA statements in the FLASH program would have been equally effective, although the interactive nature of the CARDS program will make the process much easier for the beginner or non-computer user.

So how do I rate CURSOR? First, it isn't really a magazine, just a novel method of distributing what seem to be very well-written programs on a regular basis. The programs I saw were extremely well done simple programs - DOTS and QUIX are fun for a few minutes, and might entertain children for quite some time. I might have been able to put BAR to work as a presentation tool - except for the inability to save entered data. (The scaling routine also produced clumsy values for the axis labels.) FLASH and CARDS might be very useful if I were learning something which required drill and practice, since I could save each lesson and use it for later review. At $24.00 for 12 issues, each program cost about fifty cents - and they are certainly <u>well</u> worth that! If you'd like to subscribe to CURSOR, send your $24 to CURSOR Magazine, Box 550, Goleta, CA 93017 - and mention to Ron that you read about CURSOR in THE PAPER!

Conncecticut Microcomputer announces its new AIM16 - an Analog Input Module of the CmC Data Acquisition Modules. The AIM16 has 16 8-bit analog inputs, each of which is individually addressed. The AIM16 can be used with any computer that has an 8-bit input port and an 8-bit output port. Conversion time is 100 microseconds. AIM16 sells for $159.00, and the AIM16 starter kit (AIM16, power-supply, input and output connectors) sells for $189.00 - assembled and tested. Write to Connocticut MicroComputers, 150 Pocono Road, Brookfield, CT 06804 for delivery information before ordering.

Forethought Products, 87070 Dukhobar Road, Eugene OR 97402, announces off-the-shelf delivery of Betsi - the PET to S-100 interface/mother-board. Betsi attaches directly to PET's memory expansion connector and provides both interface logic and four s-100 slots on a single circuit board. Bestsi has a dynamic memory controller to permit the use of the S.D. Sales "Expandoram" memory board, sockets and de-coding circuitry for 8K of PROM (2716), and sells for $165 assembled and tested and with four S-100 connectors.

REVIEW - WARLORDS [SOFTWARE]

by Rick Simpson

Personal computing games are beginning to mature, and WARLORDS by Speakeasy Software of Canada is a perfect example of the direction PET games are moving. When I wrote my first ten PET games (which eventually became the Don Alan "Housebreak Your PET" package), they were short (1 - 3K) and capitalized on the uniques (at that time) graphic features of the PET. At the same time, dozens of people were converting the older TTY-oriented games which had existed on time sharing systems such as the HP-3000 series. Some were direct conversions; others were modified to take advantage of PET graphics. For example, I have seen at least five versions of "Hangman" which range from a straight TTY-like display to the version in our Flea Market, in which a stic figure actually mounts the gallows a step at a time. Most, however, were adaptations of existing pencil-arcade, or teletype games. Not so WARLORDS!

In WARLORDS, the programmer has constructed a game which is derived from the more complex board games, which require the ability to rapidly rewrite the entire screen (unlike the TTY type games). The game takes some thought rather than the rapid reflexes of arcade type games, and it really uses the record-keeping, randomizing and calculating capabilities of the PET, unlike the paper and pencil games.

Don't be misled, however. WARLORDS is not in a class with RISK (but I've seen RISK on a Compucolor), or the large-scale strategy games like AFRIKA CORPS or BLITZKRIEG put out by companies such as Avalon Hill or TSI. WARLORDS does show that personal computers have been around long enough to attract people with real knowledge in game construction; who understand what it takes to make a "playable" game; and who are willing to make the considerable time investment to build a more sophisticated game (my Don Alan games only took about four hours each to do).

WARLORDS is played on a seven by seven "mapboard" displayed on the screen, which contains cities, forests, swamps, and castles. Up to four players move their troops around the map, collecting territory, fighting one another, and being beset by a variety of random setbacks, such as plagues in their castles. Computer-generated randomness is used to select which player moves next, yet insures that ultimately each player gets the same number of moves per "campaign". The computer decides the winner in each of the battles, presumably considering the relative strengths of each force and the type of terrain each is on, but the scoring algorithm is not given to the players and must be understood via experience "in the field" (even most generals admit that the outcome of their battles between real armies are equally hard to predict). This is a real advantage over the traditional board games,

in which the players have to calculate "attack factors" and wade through dozens of rules concerning terrain, supply, etc., many of which are open to subjective interpretation. Here, if the PET says you win -- you win.

