VOLUME 1 ISSUE 3

commodore

PET USERS CLUB NEWSLETTER

Newsletter Contents

MEMBERSHIP/SUBSCRIPTION

The Charter of the COMMODORE PET USER CLUB is to provide a method of sharing up to date information, and programs relating to the PET Computer between the many PET owners and users.

We would like to publish features from PET Users concerning specific applications interesting discoveries or even bits worthy of sharing. If you would like to contribute to future Newsletters, please send your article, letter or comments to:

THE EDITOR
COMMODORE U.S. PET USERS' CLUB
COMMODORE BUSINESS MACHINES, INC.
3330 SCOTT BLVD.
SANTA CLARA, CALIF. 95050

320851-AO3

Editor Notes

Dear Pet User Club Readers:

As User Club membership grows, the charter of this Newsletter-- to provide effective communication between Commodore and its equipment owners and users--becomes increasingly important.

To do this, we rely on hearing from each of you concerning all facets of usage, from intriquing problems to interesting discoveries.

The following error corrections have been noted in Issue 2:

- On Page 8, Mr. James A. Fowler is the author of "WEAVE AND DRAFT" and Mr. Mark Stewart is the author of "DYNAMIC JOB SCHEDULES".

- Page 22. Formatting Routine Program Listing Corrections:

  Line 26: Delete left parenthesis preceding ABS(X).

  Line 100: Delete space between X and $.

  Line 600: There should be a comma between the two "3s" rather than a semicolon.

Needless to say, we are always looking for ways to improve this Newsletter. Your comments and suggestions are welcomed.

THE EDITOR

Data Exchange

IN AN EFFORT TO EXPAND COMMUNICATION WITH OUR USERS, THIS SECTION WILL COVER ANSWERS TO YOUR SPECIFIC INQUIRIES NOT COVERED IN OTHER SECTIONS OF THE NEWSLETTER.

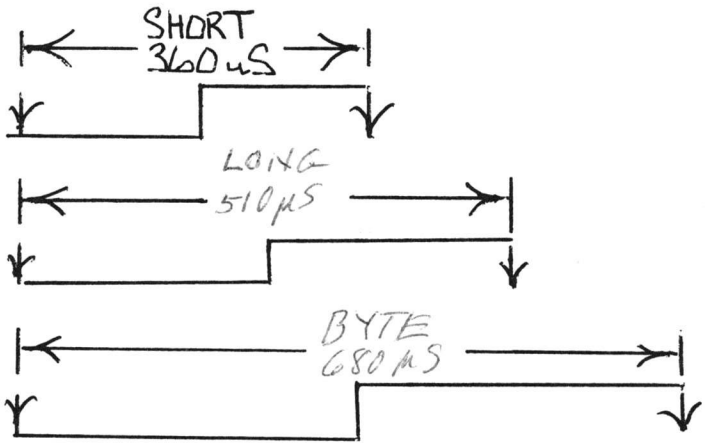
In response to Mr. Arthur B. Hunkins, we have published the requirements for high-speed duplication for the PET. Although lengthy, this information should be something all Users could eventually benefit from.

TAPE DUPLICATION HINTS (by L. Bryant)

A. Explanation of PET recording scheme:

The PET cassette deck uses an unequalized constant current recording method to place data on magnetic tape. The encoding scheme uses three distinct full cycle pulses. (See Figure 1).

FIGURE 1:
DATA TIMING



A data zero or one is represented by a pairing (or dipole) of a short and a long pulse. If the short pulse is first, then the dipole is considered to be a zero. If the long pulse is first, the dipole is a one. The byte mark occurs once each byte and provides a reference for byte identification.

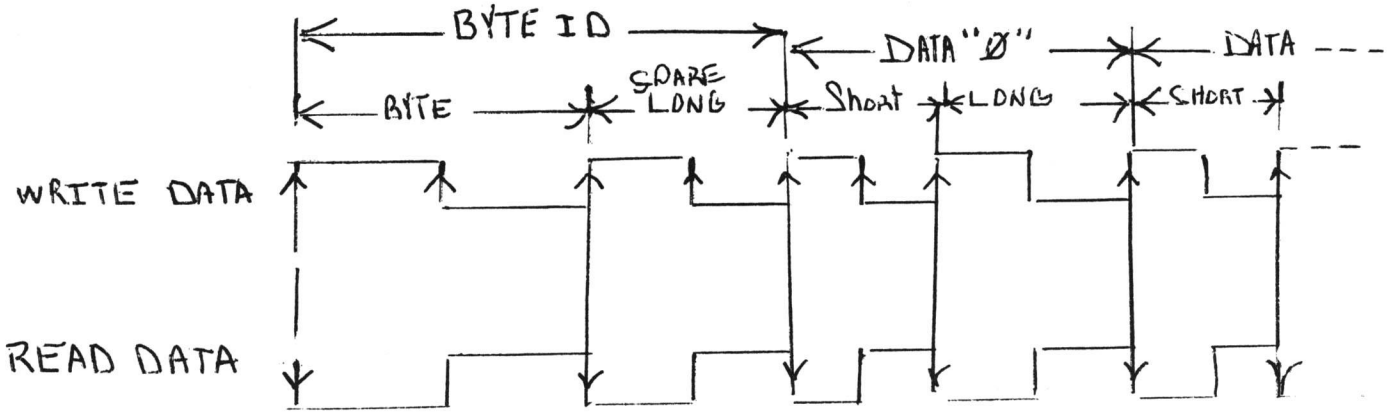
B. PET Playback Circuit

The PET cassette playback circuitry first amplifies the recorded signal then passes this through equalization and squaring circuits. Thus a logic-level signal is presented to the computer. The computer measures the time between negative edges of the signal and decodes the data from these measurements.

C. The following points are important to successful tape duplication:

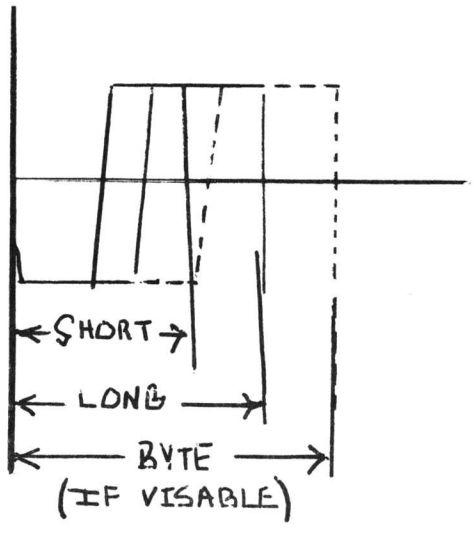
1. The PET outputs data during WRITE to the cassette with the information carried by the positive transitions and accepts data during READ with the information carried by the negative going edges. See Figure 2.

FIGURE 2: DATA IN/OUT



2. Because of this encoding scheme, the data is polarity sensitive. A 180° phase reversal to proper data produces unreadable data. To check for proper data polarity with an oscilliscope, connect the scope to monitor the READ data from the PET cassette to the computer. Put the tape to be checked into the cassette and press PLAY. Set the horizontal rate to 100 micro-seconds per centimeter, and the triggering for negative going edges. Set the vertical scale to 1 volt per division and center the waveform on the screen. Adjust the scope trigger so that the displayed waveform is at the center of the left edge of the screen. The signal should appear as shown in Figure 3, with the negative going edges of the short and long pulses clearly visible. Depending on the scope used and the data, the byte mark negative edges may also be visible.

FIGURE 3:
READ DATA
SCOPE DISPLAY



Try switching the polarity of the scope trigger to positive going edges and observe if the positive edges are closer to the proper timing than the negative edges. If the positive edges are better, then the recorded data has the wrong polarity.

3. Because of the great high frequency emphasis encountered with audio cassette recording the phase of the signal may shift as much as 90° due to this emphasis. This produces read data which is halfway toward being reversed polarity. This situation is evident when scope shows negative and positive edges to be equally far from the proper timing. A partial phase shift (much less than 90°) usually accompanies tape duplication and this is visible on the scope as a widening of the negative going edges. Generally, better duplication has been obtained with the high frequency peaking in the duplicator master deck reduced to nearly minimum.

4. The level at which a PET cassette deck records is around 500 nanowebers per meter, (nWb/m), which is just under saturation on low coercivity tapes. It has been found that duplicated tapes perform better when their level is slightly higher than the PET tape level. It is also possible to fully saturate the tape and obtain good duplication results. Generally, then, the rule on recording level is "the higher, the better", providing the duplication equipment can handle these elevated levels.

5. The PET cassette data is recorded 1/2 track on 1/8 inch tape. It has been found that when the data is duplicated with some stereo heads, the head skew and differing phase relationship between the 2 tracks causes a distorted signal and reduced readability. It is therefore best to use mounaural heads on duplicator slaves which are to be used for duplicating PET tapes.

For high volumn cassette tape reproduction you may wish to contact either of the following companies which currently produce Commodore Master Library Programs.

CORY SOUND
440 Brannan St.
San Francisco, Ca. 94107

ATTN: Phil Markinson

OR

AMERICAN SOUND
8120 Webb Ave.
North Hollywood, Ca. 91605

ATTN: Rick Hutchinson

Commodore News

NEW ROMS

A new set of Operating System ROMS - VERSION 2 will be available through your local authorized PET Dealer within the next 30 days. The price will be $49.95. A description of the major differences appear in the PERIPHERAL & ATTACHMENT section of this NEWSLETTER. When ordering, your dealer will need the serial number of your PETs' Main Logic Board Assembly (i.e. 320008,320081, 320132, or 320137).

NEW PRODUCTS

In our first NEWSLETTER we announced May production shipments for most of our new PETS and PERIPHERALS. We are pleased to report that during March, shipments commenced on the 16K and 32K Graphics Keyboard PETS.

This achievement was accomplished despite the entire relocation of our Manufacturing facility, to our Corporate Headquarters in Santa Clara. Visit your local PET DEALER (listed in this NEWSLETTER) to see the first in a series of exciting product introductions.


PROJECT
PLANNING SYSTEM
PROJECT
ACTION CODE
TASK
DESCRIPTION
NAME
START
END
LAST REV
NEXT REV
COMPLETION
STATUS
commodore
PET
2001 Series
personal
computer

Software

NEW SOFTWARE

The following programs from our operation overseas are in the process of being added to our Master Library. Pricing and Ordering information will be included in our next issue.

BACKGAMMON

Plays Backgammon against you or against itself. An "aggression" level between 0-12 can be set. Complete introductory instructions included.

BOOKS

The "BOOKS" 2.0 book-keeping program has been professionally written for students of accounting, so that they may familiarise themselves with the processes of double entry book-keeping by seeing the impact of transactions upon displayed accounting statements. The program is also useful to persons preparing or simulating the accounts of small businesses, in that figures entered as a simplified trial balance may be directly displayed as accounting statements and further amended at will by the entry of transactions in the usual way.

BASIC STATISTICS PACKAGE I

Mean, median, variance, standard deviation, skewness, kurtosis, frequency distribution, linear regression, T-tests, correlation analyses. Data is handled in DATA statements.

BASIC STATISTICS PACKAGE II

Six commonly used tests for running directly with data tapes: Paired t, Upaired t, Linear Regression, Man-Whitney, Wilcoxon, Spearman.

STRATHCLYDE BASIC COURSE

Written by Professor Andrew Collin who uses it to give newcomers to computing a very rigorous introduction to the PET and its BASIC. The package contains 12 programs and a large Workbook with many examples. The package is thoroughly reccommended.

USER PORT COOKBOOK

A manual for connecting devices to the User Port. A program which lets you maintain and modify any registers you wish is included. The 6522 specification is included as an appendix.

SOME COMMON BASIC PROGRAMS

The cassette version of SOME COMMON BASIC PROGRAMS was made specifically for the COMMODORE PET. (See PUBLICATIONS Section for review on the book version) The cassette reads closely with the book, except for afew listings, but the explanations, sample runs still apply.

