PEEK (65)

The Unofficial OSI Users Journal

Editor: Al Peabody
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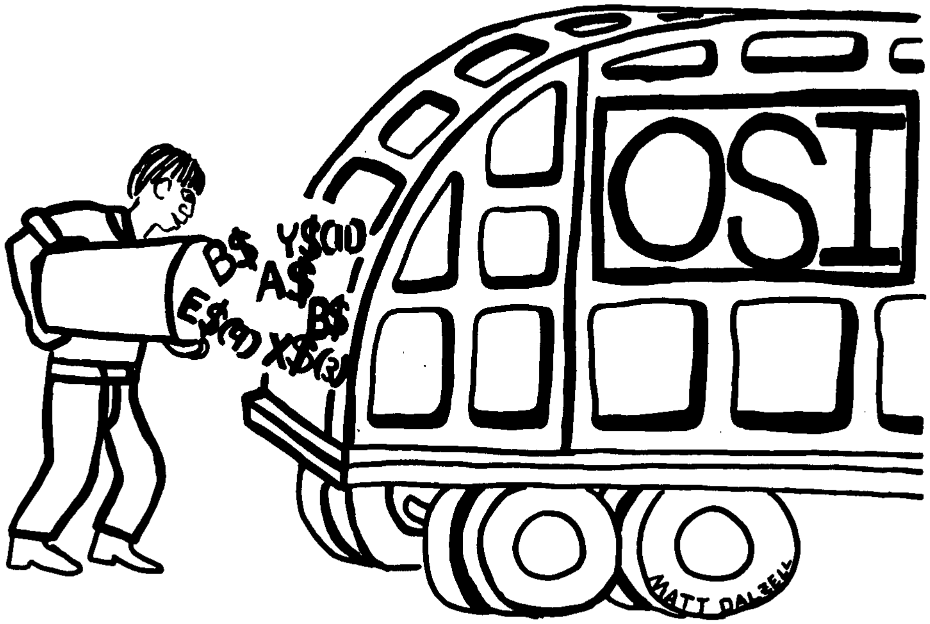
INSIDE:



Column One

Last month in this space, I announced the advent of the PEEK(65) national bulletin board. The response has been gratifying, but disappointing. Many of you have called to see what others have left on the board, but very few have left messages of your own. Call and see what's there, of course, but do think of your fellow OSI'ers and leave us a note, even if it just says where you are and what you are interested in.

Speaking of communicating, which is what the CBBS is all about, you are invited to submit your ideas and wants for an

OSI STANDARD PROTOCOL

for telephone communication between computers. Let me explain. If you and I want to communicate with each other, we need software which will let our computers talk, and more than just talk. You type a message on your terminal, and it appears on mine. That is the beginning. That we can do by unplugging the computer and just using our terminals and a couple of modems. But then suppose you have written a dynamite program, and have it on tape or disk, and I would like a copy, without having to retype it from a printout... we need file share software, preferably able to interface with our disk drivers, at least able to stick incoming stuff into RAM at a selectable location, then wait while the first batch is stored on disk or casette, then send some more. Or suppose you start sending me your 8 K program, and something is wrong: I can see that it isn't coming through right. So I want to tell you to start over. But your phone is busy, talking to my computer. I have to wait while the whole 8 K comes in (at 300 baud), then tell you it didn't work, then we start over. A few times through this loop and we will decide retyping isn't so bad after all!

What's needed is an agreement between you and me that after each line or so, my computer will send you something like a control Q to report that everything is OK, and that your computer will wait till it sees the agreed character before sending the next line. Maybe 3 or 4 control codes should be enough to handle most situations, but we need to agree, all of us, on what they will be and what they will mean before it will be worth anyone's while to write the programs we all need. So send your suggestions and ideas, not as to what the codes will actually be, but as to the situations in which they are needed. Then we can all get to work writing the programs to support the OSI Standard Communications Protocol, with some assurance that whatever we come up with will be useful to all of us.

Al

THINGS LEARNED THIS MONTH

by Jim Sanders
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New Year's resolutions being what they are, I find that I also must resolve to keep a month ahead on this column. The notebook I am keeping is getting overfull with the trials and tribulations of the information-hungry OSI users. Can you believe that some of us are trying to make a living based on OSI products in a dark environment devoid of access to the factory for even the most vital problems? So here is my effort to shed some light however small.....

LEVEL 3 HORROR STORY PART 2

The disk from the factory mentioned in the last column arrived and was put into service. Need I mention that there was no paper with it? Not a word! The new LEVEL3 does activate the watchdog timer when a WAIT FOR is made and the device is busy. After the timer runs down, the executive executes code that appears at 25186 in the LEVEL3 program module. This code is (tokenized) as RUN"RTMON". I have it on good authority (not verified) that you can poke other action into that space, such as 136, 32, 32, 54, 51, 48, 48, 48 (GOTO 63000) and thus remain within the program being executed. Note that the action taken upon timeout is the same for all partitions, requiring some level of standardization if such a change is made.

One application involves a LEVEL-3 system which uses one partition to monitor external sensors. It was desired that

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PEEK(65)
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U2

by Greg Stevenson
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Buena Park, CA

One of the most popular ways of comparing performance between computers, operating systems, computer languages or solutions to computer problems is the benchmark. A benchmark is simply a comparative timing of how long it takes the computer to perform a given task. In benchmarking OSI's FDUMP, it seems that FDUMP takes about 75 seconds for every thousand bytes it dumps (printing 64 characters per line). In contrast, this columnist now has a version of FDUMP that takes only 3 seconds to dump a thousand bytes. In other words, FDUMP IS NOW 25 TIMES FASTER and without any additional machine language routines. Imagine making one change to 65U that will allow an average increase in computer performance of about 10 times. Once this was just a dream, but as of the beginning of the year such a quantum leap in 65U is now possible and is the topic of this month's U2.

As mentioned above, only one major change needs to be made to the BASIC running under 65U...exchange BASIC for another high level programming language. Now, granted, most other languages occupy a great deal more memory than BASIC and are not all that much faster than BASIC. Indeed, none of the common programming languages could ever hope to replace 65U's BASIC for "relative efficiency" in the amount of memory it occupies. But there is another very important language rising on the computer scene. Last August, BYTE magazine dedicated its whole issue to articles on this language. Atari uses this language to control many of its video games. And most of the world's observatories use this language. It was created in 1969 by Mr. Charles H. Moore and is called FORTH. FORTH is a totally different kind of language, very compact and extremely powerful. These two characteristics allow it to replace BASIC and transform your OSI computer into a super-machine.

It is beyond the scope of this column to describe what FORTH is or how it works. It's just too different from other languages. Instead, an attempt will be made to describe some general characteristics of FORTH in order to stimulate interest in this novel language and how it can fit in with existing BASIC programs and data files.

The most obvious difference between FORTH and BASIC is speed. FORTH was designed as an application programming tool to allow programmers to be more productive in writing programs (the main module of the FDUMP program above required only 6 lines and took about 10 minutes to write and debug). As a natural result of this design, FORTH is also an extremely efficient language, much more so than traditional languages. BASIC, on the other hand was written as a teaching tool. BASIC was designed to be very friendly to novice programmers and not to be extremely efficient. However, most users of 65U are businesses, and business people are concerned with how fast a programmer can write a given program and how fast the program gets the job done on the computer, not in how "friendly" the language is to the programmer.

