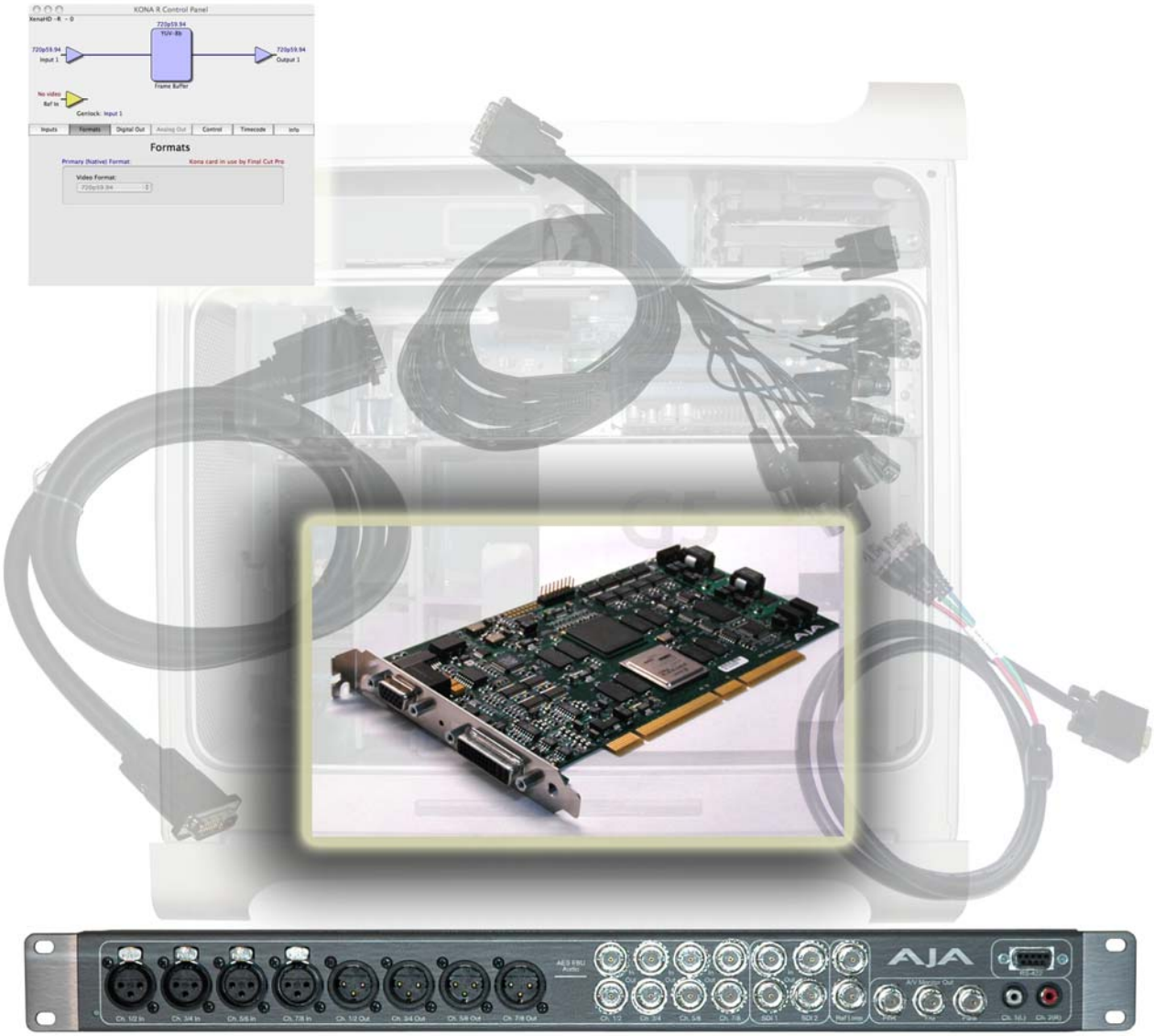
KONA 2

Installation and Operation Guide



PRELIMINARY

Contents Subject to Change

November 4, 2004 P/N101655

Trademarks

AJA, KONA, and Io are trademarks of AJA Video, Inc.

Apple, the Apple logo, AppleShare, AppleTalk, FireWire and Macintosh are registered trademarks of Apple Computer, Inc. Final Cut Pro, QuickTime and the QuickTime Logo are trademarks of Apple Computer, Inc. DVCPRO HD® is a registered trademark of Panasonic Inc.

All other trademarks are the property of their respective holders.

Notice

FCC Emission Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by AJA Video can effect emission compliance and could void the user's authority to operate this equipment.

Contacting Support

To contact AJA Video for sales or support, use any of the following methods:

443 Crown Point Circle, Grass Valley, CA. 95945 USA

Telephone: 800.251.4224 or 530.274.2048
Fax: 530.274.9442

Web: http://www.aja.com
Support Email: support@aja.com
Sales Email: sales@aja.com

When calling for support, first read the Chapter on *Troubleshooting* at the back of this manual. You can often save time and effort by looking there first for simple remedies and information on how to get support from AJA and Apple Computer Inc.

Limited Warranty

AJA Video warrants that this product will be free from defects in materials and workmanship for a period of three years from the date of purchase. If a product proves to be defective during this warranty period, AJA Video, at its option, will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, you the Customer, must notify AJA Video of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to a designated service center nominated by AJA Video, with shipping charges prepaid. AJA Video shall pay for the return of the product to the Customer if the shipment is to a location within the country in which the AJA Video service center is located. Customer shall be responsible for paying all shipping charges, insurance, duties, taxes, and any other charges for products returned to any other locations.

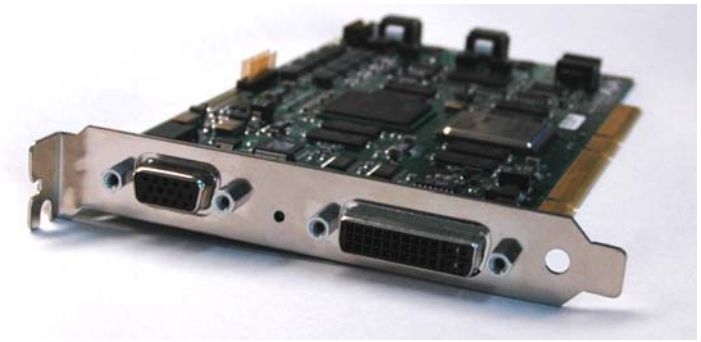
This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. AJA Video shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than AJA Video representatives to install, repair or service the product, b) to repair damage resulting from improper use or connection to incompatible equipment, c) to repair any damage or malfunction caused by the use of non-AJA Video parts or supplies, or d) to service a product that has been modified or integrated with other products when the effect of such a modification or integration increases the time or difficulty of servicing the product.

THIS WARRANTY IS GIVEN BY AJA VIDEO IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. AJA VIDEO AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. AJA VIDEO'S RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE WHOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER AJA VIDEO OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Table of Contents

KONA 2

Chapter 1: Introduction



Overview

AJA KONA 2 brings the highest quality SD, HD, and Dual Link HD video and audio to an Apple G5 Power Mac running Final Cut Pro 4 software. Offering unsurpassed 10-bit uncompressed video, 8-channel digital AES and embedded audio, up/down HD/SD format conversion, DVCPRO HD® hardware support, AJA Qrez™ hardware codec, and HD/SD component analog output—KONA 2 is designed to be the ultimate capture and playback card.

A state-of-the-art PCI-X card, KONA 2 plugs into the G5 chassis and works with Final Cut Pro and other applications to provide a professional editing suite, corporate/industrial video center, or high-powered desktop video setup—or just about anything in between. Included with KONA 2 are a cable set that connects to most every kind of SD, HD, and Dual Link HD equipment you are likely to encounter. And for even easier connectivity, an optional K-Box rack mountable breakout box can also be purchased—it ships with its own cable set.

This manual covers the installation and operation of KONA 2 and K-Box and discusses using it with Final Cut Pro and other applications.

Features

The KONA 2 card offers a large number of unique features for optimum quality, ease of use, and support for a wide variety of workflows and environments.

Hardware

- SDI, HD-SDI
- PCI-X 133 MHz
- Dual Link 4:4:4 HD-SDI
- 8-Channel 24-bit AES and Embedded Audio
- Broadcast Quality hardware 10-bit SD to HD Up-convert
- Broadcast Quality hardware 10-bit HD to SD Down-convert
- 12-bit HD/SD Component Analog Video Output
- AJA Qrez™ 4:1 Hardware Codec
- DVCPRO HD hardware acceleration
- RS-422 Control Port (Sony), 9-pin D, for machine control
- Genlock/Reference Video (looping)
- Standard Cables Included (3)
- Optional K-Box Breakout Box—Provides Rack mounting and Flexible Easy I/O (2 K-Box cables are included with the K-Box)

Broadcast-Quality Conversion

KONA 2 features hardware-based full 10-bit Broadcast quality motion adaptive SD to HD up-conversion, HD to SD down conversion, and automatic HD/SD 12-bit component analog output. The quality of the conversion features are virtually identical to AJA's award winning stand-alone products as used throughout post-production markets. The KONA 2 built-in up-converter uses a full 10-bit data path, fully motion adaptive de-interlacing, and large multi-point digital interpolators. Down conversion uses large multi-point digital anti-alias filtering and interpolation. Because these functions are hardware based, they are available full time, all the time—with no CPU load. Such conversion is useful for cost effective monitoring, making standard definition dubs of an HD project, or up-converting from a standard definition FCP project to an HD deck for dubbing.

KONA 2 Audio

KONA 2 supports 8-channel 24-bit 48kHz AES audio via either XLR (balanced) or BNC (unbalanced) connections, and 8 channel embedded 24 bit 48kHz audio over the same single SDI connection as the video. If you are using a Digital Betacam Deck, HDCAM, DVCPRO HD, D5, D9 or even an HDCAM SR—you'll have the proper connections to the deck.

At the present time Final Cut Pro only supports 2 channels of audio input and up to 24 channels of audio output. However, KONA 2 supports 8 audio channels in and out via the hardware, and will support multichannel audio input when Final Cut Pro supports that function in the future. KONA 2 also features AES input sample rate conversion; this feature eliminates the requirement for audio source synchronization. Sample rate converters auto-lock to any AES input, 32-96KHz, and then convert it to 24 bit 48KHz audio, perfectly locked to internal KONA 2 video. Sample rate conversion is done at very high quality (over 120db THD).

Dual Link

KONA 2 supports Dual Link 4:4:4 HD-SDI, an emerging technology on the Macintosh platform with Final Cut Pro. Commonly know in the broadcast video industry as Sony HDCAM SR or Thompson Viper Format, Dual Link offers a full HD raster (1920x1080) at 10-bit. AJA is working with Apple to integrate a Dual Link 4:4:4 codec for Final Cut Pro HD (4.5). KONA 2 will support SMPTE-372M compliant 4:4:4 RGB video at 10-bits.

Qrez™ 4:1 Hardware Codec

AJA provides Final Cut Pro users with an additional choice for video compression: Qrez. Qrez is our high-quality hardware based codec that provides a 4:1 compression ratio. Because the compression/decompression is all done using KONA 2's hardware, there is no processing load on the CPU—and no latency. Qrez is viable for offline and online broadcast production, allowing broadcast quality HD at rates between 25 and 35MB sec. and broadcast quality SD at rates between 2 and 3MB sec. This economy allows smaller more cost effective storage solutions to be used for broadcast quality video.

Qrez works by using KONA 2's internal scaling engine to reduce the number of lines and pixels such that the data rate is one-fourth normal size. Another way of putting it is that Qrez produces a smaller "uncompressed" raster on capture, and then scales it back up on play-out. This does reduce the resolution of the video, but it's a good choice when considering the tradeoff between storage space and quality.

The trick to making Qrez appear high quality is the use of AJA's scalars. On "average" video, it is often difficult to see any difference between uncompressed and Qrez.

DVCPRO HD® Acceleration

Developed in close cooperation with Apple, KONA 2's hardware takes a portion of the DVCPRO HD codec processing load off the CPU, allowing more processor time for Real Time effects in Final Cut Pro HD. KONA 2 also has hardware support when capturing from HD-SDI to the DVCPRO HD codec. KONA 2 along with Final Cut Pro HD and the DVCPRO HD codec bring real time HD production power to the desktop.

With KONA 2, any HD-SDI source can be captured using the DVCPRO HD codec—giving you online HD quality at remarkably low data rates (between 6 and 15 MB/sec.) and allowing the internal PowerMac SATA storage to be used for HD capture, playback and even RT effects. Of course, you will get even better performance and more RT when using a fast SCSI or Fibre Channel array, but this allows HD to be used where only SD would have been considered due to budget or time constraints.

How does the KONA 2 accelerate DVCPRO HD? Panasonic DVCPRO HD uses a 2-step process in the codec. First, the HD image is scaled to a lower pixel count horizontally, and then the reduced raster is compressed using a DCT based codec. For example, for 720p, DVCPRO HD reduces the raster from 1280x720 to 960x720, and 1080 from 1920x1080 to 1280x1080. The reason for this is a favorable trade-off between resolution (that is often not there anyway), and a much more efficient codec due to the smaller raster. Critical to this is a proper high-quality scalar to reduce the raster on capture, and scale it back up on playback. KONA 2 performs the scaling step in hardware for both capture and playback.

Because KONA 2 has AJA's scaling engine, these steps are performed at a very high quality level. Also, since the CPU does not have to do the scaling, additional RT is possible when outputting to HD-SDI.

Software

- KONA 2 Control Panel for source selection and controlling KONA 2 within the overall MacOS environment (Macintosh Desktop, Input Pass through, etc.).
- AJA QuickTime™ Drivers for tightly integrated hardware/software operation.
- Support for Apple Final Cut Pro™ (application software not included).
- Support for After Effects, Combustion, Motion, and Other Applications (application software not included).

AJA's KONA 2 software and hardware were developed for use with Final Cut Pro 4 for powerful integrated video/audio capture, editing, and video production. With an Apple G5, FCP, and KONA 2, you have the ultimate system for standard definition—and high definition—video production. Software is supplied on CD, including the KONA 2 Control Panel, drivers for the card itself, and all files necessary for Final Cut Pro and other application support.

What's In The Box?

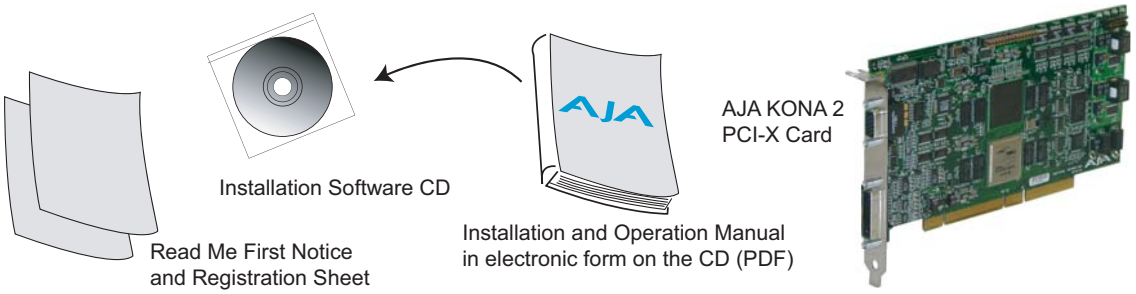
When you unpack your AJA KONA 2, you'll find the following components:

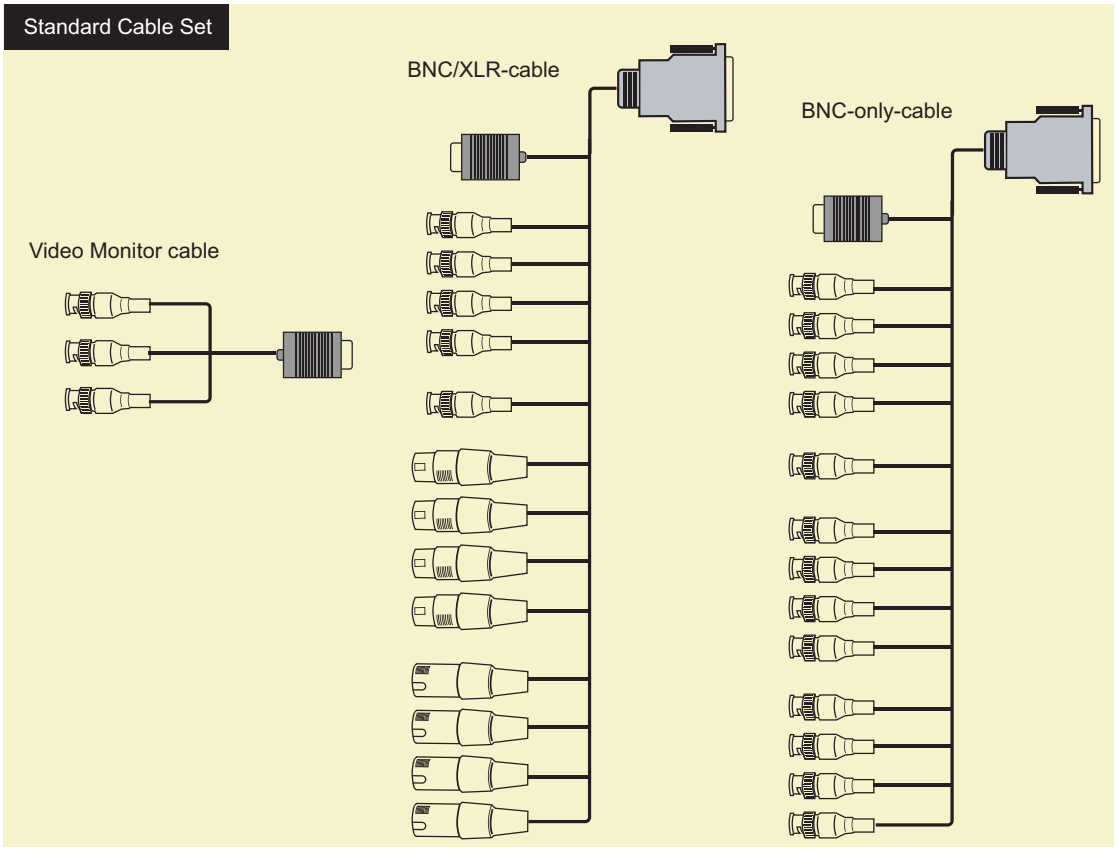
- AJA KONA 2 Software and Documentation CD-ROM—this CD contains the software installer to place KONA 2 drivers and the Control Panel on an Apple Power Mac. Install the software as discussed in this manual in *Chapter 3: Installation and Configuration.* The CD also contains a wide variety of useful information, including this manual you're reading (PDF format).
- KONA 2 PCI-X card.
- Cable, KONA 2 SDI In/Out, AES, RS422, and Reference Input—Audio connectors are XLRs.
- Cable, KONA 2 SDI In/Out, AES, RS422, and Reference Input—Audio connectors are BNCs.
- Cable, KONA 2 Analog Video Monitor Outputs (component/composite).
- Read Me First Notice—Contains late-breaking news and/or errata related to KONA 2 and the documentation.

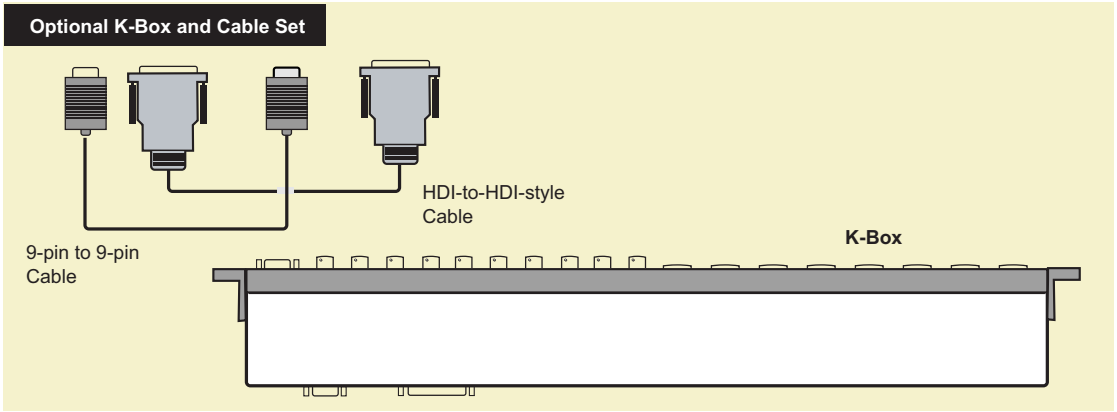
Please save all packaging for shipping the KONA 2 should you wish to do so when moving or sending it in for service.

Optional K-Box Package Contents

- K-Box 1-RU Panel.
- Cable, K-Box to KONA 2, HDI-style connectors.
- Cable, K-Box to KONA 2, 15-pin D-connectors.







KONA 2 Shipping Box Contents

System Requirements

AJA Video recommends that your system meet minimum hardware and software requirements to achieve a satisfactory level of performance when operating it. Here, we provide minimum and recommended requirements and then discuss disk storage issues that should be understood for proper system configuration.

Minimum and Recommended System and Software Requirements

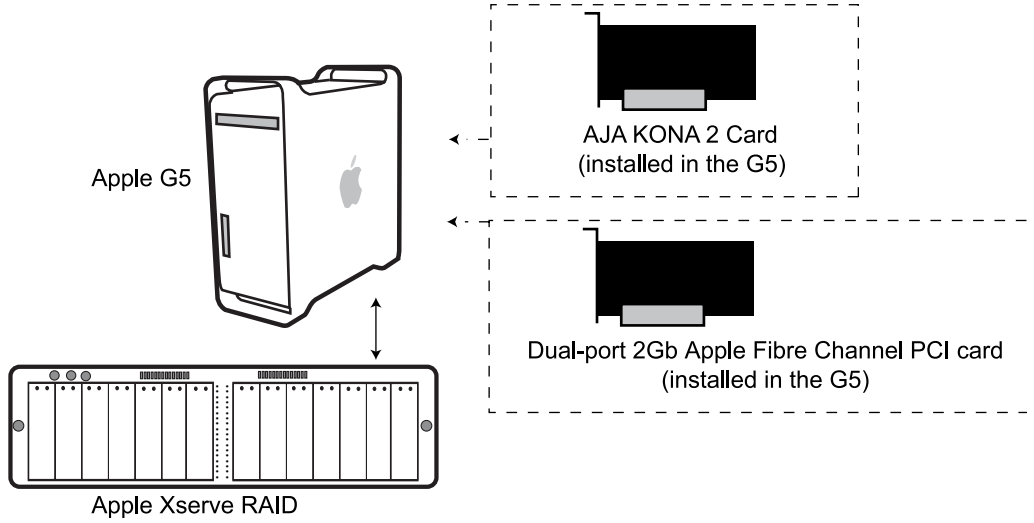
The following table outlines the system hardware and software needed.

Item	Minimum	Recommended
Macintosh Operating System	OS X, version 10.3.5, QuickTime 6.5	OS X latest release. QuickTime 6.5 or Latest
Editing/Production Software Suite	Final Cut Pro 4.5HD	Final Cut Pro 4.5HD
Macintosh	Power Mac G5, dual 2Ghz Minimum 1GB RAM	Power Mac G5, dual 2.5Ghz or better > 1GB RAM
AGP Graphics Card	ATI Radeon 9600 (firmware rev 1.3.18 or newer)	- same -
Internal Storage (inside Mac) For DV only; uncompressed SD or HD requires external RAID.	SATA (1 internal HD)	SATA (2 internal HDs RAIDed)
RAID Interface	SCSI (ATTO UL4D) or Apple Fibre Channel Dual 2GB HBA	SCSI (ATTO UL4D) or Apple Fibre Channel Dual 2GB HBA
Disk Storage ***Note:*** see Storage Methods topic that follows later in this Chapter	4 SCSI Hard Drives External RAID	Apple Xserve RAID

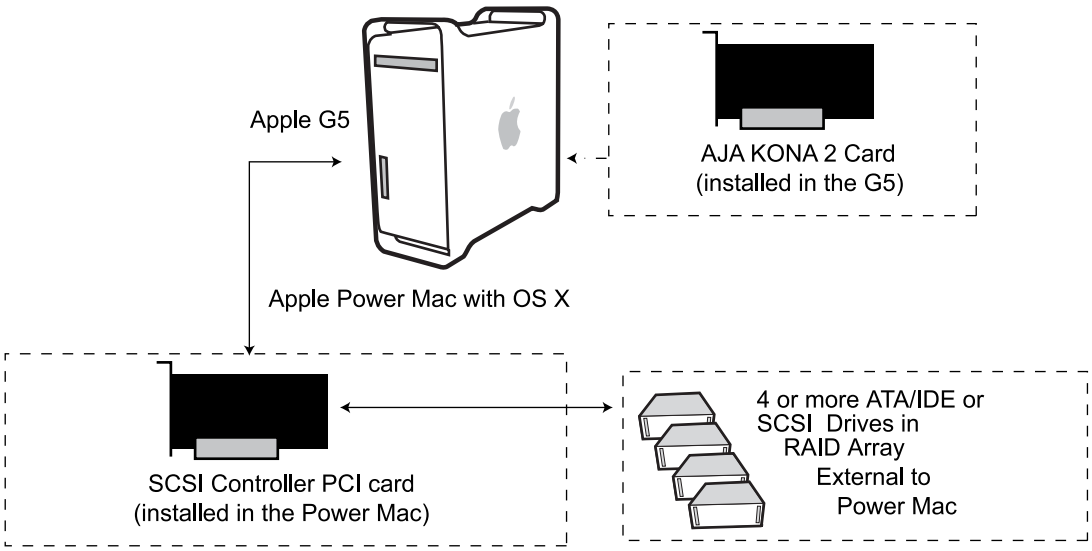
Understanding Disk Storage Methods

The KONA 2 card, an Apple Power Mac, and Final Cut Pro 4.5HD, together offer an unprecedented level of features and performance for all Video/Audio production applications. However, to ensure performance and quality, the disk storage system used with the Apple Power Mac must be able to meet the demands of storing realtime uncompressed media. At the very minimum, the disk storage system must be able to provide and maintain a consistent 50 MB/s transfer rate from the Power Mac to disk (read/write). There are a variety of system configurations and peripherals that can provide this level of performance. Possible system configurations are listed following:

Storage Method	Features/Limitations	Cost
Xserve RAID	Features up to 14 ATA/100 drive channels, dual independent RAID controllers, and a dual 2Gb Fibre Channel host interface. Xserve provides up to 5.6TB of storage with throughput of up to 400 megabytes per second.	Expensive, although the cost per gigabyte is excellent when large storage is needed
External ATA/IDE or SCSI RAID	Scalable. Performance almost as good as Xserve, although it can be more complex to set up and maintain. Many vendors offer solutions (too many to list here; check with your Apple dealer for SCSI Storage solutions for details). Although the connection to the external RAID chassis is SCSI, the drives themselves may be SCSI or ATA. A pure SCSI array will offer higher performance at a higher cost.	Moderately Expensive



Disk Storage Solutions—G5 With Xserve RAID



Disk Storage Solutions—External ATA/IDE or SCSI RAID

About RAIDs

Redundant Array of Independent Disks, or RAID, is a group of hard drives that appears to the host Power Mac as a single high-speed storage unit. RAID systems enable you to increase storage capacity and get the performance, reliability, and data protection needed for video production, but not possible from a single hard drive. RAID drives inside the array operate simultaneously, increasing overall throughput. RAID technology is comprised of these techniques (some or all):

- Striping data across multiple drives for storage performance (RAID 0).
- Mirroring for redundancy (RAID 1).
- Parity for data protection (RAID 5 [plus others]).

