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Macintosh LC II: Video (7/93)

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Article Change History

07/12/93 - REVISED
- To include Performa

TOPIC ----------

This article describes the video capabilities and expansions available for the Macintosh LC II, and Performa 400, 405 and 430.

DISCUSSION ----------

Macintosh LC II comes with either a 256K or 512K VRAM SIMM. The VRAM is installed in a 32-pin SIMM slot. There are three possible SIMMs you can use:

- NO VRAM (a SIMM containing two transparent latches)
  - monochrome on Macintosh 12-inch Monochrome Display
  - monochrome on 13-inch AppleColor High-Resolution RGB Monitor
  - monochrome on VGA
- 256K VRAM SIMM option (Performa 405)
  - 16 grays on Macintosh 12-inch Monochrome or VGA
  - 256 colors on Macintosh 12-inch RGB Display
  - 16 colors on 13-inch AppleColor High-Resolution RGB Monitor or VGA
- 512K VRAM SIMM option (Performa 400 and 430)
  - 256 greys on Macintosh 12-inch Monochrome or VGA
  - 32,000 colors on Macintosh 12-inch RGB Display
  - 256 colors on 13-inch AppleColor High-Resolution RGB Monitor or VGA

Timing Modes

The Macintosh LC II supports the following four video timing modes:

Resolution	Supported	Vertical	Horizontal	Bandwidth
512 x 384	Macintosh 12-inch RGB	60.15	24.48	15.67
640 x 480	Macintosh 12-inch Monochrome AppleColor 13-inch	66.62	34.98	31.33
540 x 384	Macintosh 12-inch RGB Macintosh 12-inch Monochrome AppleColor 13-inch	60.15	24.48	17.23
VGA		59.94	31.47	25.18

All video timing modes use a 256 x 24 Color Look-Up Table (CLUT). Monochrome mode also uses the CLUT, driving the R, G, and B with the same signal. When you select "thousands of colors" in the Monitors control panel, you're selecting 16 bit/pixel format. The 16 bit/pixel assigns the uppermost bit to an Alpha Channel and 5 bits each for Red, Green, and Blue. Selecting thousands mode divides the 256 x 24 CLUT into three 32 x 5 tables. Therefore, you get 2^15 = 32^3 = 32.7K color selections.

Monitor Video Connectors

Macintosh LC II uses a DB-15 female connector to connect to the video monitor. Here's the pin-out:

Pin	Signal	Description
1	RED.GND	Red Video Ground
2	RED.VID	Red Video
3	CSYNC~	Composite Sync.
4	MON.ID1	Monitor ID, Bit 1
5	GRN.VID	Green Video
6	GRN.GND	Green Video Ground
7	MON.ID2	Monitor ID, Bit 2
8	nc	(No Connection)
9	BLU.VID	Blue Video
10	MON.ID3	Monitor ID, Bit 3
11	CSYNC.GND	CSYNC Ground
12	VSYNC~	Vertical Sync.
13	BLU.GND	Blue Ground
14	HSYNC.GND	HSYNC Ground
15	HSYNC~	Horizontal Sync.
Shell	S.GND	Chassis Ground

Three of the 15 pins (pin 10, 7, and 4) are used to send a signal to identify the monitor type. Once identified, Macintosh LC II synchronizes the correct video timing.

The monitor IDs are:

Connector pins	10,7,4
Monitor ID bits	321
Macintosh 12-inch Monochrome	110
Macintosh 12-inch RGB Display	010
Apple IIe mode	010
AppleColor 13-inch RGB	110
VGA	011
No Monitor	111

When no monitor (111) is attached, 512 x 384 video timing is selected. Macintosh LC II performs a special function of always returning a 1 to the Monitor Parameters Register when reading Monitor ID bit 2. By performing this special function, various monitors can select the correct video timing schemes. The VGA monitor (011) has the same monitor ID as the two-page monochrome. Neither the Two-Page nor the Portrait monitor can be attached to Macintosh LC II.

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