Next, FORTH is highly structured and lends itself to modular, error-free programming. This columnist knows of no other language that is as easy to read and maintain as FORTH when done properly. A warning, however -- it is possible to write bad, unintelligible FORTH code just as it is with all other languages. This is a characteristic of the programmer rather than the language. On the other hand, many languages are such that even a good programmer has a hard time writing good code that is readable and that can be easily changed as needs change.

Another key feature of FORTH is that it is extensible. Most programmers often wish that their respective language had this or that feature or could also handle this or that type of data. Well, with FORTH this is not only possible, it is natural and expected. If FORTH doesn't have a word to do what is desired it can be added in a line or two of code and then it becomes a natural part of the language. Thus, if FORTH doesn't have it, one can add it and make FORTH fit the problem, not vice versa as with other languages.

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EVERYONE WINS

The Ohio Scientific Software Game

Selecting software for your Ohio Scientific computer is a chancy task at best. There are few trustworthy vendors with a national reputation. There are no consistent quality standards and the documentation is often cryptic and inaccurate. If you are lucky enough to find a good package, there's no guarantee of ongoing support. A wrong choice results in months of wasted time, effort, and money.

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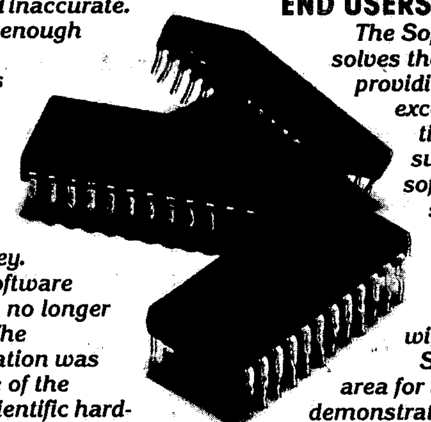

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A few other points are that FORTH is compact; a 4K FORTH program is huge, FORTH supports virtual memory so that large data arrays can be used, if desired, and lastly, FORTH is available on virtually all computers including every model and operating system that OSI sells.

Now, FORTH also has its bad points, as do other languages (it just has fewer of them). A major limitation at this time is the lack of books or classes to teach FORTH. This will be remedied in time, but FORTH was not designed to be friendly to beginners, but rather to give power to programmers. Thus, anyone wishing to learn FORTH first should be experienced in some other language.

Secondly, although FORTH gives a programmmer total control of the computer, this also means that it will allow one to crash the system, etc. While writing programs, however, this is easily overcome by writing words that include error-checking while writing and debugging the program. The error-checking words may be removed then when the program is debugged.

There is so much more to cover but space doesn't allow it. One word of relief, though--the 65U version of FORTH by Software Consultants (and well worth the asking price) will support all of 65U and can be easily extended to use existing data files. And, by the time this is printed, one should be able to use it under LEVEL III swapping between BASIC and FORTH, as needed. Thus, none of the programs written prior to FORTH need to be rewritten. Simply add FORTH and use it to enhance what is already there.

All interested persons should: (1) get a copy of the August BYTE and read it for more information; (2) obtain a copy of FORTH; (3) write to the FORTH INTEREST GROUP (fig.) at P.O. Box 1105, San Carlos, CA 94070 concerning their publications; and (4) send a self-addressed, stamped envelope to TELOS CONCEPTS for an OSI FORTH user's information sheet. Vendors of FORTH and FORTH programs are encouraged to send information also concerning their products. These will be subsequently added to this sheet.

Also, we are collecting partial documented disassembly of 65U in order to publish a complete disassembly listing. If interested in contributing, please contact Greg Stevenson at Telos-Concepts.

So long until next month, and may the FORTH be with you!

* * * * *

CASSETTE CORNER

by David A. Jones
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Probably the most notable shortcoming of the OSI ROM Monitor is its lack of facilities to save and load machine language programs on cassette tape. There is of course the psuedo load routine in the Monitor but really all this does is select the cassette port for input instead of the keyboard. There is no given method to create tapes in this format and no protocol other than "." and "/" to select the address and data modes respectively. The Extended Monitor can create and load tapes in their "Checksum" format and the Assembler/Editor can create tapes in this format but can't load them. However, in order to load these machine code programs later you must load the Extended Monitor first and then the program tape or load the Assembler/Editor followed by the source code tape and assemble to memory. Both methods are time consuming enough to discourage their spontaneous use. In addition you are restricted to loading the ExMon and A/E at 300 baud as both are loaded with the Autoload routine which is in the keyboard emulate format and you have no way to reproduce this if you make a 600 baud tape.

Once loaded you could save the Autoload code by PEEKING it

```
 10 0000                  ;CASSETTE LOADER WITH CHECKSUM
 20 0000                  ;REVISED 1-19-81
 30 0000                  CNTR=$F0    RECV WORD COUNTER
 40 0000                  WCTR=$F1    WORD COUNT REGISTER
 50 0000                  CREG=$F2    CHECKSUM REGISTER
 60 0000                  ADRS=$F4    ADDRESS REGISTER
 70 0000                  TEMP=$FC    TEMP STORE
 80 0000                  FLAG=$0203  LOAD FLAG
 90 0000                  MNTR=$FE00  MONITOR ENTRY
100 0000                  ROLA=$FEDA  COMBINE NIBBLES
110 0000                  INPT=$FFEB  INPUT ROUTINE
120 0000                  DISP=$FFEE  DISPLAY ON CRT
130 1800                  *=$1800
140 1800 A980       STRT  LDA #$80    SET LOAD FLAG
150 1802 8D0302           STA FLAG
160 1805 207518 3F        JSR INNN    GET INPUT
170 1808 C924             CMP #'$
180 180A F05C             BEQ END
190 180C C93B             CMP #';
200 180E D0F0             BNE STRT
210 1810 A200             LDX #0      ZERO FOR ROLA
220 1812 A000             LDY #0
230 1814 84F2             STY CREG    CLEAR CHECKSUM REGISTER
240 1816 84F3             STY CREG+1
250 1818 204518 3F        JSR WORD    GET WORD COUNT
260 181B 85F1             STA WCTR
270 181D 204518 3F        JSR WORD    GET SART ADDRESS HI
280 1820 85F5             STA ADRS+1
290 1822 204518 3F        JSR WORD    GET START ADDRESS LO
300 1825 85F4             STA ADRS
310 1827 84F0       DATA  STY CNTR
320 1829 204518 3F        JSR WORD    GET DATA
330 182C A4F0             LDY CNTR
340 182E 91F4             STA (ADRS),Y   STORE IT
350 1830 C8               INY
360 1831 C4F1             CPY WCTR    CHECK FOR LAST
370 1833 D0F2             BNE DATA
380 1835                  ;
390 1835 205418 3F        JSR BYTE    GET CHECKSUM HI
400 1838 C5F3             CMP CREG+1  CHECK IT
410 183A D03F             BNE ERR
420 183C 205418 3F        JSR BYTE    GET CHECKSUM LOW
430 183F C5F2             CMP CREG    CHECK IT TO
440 1841 F0BD             BEQ STRT
450 1843 D036             BNE ERR
460 1845                  ;
470 1845 205418 3F  WORD  JSR BYTE
480 1848 18               CLC         UPDATE CHECKSUM
```

and making a BASIC tape to POKE it in when you want to load a machine language tape. Then you could load checksum tapes at any speed you want. However, you must still load this loader first. The ideal situation would be a routine in EPROM. Unfortunately the OSI Autoload is self modifying and won't run from "ROM". The following routine can, and is also quite a bit shorter than the Autoload.

