

T-TAP

Thunderbolt to SDI & HDMI Mini-Converter



Installation and Operation Guide

Version 13.0
Published June 13, 2017



Notices

Trademarks

AJA® and Because it matters.® are registered trademarks of AJA Video Systems, Inc. for use with most AJA products. AJA™ is a trademark of AJA Video Systems, Inc. for use with recorder, router, software and camera products. Because it matters.™ is a trademark of AJA Video Systems, Inc. for use with camera products.

CION®, Corvid Ultra®, Io®, Ki Pro®, KONA®, KUMO®, ROI® and T-Tap® are registered trademarks of AJA Video Systems, Inc.

AJA Control Room™, KiStor™, Science of the Beautiful™, TruScale™, TruZoom™, V2Analog™ and V2Digital™ are trademarks of AJA Video Systems, Inc.

AirPort, Apple, Apple logo, AppleShare, AppleTalk, FireWire, iPod, iPod touch, Mac, Macintosh and ProRes, are registered trademarks of Apple Inc. Final Cut Pro, QuickTime and QuickTime logo are trademarks of Apple Inc.

Avid, Avid DNxHD and Media Composer are registered trademarks of Avid Technology, Inc.

Adobe is a registered trademark of Adobe Systems Incorporated in the United States and/or other countries.

HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing, LLC.

DVI is a registered trademark of DDWG.

TASCAM is a registered trademark of TEAC Corporation.

Dolby and the double-D Dolby logo are registered trademarks of Dolby Laboratories Licensing Corporation.

openGear® Ross, ROSS, ROSS®, and MLE are registered trademarks of Ross Video.

DashBoard Control System™ is a trademark of Ross Video.

All other trademarks are the property of their respective holders.

Copyright

Copyright © 2017 AJA Video Systems, Inc. All rights reserved. All information in this manual is subject to change without notice. No part of the document may be reproduced or transmitted in any form, or by any means, electronic or mechanical, including photocopying or recording, without the express written permission of AJA Video Systems, Inc.

Contacting AJA 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	https://www.aja.com
Support Email	support@aja.com
Sales Email	sales@aja.com

Contents

Notices	2
Trademarks	2
Copyright	2
Contacting AJA Support	2
Chapter 1 – Introduction	4
Features	4
Video Signal Formats	5
T-TAP Audio	5
AJA Software & Utilities	5
System Requirements.	6
System Tests	6
Cable Connections	6
Thunderbolt	7
HD/SD SDI Output	7
HDMI Output	7
In This Manual	7
Chapter 2 – Installation	8
Unpacking T-TAP	8
Installation Overview	8
Connecting to your Computer	8
Installing T-TAP Software.	9
Updating T-TAP Firmware	9
Chapter 3 – Operation	11
Using T-TAP with Professional Video /Audio Software	11
AJA Control Panel Overview	11
AJA Control Panel, Block Diagram	12
Control Screen	14
Default Output Choices and Their Meanings	14
Format Screen	15
HDMI Output Screen	16
Video Setup Screen	17
Timecode Screen.	18
Presets Screen	19
Firmware Screen	20
Info Screen.	21
Appendix A – Specifications	22
T-TAP Tech Specs.	22
Appendix B – Safety and Compliance	23
Warranty and Liability Information	29
Limited Warranty.	29
Limitation of Liability	29
Index.	30

Chapter 1 – Introduction



Overview

AJA's T-TAP provides video professionals with an inexpensive, extremely compact device that utilizes the power of the Thunderbolt™ connection to deliver high-quality 10-bit SD, and HD video and embedded audio output from any compatible computer.

HD/SD SDI and HDMI outputs are available. The SDI output can be used to feed professional monitors or recording gear, while the HDMI output is able to feed directly into consumer HDMI monitors. Both HDMI and SDI are active simultaneously allowing you to work with professional and consumer gear at the same time.

T-TAP's professional audio functionality supports full 8-channel embedded audio for multi-channel playback.

T-TAP is powered via the Thunderbolt connection with no need for an additional power supply, minimizing cabling and maximizing portability.

Features

- One Thunderbolt port
- One 1.5G SD-SDI, and HD-SDI output
- One HDMI v1.3 Output
- 8-Channel embedded audio support
- Rugged compact size
- Power via Thunderbolt

About Primary & Secondary Video Formats

In T-TAP operation, the Primary Format is the media format written to disk and used in your project.

NOTE: The Secondary format is for format conversion settings supported by other AJA KONA/Io products but not used by T-TAP.

The Primary Format menu allows you to select the video format used in your current project.

Video Signal Formats

The Video Signal Formats supported by T-TAP are listed in Appendix A: Specifications (see “Video Formats” on page 23).

T-TAP Audio

T-TAP provides up to 8 channels of SDI and HDMI embedded audio output.

AJA Software & Utilities

AJA's T-TAP software and hardware were developed for powerful integrated video/audio capture, editing, and production with a variety of 3rd-party software. With T-TAP and a qualified computer, you have the ultimate system for standard and high definition 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.

Two retail packages are available, one for Mac and the other for Windows. Each of these AJA software packages include:

Drivers

AJA device drivers for tightly integrated hardware/software operation.

