



# Tech Info Library

## Macintosh AV Series: Video Features & Subsystems (12/93)

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TOPIC -----

This article describes the video features of the Macintosh AV Series computers and their video subsystem.

DISCUSSION -----

### New Video Features of the Macintosh AV Series

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Composite and S-video output is supported directly from the logic board. This allows the Centris 660AV, Quadra 660AV and Quadra 840AV to connect directly to presentation equipment, televisions, or a VCR. NTSC and PAL video formats are supported.

Video and graphic acceleration and manipulation is enhanced by the inclusion of a new Digital Audio Visual (DAV) connector. This permits NuBus cards that have DAV connectors to manipulate audio and video signal directly from the main logic board.

Composite and S-video input can be connected directly to the Centris 660AV, Quadra 660AV and Quadra 840AV and can display and process this information in a separate video window. NTSC, PAL, and SECAM formats are supported.

### Video Subsystem

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#### DAV

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The Digital Audio Video (DAV) connector is a 40 pin DAV connector that lines up with one of the NuBus slots in the Quadra 840AV. It is included as an option when customers purchase the NuBus adapter card for the Centris 660AV and Quadra 660AV. This connector provides access to the video input signals directly from the logic board in a YUV 4:2:2 format and to the digital audio signal input for the Singer CODEC.

This connector allows 3rd party NuBus card developers to access components on the 840AV logic board for audio and video compression, which eliminates the need for redundant components on the card and allows the customer the choice of compression technologies : e.g., MPEG, JPEG, DVI, or H.261 (videoconferencing).

## Macintosh Universal NuBus Interface (MUNI)

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Supports the full range of NuBus master/slave transactions with single or block moves, including dumps and runs in which the main processor is master and the NuBus is slave, supports faster data transfer rates to and from the CPU bus, and supports NuBus 90 data transfers between cards at a clock rate of 20 MHz.

NOTE: the MUNI is located on the main logic board in the Quadra 840AV and on the optional NuBus adapter card for the Centris 660AV and Quadra 660AV.

## Two different Frame Buffers

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The Macintosh AV Series computers are the first Macintosh computers to use two different frame buffers. These are the graphics frame buffer, and the video frame buffer. VRAM can be used in two different ways, either used completely by the graphics frame buffer (standard Macintosh display), or split 50/50 between the graphics frame buffer and the video frame buffer.

For example, A Quadra 840AV with 2MB of VRAM can support a 14-inch color monitor at 24-bits in a strictly graphic environment or can provide support for a 16-bit graphics window and a 16-bit video window.

The video subsystem digitizes video input and converts the image to YUV format which is available at the Digital Audio/Video expansion adapter (DAV Connector). This provides expansion for our third party developers to develop NuBus cards for video compression and decompression, acceleration, image enhancements, etc.

## Cyclone Integrated Video Interface Controller (CIVIC)

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Manages VRAM; controls data transfer between VRAM, the VDC and Sebastian; provides 32-bit or 64-bit data paths between VRAM and the main processor or aslot card; performs convolution; provides needed video timing signals; and generates the vertical blanking and video- in interrupt signals.

## Video Data Path Chip (VDC)

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Performs input video window scaling with horizontal and vertical filtering, accepts YUV 4:2:2 color-encoded input from the Digital Multistandard Decoder or the DAV slot card bus, and produces 16-bit 1:5:5:5 RGB, 8-bit grayscale, or YUV 4:2:2 output.

## Sebastian

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Sebastian - A video color palette and video digital-to-analog converter (DAC). It accepts up to 64 bits of digital input, either as one 64-bit port or as two 32-bit ports. Lets one 32-bit port handle digital video while the other processes graphics using the same or different color lookup tables. Supports mixing video with still graphics, uses a convolution filter to minimize flicker in line-interlaced displays, and supports displays with clock speeds up to 100 MHz.

## Mickey

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Accepts analog video signals from Sebastian, provides the encoding to NTSC or PAL digital formats, and produces S-video, composite, and RGB video outputs.

## 66 MHZ AT&T DSP3210

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This processor is a 32-bit floating point processor that provides real-time processing of modem signals, video, sound, and speech recognition data which releases the 68040 from these tasks.

## Video In

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The video-in capabilities of the Quadra 840AV support full-motion, full-screen viewing of any video material in the NTSC, PAL, or SECAM format.

The video subsystem is completely independent of the CPU or DSP. One of the features provided by this subsystem is the ability to record a quarter screen\* image at 10 to 20 frames per second directly to a hard disk in real-time without data compression.

Video-in provides for on-screen viewing of video materials, 24 bit frame capture, and QuickTime movie recording without additional hardware.

\* Quarter Screen definitions: There are two competing definitions of a one-quarter size screen, assuming the standard Macintosh 640 x 480 screen. These two definitions are often used interchangeably:

- 1) The actual number of pixels on the screen divided by 4, equaling 320 x 240 pixels. This is one-quarter of the standard Macintosh 640 x 480 screen and what the QuickTime development team refers to as a one-quarter size screen.
- 2) The horizontal number of pixels divided by 4, and the vertical number of pixels divided by 4, equaling 160 x 120 pixels. This is one-eighth of the standard Macintosh 640 x 480 screen and what the VideoFusion application (bundled with the Macintosh AV Series) refers as a one-quarter size screen.

## Video Out

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The Quadra 840AV provides standard video output in both the NTSC and PAL formats. This allows you to send the video output directly to standard video inputs such as those on TV monitors, VCR's, etc.

The Quadra 840AV also supports convolution, 7 levels of transparency for blending video and graphics and Chroma-keying.

## Article Change History:

- 14 December 1993 - Retitled and revised article to incorporate entire Macintosh AV series.
- 12 August 1993 - Revised the Video In portion, adding accurate video capture

frame rates and defintion of quarter size screens.  
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