The file names on the tape are the page number on which the program can be found in the book. For instance, you look in the book for LAST PAYMENT ON A LOAN and type LOAD "33". This will aid you in having less typos which can cause you to miss the program. Another convience is if you wish, you can scan the tape and find how close you are to a given program and which way to go to find it.

Below we have listed the 76 short programs contained in this well produced cassette.

Future Value of an Investment
Future Value of Regular Deposits (Annuity)
Regular Deposits
Regular Withdrawals from an Investment
Initial Investment
Minimum Investment of Withdrawals
Nominal Interest Rate on Investments
Effective Interest Rate on Investments
Earned Interest Table
Depreciation Rate
Depreciation Amount
Salvage Value
Discount Commercial Paper
Principal on a Loan
Regular Payment on a Loan
Las Payment on a Loan
Remaining Balance on a Loan
Term of a Loan
Annual Interest Rate on a Loan
Mortgage Amortization Table
Greatest Common Denominator
Prime Factors of Integers
Area of a Polygon
Parts of a Triangel
Analysis of Two Vectors
Operations on Two Vectors
Angle Conversion: Radians to Degrees
Angle Conversion: Degrees to Radians
Coordinate Conversion
Coordinate Plot
Plot of Ploar Equation
Plot of Functions

Linear Interpolation
Curvilinear Interpolation
Integration: Simposn's Rule
Integration: Trapezoidal
Integration: Gaussian Quadrature
Derivative
Roots of Quadratic Equations
Real Roots of Polynomials: Newton
Roots of Polynomials: Half-interval Search
Trig Polynomial
Simultaneous Equations
Linear Programming
Matrix Addition, Subtraction, Scalar Multiplication
Matrix Multiplication
Matrix Inversion
Permutations and Combinations
Mann-Whitney "U" Test
Mean, Variance, Standard Deviation
Geometric Mean and Deviation
Binomial Distribution
Poisson Distribution
Normal Distribution
Chi-square Distribution
Chi-square Test
Student's "t" Distribution
Student's "t" Distribution
"F" Distribution
Linear Correlation Coefficient
Linear Regression
Multiple Linear Regression
"N"th Order Regression
Geometric Regression
Exponential Regression
System Reliability
Average Growth Rate, Future Projections
Federal Withholding Taxes
Tas Depreciation Schedule
Check Writer Recipe Cost
Map Check
Day of the Week
Days Between Two Dates
Anglo to Metric
Alphabetize

If you would like to order this cassette please send your check for $10.00 to:

OSBORNE & ASSOCIATES, INC.
630 BANCROFT WAY
BERKELEY, CALIF. 94710

FEATURE PROGRAM

Break-Even Analysis (by C. Westfall/J. Parsons)

In Volume 1, Issue 2 of our Newsletter, Break-Even analysis was listed on page 10. The program features the 'form' method of entering and displaying data; which provides a quick and easy method of entering and editing data. The program contains several modules which with slight modifications can serve many purposes. For this reason, each module will be discussed in detail as the 'printing of the form' was discussed in our last issue.

In order to understand how lines 40-90 control input from the form, it is necessary to know what each variable represents and how it is used.

Variable Name	Value or Description of its Function
A	field row position on screen
B	field column position on screen
C	field length
D	position of the cursor within a field
I	the number of the field
TE	the total number of fields
A$	home plus 25 cursor downs
B$	25 cursor lefts
C$	40 spaces
D$	input from keyboard
S$	input from the screen when a field is ex ited. It equals the number printed on the screen.
W$	return + cursor up + cursor down + clear home + home + delete + cursor left + cursor right + space + insert
Y$	1 2 3 4 5 6 7 8 9 0

Controlling input from the form

Line Number	Function
30	The screen is used as a file and open 3, 3 enables the program to access it. I is set equal to zero which is our first field, in this case FIXED COST.

	Function
40	This line is only accessed when you enter a new field either by beginning the program or using cursor controls to change fields.

A, B and C take on the values of the new field's row, column and length respectively. D is set to 1, placing the cursor at the first space in the field except when a delete or cursor left moves you out of a field into the last space of the previous field. If a delete is used D$+ cursor left, space and cursor left sets D$= cursor left.

B=B+C-1 places the cursor at the end of the previous field for simulating the cursor (spacing over).

D=C indicates that the cursor is at the end of the field to prevent input over the field length.

50 The subroutine starting at line 2000 simulates a cursor, gets the input from the keyboard, edits input from the keyboard for invalid data and resets several variables. Note that this sub-routine is only executed when the cursor is moved from one field to another. This module will be discussed in greater detail in our next issue.

K (I)=VAL (S$) stores the numerical value of S$ in K(I) so that the first field is stored in K(0), the second in K(1) and etc.

78 Is a duplicate of 80 and should be omitted.

80 If the last accepted keyboard entry was a delete (D$=cursor left) then control jumps to line 84.

81 The FOR NEXT loop in this line compares D$ (the last accepted input from the keyboard with the first five characters in W$: i.e. RETURN, cursor right, cursor left, clear home or home.

82 If D$ matched one of the first five elements in W$ then control is transferred as follows:

D$	J	GO TO
RETURN	1	90
cursor up	2	84
cursor down	3	86
clear home	4	88
home	5	89

However, should D$ not be one of these five characters J will have a value of 6. Thus, this line will transfer control to line 86.

84 Accessed only when a cursor up has been typed in, or a delete or cursor back has put you in another field.

I=I-1 puts you in the previous field.

If I 0 then I=TE: Should you be in the first field this places you in the last field offering total wrap around.

85 Returns control to 40.

86 Accessed only when the last accepted input was a cursor down, a field filled to capacity, or a cursor right carries you into the next field.

I is increased by one to carry you into the next field. If you are in the last field, I=0 places you in the first field.

87 returns control to line 40.

88 Accessed only when a clear home has been typed.

3000-3020 clears the fields on the screen and resets the stored value of each field to zero.

89 Executed for both a clear home or home.

Sets I to Ø to place the control in the first field.

returns control to line 40.

90 100-140 edits the input for incorrect data.

If data is acceptable then the calculations are performed and the answers displayed by lines 160-290.

Should the data be inadequate an error message is printed by lines 900-910.

Control is returned to line 40.

Our next issue will examine the method employed to edit the input. (Lines 2000-2220)

OTHER PET USER NEWSLETTERS

NAME	FOR ORDERING INFORMATION WRITE:
→ CURSOR	Box 550 Goleta, CA 93017
→ THE PAPER	P.O. BOX 43 Audubon, PA 19407
→ THE PET GAZETTE	1929 Northport Dr. Room 6 Madison, WI. 53704
→ PET USER NOTES	Box 371 Montgmeryville, PA 18936
→ SPHINX PET NEWSLETTER	Lawrence Hall of Science Computer Project University of California Berkeley, CA. 94720

If we have forgotten your favorite PET Newsletter please inform us for updating our next NEWSLETTER.

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PUBLICATIONS

Below is alist of books and manuals that fit into today's mode of personal computer information. Although the computer market has greatly increased, not all book stores are plentiful in this area. Therefore, we intend to release the titles and authors of quality information upon acknowledgement. They will be alphabetized, by title, for quick reference, priced and a short scholium of each book shall be included until the list becomes unmanagable. If your local PET dealer or bookstore does not carry the title you're interested in, contact the publisher directly.

→ BASIC FOR HOME COMPUTERS
by B. Albrecht, L. Finkel and J. Brown

This is an excellent source for the PET beginner. It's format is self-instructional and makes mastery of the BASIC easy. Becuse of its completness, access to a Personal Computer is not even necessary to learn BASIC with this book.

$5.95
334 pgs.

Publisher: John Wiley & Sons, Inc.
605 Third Ave.
New York, N.Y. 10016

→ BEST OF THE PET GAZETTE
by Len Lindsay

This edition is an accumulation of the best information published by the non-profit magazine THE PET GAZETTE. It is an excellent source of available programs and is full of articles contributed from Users. This edition is a must for all PET owners.

Donation - $10.00 Max.
95 pages

Publisher: PET GAZETTE
1929 Northprot Dr.
Room 6, Madison, WI. 53704
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→THE CHANNEL DATA BOOK
by Bill Lewis of Channel Data Systems

The CHANNEL DATA BOOK is the best reference book of User-oriented, PET related products that we've found on the market. It's directory includes EVERYTHING that PET USERS would possibly want:

SOFTWARE
HARDWARE & PERIPHERALS
LITERATURE AND PERIODICALS OF SPECIAL INTEREST TO PET USERS
LISTINGS OF USER GROUPS & DISTRIBUTION
CROSS REFERENCE BY PRODUCT TYPE & SUPPLIER

Prices and dealers are shown along with a short comment. The book includes an attractive 3-ring binder and updated supplements are sent at no additional cost. Definitly reccommended for ALL PET USERS.

$20.00
6% sales tax for Calif. residents.

Publisher: Channel Data Systems
5960 Mandarin Ave.
Goleta, Ca 93017

→ GETTING STARTED WITH YOUR PET ($3.95)
→ PET STRING AND ARRAY HANDLING ($3.95)
→ PET GRAPHICS ($4.95)
→ PET CASSETTE ($4.95)
→ PET MISCELLANEOUS($3.95)
→ PET CONTROL AND LOGIC STATEMENTS ($3.95)
by Total Information Services

This array of titles represents six manuals, designed specifically for the PET, each specializing in specific areas. These "workbooks" clearly designate proper ways of programming and how to get the most out of your PET. A definite MUST for your library.

(See titles for individual prices)
$19.95 per set

PUBLISHER: Total Information Services
P.O. Box 921
Los Alamos, NM 87544

→ HANDS-ON BASIC WITH A PET
by Herbert D. Peckham

This book is a prerequisite for all PET BASIC beginners. It gives the "student" of BASIC a straightforward, simplistic method of understanding BASIC "grammer", as implemented on the PET. Definitly reccommended for each new PET owner.

$10.95
267 pgs.

Publisher: McGraw Hill
8171 Redwood Hwy.
Novato, CA 94947

→ ILLUSTRATED DICTIONARY OF MICROCOMPUTERS
by Michael Hordeski

Impeccably an excellent genesis of microcomputer terminology. It covers everything from Logic Systems to Data Communications. It is comprised of 4,000 computer terms with clear definitions.

$7.95 #1088
322 pgs

Publisher: TAB BOOKS
P.O. Box 40
Blue Ridge Summit, PA 17214

→ SOME COMMON BASIC PROGRAMS, 2ND EDITION
by Mary Borchers and Lon Poole

This book involves the description of numerous programs written in the BASIC programming language. The ability to write programs in BASIC is not necessary, for programs are carefully described and include User examples along with the program listings. Available with this book, is a cassette, which is purchased at a separate price ($10.00). The cassette has also been reviewed in this issue, you can find it in SOFTWARE REVIEW. Purchased as a set or by themselves, they are a good programming source.

$8.50
193 pgs.

Publisher: Osborne & Assoc., Inc.
P.O. Box 2036
Berkeley, Calif. 94702

→ PROGRAMMING THE 6502
by Rodney Zaks

This book contains excellent material for learning to program the 6502. Key features and applications of this microprocesser are shown. Its contents ranges from simple to complex therefore it is a paragon to all microprocesser users.

$10.95
204 pgs.

Publisher: Sybex
2020 Milvia St.
Berkeley, CA 94704

→ 24 TESTED, READY-TO-RUN GAME PROGRAMS IN BASIC
by Ken Tracton

23 of the Programs presented in Mr. Tracton's book, require 8K of memory, except for 'Star Warp', which needs 20K. Program Listing and Documentation are provided for all programs. The selection of games given could be quite an addition to your recreation library.

$5.95
251 pgs.

Publisher: TAB Books
P.O. Box 40
Blue Ridge Summit, PA 17214

If you've read a good programming book that you feel would benefit our readers and would like to share it with them, please feel free to write our Editor.