The WARLORDS tape is accompanied by a six page booklet which sets the scene and gives three pages of instructions. The instructions are perfectly sufficient, except that they don't mention that you have to have troops in your castle in order to collect taxes, just that you need to collect taxes to raise more troops unless you have money in your "treasury". The only "bug" we could find is that PET failed to detect the end of the game - a situation which will be very obvious to the human players.

WARLORDS is produced by Speakeasy Software Ltd., of Kemptville, Ontario, Canada. It is available only through computer stores for around $12. Speakeasy has written a number of other ingenuous programs, which we will review over the next few months.

Applications Research Company, 13460 Robleda Rd., Los Altos Hills, CA 94022, announces a reverse-polish programmable scientific calculator program for use in the PET.

According to the manufacturers, PEO-CAL-I combines the best features of the PET with those of the hand-held and desk-top calculators, supporting single key execution of more than 50 forward and inverse arithmetic, algebraic, trigonometric, and exponential functions. It implements calculations in binary, octal, decimal, and hexidecimal modes with a single keystroke conversion between modes and simultaneous decimal equivalent display.

The program uses the PET monitor to display 10 memory registers, 5 stack registers, and a record of the 14 most current I/O operations, to permit instant checking of procedures and results. It also allows the recording and playback of calculator programs on cassette tape, permitting the use of most calculator software already in use, up to a maximum of 255 steps.

PRO-CAL-I is written in BASIC and machine language, comes with software on cassette and an operating manual, for $26. (USA) or $28. (foreign). Delivery is said to be 5 weeks. Write for further information to Applications Research Co., 13460 Robleda Rd. Los Altos Hills, CA 94022. Quantity discounts are available.

ROM TEST

Want to test the ROM on your PET? Here's an anonymously contributed ROM test which works on our PET. We haven't checked the 019 version, since we have the 011 ROMs on both of the PETs, but we ran the 011 version - our PET sort of sat there and blinked the cursor at us for the 20 minutes or so while the test was in progress. I gather that there would be a message such as "#1 ROM DEFECTIVE" or something if everything weren't okay, but I didn't translate all the decimal numbers into characters to find out.

We'll try to get as good a listing of a RAM test for you by next issue - one which is also anonymously contributed. We just have to decipher the code and check it out.

ROM TEST INSTRUCTIONS ** READ CAREFULLY ** ROM TEST INSTRUCTIONS

1. Enter the BASIC code. Replace line 820 with: 820 ?A
   Delete line 840.

2. RUN the program. Check the data that appears on the screen against the data in the listing for your ROM (either the 011 or the 019). Make any necessary corrections.

3. SAVE the program. Do not try to RUN it until <u>after</u> it is saved. There is no way out of the ROM TEST without turning off the PET - so if you RUN before you SAVE, you'll have to enter the data again from the beginning.

4. You don't <u>have</u> to delete the lines of data which do not pertain to your ROM if you have the 011 ROM. PET will never get to the rest of the data. If you have the 019 ROM, however, you <u>must</u> delete lines 430 - 570. If you don't, PET will tell you your #1 ROM is defective.

5. For those of you who will be using the assembly language program rather than the BASIC program, the data shown in the BASIC program is stored beginning in location 1121 (decimal) and continuing through location 1174 (decimal). We obtained this assembly listing using our FLEA MARKET version of HIMONDIS. The program is contained in locations 1039 thru 1120 (decimal), and is shown in lines 300 - 410 of the BASIC code.

