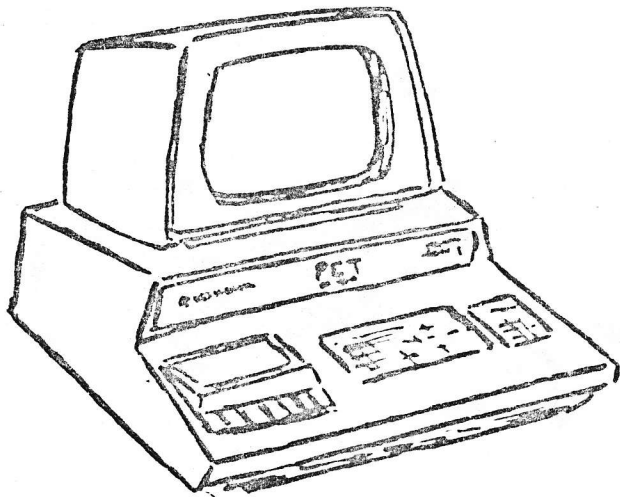


AN ARESKO PUBLICATION

THE



PAPER

BOX 43 AUDUBON PA 19407

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JULY 1978

ISSUE # 5
VOLUME I

EDITORIAL

Has anyone received the new, improved, 50-page manual yet? What do you think of it? Is it any better, in your opinion, than the initial 9-page "preliminary" manual, or the 38-page "temporary" manual?

We hear from Commodore that the "real" manual is in "the final stages of draft", which means that by the time you are ready to put your PET out to pasture, the manual will be "at the printer's".

We have received dozens of phone calls from irate PET owners who are tired of the

famous Commodore runaround. Are you one of them? We have been asked by several readers if we will permit a general "sounding off" column, in which you can all blow off steam about the treatment you receive from the company - and from others you contact about PET products. We are willing to do this, provided the material is not libelous! The story on page 10 is a bare beginning....

We were wrong, Albert ... you can connect a 28KSR to your PET! Jerome Salko tells you how to do it on page 12. Have fun.

Send a large SASE to Len Lindsay, 1929 Northport Dr., Room 6, Madison Wisconsin, 53704, for your free copy of the PET GAZETTE.

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THE PAPER is not affiliated in any way with Commodore Business Machines or any of its subsidiary companies.

STANDARD

SYMBOLS

(H) Cursor HOME
 (C) CLEAR Screen
 (R) Cursor RIGHT
 (L) Cursor LEFT
 (U) Cursor UP
 (D) Cursor DOWN
 (F) Reverse Field ON
 (S) STOP

(O) Reverse Field OFF
 (⓪) Carriage return
 (↑) Shift ON
 (↓) Shift OFF
 (∕) Delete
 (I) Insert
 () Space
 (*) Shifted RUN/STOP (for Load & Run procedure)

USER GROUP INFO

ACGNJ meets 4th Fridays. Call John Loofbourrow at (201) 233-7068

SPHINX 314 10th Ave, Oakland. Call (415) 451-6364

The Human Society - United PET Users meets 1st Thurs. 1929 Northport Dr. #6. Call (608) 249-2666

PET Users in the Twin Cities, MN area call John Fung (612) 376-5465

Sacramento PET Workshop P.O. Box 28314, Sacramento, CA

PET Users 2001 Bryan Tower, Suite 3800, Dallas, Tx 75201

PUG meets 1st Wed. in the Mercury Room, 310 Showers Dr. Mountain View, CA

BAMUG 1450 53rd St. Emeryville CA. Call (415) 523-7396

North Orange County Computer Club, David Smith, 3030 Topaz Apt A, Fullerton, CA 92631

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 (i.e., education, engineering, business or something else) 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 \$25.00, your name, address, phone number and field of expertise. The information will be published in all remaining issues of this volume of the PAPER.

WES FASNACHT (215) 436-2886
West Chester State College
West Chester, PA 19388
PROGRAMMING & SYSTEMS DEVELOPMENT



DON PEGNATARO
1420 Centre Avenue #1907
Pittsburgh, PA 15219
EDUCATION APPLICATIONS,
ENGINEERING, BUSINESS, GAMES,
PHOTOGRAPHIC APPLICATIONS

ADVERTISING & SUBSCRIPTION INFORMATION

THE PAPER is published ten times per year and mailed to subscribers on the last day of each month except July and December. Single copy price is \$2.00 per issue, subscription price is \$15.00 (all ten issues of one volume). Dealer prices upon request. Outside USA and Canada, add \$10.00 per subscription postage (\$1.00 postage per single issue).

Readers are encouraged to submit articles of general interest to PET owners. Material submitted will be considered free of copyright restrictions and should reach us by the 10 day of the month in which publication is desired. Non-profit organizations (i.e., computer clubs) may reprint any part of the PAPER without express permission, provided appropriate credit is given with the reprint. Any other persons or organizations should contact the editor before reprinting PAPER material.

Advertising rates are as follows:

- * ¼ page -- \$25.00
- * ½ page -- \$45.00
- full page -- \$85.00

Please send camera ready copy in the exact page size of your ad. We will be able to reduce to our format. Copy should reach us by the 10th day of the month in which publication is desired. Payment is required with copy; we have no facilities for billing.

* Please note the reduced ad rates. We now have sufficient readers to justify your ad space and are no longer pricing ads prohibitively high.

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

Associate Editor: Rick Simpson

PET PARADE

Terry - Yes, of course I would like the address of the PET GAZETTE! Why didn't you publish the address in issue #4? You wanted inquiries (with checks included, of course)? And how about publishing something on the merging method by George Sherritt referred to in #4? - John Latrash, Silver Spring, MD

John - I was afraid someone would think of asking that! My copy of the GAZETTE arrived on the day the PAPER went to press. I raced down to the printer to try and include the information (if you'll notice, I wrote the editorial instead of Rick, who usually does it) and when I arrived I discovered I had forgotten to bring the info with me. Having already torn the original of the PAPER apart to rewrite the editorial, I was somewhat stuck. And then, when I got the PAPER back from the printer and discovered that A) George's merge method was not included and B) the locations needed for the music circuit in Kim's article reprinted from the Orange County User Group notes was not included, I felt like seven kinds of idiot. Nevertheless, I determined to print George's method this time. But when I mess things up, I do a good job of it, and I have managed to lose the information! So soon - when I can contact George again - I'll get his work into the PAPER. The locations for Kim's music circuit are here, though, along with a lot of other neat things. See page and let me try again next month with George's merge method.
- Terry

Terry - Yes, I'd like the address for the PET GAZETTE by Len Lind-

say. By the way - keep part of THE PAPER for "beginners" who don't know anything about POKEs, PEEKs, assembly language, etc. I personally know very little about files (I sent for TIS's workbook on files just the other day). I'm sure many others know as little as I do, since Commodore gave us very little to go on. I got a paper from Connecticut Microcomputer the other day which had a sample routine for finding arcsin and arccos, which I believe was not complete in following the definition of the functions. Below, I've made a listing that I believe does follow the definitions. Note that they are for decimal degrees and can be changed to radians quite easily by using π , $\pi/2$, etc., for 180° , 90° , etc.

```
10 REM COMPUTE ARCSIN (DEGREES)
20 INPUT "SIN VALUE";S
30 IF S=1 THEN A=90:GOTO 70
40 IF S=-1 THEN A=-90:GOTO 70
50 IF S<-1 OR S>1 THEN PRINT
   "OUT OF DOMAIN":GOTO 10
60 A=ATN(S/((1-S*S).5))*180/ $\pi$ 
70 PRINT "ARCSIN("S")="A"DEGREES
   :GOTO 10
```

```
10 REM COMPUTE ARCCOS (DEGREES)
20 INPUT "COS VALUE";C
30 IF C=-1 THEN A=180:GOTO 80
40 IF C=0 THEN A=90:GOTO 80
50 IF C<=1 OR C>0 THEN A=ATN((1
  -C*C).5/C)*180/ $\pi$  :GOTO 80
60 IF C>1 OR C<-1 THEN PRINT
   "OUT OF DOMAIN":GOTO 10

70 A=180+ATN((1-C*C).5/C)*180/ $\pi$ 
80 PRINT "ARCCOS("C")="A"DEGREES"
   :GOTO 10
```

Almost forgot - how does one get a list of people in the area who have PETs to start a User's Group?

