



Tech Info Library

Apple II and II+: Memory typically available to users

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Security: Everyone

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After startup, Applesoft's FRE(0) statement reports the same amount, 48K, of free memory in the II Plus, the Apple IIe with 64K, and the Apple IIe or IIc with 128K. No matter how much the maximum memory of the CPU is, you will never have more than 48K of memory available to you, since the microprocessor lets BASIC have DIRECT access to only 48K in Apple II family computers with memory configurations equal to or greater than 48K.

This discrepancy stems both from the microprocessor's memory limit and from the demand placed on the system by the software. The Apple's 6502 microprocessor can directly access only 64K of memory (address 65536 (\$FFFF)). Some of the 64K has to be loaded with system software: the monitor, Applesoft, I/O, stacks, keyboard, vectors, and text display. The Apple's system monitor and Applesoft language routines reside in upper memory from \$D000 to \$FFFF. I/O ROM locations span from \$C000 to \$CFFF. Finally, the system uses \$0000 to \$07FF for its stack, keyboard input, system vectors and text display. This amount of software leaves you with 47103 bytes (the memory space between \$0800 and \$BFFF) that you can directly access through BASIC.

The user can then decide to give more of this memory to an operating system and high resolution graphics. For example, if you use DOS 3.3, you relinquish approximately 10.5K, the memory space from \$9600 to \$BFFF. Similarly, high resolution graphics page 1 or 2 takes another 8K for each page.

--> Adding more memory for the user

Adding memory allows you to load operating systems not dependent on BASIC; it also lets you take advantage of the full 64K from assembly language programs. Apple II and II+ users can add 16K to a 48K configuration if they install a RAM card in slot #0.

In the IIe, this 16K "RAM card" is built onto the motherboard and is addressed in the same way as the card in the II and II+; that's why there's no slot #0 on the Apple IIe. This additional 16K actually overlays the upper 16K of memory only by bank-switching between the ROM and RAM.

Apple Technical Communications

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