Most RAID configurations, or RAID levels, combine these to provide a balance of protection and performance.

Striping divides a logical drive into data blocks, or stripes, that are distributed across an array of physical drives. Striping a set of disks improves storage performance because each drive operates concurrently. However, striping alone, known as RAID level 0, offers no data protection.

Mirroring involves writing identical copies of all data to a pair of physical drives. This results in very high data reliability: If one drive fails, the data is still available on the remaining disk drive. However, it also results in a storage efficiency of only 50 percent, because two physical drives are required to achieve a single drive's capacity. Mirroring alone is known as RAID level 1.

Parity provides data protection without requiring complete duplication of the drive contents. In the event of a drive failure, parity information can be used with data on surviving drives to reconstruct the contents of a failed drive. Parity data can be stored on a dedicated drive, as in RAID 3, or distributed across an array of drives, as in RAID 5. Parity provides much greater storage efficiency than mirroring—up to 85 percent for a set of seven drives.

Software For Striping

AJA recommends the Disk Utility software provided by Apple with OS X for creating and striping RAIDs, including 3rd-party, SCSI, and Xserve RAIDs. It is very easy to use and has been tested to work well. The utility can be found in *Macintosh HD/Applications/Utilities,* where *"Macintosh HD"* is the name of the system drive.

AJA KONA 2 and Xserve RAID

For the optimum in disk storage with Final Cut Pro 4.5HD and AJA KONA 2, we recommend Apple's Xserve RAID. Xserve RAID holds up to 14 hot-swap Apple Drive Modules—5.6TB of storage—in a rack-optimized 3U enclosure. Each 7200-RPM hard drive connects to a dedicated ATA/100 drive channel, eliminating a traditional source of bottlenecks and maximizing the 2Gb/s Fibre Channel host connection(s). By adding more Xserve RAID systems, you'll have very large expansion capabilities: A standard 42U rack can hold over 78TB of Xserve RAID storage.

Xserve RAID is designed for nonstop operation. Redundant hot-swap power and cooling modules allow the system to keep functioning even if one module fails. A high-availability architecture and dual independent RAID controllers support RAID levels 0, 1, 3, 5, and 0+1. In addition, Xserve RAID supports hybrid RAID levels 10, 30, and 50 when used in conjunction with host-based software RAID. Remote Xserve RAID management capabilities are provided via Apple's Java-based RAID Admin application.

Note: When creating and striping an Xserve RAID for KONA 2 using the Apple Disk Utility provided with OS X, use *RAID 50*: in other words, the internal Xserve RAID drives are set up as RAID 5; the Xserve RAID then shows up in Disk Utility as two drives (regardless of the number of internal drives) which must be configured together as RAID 0. Apple calls this configuration "RAID 50."

Storage capacity

No matter which storage system you choose, pick one that can scale to meet your needs over time. Ideally, you should be able to increase storage capacity or switch to a RAID level offering increased data protection in the future. Balance current and future storage needs with your budget and choose accordingly.

FORMAT	Transfer Rate in MB/sec	Storage Requirement in GB/Hour	Hours of Storage Per Terabyte of Disk
10 bit Uncompressed Standard Definition	28	101	9.9
8 bit Uncompressed Standard Definition	21	76	13.1
DV50 Standard Definition	6.3	23	43.4
DV25 Standard Definition	3.1	11	90.0
Photo JPEG Standard Definition	2.5	9	111
8-bit Uncompressed 1080i @59.94/60Hz	124	448	2.2
10-bit Uncompressed 1080i@59.94/60Hz	166	597	1.7
Dual Link 1080psf@29.97/30Hz	249	896	1.1
8-bit Uncompressed 1080i @50Hz	104	373	2.7
10-bit Uncompressed 1080i@50Hz	138	498	2.0
Dual Link 1080psf@25Hz	207	746	1.3
8-bit Uncompressed 1080psf@23.98/24Hz	100	358	2.8
10-bit Uncompressed 1080psf@23.98/24Hz	133	478	2.1
Dual Link 1080psf@23.98/24Hz	199	717	1.4
8-bit Uncompressed 720p@59.94/60Hz	100	358	2.8
10-bit Uncompressed 720p@59.94/60Hz	133	478	2.1
DVCPRO HD	12.5	45	22.2
MB = MegaBytes *GB = GigaBytes*			

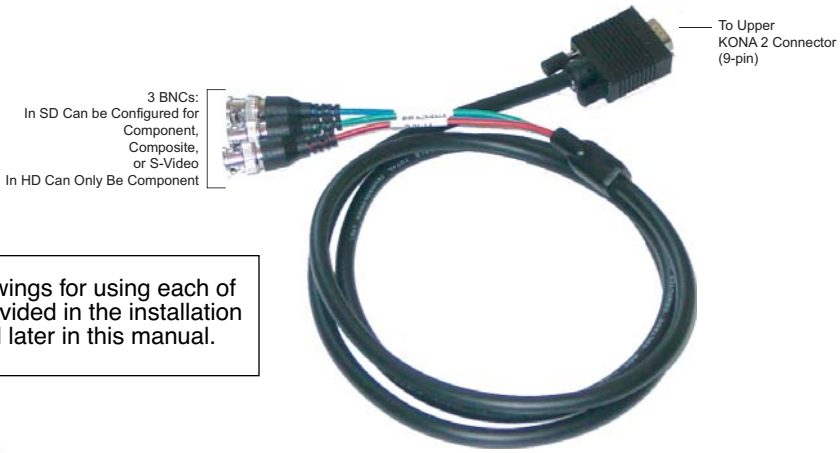
Note: for uncompressed formats, PAL and NTSC transfer rates and storage requirements are the about the same because PAL has a lower frame rate, but more lines.

Cable Connections

When KONA 2 is installed in a PowerMac, it connects to the outside world via either the standard cable set supplied, or the optional K-Box (using the two cables supplied with it).

Using the Standard Cables

KONA 2 offers you cable connectivity choices. Two versions of the KONA 2 breakout cable are provided: one having AES/EBU digital XLR connections, and one with AES/EBU digital BNC connections. When you plug in the desired cable, KONA 2 automatically configures. An additional analog A/V monitoring cable has a small 15-pin D-connector that attaches to the upper connector on KONA 2 and provides 3 BNCs for an analog component/composite monitor. The general KONA 2 breakout cables provide connection to your VTR machine control, input and output sources, and external reference video (genlock).



Configuration drawings for using each of the cables are provided in the installation chapter presented later in this manual.

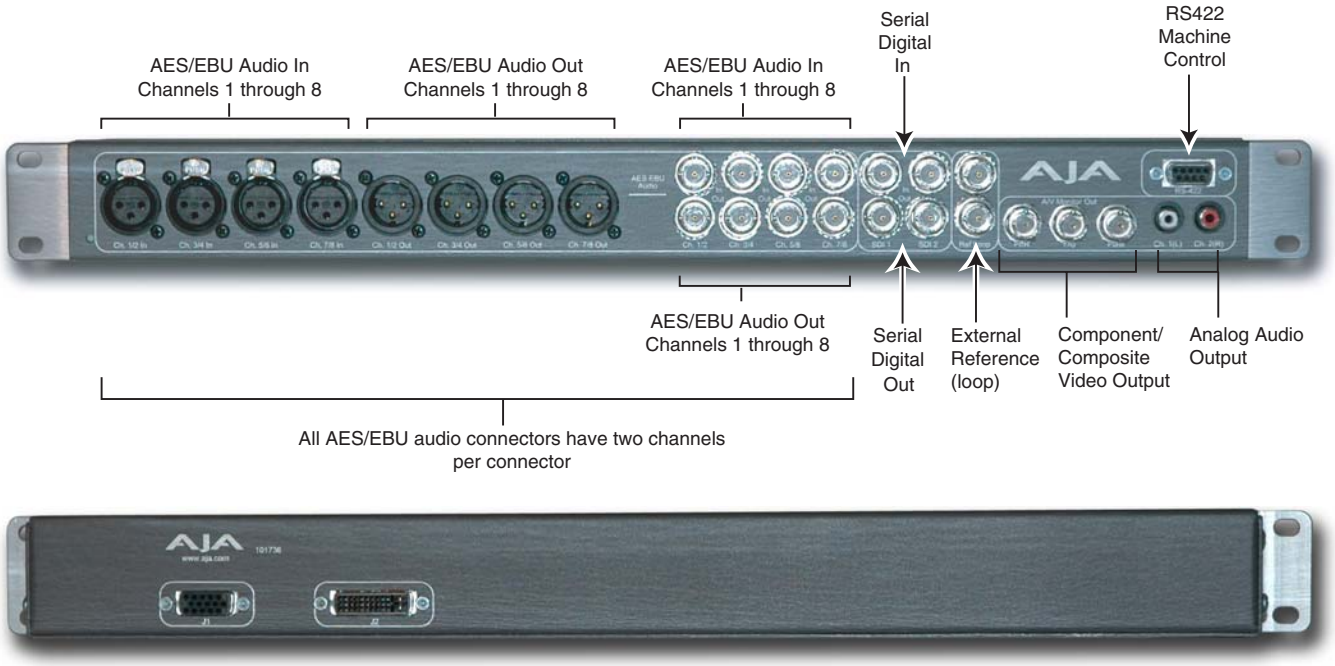
Note: The general I/O Cable with BNC connectors is not shown (it's identical to the cable above, with BNCs instead of XLRs)

Note: KONA 2's breakout cables should only be used for relatively short cable runs of HD-SDI digital video. For example—they can be used for directly connecting a tape deck, or other HD-SDI equipment, or connecting to HD-SDI cable runs of 20-30 feet. For longer runs, the optional K-Box breakout box must be used. The K-Box electrically re-buffers all signals and will support up to 125 meters of HD-SDI cable.

Using K-Box

The K-Box attaches to the KONA 2 card via two supplied cables that attach to the back of the K-Box. These cables each have unique connectors so they cannot be connected incorrectly. One cable uses 15-pin D-connectors, while the other uses an HDI-style connector (Note: the signals *are not* HDI pin-compatible signals.)

For additional functionality, the K-Box provides some features not present in the standard break-out cables: simultaneous XLR and BNC AES output, 2 channel RCA analog audio monitoring, and looping BNC Genlock reference connectors.

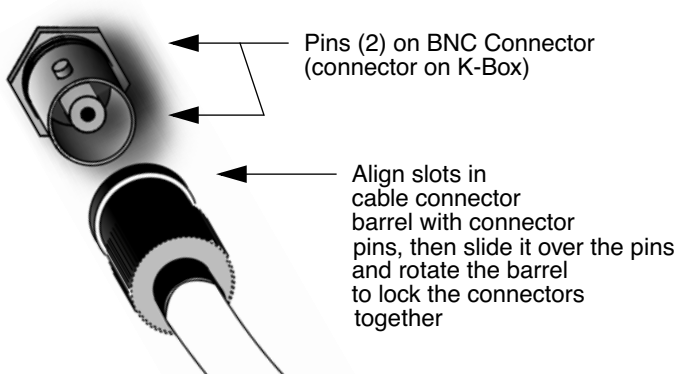


AJA K-Box Panel Connectors

About BNC Connectors

Although most video professionals are used to BNC connectors, you may not have seen them if you've been using primarily desktop video equipment. BNC connectors ensure a positive connection by the act of locking the connectors together via pins in one connector that fit into slots in the corresponding connector.

To make a BNC connection, slide the cable connector over the panel connector and then when seated, rotate the barrel of the cable connector 90˚ clockwise until the connectors are locked together. When properly locked, the cable cannot accidentally be pulled out.



Connector Descriptions—Cables and K-Box

Connectors on the standard cable set are labelled as to their function for easy installation and maintenance. Similarly, connectors on the optional K-Box are also labelled.

8 Channel Digital AES/EBU Audio Inputs And Outputs

When using the standard cables, you can choose either XLR or BNC connections for the AES/EBU audio input/output. One of the cables provides BNCs connectors while the other provides XLRs. In the latter cable, 4 four female XLR connectors are provided for audio input and four for audio output. Each XLR carries two channels. Both BNC and XLR connectors are labelled as to input/output and channels.

The optional K-Box provides both BNC and XLR audio connections on the front panel.

Note: XLR connections are digital and cannot be used with analog equipment having XLR connectors.

Analog 2 Channel Unbalanced Audio (K-Box only)

On the K-Box are two analog output connectors, one for each channel. These connectors are RCA-style phono jacks.

RS422 Machine Control

A female DB9 connector provides connection for VTRs, camcorders, disk media servers, and other devices using RS422 SMPTE (Sony) protocol. This connector is present on both the general I/O cables and the optional K-Box. (Connector pinout is listed in Appendex A: Specifications.)

SDI Input and Outputs

BNC connectors are provided for two SDI inputs and two SDI outputs for single or dual-link. KONA 2 has three video outputs altogether—2 SDI outputs that are used for both high- and standard-definition (SD/HD-SDI), and a component analog output (this last connector is discussed later). Each of the three outputs is independently switchable between HD and SD. For example, if you are working in HD, you can have simultaneous HD-SDI, SD-SDI, and HD-component analog output.

SDI inputs and outputs support video and 8-channel embedded 24-bit digital audio. Use SDI wherever possible for the best quality 10-bit uncompressed video input, capture and output. If peripheral equipment has a variety of inputs/outputs, look to see if it has SDI I/O, and use it where possible. Most high-end professional broadcast equipment supports SDI (VTRs, cameras, media storage servers, etc.).

For SDI video, the breakout cables have 2 HD/SD BNC Ins and 2 Outs for single or dual link. On the optional K-Box, these connectors are also provided on the right side of the panel next to analog audio out and the RS-422 machine control connectors.

Note: In the past manufacturers have used separate I/O connections for standard- and high-definition SDI because the circuits were different. On KONA 2 we use the same connectors for both HD and SD-SDI (both input and output). When connecting an input or output to a VTR or other external device, ensure it has separate connectors for SD and HD and choose the appropriate connectors.

Analog Monitor Out (Component/Composite HD/SD)

The analog component output can be switched to full-time SD—for both HD and SD projects. This allows use of an inexpensive analog monitor for both HD and SD work. You can even use a composite video monitor. For dual-link HD-SDI output, HD or SD can be monitored through the component output. Dual link HD can be sent out as 4:4:4 RGB.

KONA 2 features 12-bit component video output for both HD and SD. SD can be switched to composite and Y/C. (The same 3 BNC connectors share component and Y/C functions.) When working with HD, the component output can be independently switched to SD video—this allows you to use an SD monitor for both HD and SD.

Component video signals are generally higher quality than composite, but not as high quality as serial digital (SDI).

When using the standard cable set, these connectors are provided on a separate Monitor cable that connects to the smaller 15-pin D-connector on the KONA 2 card; when using K-Box, these connectors are found on the right side of the K-Box front panel.

A Note About RGB—Although RGB is used less in today's video systems, KONA 2 supports it for A/V Monitor output. However, because KONA 2's (and SMPTE SDI's) native format is YPbPr, AJA recommends the use of YPbPr whenever possible for analog monitoring. Although component video monitors often have RGB inputs, it's better to use YPbPr when the monitor supports it. The YPbPr format provides "headroom" for "superwhite" and "superblack"—and these video levels *will be clipped* when transcoding to RGB. Also, the RGB/YPbPr transcoding involves a level translation that results in mathematical round-off error. RGB can be configured in the KONA 2 Control Panel.

A Note About YPbPr—Component Video, or YPbPr, has been given several names over time. YUV, Y/R-Y/B-Y, and YCbCr, are just some examples. Although these various formats have some differences in levels, they are all basically the same. KONA 2 uses the modern YPbPr terminology exclusively. KONA 2 supports three different types of YPbPr: SMPTE/EBU N10, Betacam (NTSC), and Betacam (NTSC Japan). These three formats differ in level only and are configured in the KONA 2 Control Panel.

Reference Video

A single BNC on the standard KONA 2 cable—or two BNC connectors on K-Box (it loops through)—allows you to synchronize KONA 2 outputs to your house analog reference video signal (or black burst). If you have a sync generator or central piece of video equipment to use for synchronizing other video equipment in your studio, then connect its analog composite output here. When KONA 2 outputs video it uses this reference signal to lock to. When connecting a reference video source, the locking signal should be the same format (1080i29.97, 625i25, etc.) as the Primary format selected in the KONA 2 Control Panel. It is possible in some circumstances to use an alternate format video signal as long as the basic frame rate is compatible (for example, using a 525i29.97 genlock signal to lock a system running 1080i29.97).

In This Manual

Chapter 1 is the introduction you're reading, listing features, box contents, and system requirements.

Chapter 2 gets you started with using KONA 2 in a typical Video environment. Typical workflows for SD, HD, Dual-Link are discussed.

Chapter 3 provides complete instructions for installing and configuring the AJA KONA 2 card. The user is guided through unpacking, installing the card into a PowerMac G5, installing KONA 2 Mac Software From CD, cabling the system and then getting it up and running. Important configuration information is also provided on video settings and use of genlock/external reference.

Chapter 4 discusses operational aspects of KONA 2 when used with Final Cut Pro.

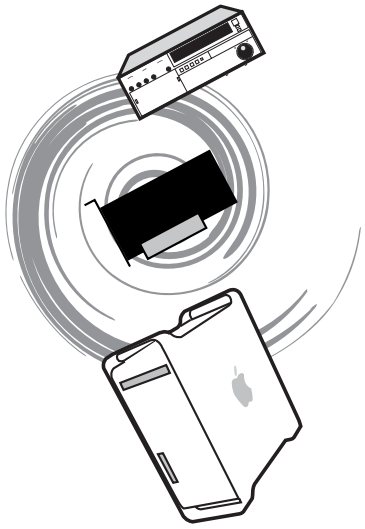
Chapter 5 discusses troubleshooting problems with your system and what to do when there's a problem you can't solve.

Appendix A presents a list of technical specifications for the prod uct.

Appendix B gives a glossary of technical terms and acronyms used in the manual.

The remainder of the manual consists of appendices listing specifications and an index section to help you rapidly find topics in the manual.

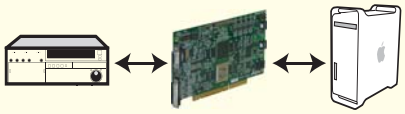
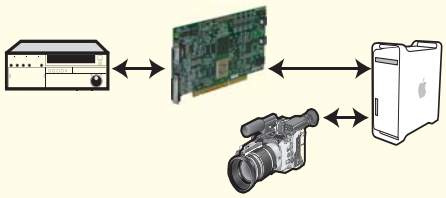
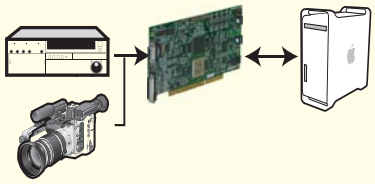
Chapter 2: Getting Started



KONA 2 And Your Workflow

There are a lot of ways to think about the video/audio workflow you follow. Your setup might be categorized as corporate video, professional broadcast, or desktop video. Or the workflow might be categorized by the type of equipment used rather than the nature of work produced—many systems these days are a mixture of equipment from high-end professional to desktop video. This chapter hopes to show how Final Cut Pro and KONA 2 can help fit into whatever workflow you currently have and make it more efficient.

A *Workflow Scenarios* diagram on the following page shows types of equipment, sorted by VTR source, and the types of workflow attributes and KONA 2 applications supported. After the diagram, we also discuss some typical applications.

Source Deck Type(s)		Workflow Attributes	Applications
Digital SD or HD Examples: Digibeta, DV50, DVCPROHD, HDCAM, and DVcam		KONA 2 captures and outputs SDI video (SD or HD) with embedded audio. Use high-quality AES/EBU and/or embedded 8-channel audio output.	Pro Broadcast Corporate/Industrial On-site Editing
Digital capture via Firewire with Output via AJA KONA 2 Example: MiniDV		Using standard desktop video techniques, video/audio is captured directly from a camcorder or deck. KONA 2 is used for playing back captured media and editing/mastering to tape or DVD using Final Cut 4.5HD and other tools such as After Effects, Combustion, Apple Motion, etc.	Desktop Video Corporate/Industrial On-site Editing Pro Broadcast
Without even using a deck; use the video monitor as a second Mac monitor. The KONA 2 desktop lets you drag graphics from programs like Adobe Photoshop from the computer display to the video monitor. You paint full frame and live onto a broadcast monitor. Output virtually anything to video—ideal for animators and compositors.		Using Final Cut Pro, work with a wide range of old and new SD and HD sources, including dual-rate and dual-link, and then also use desktop graphics and video software for creative power and flexibility.	Post-production Animation Compositing

Workflow Scenarios

Understanding Typical Workflows

KONA 2 and Final Cut Pro 4 allow more workflow flexibility than ever before. Users can independently select different formats for capture and storage media, while also outputting to KONA 2's full array of digital SD or HD uncompressed formats—with all outputs active simultaneously. Capture can range from DV to digital uncompressed. Media can be stored on disk as:

- offline quality at low bit rates
- on-line quality at moderate bit rates
- or with the highest quality as 8 or 10 bit uncompressed SD and HD

As quality and codecs improve, the lines between offline and online are blurring. For example, with the DVCPRO HD codec introduced in FCP HD, native HD editing in that codec is now possible, providing very high quality results (true HD editing) at very low data rates, in some cases as low under 6 MB sec. (compare this to 100MB/sec and higher for uncompressed HD formats, and you can immediately see the benefits)

Following are summaries of the most common workflows, listing data rates and relative quality levels. Some workflows require a RAID array and some will work using the host Power Mac's internal system drive—it's noted where this is supported in the following discussions.

PhotoJPEG

Data rate: approximately 1-3 MB/second standard definition or high definition—supported by internal system drive

Quality: Very Good

The Apple PhotoJPEG codec offers an excellent compressed media choice for on-line quality at low data rates. PhotoJPEG can use the full-raster at 4:2:2 sampling. Final Cut Pro 4 allows you to adjust quality using a PhotoJPEG control panel. KONA 2 allows for PhotoJPEG monitoring and/or output in both SD and HD. KONA 2 can capture from almost any HD or SD input, directly to PhotoJPEG media.

DV (DV25)

Data rate: 3.13 MB/second (megabyte/second) standard definition only—supported by internal system drive

Quality: Good

In this workflow, DV is usually input to a Power Mac running Final Cut Pro 4 through its FireWire port. DV offers good quality, but it has lower Chroma resolution when compared to DV50, JPEG, or uncompressed. You can use KONA 2 to convert DV projects to uncompressed—in real time—for monitoring and/or output. Alternatively, KONA 2 can capture uncompressed from any input, directly to DV media.

DV50

Data rate: 6.26 MB/second standard definition only—supported by internal system drive

Quality: Very Good

Like DV25, Final Cut Pro 4 also supports the Panasonic DV50 standard definition codec. DV50 is a 4:2:2 compressed format and therefore has higher chroma resolution when compared to DV25. Also like DV25, you can use KONA 2 to convert DV50 projects to uncompressed—in real time—for monitoring and/or output. KONA 2 can capture uncompressed from any input, directly to DV50 media.

DVCPRO HD

Data rate: 12 MB/second high definition—supported by internal system drive

Quality: Excellent

KONA 2's hardware takes a portion of the DVCPRO HD codec processing load off the CPU, allowing more processor time for Real Time effects in Final Cut Pro HD. KONA 2 also has hardware support when capturing from HD-SDI to the DVCPRO HD codec.