Mine starts at $F800 in EPROM but the following code is assembled at $1800 so you don't have to modify anything in order to try it out. To relocate it back to $F800 just change the high order bytes of the jump addresses to $F8 instead of $18.

The routine searches for 2 dollar signs in a row indicating the end of data and will jump to the monitor if found so that a second program on tape won't start to write over a previous load if you're notwatching it. Keep this in mind when creating tapes and end them with $$ for this bit of automation. Also, page zero locations $FO-FD are used so you can't load into this space.

If an error is detected while loading, an error message is displayed. Rewind the tape past the error and type "G" to restart.

If you don't plan to put this in EPROM right away (or ever for that matter) you can make a BASIC tape to SAVE and RELOAD it with the BASIC routine that follows. The routine saves the data by recording it as DATA statements on tape and then saving itself. When the tape is loaded the next time the code in the DATA statements is POKED back in memory. The interested reader could expand this to accept start and stop addresses or otherwise automate creating tapes.

```
1849 65F2                ADC CREG
184B 85F2                STA CREG
184D 9002                BCC NOCRY
184F E6F3                INC CREG+1
1851 A5FC      NOCRY     LDA TEMP
1853 60                  RTS
1854                     ;
1854 205718 3F BYTE      JSR CHAR
1857 205718 3F CHAR      JSR INNN
185A C941                CMP #$41
185C 9002                BCC HEX
185E E907                SBC #$07
1860 290F      HEX       AND #$0F
1862 20DAFE              JSR ROLA
1865 A5FC                LDA TEMP
1867 60                  RTS
1868                     ;
1868 207518 3F END       JSR INNN     GET SECOND $
186B C924                CMP #'$      CONFIRM IT
186D D091                BNE STRT
186F 8E0302              STX FLAG     CLEAR LOAD FLAG
1872 4C00FE              JMP MNTR
1875                     ; 720 1875 20EBFF  INNN   JSR INPT
1878 4CEEFF              JMP DISP
187B                     ;
187B A000 3F   ERR       LDY #0     DISPLAY ERROR MESSAGE
187D B99518    MSG       LDA TEXT,Y
1880 F006                BEQ REST
1882 20EEFF              JSR DISP
1885 C8                  INY
1886 D0F5                BNE MSG
1888 8C0302    REST      STY FLAG
188B 207518 3F           JSR INNN
188E C947                CMP #'G
1890 D0F6                BNE REST
1892 4C0018 3F           JMP STRT
1895                     ;
1895 0D        TEXT      .BYTE $0D,$0A,$0A
1896 0A
1897 0A
1898 45                 .BYTE 'ERROR'
1899 52
189A 52
189B 4F
189C 52
189D 0D                 .BYTE $0D,$0A,$00
189E 0A
189F 00
```

```
10 INPUT "SAVE OR POKE (S/P)";A$ 15 IF A$="P" THEN 60
20 A=6144:SAVE:REM 1800 HEX
25 PRINT"START RECORDER":FOR X=1 TO 5000:NEXT X
30 FOR X=100 TO 250 STEP 10
35 PRINT X "DATA";
40 FOR Y=1 TO 9:PRINT PEEK(A)",";:A=A+1:NEXT Y
45 PRINT PEEK(A):A=A+1
50 NEXT X
55 LIST
60 A=6144
65 FOR X=0 TO 159
70 READ I:POKE(A+X),I
75 NEXT
```


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IMPROVE YOUR GARBAGE COLLECTION

E.D. Morris, Jr.
3200 Washington
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OSI BASIC-in-ROM has a defect known variously as "the string handling bug" or the "garbage collector bug". This bug appears in programs which do a lot of string manipulations. When the bug strikes, the BASIC program stops and the video screen flickers at two second intervals. This can be demonstrated by the following program:

```
10 Z$(2)="MICRO"
20 PRINT FRE(1)
```

The only way to recover is to press "Break" and then "Warmstart". Often the BASIC program is no longer correct but has been garbled. The remainder of this article describes a hardware fix to OSI's garbage collector problem.

The bug described above occurs only when string variables are used; in particular only when subscripted string variables are used. These variables are stored at the high end of RAM memory and work down as more space is required. Whenever a string variable is changed, the new data is stored in succeeding lower bytes of "fresh" memory. The old data is not erased, but merely abandoned. As string manipulations are done, string storage works down in memory until it would collide with program and numeric variable storage. Before this happens, the garbage collector routine is called. This routine erases all abandoned strings and repacks the remaining data into the high end of RAM memory. (see PEEK (65) Vol.1, #1). Unfortunately subscripted sting variables are not handled properly and the routine hangs up.

The FRE(X) function is used to determine the amount of unused RAM memory space available. This routine first calls the garbage collector to repack the strings before determining free memory. Thus calling FRE(X) forces the garbage collector into action.

It has been suggested (PEEK 65) that the problem can be avoided by properly dimensioning subscripted string variables according to the formula N = 2 + 3*I where I is an integer. For example 2,5,8,11 and 14 obey this rule. The default dimension is 10 which is not among the "magic" dimensions. Thus adding a line to the previous program appears to solve the problem:

```
5 DIM Z$(11)
10 Z$(2)="MICRO"
20 PRINT FRE (1)
```

I said "appears to solve" for a good reason. Try the following program:

```
10 DIM Z$(11)
20 Z$(1)="I LIKE"
30 Z$(2)="MICRO"
40 Z$(3)=Z$(1)+Z$(2)
50 PRINT FRE (1)
60 PRINT Z$(3)
```

You will find it does not run correctly. Thus the simple dimensioning trick does not always work.

A recent article by Stanley Murphy (PEEK 65 and also "First Book of OSI") describes the garbage collector in more detail. Mr. Murphy also gives a neat software patch to fix the problem. The G.C. routine is copied out of ROM into RAM. Then several patches are made so the routine will handle subscripted strings properly. The corrected routine is then called with a USR function. As long as the programmer continues to call USR before string memory is filled, the defective ROM routine is never used. The method is cheap and it works. It does have some disadvantages: the programmer must keep track of free string space. The FRE(X) function still does not work, and the patch must be reloaded every time the computer is powered up. Therefore I have turned to a permanent hardware solution to the problem.

