ioXT

Installation & Operation Guide

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Because it matters.™

AJA VIDEO SYSTEMS

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Contacting Support

When calling for support, have all information at hand prior to calling. To contact AJA for sales or support, use any of the following methods:

Telephone: +1.530.271.3190

FAX: +1.530.271.3140

Web: http://www.aja.com

Support Email: support@aja.com

Sales Email: sales@aja.com

Chapter 1: Introduction



Overview

AJA's Io XT and Io 4K provide professional-grade I/O for high-end computers. Io XT and Io 4K are the ideal companion for lightning-fast video capture, playback and up/down/cross conversion. Designed for today's workflows, Io XT/4K provides an ideal interface for video professionals to bridge the gap between their Thunderbolt-enabled computers, and other pro video devices.

Io XT and Io 4K connect with a single Thunderbolt cable and provide a second Thunderbolt connector for storage, making them perfect for on set, or in the edit suite.

Based on the KONA 3G and KONA 4 hardware, these Io products provide 3G/Dual-link/HD/SD-SDI, Component Analog, and HDMI connectivity.

Io XT's and Io 4K's 10-bit hardware conversion capability paired with a Thunderbolt storage system creates a super-fast editing system, portable enough to fit in a backpack—with desktop level power.

Features

The following table provides a comparison of Io 4K and Io XT features.

Table 1. Io 4K/XT Feature Comparison

Feature	Io 4K	Io XT
Two Thunderbolt ports (supports pass-through/"daisy-chaining")	X	X
Supports Thunderbolt 2 connectivity	X	-
Two SD-SDI, HD-SDI, and 3G HD-SDI inputs and outputs	X	X
Single link SDI 4:2:2 or 4:4:4; Dual-link SDI 4:4:4	X	X
Bidirectional SDI BNCs configurable for four 4K inputs or outputs	X	-
HDMI Input and Output	X	X
Analog component/composite output, 10-bit		X
Broadcast quality hardware-based 10-bit up-conversion	X	X
Broadcast quality hardware-based 10-bit down-conversion	X	X

Table 1. Io 4K/XT Feature Comparison

Feature	Io 4K	Io XT
Broadcast quality hardware-based 10-bit cross-conversion (1080 to 720 and 720 to1080)	X	X
Dedicated realtime 4K to HD down-conversion output (SDI 5 BNC)	X	
DVCProHD hardware scaling acceleration	X	X
HDV hardware scaling acceleration	X	X
Broadcast quality hardware-based 10-bit SD aspect ratio conversion (anamorphic to letterbox, etc.)	X	X
16-Channel Embedded SDI audio	X	X
Eight channels analog audio output (Tascam-style DB25-type cable)	X	X
Front panel LED VU meters and Headphone output w/level control	X	X
Reference In/LTC In (selectable)	X	X
LTC Output	X	X
RS-422 control via 9-pin	X	X
Rugged Chassis, Small Size	X	X
12V DC, 4-pin XLR Power (AC adapter included)	X	X
Supports both Quadrant and Two Sample Interleave transport of UHD and 4K video	X	
HDR Features (12 Bit RGB, HDR10)	X	

Broadcast-Quality Conversion

Io XT features hardware-based full 10-bit broadcast quality motion adaptive SD to HD up-conversion, HD to SD down-conversion and HD to HD cross-conversion.

The quality of the conversion features is virtually identical to AJA's award winning stand-alone converter products used throughout the post production market. The Io XT built-in up converter uses a a full 10-bit path, fully motion adaptive de-interlacing, and large multi-point digital interpolators. Down-conversion uses large multi-point digital interpolators, anti-alias filtering and interpolation.

Cross-conversion is high-quality hardware-based and offers true broadcast picture quality in realtime. Because these functions are in hardware, they are available full time, all the time—with no CPU load. Such conversions are useful for cost effective monitoring, making standard definition dubs of an HD project, or up-converting from a standard definition project to an HD deliverable.

Video Formats

For a list of supported video formats, see *"Appendix A: Specifications on page 51"*.

Io XT/4K Audio

Io XT and Io 4K provide up to 16 channels of SDI embedded audio. The front panels have a mini TRS headphone output with a lockable level control knob.

For analog audio output monitoring, Io XT and 4K provide a DB25 connector with eight channels of audio to be used with industry standard Tascam-style audio breakout cables. The front panel has an eight-channel VU meter display to monitor output levels.

HDMI Audio

Both Io XT and Io 4K also support HDMI Audio, 2 or 8 channels.

AJA Software & Utilities

AJA's Io XT/4K software and hardware were developed for powerful integrated video/audio capture, editing, and production with a variety of 3rd-party software. With Io XT/4K and a qualified computer, you have the ultimate system for production, post-production, broadcast, and streaming work. AJA software is distributed as a unified package which includes all the software, firmware, plugins, and utility programs for AJA's Io, KONA, and T-TAP products.

Three retail packages are available, one for Mac, one for Windows, and one for Linux.

NOTE: Support for the Linux OS retail drivers is based on the Linux application used and comes from the application's vendor.

The Mac and Windows packages include:

Drivers AJA device drivers for tightly integrated hardware/software operation.

AJA Control Panel The Control Panel provides:

- Source selection and control of your AJA hardware.
- A block diagram to show visually what routing and processing is being performed.

AJA Control Room Control Room is a cross-platform software application for ingest, playback and output with AJA products.

AJA System Test System Test provides accurate and detailed evaluations of drive and PCIe performance statistics, allowing you to measure the capabilities of your system for recording and playing back various resolutions and codecs.

3rd-Party Plugins AJA-provided plugins for popular 3rd-party Professional Video Applications from Adobe, Avid, Apple, Telestream, and others.

To download AJA software, go to the AJA website:

http://www.aja.com/en/support/downloads

For a complete software compatibility list, see the AJA website link:

http://www.aja.com/en/category/edit/compatibility

System Requirements

NOTE: See the vendor of your system software for requirements/recommendations of GPU and additional hardware requirements.

For best performance AJA recommends:

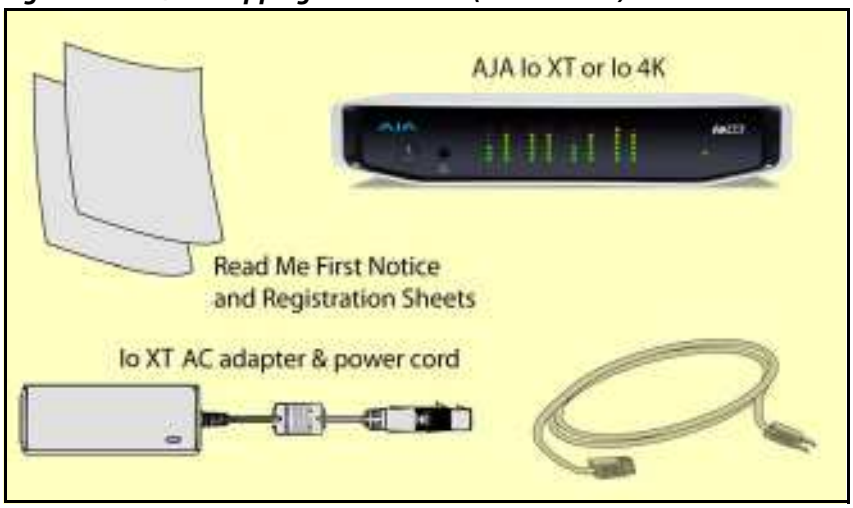
- Mac OS 10.9.5 or later
- Windows 7/8.1/10 with all updates
- 2.0 GHz quad core i7 or better
- 4GB RAM Minimum, 8GB Recommended

What's In The 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 Io XT/4K repaired or replaced. 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.

Figure 1. Io XT/4K Shipping Box Contents (Io 4K shown)



When you unpack your AJA Io XT/4K, you'll find the following components:

- Io XT or Io 4K
- 12V power adapter and power cord
- Read Me First Notice—Contains late-breaking news and/or errata related to the product and it's documentation.
- Registration Sheet—allows you to register your Io XT/4K by mail or online (details provided).

In This Manual

Chapter 1 Introduces the product briefly, listing features, box contents, and system requirements.

Chapter 2 Provides complete instructions for installing and configuring the AJA Io XT/4K. The user is guided through unpacking, cabling the Io XT/4K, installing AJA & third-party support software, then getting it up and running. Important configuration information is also provided on video settings and use of genlock/external reference.

Chapter 3 Discusses operational aspects of Io XT/4K and how to work with 3rd-party software.

Chapter 4 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 product.

Appendix B Provides important Safety and Compliance information.

Chapter 2: Installation



Installation Overview

The installation and set up of an Io XT and Io 4K is very simple. A functional description of each connector is provided in this chapter. The steps of installation and configuration are outlined here and each of these steps are explained in greater detail on the remaining pages of this chapter:

1. If not previously installed on your Thunderbolt equipped computer, ensure that appropriate application software is installed as detailed in its user documentation.
2. For latest System Compatibility and Software Version information for Io XT or Io 4K visit the AJA website.

   For Io XT, visit:

   http://www.aja.com/en/products/io-xt/#/overview

   For Io 4K visit:

   www.aja.com/en/products/io-4k#overview
3. Install the latest AJA software on your computer from the AJA website.

   For Io XT, visit:

   http://www.aja.com/en/products/io-xt/#support

   For Io 4K visit:

   www.aja.com/en/products/io-4k#support
4. First install the Io XT or Io 4K driver package (includes the AJA Control Panel) and then finally install any AJA plug-ins for 3rd-party software.

System Test Application

AJA System Test is a utility for measuring system performance with AJA Io devices. The application includes:

- System Disk Test
- AJA Device Test
- Disk + Device Test
- System Report

The application tests Read and Write, Capture and Playback speeds tests in both Megabytes per second and Frames per second. The disk speed tests differ from standard disk I/O performance applications in that they specifically test the system under conditions typically encountered with video capture, playback, and editing.

We suggest the best test is to fill your storage disk to 80% and then test capture at the highest data rate you will use.

Connecting to your Computer

1. Connect a Thunderbolt cable between the computer and the Io XT/4K.
2. Power the unit (AC supply or battery) and if it is Io XT, turn it on using the power button on the front. Io 4K does not have a power button.
3. Cable the system audio and video sources, VTR, audio monitor, and video monitor.
4. When you run the AJA Control Panel, you'll notice that the Io XT/4K is auto-discovered as long as it is properly cabled and powered up.
5. Please read *"Chapter 3: Operation on page 14"*. (The latest version of the manual can be downloaded from the AJA support page provided above.)

Cable Connections

Io XT and Io 4K connections are made directly to the unit's rear connector plate. Both have a Tascam-style DB25 connector providing 8 audio output channels.

Figure 2. Io XT Connectors



Figure 3. Io 4K Connector



Connector Descriptions

The following section describes the connectors offered on the Io XT and Io 4K chassis in the following order:

- Connectors common to both models
- Io XT connectors
- Io 4K connectors

Connectors Common to Both Models

HDMI Input and Output

Two HDMI connectors on the Io XT/4K provide input and output of HDMI video and multi-channel embedded audio.

- Io XT has HDMI v1.3a capability at 30 bits per pixel allows full support of the latest 10-bit monitors.
- Io 4K has HDMI 1.4 capability, supporting Ultra HD and 4K resolutions at up to 30 frames per second at 10 Bit 4:2:2 and 50/60 frames per second at 8-Bit 4;2:0.
- Both Io XT and Io 4K support 2 or 8 channel HDMI audio input and output.

HDCP is not supported on either input or output. Io XT/4K HDMI output does not have HDCP, and input sources having HDCP are not supported. The HDMI input is designed to support long cable runs—up to 100 ft. when using 22 or 24AWG HDMI cable, or up to 50 ft. using 28 or 30AWG HDMI cable. The HDMI output supports standard HDMI cables only.

RS422 Machine Control

A female DE-9 connector on Io XT/4K provides connection for VTRs, camcorders, disk media servers, and other devices using RS422 SMPTE (Sony) protocol. (Connector pinout is listed in Appendix A, see *"Machine Control"*.)

Reference Video and LTC Input

Two BNC connectors on Io XT/4K provide reference Input and Output. The Reference Video input can also be used for LTC input. The selection of Reference (sync) or LTC is set using the AJA Control Panel (*"Input Select Screen" on page 26*).