Uncompressed 8-bit

Data rate: 21 MB/second standard definition, or 100-124 MB/second high definition (see later "Storage Capacity" chart in Chapter 1 for the various transfer rates per format)—requires SCSI, Fibre Channel, or ATA drive array

Quality: Excellent

Uncompressed media is KONA 2's native storage format, offering the highest quality available. Capturing in uncompressed results in no compression artifacts, and video is sampled over the full raster at a 4:2:2 rate. Using uncompressed maintains a higher quality in your project from capture all the way through effects rendering. Final Cut Pro 4 supports RT with uncompressed media using RT Extreme. KONA 2 supports capture of uncompressed through any of its inputs, and uncompressed projects are output to all of its outputs simultaneously.

Uncompressed 10-bit

Data rate: 28 MB/second standard definition, or 133-166 MB/second high definition (see later "Storage Capacity" chart in Chapter 1 for the various transfer rates per format)—requires SCSI, Fibre Channel or ATA drive array

Quality: Excellent, very high quality

Offering all the benefits noted previously for 8-bit uncompressed, 10-bit additionally offers the very highest quality available. With 10-bit media and Final Cut Pro's 32 bit Floating Point YUV Codec, video quality is second to none—at any price. For more information on this subject, please see the topic at the end of Chapter 4: *Installation and Configuration*, titled "Using 8-bit Versus 10-bit Video."

Uncompressed 10-bit Dual Link HD

Data rate: 199-249 MB/second high definition (see later "Storage Capacity" chart in Chapter 1 for the various transfer rates per format)—requires SCSI, Fibre Channel, or ATA drive array

Quality: Excellent, highest quality available

Offering all the benefits noted previously for 10-bit uncompressed, Dual-link Dual Link 4:4:4 video uses 2 HD-SDI channels to provide full color resolution as well as luminance. The term "4:4:4" refers to the ratio of sampling frequencies used to digitize the luminance and colour difference components (Y, B-Y, R-Y) or the RGB components of a video signal. In this ratio there is always an equal number of samples of all components, providing increased quality over 4:2:2. However, current HDTV and standard definition video formats are 4:2:2 based, so you only get half the color resolution of the original image.

Workflow General Notes

The previously discussed codecs (DVCPRO HD, PhotoJPEG, DVCPRO 50, etc.) are used in different ways based on project characteristics. Some codecs create very high quality offline files at low data rates for projects that will ultimately be delivered as uncompressed; other projects may use these compressed formats as their final masters. These settings can be used in a "capture once—use in many steps" type of process. For example, you might use offline files for editing, digital dailies for review from a digital projector, location footage viewing and editorial performed on powerbooks, and even creating screening cuts of the project for approval and audience testing—all from one QuickTime file using the DVCPRO HD codec. Some examples of these scenario workflows are given following.

HD Offline Scenario #1

A popular way to edit long form content, such as feature films shot at 24fps film (or 23.98 in the case of HD to achieve a film look) is to take the telecine to HD tape masters, or the HD field masters (typically at 23.98fps) and then capture using the KONA 2 to a compressed format. An interesting and very high quality option would be to use the DVCPRO HD codec to capture from whatever deck you are using for your HD masters (typically HDcam or D5). This allows for offline files that in the 1080p raster are under 12MB/sec. and in the 720p raster are under 6MB/sec. This size and processing efficiency allows for the use of multiple layers of RT effects and color correction in FCP HD, as well as the choice of viewing quality (draft or high quality modes) depending on how much RT is required and the speed of your PowerMac hardware. In addition to the low data rates, another advantage here is that your offline files are in the same timebase as your original master tapes, greatly simplifying the online editing and finishing process.

A more traditional way (still supported by the KONA 2 using the on-board down-conversion option, and Cinema Tools software) is to down-convert your HD masters to an SD format (DV for example, at 29.97fps). This allows for traditional lower cost SD monitoring equipment to be used, but you are changing the time base of your media for your offline editing, which then must be dealt with via a somewhat complex series of software steps. Keeping your files in the same timebase allows for a much simpler offline/online process, particularly when dealing with 24p HD media. For 29.97 (59.94) HD projects, the complexity of the changing time base is eliminated, but the same rules apply. In this case, using the 1080i DVCPRO HD setting for your offline gives you great results at data rates about half the size of SD uncompressed files for offline—and you are working in HD.

HD Offline Scenario #2

The PhotoJPEG codec and DV codec have been around for awhile in FCP, providing a well-suited offline editing workflow that has proven to work fine for many projects. Similar to the process described above with the newer DVCPRO HD codec, these codecs can be used to capture from your HD tapes at the native frame rates of those tapes (e.g., 23.98). While not as high quality as DVCPRO HD, the files sizes can be even smaller—as low as 2 MB/sec for the photoJPEG depending on the raster size chosen—and are usually more than adequate for offline purposes.

HD / SD Online Scenario With Qrez™

Using the high quality scaling engine built into KONA 2, the Qrez hardware codec on the card can be used to create offline or online files via real-time capture, in a similar fashion to that described previously. Since Qrez uses hardware scaling instead of software compression, impressive results can be achieved in both HD and SD at 1/4 the size of what the files would be if captured using the uncompressed codecs alone. Using Qrez, you will see uncompressed 1080p files at approximately 25MB/sec, and uncompressed NTSC files at approximately 5MB/sec., often with no visible difference in quality on monitoring equipment. This make Qrez an interesting option for large scale presentation videos on video projectors or plasma displays.

Mixing and Matching Formats in Final Cut

In Final Cut Pro, it works best to use one format consistently. For example, if you capture DV 50 files and then capture 8-bit uncompressed files, you'll have to rerender one or the other when using the two types on the same Final Cut *sequence* (the timeline where media is edited into a project). You could even capture 8-bit uncompressed and DV, and then place them both on a PhotoJPEG timeline and end up having to render them *both*. You can capture directly, in real time to any supported format, even if it doesn't match the source formats at all (for example, DV and DV50 to 8 bit uncompressed).

Therefore, it makes sense to capture media into your system at the highest quality you'll expect to use to eliminate rerendering and ensure best results. KONA 2 is ideal for this since it has the connections necessary to bring in a variety of media for capturing into Final Cut.

Chapter 3: Installation & Configuration

Installation Overview

The installation and set up of a KONA 2 is very simple. All of the steps of installation and configuration are documented in this chapter, summarized as follows:

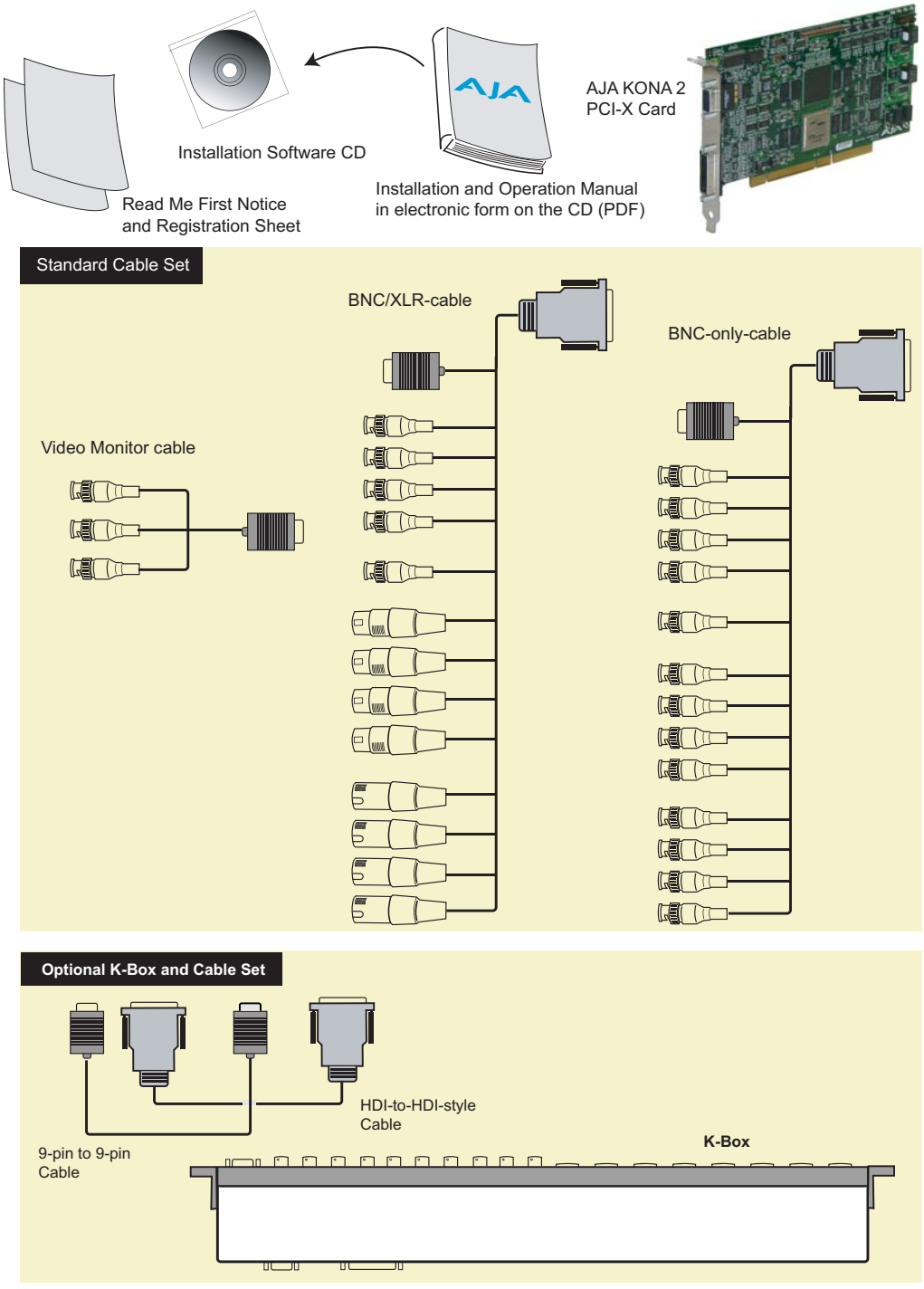
1. Unpack the shipping box
2. If not previously installed on your Power Mac, ensure that Final Cut Pro 4 HD is installed as detailed in its user documentation. Final Cut Pro 4 HD *must be installed and have been run at least once prior to installing AJA KONA 2 software.*
3. Lay the PowerMac G5 on it's side (motherboard facing up).
4. Install the KONA 2 capture card into either the 133 MHz slot or one of the 100 MHz slots in the PowerMac. If the RAID controller card (SCSI or Fibre Channel) requires the PCI-X 133 MHz slot put it there and insert KONA 2 in one of the 100 MHz PCI-X slots. DO NOT put the RAID controller and the KONA 2 both into 100 MHz slots—they should be on separate PCI-X busses to ensure optimum performance.
5. Install AJA KONA 2 software on your Power Mac from the supplied AJA CD-ROM
6. Cable the system audio and video sources, VTR, audio monitor, and video monitor. If you purchased the optional K-Box, then install it into an equipment rack or place it on a desk and connect its two cables to the KONA 2 card. If you're instead using the standard cable set, then use those to connect equipment.

Each of these steps are explained in greater detail in the pages of this chapter.

Unpacking

Shipping Box Contents

KONA 2 is shipped with a CD containing system software and an Installation and User manual (a PDF on the CD), and three cables (two breakout cables and a video monitor cable). If you purchased the optional K-Box breakout box, it ships with its own set of two cables for connection to the KONA 2 card.



Contents, KONA 2 Shipping Box and Optional K-Box Shipping Box

As you unpack the shipping box(es), carefully examine the contents. Ensure you received everything and that nothing was damaged during shipment. If you find any damage, immediately notify the shipping service and supply them with a complete description of the damage. AJA will repair or replace damaged items. If you find shipping damage, contact your AJA dealer or distributor for details on how to have your KONA 2 repaired or replaced.

Note: Save packing materials and the shipping box. If you ever require service or move your system—use the packaging materials and box for safe shipment.

Installing the KONA 2 Card

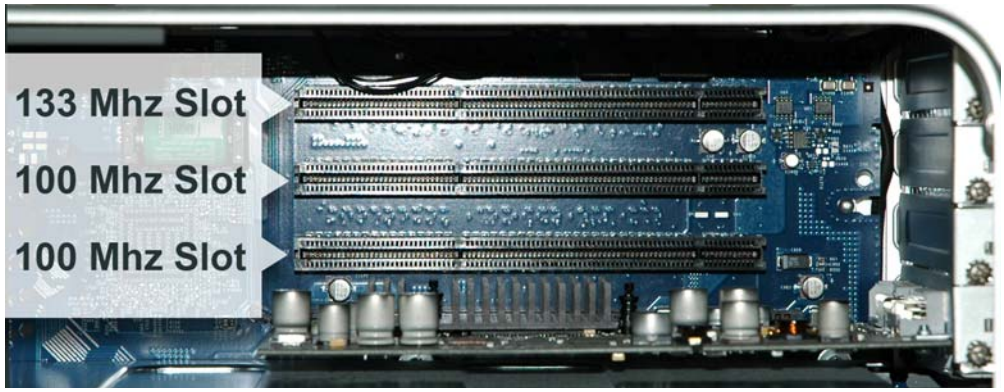
1. Place the G5 in a well-lit convenient area, where you will have easy access to the chassis access door.
2. Using your hand, touch the outside of the G5 to discharge any static electricity you have. Remove the power cable from the back of the PowerMac G5.
3. Remove the access door and clear inner panel as described in your Apple G5 User Manual. Lay the G5 on its side, motherboard facing up.
4. Remove the KONA 2 card from its protective anti-static bag; place the card on top of the bag.
5. Visually locate the PCI slots inside the G5 chassis (photo shown on the following page). There are two 100 MHz slots, and one 133 MHz slot. The 133 has its own data bus and is isolated from the other two. Use the fastest slot (the 133) for your RAID controller (SCSI or Fibre Channel)—if it requires the speed. For example, if your RAID controller card is only a 66MHz card, then it should go in one of the 100MHz slots. If, however, you had an ATTO UL4D SCSI controller (a PCI-X 133 card), then you should put that in the 133 MHz slot. Of most importance is to keep the KONA 2 card and the disk controller card on separate buses (one on the 133 and one on the 100).

Note: Do not put the RAID controller *and the KONA 2* in the two 100MHz slots since this makes them share the same bus, which could create bus-contention delays.

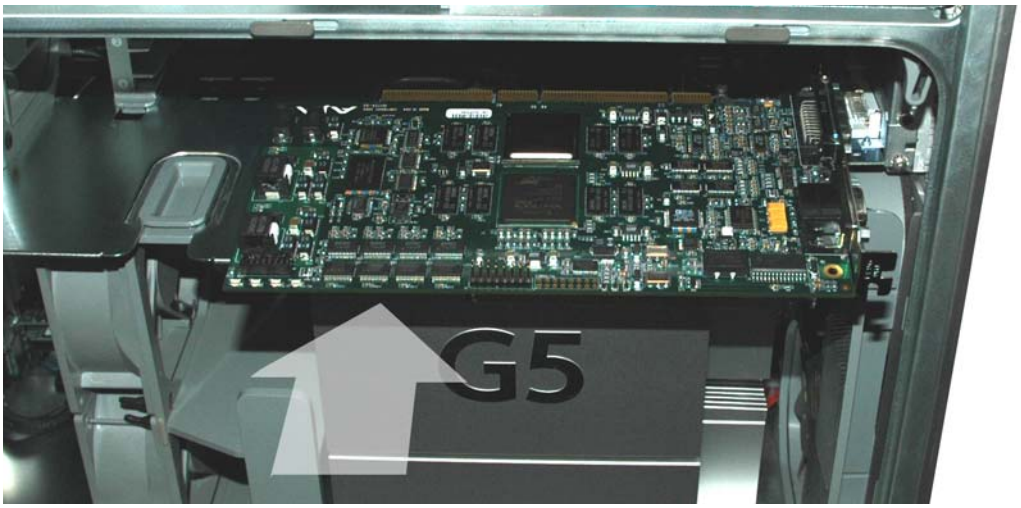
6. Remove the card edge access cover from the desired slot where you will be inserting the KONA 2 card. The card edge cover is secured by a phillips screw; save this screw for use in installing KONA 2.
7. Holding the KONA 2 card by the card edge plate and an outside edge, carefully insert the KONA 2 card by rocking it slowly into the slot. Ensure the card edge aligns properly with the G5's opening (where the card edge cover was just removed) and that it is fully seated in the slot.
8. Secure the card in the slot using the screw removed earlier.
9. Replace the G5's clear inner panel and outer access door.

Remove the KONA 2 Card From The Anti-Static Bag

Locate the PCI Slots Inside Your G5



PowerMac G5 PCI Slot Detail



Insert the KONA 2 Into the Slot

Note: After you install the KONA 2 card, you may notice that in the MacOSX Network preferences there is a message stating "You have a new network port named KONA 2 —be sure to check the settings...". There is no need to take any action; this occurs because MacOSX detects the RS-422 serial port on the KONA 2 card that you will use for VTR machine control.

Installing the Optional K-Box Breakout Box—Desk or Rackmount

Physical Requirements

You can place the optional K-Box breakout box in a 19" equipment rack for ease of access and connectivity. You can also simply place the K-Box on a desktop. When planning equipment locations and mounting methods, take into account the weight and size of the K-Box chassis.

- Chassis Dimensions:
  Height—1 rack unit, 1.75” (4.445cm)
  Depth—3” (7.62cm)
  Width—17.25” (43.8 cm)

- Chassis Weight: 4 pounds (1.81 kg).

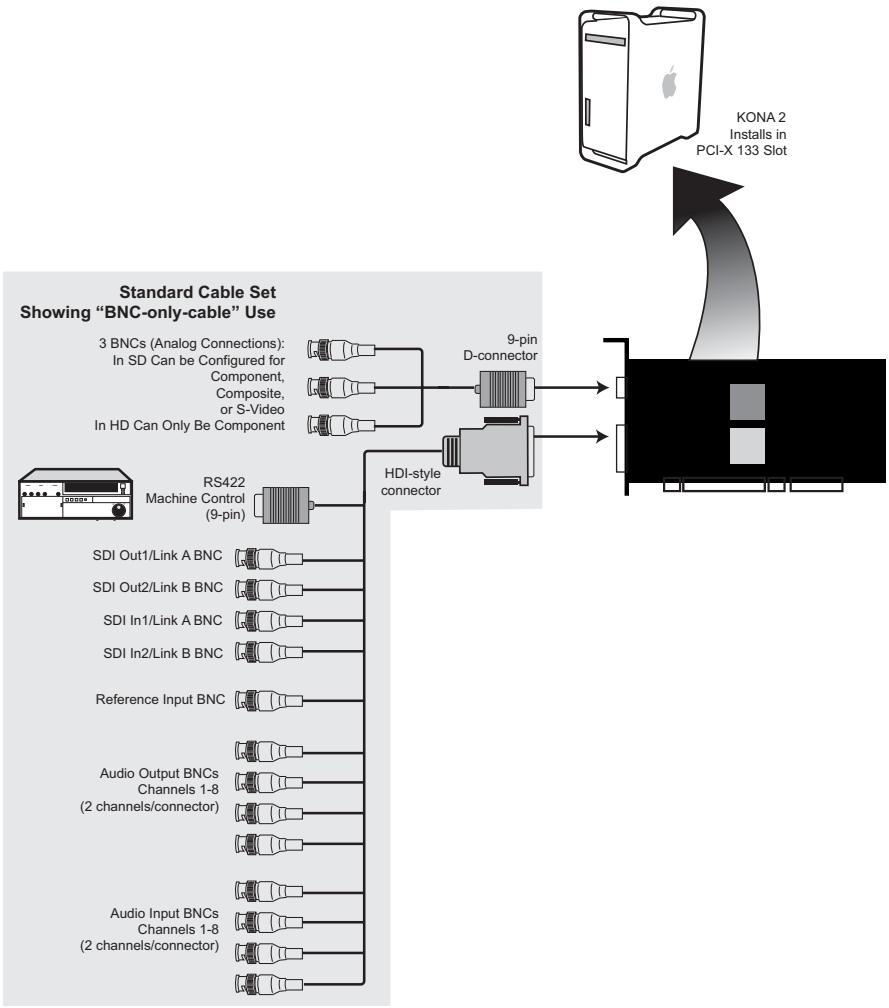
Plan adequate space for cable routing from the K-Box. Ensure that cable connectors are not stressed and that cables are not bent or crimped.

Cabling the System

System Video/ Audio Cable Connections

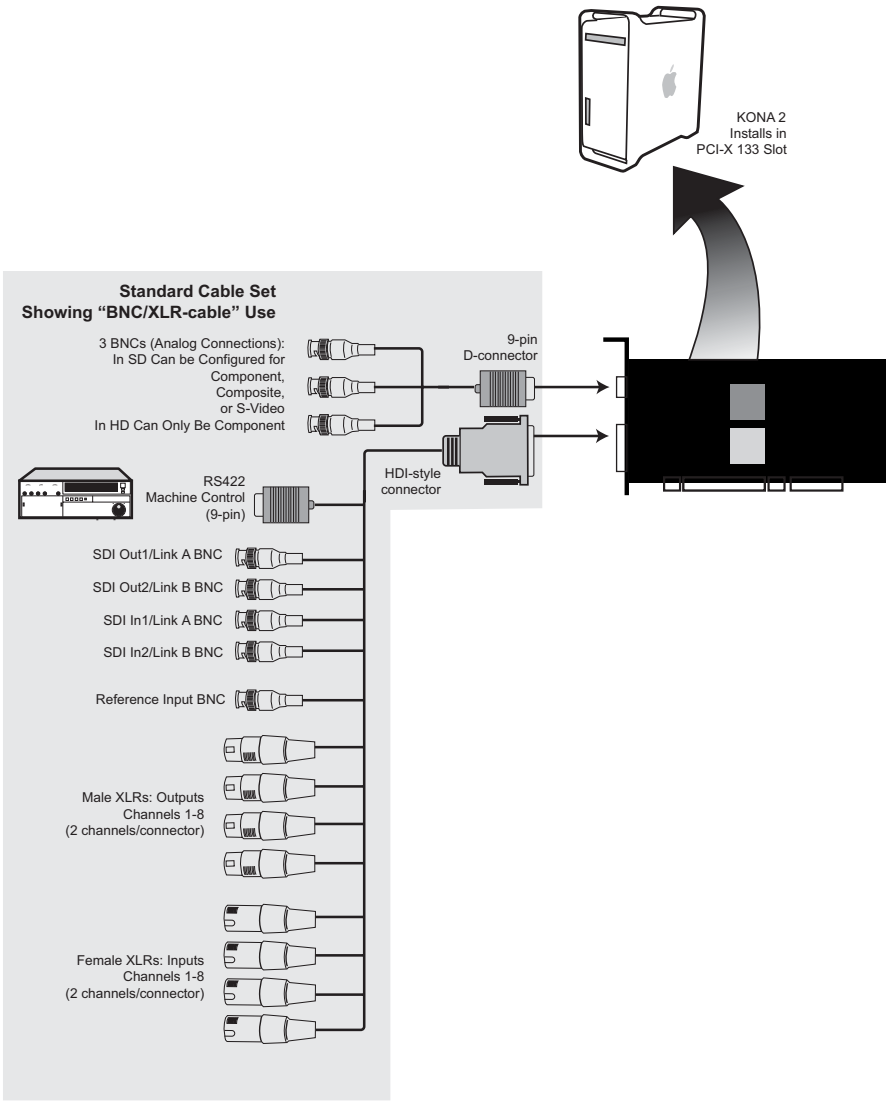
When installing your system, you’ll make video and audio input/output connections. These connectors are explained individually in chapter 2. Here, system interconnection is shown and described.