The garbage collector routine is located in memory at $B24A. It is physically located in the ROM marked "BASIC 3" which contains the addresses $B000 to $B7FF. This chip is a 2316 Read Only Memory and is unfortunately not alterable. However the 2716 EPROM (Erasable Programmable Read Only Memory) has a pinout identical (almost) to the 2316 ROM. Thus data from the BASIC 3 ROM can be programmed into the EPROM except for three bytes which need correction. According to the article by Mr. Murphy, the locations to be corrected are as follows:

Location	ROM DATA	Corrected Data
$B18A	03	04
$B21F	04	02
$B220	4A	18

The 2716 EPROM is very easy to program. There have been several articles in Kilobaud describing cheapo programmers. You need a 25 volt supply and a parallel output port on your computer. The only lines which need to be pulsed are 5 volt logic signals. I use a BASIC program to PEEK at the ROM and POKE the data into the EPROM being burned.

Once the 2716 EPROM is programmed, it must be installed on your CPU board. Here is where the "almost identical" I glossed over earlier comes in. The pin-out for the 2716 is shown in figure 1. The pin-out for the 2316 ROM is the same except the polarity of two pins is inverted.

Pin#	2316	2716
18	+5	GND
20	CE	CE'

Before the new EPROM can be plugged in to replace the BASIC 3 ROM, some accommodation must be made for the difference in these two pins. The changes depend whether you have a 500 CPU, 502 CPU or Superboard.

The OSI 500 CPU board is set up to accept either 2316 ROM's or 2716 EPROM's by moving jumpers at location L2 and L3. Figure 2 shows the jumper location from the back (non-component side) of the board. On connector L-3 the foil between 2 and 15 is cut and 15 is jumpered to 11. On connector L-2, the foil to pin 4 is cut and jumpered to pin 7. These changes can be reversed by adding a wire jumper back across the cut foils.

The 502 CPU and Superboard also have jumpers, but these select between 2316 and 2364 ROM's and are of no help here. To install the 2716 EPROM thus requires what is politely referred to as a "kludge". I have used two different methods to do this. The goal was to avoid cutting up or otherwise doing irreversible damage to the CPU boards.

METHOD 1: Bend pins 18 and 20 on the 2716 so they point up rather than down. Then plug the remaining 22 pins into the "BASIC 3" socket. Wires can then be soldered directly to the pins of the EPROM and jumpered to the proper positions. Once you bend up the pins, don't try to straighten them again or they will break off.

METHOD 2. If you feel bending pins is cruel and unusual punishment for an I.C. or you might want to reuse the 2716 for some other purpose later, then this method is for you. Purchase a 24 pin DIP header and a 24 pin I.C. socket. Solder 22 of the socket pins to the top of the DIP header. (Caution: some headers use plastic which melts when you solder and allows the pins to move.) Solder wires to pins 18 and 20 of the I.C. socket and avoid making contact with the DIP header pins 18 and 20. Now you have a bulky sandwich consisting of the CPU board, the original BASIC 3 socket, the DIP header, the new socket, and finally the 2716 EPROM. At least you have done no permanent damage to the CPU board or the EPROM chip.

Whether you use method 1 or 2, the wire from pin 18 must be connected somewhere to ground. The wire from pin 20 must be connected to the chip select signal somewhere ahead of the 74LS04 inverter. Figure 3 shows the connection for both the 502 CPU and Superboard.

Before attempting this project, you should use the machine monitor to look at and write down a few bytes of data from the address range $B000 to $B7FF. After the EPROM is installed, go back and verify that the data at these selected locations is correct. Also verify that the correct data has been patched into the G.C. routine. The final test is to cold start BASIC and run the programs listed earlier in this article.

After modifying several computers, I discovered this "fix" solves only part of the problem. Now the FRE function will work properly. However, if string space is filled and BASIC calls the G.C. routine, the system will still crash. This can be demonstrated by the following program which fills memory with strings. Memory size has been set to 2000 so that the crash occurs sooner.

```
10 FOR X=1 TO 255
20 A$(5)=A$(5)+"A"
30 PRINT LEN(A$(5))
40 NEXT
```

With or without my modification, the crash will occur after the program has printed "46".

If you have made the modification described in this article, the program will work by adding the following line:

```
35 Q=FRE(1)
```

The FRE function now works and can be used to repack strings into high memory. However, FRE must be called after every major string operation, or often enough so that BASIC never calls the G.C. routine.

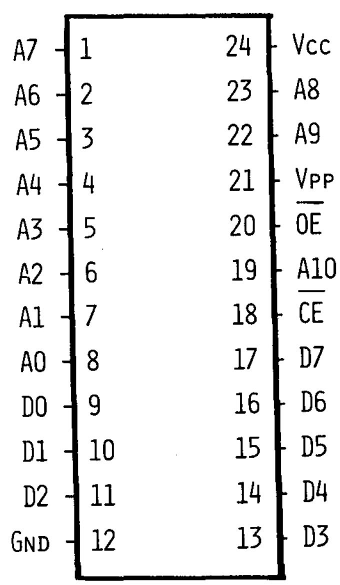
Unnecessary calls to FRE can be reduced by PEEKing at the string memory pointer and determining if strings are in danger of colliding with variables. Thus the following line can also be added to the above program:

```
35 IF PEEK(128)+2 >
PEEK(130) THEN Q=FRE(1)
```

We are now left with a system very much like that originally suggested by Stanley Murphy, except the patch does not have to be loaded from tape on each start-up, and FRE now works.

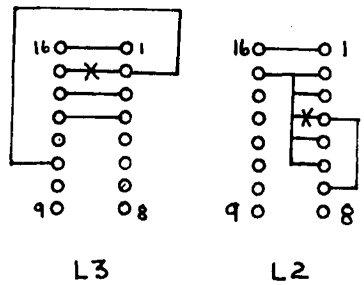
This patch is very usable, and it works. I find it a little unsatisfying though, not to have solved the total problem. If any of you readers out there think you have the correct code for a complete fix, please correspond with me and I will burn some more 2716 EPROMs.

* * * * *



PIN OUT OF 2716 EPROM

FIGURE 1



500 CPU JUMPERS

FIG. 2

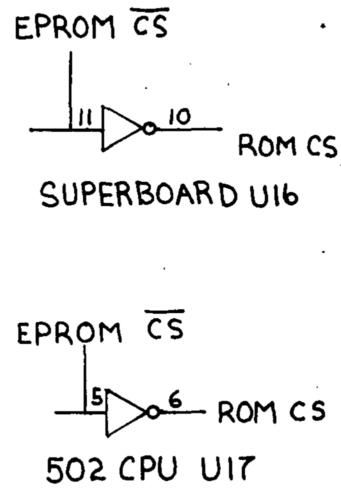


FIG. 3

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OSI-FORTH 2.0 / FIG-FORTH

OSI-FORTH 2.0 is a full implementation of the FORTH Interest Group (FIG) version of the FORTH language. It conforms to the FORTH-79 Standards Specification, and includes a resident text editor and 6502 assembler as part of the basic package. The OSI-FORTH system runs under the OS-65D3 operating system on any disk-based Ohio Scientific system, and has access to all DOS commands and resources. The package price is $79.95 for either a 8" or mini disk and manual. The manual is available separately for $9.95, deductible later from package purchase price.