In Video Pass-through mode, these connectors are effectively loop-through. Supplying reference signal to the Reference input allows you to synchronize Io XT/4K 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 Io XT/4K outputs video, it uses this reference signal for locking. When connecting a reference video source, the locking signal should be the same format as the Primary format selected in the AJA Control Panel. It is possible in some circumstances to use an alternate format video signal as long as the basic frame rate is compatible.

Balanced Analog Audio Output

A 25-pin DB connector provides 8-channel, 24-bit D/A analog audio, 48kHz sample rate, balanced via 8x XLR on DB-25 breakout cable. (Cable not supplied.)

12V Power Connector

A standard 4-pin XLR type connector is provided for either battery or line source power using the supplied AC power adapter.

Io XT Connectors

These connectors are used only on the Io XT model.

Thunderbolt ports

Two Thunderbolt ports are provided as describe in the figure above. These are first generation Thunderbolt connections.

HD/SD SDI Input and Output

BNC connectors are provided on Io XT for two HD/SD-SDI inputs and two HD/SD-SDI outputs. The input and output support video and 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.).

Component Video Output

Io XT features a group of 3 BNC connectors for output of component, composite and Y/C functions. The signals are labeled on the BNC connectors on the rear panel of Io XT.

NOTE: 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. Io XT uses the modern YPbPr terminology exclusively. Io XT 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 via the AJA Control Panel.

Io 4K Connectors

These connectors are offered only on the Io 4K model.

Thunderbolt 2

The Io 4K provides the second-generation Thunderbolt ports to support UHD and 4K signals. Two ports are provided for "daisy-chained" network configurations.

Bi-directional SDI I/O

Four bidirectional BNC connectors can be configured via the AJA Control Panel for:

- HD/SD inputs (x2) and outputs (x2)
- Or you can input **or** output 4 channels of video representing individual quadrants of the higher definition Ultra HD (3840x2160) and 4K (4096x2160) formats.

NOTE: The Io 4K can only be configured for either input or output of 4K at a time. It cannot support 4K input and output at the same time since both require four BNCs.

Dedicated SDI HD/SD Output

One BNC connector is provided for full-time, real-time output of HD/SD video. 4K video is down-converted to 2K HD and UHD is down-converted to HD.

Installing Io XT/4K Software

Go to the AJA website and download the latest Io XT/4K driver software containing the AJA Control Panel application.

http://www.aja.com/en/support/downloads/

System software updates may occasionally become available to AJA Io XT/4K owners on our website (www.aja.com). We recommend checking occasionally for both software updates and additional product information.

NOTE: If your computer has previously had another video capture or multimedia device installed, ensure you uninstall any related software before installing Io XT/4K This will prevent any hardware or software conflicts.

Before installing the Io XT/4K software package, ensure that your capture/editing application is installed as detailed in its user documentation. You cannot use Io XT/4K with a third-party application until the application has been installed and run at least once on your workstation. Next, install the AJA software package.

If you add Io XT/4K supported applications at a later date and have not previously installed the appropriate drivers, you must run the install program again selecting the appropriate application support software to be installed.

Chapter 3: Operation



Using Io XT/4K with Professional Video /Audio Software

NOTE: This chapter initially describes the Io XT version of the Control Panel screens that support video formats up to 2K bandwidths. Io 4K differences will be noted and detailed UHD/4K operations are discussed in the section "Using Io 4K for UHD/4K" on page 40

After you install the Io XT or Io 4K software and any AJA plug-ins to support your choice of 3rd-party software, you're ready to begin capturing and playing back video and audio.

Go to the AJA website for AJA plug-ins and documentation for your favorite 3rd-party software applications.

For Io XT, visit:

http://www.aja.com/en/products/io-xt/#support

For Io 4K, visit:

www.aja.com/en/products/io-4k#support

For further support information and downloads for third-party software and DirectShow for Developers, go to this link:

https://www.aja.com/en/category/edit/compatibility

Once you've installed all the AJA software as detailed in Chapter 2, you'll find the AJA Control Panel application in your Applications.

AJA Control Panel Overview

The AJA Control Panel is a software application that provides a simple visual showing how the Io XT/4K hardware is currently configured and allows you to make changes. You can change signal input and output parameters and define the video processing that will be performed.

The AJA software installer automatically installs the Control Panel application on your computer.

AJA Control Panel User Interface

The AJA Control Panel user interface includes a visual block diagram of the unit's current configuration. The current status, input and output settings, and many other details are depicted in the color-coded block diagram. Below this block diagram are various controls for changing operating parameters, which will vary depending on which function screen has been selected.

The left side of the AJA Control Panel provides a navigation list of available function screens. Clicking on a link (or alternatively, a related element in the block diagram) displays a function screen corresponding to that topic.

Figure 4. AJA Control Panel, Block Diagram and Controls

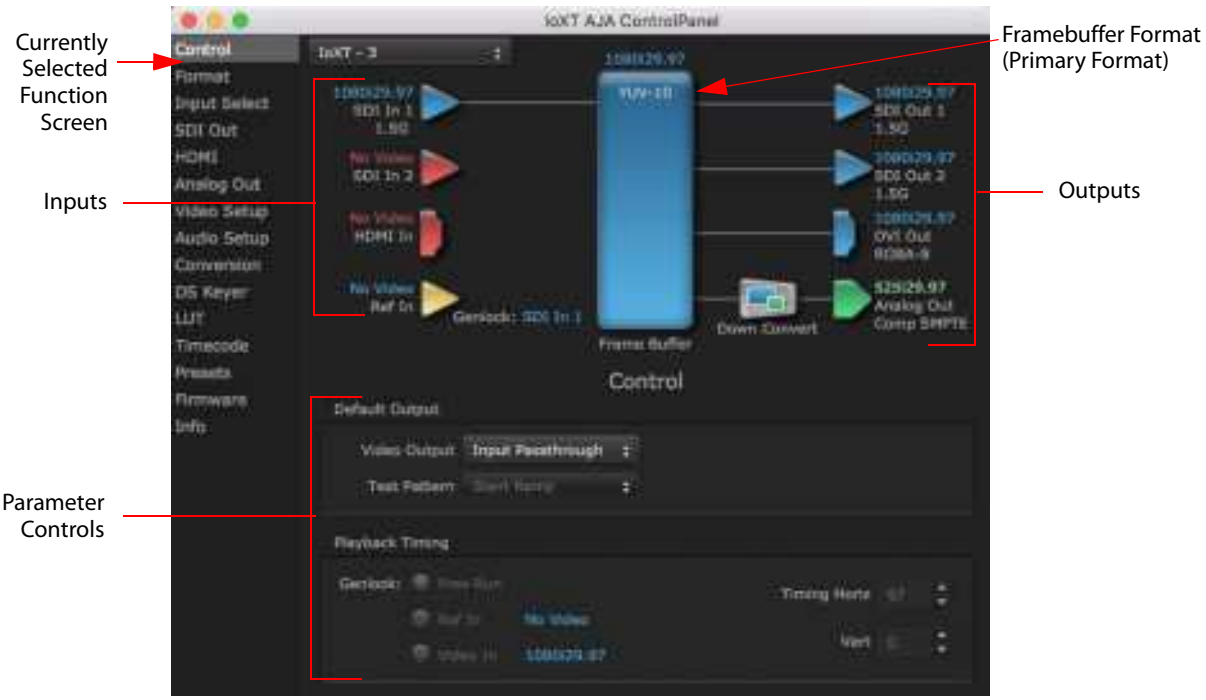
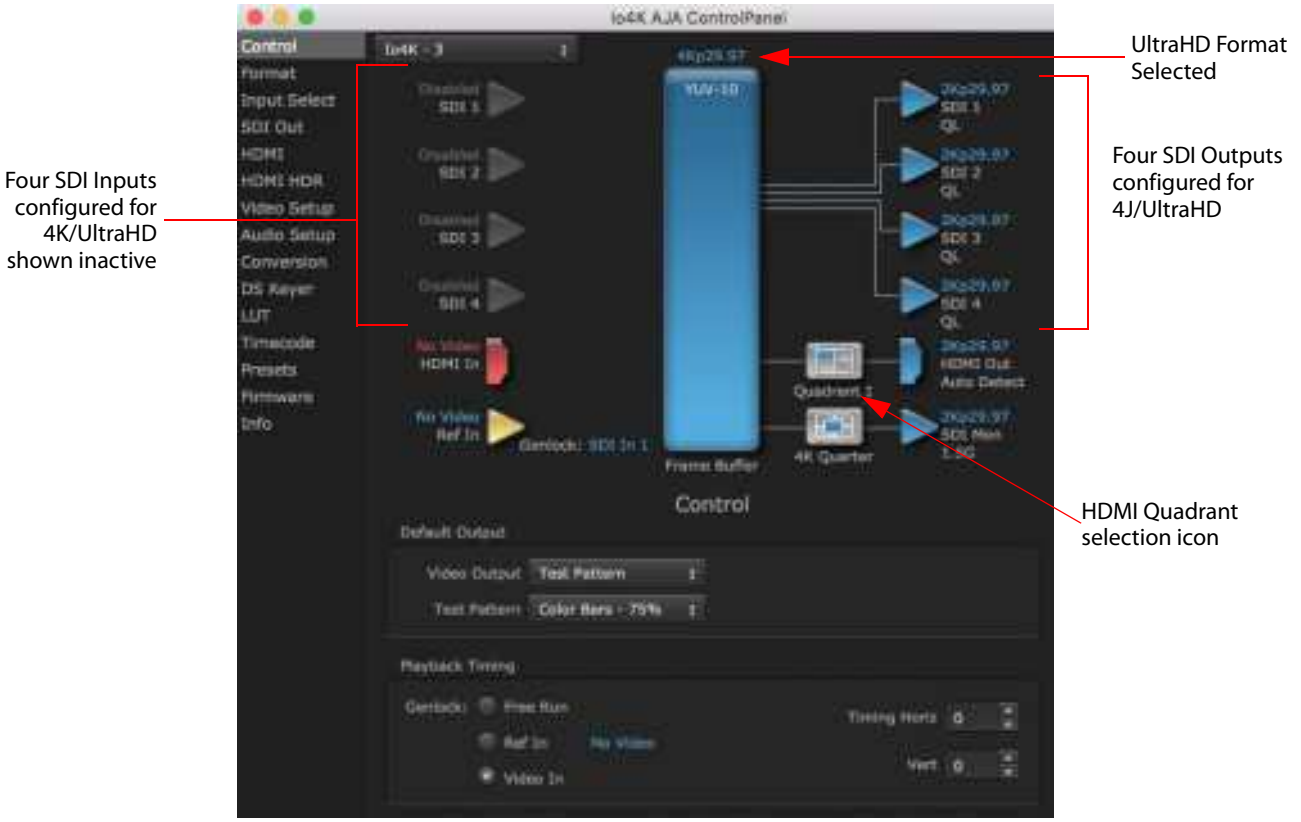


Figure 5. Io 4K, Block Diagram set for UHD Format



Block Diagram Area

The top block diagram area of the Control Panel screen is a visual representation of the processing, if any, that's currently occurring, including inputs/outputs, reference source, and system status. Lines between inputs, the framebuffer, and outputs, show a video path. Where there are no lines, there is no connection; this can be because an input or output isn't selected in the Input Select menu. The lines will also show whether the outputs are video or video + key.

You can click any of the function screen selection links in the left column to view its current settings or click on an icon to call up its related settings screen. You can also right-click or Control-click to see context-sensitive information and choices (*Figure 6*).

Figure 6. Context Sensitive Menu



Color Meanings

All items in the AJA Control Panel block diagram are color-coded to show what is happening in realtime. This applies to both icons and text. These colors indicate:

Blue Video is same format as the Primary Format (framebuffer)

Green Indicates that Io XT/4K is performing an active change to the video making it different from the Primary Format (e.g., down-conversion).

Yellow Reference video (black burst or other reference source)

Red The selected operation cannot be performed

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.

Figure 7. Input/Output Icons



Framebuffer

The framebuffer is the "engine" where your third-party applications interface with the AJA device. The framebuffer has a format (called the "Primary Format") and color space that it follows, as defined in the linked menu screens or via external application software. The "Secondary Format" is a selection for format conversion.

Primary Format

The Primary Format is the media format written to disk and used in your project. This is the format that the framebuffer will use and is shown in the Control Panel using the color blue. It is the format that the third-party application software will either receive from the AJA hardware, or is sending to the hardware. 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 indicate that something is in the primary format. For example:

- If the input and output icons are blue, you know that the same format is used throughout the video path. No format conversion is being performed.
- If the input or output icon colors differ (blue input and green output icons for example), you know that a format conversion is being performed.