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Peripherals & Attachments

ROMS VERSION 2 OPERATING SYSTEM (by J. Feagans)

By retroffiting your existing 8K PET with the Version 2 ROMs, you can add several new software features.

The most important addition to the new ROMs is the Machine Language Monitor, formerly loaded into RAM from the cassette tape, P/N 321000. This monitor allows you to load and save arbitrary blocks of memory, examine and deposit values into RAM, and execute Machine Language Programs with pre-set break-points for debugging purposes.

The 6502 NMI (Non Maskable Interrupt) vector has been defined to point at a warm start of BASIC. This allows you to restart a machine without destroying data. Also, a warm start of the Machine Language Monitor is available if you ground the diagnostic sense line on the parallel port while simultaneously applying RESET. (For further explaination refer to Table 7.6 and Table 7.13 in the PET USER MANUAL.)

Some improvements to be noted with the new ROMs are:

→ Arrays may be dimensional as a function of available memory size. (256 element constraint was eleminated)

→ The OPEN statement has been corrected when writing cassette files thereby eliminating the following program patch:

OLD:	CASSETTE 1	CASSETTE 2
	POKE 243,122 POKE 244,2 OPEN 1,1,1,"DATA FILE"	POKE 243,58 POKE 244,3 OPEN 1,2,1,"DATA FILE"
NEW:	CASSETTE 1	CASSETTE 2
	OPEN 1,1,1,"DATA FILE"	OPEN 1,2,1,"DATA FILE"

→ The gap between tape records is automatically extended to the required enter-record gap. The following code is no longer required in conjunction with the PRINT statement:

CASSETTE # 1	CASSETTE # 2
POKE 59411,53	POKE 59456,207

→ The accuracy of the TIME $ function has been improved.

→ THE RND (Ø) function becomes available and is based on a free-running clock rather than the pseudo random number generated by RND (1).

→ When an attempt is made to open more than 1Ø files, the following error message will PRINT rather than entering a Lock-up state:

"?TOO MANY FILES ERROR"

→When a checksum error is encountered while loading from the cassette, the load will be terminated rather than loading potential garbage in memory reserved for the operating system.

→ When a program attemps to write data into a file which has been previously defined for input only, the message reads:

? NOT OUTPUT FILE ERROR

The previous ROMs gave the message:

? FILE NOT OPEN ERROR

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Applications

In our previous NEWSLETTERS we offered $50.00 worth of free Master Library Software to the best 'Application' program submitted. This incentive has now been DOUBLED to $100.00!

For further competitive inspiration, we will be soliciting specific categories of Software each month.* This by no means should stop you from submitting your Application Program just because it doesn't fall within this months' category - send it in and it could be published on its own merit.

Also, for our review staff to be as effectual as possible, please include, with your tape, complete and accurate documentation.

*Current submittals should aid the HOUSEHOLD; personel finance, record keeping, gas mileage file, recipe file, etc....Anything dealing with the efficiency of the American household. The deadline for this application will be May 25, with the "winner" to be announced in early June Why not get some competition going internally with your local USER Group, or compete with another group in your city. Good Luck!
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Programming

THIS SECTION WILL BE DEALING WITH USEFUL ROUTINES AND PROGRAMMING TECHNIQUES FOR YOUR PET. SOME ARTICLES COME FROM USERS, SOME FROM OURSELVES, AND THERE IS A 'BITS AND PIECES" SECTION FOR SMALLER YET VALUABLE ITEMS.

LINE LISTER (by H.S. Patterson)

LINE LISTER is a short BASIC program that can be used as an aid to BASIC programming development. It is less than 1K in size and most lines are numbered above 63000. The program can be loaded and used in viewing the lines of the program being developed.

When RUN is typed and RETURN has been depressed, you are prompted for the starting line. Once the starting line has been entered, the ending line number or a range is then requested. These line numbers are POKED into the program at Line 2. (See Listing below). Upon subsequent RUNs, the RETURN key may be entered to view the same range of BASIC program lines.

If you want to view a particular set number of lines, the letter "R" and a number can be entered at the second prompt. Typing only a RETURN at this point will default to 15 lines, (about one screen's worth of lines).

When an ending line number has been determined, the time of day, and the size of unused memory, FRE(0), is highlighted on the top line along with the listing. The time of day must be initialized by typing in RUN 3 and completing the appropriate entry.

If you keep your program modularized and numbered between 10 and 62999, this small program core can be very convenient in the editing and development of any BASIC program.

```
 1 GOTO63000
 2 LIST00001-63075
 3 GOTO63500:REM SET TIME
 4 *** LINE LISTER ***
 5 *** WRITTEN BY H. SCOTT PATTERSON ***
63000 PRINT"STARTING LINE?▲▲■";
63010 OPEN1,0:INPUT#1,A$
63020 IFASC(A$)=160THEN63060
63030 SL=VAL(A$):GOSUB63200
63040 L=SL:M=1045:GOSUB63100
63050 L=EL:M=M+6:GOSUB63100
63060 T%=VAL(TI$)/100:T0$=" AM":IFT%=>1200THENT0$=" PM"
63065 IFT%<100THENT%=T%+1200
63070 IFT%=>1300THENT%=T%-1200
63075 T1$=RIGHT$(" "+STR$(T%),4)
63080 PRINT"■■   ";:PRINTLEFT$(T1$,2)":"MID$(T1$,3,2)T0$;
63085 CLR:PRINT"  SPC="FRE(0)"■■ ■";
```

```
63090 GOTQ2
63100 L$=STR$(L):LL=LEN(L$)
63110 FORI=0TO4:POKEM-I,48:NEXT
63120 FORI=0TOLL-2
63130 POKEM-I,VAL(MID$(L$,LL-I,1))+48:NEXT:RETURN
63200 PRINT
63205 PRINT"TYPE ENDING LINE #,":PRINT"■R■00, OR ■RETURN■ FOR RANGE ▲▲▲■■";
63210 INPUT#1,C$
63215 IFASC(C$)=160THENNL=15:PRINT"■RANGE="NL:GOTO63235
63220 EL=VAL(C$):IFEL<>0THENRETURN
63225 IFASC(C$)<>82THENPRINT"■"CHR$(13)"■";:GOTO63205
63230 NL=VAL(RIGHT$(C$,LEN(C$)-1))
63235 LK=1025:CL=SL
63240 GOSUB63300
63245 IFCL>=SLTHEN 63260
63250 GOSUB63300:IFLK<>0GOTO63240
63255 RETURN
63260 FORN=1TONL- 1
63265 GOSUB63300:IFLK=0THENRETURN
63270 NEXT:RETURN
63300 EL=CL:CL=PEEK(LK+2)+PEEK(LK+3)*256
63310 LK=PEEK(LK+1)*256+PEEK(LK):RETURN
63500 INPUT"24 HR TIME, ■HHMM■ ";T$
63510 TI$=RIGHT$("0"+T$,4)+"00":RUN
```

WAITING FOR THE CASSETTE

(by J. Parsons)

Some Users may wish to print their own messages to direct the use of the cassettes. This can be done with the use of the BASIC command, WAIT.

The WAIT command will halt the PET Basic program until a bit is set or reset based on the format of the WAIT command.

EXAMPLE: WAIT 59411,8,8

This statement will wait until the 3rd bit (Value of 8) of location 59411 (TAPE #1 CONTROL VECTOR) is **reset** (BIT = Ø). That is, the PET will wait until cassette #1's (internal cassette) motor is turned on.

WAIT 59411,8

This statement will wait until the 3rd Bit of location 59411 is reset (BIT = 1). That is, the PET will wait until cassette #1's motor is turned off.

EXAMPLE PROGRAM FOR CONTROLING TAPE #1:

```
 10 PRINT "REWIND TAPE ONE"
 15 WAIT 59411,8,8
 20 PRINT "THANK YOU"
 25 PRINT "PRESS STOP KEY ON TAPE ONE
"
```

```
30 WAIT 59411,8
35 PRINT "THANK YOU"
40 PRINT " PRESS PLAY ON TAPE #1"
45 WAIT 59411,8,8
50 PRINT "THANK YOU"
60 OPEN 1,1,0
65 PRINT "FOUND A FILE ON THE TAPE"
70 PRINT "PRESS THE STOP ON TAPE #1"
75 WAIT 59411,8
80 CLOSE1
85 PRINT "THANK YOU"
```

If you wish to control Tape #2 then use "WAIT 59456,16,16" to wait for the motor to start and "WAIT 59456,16" to wait for the motor to stop.

NOTE: The execution of the WAIT Command cannot be stopped with the RUN/STOP key. Therefore, if you instruct the PET to WAIT for a condition that will never occur, the only way to recover control is to reset the PET (turning it OFF and then ON).

To find more on the WAIT command read page B-7 in the PET USER MANUAL. For Boolean operators check page D-2 of the PET MANUAL and page 21 of the MOS PROGRAMMING MANUAL.

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PROBING PET'S MEMORY

The following article was written by Karl Hildon and appeared in "The Transactor", Bulletin #9. Accompanying it is a copy of Jim Butterfield's memory map. We thank them for their contribution and permission to allow us to share it with you.

Although other maps have been published, I found Jim's to be the most comprehensive thus far. It lists nearly all of the sub-routines that PET has in ROM and also the areas of RAM that PET uses as registers and buffers. For those who hav en't used a memory map it's as easy as using a city road map. We'll explore this simplicity with a few examples but first a brief explanation of PET memory and the memory map.

ADDRESSING

Every memory location in your PET contains one byte of information. In order for PET to get at these bytes it must have a means of accessing them. Therefore, each and every memory location has its own individual address; all 65536 of them. The microprocessor places these addresses on the address buss which immediately enables one memory location to the data buss. Bearing that in mind, one of two operations can happen now. PET can either place a byte into that location (i.e. POKE) or "look" at what's already there (i.e. PEEK). When performing the first operation the microprocessor places a byte on the data buss and transfers it along the buss and into the enabled memory location.
~~~~~~

In the second operation, the information or byte in the enabled location is transferred onto the data buss and along the data buss back to the microprocessor. This location is not "emptied" but rather only a duplicate or copy of the information is transferred. Once either of these operations is complete the microprocessor then places a new address on the address buss and another location is enabled. This process repeats thousands of times every second, however, these operations aren't possible on all memory locations, but I'll explain this later.

The microprocessor has control of 99.9% of the addresses being placed on the address buss. That extra 0.1% control was left for the user and can be obtained through use of the PEEK, POKE and SYS commands. When executing these commands the user must choose an address. This address will be one of the 65,536 memory locations, (i.e. 0 to 65535). This is where the memory map enters the picture. The memory map may well be your most powerful tool for choosing addresses. If you look at the map you'll see that all of the addresses are listed in ascending order down the left hand side; first in hexadecimal and then in decimal. (See section on hexadecimal and binary for explanation of this conversion), the decimal address is the one you use when executing the above 3 BASIC commands. To the right are the descriptions of what you can expect to find at the corresponding addresses. If we then PEEK these addresses we are returned the actual bytes that are in those particular memory locations. For example, let's say during a program we hit the STOP key and got:

```
BREAK IN 600
READY
```

PET gets '600' from a storage register at addresses 138 and 139. We could also PEEK these locations and find that 600 is indeed stored in 138, 139. However, it is not stored as a six, a zero and a zero. Instead it is stored as the decimal conversion of the line numbers representation in hexadecimal. All information of this type is returned in this manner. Now that we know what the memory map will help us do let's cover some of the rules.

RAM and ROM

We all go through life with basically 3 types of memory:

1. MEMORY PRESENT: This memory we use to remember things like what street we're driving on or our present location.

2. MEMORY PERMANENT: Things like our names and fire is hot we never forget.

3. MEMORY PAST: Recent occurrences and not so recent such as things we did 10 or 12 years ago.

In the PET there are only two:

1. RAM Random Access Memory: This type of storage is used for our programs and things that change such as the clock and previous line number.

2. ROM Read Only Memory: This is PET's permanent memory. In ROM are the addition routines, clock updating routines and loading routines to name a few. These functions would have to be programmed into PET on each power up if they weren't permanently 'burnt in'.

The third type, memory past, is instantly 'forgotten' on power down. The only way to recall it is to first save it on disk, tape, etc.

Recall earlier I mentioned that POKE and PEEK aren't possible on all memory locations for several reasons:

A. Not all PET memory locations actually exist. On the memory map, locations 1024 to 32767 is the 'available RAM including expansion'. If you have a PET with 8K, simple arithmetic shows that 3/4 of the available RAM space is non-existent. If you decide to expand your system, PET will 'fit' the added RAM into this area. However, POKing or PEEKing this space (i.e. 8192 to 32767) will return invalid results on 8K PETs.

B. The same concept applies to locations 36864 to 49151. This is the available ROM expansion area.

C. Next on the memory map is the Microsoft BASIC area; locations 49152 to 57463. This is the memory that recognizes and performs your commands. Changing the contents of these locations is impossible because it is Read Only Memory and is actually 'burnt in' at the factory. Therefore, POKing these locations will simply do nothing. Also, Microsoft requested that these locations return zeros if PEEKed (for copyright reasons).

With these 3 rules and your memory map you are now equipped to explore capabilities of your PET that you probably never thought possible. Before we try some examples let's go into one more important occurrence that may have had you scratching your head ever since that first power up.

MISSING MEMORY?

When you turn on your 8K (where K - 1024) PET, the first thing it tells you is 7167 BYTES FREE; reduction of almost 12%.

Q. Where did the missing 1024 bytes go?

A. It's still there...right below the available RAM space (notice it starts at location 1024). PET uses this memory to do some very useful operations for you which you can find and access by looking them up on the memory map.

Q. But why not do this in ROM space?

A. PET needs RAM type memory to store this data because it is always changing. The information in this "low" end of memory is actually produced by routines found in ROM.

Take for example the built-in clock. The clock or time is stored in locations 512, 513 and 514 of RAM. However, the data comes from a routine found in ROM at location $F736_{hex}$. The time is of course always changing, therefore, it must be stored in RAM. But because it is in RAM you may also change it; either by setting TI or TI$ or you can POKE the above 3 locations. Try it.

Now let's try some examples.

1. Location 226 (00E2 in HEX) holds the position of the cursor on the line. Try these:

   ```
   POKE 226,20:?"PRINTS AT NEXT SPACE
   ?"123456789";:?PEEK(226)
   ```

2. Location 245 (00F5 in HEX) stores the line the cursor is presently on (0 to 24). POKing this location will move the cursor to the specified line after a display execution. For example try:

   ```
   ?"A":  POKE 245,10:?"B":?"C"

   POKE 245,21-1:?"cu":POKE 226,20:?"PRINTS HERE"
   ```

   The above will move the cursor to line 20 (21-1), print a 'cursor up' on line 21 and display your message starting at column 21, line 20.

   While experimenting with out-of-range values I obtained some rather interesting results. Try POKing location 245 with a number greater than 24, say 40 or 60, and hit the cursor up/down key a number of times. Also, experiment with unusual numbers in location 226 such as:

   ```
   POKE 226,100:?"123456789"
   ```

3. Location 526 is the reverse field flag. POKing this address with a non-zero value will execute the following same line print statements in RVS field. Once finished, PET resets 526 to zero. Try this:

   ```
   POKE 526, 1:?"123":?"456"
   ```

   now INST a semi-colon between 3" and the colon (i.e. ...23";:?"4...) and re-execute.

4. Notice below the RVS field flag is location 525; the number of characters in the keyboard buffer. Above the RVS flag is the buffer itself at locations 527 through 536. Although this designates 10 buffer locations, there are actually only 9. The tenth (536) is for some reason a "dead" location. During program execution, the operating system scans the keyboard every 60th of a second. If keys are typed, say, during a 'FOR NEXT' loopc, they are stored in the keyboard buffer until the program encounters a GET or an INPUT.* PET then

* or after a BREAK, READY.

'draws out' the contents of the buffer and implements them according to the command involved (GET or INPUT). However, if more than 9 keys are typed during the loop, PET erases the entire contents of the buffer and continues to fill the buffer with the 10th character as if it were the first, and so on ("modulo 10").

In the command mode (i.e. when you're operating PET directly all typed keys go first into the keyboard buffer and then into screen memory or VIDEO RAM. However, you may also load the buffer under program control by POKing the ASCII representations of the characters into sequential locations of the buffer. You must also increment by 1 the contents of 525 each time another character is POKed in, but remember--not past 9. Page 6 of "Transactor" #2 contains a table of all the values for characters and commands. "Transactor" #1, page 12 lists

some extras such as cursor controls and the RETURN key (13). Try the following endless loop. 145 is a cursor up

```
POKE 525,4:POKE527,145:POKE528,145:POKE529,145:POKE530,13
```

Some other interesting items are:

```
POKE59409,52 - Blanks screen
POKE59409,61 - Screen back on
POKE59411,53 - Turns cassette motor on
POKE59411,61 - Turns motor off
POKE59468,14 - Lower Case mode
POKE59468,12 - Graphics mode
POKE537,136  - Disables STOP key and clock
```

If anyone knows of or discovers and peculiarities by"POKing" around, please send them in. When I receive enough of them a handy dandy 'PETRIX' card will be included in a future "Transactor" bulletin.

THE SYStem COMMAND

On the last three pages of the memory map are listings of the subroutines stored in PET ROM that perform your commands and programs. These subroutines are stored as machine language. When a SYS command is executed PET jumps to the specified decimal address and continues from there in machine language. Take for example the Machine Language Monitor program. This is a machine language program and is initialized by a SYS command stored as a BASIC program line. LOAD and RUN your M.L.M. then type 'X' and hit 'RETURN' to exit to BASIC. Now list. What you'll see is:

```
10 SYS (1039)
```

Location 1039 is the address to which PET will jump and also the address at which the first machine language instruction is stored. (listing of all of all of the M.L.M. instructions is in "Transactor" #5, pages 5A and 5B). When this BASIC line is executed PET operates in machine code beginning with address 1039.

The SYS command does not require brackets around the specified address.

Since PET has its subroutines stored in machine language you can use the SYS command to access and execute them. However, you may come up with some rather peculiar if not disastrous results. When jumping into ROM you may find yourself in the middle of a subroutine or at the beginning of a subroutine belonging to a major function routine. Often PET will 'hang-up' or crash and you will be forced to power down to resume normal operation. To demonstrate jumping into the middle of a routine, try the following examples:

1. SYS52764 (CE1C)
2. SYS62498 (F422)
3. POKE523,1:SYS62498 (F422)
4. SYS62463 (F3FF)
5. SYS64824 (FD48)

The numbers on the right are the addresses of the above sub-routines in hexadecimal. Compare them to the memory map, especially for e.g. #1. Also take a look at 523.

The following are examples of valid locations which you can use with the SYS command to access useful routines, however these routines are already accessible through BASIC.

1. SYS62651 (F346)
2. SYS62278 (F4BB)
3. SYS63134 (F69E)

Example #3 will perform a 'SAVE' but will not produce a tape header.

Experiment with your memory map. Hex to decimal conversions can be obtained using the method following this article.

SUMMARY

This has been merely 'a scratch on the surface' of the extremely complex inner workings of PET. Do not be afraid to experiment with the POKE and SYS commands. There is absolutely nothing you can do to harm PET from the keyboard that turning power off and on won't fix. Also, do some PEEKing around expecially in low end memory. One good way is to write a small monitor program:

```
10?"c"PEEK(516):GOTO 10
```

The above will monitor the SHIFT' key. Try running it and depress 'SHIFT'. Compare the map.

When POKing or SYSing to random addresses, remember the address you choose. Often PET will do something which may erase the address from the screen (e.g. SYS64840).

The addresses that have been listed here are only a few of many that are already known and only a minute percentage of the ones no known. Probe around and send in any discoveries, useful, peculiar or otherwise.

Send to:

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for publication in future Newsletters.

PET MEMORY LOCATIONS

0000-0002	0-2	USR Jump instruction
0003	3	Current I/9 Device for prompt-suppress
0005	5	Cursor position for Input & Print
0008-0009	8-9	Integer address from Basic (for SYS, GOTO, etc.)
000A-0059	10-89	Basic input buffer; # of array subscripts
005A	90	Search character (usually ':' or end-of-line)
005B	91	Scan-between-quotes flag
005C	92	Basic input buffer pointer; number of subscripts
005D	93	First-character of array-name; default DIM flag
005E	94	Type: FF=string; 00=numeric
005F	95	Type: 80=integer; 00=floating point
0060	96	'DATA' scan flag; LIST quote flag; memory flag
0061	97	Subscript flag; FNx flag
0062	98	0=input, 64=get, 152=read (flag)
0063	99	flag for trigonometric signs/comparison evaluation flag
0064	100	input flag (suppress output if negative)
0065	101	variable pseudo-stack pointer
0066	102	fixed-point pseudo-stack pointer
0067	103	dummy value (0)
0068-0070	104-112	variable x pseudo-stack
0071-0072	113-114	pointer for number transfer
0073-0074	115-116	number pointer
0075-0078	117-120	product staging area for multiplication
007A-007B	122-123	start of basic pointer
007C-007D	124-125	end of basic/start of variables pointer
007E-007F	126-127	end of variables/start of arrays
0080-0081	128-129	start of available space pointer
0082-0083	130-131	bottom of strings (moving down) pointer
0084-0085	132-133	top of strings *moving down) pointer
0086-0087	134-135	limit of Basic memory pointer
0088-0089	136-137	current program line number
008A-008B	138-139	previous line number
008C-008D	140-141	previous line address (for CONT)
008E-008F	142-143	line number of DATA line
0090-0091	144-145	memory address of DATA line
0092-0093	146-147	input vector (DATA, etc.)
0094-0095	148-149	current variable name
0096-0097	150-151	current variable address
0098-0099	152-153	variable pointer for current FOR/NEXT
009A	154	Y save register; new operator save
009C	156	comparison symbol accumulator: 1 = 2 4
009D-00A1	157-161	number work area for SQR, etc.
00A2	162	pseudo-stack yardstick (3 or 7)
00A3-00A5	163-165	jump vector for functions
00A6-00AA	166-170	numeric store area
00AB-00AF	171-175	numeric store area
00B0-00B5	176-181	primary accumulator E,M,M,M,M,S
00B6	182	Taylor series constant counter
00B7	183	accumulator high-order propogation word
00B8-00BD	184-189	secondary accumulator
00BE	190	sign comparison, primary/secondary
ooBF	191	low-order rounding byte for primary acc

0000-0001	192-193	Cassette buffer length/Taylor constant pointer
0002-00D9	194-217	Subrtn: Get Basic Char: C9.CA=pointer
00DA-00DE	218-222	RND storage and work area
00E0-00E1	224-225	Pointer to screen cursor line
00E2	226	Position of cursor on line
00E3-00E4	227-228	Utility pointer; tape buffer, scrolling
00E5---E6	229-230	End of current program/tape and address
00E7-00E8	231-232	Tape timing constants
00E9	233	Tape buffer character
00EA	234	Direct/programmed cursor; 00=direct
00EB	235	Tape read/verify flag
00EC	236	Tape write flag
00ED	237	
00EE	238	Number of characters in file name
00EF	239	Logical file number
00F0	240	File command (from OPEN)
00F1	241	Device number
00F2	242	Maximum line length (40 or 80)
00F3-00F4	243-244	Tape buffer address (start of buffer)
00F5	245	Line where cursor lives
00F6	246	Last key pushed (ASCII); buffer checksum
00F7-00F8	247-248	Tape start address/tape pointer
00F9-00FA	249-250	File name pointer
00FB	251	Number of "insert" keys pushed
00FC	252	Serial bit shift word
00FD	253	# blocks remaining to write
00FE	254	Serical word buffer
0100-010A	256-266	Binary to ASCII conversion area
010B-01FF	267-511	Stack area
0200-0202	512-514	TI and TI$ clock - jiffies
0203	515	Which key depressed: 255=no key
0204	516	Shift key: 1 if depressed
0205-0206	517-518	Clock (unused?)
0207	519	Cassette 1 status switch
0208	520	Cassette 2 status switch
0209	521	Keyswitch BIA: STOP & RVS flags, etc.
020A	522	
020B	523	Load=0, Verify=1
020C	524	Status
020D	525	# characters in keyboard buffer
020E	526	Reverse flag
020F-0218	527-536	Keyboard buffer
0219-021A	537-538	Hardware interrup vector
021B-021C	539-540	Break interrrupt vector
021D	541	
021E	542	End-of-line-for-input pointer
0220-0221	544-545	Cursor log (row, column)
0222	546	PBD image for tape I/O
0223	547	Key image
0224	548	0=flashing cursor; else no cursor shows
0225	549	Cursor timing countdown
0226	550	Character under cursor
0227	551	Cursor blink flag
0228	552	Tape write
0229-0241	553-577	Line address high & screen line wrap table

0242-024B	578-587	Logical numbers of open files
024C-0255	588-597	Device numbers of open files
0256-025F	598-607	Command/Secondary address of open files
0260	608	Input from screen/input from keyboard
0261	609	X-save flag
0262	610	How many open files
0263	611	Input device, normally 0
0264	612	Output CMD device, normally 3
0265	613	Tape parity
0266	614	
0268	616	Pointer in filename transfer
026A	618	
026C	620	Serial bit count
026F	623	
0270	624	Tape write countdown
0271	625	Tape buffer #1 count
0272	626	Tape buffer #2 count
0273	627	Leader counter
0274	628	Flag for tape error
0275	629	0 if lst ½-byte cntr not written
0276	630	2nd ½-byte cntr/tape error count
0277	631	
0278	632	Cassette read flag
0279	633	Checksum working word
027A-0339	634-825	Tape #1 buffer
033A-03F9	826-1017	Tape #2 buffer
0400-7FFF	1024-32767	Available RAM including expansion
8000-8FFF	32768-36863	Video RAM
9000-BFFF	36864-49151	Available ROM expansion area
C000-E077	49152-57463	Microsoft Basic
E078-E7F8	57464-59384	Keyboard/screen/Interrupt monitor
E810	59408	PIA1 - Keyboard A register; (Direction with CRA2=1)
E811	59409	PIA1 - Keyboard A control
E812	59410	PIA1 - Keyboard B register; (Direction with CRB2=1)
E813	59411	PIA1 - Keyboard B control
E820	59424	PIA2 - IEEE A register; (Direction with CRA 2=1)
E821	59425	PIA2 - IEEE A control
E822	59426	PIA2 - IEEE B register; (Direction with CRB2=1)
E823	59427	PIA2 - IEEE B control
E840	59456	VIA 1/0 register B
E841	59457	VIA I/0 register A with handshake
E842-E843	59458-59459	VIA Data Direction regs, A and B
E844-E845	59460-59461	VIA Timer 1
E846-E847	59462-59463	VIA Timer 1 latch
E848-E849	59464-59465	VIA Timer 2
E84A	59466	VIA shift register
E84B	59467	ACS: T1.T1.T2.SR.SR.SR.PB.PA
E84C	59468	PCR: B2.B2.B2.B1.A2.A2.A2.A1
E84D-E84E	59469-59470	IFR, IER: T1.T2.CB1.BC2.SR.CA1.CA2
E84F	59471	I/0 Register A without handshake
F000-FFFF	61440-65535	Reset/tape/diagnostic monitor

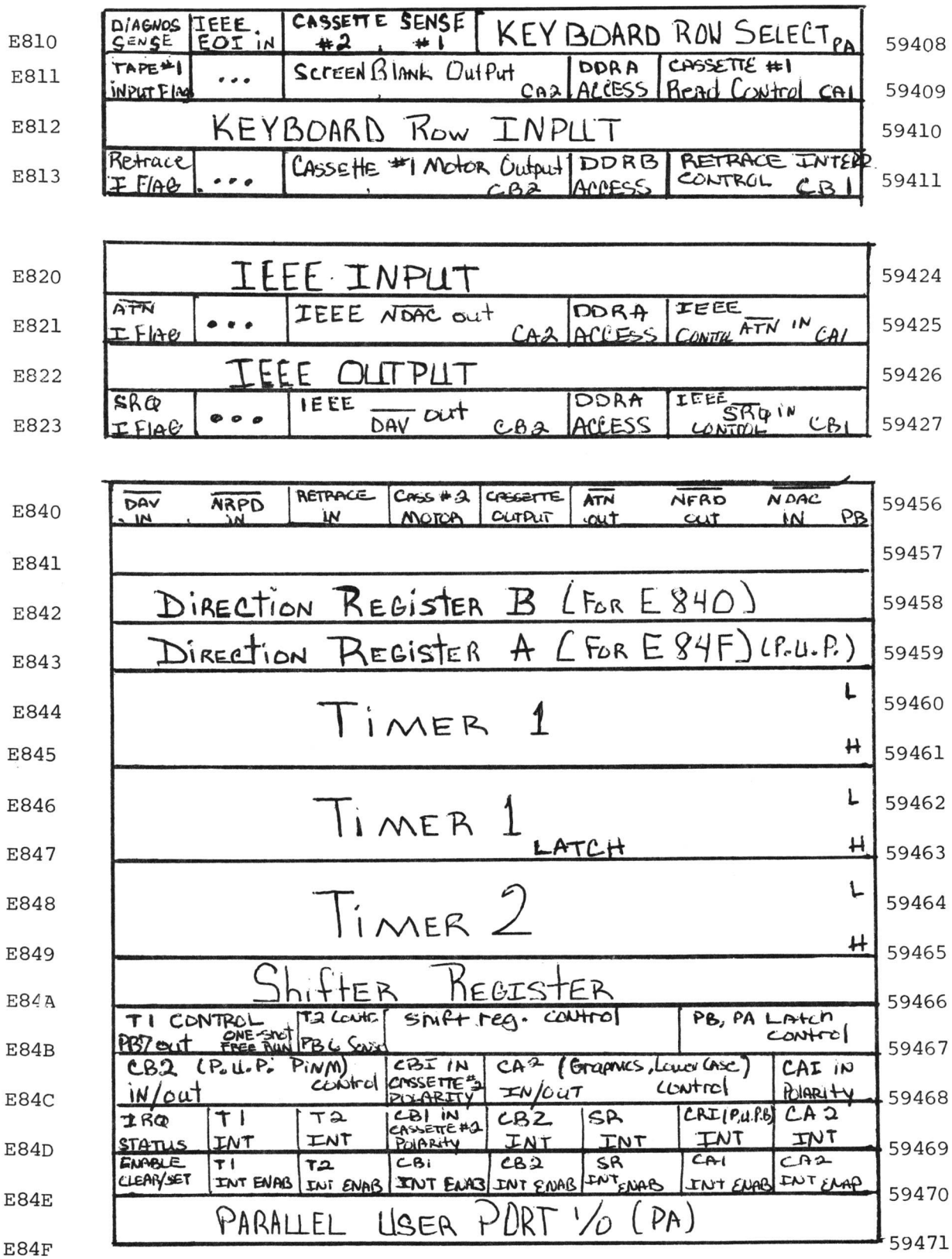
CDC1-CDE7	checks for special characters (+,-,",.) at start of expression
CDE8-CDF6	performs NOT function
CDF7-CE04	checks for various functions
CE05	evaluates expression within parentheses ()
CE0B	checks for right parenthesis
CE0E	checks for left parenthesis
CE11-CE1B	checks for comma
CE1C-CE20	prints SYNTAX ERROR and exits
CE21-CE27	sets up function for future evaluation
CE28-CE39	set up a variable name search
CE3B-CE96	checks for special variables TI, TI$ and ST
CE97-CED5	identifies and sets up function references
CED6-CF05	perform the OR and AND functions
CF06-CF6D	performs comparisons
CF6E-CF7A	sets up DIM execution
CF7B-D00E	searches for a Basic variable
D00F-D078	creates a new Basic variable
D079-D087	logs Basic variable location
D088-D098	is array pointer subroutine
D099-D09C	is 32768 in floating binary