6. When you're ready to RUN the program, insert line 820 and 840 as shown in the listing, then type RUN. The screen will clear, the words ROM **TEST** IN PROGRESS (or 019 ROM TEST IN PROGRESS) will appear on the screen, along with the flashing cursor in the "home" position. Let it run for 15 - 20 minutes at least.

```
100 PRINT"PRESS 'G' TO START
110 PRINT"THE ROM TEST.
120 PRINT"PRESS 'S' TO STOP
130 PRINT"IF YOU WANT TO SEE
140 PRINT"A LISTING OF THE
150 PRINT"PROGRAM BEFORE THE
160 PRINT"ROM TEST IS RUN.
170 GET A$: IF A$="" THEN 170
180 IF A$="S" THEN 1000
190 IF A$ <> "G" THEN 100
200 REM
210 REM  MACHINE LANGUAGE CODE
220 REM  IN DECIMAL
300 DATA 162,0,189,104,4,32,210
310 DATA 255,232,224,26,208,245
320 DATA 120,216,169,128,77,00
330 DATA 128,141,00,128,162,7
340 DATA 202,48,243,169,8,133,0
350 DATA 189,97,4,133,2,169,0
360 DATA 133,3,133,1,160,0,24
370 DATA 113,1,144,2,230,2,198
380 DATA 0,208,240,221,130,4
390 DATA 208,7,189,137,4,197,3
400 DATA 240,208,138,24,105,49
410 DATA 157,16,128,208,199
420 REM
430 REM THE FOLLOWING DATA IS
440 REM FOR THE 011 ROM.  IF
450 REM YOU HAVE THE 019 ROM,
460 REM YOU MUST DELETE LINES
470 REM 520 THROUGH 570 BEFORE
480 REM RUNNING THE ROM TEST.
490 REM
500 DATA 192,208,224,240,200,216
510 DATA 248,147,17,17,17,17,17
520 DATA 82,79,77,32,84,69,83,84
530 DATA 32,73,78,32,80,82,79,71
540 DATA 82,69,83,83,95,252,146
550 DATA 28,254,73,136,232,49
560 DATA 202,242,228,30,26,73,0
570 DATA 139,18,128,0,0
580 REM
590 REM THE FOLLOWING DATA IS
600 REM FOR THE 019 ROM. IF
610 REM YOU HAVE THE 011 ROM,
620 REM YOU MUST DELETE LINES
630 REM 660 THROUGH 710 BEFORE
640 REM RUNNING THE ROM TEST.
650 REM
660 DATA 48,49,57,32,84,69,83,84
670 DATA 32,73,78,32,80,82,79,71
680 DATA 82,69,83,83,203,252,146
690 DATA 28,254,73,136,231,49,202
700 DATA 242,228,30,26,73,0,139
710 DATA 18,128,0,0
720 REM
800 FOR I = 1039 TO 1174
810 ::: READ A
820 ::: POKE I,A
830 ::: NEXT I
840 SYS(1039)
850 REM
1000 END
```

HEX ADDRESS	OP CODE	MNEMONICS	OPERAND
ø4øF	A2 øø	LDX	=$øø
ø411	BD 68 ø4	LDA	$ø468,X
ø414	2ø D2 FF	JSR	$FFD2
ø417	E8	INX	
ø418	Eø 1A	CPX	=$1A
ø41A	Dø F5	BNE	$ø411
ø41C	78	SEI	
ø41D	D8	CLD	
ø41E	A9 8ø	LDA	=$8ø
ø42ø	4D øø 8ø	EOR	$8øøø
ø423	8D øø 8ø	STA	$8øøø
ø426	A2 ø7	LDX	=$ø7
ø428	CA	DEX	
ø429	3ø F3	BMI	$041E
ø42B	A9 ø8	LDA	=$ø8
ø42D	85 øø	STA	$00
ø42F	BD 61 04	LDA	$ø461,X
ø432	85 ø2	STA	$ø2
ø434	A9 øø	LDA	=$øø
ø436	85 ø3	STA	$ø3
ø438	85 ø1	STA	$ø1
ø43A	Aø øø	LDY	=$øø
ø443	C8	INY	
ø444	Dø F6	BNE	$043C
ø446	E6 ø2	INC	$ø2
ø448	C6 øø	DEC	$øø
ø44A	Dø Fø	BNE	$ø43C
ø451	BD 89 ø4	LDA	$ø489,X
ø454	C5 ø3	CMP	$ø3
ø456	Fø Dø	BEQ	$0428
ø458	8A	TXA	
ø459	18	CLC	
ø45A	69 31	ADC	$31
ø45C	9D 1ø 8ø	STA	$8ø1ø,X
ø45F	Dø C7	BNE	$ø428

Using our Flea Market version of HIMONDIS, we disassembled the BASIC code which was poked into locations 1039 through 1120. This listing is the result.