Mr. Clean

Let Mr. Clean pretty up those BASIC programs! This very fast machine language program will resequence (renumber) and/or pack (remove spaces and REMarks), from any OS-65D3 BASIC program. Mini or 8" disk and instructions is $17.95.

VIDEO BANNER

Video Banner puts up to three lines of nine letters and/or punctuation marks each on the OSI 540 video screen. The letters are '3-D', built from graphics elements (resembling letters above). Mini or 8" disk contains the data files for the characters, utility programs to display them on the screen and save screens to disk, and demo program. Documentation provided will enable you to incorporate the data base and display into application programs (educational programs, games, clock programs, display 'signs'). An excellent program for dealers to catch customer eyes! Mini or 8" disk is $24.95 .

ADVENTURE-65

Explore a deep and mysterious cave, but watch out for the dragon and don't spill the lamp oil! Will you find all of the treasure before the lamp burns out? Will your leap across the chasm be successful? How do you deal with the dragon? Can you find all of the rooms in the cave? This micro version of the famous 370 Adventure retains all of the excitement and frustration of the original. No two trips into the cave will be exactly alike, so keep exploring! Requires 8K of memory. Cassette is $9.95, mini or 8" disk is $14.95 .

DISK-PAK 1

A collection of very useful OS-65D3 utilities. DSKPRP prepares a new diskette for use, by initializing any track range and putting in a blank directory. DIR540 uses the full 540 video screen (or terminal) to display the complete sorted directory in one view, allowing file creation with the full directory in view. SAVE automatically creates a file of given length by finding available space for you! It will ALSO optionally figure out the space needed to save whatever program is in a scratch file ("SCR"), create the file and transfer the program from SCR to the new file! All of the convenience of an Apple with the simple sequential files of OSI! COPIER copys the OS-65D3 System onto a new disk with a minimum of disk swaps (uses 24K). ONERR is a program (subroutine) that modifies OS-65D3 to allow your BASIC program to automatically execute any given line number upon detection of an error. BACKUP maintains a backup directory on disk and will restore a directory lost due to a disk error or mistake. Mini or 8" disk is $24.95 .

MANUALS

C4P/C4P-MF Users Manual: This is a nicely typeset manual recently released by Ohio Scientific. $8.95

OSI-SAMS **Service Manuals**: These excellent manuals contain schematics, logic diagrams, parts lists, scope traces and other valuable service data. C4P/C4P-MF manual is $14.95 (C4 manual for C8, too). C1P/SBII is $7.49 C3/C20EM manual is $38.95 .

CONNECTORS

A set of four male and four female connectors of the type used by OSI for board connection to the backplane and other I/O. $4.95

INFO

Our Floppy Disk Information pack provides the information you need to upgrade your OSI ROM BASIC system to a disk-based system. $3.49

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Descriptions of the CA- products appear as separate write-ups. The product described here is the floppy disk controller variation of the 470 board.

470 Board (Floppy Disk) Set Up

The 470 board wired as a floppy disk controller contains two different interfaces: a PIA and an ACIA. The PIA A and B ports are used in control circuits: raise and lower the head, detect drive ready, detect sector hole, clear error faults, etc. The ACIA is the interface over which the data actually travels. Typical operation is to drop the head, reset the ACIA, wait for the index hole to come around, activate the read or write circuit, then read or write characters through the ACIA.

A real time clock can be added to the board as an additional feature. This causes the processor to be interrupted at regular intervals (the interval depends on board jumpering). The only additional interface needed to support this is a strobe pulse to reset or clear the clock as needed. This is done by reading or writing a particular address.

470 Board Addressing

Address	Read	Write
C000	PIA: PA0 thru PA7	PIA: PA0 thru PA7 or DDA0 thru DDA7
C001	PIA: Port A Ctrl	PIA: Port A Control
C002	PIA: PB0 thru PB7	PIA: PB0 thru PB7 or DDB0 thru DDB7
C003	PIA: Port B Ctrl	PIA: Port B Control
C010	ACIA: Status Reg.	ACIA: Control Register
C011	ACIA: Data Path	ACIA: Data Path
C020	Clear Real Time Clock (Reset) ($FF returned)	Clear Real Time Clock (Reset) (Data Ignored)

PIA Data Register A Layout:

IHD	SD2	WP	RDY2	SHD	FD	TZD	RDY1
(In)	(Out)	(In)	(In)	(In)	(In)	(In)	(In)

PIA Data Register B Layout:

HLD	LCS	SD1	FR	ST	STI	EE	WE
(Out)	(Out)	(Out)	(Out)	(Out)	(Out)	(Out)	(Out)

IHD - Index Hole Detect
SD2 - Select Drive 2 (Drive B)
WP - Write Protected
RDY2 - Drive 2 Ready
SHD - Sector Hole Detect
FD - Fault Detected
TZD - Track Zero Detected
RDY1 - Drive 1 Ready
HLD - Head Load
LCS - Low Current Select
SD1 - Select Drive 1
FR - Fault Reset
ST - Step
STI - Step In
EE - Enable Erase
WE - Write Enable

> Note: All lines are negative logic

OSI 500 Board

The 500 board was the basis for the 8-slot Challenger-II machines of the 1978 era. They have provisions for on-board RAM, ROM, and EPROM memory as well as ACIA and PIA interfaces. The 500 board was used in the hard-wired BASIC machines as well as the early 8-inch floppy systems. Because a good many 500 boards are still in use, 500 board addressing information will still be useful. The ACIA is used as the system console interface. The PIA has no assigned use and all interface pins are available for external use.

500 Board Addressing

Address	Read	Write
0000-03FF	First Block (1K) of Ram	First Block (1K) of Ram
0400-07FF	Second Block (1K) of Ram	Second Block (1K) of Ram
0800-0BFF	Third Block (1K) of Ram	Third Block (1K) of Ram
0C00-0FFF	Fourth Block (1K) of Ram	Fourth Block (1K) of Ram
A000-A7FF	First Rom (2K)	First Rom (2K)
A800-AFFF	Second Rom (2K)	Second Rom (2K)
B000-B7FF	Third Rom (2K)	Third Rom (2K)
B800-BFFF	Fourth Rom (2K)	Fourth Rom (2K)
F700	PIA: PA0 thru PA7	PIA: PA0 thru PA7 or DDA0 thru DDA7
F701	PIA: Port A Ctrl	PIA: Port A Ctrl
F702	PIA: PB0 thru PB7	PIA: PB0 thru PB7 or DDB0 thru DDB7
F703	PIA: Port B Ctrl	PIA: Port B Ctrl
Address	Read	Write
FC00	ACIA: Status reg.	ACIA: Control register
FC01	ACIA: Data Path	ACIA: Data Path
FD00-FDFF	First Eprom (1702) (.25K)	(Writes are Ignored)
FE00-FEFF	Second Eprom (.25K)	(Writes are Ignored)
FF00-FFFF	Third Eprom (.25K)	(Writes are Ignored)

OSI 510 Board

The 510 is a multiple processor CPU board containing the MOS 6502, Motorola 6800, and Zilog Z-80 chips. Only one of the processors can be active at a time, but any processor can activate any other under software control. Also provided is a swappable RAM which can be used to replace the monitor PROM usually found in the highest 256 bytes of memory. The RAM swap and CPU select functions are performed through Port A of a PIA chip. Port A is also used for memory partitioning: the high four memory address lines (A16 thru A19) are set using four bits in Port A. Port B is brought out directly to a board connector and may be used for anything desired. An ACIA is used to interface to a system console.