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—the Primary Format. A conversion is readily apparent because of the color change from blue.

NOTE: In some cases the application you use with the Io XT/4K will automatically set the Primary Format, overriding the user's selected primary format in the AJA Control Panel.

Format Conversion

Format function screen conversion allows selection of a format conversion between High-definition and Standard-definition. The choices offered depend on the AJA device present in your system and the Primary and Secondary format selected.

NOTE: When converting an Input to the Primary Format, select the Secondary Format option that has (I), for input only, appended to it. Conversely, when converting an Output from the Primary Format, you must select an output signal with (O) for output only.

IMPORTANT: Do not confuse this Format function screen conversion, which uses AJA hardware and operates on either Mac or PC, with the separate Conversion function screen, which uses Quicktime software codecs for conversion and is only available on Mac.

Conversion Icons

When an input or output is a different standard than the framebuffer, the Io XT/4K may be up- down- or cross-converting the signal to the selected 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.

Figure 8. Up, Down, and Cross-Convert Icons



Controlling Application

It is important to understand that the computer can contain many applications that can use the AJA device (as you switch from window to window) and it may not always be obvious which currently controls it.

Figure 9. Control Panel In Use Message (in red)



In the top right corner, the Control Panel displays the name of the application controlling the unit. In some cases, applications may not always properly "let go" of the I/O interface as another takes over—you'll be able to tell by looking at the Control Panel.

Presets

Setups can be named and saved as a snapshot (Preset) for recall at any time. You can save various Control Panel configurations associated with your frequent tasks. You don't have to spend time resetting interface configurations—just load the previously saved Preset for each task.If you work on multiple systems and want to carry your saved setup to another location, you can copy your saved Presets file on to movable storage and load it into any computer running the AJA Control Panel application. Presets are described in more detail later in this manual.

Single-User & Shared Preferences

When an AJA device starts up, preferences can determine what settings it will have it when it begins to operate. The AJA Control Panel offers preference settings that support both:

- User Preferences— Preferences stored from the last Control Panel State to be used on next startup of AJA Control Panel.
- Shared Preferences— Preferences saved by an Administrator for use as a default start state for AJA Control Panel.

User Preferences

This file exists to immediately, automatically, store preference changes made by a user on a particular AJA device. When any control is changed in the Control Panel, that change is recorded in the preferences file stored in a unique user preferences location dedicated to that particular device and serial number. Then, when AJA control panel is restarted for any reason, it will restart with the same preferences it used when it closed.

However, if a user sets their preferences, and then replaces the AJA device with a different one, the Control Panel will either:

- Start up with the factory defaults, or
- Start up with the "house defaults" dictated by the system administrator (if a Shared Preferences file exists).

The User Preferences File can be found in the following locations.

On Mac:

- /Users/<USER_NAME>/Library/Preferences/com.aja.devicesettings

On Windows:

- C:\Users\<USER_NAME>\AppData\Local\Aja\com.aja.devicesettings

Shared Preferences

An administrator can establish house standards for the AJA Control Panel by creating the user preferences file (described above) and placing it in a shared location where it will establish a standard default startup state for all users of a given computer system. These settings preempt the initial AJA default settings.

To establish the *House Default* for every user on every system, a system or network administrator can move this default file to all systems on the network (manually or by pushing it out across the network). All users on the network will then open to the *House Defaults* when they launch the AJA control panel for the first time.

NOTE: *If the user makes changes to the control panel themselves, those changes will be saved in their user preferences, which will take priority over the house default dictated by the shared preferences file.*

The Shared Preferences file should be a file created at the User Preferences location described above, and placed by the System Administrator in the following locations.

On Mac:

/Users/Shared/Library/Preferences/com.aja.devicesettings

On Windows:

C:\Users\All Users\Aja\com.aja.devicesettings

Function Screens

The side area of the Io XT/4K Control Panel provides different information categorized by topics. Clicking on a topic—or a block diagram element—displays an information screen corresponding to that topic. Screens that can be selected are:

Control Configures Io XT/4K operation and output timing.

Format Selects the framebuffer primary video format and any secondary formats for conversion of inputs/outputs

Input Select View and edit input selections and how they are mapped

SDI Out Selects output format

HDMI Configures the HDMI I/O

HDMI HDR Configure High Dynamic Range settings for HDMI output (Io4K only)

Analog Out Configures the component/composite analog output

Video Setup Configures Video such as composite black level and filtering specific video parameters for output.

Audio Setup (Io XT only) Configures Audio options such as analog audio monitor level.

Conversion (Mac only) For applications that support selection of codec options such as whether paused video appears as a full frame or a single field (jitter shown or not shown) and 24 to 30 fps padding patterns, RGB range, and Stereo 3D signal configuration (if applicable).

DS Keyer Setup and control the insertion of keyed video from the frame buffer or graphics files with alpha channel.

LUT Load a lookup table (LUT) file to adjust the calibration of color for any source.

Presets Add or delete saved preset configurations (handy for setting up the Io XT/4K for certain workflows and then saving it as a canned configuration for easy later recall

Firmware Enables installation of AJA card firmware.

Info Displays status information and firmware version # of the Io XT/4K and how it is installed in the host computer. This information is generally intended for troubleshooting/ support.

Using Io XT and IO 4K for HD, SD, 2K

In this section, standard SD, HD, and 2K Control Panel operations are described. These are essentially the same for both Io XT and Io 4K and are illustrated using Io XT screen shots (exceptions are noted).

Control Panel operation for Io 4K using Ultra-HD and 4K formats are described separately (see *"Using Io 4K for UHD/4K" on page 40*).

Control Screen

The Control screen is where you select how the Io XT/4K directs video and is used by application software. This screen also provides control for configuring output timing with regard to external reference video and horizontal/vertical delay. The top of the Control screen shows the current Default Output and the application currently controlling the Io XT/4K.

Figure 10. AJA Control Panel, Control Screen



Default Output This is where you select what Io XT/4K will output as a default when no application has control of the board, such as when the Finder is active. Since Io XT/4K 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 Io XT/4K inputs/outputs. These settings determine what happens when an application that doesn't grab the Io XT/4K inputs/outputs is active.

Input Pass through This selection directs Io XT/4K 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, in effect, makes the Io XT a converter when used in conjunction with the AJA Control Panel application and your computer. No applications other than the AJA Control Panel need to be open to convert audio and video from one format to another. For example, if an SD source tape needs to be dubbed to an HD tape, the signal might be routed from the SD VTR to the Io XT, configured for up-conversion in the AJA Control Panel and then passed through to the HD VTR for recording.

NOTE: *See "Using Io 4K for UHD/4K" on page 40 for using this menu to input UHD/4K formats.*

Test Pattern This selection directs Io XT to output a choice of preset pattern when no other application is using the Io XT. You can choose from: Black, Color bars (75% or 100%), Ramp, Multiburst, Line Sweep, Multi Pattern, or Flat Field.

While in Test Pattern mode, you can select RGB or YUV output via a pulldown menu.

In addition to the preset test pattern choices, a "Load File..." selection at the bottom of the menu allows you to load any standard RGB graphics file (.tif,.psd, etc.) into the frame buffer for display.

NOTE: The graphics file will not be scaled to fit. If it's smaller than the current frame buffer format, Io XT/4K will center it in the frame. If it's larger than the current frame buffer format, it will be cropped on the right and bottom. Also some graphics formats and bit depths may not be supported. Once a graphic file is loaded into the frame buffer it will be retained until it is overwritten by another graphic or test pattern, or when power is turned off. Graphic file names are only "remembered" in the menu as long as the AJA Control Panel application is running.

Hold Last Application This selection directs Io XT/4K to hold and output the last frame of video from the last application to control Io XT/4K. This can be helpful when operating in an environment where you're switching back and forth between multiple application windows.

Playback Timing

Use these controls to set Genlock and Timing adjustment.

Genlock Selects how Io XT/4K will synchronize program video:

- Freerun: In this mode, Io XT/4K generates sync without an external reference source
- Ref In: Directs Io XT/4K to use the Ref Video source for sync (usually an analog black burst video signal)
- Video In: Directs Io XT/4K to use whichever video input source has been selected in the Inputs screen for sync

Timing (Horiz and Vert) These two pull-downs allow output timing adjustment with reference to the Ref Video source selected.

- Horizontal: The Horizontal reference can be adjusted by selecting a number of pixels (clocks) to offset
- Vertical: The vertical reference can be adjusted by specifying a number of lines to offset.

Format Screen

The Formats screen shows the video format currently in use by the Io XT/4K framebuffer (called the *Primary Format*) and allows you to change it. All throughout the Control Panel, choices are always presented based on what Io XT/4K can do with the signals available and the inputs/outputs selected. For example, on the Format 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/cross conversion is employed.

Figure 11. AJA Control Panel, Formats Screen



Video Format (Primary and Secondary)

These pull-down menus show the currently selected formats. If you select an alternate value in the Primary Format using the pull-down, it will change the format used by Io XT's framebuffer. When a change is made via the Video Format pull-down or by right-clicking or Control-clicking an icon and selecting a new format via a contextual menu, the block diagram will change to reflect the new format. In the case of a 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). The "Secondary Video Format" pull-down menu lists all compatible formats for selection (incompatible formats are not shown). This allows you to see what you've chosen, and also see those formats that are compatible with the selected Primary format.

For a complete list of Io XT/4K Formats see *"Appendix A: Specifications on page 51"*.

NOTE: The AJA Control Panel software uses the abbreviation "sf" instead of "psf" when referring to "progressive segmented frame" formats. In the manual and in other literature you may see either of these acronyms used interchangeably. Visually it is easier to discern at a glance if you are working with progressively segmented frame formats (sf in the AJA Control Panel) as compared to progressive frame formats which will show only "p."

Pixel Format Use this pulldown menu in Io 4K to choose: YUV-10, YUV-8, RGB-10, ARGB-8, or RGB-12.

RGB Range The *RGB Range* pulldown menu allows you to select either Full range (0-1023) or SMPTE range (typically 64-940) for RGB color output.

Follow Input Enabling the Follow Input checkbox allows the Control Panel Buffer to auto-switch to whatever is the detected input format. This feature works only if the controlling application supports input-based capture—AJA Control Room for example.

Cross-Conversion If you have an HD format as your primary and then select a secondary HD format with a different frame size, the Io XT will perform a cross-conversion where necessary (input or output) for "*like Hz"* formats. "*Like Hz"* means that 720P 59.94 may be converted to 1080i 29.97 (59.94Hz). Converting from disparate Hz is not supported on the Io XT for cross-conversions. The example below shows 1080i to 720p.

Up Conversion The *Up* and *Down* pull-down menus are available when conversion has been selected for the video path to/from the framebuffer and like Hz formats are selected (the one exception is 1080PsF 23.98 which can be down-converted to 525i 29.97.) Different choices will be available depending on the type of conversion and formats being converted. SD to SD conversions are essentially aspect ratio conversions to accommodate transforming anamorphic images to letterbox or vice versa.

For up-conversion the following choices are available:

- ***Anamorphic:*** full-screen "stretched" image
- ***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 For down-conversion the following choices are available:

- ***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
- ***Anamorphic:*** full-screen "stretched" image

SD to SD Conversion This pulldown is for SD to SD aspect ratio conversion.

- ***Letterbox:*** this transforms SD anamorphic material to a letterboxed image.
- ***H Crop:*** will produce a horizontally stretched effect on the image; transforms anamorphic SD to full frame SD
- ***Pillarbox:*** will produce an image in the center of the screen with black borders on the left and right sides and an anamorphized image in the center
- ***V Crop:*** will transform SD letterbox material to an anamorphic image

4K to HD Down-conversion

The Io 4K provides a dedicated SDI Monitor BNC that outputs a quarter-size image of a selected UHD/4K signal format. For details, see *"Using Io 4K for UHD/4K" on page 40*.

Figure 12. AJA Control Panel, Formats Screen, Example shows Io XT cross-conversion



Input Select Screen

On the Inputs screen you can view the currently selected video and audio input sources and map audio sources to the channels supported by your editing application. Two information panes in the screen are provided: Video Input and Audio Input.