PET PARADE (cont)

Attached is a list of all the programs I've been working on. Most of them are not original, but rather modifications. If you see a need for them, please let me know. - Peter L. A. Oakes, Muskegon, MI

Peter - Be assured - part of the PAPER will always be reserved for beginners - they are the very reason for the existence of this newsletter! We have decided to publish a separate catalog of Special Purpose Software, and your programs may fit in very well. Do send them to us, please. We should have the catalog ready sometime in early December. - Terry

Terry - Help! What does A, D, C mean; as in OPEN A,D,C? And what is a logical file? I got the documentation Commodore sent with my PET, but it does not tell me what a logical file is or how to find its number. Thanks - Bob Smith, New York, NY

Bob - The logical file is the file being referenced in the program when you enter a PRINT#, INPUT#, GET#, or CLOSE keyword. Since PET permits you to have more than one file open at a time, you must be able to tell it which file you want to use in any given statement. For example, if you are using the first cassette to hold the input data, and the second cassette unit to hold the output data, you must be able to tell the PET where to get the input and where to put the output. It might be possible to use filenames instead of logical file numbers, but that would take a lot of keystrokes. So you simply assign each file a number, from 1 to 255. If you look closely at the Commodore

"Introduction to your PET" manual, you'll see that PRINT#, INPUT#, GET#, and CLOSE are all associated with a logical file. This file has the number you assign. Here is an example:

```
10 OPEN 1,1,A
```

This is the logical file #
This is the physical device
And this is the command for
input, or read.

```
20 INPUT#1,A0
```

This is the logical file #
This is the data to be read

```
30 CLOSE 1
```

This is the logical file #

The available numbers for logical files are 1 through 255. The available physical device numbers are:

- 0 keyboard
- 1 cassette unit #1
- 2 cassette unit #2
- 3 screen
- 4- IEEE-488 devices

The available C commands are:

- 0 read (input)
- 1 write (output). An end-of-file mark is written at the end of the file.
- 2 write (output). An end-of-tape mark is written at the end of the file.

Because of the PET's tendency to miss the end-of-file (EOF), it might be a good idea to use C command 2 at the end of the file. Then, when PET finds the end-of-tape (EOT) it will stop. For example, 10 OPEN 1,1,2. Hope this info helps somewhat. You might try TIS for greater detail. - Terry

PET PARADE

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60 IF C>1 OR C<-1 THEN PRINT
   "OUT OF DOMAIN":GOTO 10
70 A=180+ATN((1-C*C).5/C)*180/ $\pi$ 
80 PRINT "ARCCOS("C")="A"DEGREES"
   :GOTO 10
```

Almost forgot - how does one get a list of people in the area who have PETs to start a User's Group?

PET PARADE (cont)

Terry - What do the different values of the I/O status word ST mean? How do you change the character set on the PET PRINTER? (They said you could do that!) What have you heard about higher level languages besides BASIC for the PET? Is anybody offering a music synthesizer for the PET? - Russell Selph, Del Mar, CA

Russ - We haven't heard anything at all about being able to change the character set on the printer. Commodore is not planning any other high level languages for the PET, and we haven't heard that anyone else has succeeded in developing one. However, we hear rumors that someone in upstate N.Y. has a fully documented and decoded copy of the operating system listing as well as a full set of up-to-date schematics. This is only a rumor, but we're chasing it avidly. Other columns in this issue will answer your questions re: the music synthesizer and the I/O status word. - Terry

Terry - One problem I have been having with my PET is that if I load a program that has a DIM statement in it, I can't then load another program with a DIM statement in it. If I try, the cursor disappears as soon as I RUN the program. If I let the PET stay powered off for 10 - 15 minutes, it will then load again okay. I believe I have heard that others have had this problem, and that it is because the DIM statement is somehow related to one of the tape drive commands which stays hi or something. I suspect that when I turn the

the set off for a period of time, the filter capacitor drains down and releases the high state on the chip function. Is there a cure for this? It's a pain in the rear! - John F. Garbarino, Mystic, CT.

John - This is a new one on me! I suspect the problem is with your particular PET, not with the DIM statement. If any of our readers know otherwise, perhaps they'll contact us so we can relay the information to you. - Terry

Terry - I have just received the third issue of THE PAPER and thought it was very informative. I did find a mistake in the PET PARADE section in the program from S.T. Wilson, Baton Rouge, LA. Line 30 of the program should have read $D=INT(D1/100)$ instead of $D=INT(D1/1000)$. Also, I would like to see more technical information in the PAPER like a circuit for flashing certain data on the screen off and on, like the cursor, or maybe a program that will do the same thing. I would also like to see a circuit for a reset button for the 6502 processor so that when the monitor program into limbo, you can reset the CPU without shutting off the machine and losing the many hours of program entry you just typed into RAM. - Paul T. Mann, Hudson, MA

Paul - Thanks for the correction. Right now (unless I want to write the entire PAPER myself), we're waiting for someone to contribute the articles you mentioned. So far as we know, there isn't any way to reset the CPU without losing whatever is in RAM.

PET PARADE (cont)

Since most of our readers are newcomers to the whole field of computers, and the PET is their first venture, we have not had an abundance of submitted articles. The User Groups have been most helpful, and when they get wind of the kind of things you'd like to see, I'm sure one of the PET Vets will come up with the circuit or program you have in mind. We'll keep you posted. - Terry

Terry - Thought I'd drop you a line and share a quick subroutine with you. When I need to pause in a program, instead of making the PET loop or something, I use this:

```
10 P=5: GOSUB 1000
    :
    :
    :
1000 X=P*60
1010 Y=TI
1020 IF TI<Y+X THEN RETURN
1030 GOTO 1020
```

By using this short subroutine, I can set the pause exactly every time by changing the value of P. My programs usually have to use this frequently, and by putting it into a subroutine, it runs efficiently. Simple, but effective. I'll send some more when I have time. I really look forward to the PAPER, and think you're helping tremendously. - Dean VanDusseldorp, Douglas, AK

Dean - Thanks for sharing with us. This subroutine looks good and doesn't take up much space in a program. - Terry.

Terry - I found out how to get a short subroutine merged into a taped program!! First, load

the subroutine (it has to fit on the screen for this to work). Then LIST the subroutine so it all shows on the screen. If it is too long, some of the beginning lines may have to be typed in, since PET will take up screen lines in the LOAD procedure. Then move the cursor up over the READY and delete it or erase it from the screen, and move the cursor up again until it is on the first blank line under the subroutine. Now LOAD the program you want the subroutine merged into. When it is loaded, send the cursor HOME, then press RETURN for as many times as needed to get all the subroutine lines into the program. Neat, huh? S.T. Wilson, Baton Rouge, LA

S.T. - Thank you! Now if we can find a way to get the cursor to stop disappearing when we have big programs to merge with little subroutines - and we hit RETURN to get the subroutine code into the program - we'd have it made!
- Terry

Terry - We think you have a very good publication. We have our 2nd PET on order (one for home, one for office). We very much need "business" tapes - inventory, etc.. Is there any disk on the market which will interface with PET? We placed our deposit for a PET printer about 4 or 5 weeks ago. Mr. Calculator of Texas now advises us we will receive it with in 2 weeks. - Ms. Joe Ann Morris, Houston, TX

Joe Ann - See the editorial column about the disk...Do you have your printer yet? - Terry

Terry - Is there any way of deleting a group of line numbers

PET PARADE (cont)

without having to actually type each line number in the group? I occasionally have 50 to 100 lines to delete... also, can I save only part of a program? I get two, three, or more programs loaded to create a file, but only need, say most of one of them to do something else. By the way, while Rick was with MOS Technology, we thought we found a bad RAM, since we read 895 BYTES FREE. We swapped both RAMs to position 8. Now most of the time after running any program and turning off the PET for 30 seconds or less, I will read 7039 BYTES FREE, when I turn it back on. But if I leave the PET off for a minute or more, I get 7167 Bytes Free. Reversing the RAMs in position 8 has no effect. Also, I occasionally get an upper case graphic from a variable which had been assigned a lower case letter, particularly during a sort. Any suggestions? And how about a decent keyboard? Been hoping someone will show up with one. - E. L. Wright, Charleston, W VA

E. L. - We know of no way to delete a whole group of line numbers at once, nor of any way to save only part of a program. But we'd like to know how you manage to load two, three, or more programs at once into your PET! The upper and lower case letters (well, the graphics and the lower case letters) can't be used at the same time. You may be poking the graphics back in before, during, or after a sort, and that would explain why you get the graphic instead of the lower case letter in the variable. As for the RAM problem, the only way we know of to fix it is to replace the RAM. And, so far as we know, you have to get those RAMs from Commodore. - Terry

Terry - Having heard of you both via your respective connections

with Commodore and MOS Technology, and as an almost-satisfied PET owner (lacking only information), I can hardly pass up an opportunity to subscribe to this newsletter. For what it's worth, my needs for information are about like those of any computer novice lacking an instruction manual. In other words, HELP!!! I've tried interfacing a second cassette, which refuses to work, and short of gutting the #1 cassette and duplicating its contents, I don't know where to go next. Ditto for a joystick (or four). How does one do this? I have managed to get the PET generating music via line CB2 on the parallel port, and have had a lot of fun with random sequencing of notes. I'm hot to get into a disk system, but don't know whether to trust (and wait for) Commodore. Are there any alternatives available now? Have had 24K of memory on order from Forethought Products for a couple of months, but they have been delayed with connector problems. Have you heard anything about, or seen, their BETSI? Is it worth waiting for? These and other questions are burning me up with curiosity, and I hope you can provide me with some assistance, either in the form of the newsletter or a personal reply. By the way... I still have not received the documentation and machine language monitor which Commodore has been promising. After several unanswered letters and long distance telephone run-around, I've gotten very tired of trying to communicate with them. Do you know whether they've started sending that stuff, or whether they're even going to? Thanks for meeting the needs of PET owners by sharing information with us. Hoping to receive a copy of the newsletter as soon as possible. - Jerry A. Velders, Evansville, IN

Jerry - I hate to be the one to

PET PARADE (end)

break the bad news, but: the reason you have been unable to interface a second cassette is that you have to buy Commodore's second cassette unit for \$99.95. Or get #1 and duplicate its contents if you can. And the reason you haven't received the monitor from Commodore is that they are not giving it to PET owners as "promised". They'll sell it to you, however. And there's the usual interminable wait for Commodore to deliver. The latest word on the documentation is that "it's in the final draft stage" now. That shouldn't take more than a month or two, then another month or two for the "finished copy", then another month or two while the work is "at the printer" and then a few weeks more while the documentation is "prepared for mailing" to PET owners. At that time, Commodore will tell

you how much it will cost and will tell you how long you have to wait for delivery! If there is a disk available anywhere, the place to find out about it is in the PET GAZETTE (see the editorial in this issue). And Forethought Products has an absolutely unblemished reputation, earned with the fine quality of its KIMSI, the S-100 to KIM interface. While we haven't used the BETSI, we're sure you'll be satisfied with it. - Terry

Terry - Suggest an article on the IEEE-488 and the PET. - Hunter
Bell, Helena, AR

Hunter - Will do. We're waiting for some of the PET Vets to write it down. - Terry.

SIMPLE MEMORY TEST FOR PET

```
10 B=255
20 FOR I=1250 TO 8191
30 REM: 8191 IS FOR AN 8K PET
40 REM: USE 4095 FOR A 4K PET
50 POKE I,Z:REM: DO NOT SET Z=0
60 IF PEEK(I) Z THEN A=PEEK
  (I):GOTO 120
70 POKE I,B
80 IF PEEK(I) B THEN A=255-
  PEEK(I):GOTO 120
90 NEXT I
100 C=C+:PRINT C;"CYCLES"
110 GOTO 20
120 IF A 32 THEN PRINT"I";:GOTO
  140
130 PRINT"J";
140 PRINT INT(1+I/1024);" IS BAD"
```

As some of you may have noticed, the two rows of RAM in the

PET are labeled I and J, on the PC board, to the right of the chips. I is the row farthest from you as you sit in front of the unit with the housing propped up. J is the nearer row.

This memory test program will tell you which of your RAM chips is bad, and you can simply swap it into position 8 (the left most chips) while you wait for Commodore to send you a replacement RAM (call first - the price may have changed). Heed the warning in line 50 of the code: do not set Z=0. Pet will hang up on you. The program will run until a bad RAM is found, or you press the STOP key, or the power is turned off, whichever comes first.

THE LEGEND OF THE MARVELOUS, MAGICAL, MYSTICAL, MIRACULOUS MICROMACHINE

Once upon a time, it was believed that Commodore's magical, miracle micromachine would be able to cope with the Dastardly Datafile in the same carefree, confident manner with which it dealt with the easygoing, amiable Programfile. According to legend, this marvelous micromachine was in the same league as the Giant Mainframe of ancient Big Business history. It could do everything the Big Boys could do - just a little less of it. The miraculous micromachine would be able to save and retrieve data from the Complicated, Dastardly Datafile, just as easily as it saved and retrieved programs from the Easygoing, Amiable Programfile.

Datafiles, however, are a different breed of cat than Programfiles. A Programfile has a beginning and an end, and once the mystical micromachine found the beginning of a Program file, it could just gobble up the code from the tape until it came to the end, and then stop. It was a pleasant, easy task, and didn't cause so much as a ripple in the magnificent micromachine's Undecipherable Operating System Code. Datafiles didn't work that way. First of all, the magnificent micromachine had to find the start address; had to locate the address in order to be certain the Dastardly Datafile really did have a beginning. Then the Unwilling Dastardly Datafile shoved data unmercifully down the I/O port of the magnificent micromachine, causing the poor valiant micromachine to choke and sputter and, oh, horrors! to even miss the next block of data shoved at it by the Dastardly Destructive Datafile!

And, if that weren't bad enough, when the marvelous micromachine tried to find the end of the Datafile, it discovered more often than not, that the end had come and gone, and the magical machine had missed it altogether, because it had been

all choked up over some tasteless hunk of old and useless data that had previously been shoved unkindly down its I/O port. The poor machine had no recourse, however. It was duty-bound to go on hunting, searching endlessly for the end of the Dastardly Datafile. When the gentle Owner of the magnificent micromachine finally stepped in and pressed the Secret STOP button, the magical machine was too upset to be fit company for its beloved Owner, and it ran away in pain and shame and agony, and hid blushing and seething amongst the NOPS in its Undecipherable Operating System Code.

Yet, if the Gentle Owner did not attempt to help, the cassette would run out of tape, and then the patience of the mystical, magical micromachine really wore thin. Sometimes it would get quite upset, and lose its cursor, and then run away to seek relief among the NOPS in its Undecipherable Operating System Code.

Finally, one daring young Programmer, all dashing and brave and heroic in his ankle length blue jeans and shoulder length hair, took pity on the marvelous micromachine, and began to let it be known throughout the land that the Gentle Owner could prevent the ravaging of his marvelous magical machine by the Dastardly Datafile. All the Owner had to do was to POKE some secret charmed code into some special, especially vulnerable places in the memory of the magnificent micromachine, so it would be reminded of its duty and would diligently digest the block after endless block of data from the Complicated, Dastardly Datafile.

And for a while, the magic invented by the Brave Young Programmer seemed to work. The mighty and magnificent micromachine tried

ever so hard to catch all the data thrust mercilessly down its I/O port by the Dastardly Datafile. But it couldn't quite manage, and soon the constant but inconsistent failure began to tell: the magical, marvelous, miraculous micromachine became addicted to the NOPs in its Undecipherable Operating System Code, and frequently would run away and hide just for the fun and the fantastic feeling of Non Operation. Furthermore, no matter how often, nor in how many different places, nor how gently nor how violently, the Gentle Owner POKEd at his mythical (sorry, mystical) micromachine, there was no way to overcome the hateful, horrid Complications of the Dastardly Datafile.

So the daring Young Programmer designed a secret THING, and he called it by a secret code name he was too afraid to reveal to anyone, and he ruthlessly thrust this THING deep into the bowels of the marvelous micromachine, in spite of the heat of the bright summer day, and in spite of the wires and resistors the micromachine tried to impose between itself and the angry young Programmer.

Ed. note: This story was submitted by our good friend A. Nony Mous, who is still hiding out from the Good Guys at Commodore. He's afraid they'll "reduce his information ration."

Now the marvelous micromachine felt great peace and blissful relief. Now it didn't need to wait for the Dastardly Datafile; it could lose its cursor just because it felt good to lose one's cursor once in a while! And soon, the magnificent, marvelous, magical mystical micromachine was sadly addicted to the NOPs in its Undecipherable Operating System Code, and would only come out for a few minutes at a time, when its Gentle Owner pressed the Power-On.

And all throughout the land, Gentle Owners grieved and mourned and tore out their hair and rent their clothes in frustration, anger, and pain. And horrible were the threats hurled against the marvelous micromachine, which cared not, and basked in an endless supply of its beloved NOPs, deep in the heart of its Undecipherable Operating System Code. And great was the number of marvelous, magical micromachines mysteriously returned to their maker. And even the Gentlest of the Gentle Owners began to suffer from a lack of True Faith, and turned to other gods than the mighty Commodore.

And the Complicated, Dastardly Datafile remained unsaved and unretrieved, and remains so to this day, and cavorts in evilly magnetic ecstasy on a thousand reels of dusty old discarded C-10 cassettes.

■ Remember: this is a legend.

One of our readers suggests that anytime someone would like to share material with us (or with others in the industry), and there is a fear of repercussion from Commodore, that instead of using the name A Nony Mous, the name Chip Bitly be used. Like it?

In the last issue of The Paper (#4 V1) Albert E. Nichols asked for information on using a Baudot teletype with the PET. I have interfaced a model 28KSR to the parallel user port using an ASCII to baudot converter sold by Southwest Technical Products (\$24.50).

For handshaking CA1 on the parallel port connects to J on the A-B board, CB2 to L and K goes to +5 volts. The TTY can then be run using peek and poke commands. This method slows down the printing causing a 100 WPM TTY to print at about 60 WPM.

The following is a machine language program to run a TTY without sacrificing any speed:

```

10 POKE 59459,255:POKE 59468,PEEK(59468)or 224
20 POKE 826,31:POKE827,192:POKE 828,224:POKE 829,2
30 FOR A=850 TO 888
40 READ B
50 POKE A,B
60 NEXT A
70DATA 173,76,232,45,58,3,13,59,3,170,142,76
80 DATA 232,173,62,3,170,143,65,232,173,77
90 DATA 232,45,61,3,240,248,173,76,232,13
100 DATA 60,3,170,142,76,232,96

```

Outputting to the TTY is accomplished by POKING location 830 with the ASCII code of the character to be printed and calling SYS(850). The poke commands in lines 10 and 20 can be included in the data statements. I used the buffer storage area for cassette #2 for the machine language program with location 850 as the start of the first instruction.

Strings can be outputted to the TTY using the following or a variation thereof:

```

For T=1to80
A=ASC(MID$(A$,T,1))
POKE 830, A
SYS(850)
NEXT T

```

A few points to remember:

C-15 on the A-B board should be able to handle the loop supply voltage.

The Southwest Tech. kit includes PROMS but they are not programmed. They give you the name of a party who will program them for \$5.

Either way if you program them or send them away be shure to program spaces for the characters that the baudot machine will not print.

That way you can add them by hand and get accurate listings.

I have written programs to use with the TTY that copy the screen, disassemble programs in memory,output data from tape to printer, loan payment, checkbook, etc.

The TTY can probably be connected to the IEEE port to make it easier to use to obtain listings but I haven't tried it yet.

All in all it's a little work but it is a cheap and dirty way to be able to get hard copy from the PET.

All of us are searching for the RAM locations we can use to make PET live up to its potential. Several User Groups and many individuals have contributed information about these locations. Please don't be hurt if your name isn't specifically mentioned here - we've had similar reports about each location from several sources.

PEEK(630) gives the number of tape drop-out errors found during a tape read or program load. The number shown is 2 times the actual number of drop-out errors.

SYS(1039) initiates ROM test to check proper checksum on the BASIC ROMs. You need Commodore's ROM TEST program (in machine language) to use this.

POKE 32768+Y,X pokes the screen memory, with Y going from 0 to 999 and X going from 0 to 255.

POKE 59409,228 (52 also seems to work) turns off the screen without clearing screen memory.

POKE 59409,60 turns the screen back on.

WAIT 59410,4,4 waits for the SPACE key to be pressed. There is no way out of the WAIT until the space key is pressed or the PET is turned off.

POKE 59411,53 turns on the motor on cassette #1.

POKE 59411,61 turns off the motor on cassette #1.

POKE 243,122:POKE 244,2 initializes the cassette start address for cassette #1.

POKE 243,58:POKE 244,3 initializes the cassette start address for cassette #2.

POKE 59464,C sets frequency of square wave from high (1) to

low (255). The formula is $f = 500,000\text{Hz} / (C+2) * (D1)$, where $D1 = 8$ when $D=15$, $D1=4$ when $D=51$, and $D1=2$ when $D=85$.

POKE 59466,D controls three octaves, with $D = 15$ or 51 or 85 . Bit pattern is repeated, increasing the pitch. This loads the shift register for a square wave output.

POKE 59468,12 initializes graphics.

POKE 59468,14 initializes lower-case alphabet. You can't get the lower case letters on the screen at the same time as the graphics.

SYS(64824) resets the PET and clears memory.

Some special maneuvering is necessary to turn on and off cassette #2 in order to increase the distance between blocks of data in a file. This routine does it:

```

:
:
:
100 A=PEEK(59456)
110 POKE 59456,(A AND 239)
120 REM 110 TURNS #2 ON
130 FOR I=1 TO 100:NEXT
140 REM 130 WASTES TIME
150 REM WHILE MOTOR IS ON
160 POKE 59456,(A OR 16)
170 REM 160 TURNS #2 OFF
:
:
:

```

Maybe we should keep a file!

THE STATUS WORD [ST]

The status word (ST) is used after each I/O operation to check for certain conditions of the I/O operation. Each unique ST value indicates a unique situation, and when more than one situation is present, the sum of the status values is stored in ST. The user must then break the sum down into its component parts to discover the several conditions existing after the completion of the I/O operation. For example, if ST=56, then the values 6, 16, and 32 were added together and the sum, 56, stored in ST (8+16+32=56).

STATUS CODES FOR TAPE I/O

4	SHORT BLOCK
8	LONG BLOCK
16	UNRECOVERABLE READ ERROR (FATAL ERROR)
32	CHECKSUM ERROR
64	END OF FILE
128	END OF TAPE

SHORT BLOCK (ST=4) When reading a block of data from the tape, the inter-record gap (IRG) was encountered before the expected number of bytes of data had been read from the tape. One possible cause for this problem is trying to read a short program file as a data file.

LONG BLOCK (ST=8) When reading a block of data from tape, the IRG was not encountered after the expected number of bytes of data had been read from the tape. Again, a possible cause is trying to read a program file as a data file. The usual cause is that PET failed to find the IRG.

UNRECOVERABLE READ ERROR (ST=16) This is a **fatal error**. PET will return to BASIC and print an error message. This is caused by finding more than 31 errors in

the first block of two (redundant) data blocks, or an error that can not be corrected because it occurred in the same place in both data blocks. Try cleaning the tape heads, realigning the tape heads, demagnetizing the tape heads, and if all else fails, consider that you may be using a defective tape.

CHECKSUM ERROR (ST=32) After a LOAD or reading data, a checksum is computed over the bytes in RAM and is compared to a byte received from the input device. If they don't match, 32 is stored in ST. A possible cause for this is faulty RAM. It could also be a multiple bit error in the data transmitted. Or a failure of data or a program to VERIFY correctly.

END OF FILE (ST=64) This value is stored in ST when an attempt is made to read data from a tape file when there is no more data in the file. This is the normal condition after reading or loading or verifying data or program files.

END OF TAPE (ST=128) This is a **fatal error**. A programmed end of tape was encountered before the file being searched for was found.

The user must check for the status word after each I/O operation, using the AND operation:

```
IF (ST) AND (64) THEN XXXX
```

where XXXX is the line to which control is transferred when the EOF is encountered, usually a CLOSE statement. Another way of doing it is:

```
10 GET#1,A$ : A1$=A1$+A$ : IF NOT ((ST) AND (64)) THEN 10
```

which will read data into A1\$ until an EOF is encountered. Do **not** use "equals" (=) as in IF ST=64.....

new products

Yes, I know I said there wouldn't be a July issue! But I'm so excited about all the new things that are happening, I couldn't wait 'til August to tell you about them. I think the most important new product to hit the market is the PET GAZETTE, published by Microcomputer Resource Center, 1929 Northport Dr, Room 6, Madison, WI 53704. The GAZETTE is not a "news" letter - it is a catalog of software and hardware and paperware; what peripherals and programs are available and from whom; how much they cost; what they do. Lists of magazine articles of interest to PET owners, a cassette exchange, and lists of User Groups. Software and hardware reviews. In short, all the information you'll need to get the best and latest accessories for your PET. Music boxes, joysticks, memory boards, dustcovers - everything presently known or suspected to be manufactured for the PET is listed in the GAZETTE. Drop a line to Len Lindsay, the editor, and ask for your copies - they really are free for they asking!

The next most exciting thing I've read about is the PET Tape Directory. It occupies only 400-500 bytes of memory and permits you to search a tape at fast forward speed for named program files. Warren Swan, 15933 S. Grove Avenue, Oak Forest, IL 60452, is selling the Directory for \$5.00 - complete with listing and documentation.

And then there's Cursor - the new monthly cassette magazine of programs written for the PET. Each issue will contain a featured game as well as a variety of practical programs for use in the home, in business, or in education. Contact Ron Jeffries, the publisher, at P.O. Box 550, Goleta, CA, 93017. Cost is \$24.00 for 12 issues on C-30 cassettes.

N.E.E.C.O called me the other day to ask me to ask you whether you would be interested in purchasing a full

ASCII keyboard for the PET. His prototype unit has single key functions (for insert, ©, Ⓚ, Ⓛ, etc., and is intended to run in conjunction with (not instead of) the original PET keyboard. In other words, you get the ASCII keyboard and the PET's unique graphics at the same time. Don't send orders in yet - N.E.E.C.O. is not ready for that. But drop a line to Robert Crowell, N.E. E.C.O., 248 Bridge Street, Springfield, MA, 01103, and let him know whether you're interested - at a price of \$125 retail - or whether you are interested at some other price. He needs feedback, folks.

Microtronics, a California based company having nothing to do whatever with Microtronix, the Pennsylvania company, has a Ham radio interface for the PET. The M-65 is a complete Morse Code and RTTY system, complete with hardware and software. No modifications to your PET or your rig are needed - and no external power supply is required. The kit is \$69.95, the assembled unit is \$99.95, from Microtronics, 5943 Pioneer Road, Hughson, CA 95326. Phone Ron at (209) 634-8888 for a brochure or for more information or to place your order.

Centronics has an electrosensitive printer at 150 lpm, which can be interfaced to the PET via Connecticut Microcomputer's ADA 1200. The printer uses 4 inch paper coated with aluminum, and permits the user to select the number of characters per inch (5/10/20). The P1 is standard 7-bit ASCII parallel interface, and sells for \$395. Centronics, Hudson, NH 03051. Phone (617) 935-6150.

NEW PRODUCTS

Compusoft Publishing announced the BASIC HANDBOOK, an encyclopedial of the BASIC computer language by Dr. David A. Lien. Dr Lien wrote the TRS-80 beginner's manual and in the new book covers the PET, the APPLE, the IMSAI, and many other micro computers as well as the TRS-80. Shipment is scheduled for sometime in September, but your orders will be promptly acknowledged. Cost is \$9.95 + 50¢ (+60¢ tax for Californians) from Compusoft Publishing, 8662 Dent Drive, San Diego, CA 92119.

LINK-4 is a computer game of vertical strategy for one or two players, developed by the Institute for Public Program Analysis. The object of the game is to build a row of four playing pieces either horizontally or vertically or diagonally on the playing grid while trying to prevent your opponent from doing the same. The grid is seven squares wide and six squares high. When played by a single player, the computer will play the second, using a programmed strategy that will "learn" to improve as it plays. Unfortunately, the literature I received did not specifically state that the program is for the PET, I assume it wouldn't have been sent to me if it were not. IPPA, 230 S. Bemiston, Suite 914, St Louis, MO 63105. No price was given. Phone is (314) 862-8277.

IPPA also announced a Patrol Plan and Schedule Plan being developed for police and local government management. For information regarding these programs and training seminars and other things IPPA has in mind, contact them at the above address.

Karl Zinn, 109 E. Madison, Ann Arbor, MI 48104, writes that a workshop on Personal Computers in Teaching and Scholarly Work has been offered to faculty members at the University of Michigan, scheduled for next spring. Karl is interested in helping others set up similar workshops. Call Karl at (313) 793-4410 for information about the workshops, conferences, consultations, and/or many of the other projects currently underway at the University's Center for Research on Learning and Teaching.

Microsignal, P.O. Box 161988, Sacramento, CA 95816, announces COMPUVOX, a low cost computer voice input. You teach your PET to recognize your voice. The unit is completely assembled, comes with driver software and user's manual, for \$29.95 + \$1.50 P & H (+6% sales tax for Californians). There are two programs available on one tape for \$4.95. Voicemaze and Soundtrap utilize the COMPUVOX unit as well as PET's graphics. The second unit announced by Microsignal is Computone - the voice of your PET. Comes assembled with a manual containing many programs, for \$14.95. PETYPE allows you to use a teletype as a printer for your PET, and comes assembled with two programs: Screenprint and Lister. PETYPE can co-exist with COMPUVOX and COMPUTONE and requires connectors also sold by Microsignal. Send for their catalog - their new products lists appears to be never ending! They have lots of neat sounding programs, too, which they guarantee to load.

Again, I want to stress the importance of the PET GAZETTE to all PET owners. Whatever it is you're looking for, the Gazette will probably know where you can get it and for how much and whether it will perform as advertised. And, since it's free, you have nothing to lose by contacting Len and asking for a subscription. Microcomputer Recource Center's address is first in this article.

FLEA MARKET TAPES

THE FOLLOWING PROGRAMS ARE FOR SALE - FOR \$5.00 EACH ONLY IF YOU DO NOT HAVE A PROGRAM TO SEND TO US IN EXCHANGE. IF YOU DO HAVE A PROGRAM WE CAN ADD TO OUR FLEA MARKET, SEND IT TO US. WE'LL SEND YOU THE PROGRAM YOU WANT IN EXCHANGE FOR IT. PLEASE INCLUDE \$2.00 FOR POSTAGE AND HANDLING.

DARTS - a graphic game of darts permitting up to three players. Allows overhand, underhand, and straight tosses of the darts at a target, and keeps score.

HANGMAN - the most unique version of this game we've ever seen! The PET has a vocabulary of words and the user selects a category. PET selects the mystery word and the game begins. PET also keeps track of the letters you miss and doesn't let you guess the same letter again. Wonderful graphics.

MAXIT - A great "board" game, utilizing PET's programmable cursor controls as well as the graphics. The board is filled with an array of numbers from -9 to +15. Pet moves vertically, the user moves horizontally, each trying to capture the biggest score. A fun and fascinating game of strategy.

SPACE CONVENTION - an impressive display of mighty starships zooming across the screen - singly, then in twos and threes, and finally in massed formation. Since the "starships" are represented by the " ", the graphics are hard to classify. But it is certainly impressive to see!

MAGIC SQUARE - Construct a Magic Square (the sum of the digits in each column, row, and diagonal must not exceed 15) with the PET as an active and formidable opponent.

SEE ISSUES #1 THROUGH #4 FOR DESCRIPTIONS OF THE FOLLOWING PROGRAMS:

SNAKE	AIR WAR
YAHTZEE	HIMONDIS
SPADES	LOMONDIS
RND CHAR	DOGFIGHT
SPIRAL	
TYPEWRITER-5	
PRIME NUMBER	
DIGITAL CLOCK	
MORSE CODE TUTOR	
VACATION BUDGET	
ADDITION GAME	
OTHELLO FOR ONE	
OTHELLO FOR TWO	
CODES	
ROAD RALLY	
SLOT MACHINE	
STATES & CAPITOLS	
EMPEROR	
GRADES	
HEX/DEC	
MATH QUIZ	
FLEA PAK I	
KLIDISKOP	
KYBD UTILITY	
RENUMBER & UNLIST	

SOFTWARE

SHELF

CHASE	\$10.00
BLOCKADE	\$10.00
BLACKJACK	\$10.00
DEFLECTION	\$10.00
SPACE TALK/ SPACE FIGHT	\$10.00
STAT I *	\$20.00
STAT II **	\$20.00
DATA RETRIEVAL ***	\$10.00
DATA EDIT ****	\$10.00

* STAT I permits keyboard input of data during program execution. It also plots the data on the screen.

** STAT II is a set of seven programs. Data must be entered prior to execution, in DATA statements, and there is no plot. STAT II provides a slightly larger array of statistical tests.

*** DATA RETRIEVAL permits the user to create new data files on tape with an unlimited number of records in each file. The user can sort up to 50 records at a time and save them in a new file. An unlimited number of files is possible and the user can add data to the records in memory from any number of tape files. There is no editing capability. Any person owning the original version of HOME DATA RETRIEVAL is welcome to write and ask for a listing of the program in its most current form (version 6)

**** DATA EDIT uses the records created by the DATA RETRIEVAL program. It permits the user to create new files, edit existing files, and to save and load additional records for editing from any number of files. There is no sorting capability.

Both DATA RETRIEVAL and DATA EDIT are accompanied with User documentation and a program listing made on the Centronics P1 printer. The listing will be sent to anyone who owns the original HOME DATA RETRIEVAL program upon request, to permit the owner to update his program and make use of the DATA EDIT program.

Please ship the following program tapes. I enclose full payment as described in the Flea Market or Software Shelf columns (or \$2 and an exchange program for a Flea Market exchange).

 NAME _____
 ADDRESS _____ CITY _____ STATE _____
 ZIP _____ MC/VISA/BAC # _____
 EXPIRATION DATE _____ MC INTERBANK # _____
 REQUIRED CREDIT CARD SIGNATURE _____

RENUMBER & UNLIST: A LISTING

RENUM & UNLIST was contributed to the Flea Market by Neil Bussey of the SPHINX group in Berkeley, California. RENUM begins in line 59910 and UNLIST begins in line 60000. Instructions for UNLIST begin in line 61000. Use the same principles for RENUM. To line 440, after moving the cursor past the existing code, add :IF G=256 GOTO 0 to prevent PET from trying to read characters that don't exist. Look at lines 2131 - 2140 before trying to run the program - and follow the code from there.