PIA Data Register A Layout:

```
+------+------+------+------+------+------+------+------+
! PC2  ! PC1  ! PSEL ! RSWP ! A19  ! A18  ! A17  ! A16  !
+------+------+------+------+------+------+------+------+
 (Out)  (Out)  (Out)  (Out)  (Out)  (Out)  (Out)  (Out)
```

PC2 - Processor Code Bit 2
PC1 - Processor Code Bit 1
PSEL - Processor Select (Negative Logic)
RSWP - RAM Swap (Negative Logic)
A19 - Memory Address Bit 19
A18 - Memory Address Bit 18
A17 - Memory Address Bit 17
A16 - Memory Address Bit 16

Processor Codes

PC2	PC1	Processor Selected
0	0	All Processors Disabled
0	1	Zilog Z-80
1	0	Motorola 6800
1	1	MOS 6502

510 Board Addressing

Address	Read	Write
F200- F2FF	Swappable RAM (Normal) -or- Non-existent Mem (Swapped)	Swappable RAM (Normal) -or- Non-existent Mem (Swapped)
F700	PIA: PA0 thru PA7	PIA: PA0 thru PA7 or DDA0 thru DDA7
F701	PIA: Port A Ctrl	PIA: Port A Control
F702	PIA: PB0 thru PB7	PIA: PB0 thru PB7 or DDB0 thru DDB7
F703	PIA: Port B Ctrl	PIA: Port B Control
FC00	ACIA: Status Reg.	ACIA: Control Register
FC01	ACIA: Data Path	ACIA: Data Path
FD00- FDFF	PROM or EPROM (Hard Disk Boot)	(Writes are Ignored)
FE00- FEFF	PROM or EPROM (Monitor ProgRAM)	(Writes are Ignored)
FF00- FFFF	PROM or EPROM (Floppy Bootstrap) -OR- Swappable RAM (Swapped)	(Writes are Ignored)
FF00- FFFF 6800 Only	PROM or EPROM (68A2 Monitor) -or- Swappable RAM (Swapped)	(Writes are Ignored)

Assembler Programmer's Guide to OSI Board Interfacing

Tabulated for Digital Technology, Inc.
by:
Ken Holt of Virginia Computer Consultants

OSI 430 Board

When OSI first came out with the 430 board, it was dubbed the "Super I/O Board". The name is well deserved as it handles Digital to Analog, Analog to Digital, Serial Communications (either RS-232 or Casette), 8-bit parallel interface, one-shot pulse-generators, and several high-speed strobes. OSI has since discontinued the 430, but a lot of them are still in service. Board addressing information may still be needed for those people who are writing machine language support of the more unusual features of the board.

430 Board Addressing

Address	Read	Write
FB00	Analog Input (Conn. 36 or Mux)	Analog Out 1 (Or Secondary Out Latch)
FB01	8-bit Input Port	Analog Out 2 & One-shot (Or Secondary Out Latch)
FB02	Fast strobe: 74154 Pin 11 ($FF Returned)	Select Mux Channel (0-7) (Or Primary Out Latch)
FB03	UART: Rec'd Data	Fast Strobe: 74154 Pin 4 (Data Ignored)
FB04	Fast Strobe: 74154 Pin 14 ($FF Returned)	UART: Transmit Data
FB05	UART: Read Status	UART: Store Control Reg
FB06	UART: Master Reset ($FF Returned)	Fast Strobe: 74154 Pin 7 (Data Ignored)
FB07	Fast Strobe: 74154 Bit 17 ($FF Returned)	UART: Reset ODA Bit (Data Ignored)

OSI 470 Board

The 470 board is a multi-purpose interface board which can be configured in a variety of ways to support a Centronics-compatible printer, a printer with a 12-bit Diablo interface, Floppy Disk Drives, special purpose interfaces, and probably a few more future products. The way in which the 470 board is configured determines its OSI designation, usually this will be CA-something.

The Ambiguity of the 470 Designation

The only exception to the CA designation is that when it is used as a floppy disk controller, it is actually referred to as a 470 board. This can lead to much confusion if you are not aware of the designations, especially since the characters "CA-9" rarely appear on the 470 board. So, if you have a 470 board on the shelf, it may not be immediately apparent if it is a floppy disk controller, Centronics board, or Diablo board.

OSI # SOFTWARE FOR OSI **OSI**

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4) An OSI Disk Primer.
5) A Word Processor For Disk Or Tape Machines.
6) Moving The Disk Directory Off Track 12.

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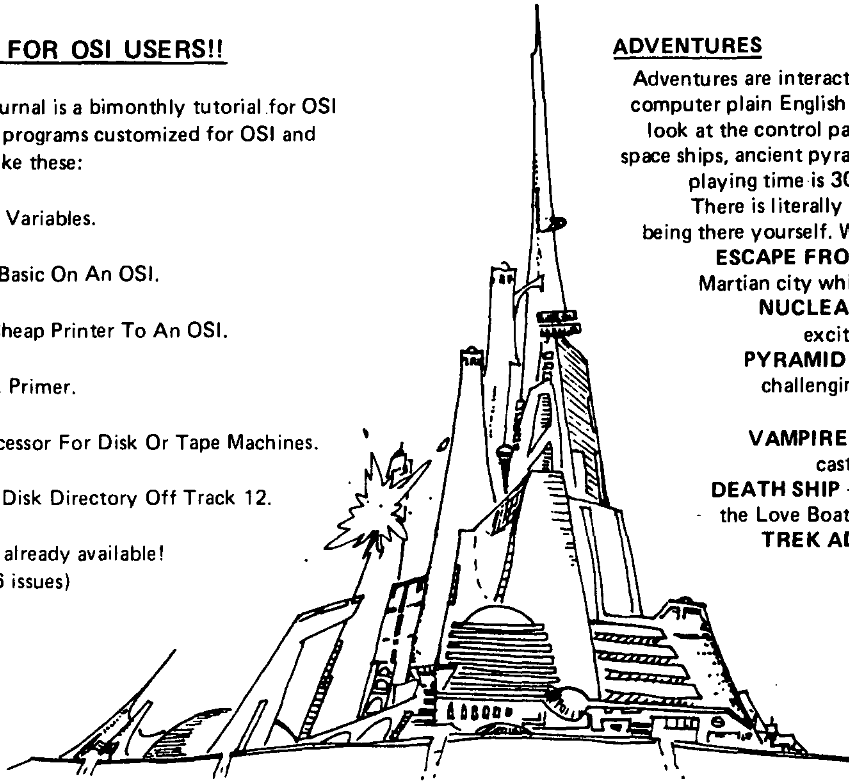

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Adventures are interactive fantasies where you give the computer plain English commands (i.e. take the sword, look at the control panel.) as you explore alien cities, space ships, ancient pyramids and sunken subs. Average playing time is 30 to 40 hours in several sessions. There is literally nothing else like them – except being there yourself. We have six adventures available.