Figure 13. AJA Control Panel, Inputs Screen



Video Input

The pulldown menu allows you to see and change what's currently selected and shows the video format that Io XT has detected (if any). The figure above shows that video is selected at the HDMI input and the format is 1080i with a frame rate of 29.97. Since this text is blue, you can tell that it matches the framebuffer's primary format selected in the "Format" screen. By looking at the input source, you can determine how the primary format should be set (unless you want to perform a conversion on the input.) If you wish to select a different input use the pulldown to select either SDI 1, 2 or Dual Link for two-wire 4:4:4 RGB, or Stereo 3D. For 3G single-link, choose the SDI Source used and select Stereo 3D from the SDI pulldown menu.

Use the LTC/Ref menu pulldown next to Video Input to select how the LTC BNC is used: selecting Reference means it's used a Reference standard; selecting LTC means it's used for linear time code (LTC) input.

System Genlock

For video stability and proper system operation, you can genlock all equipment to house sync, however genlock is not required for Io XT/4K due to excellent freerun accuracy. To connect genlock, use a black burst generator output looped through the system. On the Io XT/4K house sync is connected to "LTC/Ref In".

NOTE: Be sure to set the Reference/LTC connection to Reference in the pulldown menu in the Video Input pane.

Audio Input This pulldown menu allows you to pick where the audio comes from. Io XT/4K supports up to 16 channels of embedded audio. Here you can also select which two channels from the 16 embedded would be mapped to your editing application if only two channels were selected in that application.

SDI Out Screen

The SDI Out screen shows the current settings for the SDI outputs. Because the outputs can be configured independently, one output may be the Primary format and the other output may be the Secondary format. If an input/output has no video, it will be indicated on the block diagram ("No Video").

SDI Output 1 and 2 Configure SDI Out 1 and 2 via pulldowns:

Figure 14. AJA Control Panel, SDI Output Screen



- **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).
- **Video+Key** - When selected, this indicates that the SDI 1 Output video is set to the same format as the framebuffer. SDI 2 Output is set to a video key signal associated with SDI 1 (the shape to be cut out from the video - this will appear as a black and white image/matte). Using the second Io XT output as an Alpha Channel key, with the video output, may be useful for feeding production switchers, DVEs or other professional video equipment.

Figure 15. SDI Outputs Set for Video +Key



Stereo: When selected, this indicates that SDI 1 represents the left eye output and SDI 2 represents the right eye output of stereoscopic material. Io XT also offers single link 3Gb output of multiplexed Stereo 3D.

Transport Options

- **Dual Link** - Output (SMPTE 372M) using SDI 1 and SDI 1 in concert.
- **3Gb** - Output (SMPTE 424M) using a single-link transport.
- **RGB SMPTE** - When selected, sets the output to RGB SMPTE range video for the SDI output.
- **RGB Full** - When selected, sets the output to RGB full range video for the SDI output.

HDMI Screen

The Io XT/ 4K HDMI input and output are configured at this screen. For Io 4K UHD and 4K format setup, see *"HDMI Screen in 4K Mode" on page 46*.

Figure 16. AJA Io XT HDMI Screen



HDMI Output

- **Source** - This pulldown menu allows you to select either the primary video format (framebuffer) or (if conversion is supported) a secondary one (up/down/cross-conversion).

- **Protocol** - This pulldown allows you to choose either “HDMI” or “DVI” protocol—use DVI if you’re outputting to a DVI monitor using an HDMI to DVI adapter.
- **RGB Range** - This pulldown lets you configure video output range. Choose from SMPTE or Full.
- **Color Space** - This pulldown lest you select from RGBA8bit, RGB10bit, or YCbCr10bit.
- **Audio Channels** - This pulldown allows you to select the number of embedded audio channels for the HDMI output.
- **Stereo 3D** - This pulldown lets you to select either Side-by-Side or Top-Bottom (Stacked) output of left-eye and right-eye signals.

*NOTE: This selection must agree with format selection in the third-party CineForm Codec (**NOT** included with AJA Io XT) pulldown menu.*

HDMI Input The detected HDMI input video format is displayed and you’re given a chance to configure the RGB range (SMPTE or FULL) and select any two embedded channel pairs from those supplied for stereo output (if applicable).

Analog Out Screen (Io XT Only)

Io XT provides a high-quality analog component or composite + Y/C output, generally used for monitoring. This screen shows the current settings for that analog output, and allows you to re-configure it when desired.

Figure 17. AJA Control Panel, Analog Out Screen



Analog Output Select Primary or Secondary (any conversion applied) for the analog output; if a conversion is applied, you’ll see the conversion icon appear on the block diagram. Next, select the video format from the *Format* pulldown.

Analog formats can be:

- Composite +Y/C (one composite output *and* a simultaneous Y/C [S-Video] output)
- Component (SMPTE/EBU N10)
- Component (Beta)
- Component (RGB)

Audio Monitor Here you select which two channels will be mapped to the analog audio stereo output (headphone jack).

Video Setup Screen

The Video Setup screen shows various other settings which will affect how video inputs and outputs behave, and how Io XT/4K interacts with some software applications.

Figure 18. AJA Control Panel, Video Setup Screen



Analog Black Level (in Io XT only) Choices available for Black Level are the two Composite analog formats. Choices presented are for US or Japan:

- 7.5 IRE (NTSC US)
- 0 IRE (NTSC Japan) 56

Progressive Formats Radio buttons allow you to choose between *psf* (progressive segmented frames) and *p* (progressive frames) non-interlaced output. This feature is used to default the hardware to use either p or psf output over SDI when it has not been specified by the application.

VANC Checkbox When checked ON, the VANC checkbox tells the Io XT to capture and process any ancillary data in the SDI stream. This can include Closed Captioning data, and other types of metadata. Applications such as Premiere Pro and Final Cut Pro will not capture or output this data through the Io XT, if this box is not checked on.

NOTE: Io4K does not require enabling the VANC checkbox for Closed Captioning.

VOut Filters These controls enable/disable output capabilities in the Quicktime VOut filter. This filter is used by older applications that are built on legacy Quicktime architecture such as FCP7, AJA TV, VTR Exchange, and older versions of After Effects. Boxes that are checked

will define what framerate and resolution types will appear in the list of available formats in the AJA hardware. For example, if 25/50 is unchecked, then all resolution/framerate combinations with 25 or 50 fps will not appear in the list of capabilities for the installed AJA hardware, when using software that relies on the Quicktime VOut filter.

Audio Setup Screen

This screen shows the current settings for the analog audio output, allowing you to re-configure it when desired.

Figure 19. AJA Control Panel, Audio Setup Screen



Lock Audio Gain To Unity When set, the Io XT will ignore the third-party application's gain setting and set the audio gain at unity. When not set, this checkbox tells the Io XT to get the audio gain setting from the editing application (if supported).

Analog Audio Monitor Level This selection determines the audio level that will appear at the analog audio outputs ("FSD" is full-scale-deflection reading as measured on a VU meter). Select +18 for Europe or +24 for USA.

Audio Delay Here you can set up to 6 frames (in tenths of a frame) of delay for the AJA device's audio input and output. The AJA Control Panel delays all audio outputs—SDI, HDMI, and Analog

IMPORTANT: If you use this Control Panel delay, do not use other delay settings in your applications. They can conflict.

Conversion Screen (Mac OS only)

This screen offers controls that determine how the card behaves with 3rd-party applications.

NOTE: This screen is present in the Mac version of AJA Control Panel only and not all applications support these functions.

Figure 20. AJA Control Panel, Conversion Screen



Software Conversion These parameters can affect pulldown and pause behavior. This group of software conversion parameters apply ONLY when using legacy quicktime based applications on Mac OS. These applications include things like FCP7, VTR Exchange, and AJA TV. Applications like FCPX, Premiere Pro, Media Composer and Control Room, no longer use these legacy Quicktime Components.

3:2 Pulldown Pattern The value selected from this list is used whenever, due to format selection, you've chosen to do 24 frames-per-second to 30 conversion where extra fields will be added to pad the existing ones. Depending on video content, selection of different field patterns may be useful in reducing jitter due to the content of adjacent fields. The numbers in the pattern choices specify the frequency with which inserted fields will be repeated. For example, "2:3:2:3" means duplicate a field twice, then the next field three times, then the next twice, and then back to three times.

3:2 Pulldown Offset The 3-2 Pulldown offset is used if the 3-2 pulldown feature is removing the wrong frames. This setting lets you adjust when the pulldown begins in a sequence of frames.

Figure 21. Conversion Screen Frame-padding Pattern Choices



Pause On These two choices determine what happens when the editing application is paused in stop mode:

- *Full Frame:* both fields are displayed resulting in some jitter while paused.
- *Single Field:* a single field is displayed, showing no flicker (useful when color correcting or whenever the flickering would be a distraction).

YUV-RGB Conversion

These pulldowns select industry standard color space and gamma transfer functions for the YUV-RGB conversion, or allow you to direct Io XT to automatically determine it for you.

Colorspace Choose from:

- Rec 601
- Rec 709
- Auto

Gamma Choose from the following:

- Linear (1.8)
- Rec 601 (2.20)
- Rec 709 (2.22)
- Auto

DS Keyer Screen

The Io XT and Io 4K have a hardware-based downstream keyer that is ideal for putting logos, “bugs” or other video material with an alpha channel on top of video being played out or printed to tape.

NOTE: The Io 4K does not support Downstream Keying in UHD and 4K formats.

A typical application would be putting a television station's call letters or channel over program video content. Keyed video can be from the Io XT internal Frame Buffer (from storage, video In, etc.) or from a graphics file that has an alpha channel (PhotoShop etc.).

Settings in the DS Keyer Screen provide control over how the keyer operates and whether it's turned on or off.

Figure 22. AJA Control Panel, Downstream Keyer Screen



Mode Downstream Keyer Off - When this pulldown menu item is selected the downstream keyer will be turned off

- Frame Buffer over Matte - Places the keyed video with alpha channel currently in the Frame Buffer over a fixed color matte determined by the “Matte Color” setting set separately.
- Frame Buffer over Video In - Places the keyed video currently in the Frame Buffer over the video input for playout or print-to-tape.
- Graphic over Matte - Places a graphics file having an alpha channel (chosen in “Graphic File” pulldown) over a fixed color matte determined by the “Matte Color” setting set separately.
- Graphic over Video In - Places a graphics file having an alpha channel (chosen in “Graphic File” pulldown) over the video input for playout or print-to-tape.
- Graphic over Frame Buffer - Places a graphics file having an alpha channel (chosen in “Graphic File” pulldown) over the current contents of the Io XT Frame Buffer (which might be from storage, video In, etc.).

Matte Color Only available when the pulldown “Frame Buffer over Matte” or “Graphic over Matte” are selected-pressing this button brings up a color selection dialog. The dialog provides a variety of ways to select a matte color including a color wheel, color picker (choose from a location anywhere on the computer screen), numeric sliders, swatches, “crayons”, and spectrums. The matte chosen will be used as a video background under the keyed video.

Foreground pre-multiplied (checkbox) Use to avoid “matte lines” and improve the appearance of the foreground (key) being composited over the background.

Audio Out

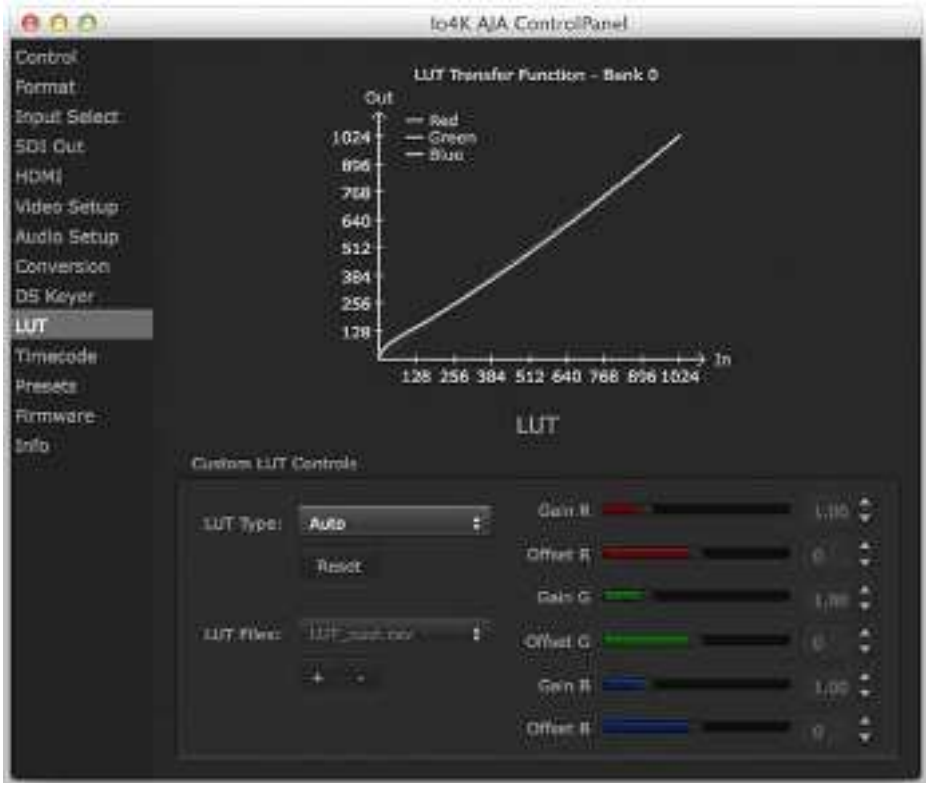
- Frame Buffer - Select audio out to be routed from the Frame Buffer.
- Audio In- Select audio out to be routed from the Io XT’s selected input(s).

