

Inside Macintosh



Promotional Edition

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The Bit Image

A bit image is a collection of bits in memory which have a rectilinear representation. Take a collection of words in memory and lay them end to end so that bit 15 of the lowest-numbered word is on the left and bit 0 of the highest-numbered word is on the far right. Then take this array of bits and divide it, on word boundaries, into a number of equal-size rows. Stack these rows vertically so that the first row is on the top and the last row is on the bottom. The result is a matrix like the one shown in Figure 5 — rows and columns of bits, with each row containing the same number of bytes. The number of bytes in each row of the bit image is called the row width of that image.

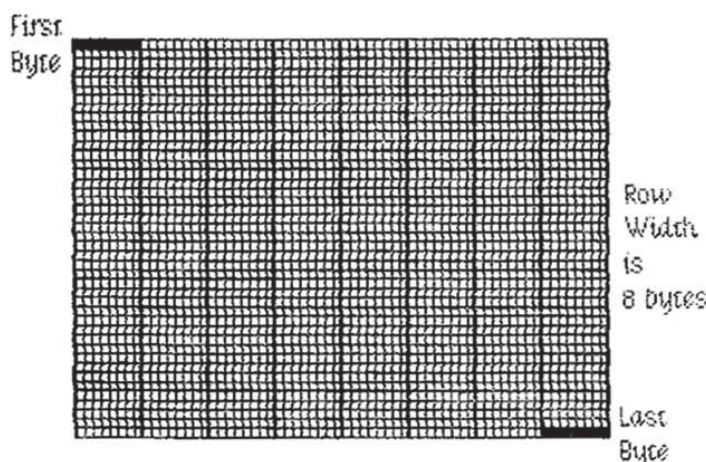


Figure 5. A Bit Image

A bit image can be stored in any static or dynamic variable, and can be of any length that is a multiple of the row width.

The Macintosh screen itself is one large visible bit image. The upper 21,888 bytes of memory are displayed as a matrix of 175,104 pixels on the screen, each bit corresponding to one pixel. If a bit's value is 0, its pixel is white; if the bit's value is 1, the pixel is black.

The screen is 342 pixels tall and 512 pixels wide, and the row width of its bit image is 64 bytes. Each pixel on the screen is square; there are 72 pixels per inch in each direction.

(hand)

Since each pixel on the screen represents one bit in a bit image, wherever this document says "bit", you can substitute "pixel" if the bit image is the Macintosh screen. Likewise, this document often refers to pixels on the screen where the discussion applies equally to bits in an off-screen bit image.

