Macintosh LC II: RAM Configuration and 10 MB Limit (7/96)

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TOPIC -----

Is there a technical reason for the 10 MB limit on RAM for the Macintosh LC II and Performa 400, 405, and 430 computers?

DISCUSSION -----

The Macintosh LC II and Performa 400, 405, and 430 computers have 4 MB of DRAM soldered onto the logic board. In addition, there are two 30-pin SIMM slots that accept 1, 2, and 4 MB SIMMs, which results in 4, 6, 8, and 10 MB configurations. SIMMs should be fast-paged mode, 100 nanoseconds (ns) RAM access time, or faster.

Although you would physically have 12 MB of DRAM installed in the computer if you populated each SIMM slot with 4 MB SIMMs, the total amount of addressable RAM is limited to 10 MB. As a result, when you populate your board with two 4 MB SIMMs, the lower 2 MB of DRAM on the logic board cannot be accessed.

This 10 MB addressable RAM limit on these computers is because the hardware only uses 24 address lines to select addresses, regardless whether it is in 24- or 32-bit mode. This means the hardware can access only $xx00 0000 - $xxFF FFFF, or 16 MB of address space. The hardware ignores the upper 8 bits of the address.

A distinction must be made between what the hardware looks at and what the software looks at. In 32-bit mode the software looks at all 32 bits of the address, but when the software tries to read a value from the memory location $40A0 0000, for example, the hardware, ignoring the upper 8 bits of this address, reads a value from $00A0 0000 instead.

In addition, since the ROM is mapped by the hardware to $00A0 0000 in both 24- and 32-bit modes and RAM needs to be contiguous, the largest contiguous amount of memory is from 0 -$9F FFFF, which is 10MB.

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07 Jul 1992 - Added Performa.

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