Graphic File This pulldown allows you to choose from any recently accessed file or select a new file ("Load File..."), which then brings up a file dialogue. Remember that the file raster (pixel x pixel count) should match the primary format in the frame buffer or the secondary format if up-converting. Example: you wish to key a logo on top of your 1920x1080 footage, the still image with alpha channel that you load should be 1920x1080.

LUT Screen

Users can specify their own custom LUTs by creating a LUT file and uploading it to an AJA Video Device using the LUT (lookup table) screen in the Control Panel. You can create a custom LUT file using most text editors or spread sheets, provided the data is arranged according to the LUT File Format Specification that follows (see *"LUT File Format Specification" on page 36*).

Figure 23. LUT Screen



Uploading Custom User LUT file

Once the LUT file is created, you can upload it with the following steps:

1. Before loading a LUT, make sure you are using an RGB/RGBA frame buffer format, and that you have a AJA Video Device that supports LUTs.
2. Open AJA Control Panel and select the "LUT" pane.
3. Click the "LUT Type" popup and choose "User LUT File" menu item. Note "LUT Files" options become enabled.
4. Click the "+" button and use the navigation dialog to choose a custom LUT file. The LUT is now loaded.

LUT File Format Specification

LUT files are normal text files that contain 1025 lines (numbered 0 - 1024). Each line contains 3 integer values in the range 0 - 1023, representing 10 bit R, G, B component output values. Component values may be separated by one or more commas, spaces, or tabs. The example below show LUT File contents for Line 0, Line 1, Line 2, and Line 1024, with several valid ways to separate the numbers in a line.

- 16, 17, 17
- 17 18 18
- 19 19 21
- …
- 1000, 1022, 1023

In the example above, the first line (Line 0) represents the output values for the case where R=0, G=0, or B=0. In other words, if the R component of a pixel is set to 0, then set R component value to 16. Likewise, if G is set to 0, then set G to 17. The second line (Line 1) does a similar thing for input component values equal to 1.

A simple way to construct a LUT file is to use a Spreadsheet like Excel. Simply fill 3 columns and 1025 rows with LUT data, and save the result as a "CSV" file.

Timecode Screen

Figure 24. AJA Control Panel, Timecode Screen



The Timecode screen:

- Selects the timecode stream read for applications that use it (for example, AJA Control Room, when the timecode source is set to *"Use control panel setting,"* will read the selected stream)
- Is used for monitoring the RP-188 timecode embedded in the digital data stream
- Is used for selecting a timecode offset (if required)

Timecode Input Settings

RP-188 Timecode <n> In RP-188 timecode (SMPTE 12M-gg2) there can be multiple timecode types in the data stream. Use this pull-down to select the one you wish to monitor:

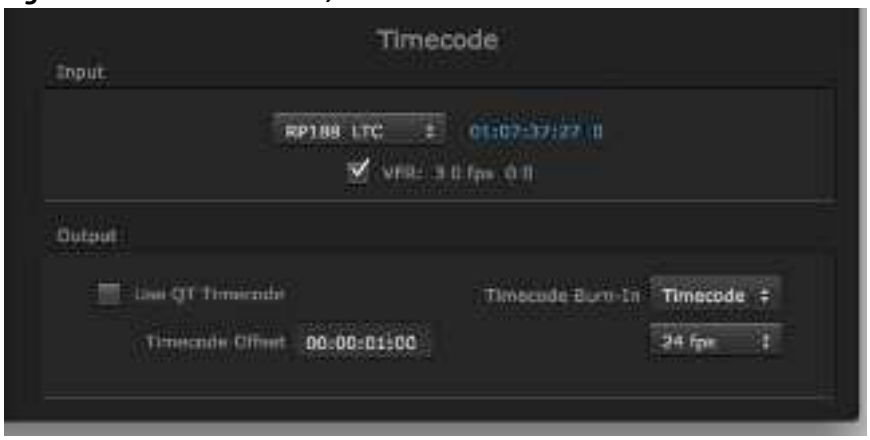
- RP188 LTC (Linear timecode)
- RP188 VITC 1 (Vertical Interval timecode)
- RP188 VITC 2
- LTC Port input

The selection will be displayed in the timecode value displayed to the right of the pull-down.

User Bits For monitoring a variable framerate (VFR) timecode (such as Varicam), you may wish to check the User-bits box. If you set this checkbox, Io XT/4K will detect and interpret the user-bits and display them next to the checkbox. You will see the original framerate (30 fps in the figure below) followed by the adjusted frame padding (two digits reporting discarded and retained frame padding).

NOTE: SMPTE 12M-2 is the updated name and specification for what was RP-188.

Figure 25. AJA Control Panel, Timecode Screen



Timecode Output Settings

Use QuickTime Timecode (Mac OS Only) This feature is for Final Cut Pro 7 (or earlier), VTR Exchange, and AJA TV only. When checked, it directs Io XT/4K to output timecode from the QuickTime timecode track.

Timecode Burn-in This pulldown selects whether the timecode value is displayed in a "burned-in" window in video output. If set to "OFF", timecode will not be keyed over the video. If set to "Timecode", then the timecode value will be keyed over the output video for all of the Io XT/4K outputs. This can be useful for synchronizing, choosing edit points, dailies, and many other purposes.

Timecode Offset When QuickTime timecode in disabled, this text entry field allows you to generate a timecode based on the offset entry. You can select a framerate from the pulldown menu at the right side of the pane. Use that same value here as the source video 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.

Presets Screen

After configuring the AJA Control Panel screens, you can then save all your settings as a snapshot for later recall—called a *preset*. In this way, you can organize presets for all your typical tasks, eliminating time-robbing manual reconfiguration each time. To save a preset, simply go to the Presets screen and click "Save Preset". A dialog will be presented asking you for a name; enter a meaningful name and click "OK". Thereafter the preset will be available under the Control Panel "Presets" list.

Figure 26. Presets Screen



Loading and Saving Presets

From the Presets screen you can manage your collection of presets easily. To Load or Delete a stored preset, just select it with your mouse and then click the "Load Preset" or "Delete" button respectively.

Transferring Saved Presets

If you want to use a saved Preset on another workstation, you can simply copy the file on removable storage and install it at the new location. The Preset file is always stored at:

- ~/Library/Application Support/AJA/<device name> Presets/ [on Mac]
- c:\Users\<username>\AppData\Local\AJA\Control Panel\<device name> Presets\ [Windows 8]

Reset to Default When you click the 'Reset to default' button the control panel will delete the User's preference file and do one of the following:

- If “Shared” preferences exist, they are reloaded and the device is set to this state.
- If the “Shared” preferences file does not exist, “factory defaults” are loaded and the device is set to this state.

Erase all Prefs For technical support purposes you may be required to remove Preference settings. This button automates that function. If activated, all your preference setting will be lost.

Firmware Screen

Use the Firmware screen to access the firmware install screen. Click install to erase current firmware and load the firmware version contained in your current driver installation. Note the Installation message shown below.

Figure 27. Firmware Update



You will be required to power-cycle your computer and Io XT/4K to finish the update.

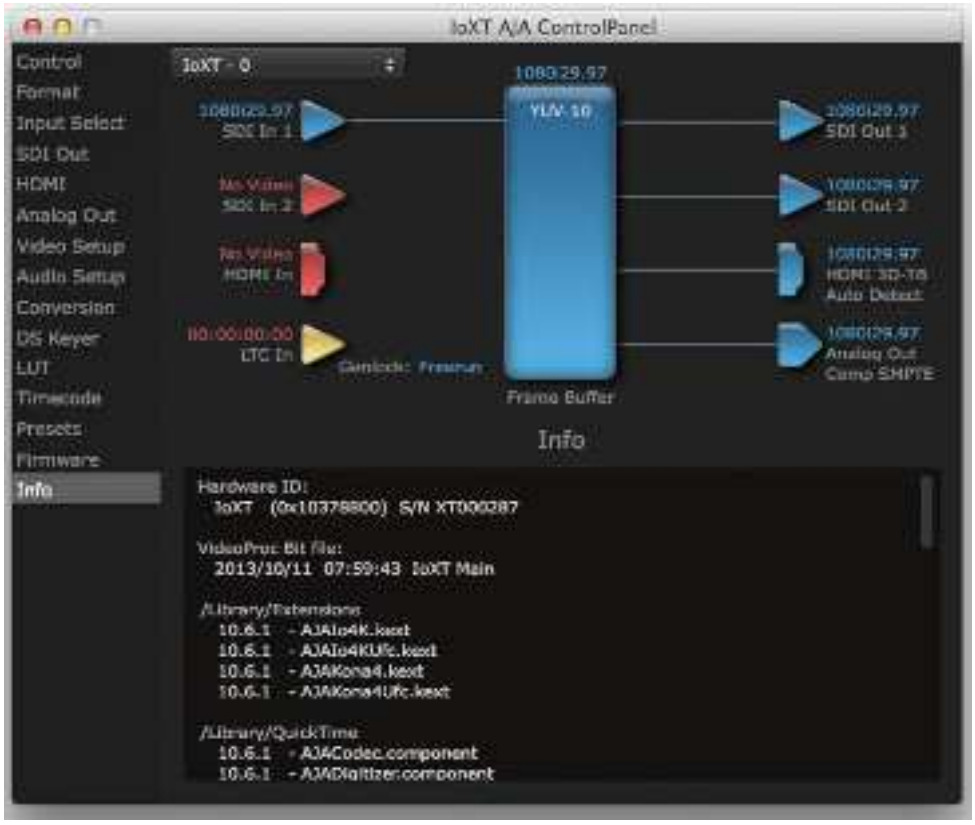
Figure 28. Update Completed



Info Screen

This screen shows the Io XT/4K 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.

Figure 29. Information Screen in Standard Mode



Using Io 4K for UHD/4K

This section describes the AJA Control Panel operations specific to Io4K in 4K Mode. Note that in 4K Mode, you can still capture and playback SD, HD, and 2K formats, though there are no up/down/cross conversions available.

4K Transport Modes

The 4K and UHD SDI formats can use different transport modes, associated with the number of links used to transport the signal, the data rates involved, and the way the image data is organized. Io4K in 4K Mode supports both Quadrant and Two Sample Interleave (2SI) transport standards. Many different combinations of modes and data organization exist. In 4K mode, besides single link transport SD, HD and 2Ksignals, Io4K also supports the following transport modes for UHD and 4K:

- Quadrant 4-wire (transported on four links)
- Quadrant 2-wire (transported on two links)
- 2SI (two or four links automatically selected)

The amount of data in the signal affects the number of links and data rates necessary to carry that signal.

Quadrant Mode

In Quadrant Mode you can input (for capture) or output four channels of SDI HD 1080 or 2K video at 30 fps or less, representing individual quadrants of the higher definition UHD 3840x2160 or 4K 4096x2160 4K formats. Physical connections of the quadrants will be mapped to the SDI connectors as shown. Monitoring one of these HD signals on a standard SDI monitor will display one quadrant of the picture.

Figure 30. Mapping of Quad SDI Outputs



For UHD and 4K frame rates higher than 30, the same mechanism can be used to transport four 3G signals.

2SI Mode

Two Sample Interleave is an alternative method to organize the data of SDI UHD and 4K formats. Instead of dividing the picture raster into quadrants, this method samples pixels to create four lower resolution versions of the entire picture. These are combined later to create the full resolution image.

