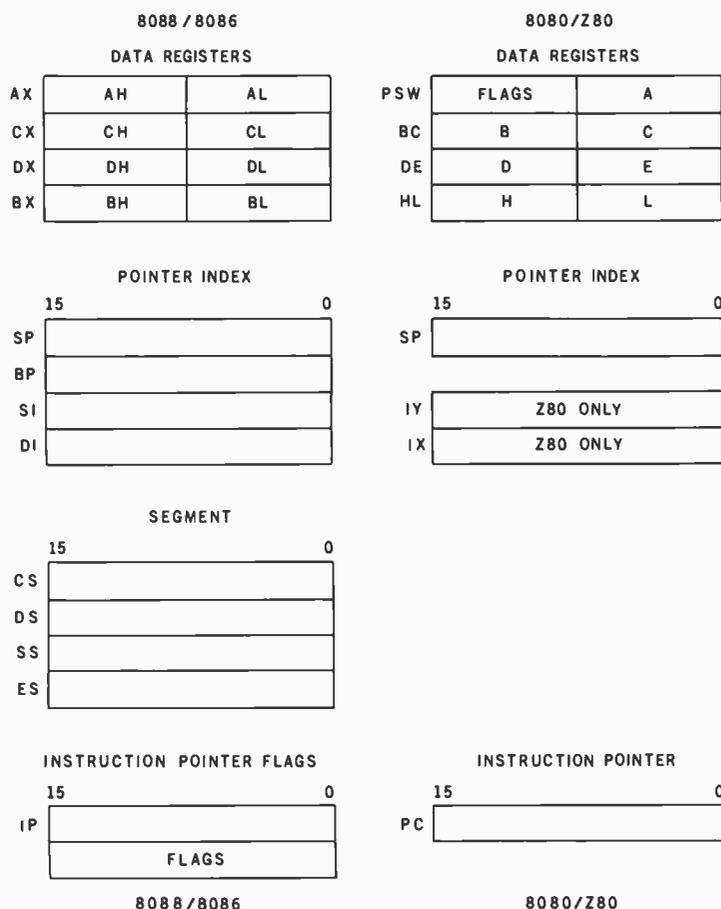


**Figure 4:** The 8086 extends a segment register with 4 low-order bits of 0. It then adds the segment to a 16-bit address from another register to achieve a 20-bit address.



**Figure 5:** Register-usage mapping between the two processor families is shown. Note that the IX and IY registers of the Z80 do not exist for the 8080/8085. More registers are in the 8088/8086 than in either the 8080 or Z80. Observe that the 8088/8086 segment registers have no parallel in the 8080/Z80 family. The 8080 family has a 16-bit address bus that allows addressing of 65,536 bytes of memory. While the internal registers of the 8088/8086 family also have 16 bits, the external address bus has 20 bits, formed by extending a segment register with 4 low-order bits of 0, and adding it to a 16-bit address from another register.

a role in string operations. All destinations of string operations use the DI register in calculating addresses, and are taken relative to the ES register.

Besides the four segment registers, the 8086 has the following:

- Four general-purpose registers: AX, BX, CX, and DX. Each is addressable as a 16-bit register or as two 8-bit registers. When addressed as 8-bit registers, the pairs are called: AH, AL; BX, BL; CH, CL; and DH, DL. The general-purpose registers hold the intermediate results of operations.
- Four pointer and index registers; these locate data within a specified segment of memory. SP is the stack pointer, BP the base pointer, SI the source index, and DI the destination index.
- One program counter.
- One 16-bit flag register (program status word, or status register) containing nine flags.

Now that we've looked inside the 8086, we can take a look at how register usage in the 8080/Z80 processor family corresponds generally with that in the 8086. Figure 5 shows the sets of registers alongside each other so that you can see the general correspondence clearly. Note that the IX and IY registers of the Z80 do not exist for the 8080/8085. On the other hand, the alternate register set of the Z80 (not shown) as well as the I and R registers have no parallel in the 8086 register set; operations involving these will require special attention from the programmer after the conversion is done.

Clearly, the 8086 has more registers than either the 8080 or Z80. Since the 8086 also has a more powerful instruction set, translation should be possible with minor restrictions.

### Complications

Since all CP/M-80 programs had to exist in a 64K-byte region, there should be little trouble fitting a translated program into a 1-megabyte (1,048,576-byte) region. If you're translating from the Z80, however, things are complicated slightly