System Cabling When Using BNCs for Audio



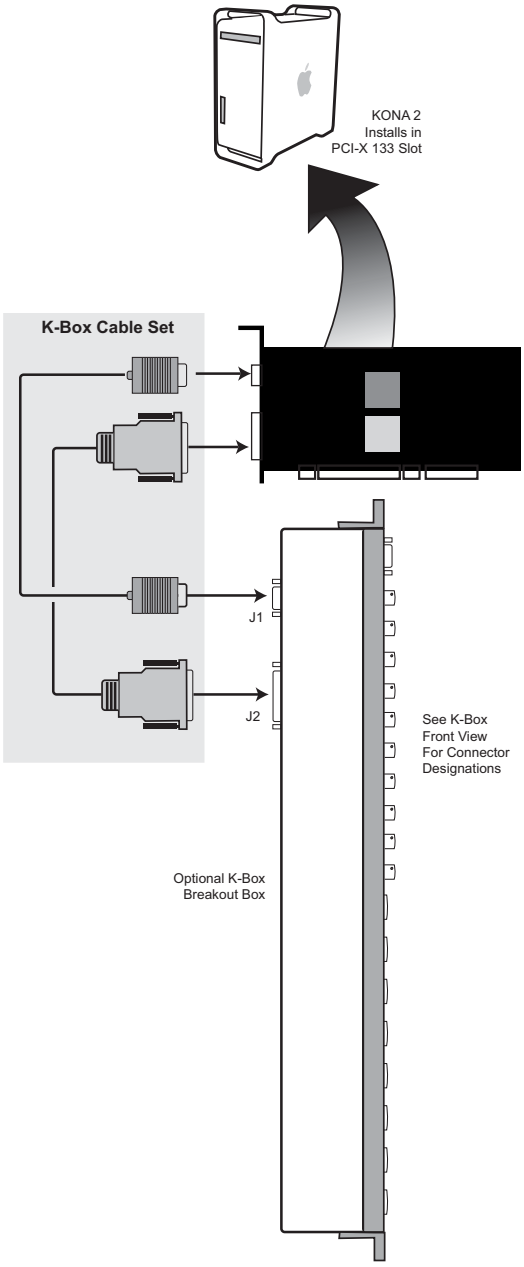
KONA 2 System Using BNC Breakout Cable

System Cabling When Using XLRs for Audio



KONA 2 System Using XLR Breakout Cable

System Cabling When Using Optional K-Box

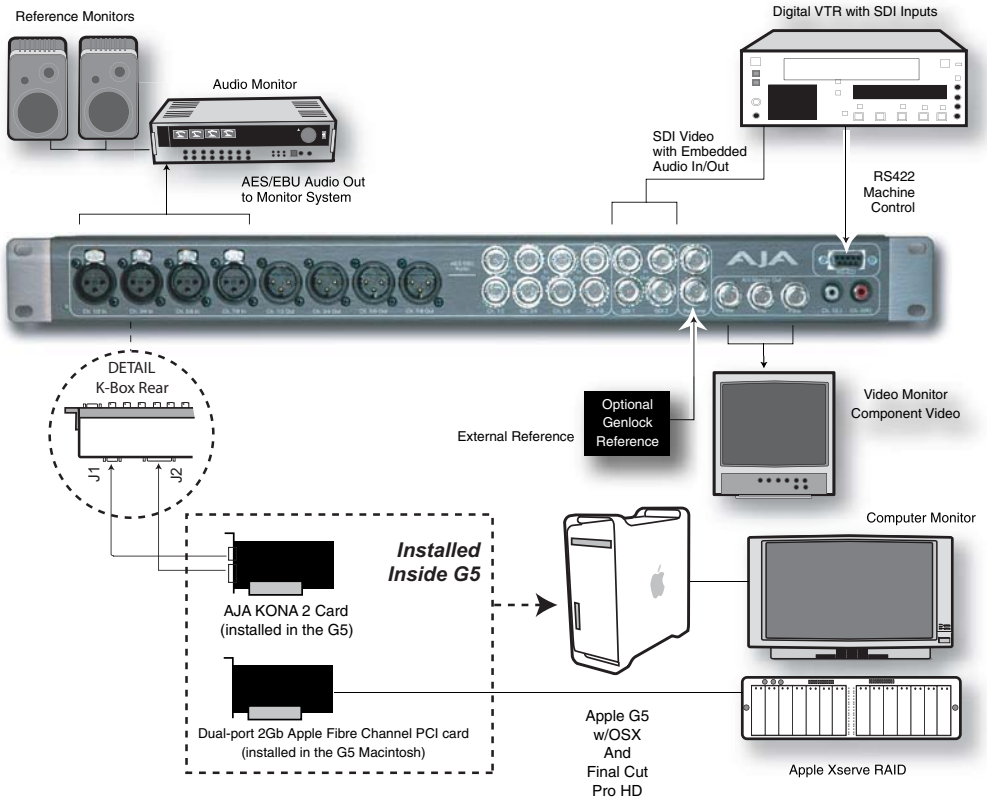


KONA 2 System Using K-Box

Typical System

A figure on the following page shows typical system interconnections for a system with digital A/V sources. Your system may differ depending on VTRs, audio monitoring, and video monitoring.

1. If desired, connect your house reference sync to the KONA 2 *Ref Loop* connector (BNC). The second KONA 2 Ref Loop connector on the K-Box (if used) can be connected to your VTR or terminated with a 75 ohm terminator.
2. Connect a Video Monitor to the KONA 2 *Component Analog Video Out* BNC connectors (preferred), or instead connect to a composite monitor.
3. Connect a 9-pin DB9 machine control cable between your VTR's RS422 control port and the KONA 2 *RS-422* machine control connector.
4. Connect two SDI cables between KONA 2 and your digital VTR (Digital Betacam etc.): one from KONA 2 *SDI In* to the VTR SDI Out, and one from KONA 2 *SDI Out* (1 or 2) to the VTR SDI In. The KONA 2 SDI connections have embedded audio so the VTR must be configured accordingly.
5. If you have an AES/EBU-ready audio monitoring system, then connect the eight channels of AES/EBU output from KONA 2's XLR or BNC connectors (1/2, 3/4, 5/6, and 7/8) to the monitoring system AES/EBU inputs. If you instead have an analog audio monitoring system, you can use the two RCA-style unbalanced stereo output jacks on the Optional K-Box for output.



Typical System Connections

Installing KONA 2 Software

First ensure that Final Cut Pro 4 is installed as detailed in its user documentation. Final Cut Pro 4 *must be installed and have been run at least once prior to installing AJA KONA 2 software.* Next, use the CD-ROM supplied with the KONA 2 system to install necessary software drivers and KONA 2 control panel. You cannot use KONA 2 with Final Cut Pro until the AJA KONA 2 software has been installed on the host G5 Power Mac.

System software updates may occasionally become available to AJA KONA 2 owners on our website (www.aja.com). We recommend checking occasionally for both software updates and additional product information.

Note: If your PowerMac has previously had another video capture or multimedia card installed, ensure you remove the card and uninstall any related software before installing KONA 2. This will prevent any hardware or software conflicts. KONA 2 will operate properly on a PowerMac that also has an AJA Io installed.

Software Installation Procedure

Locate the AJA KONA 2 Software CD packaged with your system. Then follow the procedure below to put the required software on a host system to be used with KONA 2. The system must be an Apple Power Mac G5. Minimum system requirements for the host were described in *Chapter 1: System Requirements.*

Note: Before installing KONA 2 software, turn off any virus protection and security software that you may have installed on your computer.

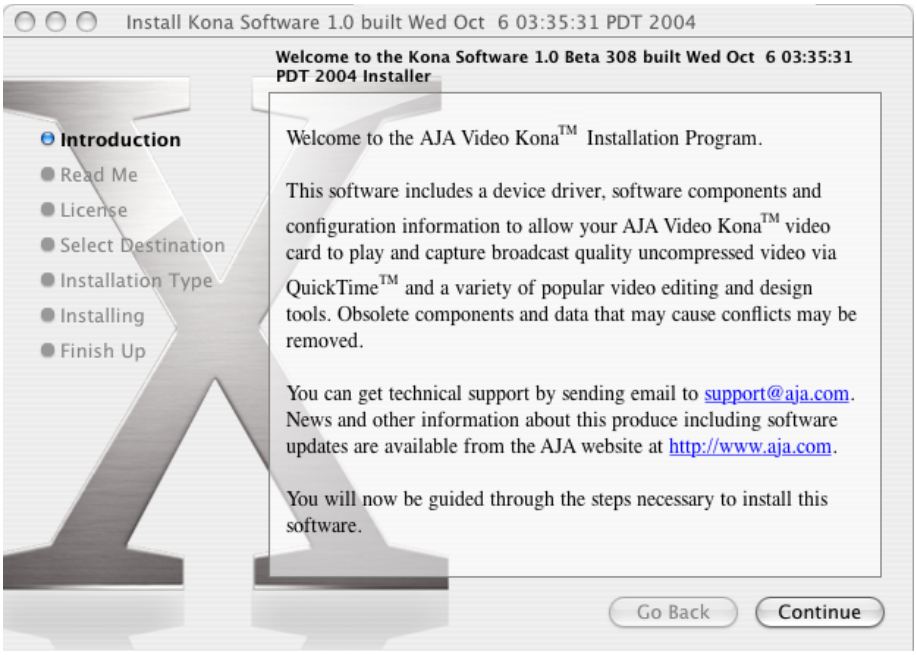
1. Insert the KONA 2 CD in the Power Mac
2. Locate the KONA 2 CD icon on the OS X desktop.
3. Move the mouse cursor to the icon and double click to see the CD contents, which will appear in its own window.
4. In the window, locate the package file; it has an icon that looks like a box and has a ".mpkg" suffix.

Note: Files ending in the ".mpkg" suffix are OS X installer files. These launch the OS X installer and tell it where and what to install on your system.

5. Double-click the package to log on and begin software installation.
6. The system will respond by asking you to authenticate who you are as currently defined on your OS X user profile. Enter the proper name and password at the Authenticate prompt; if you have multiple users defined, ensure that you log on as a user with administrator-level authority.

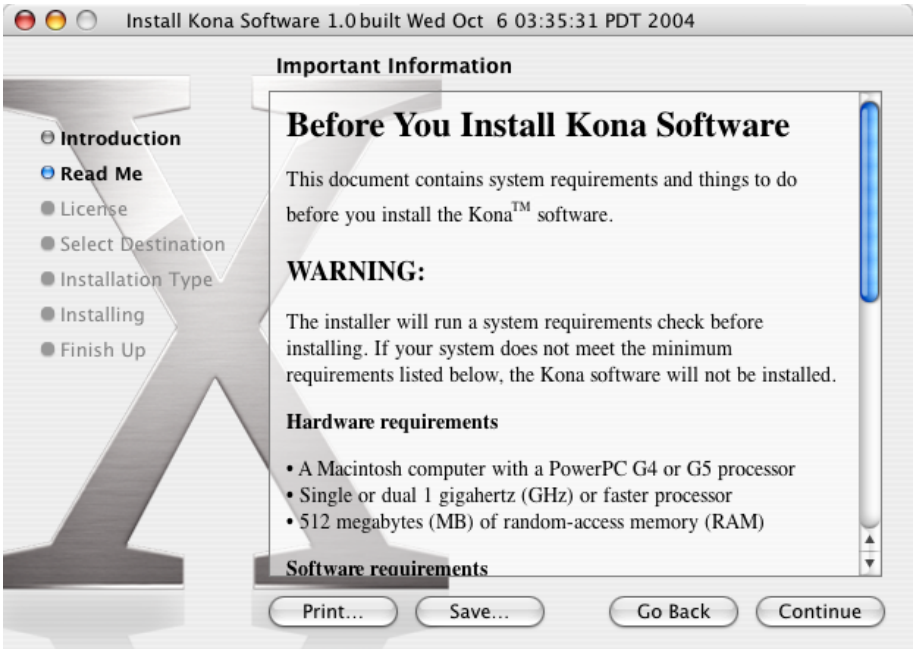
Log On Authenticate Prompt

7. Click on the *OK* button after entering a valid user and password.
8. The installer will launch and you'll see a series of installer screens.



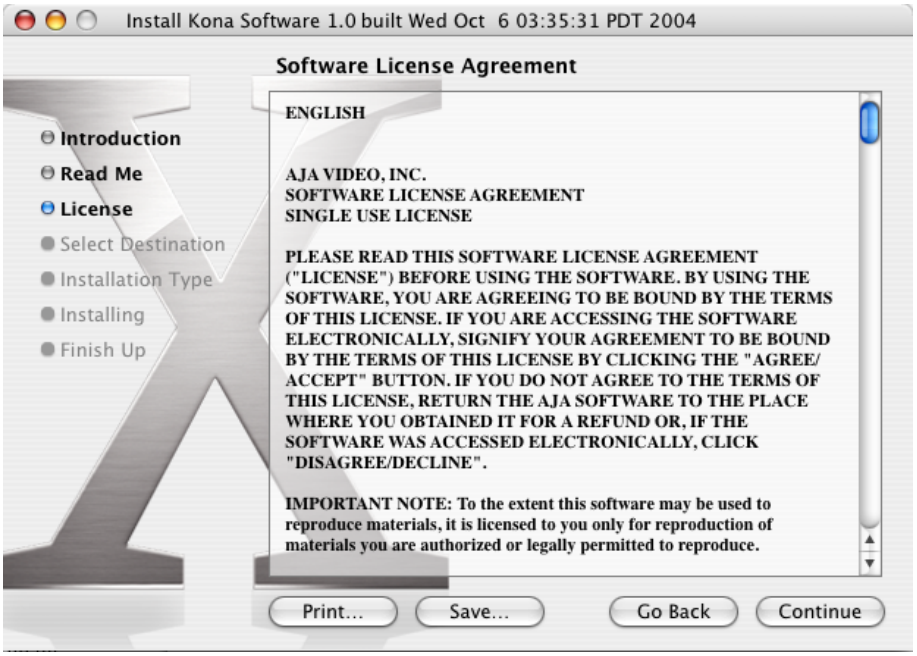
Initial Installer Screen

9. Click *Continue* to begin installation.
10. The next screen lets you know that the installer will check your PowerMac to ensure it has the hardware and software resources required (see Minimum Requirements in Chapter 1).



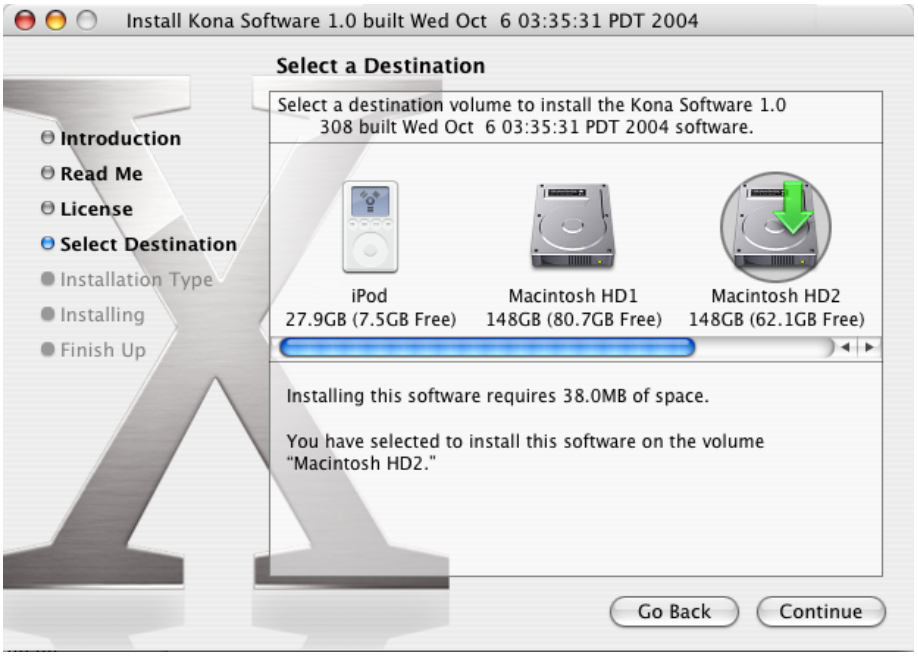
System Check Installer Screen

11. Read and agree to the Software License Agreement.



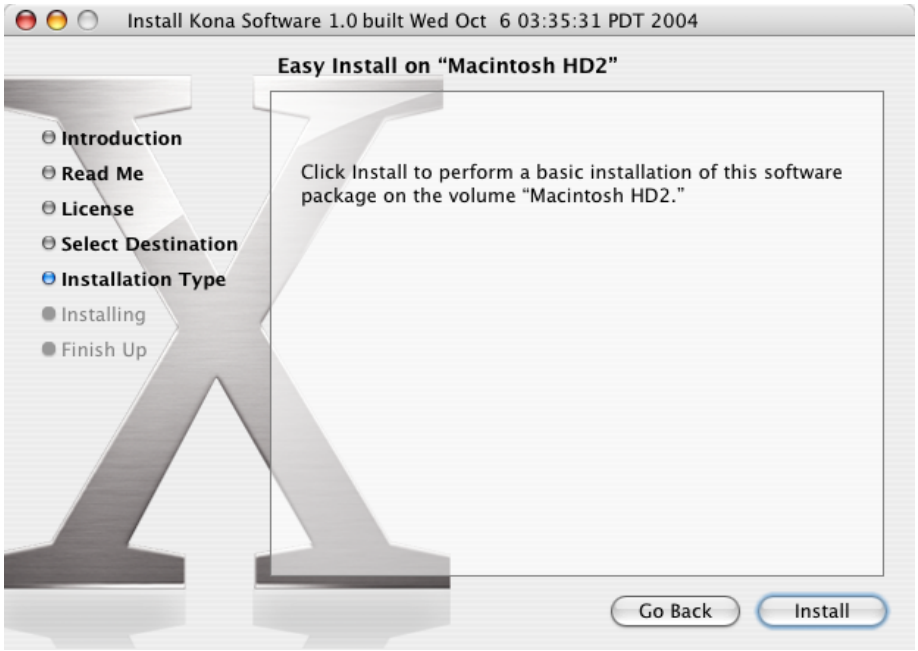
KONA 2 Software License Agreement Screen

12. The next screen shows all the available drives on the Power Mac. Click on the drive that contains your system files (Apple default is "Macintosh HD"). A green arrow will point to the drive you've selected. Click the *Continue* button to proceed with installation.



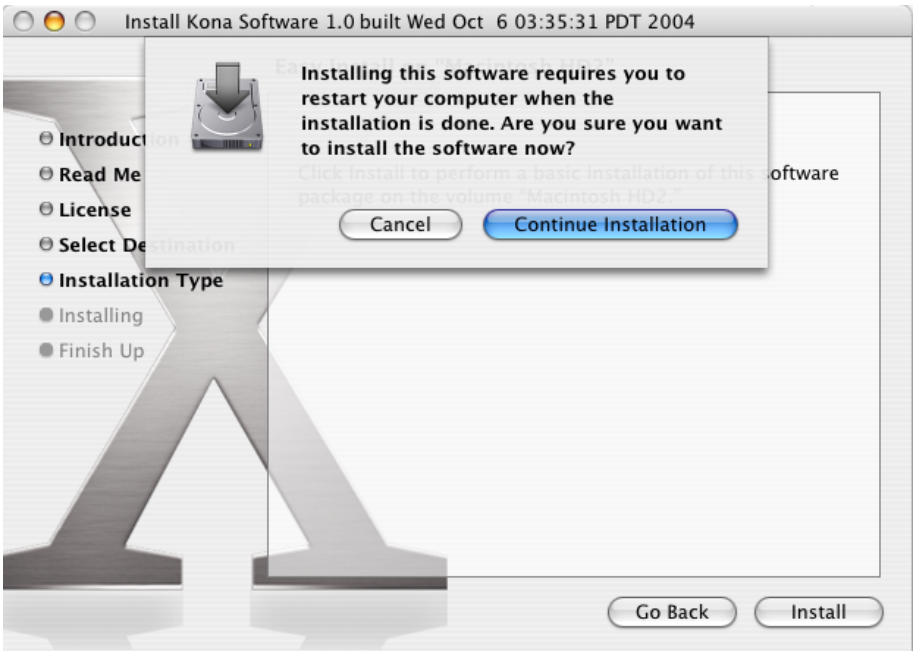
Select a Destination Drive For the KONA 2 Software

13. At the next screen, click the *Install* button to place the software on the drive you previously selected.



Easy Install, Installer Screen

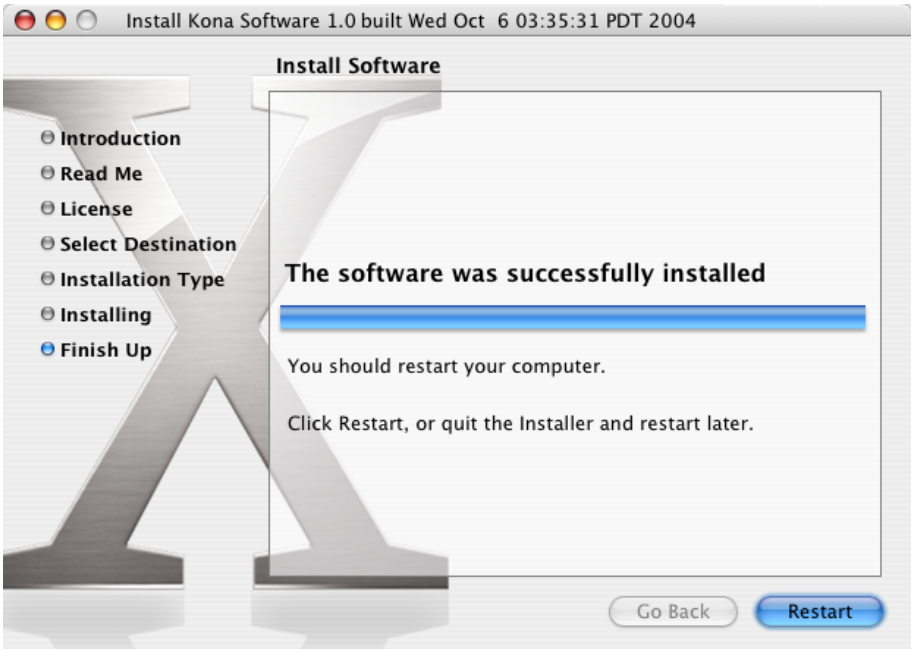
14. A system prompt will pop up with a reminder that OS X must be restarted after installation. Click the *Continue Installation* button to proceed.



Restart OS X Reminder Prompt

15. The installer will run and put all the necessary KONA 2 drivers, KONA 2 Control Panel, presets and software on the desired hard drive. When it has completed installation, a final screen will be displayed announcing that "software was successfully installed."

16. Click the Restart button to complete the installation procedure. The system will perform a software restart and be ready for use.



Final Installation Screen

Genlock and Your System

For video stability and proper system operation, it's always best to genlock all equipment to house sync. Although genlock is not absolutely required for KONA 2 or your system, better quality and repeatable operation will be experienced by doing so. Usually, this means using a black burst generator output looped through the system. On the KONA 2 cables and optional K-Box breakout box, house sync is connected to "Ref Loop".

Chapter 4:
Final Cut Pro and Other Software

Final Cut Pro

Final Cut Pro 4 (not included with KONA 2) ships with information already configured for most common system configurations. After you install the KONA 2 software on your Power Mac, all you need to do to begin using it is to become familiar with the KONA 2 Control Panel and how Final Cut Pro works with KONA 2.

With Final Cut Pro you'll choose the proper setups from the canned ones provided by AJA. These canned setups are called "Easy Setups" in Final Cut Pro and are available to use and edit under Audio/Video Settings in the "Final Cut Pro" menu (next to the apple menu).

You'll also need to gain familiarity with the KONA 2 Control Panel, which will be used for source selection, configuring many KONA 2 features, and for creating your own preset configurations for different applications.

The manual you are reading does not provide operational information about Final Cut Pro 4. Please read the Final Cut Pro user documentation provided with it for information on configuration and operation. The chapter you are reading addresses configuration and setup unique to use of KONA 2 with Final Cut Pro and other applications.

Using The KONA 2 Control Panel

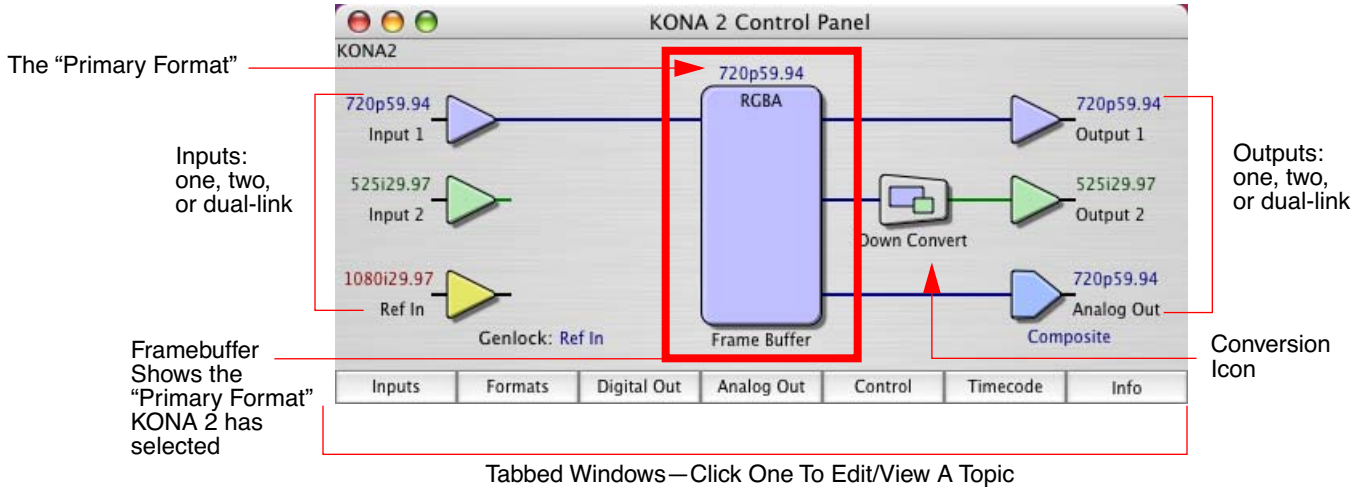
The KONA 2 control panel is a software application that provides a simple visual way to see how the KONA 2 card is currently configured and then make changes as desired. Settings—both what you changed and didn't—can be saved as a snapshot for recall at anytime. This lets you save settings associated with all your frequent tasks; then as you switch tasks you don't have to spend extra time constantly resetting card configurations—just load the previously saved settings for each task.

One thing you'll notice instantly about the control panel is that it represents a visual block diagram of how the card is set. The current status of the upconverters/downconverters, the input and output settings, and many other details can be viewed as a color-coded block diagram in the control panel.