Figure 31. Mapping of 2SI Outputs



For 2SI UHD or 4K SDI video at 30 fps or less, monitoring one of these four signals on a standard SDI monitor displays the entire picture, but at a lower resolution. Above 30 fps, 3G bandwidth is required, so this type of signal cannot be monitored on a standard SDI monitor using only one connector.

NOTE: In some versions of AJA Control Panel, the 2SI method is referred to as '425' which is a reference to the SMPTE 425 standard which defines this method.

2-Wire and 4-Wire Modes

Using higher data rates, it is possible to carry UHD and 4K signals on two SDI links, instead of four. In this situation, half (two quarters) of the image data is carried on one link, with the other half carried on the other link. These types of signals also cannot be viewed on a standard SDI monitor using one connector.

You can choose 2-wire or 4-wire input and output (depending on the type of signal). If the number of links selected is not sufficient, the number of links is automatically increased to accommodate the signal. UHD or 4K SDI signals 30 fps and below can be input and output simultaneously, using two connectors in each direction. However, all four connectors are required above 30 fps. You will be able to either input or output a high frame rate SDI signal, not both at the same time. In this situation, you can use the HDMI output or a down-converted Analog output to monitor the input signal.

Specifying the number of wires for output forces Quadrant mode. You cannot specify the number of links when 2SI output is selected (the lowest number of links will be set automatically).

Control Screen in 4K Mode

Besides SD and HD input and output, 4K mode permits UHD or 4K input and/or output over 2 or 4 links.

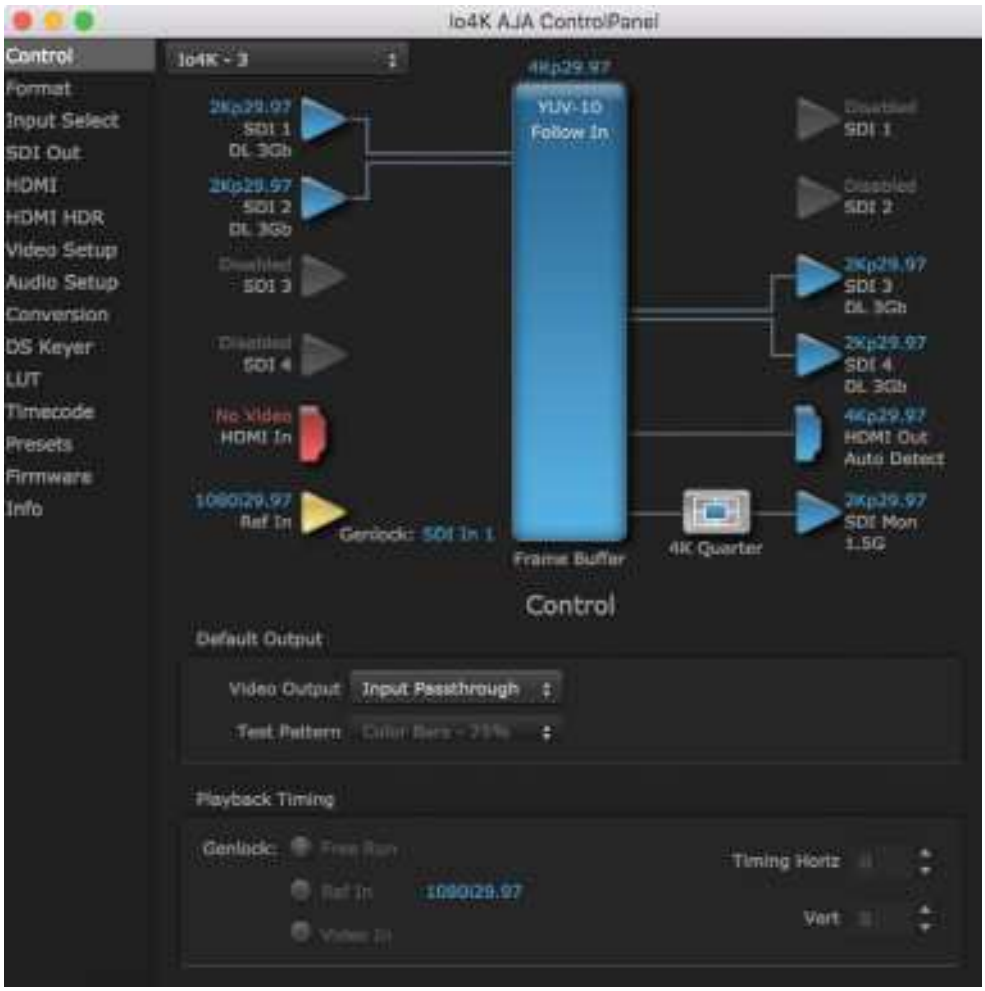
For example, setting the Control Screen Default Video Output to Input Passthrough with a UHD 29.97 four link input connected, and selecting UHD/4K 4-wire Source on the Input Select menu, four connectors are used receive the signal to process. UHD signals report their links as1080. No SDI BNC output connectors are available for use.

Figure 32. Control Screen with UHD 4 Link Input



If a 4K 29.97 two link input is connected and a UHD/4K 24-wire Source is selected on the Input Select menu, two BNC connectors are used for input, allowing the other two to be used for SID output. 4K signals report their links as 2K.

Figure 33. Control Screen with 4K 2 Link Input and Output



4K Controlled Mode

Alternatively, if you launch an appropriate control application (such as AJA Control Room), the SDI input and output ports will be mapped automatically. If you connect a UHD or 4K input signal higher than 30 fps, all four BNCs are required for SDI input or output. You can use the HDMI output to monitor an input signal.

Figure 34. Control Screen with a Controlling Application



SDI Output Screen in 4K Mode

The SDI Output Screen allows you to select the Primary format or RGB for 4K output, same as Std or UFC Mode. Video+Key and Stereo 3D are only available for SD, HD, or 2K formats.

Figure 35. SDI Output Screen with 4K Format



Additional 4K related settings are available in 4K mode.

Transport Select from:

- Auto - Set automatically based on input.
- Dual Link - Output (SMPTE 372M) using SDI 1 and SDI 1 in concert.
- 3Gb - Output (SMPTE 424M) using a single-link transport.

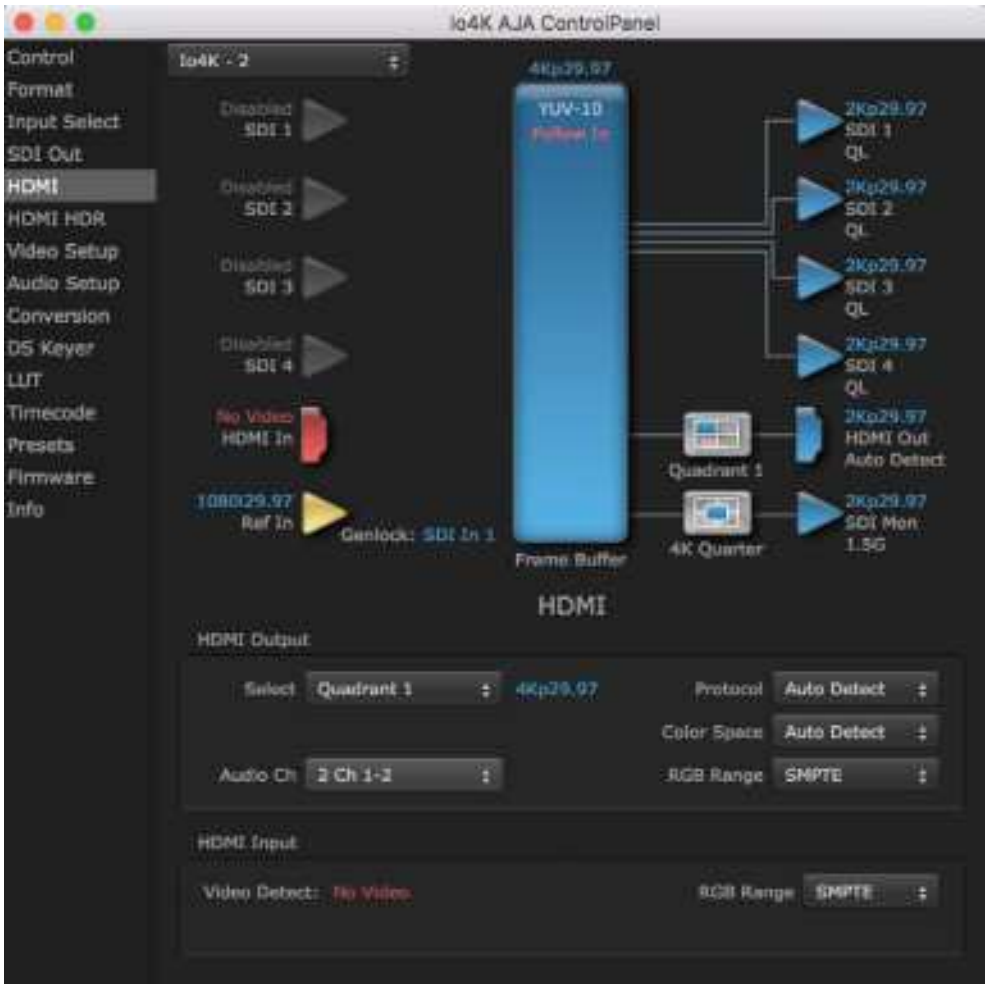
4K Transport Select from:

- Quadrant 4-Wire
- Quadrant 2-Wire
- 2SI (Two Sample Interleave)

HDMI Screen in 4K Mode

The HDMI screen allows you to make the same selections previously described for Standard Mode when an SD, HD, or 2K format is selected.

Figure 36. HDMI Output Screen with Quad HD Output Configuration



For UHD/4K formats, an HDMI monitor output Select menu is available to choose:

- Primary – the full 4K or UHD format
- 4K 1/2 Framerate – outputs every other frame
- 4K Quarter – a downconversion to 2K x 1080 in 4K or 1920 x 1080 for UHD.
- A single Quadrant (1, 2, 3, or 4) of the 4K or UHD signal (see the discussion on 4K quadrant mapping at this beginning of this section).

Figure 37. HDMI 4K Quadrant Selection Menu



HDMI HDR Screen

The HDMI-HDR screen provides a mechanism to inform an HDMI sink device (such as a TV or monitor) that the video content is HDR encoded. This includes generation of the Dynamic Range and Mastering Infoframe and the static metadata descriptors as defined in CTA-861.3 and HDMI v2.0a. Included are pre-canned primaries values for BT.2020 and DCI P3 color gamuts.

Figure 38. HDMI HDR Screen with 4K Primary Format



HDR Mode

- Off - HDR Mode disabled (default).
- DCI-P3 D65
- BT-2020
- Custom - Allows custom values for the Digital Primaries.

EOTF The Electrical Optical Transfer Function metadata bit tells the HDMI display which EOTF to use. Most TV's will require this to be set to ST 2084 for their HDR modes.

Ext. Color Most TV's require this be set to Non-Const Luma to go into their HDR modes.

Video Setup Screen in 4K

4K Mode adds the 4K Geometry selection (check box). Like other raster sizes, the Geometries checkbox for *4K* needs to be enabled for the format to be presented and selectable in applications like AJA VTR Xchange and AJA TV.

Figure 39. QuickTime Video Output Filter 4K Geometry Checkbox



No Downstream Keyer in 4K Mode

The Downstream Keyer is not available for use in 4K Mode. If you select the tab, you will see: “Keyer does not support 4K video formats

Chapter 4: 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 makes 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.

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. Virus checking software running in the background (disable it). 2. 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* screen of the Io XT Control Panel application. Also check equipment cables.
Dropped frames during playback	Look for scroll bars in the viewer or canvas as a warning sign that the zoom setting exceeds the fit-t-window.
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 for software updates.

For Io XT, visit:

http://www.aja.com/en/products/io-xt/#support

For Io 4K, visit:

www.aja.com/en/products/io-4k#support

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. Even if you cannot find the cause of the problem, having this information at hand will help when you call 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 3rd-party software operational issue, Mac system issue, then call Apple Customer Support or the 3rd-party software manufacturer for help.

If the problem is an AJA Video Io XT issue, then contact AJA Video Customer Support.