```

0 GOTO 2000
1 REM " TEN PEEKS "
9 F=10
10 PRINT "NXT LOC"
20 INPUT L
29 M=L
30 X=L
31 IF L=0 THEN 300
40 GOSUB 121
50 PRINT "L="; L; H2; H4
51 H1=0; H2=0; H3=0; H4=0; P=0; I=0; I1=0; X=0
55 A=PEEK(L)
56 C$=CHR$(A)
57 X=X
58 IF A=0 THEN 310
60 GOSUB 121
61 PRINT "CONTENTS="; A; C$; H2; H4
62 H1=0; H2=0; H3=0; H4=0; P=0; I=0; I1=0; X=0
70 IF L=MHF GOTO 2000
71 L=L+1
80 GOTO 30
121 F=LOG(X)/LOG(2)
122 I=INT(P)
124 IF I>15 GOTO 1000
125 IF I>7 THEN 130
126 IF I=0 THEN 140
127 IF I<0 THEN 200
130 I1=I-6
131 H1=10*I1
132 H2=H2+H1
133 GOTO 150
140 H3=10*I1
141 H4=H4+H3
142 GOTO 150
150 X=X-2*I
151 IF X=0 THEN 200
152 GOTO 121
200 RETURN
300 RETURN
310 PRINT "CONTENTS = 0"
320 GOTO 62
330 PRINT "L=0000"
340 GOTO 51
399 REM "CHR$ COMPARE"
400 LET G=0
401 LET V=L 23E23
402 LET U=3E11
405 LET U$=CHR$(G)
406 IF G=19 GOTO 420
407 IF G=147 GOTO 420
410 POKE 33740, G
411 PRINT PEEK(33740); U$
420 LET Z=LOG(V)/LOG(U)
440 LET G=G+1
450 GOTO 405
2000 REM "*****16016 CONVERSION*****"
2010 PRINT "PRECEED # WITH AN H FOR HEX EQUIVALENT"
2020 PRINT
2030 DATA 4096,256,16,1
2100 H$="0123456789ABCDEF"
2110 REM GET NEXT NUMBER
2120 RESTORE
2130 INPUT N$
2131 IF LEFT$(N$,1)="P" GOTO 2142
2132 IF LEFT$(N$,1)="5" GOTO 2500
2140 IF LEFT$(N$,1)="H" GOTO 2320
2141 GOTO 2150
2142 INPUT "LINES"; F
2143 GOTO 10
2150 IF N$="END" THEN 0001
2160 REM DECIMAL TO HEX
2170 H=VAL(N$)
2180 Y$=""
2190 J=4
2200 READ P
2210 FOR I=1 TO 16
2220 IF H-I*P<0 THEN 2260
2230 NEXT I

```

LIST

