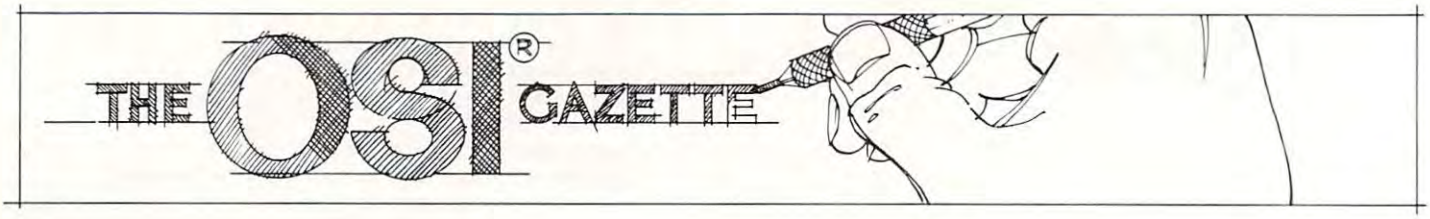

OSI Relocation Or What's NEW?

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After reading Elizabeth Deal's article on "Relocation of BASIC Programs on the PET" in **COMPUTE!** #13, I tried to implement the program relocation on my OSI C1P. After doing some POKEing around, both on and off-line, I found not only how very simple it was to do on an OSI machine, but also some observations about how the NEW command works.

Ms. Deal broke the relocation process down into four steps:

1. Set up one or more partitions
2. Adjust all BASIC pointers
3. Change the tape header information
4. Correct the forward pointers in the relocated program.

Since OSI machines store programs on tape in ASCII (not in the internal format) steps (4) and (5) are unnecessary. All one needs to relocate is to set up the partitions and to adjust the pointers.

In Williams and Dorner's *The First Book of OSI*, doing just that is described. In an example in that book, the authors show how a new workspace may be created by two (or three) POKEs and the NEW statement. One needs to adjust the pointer at $079, $007A (decimal 132,133), the beginning of BASIC workspace pointer, and to POKE in the initial null (Williams and Dorner do this with only two POKEs in the book, but normal use would probably entail three POKEs). So, if one needed to create a workspace at $1000, $0079 should be set to $01 (one byte past the initial null), $0071 should be set to $10, and a null should be inserted at $1000. After these POKEs, NEW should be typed to reset all other necessary pointers.

A normal LOAD should then load the program on tape into the new workspace, provided enough memory is left to hold it.

To return to a program LOADed into a new workspace, change the beginning of Basic workspace pointer with POKEs and type RUN.

What Else Was NEW Doing?

What I became interested in was the effect of the NEW upon the process. What other pointers were being reset? What else was NEW doing? Was it possible to relocate a BASIC workspace merely with POKEs?

I quickly found out that just leaving out the NEW only caused a machine crash. Taking a clue from Harvey Herman's article in the same issue of **COMPUTE!**, I tried modifying the single variable storage pointer, which is the same as the end of text pointer. In a normal cold start the end of text pointer ($007B, $007C) points to a memory address two bytes past whatever address $0079,7A points at. That is, after just cold-starting my C1P, $0079,7A points at $0301 (768) and $007B,7C points at $0303 (770). So, I tried setting my beginning of workspace to $1001 and my end of text pointer to $1003.

Well, it didn't crash — immediately. Obviously, there was something else the NEW statement did.

Checking around, I found that in a cold start, and in a NEW, addresses $0300 to $0302 are nulled out. So, I tried adding the POKEs to null $1001 and $1002 to the POKEs I had already.

Success! By POKEing the beginning of text pointer, the end of text pointer and nulling out the first three bytes of my new workspace, I could seemingly relocate my BASIC workspace without using the NEW command. But seven pokes seemed quite a bit more work than three pokes and a NEW statement, so I decided to see if any of the three nulls could be removed.

I found that the initial null could be left out to enter a program and to LIST it, but the RUN command generated a syntax error. If the null at $0302, or in the modified workspace $1002, was left out, the program would not LIST. But the null at $0301 or $1001 could be left out with no obvious problems.

$0301 and $0302 are pointers to the second line in the program in the 6502 format of least significant byte (LSB), most significant byte (MSB) for addresses. I knew that both being nulled indi-

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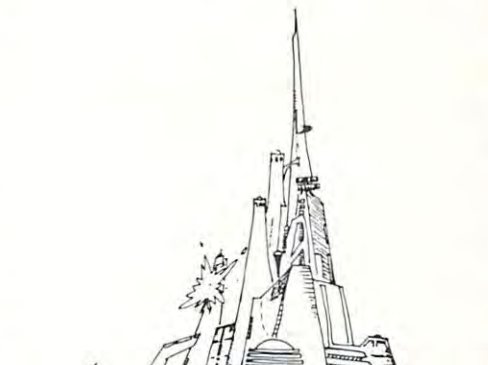

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cated the end of the program, i.e. there are no other lines to be pointed to. But the need for only one null at $0302 convinced me to start experimenting with nulls in the MSB of pointers later on in the program.

I found that regardless of what value the LSB contained, a null in the MSB of any line's pointer had the effect of deleting that line and all lines following.

For example, let's say that a multi-line program has been typed into an OSI C1P at the normal workspace of $0300, and the memory addresses $0301 and $0302 contain $0E and $03, respectively. This means that the second line of the program begins at address $030E, and the pointer to the third line is at ($030E,$030F). If we change $030F to a null ($00), we will not be able to LIST or RUN past the first line of the program. Everything from the second line on will be deleted. Except for changing the pointers to FREe the now unused memory, we have effectively NEWed most of our program. But, if we restored the value contained in $030F before it was nulled, we would also find our program restored, as long as we hadn't added any new lines of code which would overwrite the pseudo-NEWed code.

This means that during a RUN or LIST, BASIC does not check both the LSB and the MSB for nulls to indicate the end of the program-just the MSB. Actually, this makes sense since no real program line would exist in Page Zero memory (addresses that start with $00).

Though relocation without a NEW statement is still six pokes (four for the pointers and two for inserting nulls), it seems to me that knowing exactly what each POKE is doing is a lot safer than using such a dangerous command as NEW. Further, this information gives us a number of practical benefits such as the capability of a reversible NEW.

So these are the results of my excursion into OSI relocation. I hope users of both OSI and other BASIC systems may find my experiences to be helpful.

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Deal, Elizabeth, "Relocation of Basic Programs on the PET", **COMPUTE!**, June 1981

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