Appendix A: Specifications

Io XT Specifications

Video Formats

- 525i 29.97
- 525i 23.98*
- 625i 25
- 720P 23.98*, 24 *, 25 *, 29.97*, 30 *, 50, 59.94, 60
- 1080i 25, 29.97, 30
- 1080PsF 23.98, 24, 25, 29.97, 30
- 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- 2Kx1080p 23.98, 24, 25
- 2Kx1080PsF 23.98, 24, 25

Software-dependent Formats

* These formats are dependent on specific software functionality and are not normal 'over-the-wire' formats.

- 720P 23.98, 24, 25, 29.97, 30

Video Input

- 3G-SDI, SMPTE-259/292/296/424, 10-bits
- Single Link 4:2:2 or 4:4:4 (1 x 3G BNC)
- dual link HD 4:4:4, (2 x BNC)
- HDMI v1.3
- 1D LUT Support (Mac and PC)

Video Output Digital

- 3G-SDI, SMPTE-259/292/296/424
- Single link 4:2:2 or 4:4:4 (1 x BNC)
- dual link HD 4:4:4, (2 x BNC)
- HDMI v1.4, 30/36 bits/pixel, RGB or YUV, 2.25Gbps

Video Output Analog

- Composite/S-Video (Y/C) (1 x BNC/2x BNC+adapter)
- NTSC, NTSCJ, PAL
- Component (3 x BNC)
- HD: YPbPr, RGB
- SD: YPbPr, RGB (component mode)
- SMPTE/EBU N10, Betacam 525 line, Betacam 525J, RGB
- 12-bit D/A, 8x oversampling
- +/- .2 dB to 5.0 MHz Y Frequency Response
- +/- .2 dB to 1 MHz C Frequency Response
- .5% 2T pulse response
- <1% Diff Phase
- <1% Diff Gain
- <1 ns Y/C delay inequity

Audio Input Digital

- 16-channel, 24-bit SMPTE-259 SDI embedded audio, 48kHz sample rate, Synchronous
- 8-channel, 24-bit HDMI embedded audio, 48kHz sample rate, Synchronous

Audio Output Digital	• 16-channel, 24-bit SMPTE-259 SDI embedded audio, 48kHz sample rate, Synchronous • 8-channel, 24-bit HDMI embedded audio, 48kHz sample rate, Synchronous
Audio Output Analog	• 8-channel, 24-bit D/A analog audio, 48kHz sample rate, balanced, using industry-standard 8 x XLR on DB-25 breakout cable (Breakout cable NOT included) • +24dbu Full Scale Digital (0dbFS) • +/- 0.2db 20 to 20kHz Frequency Response
Downstream Keyer	• Supports graphics with alpha channel over video, matte or framebuffer, or framebuffer content over incoming video or matte.
Up-Conversion	• 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 side bars • 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
Cross-conversion	• Hardware 10-bit • 1080i to 720P • 720P to 1080i • 720P to 1080PsF
SD to SD aspect ratio conversion	• Letterbox: This transforms SD anamorphic material to a letterboxed image • H Crop: Will produce a horizontally stretched effect on the image; transforms anamorphic SD to full frame • SD Pillarbox: Will produce an image in the center of the screen with black borders on the left and right sides and an anamorphized image in the center • V Crop: Will transform SD letterbox material to an anamorphic image

Reference Input or LTC Input	• 1 BNC assignable to Reference video or LTC input
	• Reference:
	  • Analog Color Black (1V) or Composite Sync (2 or 4V)
	  • Non terminating

Power:	• 10-20V, 18W typical, 22W max
Safe Operating Temperature Range:	• 0C to 40C (32F to 104F)

Machine Control

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

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

Io 4K Specifications

Video Formats

- SD
  - 525i 29.97
  - 625i 25
- HD
  - 720P 50, 59.94, 60
  - 1080i 50, 59.94, 60
  - 1080PsF 23.98, 24, 25, 29.97, 30
  - 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- 2K
  - 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
  - 2048 x 1080PsF 23.98, 24, 25, 29.97, 30
- 4K
  - 3840 x 2160P 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
  - 3840 x 2160PsF 23.98, 24, 25
  - 4096 x 2160P 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
  - 4096 x 2160PsF 23.98, 24, 25

NOTE: High Frame Rate support is dependent on Thunderbolt speed. Not all systems will support all frame rates.

Video Input

- 3G-SDI, SMPTE-259/292/296/424, 8 -or 10-bits
- Single Link 4:2:2 or 4:4:4 (1 x BNC)
- Dual Link HD 4:4:4 (2 x BNC)
- 2K HSDL (High Speed Data Link) 4:4:4, (2 x BNC)
- 4K/UltraHD 4:4:4 (4 x BNC)
- HDMI v1.4
  - 30/36 bits/pixel, RGB or YUV, 2.25Gbps
  - SD, HD, 2K, and UHD

Video Output

- 3G-SDI, SMPTE-259/292/296/424, 8 -or 10-bits
- Single Link 4:2:2 or 4:4:4 (1 x BNC)
- Dual Link HD 4:4:4 (2 x BNC)
- 2K HSDL (High Speed Data Link) 4:4:4, (2 x BNC)

- 4K/UltraHD 4:4:4 (4 x BNC)
- HDMI v1.4
- 30/36 bits/pixel, RGB or YUV, 2.25Gbps
- SD, HD, and 2K. UHD with HFR support up to 60p 4:2:0

Audio Input Digital
- 16-channel, 24-bit SDI embedded audio, 48kHz sample rate, Synchronous
- 8-channel, 24-bit HDMI embedded audio, 48kHz sample rate, Synchronous

Audio Output Digital
- 16-channel, 24-bit SDI embedded audio, 48kHz sample rate, Synchronous
- 8-channel, 24-bit HDMI embedded audio, 48kHz sample rate, Synchronous

Audio Output Analog
- 8-channel, 24-bit D/A analog audio, 48kHz sample rate, balanced, using industry-standard 8 x XLR on DB-25 breakout cable (Breakout cable NOT included)
- +24dbu Full Scale Digital (0dbFS)
- +/- 0.2db 20 to 20kHz Frequency Response

Downstream Keyer
- Supports graphics with alpha channel over video, matte or framebuffer, or framebuffer content over incoming video or matte.

4K/UHD Down-Conversion
- Real time, dedicated 4K down-conversion output (1 x BNC)
- 4K to 2K down-conversion
- UltraHD to HD down-conversion

Reference and LTC I/O
- 1x BNC LTC Output
- 1 x BNC assignable to Reference video or LTC input
- Reference:
  - Analog Color Black (1V) or Composite Sync (2 or 4V)
  - Non-terminating

Power
- 10-20V, 23W typical, 28W max

Safe Operating Temperature Range:
- 0 to 35C (32F to 95F)

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

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

Appendix B: Safety and Compliance

Federal Communications Commission (FCC) Compliance Notices

Class A Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15, Subpart B of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian ICES Statement

Canadian Department of Communications Radio Interference Regulations

This digital apparatus does not exceed the Class A limits for radio-noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class A digital apparatus complies with Canadian ICES-003.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada. Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

European Union and European Free Trade Association (EFTA) Regulatory Compliance

This equipment may be operated in the countries that comprise the member countries of the European Union and the European Free Trade Association. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:

AUSTRIA, BELGIUM, BULGARIA, CYPRUS, CZECH REPUBLIC, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, IRELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM, ICELAND, LICHTENSTEIN, NORWAY, SWITZERLAND

Declaration of Conformity

Marking by this symbol indicates compliance with the Essential Requirements of the EMC Directive of the European Union 2014/30/EU.

CE This equipment meets the following conformance standards:

Safety: EN 60065: 2002 + A1: 2006 + A11: 2008 + A2: 2010 + A12: 2011 (GS License)

IEC 60065: 2001 + A1: 2005 + A2: 2010 (CB Scheme Report/Certificate)

Additional licenses issued for specific countries available on request.

Emissions: EN 55032: 2012, EN 55022: 2010, CISPR 22: 2008

EN 61000-3-2: 2014, EN 61000-3-3: 2013

Immunity: EN 55103-2: 2009

61000-4-2: 2009, EN 61000-4-3: 2006 + A1: 2008 + A2: 2010,

EN 61000-4-4: 2004 + A1: 2010, EN 61000-4-5: 2006,

EN 61000-4-6: 2009, EN 61000-4-11: 2004

Environments: E2, E3 and E4

The product is also licensed for additional country specific standards as required for the International Marketplace.

	**Warning!** This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures. Achtung! Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist. Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l?utilisateur de prendre les mesures spécifiques appropriées.

Recycling Notice

	This symbol on the product or its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.

Korean KCC Compliance Statement

A급 기기 (업무용 방송통신기자재) Class A (Broadcasting Communication Equipment for Office Use)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다. As an electromagnetic wave equipment for office use (Class A), this equipment is intended to use in other than home area. Sellers or users need to take note of this.

Taiwan Compliance Statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻
干擾，在這種情況下，使用者會被要求採取某些適當的對策。

This is a Class A product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japanese Compliance Statement

1. Class A ITE

この装置は、クラスA 情報技術装置です。この装置を家庭環境で使用すると電波妨害

を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求され

ることがあります。ＶＣＣＩ－A

This is a Class A product based on the standard of the VCCI Council (VCCI V-3/2015.04). If this equipment is used in a domestic environment, radio interference may occur, in which case, the user may be required to take corrective actions.

Chinese Compliance Statement

This product has been tested to the following Chinese standards:

GB13837-2012, GB8898-2011, and GB17625.1-2012

This product meets the requirements of implementation rules for compulsory certification (REF NO. CNCA-01C-17:2010) under certificate numbers 2012010805541543 and 2014010805686912.

Translated Warning and Caution Messages

The following caution statements, warning conventions, and warning messages apply to this product and manual..

 Warning Symbol  Caution Symbol

Before Operation Please Read These Instructions



Warning!

Read and follow all warning notices and instructions marked on the product or included in the documentation.

Avertissement ! Lisez et conformez-vous à tous les avis et instructions d'avertissement indiqués sur le produit ou dans la documentation.

Warnung! Lesen und befolgen Sie die Warnhinweise und Anweisungen, die auf dem Produkt angebracht oder in der Dokumentation enthalten sind.

¡Advertencia! Lea y siga todas las instrucciones y advertencias marcadas en el producto o incluidas en la documentación.

Aviso! Leia e siga todos os avisos e instruções assinalados no produto ou incluídos na documentação.

Avviso! Leggere e seguire tutti gli avvisi e le istruzioni presenti sul prodotto o inclusi nella documentazione.



Warning!

Do not use this device near water and clean only with a dry cloth.

Avertissement! N'utilisez pas cet appareil près de l'eau et nettoyez-le seulement avec un tissu sec..

Warnung! Das Gerät nicht in der Nähe von Wasser verwenden und nur mit einem trockenen Tuch säubern.

¡Advertencia! No utilice este dispositivo cerca del agua y límpielo solamente con un paño seco.

Aviso! Não utilize este dispositivo perto da água e limpe-o somente com um pano seco.

Avviso! Non utilizzare questo dispositivo vicino all'acqua e pulirlo soltanto con un panno asciutto.



Warning!

Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

Avertissement ! Ne bloquez aucune ouverture de ventilation. Suivez les instructions du fabricant lors de l'installation.

Warnung! Die Lüftungsöffnungen dürfen nicht blockiert werden. Nur gemäß den Anweisungen des Herstellers installieren.

¡Advertencia! No bloquee ninguna de las aberturas de la ventilación. Instale de acuerdo con las instrucciones del fabricante.

Aviso! Não obstrua nenhuma das aberturas de ventilação. Instale de acordo com as instruções do fabricante.

Avviso! Non ostruire le aperture di ventilazione. Installare in conformità con le istruzioni del fornitore.



Warning!

Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Avertissement ! N'installez pas l'appareil près d'une source de chaleur telle que des radiateurs, des bouches d'air de chauffage, des fourneaux ou d'autres appareils (amplificateurs compris) qui produisent de la chaleur.

Warnung! Nicht in der Nähe von Wärmequellen wie Heizkörpern, Heizregistern, Öfen oder anderen Wärme erzeugenden Geräten (einschließlich Verstärkern) aufstellen.

¡Advertencia! No instale cerca de fuentes de calor tales como radiadores, registros de calor, estufas u otros aparatos (incluidos amplificadores) que generan calor.

Aviso! Não instale perto de nenhuma fonte de calor tal como radiadores, saídas de calor, fogões ou outros aparelhos (incluindo amplificadores) que produzam calor.