The PET™ Symbol Table and Data Formats©

by Roy Busdiecker

Some exploration through the PET's RAM*, assisted by the MEM-EXPLORER program listed at the end of the article, provided some interesting information on the PET's management of variables. This article reports the results of that exploration, which provides some facts not previously published and corrects some inaccuracies in material which has been published.

There are three pairs of bytes which point into the symbol table. In the typical 6502 fashion, the first byte holds the low-order bits of the address, while the second has the high-order information.

Location (Decimal)	Points to
124,125	Beginning of symbol table (at end of BASIC program), where single-value variables are located.
126,127	Array variable symbols and storage (immediately follows single-value storage area).
128,129	First byte beyond end of symbol table. Beginning of unused storage.

In the single-value variable area, there are three data types: REAL NUMBERS, INTEGERS, and CHARACTERS. The first two types store both the name and value of each variable in this area, in the format shown below. For CHARACTERS, this area contains the name of each variable, the number of characters contained in the string associated with that name, and a pointer to the beginning location where the actual character string is located (at the high end of user memory). All three types require seven bytes in this area, with the specific contents shown below.

REAL NUMBERS

first character in variable name	second character in variable name	binary exponent + 129	first bit of first byte is sign. remaining bits, with all bytes concatenated, give binary mantissa

(Note: articles on real numbers have appeared in The ___ Paper, issues #6, Aug 78, and #4)

* RAM, random access memory ... more properly called read/write memory to differentiate between it and the read-only, or ROM, variety ... incidentally, ROM is also random access.

INTEGERS

first character in variable name (ASCII values plus 128)	second	high order byte of binary version of integer value (note sequence!)	low	Ø	Ø	Ø

CHARACTERS

first character in variable name (128 added to 2d character only	second	number of char's in string	low order byte of address where string is stored	high	Ø	Ø

Array storage also provides for three data types; however, the amount of memory required to hold an array is different for each type. The general form of arrays is shown below.

ARRAY HEADER	ELEMENT (Ø)	ELEMENT (1)	≈	ELEMENT (N)

N stands for the designation of the last element in the array, which depends upon the DIM_( ) statement used to establish the array.

Array headers are very similar regardless of data type, while the elements show great difference from one type to the next. Array headers are in the format shown below.

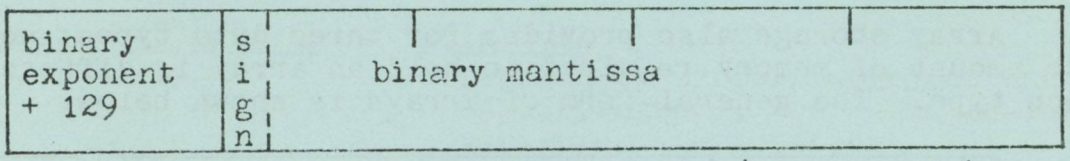
first character in name of array	second	low byte number of memory locations used by array	high byte	number of dimensions in array	high byte number of elements in last-specified dimension of array	low byte	optional expansion
BYTE 1	2	3	4	5	6	7	8 9

The code inserted in the Array Name (bytes 1,2) is coded to show data type. In a REAL NUMBER ARRAY, both characters are unshifted, while an INTEGER ARRAY has both characters shifted (ASCII value +128). A CHARACTER ARRAY header has the first character unshifted and the second shifted.

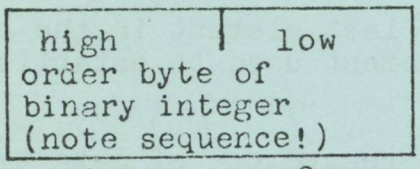
A one-dimensional array, created by a statement like DIM L(N), has a seven-byte header exactly as illustrated. If the array has two dimensions, like DIM L(N,M), then the header will have nine bytes. The value of M would be in bytes 6 and 7, while N would be in 8 and 9. In other words, the dimension information goes into the header "backwards" from the order in the DIM statement. Additional dimensions follow the same pattern. The length of the header, then, is five bytes plus two times the number of dimensions in the array.