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C1S – for the C1P only, this ROM adds full screen edit functions (insert, delete, change characters in a basic line.), Software selectable scroll windows, two instant screen clears (scroll window only and full screen.), software choice of OSI or standard keyboard format, Bell support, 600 Baud cassette support, and a few other features. It plugs in in place of the OSI ROM. NOTE: this ROM also supports video conversions for 24, 32, 48, or 64 characters per line. All that and it sells for a measly $39.95.

C1E/C2E for C1/C2/C4/C8 Basic in ROM machines.
This ROM adds full screen editing, software selectable scroll windows, keyboard correction (software selectable), and contains an extended machine code monitor. It has breakpoint utilities, machine code load and save, block memory move and hex dump utilities. A must for the machine code programmer replaces OSI support ROM. Specify system $59.95

DISK UTILITIES

SUPER COPY – Single Disk Copier
This copy program makes multiple copies, copies track zero, and copies all the tracks that your memory can hold at one time – up to 12 tracks at a pass. It's almost as fast as dual disk copying. – $15.95

MAXIPROSS (WORD PROCESSOR) – 65D polled keyboard only - has global and line edit, right and left margin justification, imbedded margin commands, choice of single, double or triple spacing, file access capabilities and all the features of a major word processor – and it's only $39.95.

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MEMORY BOARDS!! – for the C1P. – and they contain parallel ports!
Aardvarks new memory board supports 8K of 2114's and has provision for a PIA to give a parallel ports! It sells as a bare board for $29.95. When assembled, the board plugs into the expansion connector on the 600 board. Available now!

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SCREEN EDITORS

These programs all allow the editing of basic lines. All assume that you are using the standard OSI video display and polled keyboard.

C1P CURSOR CONTROL – A program that uses no RAM normally available to the system. (We hid it in unused space on page 2). It provides real backspace, insert, delete and replace functions and an optional instant screen clear.
$11.95

C2/4 CURSOR. This one uses 366 BYTES of RAM to provide a full screen editor. Edit and change lines on any part of the screen. (Basic in ROM systems only.)

FOR DISK SYSTEMS – (65D, polled keyboard and standard video only.)

SUPERDISK. Contains a basic text editor with functions similar to the above programs and also contains a renumberer, variable table maker, search and new BEXEC* programs. The BEXEC* provides a directory, create, delete, and change utilities on one track and is worth having by itself. – $24.95 on 5" disk - $26.95 on 8".

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C1P Model II	429
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LETTERS

ED:

Split screen effects are possible on OSI video systems if the top portion of the screen can be protected from the scrolling function. This can be done on an OS65D3.2 8" disk system by POKEing location 9761 ($2621). Normally this location contains a value of 207 ($CF). The top of the screen can be protected in segments of four lines. The value to be POKEd into 9761 is equal to 207 plus the number of lines to be reserved divided by four. To set aside the top 3/8 of the screen, for example, POKE 9761, 210! Then PRINT #5 can be used to write messages, menus, etc. to the protected area.

A similar function is provided on OS65U systems by memory location 15382.

I must mention that the OS65D Version 3.2 Disassembly offered by Software Consultants, 7053 Rose Trail, Memphis, TN 38134 is invaluable for finding key locations in the operating system. Delivery of my copy was almost immediate!

Phil Lindquist
Union Lake, MI

* * * * *

ED:

I am writing out of desperation for some information on programming my C4P. I have a problem with the material I find for programming, either it's too basic or too complicated. For instance, your magazine is too complicated for me to understand. I am hoping you can tell me where to find the books to help me program and understand your magazine.

Edward Maltby
Huntington, CA

Edward:

Programming is not easy, but it can be done. I suggest Dwyer and Critchfield's Programming Personal Computers in BASIC. If you don't understand what is going on ASK SOMEONE (community college programming teacher, dealer, or me). By moving slowly you will learn more and more about programming. Then ask specific questions about specific problems. Keep in touch.

AL

* * * * *

SECOND EDITION

All About OSI BASIC IN ROM

After 1 year and 4 printings the first edition has been revised and expanded. Two parts: Basic BASIC explains all commands, statements and functions, with sample programs. Over half the book is Exotic and Elegant BASIC and maps. Includes Speed, Space and Clarity, Keyboard and Screen Tricks, Debugging, Utility Programs: BASIC Trace (new), Program Compactor, Branch Locator, Correction for Error Codes, Machine Language Tapewriter, and many more. BASIC's innards: Tokens, Source Code, Variable Tables, and the Stack. Maps of pages $00,01,02. Routine locations in $A000-BFFF. Complete commented disassembly of MONITOR and support in $FE,FF. From your dealer or send check to me: US$9.95 postpaid in US. (COD $1.10) (air postage 50¢ in Canada and Mexico, $2.50 elsewhere)

Edward H. Carlson
3872 Raleigh Dr.
Okemos MI 48864

ED:

The following is a "Print At" subroutine for a C2-MF system. This program allows data to be input from a set of questions already on the video screen. As each question is answered, the cursor drops down to the next question. It is an effective and accurate method to use because you will know what the next question is.

Printing and inputs can be made anywhere on the screen with no scrolling. Use the Video Display Memory Map for your starting position.

A line of PA$="54500TEST": GOSUB 450 will print "TEST" at location 54500.

The line PA$="54500IN": GOSUB 450: A=Z: A$=Z$ will input A$ or A.

There are many possibilities for this subroutine; look over the demo program and experiment with it. If you don't care for the looks of your cursor, POKE 9680,??? and choose a new one. Have Fun!

```
  5 REM * DEMO PROGRAM ******
 10 FORZ=1TO28:PRINT:NEXTZ
 30 PA$="53514 NAME":GOSUB450
 40 PA$="53642 ADDRESS":GOSUB450
 50 PA$="53770 CITY STATE ZIP":GOSUB450
100 PA$="53532IN":GOSUB450:A$=Z$
110 PA$="53660IN":GOSUB450:B$=Z$
120 PA$="53788IN":GOSUB450:C$=Z$
300 PA$="54500"+A$:GOSUB450
310 PA$="54564"+B$:GOSUB450
320 PA$="54628"+C$:GOSUB450
449 END
450 REM  * PRINT AT SUBROUTINE ****
451 REM
452 REM  * STOP SCROLL & CURSOR
455 POKE9644,42:P2=0:POKE9680,32:IN=0
457 REM  * DIVIDE STRING
460 NP=VAL(MID$(PA$,1,5)):P1$=MID$(PA$,6)
465 IF P1$="IN" THEN IN=1:POKE9680,95
470 REM  * POKE IN NEW POS.
485 HH=INT(NP/256):LL=NP-(HH*256)
490 POKE9666,LL:POKE9667,HH:POKE9674,LL:POKE9675,HH
492 POKE9682,LL:POKE9683,HH:POKE9719,LL:POKE9720,HH
494 POKE9726,LL:POKE9727,HH:POKE9733,LL:POKE9734,HH
496 POKE9745,LL:POKE9746,HH
505 IFP2=1 THENRETURN
506 IF IN=1 THEN INPUT" ";Z$:Z=VAL(Z$):POKENP+64,32:GOTO509
507 PRINT" "P1$
509 REM  * RESET TO NORMAL
510 POKE9644,98:NP=55040:P2=1:POKE9680,95:GOTO485
```

Al Casper
Saukville, WI

* * * * *

ED:

My 8P-DF was recently down for two and one half weeks with disk problems. I found the problem strictly on a fluke. I had recently moved a florescent desk lamp so that it was partially lighting the top of my disk drive (and shining into the open slits in the cover). While I was checking the index light and cell, I noticed that the light was reflecting off the disk surface and obviously causing a bad index signal. Moving the light solved the problem.