Avviso! Non installare vicino a fonti di calore come termosifoni, diffusori di aria calda, stufe o altri apparecchi (amplificatori compresi) che emettono calore.



Warning!

Refer all servicing to qualified service personnel. Servicing is required when the device has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the device, the device has been exposed to rain or moisture, does not operate normally, or has been dropped.

Avertissement ! Référez-vous au personnel de service qualifié pour tout entretien. L'entretien est exigé quand l'appareil a été endommagé de quelque manière que ce soit, par exemple lorsque le cordon d'alimentation ou la prise sont endommagés, que du liquide a été versé ou des objets sont tombés dans l'appareil, que l'appareil a été exposé à la pluie ou à l'humidité, ne fonctionne pas normalement ou est tombé.

Warnung! Das Gerät sollte nur von qualifizierten Fachkräften gewartet werden. Eine Wartung ist fällig, wenn das Gerät in irgendeiner Weise beschädigt wurde, wie bei beschädigtem Netzkabel oder Netzstecker, falls Flüssigkeiten oder Objekte in das Gerät gelangen, das Gerät Regen oder Feuchtigkeit ausgesetzt wurde, nicht ordnungsgemäß funktioniert oder fallen gelassen wurde.

¡Advertencia! Consulte al personal calificado por cuestiones de reparación. El servicio de reparación se requiere cuando el dispositivo ha recibido cualquier tipo de daño, por ejemplo cable o espigas dañadas, se ha derramado líquido o se han caído objetos dentro del dispositivo, el dispositivo ha sido expuesto a la lluvia o humedad, o no funciona de modo normal, o se ha caído.

Aviso! Remeta todos os serviços de manutenção para o pessoal de assistência qualificado. A prestação de serviços de manutenção é exigida quando o dispositivo foi danificado mediante qualquer forma, como um cabo de alimentação ou ficha que se encontra danificado/a, quando foi derramado líquido ou caíram objectos sobre o dispositivo, quando o dispositivo foi exposto à chuva ou à humidade, quando não funciona normalmente ou quando foi deixado cair.

Avviso! Fare riferimento al personale qualificato per tutti gli interventi di assistenza. L'assistenza è necessaria quando il dispositivo è stato danneggiato in qualche modo, ad esempio se il cavo di alimentazione o la spina sono danneggiati, è stato rovesciato del liquido è stato rovesciato o qualche oggetto è caduto nel dispositivo, il dispositivo è stato esposto a pioggia o umidità, non funziona correttamente o è caduto.



Warning!

Disconnect the external AC power supply line cord(s) from the mains power before moving the unit.

Avertissement! Retirez le ou les cordons d'alimentation en CA de la source d'alimentation principale lorsque vous déplacez l'appareil.

Warnung! Trennen Sie die Wechselstrom-Versorgungskabel vom Netzstrom, bevor Sie das Gerät verschieben.

¡Advertencia! Cuando mueva la unidad desenchufe de la red eléctrica el/los cable(s) de la fuente de alimentación CA tipo brick.

Advertência! Remova os cabos CA de alimentação brick da rede elétrica ao mover a unidade.

Avvertenza! Scollegare il cavo dell'alimentatore quando si sposta l'unità.

	**Warning!** Only use attachments and accessories specified and/or sold by the manufacturer. **Avertissement!** Utilisez seulement les attaches et accessoires spécifiés et/ou vendus par le fabricant. **Warnung!** Verwenden Sie nur Zusatzgeräte und Zubehör angegeben und / oder verkauft wurde durch den Hersteller. **¡Advertencia!** Utilice solamente los accesorios y conexiones especificados y/o vendidos por el fabricante. **Aviso!** Utilize apenas equipamentos/acessórios especificados e/ou vendidos pelo fabricante. **Avviso!** Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore.



Warning!

Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Avertissement! La sécurité de la prise polarisée ou de la prise de type mise à la terre ne doit en aucun cas être empêchée de fonctionner. Une prise polarisée a deux broches, l'une étant plus large que l'autre. Une prise de type mise à la terre a deux broches et une troisième broche pour la mise à la terre. La broche large ou la troisième broche sont fournies pour votre sécurité. Si la prise fournie ne s'insère pas dans votre prise femelle, consultez un électricien pour le remplacement de la prise femelle obsolète.

Warnung! Der Sicherheitszweck des gepolten bzw. Schukosteckers ist zu berücksichtigen. Ein gepolter Stecker verfügt über zwei Pole, von denen einer breiter als der andere ist. Ein Schukostecker verfügt neben den zwei Polen noch über einen dritten Pol zur Erdung. Der breite Pol bzw. der Erdungspol dienen der Sicherheit. Wenn der zur Verfügung gestellte Stecker nicht in Ihren Anschluss passt, konsultieren Sie einen Elektriker, um den veralteten Anschluss zu ersetzen.

¡Advertencia! No eche por tierra la finalidad del tipo de enchufe polarizado con conexión a tierra. Un enchufe polarizado tiene dos espigas, una más ancha que la otra. Un enchufe con conexión a tierra tiene dos espigas iguales y una tercera espiga que sirve para la conexión a tierra. La expiga ancha, o la tercera espiga, sirven para su seguridad. Si el enchufe suministrado no encaja en el tomacorriente, consulte con un electricista para reemplazar el tomacorriente obsoleto.

Aviso! Não anule a finalidade da segurança da ficha polarizada ou do tipo ligação terra. Uma ficha polarizada tem duas lâminas sendo uma mais larga do que a outra. Uma ficha do tipo de ligação à terra tem duas lâminas e um terceiro terminal de ligação à terra. A lâmina larga ou o terceiro terminal são fornecidos para sua segurança. Se a ficha fornecida não couber na sua tomada, consulte um electricista para a substituição da tomada obsoleta.

Avviso! Non compromettere la sicurezza della spina polarizzata o con messa a terra. Una spina polarizzata ha due spinotti, di cui uno più largo. Una spina con messa a terra ha due spinotti e un terzo polo per la messa a terra. Lo spinotto largo o il terzo polo sono forniti per motivi di sicurezza. Se la spina fornita non si inserisce nella presa di corrente, contattare un elettricista per la sostituzione della presa obsoleta.



Warning!

Since the Mains plug is used as the disconnection for the device, it must remain readily accessible and operable.

Avertissement! Puisque la prise principale est utilisée pour débrancher l'appareil, elle doit rester aisément accessible et fonctionnelle.

Warnung! Da der Netzstecker als Trennvorrichtung dient, muss er stets zugänglich und funktionsfähig sein.

¡Advertencia! Puesto que el enchufe de la red eléctrica se utiliza como dispositivo de desconexión, debe seguir siendo fácilmente accesible y operable.

Aviso! Dado que a ficha principal é utilizada como a desconexão para o dispositivo, esta deve manter-se prontamente acessível e funcional.

Avviso! Poiché il cavo di alimentazione viene usato come dispositivo di sconnessione, deve rimane prontamente accessibile e operabile.



Warning!

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the device.

Avertissement! Protégez le cordon d'alimentation pour que l'on ne marche pas dessus ou qu'on le pince, en particulier au niveau des prises mâles, des réceptacles de convenance, et à l'endroit où il sort de l'appareil.

Warnung! Vermeiden Sie, dass auf das Netzkabel getreten oder das Kabel geknickt wird, insbesondere an den Steckern, den Steckdosen und am Kabelausgang am Gerät.

¡Advertencia! Proteja el cable de energía para que no se le pise ni apriete, en especial cerca del enchufe, los receptáculos de conveniencia y el punto del que salen del equipo.

Aviso! Proteja o cabo de alimentação de ser pisado ou de ser comprimido particularmente nas fichas, em tomadas de parede de conveniência e no ponto de onde sai do dispositivo.

Avviso! Proteggere il cavo di alimentazione in modo che nessuno ci cammini sopra e che non venga schiacciato soprattutto in corrispondenza delle spine e del punto in cui esce dal dispositivo.



Warning!

Unplug this device during lightning storms or when unused for long periods of time.

Avertissement! Débranchez cet appareil pendant les orages avec éclairsou s'il est inutilisé pendant de longues périodes.

Warnung! Das Gerät ist bei Gewitterstürmen oder wenn es über lange Zeiträume ungenutzt bleibt vom Netz zu trennen.

¡Advertencia! Desenchufe este dispositivo durante tormentas eléctricas o cuando no se lo utilice por largos periodos del tiempo.

Aviso! Desconecte este dispositivo da tomada durante trovoadas ou quando não é utilizado durante longos períodos de tempo.

Avviso! Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore, quali il treppiedi e l'esoscheletro.



Warning!

Do not open the chassis. There are no user-serviceable parts inside. Opening the chassis will void the warranty unless performed by an AJA service center or licensed facility.

Avertissement! Ne pas ouvrir le châssis. Aucun élément à l'intérieur du châssis ne peut être réparé par l'utilisateur. La garantie sera annulée si le châssis est ouvert par toute autre personne qu'un technicien d'un centre de service ou d'un établissement agréé AJA.

Warnung! Öffnen Sie das Gehäuse nicht. Keine der Geräteteile können vom Benutzer gewartet werden. Durch das Öffnen des Gehäuses wird die Garantie hinfällig, es sei denn, solche Wartungsarbeiten werden in einem AJA-Service-Center oder einem lizenzierten Betrieb vorgenommen.

¡Advertencia! No abra el chasis. El interior no contiene piezas reparables por el usuario. El abrir el chasis anulará la garantía a menos que se lo haga en un centro de servicio AJA o en un local autorizado.

Advertência! Não abra o chassi. Não há internamente nenhuma peça que permita manutenção pelo usuário. Abrir o chassi anula a garantia, a menos que a abertura seja realizada por uma central de serviços da AJA ou por um local autorizado.

Avvertenza! Non aprire lo chassis. All'interno non ci sono parti riparabili dall'utente. L'apertura dello chassis invaliderà la garanzia se non viene effettuata da un centro ufficiale o autorizzato AJA.



Caution!

For correct performance, always power up the Io XT before starting your computer and power down your computer before powering down the Io XT.

Attention! Pour obtenir de bonnes performances, allumez toujours Io XT avant de démarrer l'ordinateur et éteignez ce dernier avant d'éteindre Io XT.

Achtung! Um eine fehlerfreie Arbeit sicherzustellen, schalten Sie Io XT ein, bevor Sie den Computer starten, und fahren Sie den Computer herunter, bevor Sie Io XT ausschalten.

¡Precaución! Para un correcto desempeño, siempre encienda Io XT antes de iniciar la computadora y apague la computadora antes de apagar Io XT.

Cuidado! Para o desempenho correto, sempre ligue o Io XT antes de ligar seu computador e desligue o computador antes de desligar o Io XT.

Attenzione! Per prestazioni ottimali, alimentare sempre XT prima di avviare il computer e spegnere il computer prima di spegnere XT.

Warranty and Liability Information

Limited Warranty

AJA Video Systems, Inc. (AJA Video) warrants that the product, not including hard-disk based Storage Modules (HDD), will be free from defects in materials and workmanship for a period of three years from the date of purchase. AJA Video warrants that the hard-disk based Storage Modules (HDD), will be free from defects in materials and workmanship for a period of one year 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.

To obtain service under this warranty, the Customer must notify AJA Video of the defect before expiration of the warranty period and make suitable arrangements for the performance of service by contacting AJA Video support through the channels set forth on the support contacts web page at http://www.aja.com/support/index.php. Except as stated, the Customer shall bear all shipping, packing, insurance and other costs, excluding parts and labor, to effectuate repair. Customer shall pack and ship the defective product to a service center designated by AJA Video, with shipping charges prepaid. AJA Video shall pay to return the product to Customer but only if to a location within the country in which the AJA Video service center is located.

This warranty shall not apply to any defect, failure or damage caused by negligent, inadequate or improper use, handling or maintenance. Without limiting the foregoing, AJA Video shall not be obligated to furnish service under this warranty or repair any damage or malfunction a) resulting from attempts by personnel other than AJA Video representatives to install, repair or service the product, b) resulting from improper use or connection to incompatible equipment, c) caused by the use of non-AJA Video parts or supplies, d) if the product 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, or (e) resulting from being dropped or otherwise subjected to undue force, exposure to moisture or other corrosive or conductive substances, exposure to strong magnetic fields, use with improperly regulated power supplies, exposure to electric shock, use in temperatures outside the specified operating range, or otherwise failing to treat the product in accordance with the standard of care appropriate to sensitive and delicate electronic equipment.

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