D09D-D0B8	is floating point-to-fixed conversion for signed values
D0B9-D263	locates and/or creates arrays
D264-D277	performs FRE function
D278-D284	converts fixed point-to-floating
D285-D28A	performs PCS function
D28B-D294	checks direct/indirect command, gives 'ILLEGAL DIRECT'
D295-D348	executes DEF statements and evaluation FNx
D349-D36A	performs STR$ function
D36B-D3D1	scans and sets up string elements
D3D2-D403	builds string vectors
D404-D5C3	does 'garbage collection' - discards unwanted strings
D5C4-D5D7	performs CHR$ function
D5D8-D653	performs LEFT$, RIGHT$, MID$ functions
D654-D662	performs LEN, gets string length
D663-D672	performs ASC function
D673-D684	gets a single-byte value from Basic
D685-D6C3	evaluates VAL function
D6C4-D6CF	gets two arguments (16-bit and 8-bit) from Basic
D6D0-D6E5	checks argument is in range 0-65535
D6E6-D701	performs PEEk and POKE
D702-D71D	executes WAIT statement
D71E-D890	performs addition and subtraction
D891-D8BE	contains floating-point constants
D8BF-D8FC	performs LOG function
D8FD-D95D	performs multiplication
D95E-D988	loads secondary accumulator from memory ($B8 to $BD)
D989-D9B3	test and adjust primary/secondary accumulators
D9B4-D9E0	routines to multiply or divide by 10
D9E1-DA73	performs division
DA74-DA98	loads primary accumulator from memory ($b0-$B5)
DA99-DACD	transfers primary accumulator to memory
DACE-DADD	transfers secondary accumulator to primary
DADE-DAEC	transfers primary accumulator to secondary
DAED-DAFC	rounds the primary accumulator
DAFD-DB29	extracts primary sign; performs SGN function
DB2A-DB2C	performs ABS
DE2D-DB6C	compares primary accumulator to memory

DB6D-DB9D Convert Floating point to fixed, unsigned
DB9E-DBC4 perform INT function
DBC5-DC4F convert ASCII string to floating point
DC50-DC84 get new ASCII digit
DC94-DCAE print Basic Line number
DCAF-DDE2 convert floating point to ASCII string (at 0100 up)
DDE3-DE23 conversion constants - decimal or clock
DE24-DE2D evaluation SQR function
DE2E-DE66 evaluation of power function
DE67-DE71 negate (monadic -)
DEA0-DEF2 perform EXP function
DEF3-DF3C perform function series evaluation
DF45-DF9D perform RND calculation
DF9E evaluate COS function
DFA5-DFED evaluate SIN function
DFEE-E019 evaluate TAN function
E048-E077 evaluate ATN function
E0B5-E0CC Basic scan program, transferred to 00C2-00D9
E0D2-E173 completion of power-on-reset; memory test, etc.
E19B-E1BB partial test for TI and TI$
E1BC-E1E0 input/read/get director
E1E1-E27C initialize I/O registers, clear screen, reset subroutine
E27D-E3C3 receive input from keyboard/screen
E3C4-E3E9 set up new screen line
E3EA-E52F output character to screen
E530-E5DA check for and perform screen scrolling
E5DB-E66A start new screen line
E66B-E67D interrupt entry
E67E-E683 interrupt return
E685-E73E hardware interrupt routine: cursor flash, tape motor, keyboard
E73F-E7AB convert keyboard matrix to ASCII
E7AC-E7B9 write-on-screen subroutine
E7DB-E7EB print canned monitor message
F0B6-F1CB IEEE-488 channel open, test, close
F1CC-F22F get input character from keyboard, screen cassette, IEEE
F230-F27C output character to screen, cassette. IEEE
F27D-F2A3 restore normal I/O, clear IEEE channels
F2A4-F2AA abort (not close!) all files
F2AB-F2B7 locate logical file table entry
F2B8-F2C7 transfer file table entries to Device, Command
F2C8-F329 perform file CLOSE
F32A-F33E test stop key
F33F-F345 test if direct/indirect command for suppressing file advice
F346-F3FE perform file LOAD
F3FF-F421 print "SEARCHING.."
F422-F432 print "LOADING .." or "VERIFYING"
F433-F461 get parameters for LOAD and SAVE
F462-F494 perform IEEE sequences for LOAD, SAVE and OPEN
F495-F4BA search for specific tape header
F4BB-F4D3 perform VERIFY
F4D4-F529 get parameters for OPEN and CLOSE
F52A-F5AD perform OPEN
F5AE-F5E2 search for any tape header
F5E3-F5EC clear tape buffer
F5ED-F64C write tape header
F64D-F666 get start & end addresses from tape header
F667-F67C Set buffer start address
F67D-F694 Set tape buffer start and end pointers
F695-F69D perform SYS command
F69E-F71B perform SAVE
F71C-F735 find unused secondary address
F736-F78A update clock
F78B-F7DB set input device
F7DC-F82C set output device
F82D-F83A bump tape buffer counter
F83B-F85D wait for cassette PLAY switch
F85E-F870 test cassette switch line
F871-F87E wait for cassette RECORD and PLAY switches
F87F-F8B8 read tape initiation routine
F8B9-F8D1 write tape initiation routine
F8D2-F912 complete tape read or write
F913-F91D wait for I/O completion
F91E-F92D test stop key and abort if necessary
F92E-F95E subroutine to set tape read timing
F95F-FBDB interrupt routine for tape read
FBDC-FBE4 save memory pointer
FBE5-FBEB set ST error flag
FBEC-FBFF subroutine to count 8 serial bits per byte
FC00-FC1B subroutine to write a bit to tape
FC1C-FCFA interrupt 1 for tape write - entry at FC21
FCFB-FD15 terminate I/O and restore normal vectors
FD16-FD37 subroutine to set interrupt vector
FD38-FD47 power-on reset entry; test for diagnostic
FD48-FD7B diagnostic routine
FD7C-FD8F checksum routine
FD90-FD9A pointer advance subroutine
FD9B-FFB1 diagnostic routines

JUMP TABLE

FFC0 OPEN
FFC3 CLOSE
FFC6 set input device
FFC9 set output device
FFCC restore normal I/O devices
FFCF input character (from screen)
FFD2 output character
FFD5 LOAD
FFD8 SAVE
FFDB VERIFY
FFDE SYS
FFE1 test stop key
FFE4 get character from keyboard buffer
FFE7 abort all I/O channels
FFEA update clock

FFED-FFFA turn off cassette motors
FFFA-FFFB NMI vector (mangled)
FFFC reset vector
FFFE-FFFF interrupt vector


E810
DIAGNOS SENSE
IEEE EOI IN
CASSETTE SENSE #2 #1
KEYBOARD ROW SELECT PA
59408
E811
TAPE #1 INPUT FLAG
...
SCREEN BLANK OUTPUT CA2
DDRA ACCESS
CASSETTE #1 READ CONTROL CA1
59409
E812
KEYBOARD ROW INPUT
59410
E813
RETRACE I FLAG
...
CASSETTE #1 MOTOR OUTPUT CB2
DDRB ACCESS
RETRACE INTERR. CONTROL CB1
59411
E820
IEEE INPUT
59424
E821
ATN I FLAG
...
IEEE NDAC out CA2
DDRA ACCESS
IEEE CONTR ATN IN CA1
59425
E822
IEEE OUTPUT
59426
E823
SRQ I FLAG
...
IEEE DAV out CB2
DDRA ACCESS
IEEE CONTROL SRQ IN CB1
59427
E840
DAV IN
NRFD IN
RETRACE IN
CASS #2 MOTOR
CASSETTE OUTPUT
ATN OUT
NFRD OUT
NDAC IN PB
59456
E841
59457
E842
DIRECTION REGISTER B (FOR E840)
59458
E843
DIRECTION REGISTER A (FOR E84F) (P.U.P.)
59459
E844
TIMER 1
L
59460
E845
H
59461
E846
TIMER 1 LATCH
L
59462
E847
H
59463
E848
TIMER 2
L
59464
E849
H
59465
E84A
SHIFTER REGISTER
59466
E84B
T1 CONTROL PB7 out ONE-SHOT FREE RUN
T2 CONTR PB6 SENSE
SHIFT REG. CONTROL
PB, PA LATCH CONTROL
59467
E84C
CB2 (P.U.P. PIN/M) IN/out CONTROL
CB1 IN CASSETTE #2 POLARITY
CA2 (GRAPHICS, LOWER CASE) IN/OUT CONTROL
CA1 IN POLARITY
59468
E84D
IRQ STATUS
T1 INT
T2 INT
CB1 IN CASSETTE #2 POLARITY
CB2 INT
SR INT
CR1 (P.U.P.B) INT
CA2 INT
59469
E84E
ENABLE CLEAR/SET
T1 INT ENAB
T2 INT ENAB
CB1 INT ENAB
CB2 INT ENAB
SR INT ENAB
CA1 INT ENAB
CA2 INT ENAB
59470
E84F
PARALLEL USER PORT I/O (PA)
59471

BITS AND PIECES

Clearing the Keyboard or Buffer (by C. Westfall)

Your PET has the ability to remember what you've typed, even when it's not scanning for input. The feature is commonly called "Keyboard Buffering". If you depress a key while the PET is executing instructions other than INPUT or GET, your input (up to 10 characters) is stored in the keyboard buffer. When the next INPUT or GET is encountered, your input will then be accepted and utilized by the program. This enables you to answer a question before it is asked thereby speeding up program execution time. However, if you accidently enter a wrong key while the PET is executing instructions, this input is also stored in the buffer. For this reason, it becomes advantageous in certain situations not to accept input, except when called for by the program. This can be done by clearing the keyboard buffer. The following line of code placed immediately before a GET or INPUT will clear the buffer.