Control Panel Basics

Although the KONA 2 card auto-configures depending on the inputs present, and the Control Panel intuitively shows at a glance much about what the card is doing, there is even more information presented that may not be obvious. To ensure you make the most of the software, run the KONA 2 application and look at its display. Then refer to the "Basics" described here to fully understand what you're seeing and learn how to view and change the KONA 2 system configuration. Before we go into too much detail, here are some basic definitions you should know (please refer to the figure that follows for reference):

Block Diagram Screen—The top area of the KONA 2 Control Panel shows a visual picture representing the processing (if any) that's currently occurring, including inputs/outputs, any up/down conversion, reference source, and system status. Lines between inputs, the framebuffer, and outputs, show a video path. Where there are no lines, it shows there is no connection; this can be either because an input or output isn't selected or because no video is present at the selected input. The lines will also show whether the input or outputs are single inputs/outputs or dual-link (where two channels are used to carry the bandwidth of HD-SDI 4:4:4 video.



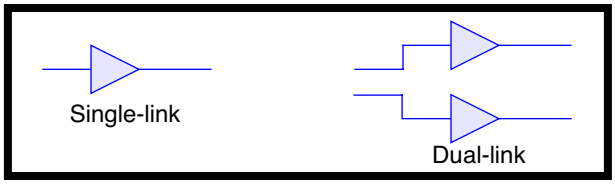
KONA 2 Control Panel, Block Diagram

Framebuffer—The framebuffer is the "engine" in the KONA 2 card where active video operations take place using Final Cut Pro, other 3rd-party applications, or even KONA 2 itself. The framebuffer has a format (called the "Primary Format" and color space that it follows, as defined in the Tabbed Windows or via external application software (such as the "Easy Setups" in Final Cut). It is important to realize that inside the Macintosh many applications can use the KONA 2 card (as you switch from window to window) and it may not always be obvious which is currently controlling it. The KONA 2 Control Panel displays the name of the application controlling the card. In some cases, applications may not always properly "let go" of the card as another takes over—you'll be able to tell by looking at the Control Panel.

Primary Format—The video format currently assigned to KONA 2. This is the format that the framebuffer will use and is shown in the Control Panel using the color blue. All icons in blue are the same as the Primary Format used by the framebuffer. Also any text descriptions in the block diagram that appear in blue also indicate that something is in the primary format. So, for example, if you see that the input and output icons are blue, then you know that the same format is used throughout the video path and that no format conversion is being performed. If a different color is displayed on the input or output, say green for example, then you know that KONA 2 is performing a format conversion in the video path.

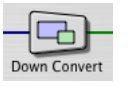
Secondary Format—Any format other than the currently selected Primary Format, is a secondary format. As described previously, this means that either the Inputs or Outputs are somehow different from the framebuffer's assigned format (i.e., the "Primary Format"). This can be seen at a glance because the color will be different than blue.

Input/Output Icons—The input and output icons are triangles that together with their color show all the input and outputs and their status (selected, not selected, input present or not, format, etc.). A complete video path is shown when inputs and outputs are connected with lines going to/from the framebuffer.



Input/Output Icons

Conversion Icons—When an input or output is a different standard (SDI, or HD-SDI) than the framebuffer's then the KONA 2 may up-convert or down-convert the signal to the proper standard. This may be automatic, because it's detected an input signal that differs from the standard currently selected, or because you've explicitly told it to convert. In either case, the block diagram will show the conversion by displaying a conversion icon in between the input/output and the framebuffer.



Down and Up Conversion Icons

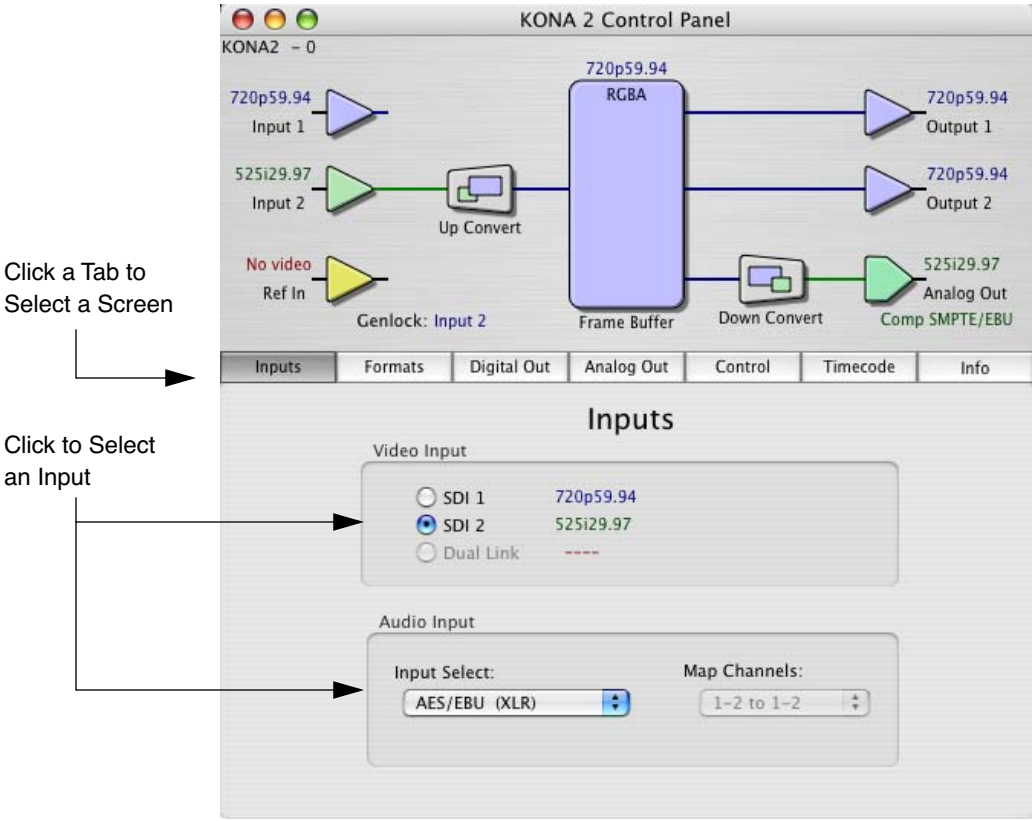
Color Meanings—All items in the KONA 2 Control Panel block diagram are color-coded to show what is happening in realtime. This applies to both icons and text. These colors have the following corresponding meanings:

Blue: video is same format as the Primary Format (framebuffer)
Red: the selected operation cannot be performed
Yellow: reference video (black burst or other reference source)
Green: indicates that KONA 2 is performing some kind of active change to the video, to make it different from the Primary Format (e.g., up/down convert, format change, etc.).

Tabbed Windows—The bottom area of the KONA 2 Control Panel provides different information categorized by topic. Clicking on a "Tab"—or a block diagram element—will result in an information screen corresponding to a tabbed topic. Each of these tabbed windows are described on the following pages. Tabs that can be selected are:

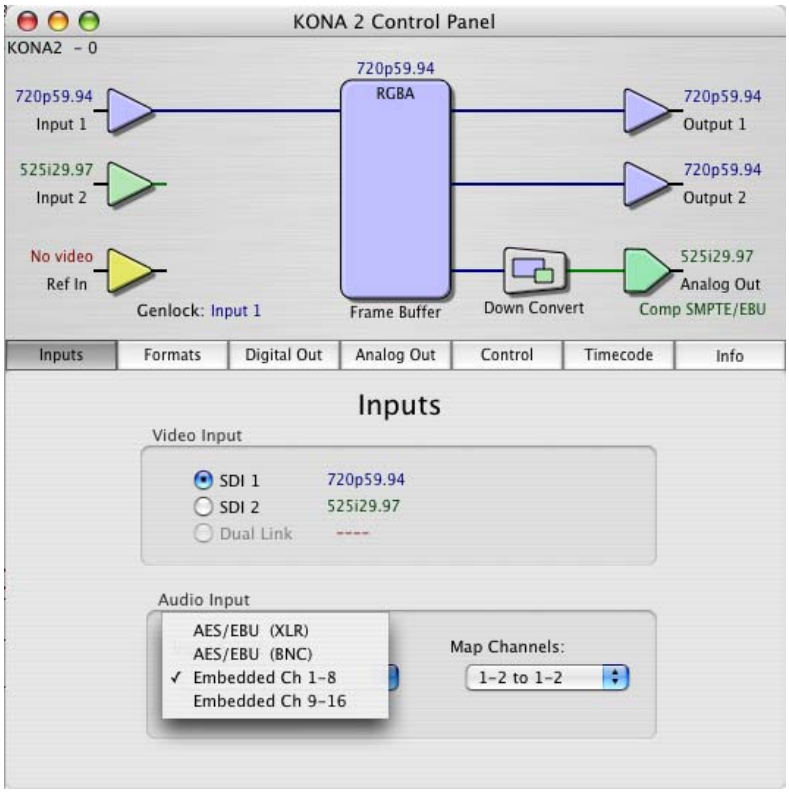
Inputs: view and edit input selections and how they are mapped
Formats: select the framebuffer primary video format and any secondary formats and up/down conversion for inputs/outputs
Digital Out: assign outputs
Analog Out: configure the component/composite analog output
Control: configures KONA 2 operation (pass through, desktop, etc.) plus sets output timing.
Timecode: monitor and configure timecode
Info: displays status information about the KONA 2 card and how it is installed in the host Macintosh. This information generally intended for troubleshooting/support.

Input Screen



KONA 2 Control Panel, Inputs Tab

On the Inputs screen you can view the currently selected video and audio input sources and map audio sources to the channels supported by Final Cut Pro (more on this later). Two information panes in the screen are provided: Video Input and Audio Input.



KONA 2 Control Panel, Inputs Tab, Dual-link Input Selected

Input Screen Settings

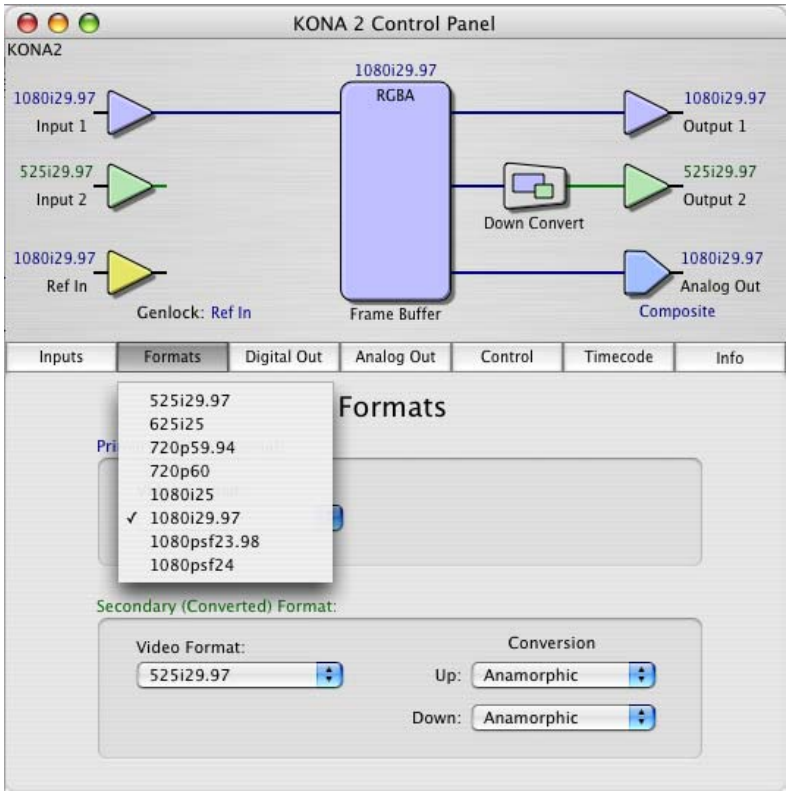
Video Input—These radio buttons allow you to see and change what's currently selected and the video format that KONA 2 has detected there (if any). In the example shown previously, it shows that video is selected at the SDI 2 input and the format is 525i with a frame rate of 29.97. Since this text is shown in green, you can tell that it doesn't match the framebuffer's primary format you've set in the "Formats" screen. In this example, it's being upconverted. If you wish to select a different input you can do so by clicking a different radio button.

Audio Input—This pulldown menu allows you to pick where the audio comes from. KONA 2 supports up to 8 channels of embedded audio, so you can choose out of the 16 channels that can be embedded in SDI, and pick which 8 to bring in (1-8 or 9-16). Since Final Cut Pro currently only supports two channels of audio, here you can also select which two channels from the 8 embedded will be mapped to Final Cut's two channels.

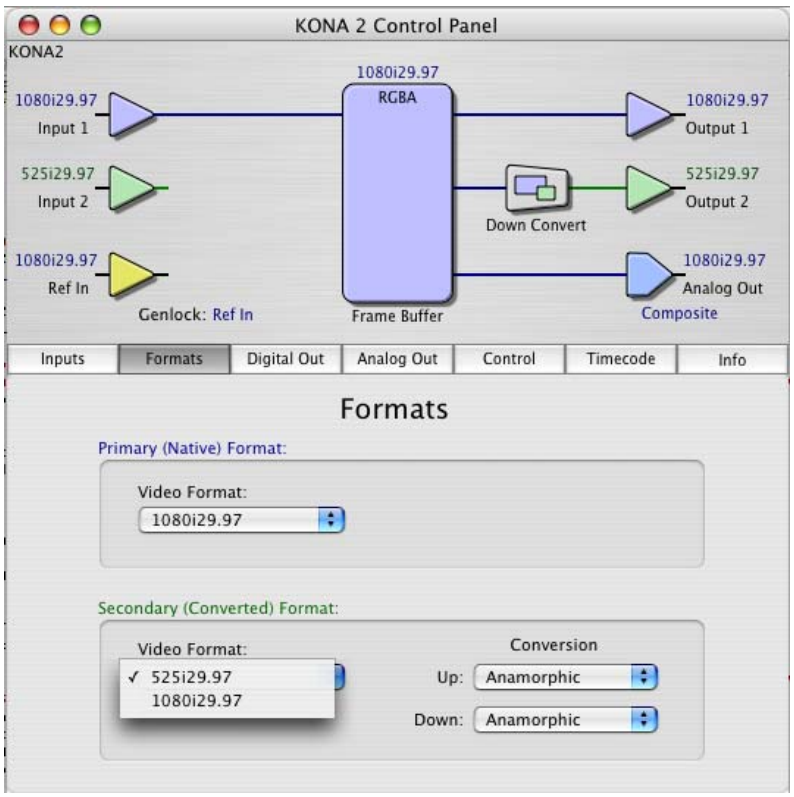
When a KONA 2 has a K-Box attached, there are two ways to connect AES/EBU inputs: XLR or BNC connectors. The Audio Input pulldown allows you to select which of the two connector groups will be used.

Formats Screen

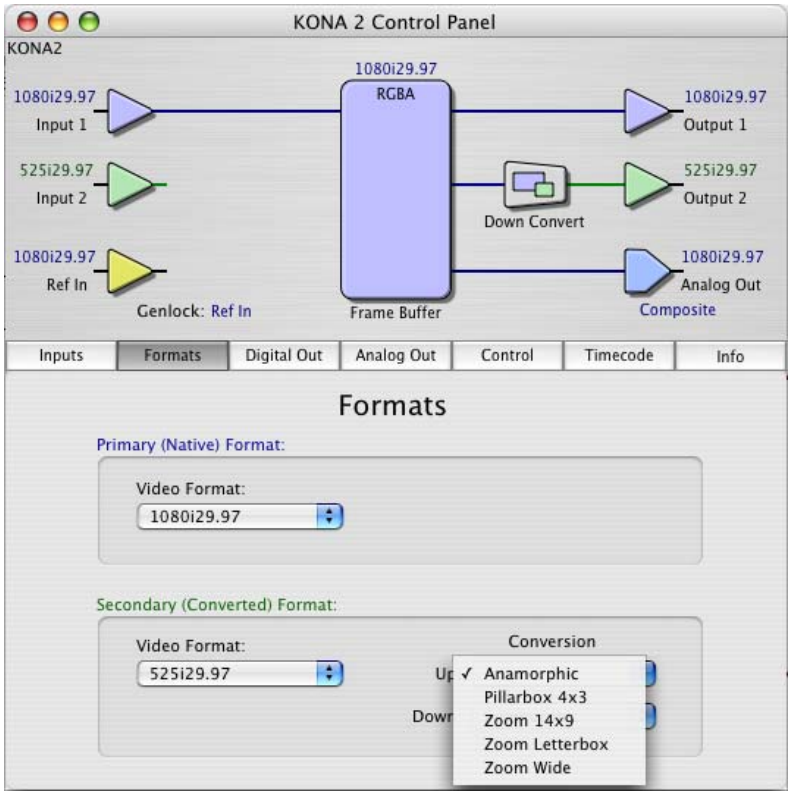
The Formats screen shows the video format currently in use by the KONA 2 framebuffer (called the *Primary Format*) and allows you to change it. All throughout the Control Panel, choices are always presented based on what KONA 2 can do with the signals available and the inputs/outputs selected. For example, on the Formats screen, if the output or inputs are a different format than the primary, then you'll see an additional information pane that allows you to view and edit the secondary format—including control over whether up/down conversion is employed.



KONA 2 Control Panel, Formats Tab, Showing Primary Formats Pulldown Menu



KONA 2 Control Panel, Formats Tab, Showing Secondary Formats Pulldown Menu



KONA 2 Control Panel, Formats Tab Showing Conversion Pulldown Menu

Format Screen Settings

Video Format—This pull-down menu shows the currently selected format. This pull-down appears in both the Primary Format area of the Formats screen as well as the Secondary Format area (if present). If you select an alternate value in the Primary Format using the pull-down, it will change the format used by KONA 2's framebuffer. Video Format can only be changed when the Control Tab menu has the setting "Input Pass through". When a change is made via the Video Format pull-down, the block diagram will change to reflect the new format. In the case of Secondary Format, the formats available can vary based on what the Primary Format is and the input signal (frame rates of input sources limits the to/from conversion choices). KONA 2 Formats include:

525i 29.97
625i 25
720p 59.94
720p 60
1080i 25
1080i 29.97
1080psf 23.98
1080psf 24

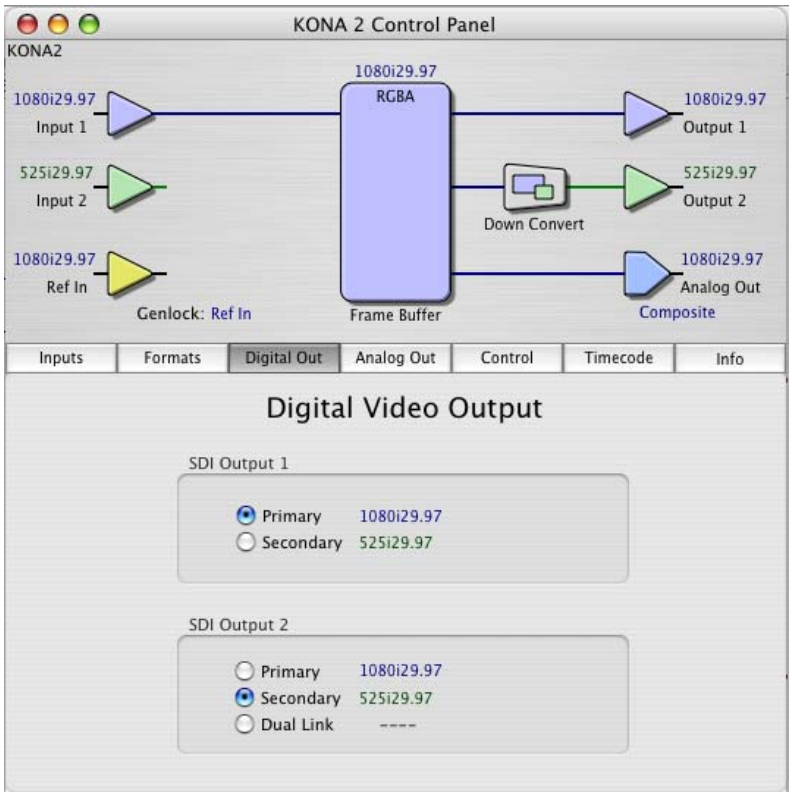
Up (Conversion)—The Up and Down pull-down menus are available when conversion has been selected for the video path to/from the framebuffer. Different choices will be available depending on the type of conversion and formats being converted. Choices that may be available:

Anamorphic: full-screen
Pillar box 4:3: results in a 4:3 image in center of screen with black sidebars
Zoom 14:9: results in a 4:3 image zoomed slightly to fill a 14:9 image with black sidebars
Zoom Letterbox: results in image zoomed to fill full screen
Zoom Wide: results in a combination of zoom and horizontal stretch to fill a 16:9 screen; this setting can introduce a small aspect ratio change

Down (Conversion)—Choices that may be available:
Anamorphic: full-screen
Letterbox: image is reduced with black top and bottom added to image area with the aspect ratio preserved
Crop: image is cropped to fit new screen size

Digital Out Screen

The Digital Out screen shows the current settings for both the SDI outputs. If an input/output has no video, it will be indicated on the block diagram ("No Video").



KONA 2 Control Panel, Digital Out Tab

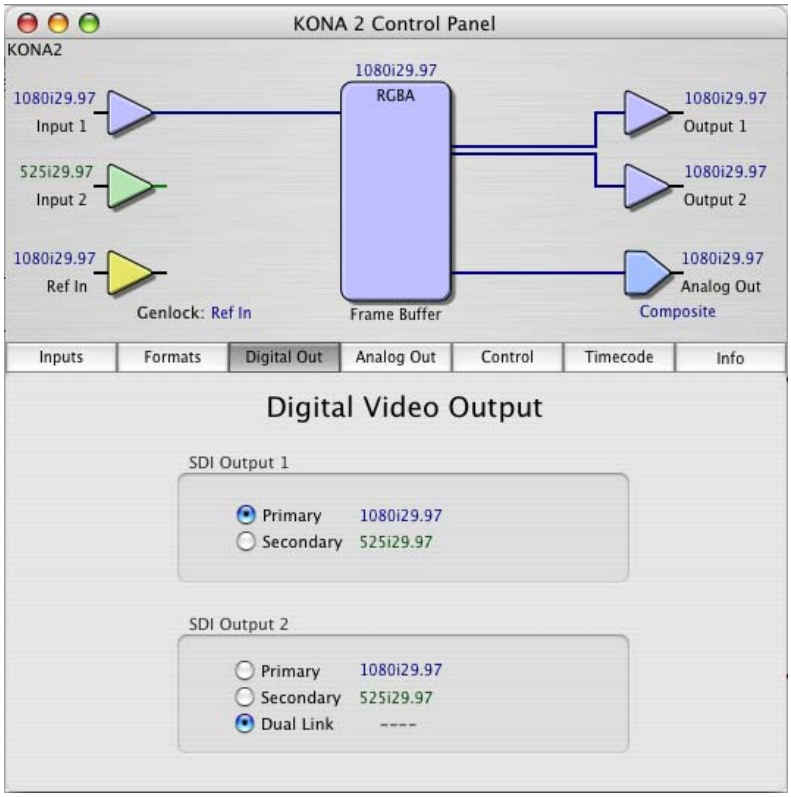
Digital Out Screen Settings

Separate information panes will be listed (as applicable) for SDI Outputs 1 and 2. Information that can appear includes the following items. You can view the current setting or click on another to change to it:

Primary—when selected, this indicates that the SDI output is set to the same format as the framebuffer. That value will be listed in blue.

Secondary—when selected, this indicates that the SDI output is set to a format different from the framebuffer (Primary Format). That secondary format value will be listed in green. This shows that active processing of the video is taking place (format change and possibly even up/down-conversion).

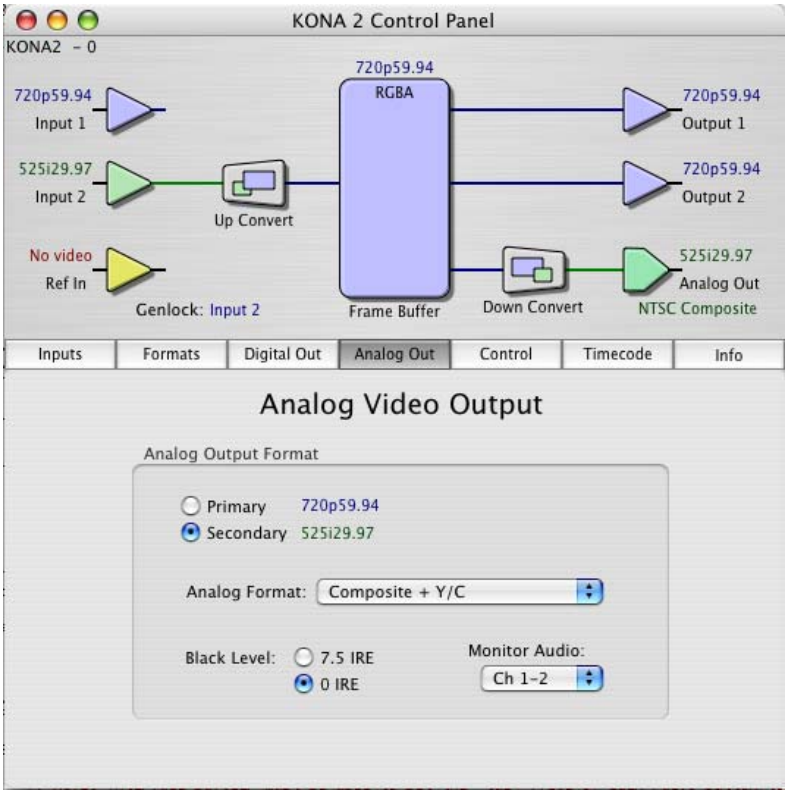
Dual Link—when selected, this indicates that both SDI outputs are being used together to output a 4:4:4 dual-link signal from the KONA 2 card.