```

2240 PRINT">>>> INPUT ERROR"
2250 GOTO 2110
2260 N=X#*MID$(CH$, I, 1)
2270 N=N-(I-1)*P
2280 J=J-1
2290 IF J=0 THEN 2200
2300 PRINT N#; " DECIMAL IS ";X#; " HEX"
2310 GOTO 2110
2320 REM HEX TO DECIMAL
2330 J=2
2340 L=LEN (N#)
2350 IF L<2 THEN 2240
2360 IF L>5 THEN 2240
2370 FOR I=1TO4
2380 O(I)=0
2390 NEXT I
2400 FOR I=6-L TO 4
2410 O(I)=ASC(MID$(N#, J, 1))-48
2420 IF O(I)>9 THEN O(I)=O(I)-7
2430 J=J+1
2440 NEXT I
2450 O=4096*O(1)+256*O(2)+16*O(3)+O(4)
2460 PRINT N#; " IS ";O; " DECIMAL"
2470 GOTO 2110
2500 INPUT "1 OR 2 BYTES ?";BN
2510 INPUT "1ST BYTE ?";B1
2520 IF BN=1 GOTO 2540
2530 INPUT "2ND BYTE ?";B2
2540 INPUT "START LOC ?";SL
2550 INPUT "END LOC ?";EL
2560 FB=PEEK(SL): IF FB=B1 THEN 2600
2570 IF SL=EL THEN 2010
2580 SL=SL+1
2590 GOTO 2560
2600 SB=PEEK(SL+1): IF SB=B2 AND BN=2 THEN 2700
2610 IF SB>B2 AND BN=2 THEN 2570
2620 REM CONDITIONS MET, SO PEEK
2700 L=SL-1:F=5:GOTO 23
59910 INPUT "RENUMBER OLD LINE NUMBERS FROM";L1: INPUT "THRU";L2
59920 INPUT"AS NEW LINE NUMBERS FROM"; L: INPUT"IN STEPS OF";D
59930 INPUT"ABS LOC OF PRGRMS 1ST LINK BYTE";K:G=256
59940 N=PEEK(K+2)+G*PEEK(K+3)
59950 IF NDL2 GOTO 59910
59960 IF ND=L1 THEN PRINT N:L:POKEK+2,L-INT(L/D)*G:POKE K+3,INT(L/D):L=L+D
59970 K=PEEK(K)+G*PEEK(K+1):GOTO 59940
60000 OPEN 1,1: REM ***FILE SPEED***
60010 GET#1,C#:IFASC(C#)>13GOTO60010
60020 POKE610,1:Y#="3":PRINTY#:D=-6:E=252:S=6:D=LD:SET#1,C#:IFC#="R"GOTO60030
60030 PRINTC#:IFASC(C#)>0THENGET#1,C#:S=D*(ER/CT)=0:IFGOTO60030
60040 Z=2:Z4="GOTO60020":IFGOTO60070
60050 CLOSE1:PRINTMID$("ERRORCONT",S+1,6):STOP:PRINTY#:Z=9:Y=60020:T=10
60060 FORI=0TO7:PRINTY+T*I:NEXT:PRINT0
60070 L=525:FORI=1TO2+1:POKEI+1,C:NEXT:POKEI,Z:PRINTZ:PRINT":END
61000 REM TO CONVERT AN ASCII PROGRAM
61010 REM (SUCH AS PRODUCED BY
61020 REM OPEN 1,1,1: CMD1: LIST
61030 REM FORI=1TO200:PRINT#1," ":NEXT
61040 REM PRINT#1,"":CLOSE1)
61050 REM TO BASIC, LOAD THIS PROGRAM
61060 REM FIRST, THEN RUN, IT WILL
61070 REM READ THE FIRST FILE ON
61080 REM TAPE 1 AND ASSIMILATE EACH
61090 REM LINE INTO THE PROGRAM
61100 REM FOR OTHER INPUT SOURCES,
61110 REM CHANGE LINE 60000.
61120 REM TO ADD A SUBROUTINE TO
61130 REM A PROGRAM, FIRST LOAD
61140 REM THIS UNLIST PROGRAM,
61150 REM THEN LIST-61090,
61160 REM THEN LOAD THE PROGRAM,
61170 REM THEN HOME AND HIT RETURN
61180 REM 9 TIMES TO PUT UNLIST
61190 REM INTO THAT PROGRAM.
61200 REM NEXT, PUT IN THE TAPE
61210 REM THAT HAS AN ASCII VERSION
61220 REM OF THE SUBROUTINE (MADE
61230 REM BY LIST), AND RUN
61240 REM IF IT STOPS BY "BREAK",
61250 REM YOU CAN DELETE THE UNLIST
61260 REM CODE BY SAYING "CONT"

```

I. I/O HARDWARE

There is much more to the PET I/O than meets the eye (or is mentioned in the owner's manual!)

The PET has three LSI I/O chips -- two of the well known PIAs (6820, 6520, etc.) and one of the lesser known but more powerful VIAs (6522).

The PIAs look to the rest of the PET like 4 memory locations each, the VIA like 16 memory locations (see table 1).

For further details, consult the appropriate data sheets. (The VIA alone takes up 24 pages of heavy material to describe all its capabilities. These notes just scratch the surface.)

A. User Port

The user port connected to one half of the VIA, PA0 to 7, are bidirectional data lines and CA1 is a bidirectional control line for handshaking. After reset it is set up as an input port and the appropriate register must be poked to set it up for output.

Example: POKE 59459,15 sets PA0 to 3 as outputs, PA4 to 7 as inputs.

CB2 is designed for use with the shift register in the VIA. (Anyone working out a good routine to use it thus, please let me know!) Incidentally, the shift register in the VIA is not used by the PET.

B. IEEE Port

The IEEE Port uses most of a PIA, having the A register initialized for input and the B register initialized for output.

The IEEE Port uses some lines from other I/O chips as well. 12 of the 15 IEEE lines (REN is not implemented) pass through Bus-Driver/Receiver strips (see schematic). The drivers are always enabled and are open collector drivers having considerable sink capability (48 MA). As a source, however, they have only termination resistance.

Example 1: PEEK (59424) reads the IEEE Port. If not connected, it will read all 1s due to the terminations.

Example 2: POKE 59426,A writes to the Port.

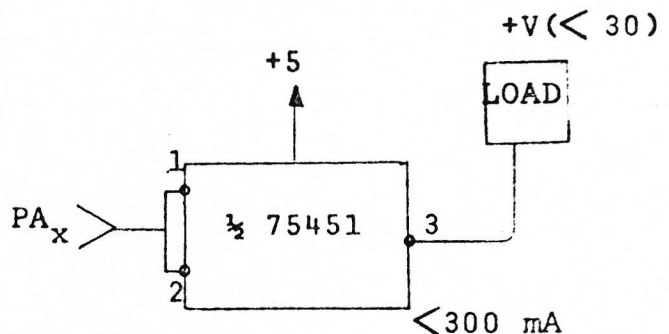
The second PIA scans the keyboard, and the other half of the VIA performs miscellaneous functions such as upper/lower case control and cassette I/O.

II. INCREASING I/O DRIVE CAPABILITY

Except for the IEEE Bus, the I/O lines are limited to driving about one TTL load or equivalent. Useful buffers are:

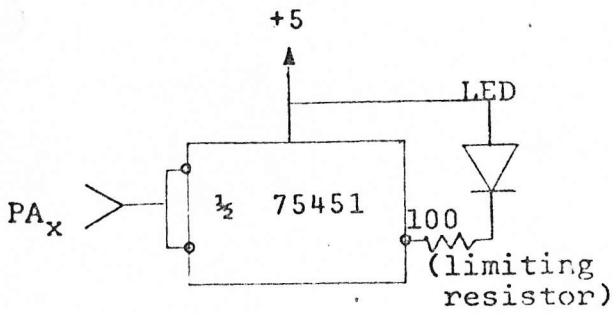
1. Peripheral driver chips such as the 75451. These can sink 300 MA for control of relays, small lamps, etc. They can stand 30V when off.

Example:

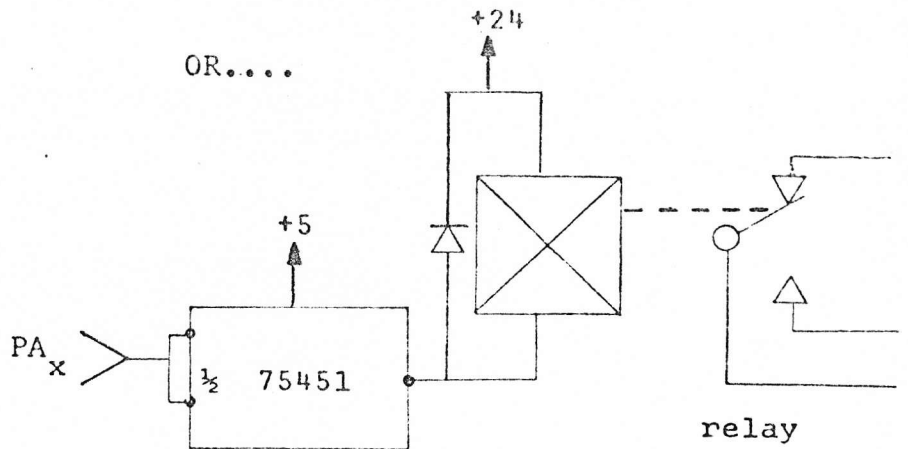


Please direct corrections, additions, comments to Richard Tobey (408) 733-0688

OR....



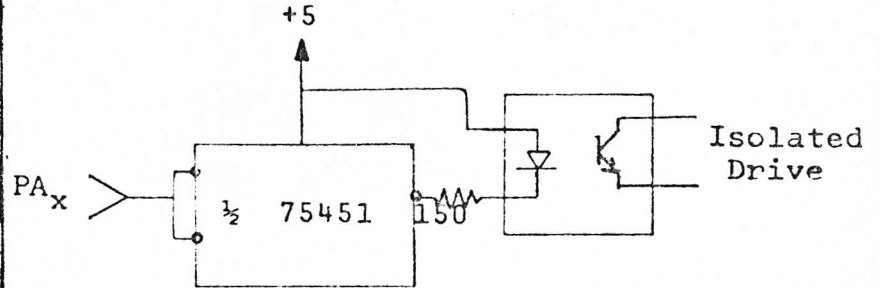
OR....