```
10 GET X$: IFX$< >""THEN10
```

Several articles in other publications have suggested the use of the POKE to clear this buffer. Although the POKE 525,0 usually works, it is not recommended because:

1) the routine which uses this location is interrupt driven. Changing this buffer index may yield unpredictible results.

2) it will make your program machine dependent. In order to incorporate new features in the 16K&32K PET's some memory had to be changed; the keyboard buffer being one of them.

Users' Directory &

Announcements

One of the major advantages in being a member of the PET USERS' CLUB is the ability to get hold of PET related Software and ideas. Although our Master Library of programs is now growing, we get frequent Software inquires for a wide range of applications.

In this issue, we have included the current Users' Directory, containing lists of people writing software, importing literature or starting local PET Groups. If you would like to use your PET for fun and profit, why not offer personal tutoring in PET programming to new PET owners. Alternatively, if you require a program to be written for you, ask for contacts via the USERS' DIRECTORY. The possibilities are endless. Please write to the EDITOR, U.S. PET USERS' CLUB, at our NEW address below.

To include your name in the USERS' DIRECTORY, please complete the following form:

TO: THE EDITOR, U.S. PET USERS' CLUB, Commodore Business Machines Inc., 3330 Scott Blvd., Santa Clara, Calif. 95050.

NAME:_____

ADDRESS_____

_____

SERVICES OFFERED/SPECIALIST AREA OF INTEREST:_____

_____

_____

To include as many contacts as possible, we must restrict each USER to only one line of description.

COMMODORE reserves the right to edit or withdraw any entry.

****

LISTED BELOW ARE PET USERS WHO HAVE RECENTLY SUBMITTED THEIR SPECIALTY OR AREA OF INTEREST TO FURTHER COMMUNICATION WITH PET OWNERS THROUGHOUT THE UNITED STATES. IF YOU WOULD LIKE TO OFFER YOUR SERVICES TO OTHERS, PLEASE FILL OUT THE "USER DIRECTORY" FORM ON THE PREVIOUS PAGE.

NAME AND ADDRESS	SERVICES OFFERED/SPECIALTIES
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Len Bugel RFD 1 Stration Mtn., VT 05155	Business/Engineering Application Software Development Basic and 6502 Machine Code.
Roger C. Garrett Rogers High School Computer Club c/o 16 Grinnell St. Jamestown, RI 02835	Teaching PET. Basic Programming
Bob Krebs c/o Folklife Terminals Box 155 Bronx, N.Y. 10453	Programs well written to Order inexpensively
John M. Morgan M.D. Lankenau Hosp. Lancaster & City Line Ave Phila, PA 19151	Medical application of Microcomputers in Diagnoise, Theruputic and informational processing Especially in the field of Diabetes Melutos.
Kent Poulsen, Area Vocational Route 3 Box 75 Astoria, Ore, 97	Computer aided instruction. Education- Electronics
Kenneth Tong 1800 Taylor Ave., N. 102 Seattle, WA 98109	Education--application of PET in classroom.
Tycome Associates 68 Velma Ave. Pittsfield, Mass. 01201	Custom Software, PET Basic or machine language.

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Lawrence Hall of Science, UC Berkeley
Computer Project, Room 254. . Berkeley, CA 94720

Las Vegas PET Users
4884 Iron Ave . . . . . Las Vegas, Nev. 89110

Lincoln Computer Club
750 E. Yosemite . . . . . Manteca, CA 95336

Madison PET Users
1400 East Washington Ave. Madison, WI 53703

Northern New England Computer Society
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North Orange County Computer Club
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Northwest PET User Group
P.O. Box 482 . . . . . Vashon, WA 98070

PET User Club (CAPE)
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PET User Group
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PET User Group c/o Meyer
35 Barker Ave. . . .White Plains, NY 10610

PET User Group . . . . .
Texas A & M Microcomputer Club, Tex. A & M, Tex.

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The Human Society--United PET Users
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3330 Peidmont Rd.
Atlanta, GA 30305
(404) 261-7100

ATLANTA COMPUTER MART
5091-B Buford Highway
Atlanta, GA 30340
(404) 455-0647

COMPUTERLAND/MARIETTA
Cumberland Square North
2423 Cobb Parkway
Smyrna, GA 30080
(404) 953-0406

THE LOGIC STORE
3050 Macon Road
Columbus, GA 31906
(404) 568-0197

OLSON ELECTRONICS
2571 North Decatur Road
Decatur, GA 30033
(404) 378-4201

HAWAII

COMPUTERLAND/HAWAII
567 South King St.
Honolulu, HI 96813
(808) 521 8002

IDAHO

CIMCO DISTRIBUTORS, INC.
1016 Park Lane
Pocatello, ID 83201
(208) 237-2448

WORLD TOY & HOBBYCRAFT, INC.
7820 Fairview Ave.
Boise, ID 83704
(208) 376-3561
(208) 376-2438

ILLINOIS

BYTE SHOP OF LA GRANGE
5 S. La Grange Road
La Grange, IL 60525
(312) 579-0920
Bill Rose

BYTE SHOP OF URBANA
1602 S. Neil Street
Champaign, IL 61820
(217) 352-2323
Dave Peters

COMPUTERLAND/NILES
9511 N. Milwaukee Ave.
Niles, IL 60648
(312) 967-1714

COMPUTERLAND/OAK LAWN
10935 S. Cicero Ave.
Oak Lawn, IL 60453
(312) 422-8080

COMPUTERLAND/PEORIA
4507 N. Sterling
Peoria, IL 61614
(309) 688-6252

FINANCIAL DYNAMICS COMPUTING
1305 N. Harlem
Oak Park, IL 60302
(312) 848-7500

KAPPEL'S COMPUTER STORE
125 E. Main St.
Belleville, IL 62220
(618) 277-2354

LILLIPUTE COMPUTER MART, INC.
4446 Oakton St.
Skokie, IL 60076
(312) 674-1383

MR. CALCULATOR
1038 Northbrook Court
Northbrook, IL 60062
(312) 272-2520

OLSON ELECTRONICS
4101 N. Milwaukee Ave.
Chicago, IL 60641
(312) 545-7336

OLSON ELECTRONICS
123 North Western Ave.
Chicago, IL 60612
(312) 421-3533

OLSON ELECTRONICS
2641 West 95th St.
Chicago, IL 60642
(312) 425-6192

OLSON ELECTRONICS
1734 Ogden Ave.
Downers Grove, IL 60515
(312) 852-9650

OLSON ELECTRONICS
721 W. Golf Road
Hoffman Estates, IL 60194
(312) 882 7330

OLSON ELECTRONICS
1354 Winston Plaza
Melrose Park, IL 60160
(312) 344-6200

OLSON ELECTRONICS
6231 Dempster St.
Morton Grove, IL 60053
(312) 966-6700

PERSONAL COMPUTER OF CHICAGO
100 East Ohio St.
Chicago, IL 60611
(312) 337-6744

PRESCRIPTION LEARNING
5240 South Sixth Street Rd.
Springfield, IL 62705
(217) 786-2500

STEREOTRONIC INDUSTRIES
Wadsworth Road and North Avenue
Zion, IL 60099
(312) 336-2222

INDIANA

AUDIO SPECIALISTS
415 N. Michigan
South Bend, IN 46601
(219) 234-5001

BYTE SHOP OF INDIANAPOLIS
8077 Bramwood Court
Indianapolis, IN 46250
(317) 842-2983
Bruce Barker

COMMUNICATIONS ELECTRONICS, INC.
2204 Grand Ave.
Connersville, IN 47331
(317) 825-6893

THE COMPUTER CENTER
19819 Orchard St.
South Bend, IN 46637
(219) 272-0252

GRAHAM ELECTRONIC SUPPLY
6101 N. Keystone
Indianapolis, IN 46220
(317) 263-4261

GRAHAM ELECTRONIC SUPPLY
133 S. Pennsylvania St.
Indianapolis, IN 46204
(317) 634-8202

OLSON ELECTRONICS
5353 N. Keystone
Indianapolis, IN 46220
(317) 253-1584

IOWA

THE COMPUTER CENTER
302 Commercial
Waterloo, IO 50701
(319) 232-9504

THE COMPUTER STORE OF DAVENPORT
4128 Brady St.
Davenport, IO 52806
(319) 386-3330

KANSAS

BYTE SHOP OF MISSION
5815 Johnson Drive
Mission, KS 66202
(913) 432-2983
Dave Land

COMPUTERLAND/OVERLAND PARK
10049 Santa Fe Drive
Overland Park, KS 66212
(913) 492-8882

THE COMPUTER ROOM
7105 W. 105th St.
Overland Park, KS 66212
(913) 648-7105

COMPUTER SYSTEMS DESIGN
906 North Main
Wichita, KS 67214
(316) 265-1120

MAIN ELECTRONICS
225 Ida
Wichita, KS 67211
(316) 267-3581

KENTUCKY

BARNEY MILLER'S, INC.
232 E. Main St.
Lexington, KY 40507
(606) 252-2216

COMPUTERLAND/LOUISVILLE
813 E. Lyndon Lane
Louisville, KY 40222
(502) 425-8308

MICROTECH, INC.
1127 So. 6th St.
Louisville, KY 40203
(502) 587 8099

OLSON ELECTRONICS
117 Southland Dr.
Lexington, KY 40503

OLSON ELECTRONICS
4137 Shelbyville Rd.
Louisville, KY 40207
(502) 893-2562

LOUISIANA

COMPUTER PLACE
3340 Highland Rd.
P.O. Box 1413
Baton Rouge, LA 70821
(504) 387-0072

COMPUTER SHOPPE, INC.
3225 Danny Park
Metairie, LA 70002
(504) 454-6600

FREEMAN ELECTRONICS
708 No. 7th St.
West Monroe, LA 71291
(318) 388-2312

VIDEO SPECTRUM
6601 Veterans' Memorial Blvd.
Metairie, LA 70003
(504) 885-6527

MARYLAND

COMPUTERLAND/GAITHERSBURG
16065 Frederick Road
Route 355
Rockville, MD 20855
(301) 948-7676

COMPUTERS, ETC.
13A Allegheny Ave.
Towson, MD 21204
(301) 296-0520

DELMARVA COMPUTER
19 No. Harrison St.
Easton, MD 21601
(301) 822-6613

MAC'S MERCHANDISE MART
7140 Fairbrook Road
Baltimore, MD 21207
(301) 298-0473

THE MATH BOX, INC.
2621 University Blvd. West
Wheaton, MD 20902
(301) 833-6555

YOUR OWN COMPUTER, LTD.
Kettering Plaza Shopping Cntr.
10678 Campus Way South
Upper Marlboro, MD 20870
(202) 783-0390

MASSACHUSETTS

COMPUTER SHOP 11000011
288 Norfolk St.—Cor. Hampshire
Cambridge, MA 02139
(617) 661-2670

MARKLINE
411 Waverly Oaks Road
Waltham, MA 02154
(617) 891-6250

NEW ENGLAND ELECTRONICS CO.
248 Bridge St.
Springfield, MA 01103
(413) 739-9626

OLSON ELECTRONICS
817-821 Boylston
Boston, MA 02116
(617) 267-4700

OLSON ELECTRONICS
Hanover Mall
Hanover, MA 02339
(617) 826-5196

OLSON ELECTRONICS
North Shore Shopping Center
Peabody, MA 01960
(617) 532-0800

RETAIL COMPUTER CENTER, INC.
455 Center St.
Ludlow, MA 01056
(413) 589 0106

MICHIGAN

COMMUNICATIONS ELECTRONICS
854 Phoenix
Ann Arbor, MI 48106
(313) 994-4444

COMPUTER HOUSE
1407 Clinton Road
Jackson, MI 49202
(517) 783-5343

COMPUTERLAND/GRAND RAPIDS
2927 28th Street, S.E.
Kentwood, MI 48508

COMPUTERLAND/SOUTHFIELD
29763 Northwestern Highway
Southfield, MI 48034
(313) 356-8111

COMPUTERMART OF ROYAL OAK
560 W. 14 Mile Rd.
Royal Oak, MI 48073
(313) 288-0040

COMPUTRONIX CORP.
423 Saginaw Road
Midland, MI 48640
(517) 631-8060

ERIC ELECTRONICS
10721 W. Ten Mile Road
Oak Park, MI 48237
(313) 547-0203

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
3430 Washtenaw
Ann Arbor, MI 48104
(313) 971-5420

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
1326 Broadway
Detroit, MI 48226
(313) 961-2955

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
1375 E. Grand River Ave.
East Lansing, MI 48823
(517) 332-8676

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
29400 Orchard Lake Road
Farmington, MI 48024
(313) 626-4594

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
3142-28th St.
Grand Rapids, MI 49508
(616) 949-8590

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
214 N. Rose St.
Kalamazoo, MI 49006
(616) 381-5164

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
33760 Plymouth Road
Livonia, MI 48150
(313) 261-0600

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
31873 Gratiot
Roseville, MI 48066
(313) 268-8550

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
3460 West Road
Trenton, MI 48183
(313) 675-7900

LAFAYETTE RADIO ELECTRONICS
ASSOC. STORE
Eric Electronics
3127 W. Huron
Waterford, MI 48095
(313) 681-7400