KONA 2 Control Panel, Digital Out Tab, Dual-link Output

Analog Out Screen

KONA 2 provides a high-quality analog component or composite output, generally used for monitoring. This screen shows the current settings for that analog output, and allows you to re-configure it when desired (format and black-level).



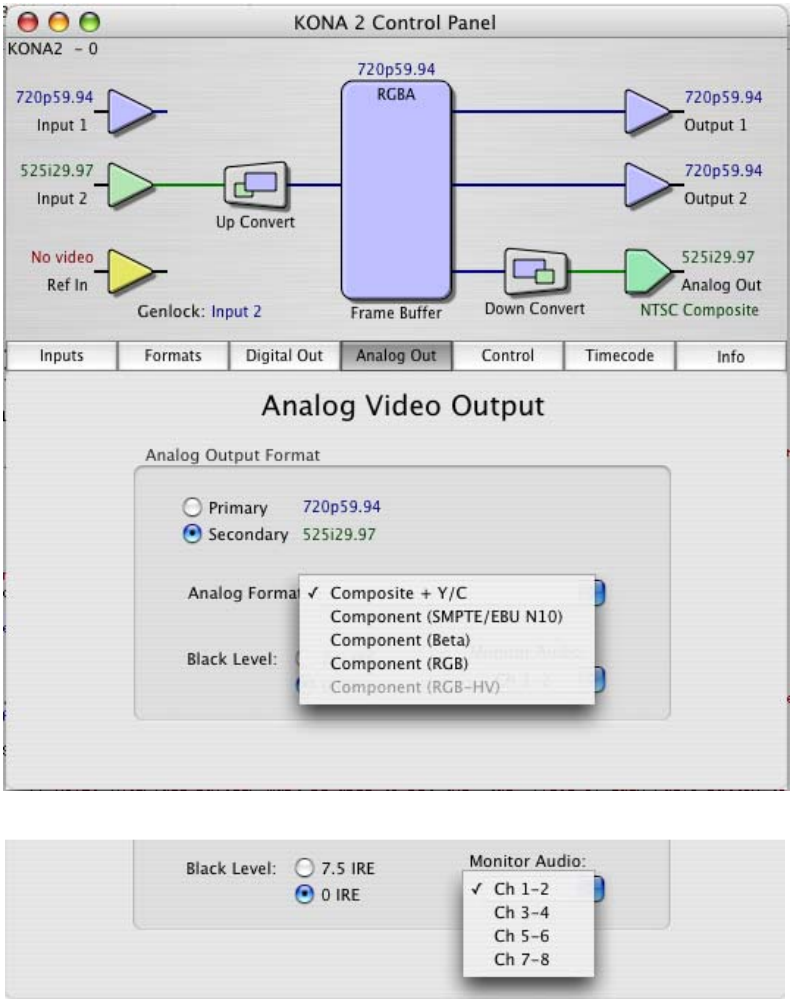
KONA 2 Control Panel, Analog Out Tab

Analog Out Screen Settings

Analog Format—choices in the Analog Format pulldown menu vary depending upon the Analog Output video standard. For example, the "Composite + Y/C" selection is only available when an SD (525i29.97 or 625i25) format is in use. Analog formats can include:
Composite +Y/C
Component (SMPTE/EBU N10)
Component (Beta)
Component (RGB)
Component (RGB -HV)

Black Level—choices in the black Level pulldown menu are only available for the two Composite and Component (Beta) analog formats . Choices presented are for US or Japan settings:
7.5 IRE (NTSC US)
0 IRE (NTSC Japan)

Monitor Audio—when a K-Box is connected to KONA 2, this pulldown menu determines which pair of the 8 output channels will appear at the Analog Audio Output RCA connector pair.

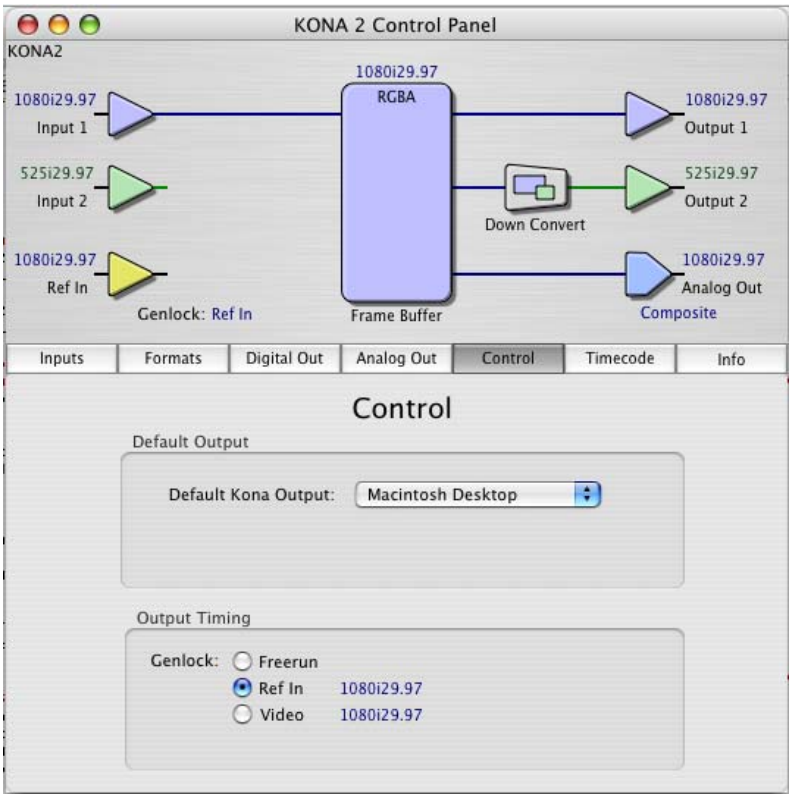


KONA 2 Control Panel, Analog Out Tab, Selecting Analog Format and Monitor Audio

Control Screen

The KONA 2 can controlled by various software applications running on a host PowerMac as well as be used as Macintosh Desktop extension. The Control Screen is where you select how the KONA 2 will direct video and be used by application software. This screen also provides control for configuring output timing with regard to external reference video and horizontal/vertical delay.

At the top of the Control screen it will show the current Default KONA 2 output and the application currently controlling the KONA 2 card (if there is one). For example, in the screen shown here, the default output is the Macintosh Desktop and the only controlling application is the KONA 2 Control Panel itself.



KONA 2 Control Panel, Control Tab

Control Screen Settings

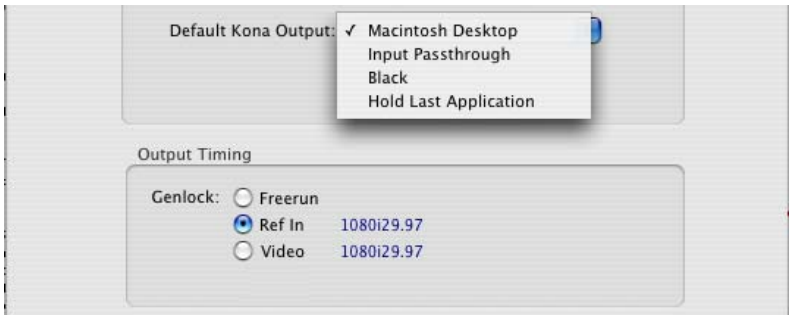
Default Kona Output—Here you select what KONA 2 will output video as a default *when no application has control of the board*,such as when the Finder is active. Since KONA 2 can be controlled by software applications as well as its own control panel, the output can change dynamically. When you select many video applications, they will grab control of the KONA 2 card inputs/outputs. These settings determine what happens when an application that doesn't grab the KONA 2 inputs/outputs is active. Choices available and their meaning are:

Macintosh Desktop: when selected, this selection causes the KONA 2 program video output (digital and analog) to be an extension of the Macintosh desktop. MacOS windows and applications can appear (when applicable) on the KONA outputs.

Input Pass through: this selection directs KONA 2 to route video from its selected input through the card for processing and output. When this selection is in effect, all Primary/Secondary Format selections are available for selection in controlling the output. This is similar to using the KONA 2 as a VTR (as far as video/audio pass through).

Black: this selection directs KONA 2 to output video black whenever an application isn't controlling the card.

Hold Last Application: this selection directs KONA 2 to hold and output the last frame of video from the last application to control KONA 2. This can be helpful when operating in an environment where you're switching back and forth between multiple application windows.



KONA 2 Control Panel, Control Tab, Default Kona Output Pulldown Menu

Genlock (*Freerun*, *Ref In*, *Input 1*, or *Input 2*)—Selects how KONA 2 will synchronize program video:

Freerun: in this mode, KONA 2 generates sync without an external reference source

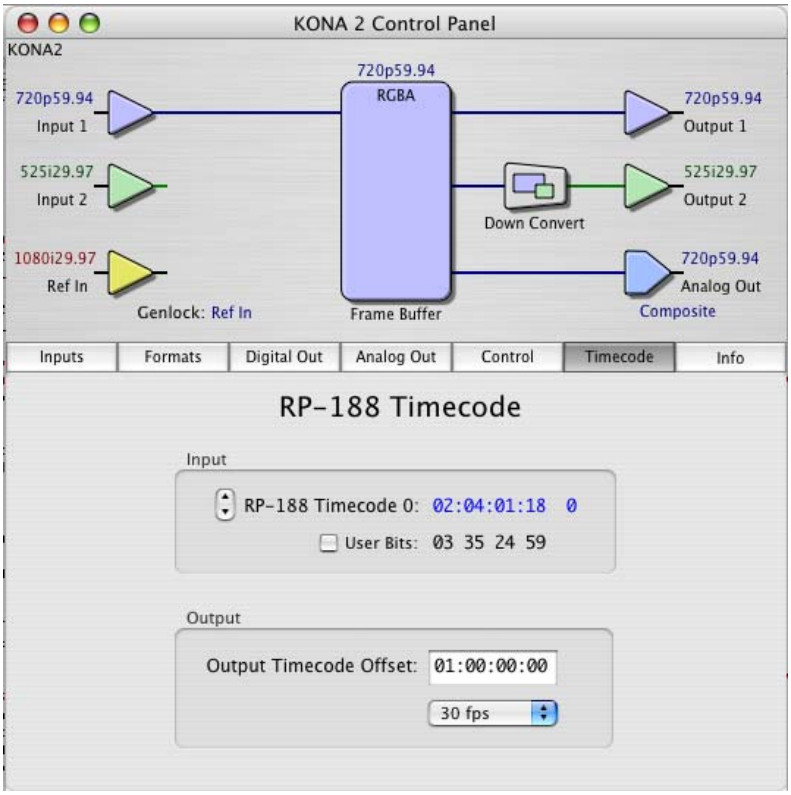
Ref In: directs KONA 2 to use the Ref Video source for sync (usually an analog black burst video signal)

Video: directs KONA 2 to use whichever video input source has been selected in the *Inputs* tab window for sync

Timing (*Horiz* and *Vert*)—these two put-downs allow output timing adjustment with reference to the Ref Video source selected. The Horizontal reference can be adjusted by selecting a number of pixels (clocks) to offset. Vertical can be adjusted by specifying a number lines to offset.

Timecode Screen

The timecode is used for both monitoring the RP-188 timecode embedded in the digital data stream and for selecting a timecode offset (if required) for the attached VTR (connected to KONA 2's RS-422 port) and sent during assemble-edit mode.

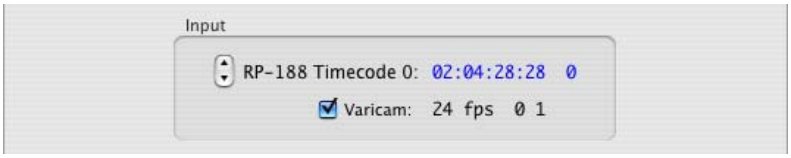


KONA 2 Control Panel, Timecode Tab

Timecode Screen Settings

RP-188 Timecode <n>—in RP-188 timecode there can be multiple timecode values in the data stream. Use this pull-down to select the one you wish to monitor. The selection will be displayed in the timecode value displayed to the right of the pull-down.

User Bits—For monitoring Varicam timecode, you may wish to monitor the user bits embedded in the timecode. If you set this checkbox, KONA 2 will detect and interpret the Varicam user bits and display them next to the checkbox.



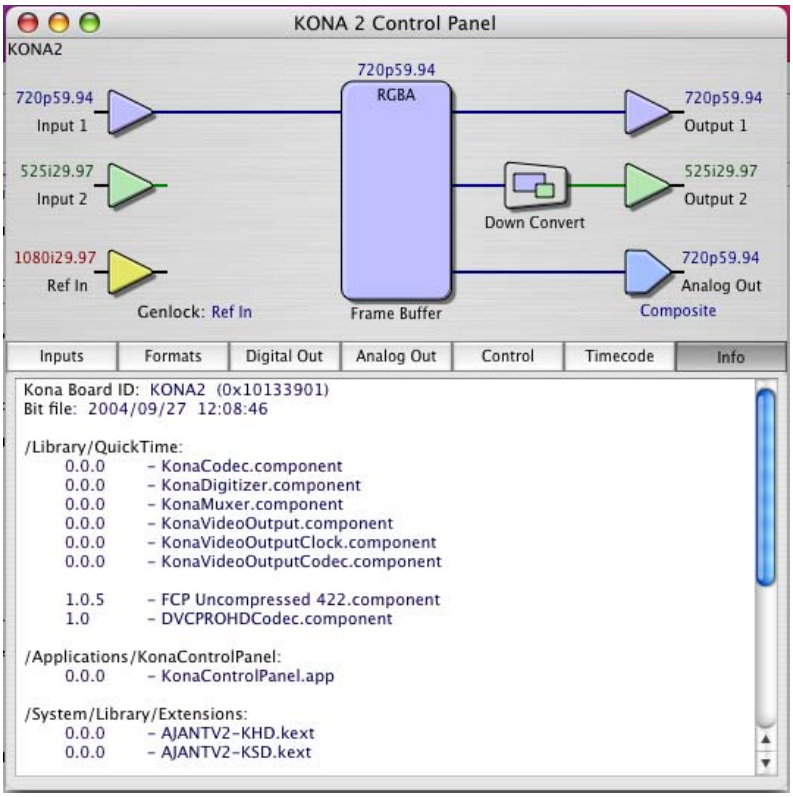
KONA 2 Control Panel, Timecode Tab, User Bits Checked

Output Timecode Offset (entry field and FPS pull-down)—this text entry field allows you to specify a timecode offset for use with Final Cut Pro (or any other application that has timecode offsets that are user-controlled). In FCP, go to "Timeline Options" and locate the "Starting Timecode" value. Use that same value here as the "Output Timecode Offset" to ensure the timecode is synchronized.

Note: SMPTE RP 188 defines a standard for the transmission of time code and control code in the ancillary data space of a digital television data stream. Time code information is transmitted in the ancillary data space as defined in ANSI/SMPTE 291M. Multiple codes can be transmitted within a single digital video data stream. Other time information, such as real time clock, DTTR tape timer information, and other user-defined information, may also be carried in the ancillary time code packet instead of time code. The actual information transmitted through the interface is identified by the coding of a distributed binary bit. Equipment manufacturers can use the meta data for different purposes.

Info Screen

This Tabbed screen shows the KONA 2 software files that have been installed on your system. This information may be needed if you talk to an AJA Customer Service representative to determine if files are missing or need updating.



KONA 2 Control Panel, Info Tab

Saving Your Control Panel Presets

After configuring the KONA 2 Control Panel via the Tabbed screens, you can then save all your settings as a snapshot for later recall—called a preset. In this way, you can organize the presets for all your typical tasks, saving time by not having to manually reconfigure each time. To save a preset, simply go to “File -> Save Preset...”. Be sure to give the preset a meaningful name. Thereafter the preset will be available under the Control Panel “Presets” menu.

Easy Setups for Typical Uses

Final Cut and KONA 2 together make working with multiple formats an easy proposition. Inside of Final Cut, equipment and setting presets are available in groups called Easy Setups, from which you can choose typical system configurations. A large set of Easy Setups are supplied with KONA 2 and installed along with the KONA 2 software. These canned choices can be used directly or as the basis for making your own customized Easy Setups unique to your system. By duplicating an Easy Setup and then making changes to it, you simplify the process of configuring and re-configuring when working with new formats.

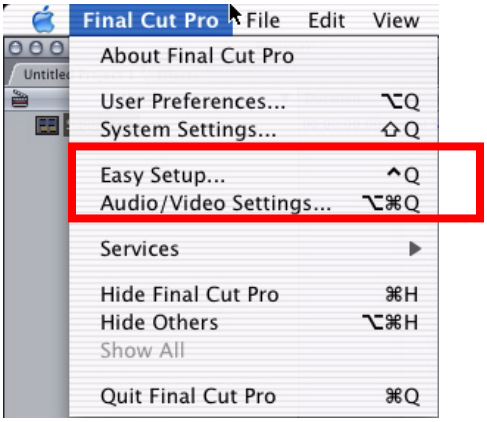
Although this manual assumes you're familiar with Final Cut Pro and have read its documentation, let's review Easy Setups and how to use them effectively with KONA 2.

At the simplest level, Final Cut lets you choose and edit presets for capturing media, device control, and for project sequences. These presets are defined in the *Audio/Video Settings* menu. Just like Easy Setups, here also there are factory defined choices, plus you can create and make your own. When you have a set of presets you want to use again, you can store them as an "Easy Setup."

On the following pages we'll further review the *Easy Setups* menu and *Audio/Video Settings* Menu.

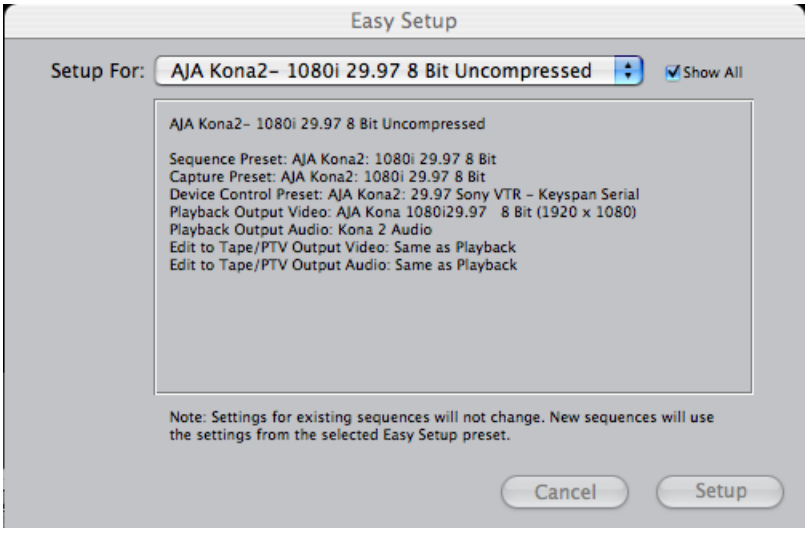
Easy Setups Menu

Both the Easy Setups menu item and the Audio/Video Settings menu item are located under the main *Final Cut Pro* menu.



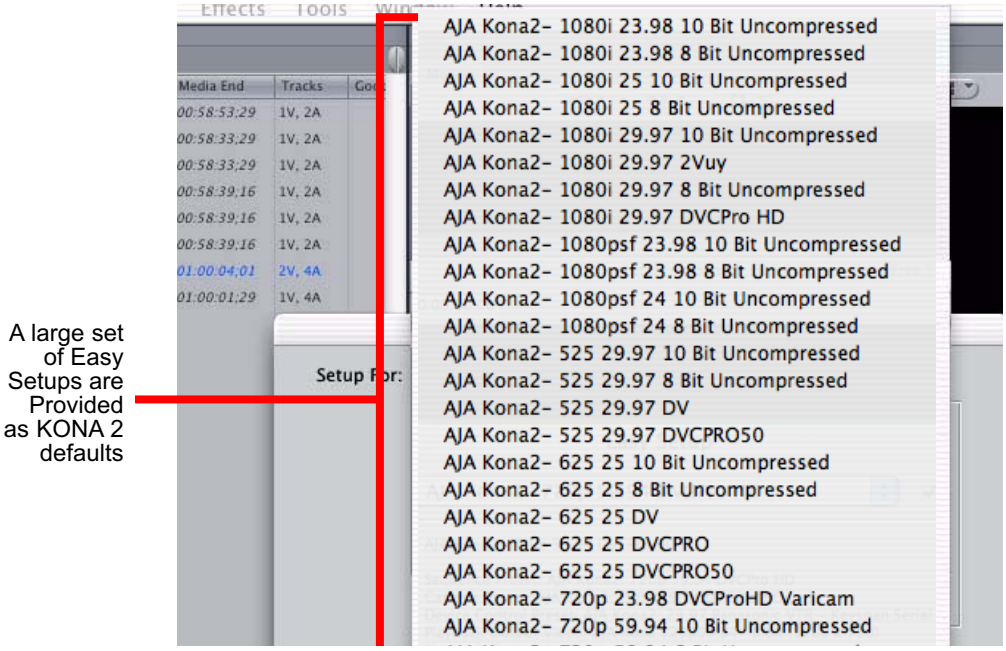
Easy Setup and Audio/Video Menu Items

Click on the Easy Setups menu item and Final Cut Pro will present the Easy Setup dialog window:



Easy Setup dialog

At the top of the Easy Setup dialog is the currently selected Easy Setup. It can be changed by clicking on the pulldown arrow at the right. Doing so results in a long list of the factory Easy Setups stored on the system. If you wish to see all of the Easy Setups, factory and user-defined, then ensure the "Show All" checkbox is marked at the right side of the dialog. By default, all AJA Easy Setups will be checked.



Factory Easy Setups

To choose a new Easy Setup from the list, click on the pulldown menu and select a desired choice. The choice won't take effect until you click the *Setup* button, but you will be able to see the description for the choice just by selecting it (without clicking the *Setup* button). Descriptions provide a paragraph summarizing what the Easy

Setup is intended for and then each of the presets are explained (Sequence, Capture, Device, Playback Output, and Edit to Tape Video/Audio Outputs).

Easy Setups For Use With KONA 2

The factory default Easy Setups currently shipped with KONA 2 are shown below. Your list may differ as AJA is continually improving and adding functionality.
AJA KONA 2 Easy Setups

Easy Setup (as listed in FCP Pulldown)	Description/Usage
AJA KONA 2- 525 29.97 8 bit uncompressed	Use this preset when working with 525 at a 29.97 framerate. Material will be processed as Uncompressed 8-bit.
AJA KONA 2- 525 29.97 10 bit uncompressed	Use this preset when working with 525 at a 29.97 framerate. Material will be processed as Uncompressed 10-bit.
AJA KONA 2- 525 29.97 DV	Use this preset when working with 525 at a 29.97 framerate. Material will be processed as DV.
AJA KONA 2- 525 29.97 DVCPRO50	Use this preset when working with 525 at a 29.97 framerate. Material will be processed as DVCPRO50..
AJA KONA 2- 625 25 8 bit uncompressed	Use this preset when working with 625 at a 25 framerate. Material will be processed as Uncompressed 8-bit.
AJA KONA 2- 625 25 10 bit uncompressed	Use this preset when working with 625 at a 25 framerate. Material will be processed as Uncompressed 10-bit.
AJA KONA 2- 625 25 DV	Use this preset when working with 625 at a 25 framerate. Material will be processed as DV.
AJA KONA 2- 625 25 DVCPRO	Use this preset when working with 625 at a 25 framerate. Material will be processed as DVCPRO.
AJA KONA 2- 625 25 DVCPRO50	Use this preset when working with 625 at a 29.97 framerate. Material will be processed as DVCPRO50.
AJA KONA 2- 720p 23.98 DVCPRO HD Varicam	Use this preset when working with high-definition Varicam 720p at a 23.98 framerate. Material will be processed as DVCPRO HD Varicam.
AJA KONA 2- 720p 24 DVCPRO HD Varicam	Use this preset when working with high-definition Varicam 720p at a 24 framerate. Material will be processed as DVCPRO HD Varicam.
AJA KONA 2- 720p 59.94 8 bit uncompressed	Use this preset when working with high-definition 720p at a 59.94 framerate. Material will be processed as 8 bit uncompressed.
AJA KONA 2- 720p 59.94 10 bit uncompressed	Use this preset when working with high-definition 720p at a 59.94 framerate. Material will be processed as 10 bit uncompressed.
AJA KONA 2- 720p 59.94 DVCPRO HD	Use this preset when working with high-definition 720p at a 24 framerate. Material will be processed as DVCPRO HD..
AJA KONA 2- 1080i 25 8 bit uncompressed	Use this preset when working with high-definition 1080i at a 25 framerate. Material will be processed as 8 bit uncompressed.
AJA KONA 2- 1080i 25 10 bit uncompressed	Use this preset when working with high-definition 1080i at a 25 framerate. Material will be processed as 10 bit uncompressed.
AJA KONA 2- 1080i 25 DVCPRO HD	Use this preset when working with high-definition 1080i at a 25 framerate. Material will be processed as DVCPRO HD.
AJA KONA 2- 1080i 29.97 8 bit uncompressed	Use this preset when working with high-definition 1080i at a 29.97 framerate. Material will be processed as 8 bit uncompressed.
AJA KONA 2- 1080i 29.97 10 bit uncompressed	Use this preset when working with high-definition 1080i at a 29.97 framerate. Material will be processed as 10 bit uncompressed.
AJA KONA 2- 1080i 29.97 DVCPRO HD	Use this preset when working with high-definition 1080i at a 29.97 framerate. Material will be processed as DVCPRO HD.
AJA KONA 2- 1080psf 23.98 8 bit uncompressed	Use this preset when working with high-definition 1080psf at a 23.98 framerate. Material will be processed as 8 bit uncompressed.
AJA KONA 2- 1080psf 23.98 10 bit uncompressed	Use this preset when working with high-definition 1080psf at a 23.98 framerate. Material will be processed as 10 bit uncompressed.
AJA KONA 2- 1080psf 23.98 DVCPRO HD	Use this preset when working with high-definition 1080psf at a 23.98 framerate. Material will be processed as DVCPRO HD.
AJA KONA 2- 1080psf 24 8 bit uncompressed	Use this preset when working with high-definition 1080psf at a 24 framerate. Material will be processed as 8 bit uncompressed.
AJA KONA 2- 1080psf 24 10 bit uncompressed	Use this preset when working with high-definition 1080psf at a 24 framerate. Material will be processed as 10 bit uncompressed.
AJA KONA 2- 1080psf 24 DVCPRO HD	Use this preset when working with high-definition 1080psf at a 24 framerate. Material will be processed as DVCPRO HD.