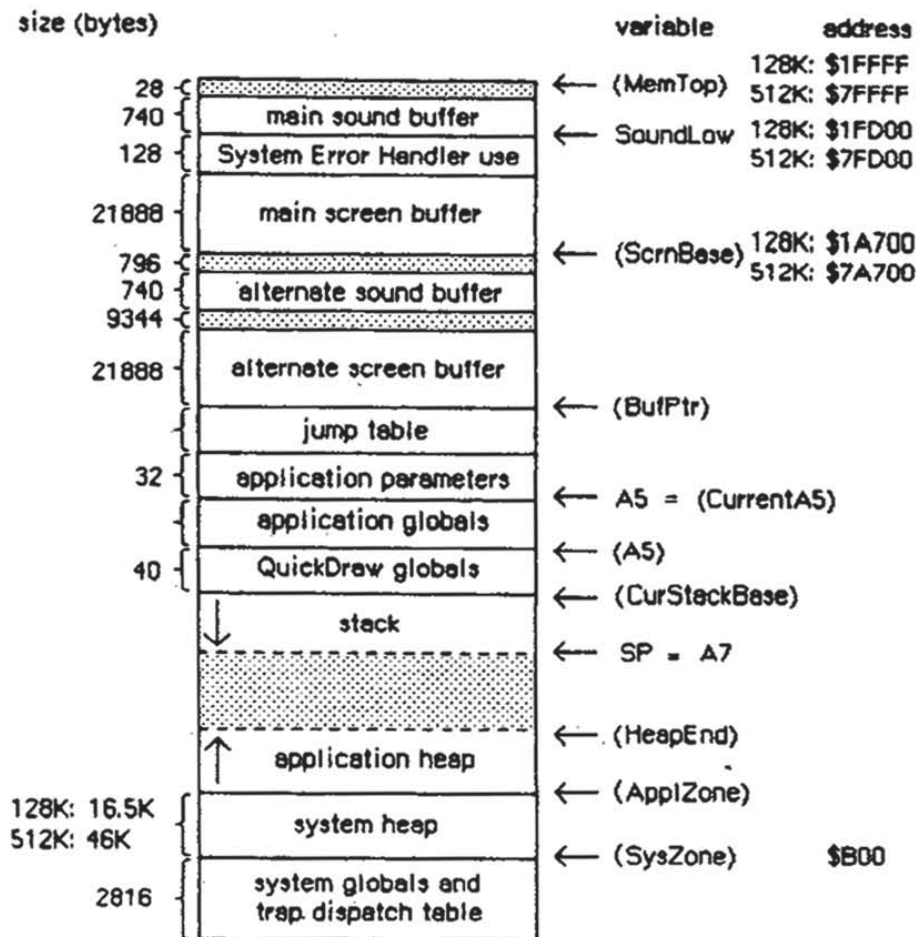


Figure 9. Macintosh RAM Organization

At (almost) the very end of memory are the main sound buffer, used by the Sound Driver to control the sounds emitted by the built-in speaker and the Disk Driver to control disk motor speed, and the main screen buffer, which holds the bit image to be displayed on the Macintosh screen. The area between the main screen and sound buffers is used by the System Error Handler. Note that the addresses of these buffers are different for different-sized computers.

There are alternate screen and sound buffers for special applications. If you use either or both of these, the space available for use by your application is reduced accordingly. The Segment Loader provides a routine for specifying that an alternate screen or sound buffer will be used.

The memory organization of a Lisa running MacWorks is shown in Figure 10.

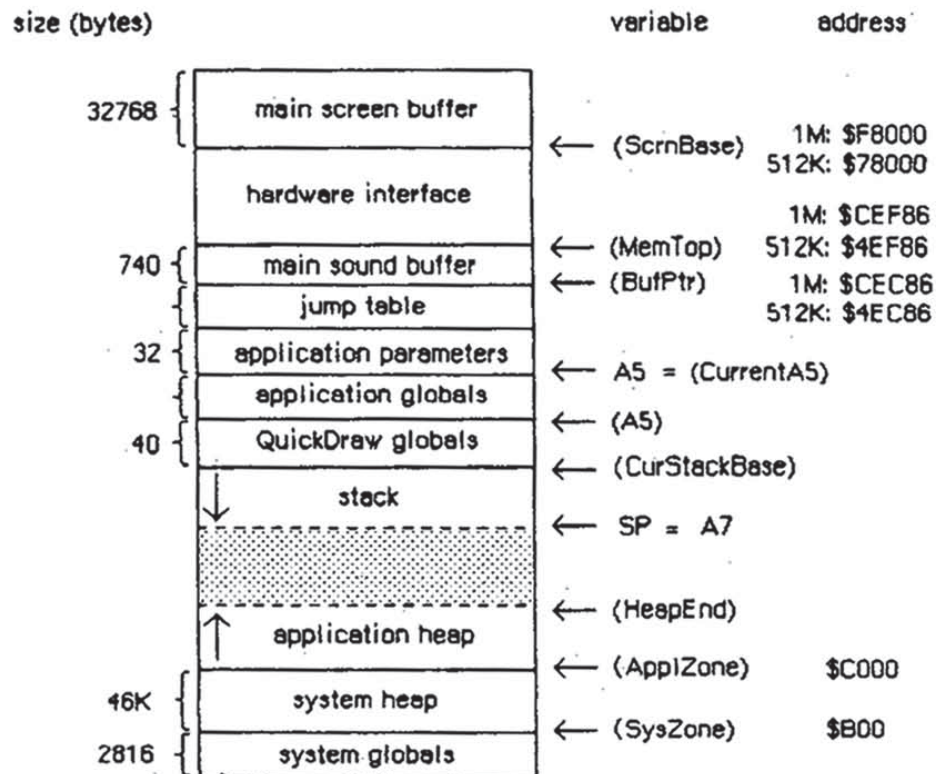


Figure 10. Lisa RAM Organization

MEMORY MANAGER DATA STRUCTURES

This section discusses the internal data structures of the Memory Manager. You don't need to know this information if you're just using the Memory Manager routinely to allocate and release blocks of memory from the application heap zone.

Structure of Heap Zones

Each heap zone begins with a 52-byte zone header and ends with a 12-byte zone trailer (see Figure 11). The header contains all the information the Memory Manager needs about that heap zone; the trailer is just a minimum-size free block (described in the next section) placed at the end of the zone as a marker. All the remaining space between the header and trailer is available for allocation.