NEWMAN COMPUTER EXCHANGE
1250 N. Main St.
Ann Arbor, MI 48107
(313) 994-3200

OLSON ELECTRONICS
15847 Southfield Road
Allen Park, MI 48101
(313) 388-9150

OLSON ELECTRONICS
1990 Woodward Ave.
Bloomfield Hills, MI 48013
(313) 334-4759

Authorized PET Dealers

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15620 Grand River Ave.
Detroit, MI 48227
(313) 838-0777

OLSON ELECTRONICS
19045 Middlebelt Road
Livonia, MI 48152
(313) 477-0280

OLSON ELECTRONICS
29121 DeQuindre
Madison Heights, MI 48071
(313) 546-0190

OLSON ELECTRONICS
37627 Gratiot Ave.
Mt. Clemens, MI 48043
(313) 463-7074, 7075

OLSON ELECTRONICS
200 N. Wayne Road
Westland, MI 48185
(313) 722-3440

TRI-CITIES COMPUTER MART
3145 Shattuck Road
Saginaw, MI 48603
(517) 790-1360

MINNESOTA

COMPUTER DEPOT
3615 W. 70th St.
Minneapolis, MN 55436
(612) 927-5601

COMPUTERLAND/BLOOMINGTON
8070 Morgan Circle Dr.
Bloomington, MN 55431
(612) 884-1474

MINNESOTA MICRO SYSTEMS
514 Cedar Avenue South
Minneapolis 55454
(612) 338-5604

MISSOURI

CDC ASSOCIATES, INC.
235 Dunn Rd.
Florissant, MO 63031
(314) 921-4433

COMPUTERLAND/SPRINGFIELD
1722 W.W. So. Glenstone
Springfield, MO 65804
(417) 883-7085

COMPUTER MART
1915 Noland Road
Independence, MO 64055
(816) 461-5005

FORSYTHE COMPUTERS
11966 St. Charles Rock Road
Bridgeton, MO 63044
(314) 739-8300

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

PARSONS ELECTRONICS
1059 Venture Dr.
St. Charles, MO 63301
(314) 723-2227

MONTANA

BYTE SHOP OF BILLINGS
1201 Grand Ave., Suite 3
Billings, MT 59102
(406) 252-2299
Richard Johnson

THE COMPUTER STORE
3548 Miles Ave.
Billings, MT 59102
(406) 656-2365

VARITRON
Box 729
Chinook, MT 59523
(406) 357-2116

NEBRASKA

BYTE SHOP OF OMAHA
8523 Park Drive
Omaha, NE 68127
(402) 339-7350
Hal Bohannon

OMAHA COMPUTER STORE
4540 S. 84th St.
Omaha, NE 68127
(402) 592-3590

NEVADA

BYTE SHOP OF RENO
4104 S. Kietzke Lane
Reno, NV 89502
(702) 826-8080
Chuck Growdon

HOME COMPUTERS
1775 Tropicana
Las Vegas, NV 89109
(702) 736-6363

INGENUITY, INC.
1562 Linda Way
Sparks, NV 89431
(702) 359-6671

NEW HAMPSHIRE

COMPUTERLAND/NASHUA
419 Amherst
Nashua, NH 03060
(603) 889-5238

NEW JERSEY

COMPUTERLAND/BERGEN COUNTY
35 Plaza
Highway E65, Route 4
Paramus, NJ 07652
(201) 845-9303

COMPUTERLAND/CHERRY HILL
Pine Tree Plaza
1442 E. Route 70
Cherry Hill, NJ 08034
(609) 795-5900

COMPUTERLAND/MORRISTOWN
2 DeHart St.
Morristown, NJ 07960
(201) 539-4077

THE COMPUTER NOOK
Pine Brook Plaza
Route 46
Pinebrook, NJ 07058
(201) 575-9468

NEW YORK

AMERICAN PERIPHERALS
3 Bangor Street
Lindenhurst, NY 11747
(516) 587-2615

APOLLO DISTRIBUTORS
39 Woodland
Farmingdale, NY 11735
(516) 420-8642

A.S.D. OFFICE SYSTEMS
Van Wyck Plaza
Poughkeepsie, NY 12603
(914) 473-9400

BYTE SHOP OF LEVITTOWN
2721 Hempstead Tnpk.
Lexington & 40th (Extension of Levittown)
Levittown, NY 11756
(516) 731-8116
Adams/Barton

THE COMPUTER CORNER
White Plains Mall
200 Hamilton Ave.
White Plains, NY 10601
(914) 949-3282

COMPUTER FACTORY
485 Lexington Ave.
New York, NY 10017
(212) 687-5001

COMPUTER GENERAL STORE
103 Atlantic Ave.
Lynbrook, NY 11563
(516) 887-1500

COMPUTER HOUSE, INC.
721 Atlantic Ave.
Rochester, NY 14609
(716) 654-9238

COMPUTERLAND/BUFFALO
1612 Niagara Falls Blvd.
Buffalo, NY 14150
(716) 836-6511

COMPUTERLAND/ITHACA
225 Elmira Rd.
Ithaca, NY 14850
(607) 277-4888

COMPUTER MART OF NEW YORK
118 Madison Ave.
New York, NY 10016
(212) 686-7923

COMPUTER MICROSYSTEMS
1311 Northern Blvd.
Manhasset, NY 11030
(516) 627-3640

COMPUTER SHOP OF SYRACUSE
3470 E. Erie Blvd.
DeWitt, NY 13214
(315) 446-1284

COMPUTER WORLD
519 Boston Post Rd.
Port Chester, NY 10573
(914) 937-6662

MEIZNER BUSINESS MACHINES
24 Lorraine Ave.
Mt. Vernon, NY 10553

NORTH CAROLINA

BYTE SHOP OF CHARLOTTE
6341 Albemarle Road
Charlotte, NC 28212
(704) 568-8100
Guy Allsup

BYTE SHOP OF GREENSBORO
218 N. Elm Street
Greensboro, NC 27410
(919) 272-2983
Robert Terrell

BYTE SHOP OF RALEIGH
c/o Carolina Info. Systems
P.O. Box 10534
1213 Hillsborough St.
Raleigh, NC 27605
(919) 833-0210
Tim Collins

CAROLINA INFORMATION SYSTEMS
P.O. Box 10534
Raleigh, NC 27605
(919) 833-0210

COMPUTERLAND/CHARLOTTE
3915 E. Independence Blvd.
Charlotte, NC 28205
(704) 536-8500

THE COMPUTER ROOM
1100 E. Morehead St.
Charlotte, NC 28204
(704) 377-9821

NORTH DAKOTA

OHIO

ASTRO VIDEO ELECTRONICS
504 E. Main St.
Lancaster, OH 43130
(614) 687-0629

BYTE SHOP OF COLUMBUS
c/o The Wry Corp.
2432 Chester Lane
Columbus, OH 43221
(614) 486-7761
Bob Yorde

BYTE SHOP OF ROCKY RIVER
19542 Center Ridge Rd.
Rocky River, OH 44016
(216) 333-3261
Nick Costanzo

COMPUTERLAND/CLEVELAND EAST
1288 SOM Center Road
Mayfield Heights, OH 44124
(216) 461-1200

DAYTON COMPUTER MART
2665 So. Dixie Ave.
Dayton, OH 45409
(513) 296-1248

GRAHAM ELECTRONICS SUPPLY
239 Northland Blvd.
Cincinnati, OH 45215
(513) 772-1661

McSHANE, INC.
123 West Washington
Medina, OH 44265
(216) 725-4568

MICRO MINI COMPUTER WORLD, INC.
Town and Country Shopping Center
62 Country Road
P.O. Box 13207
Columbus, OH 43213
(614) 235-5813

OLSON ELECTRONICS
69 West State St.
Akron, OH 44308
(216) 762-0301

OLSON ELECTRONICS
1994 Brittain Rd.
Akron, OH 44310
(216) 633-4338

OLSON ELECTRONICS
3265 West Market St., Room 108
Akron, OH 44313
(216) 864-3407

OLSON ELECTRONICS
2020 Euclid Ave.
Cleveland, OH 44115
(216) 621-6387

OLSON ELECTRONICS
6813 Pearl Road
Cleveland, OH 44130
(216) 845-2424

OLSON ELECTRONICS
6153 Mayfield Road
Cleveland, OH 44124
(216) 449-2690

OLSON ELECTRONICS
21850 Center Ridge Road
Cleveland, OH 44116
(216) 331-4600

OLSON ELECTRONICS
1975 Henderson Road
Columbus, OH 43220
(614) 451-3245

OLSON ELECTRONICS
7401 Market St.
Southern Park Mall
Youngstown, OH 44512
(216) 758-3828

RIKE'S
1111 South Miami Blvd. West
Dayton, OH 45401
(513) 225-8457

OKLAHOMA

OREGON

ANCRONA
1125 NE 82nd Ave.
Portland, OR 97220
(503) 254-5541

COMPUTER PATHWAYS UNLIMITED, INC.
145 Alice St. South
Salem, OR 97302
(503) 399-0534

PENNSYLVANIA

A. B. COMPUTERS
1411 West Callowhill Road
Perkasie, PA 18944
(215) 257-8195

BYTE SHOP
1045 West Lancaster Ave.
Bryn Mawr, PA 19010
(215) 525-7712
Dick Smith

COMPUTER AID
Latrobe 30 Shopping Plaza
Route 30 East
Latrobe, PA 15650
(412) 539-1133

COMPUTERLAND/HARRISBURG
4644 Carlisle Pike
Mechanicsburg, PA 17055
(717) 763-1116

GLOSSER BROS., INC.
Franklin & Locust Sts.
Johnstown, PA 15901
(814) 536-6633

GREY FOX ELECTRONICS
Main & Reliance
Telford, PA 18969
(215) 723-3831

MARKETLINE SYSTEMS
2337 Philmont Ave.
Huntingdon Valley, PA 19006
(215) 947-6670

MR. CALCULATOR
1700 Samson
Philadelphia, PA 19103
(215) 568-0486

OLSON ELECTRONICS
5918 Penn Ave.
Pittsburgh, PA 15206
(412) 362-1333

OLSON ELECTRONICS
3405 Saw Mill Run Road
Pittsburgh, PA 15227
(412) 881-0702

OLSON ELECTRONICS
4778 McKnight Road
Pittsburgh, PA 15237
(412) 366-7298

PUERTO RICO

MICRO COMPUTER STORE OF PUERTO RICO
1568 Avenue Jesus T. Pinero
(antes Central)
Caparra Terrace, Rio Piedras
Puerto Rico 00921
(809) 781-0350

RHODE ISLAND

SOUTH CAROLINA

BYTE SHOP OF COLUMBIA
2018 Green Street
Columbia, SC 29205
(803) 771-7824
Reynolds Tokunaga

SOUTH DAKOTA

TENNESSEE

BYTE SHOP OF KNOXVILLE
5613 Kingston Pike
Knoxville, TN 37919
(615) 584-8365
(615) 546-6363
Al Miller

THE COMPUTER STORE, INC.
2910 Southway
Memphis, TN 38118
(901) 794-1854

TEXAS

ANCRONA
2649 Richmond Ave.
Houston, TX 77098
(713) 529-3489

COMPUTERLAND/AUSTIN
Shoal Creek Plaza
3300 Anderson Lane
Austin, TX 78757

COMPUTERLAND/DALLAS
The Corner Shopping Center
8061 Walnut Hill Lane, Suite 912
Dallas, TX 75231
(214) 363-2223

COMPUTERLAND/HOUSTON-BAY AREA
1018 Willowvale
Seabrook, TX 77586
(713) 474-4808

COMPUTERLAND/S.W. HOUSTON
6439 Westheimer
Houston, TX 77057
(713) 977-0909

THE COMPUTER SHOP
6812 San Pedro
San Antonio, TX 78216
(512) 828-0553

COMPUTER SOLUTIONS, INC.
Suite Two, 6700 Sanger Ave.
Waco, TX 76710
(817) 772-3165

ECLECTIC RENTALS
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Dallas, TX 75229
(214) 358-1307

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2103 Ernestine
Houston, TX 77023

KA ELECTRONIC SALES
1220 Majest Drive
Dallas, TX 75247
(214) 634-7870

KA ELECTRONIC SALES
1117 S. Jupiter Road
Garland, TX 75042
(214) 494-2588

UTAH

ADP SYSTEMS
95 West 100 South
Logan, UT 84321
(801) 752-2770

BYTE SHOP
261 S. State St.
Salt Lake City, UT 84111
(801) 355-1041
Bob Bolinder

CENTRAL UTAH ELECTRONICS SUPPLY
735 S. State St.
Provo, UT 84601
(801) 373-7522

COMPUTERLAND/SALT LAKE CITY
161 E. 2nd South
Salt Lake City, UT 84111
(801) 364-4416

THE HI-FI SHOP
2236 Washington Blvd.
Ogden, UT 84401
(801) 621-5244

THE HI-FI SHOP
4680 Holladay Blvd.
Salt Lake City, UT 84117
(801) 277-2629

VERMONT

VIRGINIA

COMPUTERLAND/WASHINGTON D.C.
8411 Old Courthouse Road
Vienna, VA 22180
(703) 893-0424

COMPUTER SYSTEMS STORE
1984 Chain Bridge Road
McLean, VA 22101
(703) 821-8333

RMS TECHNOLOGY, INC.
706 Industry Drive
Hampton, VA 23661
(804) 838-2458

SCIENTIFIC TRADING, INC.
2990 Telestar Court, Room 115
Falls Church, VA 22042
(703) 573-8787

COW, INC.
407 Hampton Court
Blacksburg, VA 24060
(703) 552-4923

WASHINGTON

AMERICAN MERCANTILE CO., INC.
2418 First Ave. South
Seattle, WA 98134
(206) 624-6141

COMPUTERLAND/BELLEVUE
14340 N.E. 20th
Bellevue, WA 98007
(206) 746-2070

Authorized PET Dealers

COMPUTERLAND/SO. KING COUNTY
1500 So. 336th St.
Parkway Center, Suite 12
Federal Way, WA 98003
(206) 838-9363

COMPUTERLAND/TACOMA
8791 S. Tacoma Way
Tacoma, WA 98449
(206) 581-0388

MICRO COMPUTER CENTER
11822 NE 8th St.
Bellevue, WA 98005
(206) 455-3710

OMEGO COMPUTERS
1032 N.E. 65th
Seattle, WA 98004
(206) 522-0220

PERSONAL COMPUTERS, INC.
South 104 Freya
Spokane, WA 99202
(509) 534-3955

WEST VIRGINIA

WISCONSIN

BYTE SHOP OF MILWAUKEE
6019 W. Layton Ave.
Greenfield, WI 53220
(414) 281-7004

COLORTRON
2111 Lathrop Ave.
Racine, WI 53405
(414) 637-2020

COMPUTERLAND/MADISON
690 So. Whitney Way
Madison, WI 53711
(608) 273-2020

COMPUTERLAND/MILWAUKEE
10111 West Capitol Dr.
Milwaukee, WI 53222
(414) 466-8990

MADISON COMPUTER STORE
1825 Monroe St.
Madison, WI 53711
(608) 255-5552

OLSON ELECTRONICS
3125 S. 108th St.
West Allis, WI 53227
(414) 541-1406

WYOMING

COMMODORE INTERNATIONAL OFFICES

COMMODORE BUSINESS MACHINES, INC.
3330 Scott Blvd.
Santa Clara, CA 95050

COMMODORE/MOS
Valley Forge Corporate Center
950 Rittenhouse Road
Norristown, PA 19401, USA

COMMODORE BUSINESS MACHINES LIMITED
3370 Pharmacy Avenue
Agincourt, Ontario, Canada M1W2K4

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London NW1 3BI, England

COMMODORE BUROMASCHINEN GmbH
Frankfurter Strasse 171-175
6078 New Isenburg
West Germany

COMMODORE JAPAN LIMITED
Taisei-Denshi Building
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