Audio/Video Settings Menu

The Audio/Video Settings menu in Final Cut Pro contains a series of tabbed windows where you define the presets in specific categories such as A/V devices or in what format media is captured. When you open the Audio/Video Settings window, it shows a summary of the currently selected Easy Setup. Other tabbed windows are available with greater details about each category. On the initial summary window you can see the selected presets for the Easy Setup as well as change specific presets.

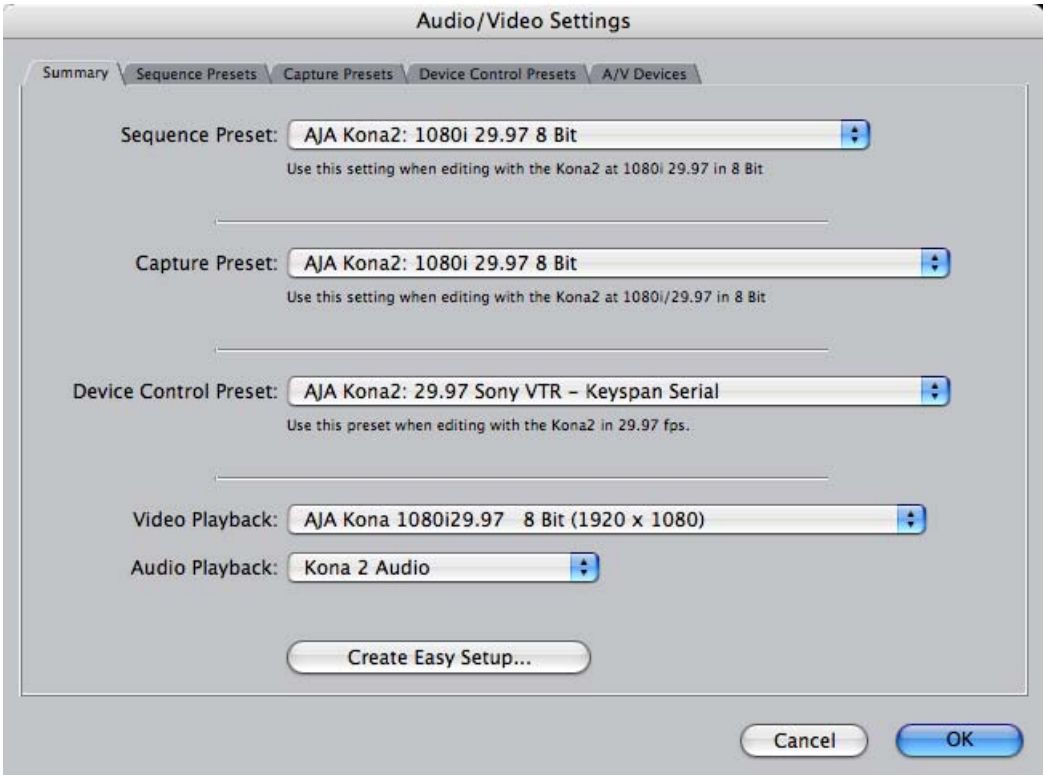
The presets you can change on the Summary window are:

Sequence Preset—select one of these as the editing timebase for new sequences. If you make a change to Sequence Presets, the change will only take effect on any new sequences you create—currently active sequences will not see the change.

Capture Preset—select one of these to set the incoming source format you'll be capturing. Ideally select the maximum quality format you'll be using for most of the material so there will be no need to re-render later as clips are added from the bin to the sequence.

Device Control Preset—select the AJA Video KONA 2 device (NTSC or PAL as desired). This tells Final Cut that the KONA 2 will control the VTR attached to KONA 2.

A/V Devices (Audio and Video Playback)—select the KONA 2 as video and audio playback devices for Final Cut and the format to be output.

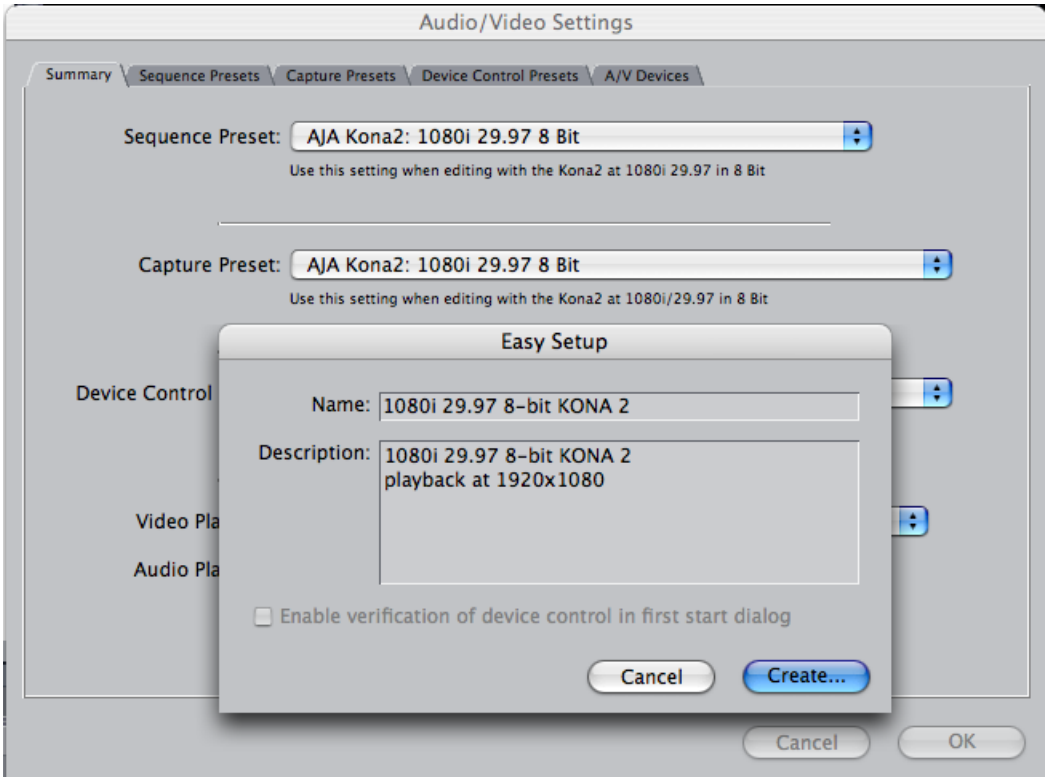


Audio/Video Settings, Summary Window

To Create A New Easy Setup

If you have a group of presets that you'd like to use continually, then you can create a new Easy Setup by modifying the settings of Easy Setup currently selected (pick one most like the one you want to create) and then saving it under a new name:

1. Change the currently selected Easy Setup by making changes at the Summary tabbed window via the pulldown menus.
2. When everything is set as desired, click on the *Create Easy Setup* button at the bottom of the Summary window.
3. A new dialog will pop up. Enter a descriptive name for the new Easy Setup (i.e., 10-bit SDI from Video Server) in the *Name* field.
4. Enter a sentence or two describing what is unique about the Easy Setup in the *Description* field.
5. Click the *Create* button to store the new Easy Setup.

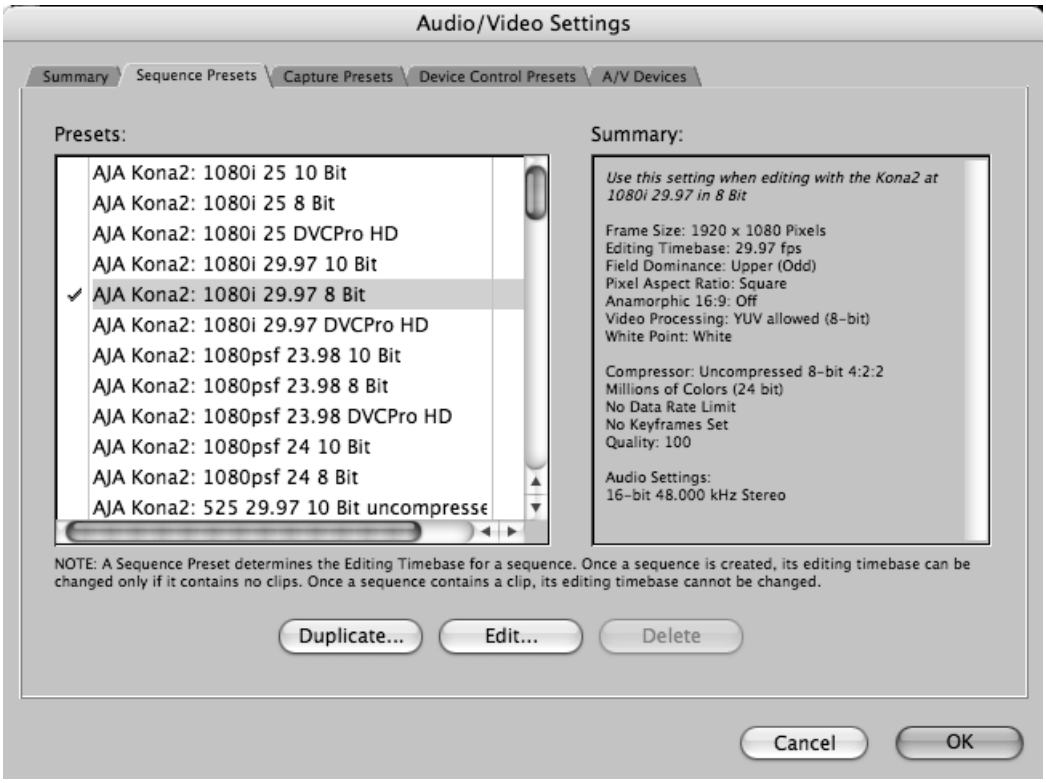


Audio/Video Settings, Creating a New Easy Setup

At any point in the above procedure you can go to the other tabbed windows and make additional changes. For example, in the Sequence Presets, Capture Presets, and Device Control Presets windows you can select a preset and click on an *Edit* button to change specific aspects of the preset. As an example, under *Device Control Preset* you might wish to change the Time Source on your VTR from LTC to VITC, or change the pre-roll and post-roll values. When you save a Setup, it defaults to saving in the Final Cut Pro *Custom Setups* folder.

Each of the tabbed preset screens are described on the following pages for your convenience. For more information, please read the Final Cut Pro user documentation.

The Sequence Presets Window



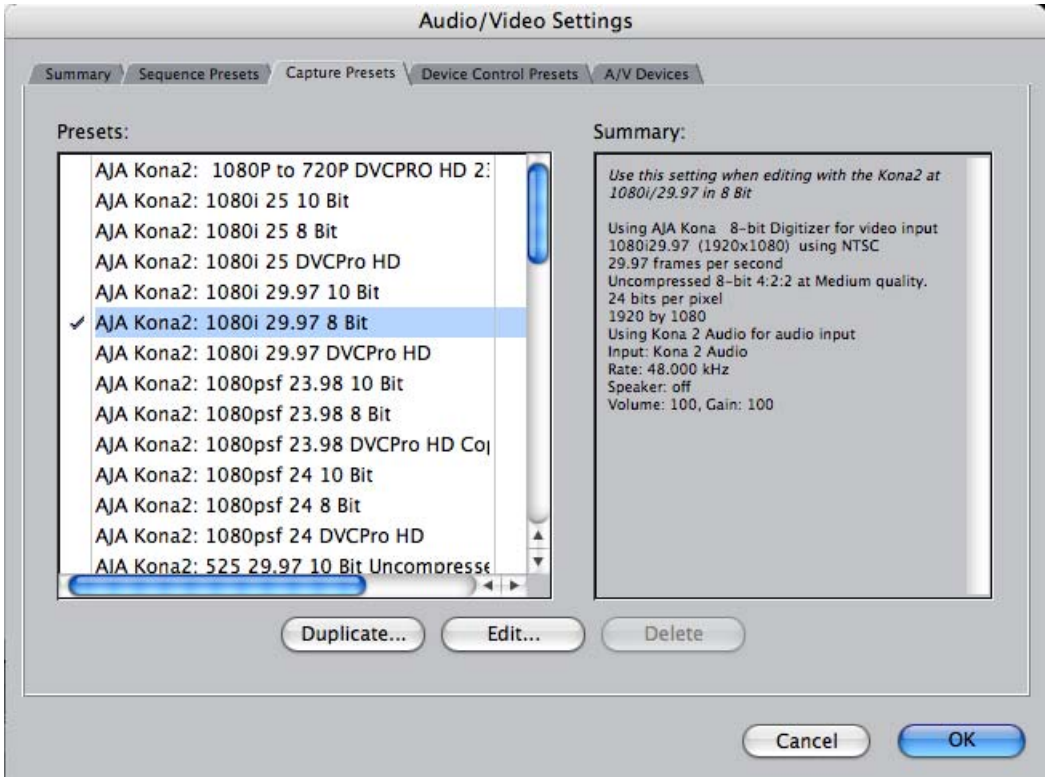
Audio/Video Settings, Sequence Presets Window

This window allows you to select an editing timebase for the current sequence. Once you add a clip to the sequence this cannot be changed. For example, once you've selected uncompressed 10-bit NTSC 48 kHz, you then have to stay in that timebase and can't switch to another. By clicking in the leftmost column (see the checkmark in the sample screen above), you select a new Sequence Preset for use. The checkmark tells which Preset is in use—highlighting a choice alone does not select it.

If you select an editing timebase you can then edit it (click the Edit button) or copy and rename it as another (click Duplicate). When editing a timebase you can change the following:

- Select video processing properties (how to render)
- Frame size and aspect ratio
- Pixel aspect ratio
- Field dominance (none, upper, or lower)
- Editing timebase
- Set QuickTime video codec settings (quality and type)
- Select audio sample rate

The Capture Presets Window



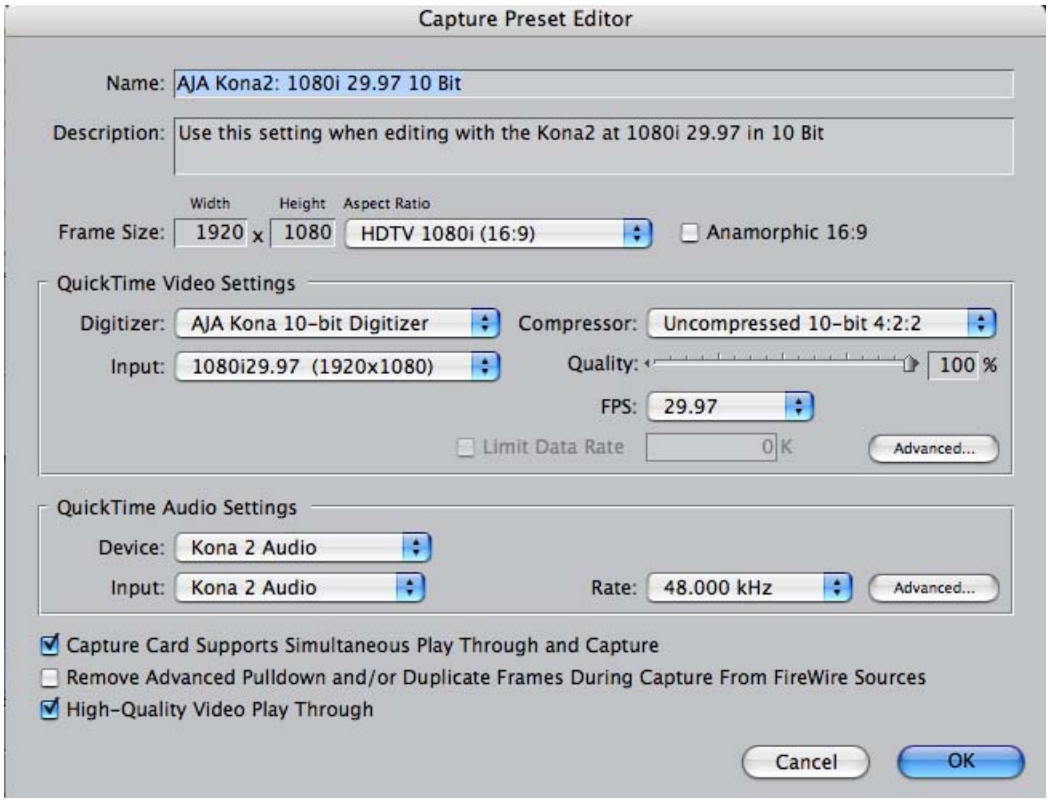
Audio/Video Settings, Capture Presets Window

This window lets you choose a preset format for incoming source video and audio media you'll be capturing. Select the maximum quality format you'll be using for most of the material so there will be no need to re-render later. The information on the right window pane describes the preset and all it's parameters. If you select a format by making a checkmark in the left column, you can edit it (click the Edit button) or copy and rename it as another (click Duplicate). The only exceptions to this are those presets marked with a lock icon; those can be duplicated, but when you try to edit one the system reports they're locked and can only be copied (it will create the copy for you when you try to edit).

Factory AJA presets are easily identified by "AJA" at the beginning of their name.

Since Capture Presets will be used frequently as you bring media into KONA 2, we'll discuss the edit screen next.

Capture Presets Editing



Audio/Video Settings, Capture Presets Editing Window

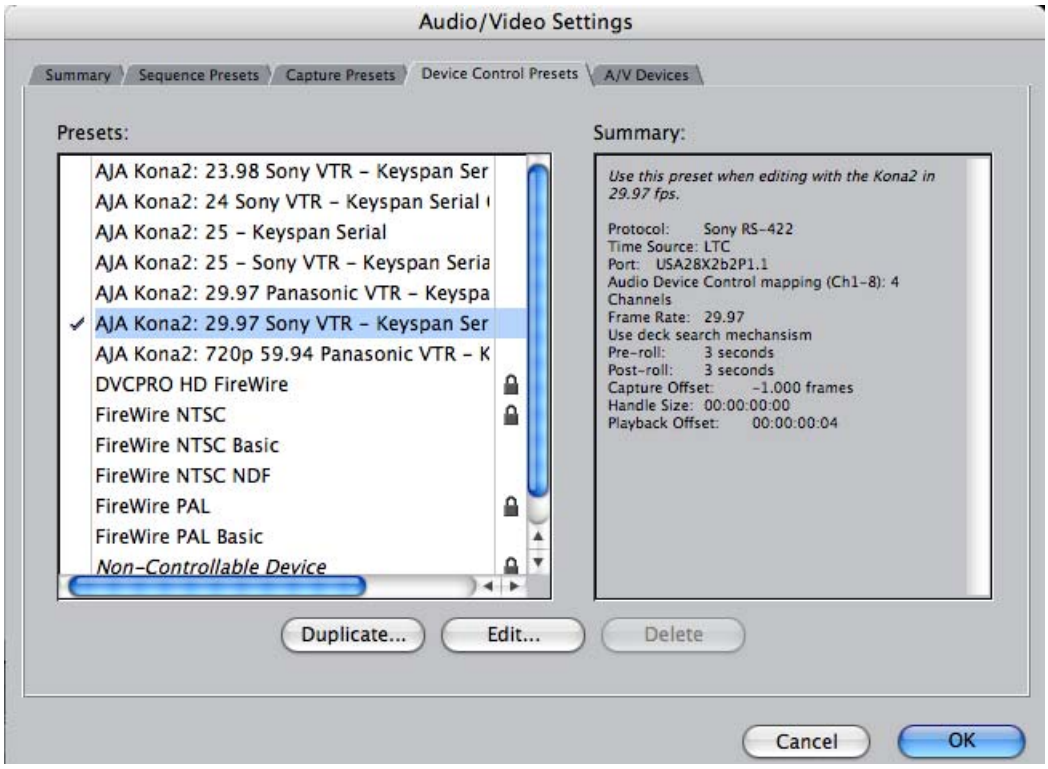
Note: Whenever a Preset is being copied as the basis of a new preset, always change the name and description to fit the new preset so users aren't confused between it and the original.

Frame Size—below the name and description are the frame size settings. These can be changed via the pulldown menu. Selecting a new *Aspect Ratio* value also changes the values in the width and height fields.

QuickTime Video Settings—these settings select a video input source and affect how it's processed by Final Cut Pro. The *Digitizer* pull-down menu selects whether you want the selected input source to be digitized as 8-bit or 10-bit uncompressed video as it comes into KONA 2. The *Input* pull-down selects the primary format KONA 2 will use to capture input video. The *Compressor* pull-down selects a codec that tells Final Cut how to process the video; the codec selected should be chosen for compatibility with the Digitizer setting selected. For example, if your Digitizer setting is 10-bit Uncompressed, then the Compressor setting should be one of the 10-bit choices available. The *Quality* slider should be set to 100 percent when capturing uncompressed; for other formats use an appropriate quality level. Set the *FPS* (Frames Per Second) setting to the correct frame rate. The *Advanced* settings button opens a new screen providing choices of codec-specific options. For uncompressed codecs these probably are not unneeded; for other codecs choose the options desired.

QuickTime Audio Settings—these settings select an audio input source and affect how it's processed by Final Cut Pro. The *Device* pull-down should be set to KONA 2. The *Input* pull-down selects that KONA 2 will be used for capturing audio—it does not select the specific inputs. For specific audio input selection use the KONA 2 Control Panel. The *Rate* pull-down selects a sample rate; it should always be set to 48 kHz for KONA 2. By clicking on the *Advanced* button, a new screen will be displayed where you can select between 8- and 16-bit sampling—AJA recommends 16-bit for optimum sound quality. (This has nothing to do with input format, as KONA 2 supports 24-bit embedded HD audio, 20-bit SD embedded audio, and 24-bit AES audio.)

The Device Control Presets Window



Audio/Video Settings, Device Control Presets Window

This window selects machine control parameters for an attached VTR. Your choice here tells Final Cut that KONA 2 is handling the machine control parameters for the VTR attached to KONA 2. Alternatively, you could also select a different device for input/output instead of KONA 2; for example, if you have a IEEE 1394 camcorder attached to the Power Mac's FireWire port you might choose "FireWire NTSC." The information on the right window pane describes the current machine control settings and parameters for the VTR attached. For KONA 2 presets this means the VTR attached at the RS422 port on KONA 2. For non-KONA 2 presets, this means camcorder/VTRs attached directly at the FireWire port or via some other interface.

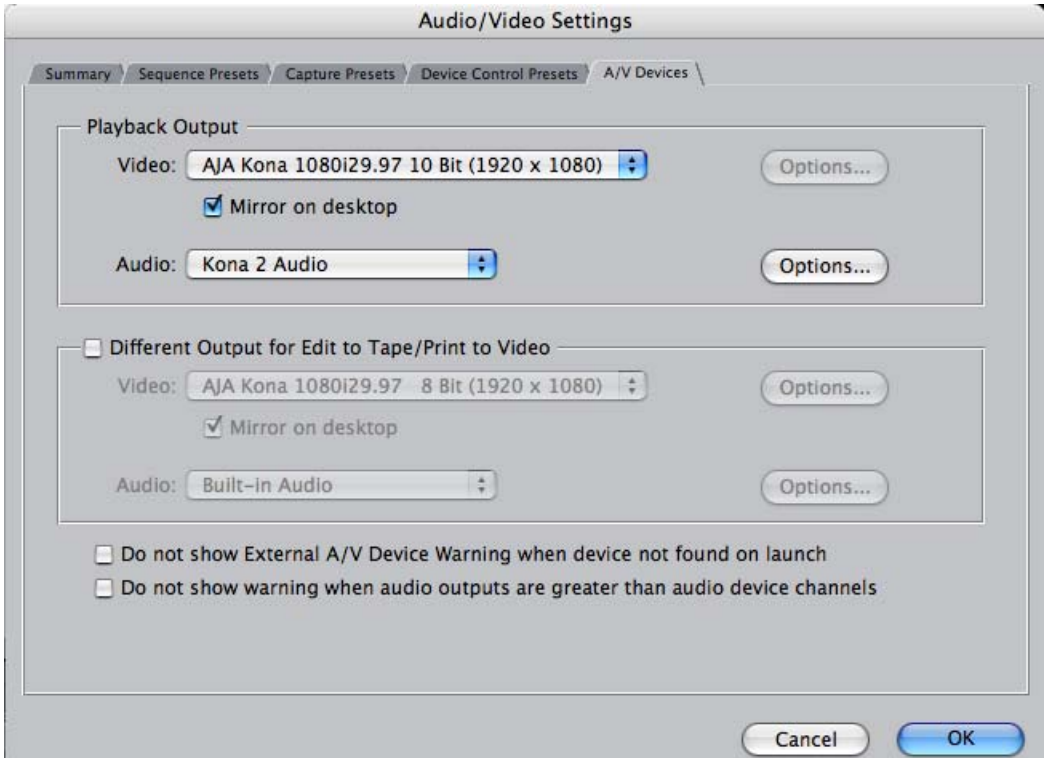
If you select a preset you can edit it (click the Edit button) or copy and rename it as another (click Duplicate). The only exceptions to this are those presets marked with a lock icon; those can be duplicated, but when you try to edit one the system reports they're locked and can only be copied (it will create the copy for you when you try to edit).

