

New Technical Notes

Macintosh



Developer Support

Color Monitor Connections

Hardware

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This Technical Note describes how to connect the Macintosh II Video Card, Macintosh IIci built-in video, and Macintosh LC video to third-party monitors.

Changes since February 1990: Added pinout description for the Macintosh LC external video connector and a Macintosh LC to VGA monitor adapter cable. Standardized signal names throughout Note.

Table 1 documents the pinout descriptions of the Macintosh II Video Cards and the Macintosh IIci built-in video:

Pin Number	Signal Name	Signal Description
1	RED.GND	Red ground
2	RED.VID	Red video signal
3	/CSYNC	Composite synchronization signal
4	SENSE0	Monitor sense signal 0
5	GRN.VID	Green video signal (with sync)
6	GRN.GND	Green ground
7	SENSE1	Monitor sense signal 1
8	n.c.	Not connected
9	BLU.VID	Blue video signal
10	SENSE2	Monitor sense signal 2
11	C&VSYNC.GND	Ground for CSYNC and VSYNC
12	/VSYNC	Vertical synchronization signal
13	BLU.GND	Blue ground
14	HSYNC.GND	HSYNC ground
15	/HSYNC	Horizontal synchronization signal
Shell	CHASSIS.GND	Chassis ground

A slash (/) at the beginning of a signal name indicates that the signal is active low.

Table 1—Macintosh II Video Card and Macintosh IIfx Built-in Video

Note: The Macintosh II High-Resolution Display Video Card is the newer replacement for the original four- and eight-bit Macintosh II Video Card (M0211 and M5640). This new card is sold in four- and eight-bit configurations (M0322 and M0324, respectively). The external video connector on the early version of the Macintosh II Video Card did not have the signals SENSE0, SENSE1, and SENSE2.

Note: The newer Macintosh II Video Cards and Macintosh IIfx built-in video require that pin 4 (SENSE0) be connected to Ground to signal the connection of a 640 x 480 monitor. Do not connect pins 7 or 10 as they are unused on original Macintosh II Video Cards and there are built-in pullup resistors on the newer Macintosh II Video Card and Macintosh IIfx to terminate these pins when not in use.

Table 2 documents the pinout descriptions of the Macintosh LC video connector:

Pin Number	Signal Name	Signal Description
1	RED.GND	Red ground
2	RED.VID	Red video signal
3,15	/CSYNC or /HSYNC	Composite synchronization signal if Apple monitor. Horizontal synchronization signal if VGA monitor.
4	SENSE0	Monitor sense signal 0
5	GRN.VID	Green video signal
6	GRN.GND	Green ground
7	SENSE1	Monitor sense signal 1 (grounded internally)
8	n.c.	Not connected
9	BLU.VID	Blue video signal
10	SENSE2	Monitor sense signal 2
11	C&VSYNC.GND	Ground for CSYNC and VSYNC
12	/VSYNC	Vertical synchronization signal
13	BLU.GND	Blue ground
14	HSYNC.GND	HSYNC ground
Shell	CHASSIS.GND	Chassis ground

A slash (/) at the beginning of a signal name indicates that the signal is active low.

Table 2–Macintosh LC External Video Connector

Note: The Macintosh LC does not supply vertical synchronization with the Green video signal (pin 5). The vertical synchronization signal is supplied on pin 12.

Note: The Macintosh LC requires that pin 4 (SENSE0) be connected to Ground to signal the connection of a 640 x 480 monitor. The Macintosh LC requires that pin 4 and 10 (SENSE0 and SENSE2) be connected to Ground to signal the connection of a 512 x 384 monitor (i.e., the Macintosh 12" RGB Display). The Macintosh LC requires that pin 10 (SENSE2) be connected to Ground to signal

the connection of a VGA monitor. Pin 7 (SENSE1) is grounded in the Macintosh LC.

Macintosh II to Sony Multiscan (CPD-1302)

To connect a Macintosh II to a Sony Multiscan monitor, you need to make an adapter cable from the video card to the monitor (which has a 9-pin D-type connector). Following is the pinout description for the adapter cable (using the automatic sync-on-green configuration):

Macintosh II Video Card Pin	Sony Pin	Signal Name
1	1	Ground
2	3	Red video signal
4	1	SENSE0 Grounded
5	4	Green video signal (with sync)
9	5	Blue video signal

Macintosh II to NEC MultiSync (JC-140IP3A)

To connect a Macintosh II to a NEC MultiSync monitor, you need to make an adapter cable from the video card to the monitor (which has a 9-pin D-type connector). Following is the pinout description for the adapter cable (using the automatic sync-on-green configuration):

Macintosh II Video Card Pin	NEC Pin	Signal Name
1	6,7,8,9	Ground
2	1	Red video signal
4	6,7,8,9	SENSE0 Grounded
5	2	Green video signal (with sync)
9	3	Blue video signal

The monitor must be set to Analog mode and Manual mode. This adaptor cable also works with an equivalent monitor such as the Taxan Super Vision 770.

Macintosh LC to VGA

The Macintosh LC can supply a 640 x 480, VGA timed signal for use with VGA monitors by using an adapter cable. The standard Macintosh LC supports VGA to 16 colors, and with the optional 512K VRAM SIMM, the VGA monitor is supported to 256 colors.

Note: The Macintosh LC supplies signals capable of driving TTL level inputs. However, some low impedance input VGA monitors do not work with the Macintosh LC.

To connect a Macintosh LC to a VGA monitor, you need to make an adapter cable from the Macintosh LC video connector to the VGA monitor. Following is the pinout description for the adapter cable:

Macintosh LC Video Connector	VGA Pin	Signal Name
1	6	Red ground
2	1	Red video signal
5	2	Green video signal
6	7	Green ground
9	3	Blue video signal
13	8	Blue ground
15	13	/HSYNC
12	14	/VSYNC
14	10	HSYNC ground
7,10	nc	SENSE1 & SENSE2 tied together

VGA monitors are identified by shorting pin 7 to pin 10 on the Macintosh LC video connector. The Macintosh LC grounds pin 7 on its video connector, which results in pulling down pin 10 and gives the correct monitor ID for a VGA monitor.

Further Reference:

- Guide to the Macintosh Family Hardware, Second Edition
- d e v e l o p, “Macintosh Display Card 8•24 GC: The Naked Truth,” July 1990