The format for each element in an array is shown in the diagrams which follow. Of course, each array can be of only one data type, so all the elements in a single array are identical in format.

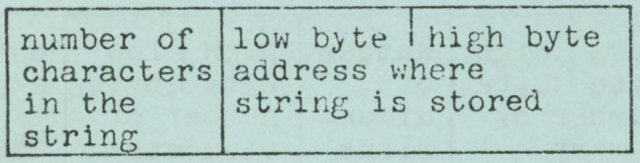
REAL ARRAY ELEMENT



INTEGER ARRAY



CHARACTER ARRAY ELEMENT



Knowing how much storage is required for each representation of a variable, one may make an intelligent decision regarding his choice of forms. Faced with the need to store ten integers when running low on storage space, the user would determine that ten different single-value variables would consume ten times seven, or seventy bytes. A ten-element integer array would require seven bytes for the header plus two bytes per element for a total of only twenty seven bytes. A word of warning is in order: do not overlook the fact that each time N% appears in a program, it consumes two bytes in the program storage area. N%(5) takes five! Perhaps it would be best to buy additional memory (several plug-in

units are available) rather than try to optimize storage space!

A few additional facts of interest are noted here. Negative integers are represented in two's complement form (see any basic text on "computer arithmetic"). If array size is not set with a DIM ( ) statement, a default value of ten is assigned, as though a DIM X(1Ø) had been used. Actually, this allows eleven elements to be stored, since the elements are numbered from zero to the DIM size. Memory space not used for program or variables is filled with the "$" character.

The PET BASIC program used in this investigation appears at the end of the article. When it is run, it provides a variety of data on twenty bytes of memory starting at a decimal location specified by the user. In five columns are printed the LOCATION (which byte is being viewed, decimal value), DECIMAL contents of that byte, CHARacter represented by the DECIMAL value, the two-byte ADDRESS value starting at this byte, and a VALUE to interpret integers (see INTEGER format diagrams). A recommended approach, when the program asks LOCATION?, is to specify 120 first, so you can see the contents of the pointers to the symbol table. Then enter those pointer values to see each area in the table.

Variables assigned values in the command mode (without line numbers) may be examined if the program is entered by a GOTO 1ØØ rather than RUN (RUN causes an automatic CLR).

MEM-EXPLORER ©

```
100 B=256: POKE 59500,14
110 INPUT "LOCATION";K  :REM /CD/ IN 120 MEANS 'CURSOR DOWN'
120 PRINT "LOCAT'N DECIMAL CHAR ADDRESS VALUE/CD/"
130 FOR J=0 TO 19
140 L = K + J
150 M = PEEK(L)
160 PRINT L;
170 PRINT TAB(8);M;
180 IF M<32 OR (M>140 AND M<150) THEN 200
190 PRINT TAB(18);CHR$(M);
200 PRINT TAB(25);M + B * PEEK(L + 1);
210 PRINT TAB(32);B * M + PEEK(L + 1)
220 NEXT J
230 PRINT
240 GOTO 110
```

COMMODORE'S "PET Communication with the Outside World"
and Machine Language Monitor

by Roy Busdiecker

Although there is material for a lot of study and comment, the following items stood out in a first pass through the "Communication" manual.

- EOF is a single character, while EOT is a complete separate header (a little experimentation revealed that multiple EOF's can be written by putting Print #1, CHR$(Ø) in a loop. Although it should be the same, Print #1, "" does not work. When doing a GET#1,A$ and an EOF is encountered, A$ is left holding the next non-EOF character encountered after the EOF).

- For a program file (as opposed to a data file), EOF is indicated by appearance of tone at the end of the file, rather than a special character.

- If LOAD is executed from a program, variable values from the preceding program are retained (if not overwritten).

- The ?VERIFY ERROR message is displayed if there is <u>any</u> error on the 1st or 2d pass through a file, even though a LOAD could have been accomplished successfully.

- When input is requested from the IEEE bus, the PET will wait 65 milliseconds for a response.

- Field delimiters (commas, semi-colans) are deleted both on Print# and Input# statements, which explains why problems have been encountered trying to put more than one variable in Print# or Input# statements.

- Descriptions of the CMD command and of the IEEE bus are included.