When editing a Device Control preset you can change the following:

- Name and description of Device Control preset
- Protocol for capture/playback VTR (for KONA 2 this will be RS422)
- Audio Mapping
- Time Source (LTC/VITC/both/etc.)
- Port
- Frame Rate
- Default Timecode (Drop Frame etc.)
- Capture/Playback Offsets (to correct for VTR versus Final Cut timing issues)
- Handles/Pre-roll/Post-roll
- Auto Record and PTV

KONA 2 ships with VTR Device Control Presets for Sony and Panasonic VTRs. Select a Device Control Preset for the desired frame rate. Presets for both Sony and Panasonic VTRs are provided with these frame rates: 23.98, 24, 25, 29.97, and 59.94.

The A/V Devices Window



Audio/Video Settings, A/V Devices Window

The A/V Devices window selects the current playback device for both audio and video. Typically, you'll select KONA 2 for both playback devices. The format chosen determines the Primary format for the KONA 2 board during playback.. The Video *Options* button is greyed out for KONA 2 (use the KONA 2 Control Panel for video configuration; the Audio *Options* button opens a second dialog where Final Cut gives options for changing bit depth, number of channels, and the sample rate. Since Final Cut currently only supports 2 channels of audio, AJA recommends you leave all of these settings as set in the factory defaults.

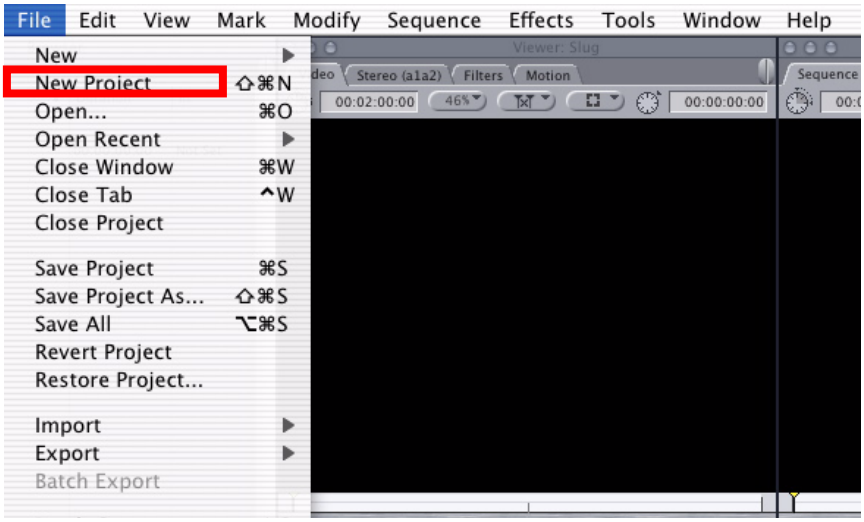
You may wish to use a different KONA 2 output for final Print-to-tape from Final Cut. You can select that in this window by clicking the checkbox “Different Output for Edit to Tape/Print to Video.” This allows you to select via a pull-down menu any KONA 2 video output and audio output.

The window also allows you to turn on and off device and audio output warnings.

Checking the System with a Simple Test Project of Bars and Tone

To test that you’ve installed the KONA 2 drivers and have audio and video monitoring correctly configured, try creating a simple Final Cut Pro project with bars and tone.

1. Select an Easy Setup as previously discussed (go to the Final Cut Pro menu and select *Easy Setup*; then select a desired preset).
2. Select *New Project* from the File menu.

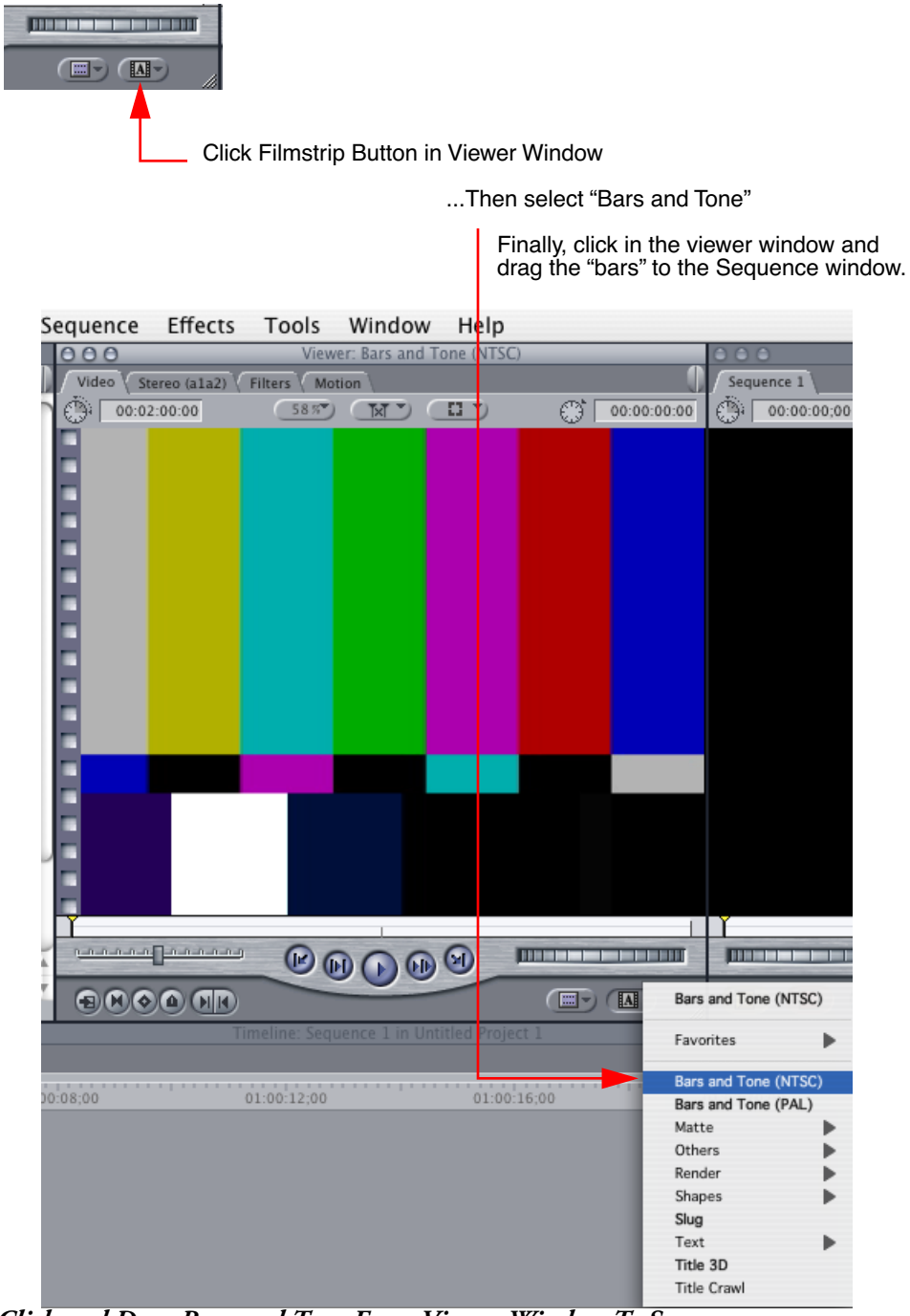


Create a New Project

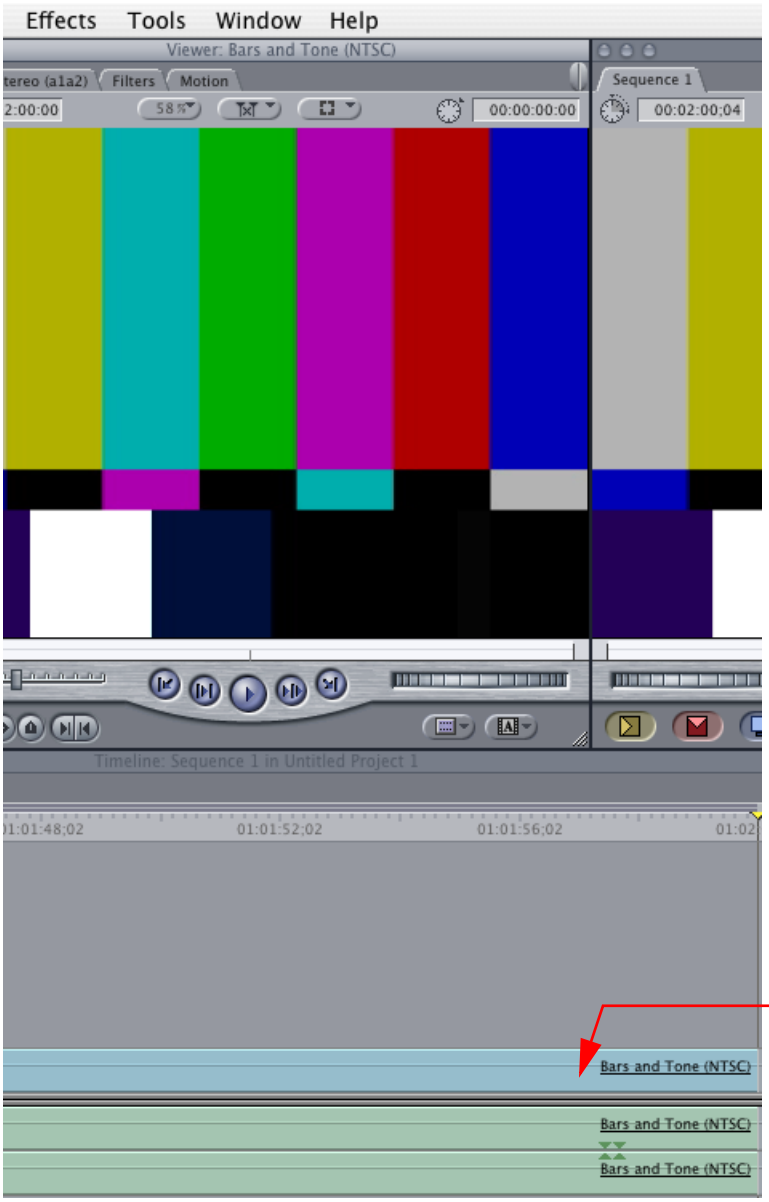
3. The Sequence window will be at the bottom of the screen and a Browser window will be at the top left. Look at the Browser window and locate the “Effects” tab at the top right. Click on it.
4. Locate the Viewer window in Final Cut and click on the Filmstrip pulldown menu button (it’s a “filmstrip” icon with an “A” on iti). Select “Bars and Tone NTSC” or “Bars and Tone PAL”. The viewer window will display bars after you do this.
5. Click the mouse cursor on the Bars and Tone in the Viewer window and drag it to the beginning of the sequence window. You’ll see the bars and tone show up on the sequence where it can them be played.

6. Go to the beginning of the sequence by clicking on the left-most icon and then click the “Play” icon. You should see and hear the bars and tone on your video monitor and audio monitoring system.

If you don’t see bars on the external video monitor and hear tone, check your connections and ensure KONA 2 is selected in the Easy Setups and Audio/Video Settings as necessary.



Click and Drag Bars and Tone From Viewer Window To Sequence



Sequence Window Showing Bars and Tone Clip Dragged from Viewer

If everything works properly, go ahead and try capturing audio and video media from your VTR.

Using 8-bit Versus 10-bit Video

While both 8- and 10-bit uncompressed video are capable of providing excellent quality broadcast video, 10-bit represents a significantly higher quality and is preferable in many situations.

Because 10-bit video has four times the numerical precision when compared to 8-bit, it has a signal-to-noise ratio 12 db higher than 8-bit video.

Visually, in 8-bit video compared to 10-bit video, you will notice a substantial difference. In 8-bit video there will be “contour lines” or “striations” visible, particularly noticeable in scenes having soft gradients like a ramp or sunset. For example, if a sky region is mostly the same color but varies by only a few digital numbers from one side of the picture to another, you may see contour lines where the signal passes from one digital value to the next higher value.

Since each numerical value in a 10-bit system is only one fourth as large as an 8-bit system's, these contours become invisible and the sky varies smoothly.

10-bit video is often used when the source and output video (or “master”) is also 10-bit. Even if the input and/or output video is 8-bit, a 10-bit “project” will still maintain a higher quality when there is a significant amount of effects rendering involved.

Industry standard professional mastering formats—Sony Digital Betacam for Standard Definition and Panasonic D5 for High Definition—are both true 10-bit formats.

Chapter 5: Troubleshooting

If You Run Into Problems

One useful way to find the source of problems is to isolate your system to the smallest size where the problem still occurs and then note all the symptoms. This serves to eliminate areas not involved in the problem and make finding the problem easier.

Once you've noted problem symptoms, look through the following table and see if any of the symptoms are listed. If so, check the items listed. If you later need to call for customer service, let them know all of the things you've tried and when and how the symptoms appeared.

Table 6-1. ***Problem Solving by Matching Symptoms to Remedies***

Symptom	Check
Disk RAID cannot keep up (dropped frames etc.).	Ensure the disk system is providing at least 50 MB/second sustained transfer rate
Dropped frames during playback.	1. Canvas/Viewer zoom setting exceeds the fit-to-window setting. Change to "Fit-to-Window." 2. RAID cannot sustain the data rate of the clip/sequence. 3. The sequence setting does not match the "playback output setting" found at FCP Audio/Video Settings -> AV Output. 4. Virus checking software running in the background (disable it). 5. Scratch drive not set to the RAID.
Dropped frames during record.	1. RAID cannot sustain the data rate of the capture preset codec. 2. Virus checking software running in the background (disable it). 3. Scratch drive not set to the RAID.
Media is not being captured from desired external device.	Check the settings in the *Input* tab of the KONA 2 Control Panel application. Also check equipment cables.

Table 6-1. ***Problem Solving by Matching Symptoms to Remedies***

Symptom	Check
Dropped frames duing playback	Look for scroll bars in the viewer or canvas as a warning sign that the zoom setting exceeds the fit-t-window.
Changes made to Final Cut's configuration aren't remembered or you need to force a change to them.	Under some circumstances, Final Cut Pro may need to be initialized back to the factory default state as it was when you installed it. The easiest way to do this is to locate Final Cut's preference file and discard it. To do so, follow this procedure: 1. Locate the file named "Final Cut Pro 4.0 Preferences". *Note: path to file is "Macintosh HD/users/username/library/preferences/final cut user data."* 3. Click and drag that file to the Trash Can icon and drop it there. When you next start up Final Cut Pro, it will present the "Choose Setup" prompt (as in initial installation) where you can again choose a desired KONA 2 input format in the "Setup For" pulldown and re-enter a desired system scratch disk (your RAID).
Video in the canvas stays frozen during playback.	1. The sequence setting does not match the "playback output setting" found at FCP Audio Video Settings -> AV Output. 2. Canvas/Viewer zoom setting exceeds the fit-to-window setting. Change to "Fit-to-Window."
Video output is black.	1. External video is set to "No Frames" (View -> External Video). 2. The "Playback output setting" found at FCP Audio Video Settings -> AV Output is set to "none" or to a non-KONA 2 device.
Video stutter during playback.	RAID cannot sustain data rate.
Red render bar occurs when placing a clip on a sequence.	The sequence setting does not match the clip setting.

Updating Software

Check on the AJA Video website (www.aja.com/support_kona.html) for software updates. If any are available, download the file and read any associated instructions prior to installing the software.

Support

When calling for support, first check over your system configuration and ensure everything is connected properly and that current Final Cut presets and Easy Setups match what you are trying to do. Even if you cannot find the cause of the problem, having this information at hand will help when you call Apple or AJA Customer Support for help.

If the problem is unknown or you need general help, first contact the dealer where you purchased the product. AJA dealers offer product support for many service requirements.

If the problem is a Final Cut Pro operational issue, Power Mac system issue, or Xserve RAID issue, then call Apple Customer Support for help.

If the problem is an AJA Video KONA 2 issue, then contact AJA Video Customer Support using one of the methods listed below:

Contacting by Mail Address:

443 Crown Point Circle, Grass Valley, CA. 95945 USA
Telephone: +1.800.251.4224 or +1.530.274.2048
Fax: +1.530.274.9442

Web: http://www.aja.com
Support Email: support@aja.com

Apple Resources

Apple provides a large amount of support information online at their support website. Information provided includes answers to top questions, discussions on specific topics, and software downloads for updates and utilities.

You may also enroll in AppleCare for extended support of hardware and software products. Information is provided on the Apple Support website on how to enroll in AppleCare.

General Apple Support Website for information on all products:
http://www.info.apple.com/

Power Mac Support Area: http://www.apple.com/support/powermac/

Xserve Support Area: http://www.info.apple.com/usen/xserve/

Xserve Discussion Area:
http://discussions.info.apple.com/
WebX?f50@176.UAD8aKWnmbr.0@.3bb84b79

Final Cut Pro Web Support: http://www.info.apple.com/usen/finalcutpro/

Final Cut Discussion Area:
http://www.apple.com/support/finalcutpro/

Appendix A: Specifications

PRELIMINARY

Video Input

HD-SDI/SDI, SMPTE-259/292/296
Dual-link HD 4:4:4
Dual-rate

Video Formats

525i 29.97
625i 25
720p 59.94
720p 60
1080i 25
1080i 29.97
1080psf 23.98
1080psf 24

Video Output

Digital:
SD-SDI, SMPTE, 259M, 10-bits, BNC
HD-SDI SMPTE, 292/296, 10-bits, BNC
Dual-link HD 4:4:4

Analog SD and HD Output, 12-bits, BNC:
HD:YPbPr, RGB
SD: YPbPr, RGB (component mode)
Composite/YC (composite mode)

Audio

24-bit embedded HD audio
20-bit SD embedded audio
24-bit AES audio

Up-Converstion

Hardware 10-bit
Anamorphic: full-screen
Pillar box 4:3: results in a 4:3 image in center of screen with black sidebars
Zoom 14:9: results in a 4:3 image zoomed slightly to fill a 14:9 image with black sidebars
Zoom Letterbox: results in image zoomed to fill full screen
Zoom Wide: results in a combination of zoom and horizontal stretch to fill a 16:9 screen; this setting can introduce a small aspect ratio change

Down-Conversion

Hardware 10-bit
Anamorphic: full-screen
Letterbox: image is reduced with black top and bottom added to image area with the aspect ratio preserved
Crop: image is cropped to fit new screen size

Reference Input

Analog Color Black (1V) or Composite Sync (2 or 4V)
Non terminating, Looping, 75 ohm

Machine Control

RS-422, Sony 9-pin protocol. 9-pin D-connector pinout is as follows:

1	GND
2	RX-
3	TX+
4	GND
5	No Connection
6	GND
7	RX+
8	TX-
9	GND
Shell	GND

Appendix B: Glossary

Reference Terms

3:2 Pull Down

3:2 pull down is a process where six frames are added to a film's original 24-frames-per-second format so that it can work within the 30 fps NTSC standard.

24P

A term for 24 full frames per second digital video progressively captured. It generally refers to the HD format of 1920x1080, although it is also used with 1280x720 images as well.

1080i

Refers to a picture resolution of 1920 vertical pixels by 1080 horizontal pixels. The "i" stands for interlaced scanning. Interlaced scanning is based on the principle that the screen shows every odd line at one scan of the screen and then all the even lines in a second scan.

1080p

Refers to a picture resolution of 1,920 vertical pixels by 1,080 horizontal pixels. The "p" stands for progressive scanning. This format works on the same principle as 720p; the only difference is that in this type there are more pixels and the resolution is better.

16:9

Refers to the aspect ratio of movie screen and widescreen DTV formats used in all HDTV (High Definition TV) and some SDTV (Standard Definition TV). The ratio is 16 arbitrary units of width for every 9 arbitrary units of height.

4:3

The aspect ratio of traditional National Television Systems Committee (NTSC) TV screens. The ratio refers to four units of width for every three units of height.

720p

Refers to a picture that is 1,280 vertical pixels by 720 horizontal pixels. The “p” stands for progressive scanning. Progressive scanning offers a smoother picture as 720 horizontal lines are scanned progressively or in succession in a vertical frame repeated 30 times a second.

Anamorphic video

Refers to video images that are "squeezed" or “stretched” (depending on whether the video is being upconverted or downconverted) to fit a video frame. When 16:9 anamorphic video is displayed on a 4:3 screen size (downconvert), the images will appear unnaturally tall and narrow.

Aspect ratio

A ratio of screen width to height. It may be traditional 4:3 or 16:9 widescreen.

ATSC

An acronym for Advanced Television Systems Committee, which is responsible for developing and establishing Digital-HDTV Standards. It is also the name of the DTV system used by broadcasters in the U.S.

Barn Doors

When a 4:3 image is viewed on a 16:9 screen, the viewer sees black bars on the sides of the screen, sometimes referred to as “barn doors."

Codec

A short term for “Coder-decoder.” This device converts analog video and audio signals into digital format, or digital signals into an analog format.

Decoder

See "codec." A device or program that translates encoded data into its original format (i.e., it decodes the data.).

Deinterlacing

The process of converting an interlaced-scan video signal (where each frame is split into two sequential fields) to a progressive-scan signal (where each frame remains whole). Advanced de-interlacers include a feature called 3-2 pulldown processing. Sometimes de-interlacing is referred to as "line-doubling."

Downconvert

Refers to format conversion from a higher resolution input standard to a lower one. For example, converting a 1080i input to a 720p display.

DTV (Digital Television)

DTV stands for Digital Television. It refers to all digital television formats and standards established by the Advanced Television Systems Committee (ATSC). Two basic DTV standards are HDTV (high-definition television) and SDTV (standard-definition television)

Frame rate

The rate at which frames are displayed. In regular NTSC video, the frame rate is 30 fps. The frame rate of a progressive-scan format is twice that of an interlaced-scan. The frame rate for film projects is 24 frames per second (24 fps).

HDTV (High-Definition Television)

High Definition Television refers to the highest-resolution formats of the DTV formats. Offering twice the vertical and horizontal picture resolution of standard definition, an HD picture is much sharper. HDTV has a widescreen aspect ratio of 16:9. HD formats 1080i and 720p both offer reduced motion artifacts like ghosting and dot crawl.

HD-SDI Refers to a high definition signal provided on a serial digital connection.

High Definition A video format consisting of either 720 active lines of progressive video or 1080 active lines, using either progressive or interlaced scanning.

Interlaced Scanning A scanning method based on the visible screen showing every odd line at one scan of the screen and the even lines in a second scan.

Letterbox Letterbox refers to the image of a wide-screen picture on a standard 4:3 aspect ratio screen. Usually black bars are shown above and below the picture to fill the unused space. Letter-boxing maintains the original aspect ratio of the source (often a film source of 16:9 aspect ratio or wider).

Luminance The brightness or black-and-white component of a color video signal. Luminance determines the level of picture detail.

Progressive Scanning Progressive scanning provides a picture made up of 720 or 1080 horizontal lines scanned progressively in succession, within a vertical frame. The frame repeats 30 times a second.

Qrez A proprietary AJA hardware codec present on the KONA 2 card that provides a 4:1 compression ratio. Because the compression/decompression is done using KONA 2's hardware, there is no processing load on the CPU—and no latency. Qrez delivers broadcast quality HD at rates between 25 and 35MB sec. and broadcast quality SD at rates between 2 and 3MB sec. Qrez internally uses KONA 2's internal scaling engine to reduce the number of lines and pixels such that the data rate is one-fourth normal size.

Resolution Resolution usually refers to the density of lines, and dots per line, that represent an image. It is measured by the number of pixels displayed. A higher number of lines and dots provides sharper and more detailed picture content. Analog television pictures have over 200,000 color pixels while HDTV—at 1080 vertical pixels by 1920 horizontal pixels—offer greater than 2 million pixels per picture.

Sampling A digital process by which analog information is measured in intervals to convert analog to digital.

SDTV (Standard-Definition Television) Standard Definition Television pictures are higher quality than NTSC, however, they do not reach the quality and resolution of HD. SDTV is based on 480 lines of vertical resolution, available with both interlaced and progressively scanned formats.

SD-SDI Refers to a standard definition signal provided on a serial digital connection.

Upconverting Process by which a standard definition picture is changed to a simulated high-definition picture.

Widescreen

Widescreen TV is a picture with a 16:9 aspect ratio. 16:9 is the aspect ratio of movie screen and widescreen DTV formats used in all HDTV (High Definition TV) and some SDTV (Standard Definition TV); it stands for 16 units of width for every 9 units of height.

Index