Now I have a request. If there is any way possible, when an article is printed that doesn't apply to the OS-65U operating system, could it possibly be noted at the beginning of the article? I waste far too much time studying articles that only apply to 65D. Sometimes only the last paragraph, common sense, or trial and error make it obvious.

Raymond G. Bruns
Chicago, IL

Raymond:

Your suggestion is well taken. We will try to follow through, but bear with us. Often we are in the same position!

AL

* * * * *

ED:

An answer to Henry F. Beechold's problem on Hot Power Supplies. The power supplies that OSI uses in C2-4P's are rated for the boards in use in the computer. A friend of mine had a C2-4P: it had a 500 CPU Board, a 540 Video Board, 527 Board and a 592 Key Board. The power supply in it ran very hot. The reason was the 500 CPU Board used 2102 RAMS and the 527 Board was added by the person who he bought his C2-4P from. I measured the current drain and it was 3 amps, what the power supply was rated at. Without the 527 Board in place. So be careful when adding Boards to OSI computers, using the straight 7400 series TTL Chip not low on power versions such as 74LS 00. Otherwise replace the power supply with a bigger one if you intend to add too many Boards to an OSI computer.

Andrew C. Weiss, Jr.
Derry, PA

* * * * *

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C.D. Lombard
Olympia WA

* * * * *

ED:

In the December issue of Peek (65) there was a letter expressing dissapointment at the locations chosen by OSI for the NMI and IRQ. The complete routine need not be located in page one. Only three consecutive bytes need to be put in page one starting with $4C.

R.E. Bonser
London England

* * * * *

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this program not compete with the other users for time except when the sensor scan was taking place (every three seconds). The watchdog timer may be set to a different value for each partition, so the process monitor would poke the timer to three seconds and wait for a device which was not ready. Upon timeout a jump to line 63000 would start the sensor scan.

There is a comment on line 600 which says "RUN '600' FOR SUPERBUG", which turned out to be an entry to the Monitor, accomplished via (OSU) POKE 8778,63:POKE 8779,254:X=USR(X).

The flood of calls I got for a copy after the January Peek 65 hit the streets is proof that stray writes to files other than the one you intended is a widespread and very expensive bug. We are still testing but the early news is that no stray writes have been experienced (not yet conclusive.) If you are trying out the new version, let me know at once if you have the same problem under the new LEVEL3 program. To obtain a copy, send me ten bucks for time, disk and postage. Or try your dealer, who probably never heard of it. Perhaps in the next newsletter....

WAIT BUG REVEALED

You may have noticed that about a year ago the good old
WAIT SP,1,130
statement you were using (or similar) quit working. Then discovered that if SP is replaced with the actual address, e.g. WAIT 64512... that it would work. In some releases of 65-U even that is not enough; the WAIT must be on a line by itself. Well, here it comes, folks: When Level 3 came along and there was a need for the WAIT FOR and the WAIT CLEAR instructions for file locking, another of the patches to OSU was designed. It intercepts the WAIT code and looks to see if the character after the WAIT token is an ascii number. If not, anyone can see that it must be either the FOR or the CLEAR token. You silly people who try to use a symbol instead of the explicit address can recode the statement like:
WAIT 0+SP,1,130
and all will be ok, except that the return from the patch will not accept another statement on the same line following the WAIT. In spite of the patches it is a better system than whatever else you might have tried.

USR DISK I/O

When trying your hand at moving data from disk file to another disk file carefully following the example in the back of the OS65-U manual (PRELIMINARY), you will find that there is a bug in the system which leaves out a bunch of data when a track boundry is crossed. There are several ways around this. If you are not in a hurry, make your transfers one page (256 bytes) at a time. If you are into S/M, calculate the amount of data up to the next track boundry and move that much first, then continue to move full tracks. If you are like me, you will make sure both the from and to files are created on track boundries and then you can eliminate a ton of code by not worrying about the problem.
The following change to all versions of OSU might fix the problem although I have not tried it. Run CHANGE, Hex, offset C00, then:
ADDR 40FC
A9 (was 84)
00 (was 31)
X (is E6)
CLOSE

FPRINT STILL DOESN'T

As mentioned a year ago, the bugs in FPRINT which prevent listing random files are still in the latest disk received from OSI. If you will take the time to fix the code, it can be a really useful utility. But why doesn't the factory fix it?

WHAT ABOUT $R?

The Tech. Newsletter 28 contains a fix (patch) for a bug in the $R function of OSU 1.2 (ONLY). I let it go by since I never had any problem with it...until last week! Or maybe I did, and didn't know what the cause was. At any rate, boot your system with OSU 1.2, (ONLY) remove your floppy and write-protect your hard disk. In the immediate mode, type:
PRINT $R, 1/104
If you get 0.00, fine. If the system goes out of control and begins trying to write on the disk while putting strange characters on the screen, you should get T.NL 28 and enter the change. See your dealer.

* * * * *

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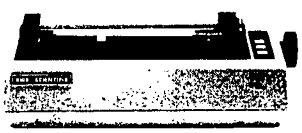

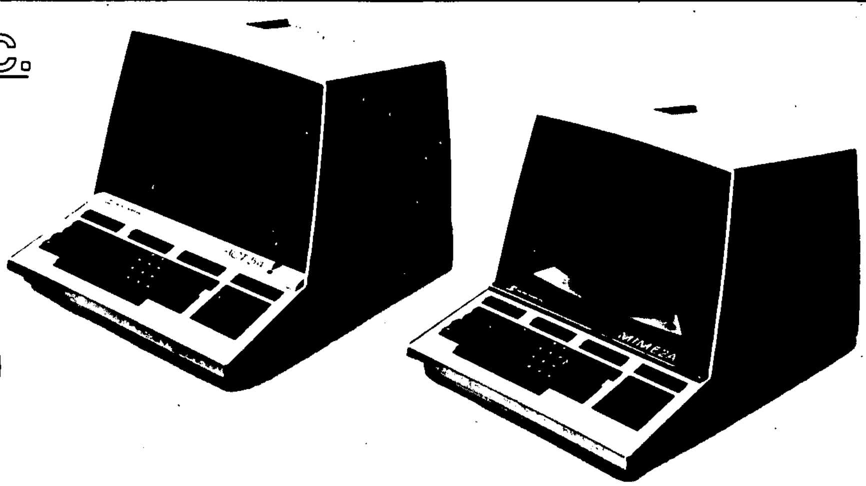

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