The Monitor manual is less well written . . . and while the errata corrected the error in specification of the SAVE command, it failed to note the obvious error in the remark associated with the same line.

- when using the .M command to display memory, it is essential to have a space after the M and before the first hex address . . . a fact not pointed out in the instructions.

- the .S in the Monitor appears to work the same as a SAVE in BASIC. A LOAD in BASIC can load a program saved by a .S. A .L in the Monitor can load a program saved with a BASIC SAVE.

- listing the Monitor results in

```
10 SYS(1039)
READY.
```

1039 is the beginning of the machine language code. It is not clear at the moment which pointer has to be reset to start a BASIC program at the end of the Monitor. I will do some more experimenting in this area (my original attempt resulted in instantaneous loss of control!).

- a Display Memory (.M) command prints out a minimum of eight locations, even if fewer are specified.

- while each command is described as a single letter (M, S, L, etc), the examples show a period preceding the letter. That period is printed by the Monitor, so the user only has to type the letter.

- the manual recommends putting machine language programs in the 2d cassette buffer ($033A), as has been suggested previously. That's fine for short programs when one doesn't use the second cassette. I propose a second alternative: modify bytes 134, 135 to make BASIC think that less memory is available in your PET, and put the machine language program in the "forgotten" memory. Unfortunately, this generally means different code for different amounts of memory (my "top 1K", for example, starts at 11K, a different set of absolute addresses for the machine language instructions). It would be better to use the low part of memory starting at 1024, if we can point BASIC to a higher starting point for storage of the user program.

Compu-Quote of Canoga Park, California has converted their popular VIDEO CHECKERS game to run on the PET. The new version contains complete checkerboard graphics, and it played according to International Rules. As the player and the PET take turns, the checkers blink and move to indicate their passage. Kinged pieces are identified and messages are displayed in text relating to each move. The program will not accept illegal moves and displays an error m ssage when one is attempted. Complete instructions are included; the game is recorded twice on the cassette. Write to Compu-quote, 6914 Berquist ave., Canoga Park, CA 91307 for information. The program sells for $14.95, and you must specify the PET version. Be sure to write first for delivery information.

SOFTWARE FROM PETSHACK

NUMBERAMA

Numberama is a number guessing game based on the popular game of "Mastermind". The computer will generate a random number with the number of digits you select (1 to 9). As you try to guess the number, the computer will give you clues. This game takes a great deal of strategy for a quick solution.

STATES

Help the kids with their geography and brush up on your own. Match States and Capitals by multiple choice or write in your own answer.

MATH TUTOR

To help your youngsters learn math in an enjoyable way. The child selects the category they want to work in, addition, subtraction, division, or multiplication. This program uses oversized numbers, the childs own name, and lots of pats on the back for encouragement.

MAD LIBS

A party favorite. You supply the nouns, adjectives, adverbs, etc. and the computer will write a hilarious story around them.

WORLD CONQUEST

An advanced game of strategy; you pit your wits and forces (Tanks, Troops, Planes, etc.) against the forces of enemy nations in an effort to conquer the world.

STARTREK

All time favorite re-written for the PET and improved with special PET graphics.

MORTAR

An advanced technical game involving X-Y coordinates and angles to direct the Mortar shell to the target as seen on the Radar screen.

PSYCHO ANNIE

Got a problem? Tell Psycho Annie: You will usually get both an interesting and provocative answer.

COMPUTER DERBY

Place your bets. Four equally matched horses race to the finish line. The computer takes your bets and keeps track of your wins and losses. Up to four people can play.

All of These and More for only $5.95 each. Write for a complete list.

P.S. An 80 column 8" impact Printer is now available for your PET. This is NOT Commodore's Printer. $495.00

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STAT II	$20.00	_____	BLOCKADE	$10.00	_____
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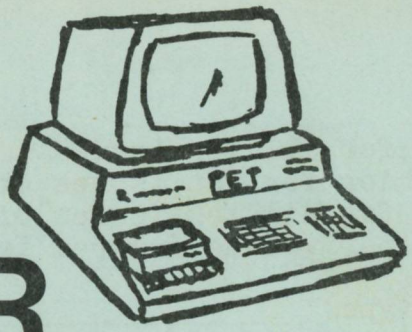

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