2. Power FETS: e.g. VN66AF. They have essentially infinite input impedance, 80V breakdown and about 3 ohm on resistance.

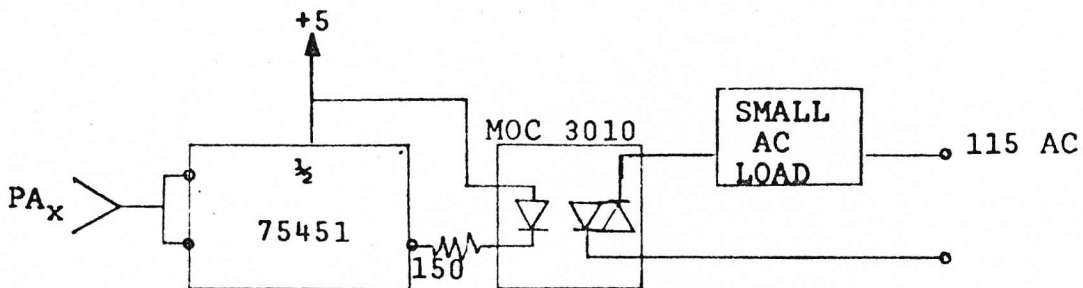
3. Opto couplers: These devices are useful when driving something which cannot share a common ground with the PET. Most types need more input current than can be supplied by the VIA. Use a peripheral Driver as well!

Example:

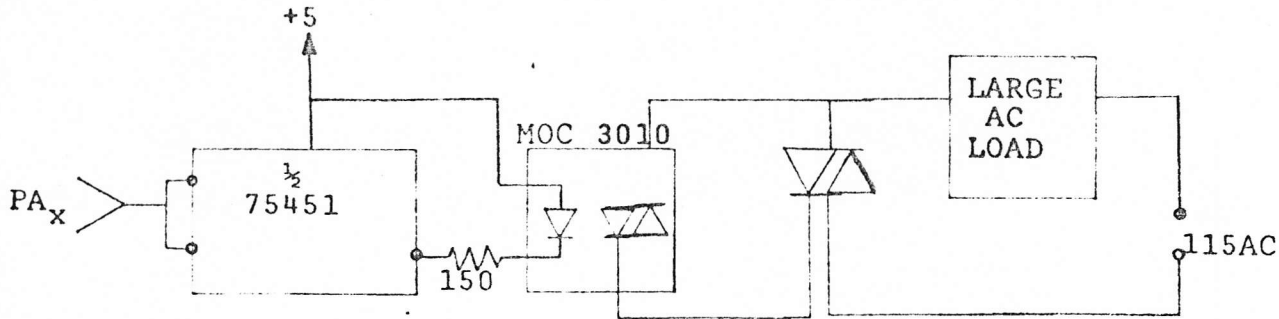


An interesting new part is the Opto coupled triac MOC3010 (Motorola).

Example 1:



Example 2:



Don't miswire or take my pin connections as gospel -- your PET won't like 115V AC on the I/O.

III. INTERRUPT STRUCTURE

Interrupts (including Break or Software Interrupts) are handled by software polling.

When the processor recognizes an interrupt it vectors through FFFE, FFFF in ROM to a routine that first inspects the processor status register to see if it was caused by a BREAK instruction or by hardware (IRQ line low).

If it was caused by a BREAK instruction, a Jump Indirect is executed through locations 021B, C. If caused by a hardware interrupt, then a Jump Indirect is taken through locations 0219, A.

These locations, being in RAM, may be user-modified to point to extra user code ahead of normal interrupt processing.

Note, however that the IRQ pointer is used by the cassette routines and should be restored to standard values before the cassette SAVE or LOAD functions are called.

Various sections of the I/O chips can be set up to cause interrupts through the IRQ line.

Example: POKE 59470,2 enables a negative edge on the user port CA1 line to cause an interrupt.

However, have your code set up to handle it when it happens!

Also note that each pass through the regular interrupt code increments the time register.

IV. EXPANSION PORT

This port is an extension of the Address and Data Bus of the PET together with some timing signals and a hardware reset input.

The 4 high-order Addresses have already been decoded into 4K block selects.

The lines are not dedicated for expansion or as strong as S100 Bus lines -- so beware! Anything hanging on the expansion port should be fully buffered, preferably with low power Schottky.

The PET regulated power supply does not appear to have anything extra for expansion devices so they will need their own supply if they draw more than, say, 100 MA.

However, with these problems taken care of, Memory

cards such as S100 8K by Godbout (and others) will work well with minor modification.

Data should be enabled onto the Data Bus through Tri State drivers during BOARDSELECT.02.R/W.

The memory write pulse should be generated during BOARDSELECT.02.R.W.PROTECT.

Memory sizing is automatic to the top of contiguous memory on Power Up.

V. I/O REGISTERS

VIA (Includes User Port) E840 - E84F

59457	ORA	Output register for User Port with handshake.
59459	DDRA	Data Direction reg. for ORA. 0=IN 1=OUT.
59466	SR	Shift Register (can connect to CB2).
59468	PCR	Peripheral Control Register. B0 is CA1 control, 0=Neg. edge, 1=Pos. edge sensitive.
59469	IFR	Interrupt Flag Register. CA1 sets B1, reset by read of 59457.
59470	IER	Interrupt Enable Register. B1=1 enables interrupt by CA1
59471	ORA	Output register without handshake.

Other registers are associated with the timers and other functions. See MCS6522 data sheets.

PIAs E810 - E813 and E820 - E823

KEYBOARD IEEE

59408	59424	A Register (also A Direction with CRA2=1).
59409	59425	A Control.
59410	59426	B Register (Also B Direction with CRB2=1).
59411	59427	B Control.

The IEEE PIA is initialized for the A Register 59424 to read, and the B Register 59426 to output DI01 to 8.

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Please fill out the questionnaire and mail it back to us so we can fulfill your information requirements.

1. Please comment about your level of expertise. What do you know about microcomputers? Do you understand hardware? Machine code? Assembler? BASIC?

2. Do you own or have frequent access to any microcomputer other than the PET? Which ones?

3. Would you be willing to write articles for the PAPER if there were something "in it" for you? Like money or free software or something? What would you write about? What would you want in return?

4. Would you be willing to help form a PET User group in your area? May we give other PET owners your name, address, and telephone number? If so, please give us that information here.

5. Which peripherals would you like to see made available for the PET? What kind of prices are you willing to pay?

YES! I'd like to subscribe to the PAPER and receive all ten issues of this year's volume! I enclose \$15.00 full payment.

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EXPIRATION DATE _____ MC INTERBANK NUMBER _____

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I am interested in forming/joining a PET Users Group. (circle one)

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I already have a subscription to the PAPER, but I'd like to see articles about:

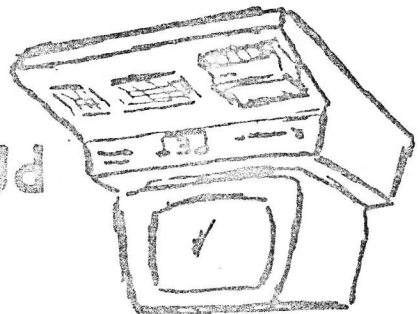
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