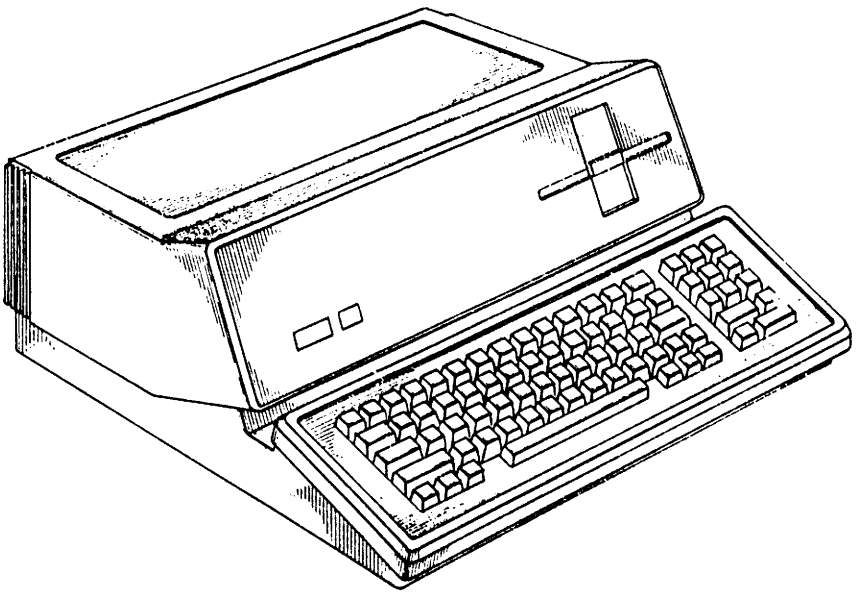
Apple II versus Apple III Hardware Architecture Comments

16 December 2002

eMail from David T Craig to Steven D Weyhrich



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Date: **December 16, 2002 5:32:54 PM CST**
Subject: **Apple II versus Apple III hardware architectures**

Here's a description of a key Apple III hardware feature which unfortunately did not make it into the Apple IIe design.

The Apple III supported a new memory addressing mode called EXTENDED ADDRESSING. This allowed a programmer to easily read or write to any memory location in any of the Apple III memory banks. The III supported up to 512K of memory grouped into banks of 32K each. This new address mode worked off of zero page of the system bank, which was always mapped (this was called bank 0) as far as the 6502 CPU was concerned. You placed a 2 byte pointer value into 2 adjacent zero page locations and then in another special page you placed a bank number. For example, to access byte 1000 of bank 5, you would store the address 1000 into say zero page location 25 and 26 and into the special page you would store the bank number 5 into location 25. Then when you executed a zero page indexed instruction such as LDA ($25),Y you were really reading from bank 5. Even Apple III Pascal had access to this feature so you were not tied to using assembly language on the III to have total memory access.

This extended memory architecture formed the heart of the III's operating system's memory access. In its simplest form it formed the foundation for the III's 80 column text and super hi-res graphic features. When transported to the IIe, this memory feature was only partially transported. This resulted in the IIe having a rather simple memory access scheme when compared to the III's more elegant scheme. The IIe's lack of extended addressing also caused Apple to implement the auxiliary memory access function in the IIe's 80-column video firmware programming that Rick Auricchio did.

In general, I would say that the III had a very elegant hardware architecture compared to the IIe. Apple ported some of this architecture to the IIe, but ended up with a IIe architecture that was (from my perspective) not as elegant as the III and almost kludgely in some regards.

Note that in your Apple II history you say that Walt Broedner came up with this idea during his IIe work. I believe that instead, this idea was done during the III's hardware development which took place in 1978-79 time-frame.

Broedner's name is all over the III schematics since he did most of the III's detailed hardware design (Wendell Sander did the high level h/w design and is typically assigned the title of "III designer"). Also, Dick Huston worked on the III's OS (SOS) and later transferred this OS to the IIe where it was called ProDOS. One can therefore say that the III was really just a much more sophisticated Apple II model whose features were only surpassed by the IIgs in the late 1980s, 10 years after the III was designed.

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