AJA Control Panel

AJA Control Panel provides:

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

NOTE: AJA also provides a Linux OS retail drivers package. Support for these drivers is based on the Linux application used and comes from the application's vendor.

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 predict 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:

<https://www.aja.com/en/support/downloads>

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

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

System Requirements

See the AJA Driver Release Notes, available on the AJA website and also installed with the driver, for the exact OS versions supported.

System Tests

To guarantee maximum system performance, use AJA System Test and the AJA DataCalc application to evaluate your workstation capabilities. They are available on the AJA website at the following URL:

<https://www.aja.com/en/products/software/>

AJA System Test

AJA System Test is a utility for measuring system performance with AJA Video Capture devices. The application includes disk drive speed tests and video data copy (DMA) speeds. 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.

NOTE: Most of the disk performance tests are generic and don't require an AJA KONA Video Capture card. The DMA performance tests do require a KONA card and AJA KONA Driver software to operate.

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.

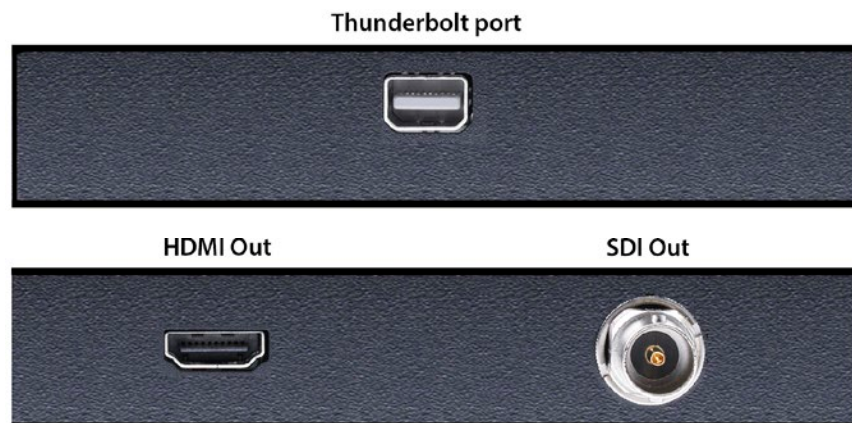
AJA DataCalc Application

This software application calculates data rates and storage requirements for a given video size, format, and frame rate. It's great for T-TAP users as a resource for configuring systems and determining storage requirements/

Cable Connections

T-TAP connections are made directly to the unit's front and rear connector channels.

Figure 1. T-TAP Connectors



Thunderbolt

The high speed of Thunderbolt allows connection to peripheral devices while achieving PCI Express performance. Thunderbolt also provides power to peripherals eliminating the need for external power supplies.

HD/SD SDI Output

A BNC connector is provided on T-TAP for one HD/SD-SDI output. This output supports video and embedded 24-bit digital audio. Use SDI wherever possible for the best quality 10-bit uncompressed video output. If your peripheral equipment has a variety of inputs, 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.).

HDMI Output

An HDMI connector on the T-TAP provides output of HDMI compatible video and multi-channel embedded audio. The HDMI v1.3a capability at 30 bits per pixel allows full support of the latest 10-bit monitors.

HDCP is not supported on the output. The HDMI output supports standard HDMI cables only.

The AJA Control Panel allows selection and adjustment of some HDMI parameters; please see "Chapter 3: Operation on page 12" for more information on Control Panel operation.

In This Manual

Chapter 1 is the introduction that lists features and system requirements.

Chapter 2 provides complete instructions for installing and configuring the AJA T-TAP. The user is guided through unpacking, cabling the T-TAP, installing T-TAP driver software, then getting it up and running.

Chapter 3 discusses operational aspects of T-TAP, the AJA Control Panel interface, and how to work with 3rd-party software.

Appendix A presents a list of technical specifications for the product.

Appendix B contains relevant Safety & Compliance information.

Chapter 2 – Installation

Unpacking T-TAP

As you unpack T-TAP, carefully examine the unit to ensure 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 units. If you find shipping damage, contact your AJA dealer or distributor for details on how to have your T-TAP 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.

After you unpack your T-TAP, go to the AJA website to download the latest software package and updated documentation. You will need to secure a Thunderbolt cable to connect to your computer. T-TAP is powered through the cable.

Installation Overview

The installation and setup of T-TAP is very simple. The steps of installation and configuration are discussed here and summarized as follows:

1. Unpack the shipping box (see above).
2. If not previously installed on your Thunderbolt equipped computer, ensure that appropriate application software such as Adobe Premiere Pro is installed as detailed in its user documentation.
3. Cable T-TAP Thunderbolt port, SDI and HDMI outputs as required for your workflow.
4. Install AJA T-TAP software on your computer from the latest AJA website download. Start by installing the T-TAP driver package with AJA Control Panel and then finally install any AJA plug-ins for 3rd-party software. Installers for the T-TAP driver software and for the AJA Control Panel are found on the AJA website—here you will get the most current software and documentation.
5. When you run the AJA Control Panel, you'll notice that the T-TAP is auto-discovered as long as it is properly cabled and powered up.

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

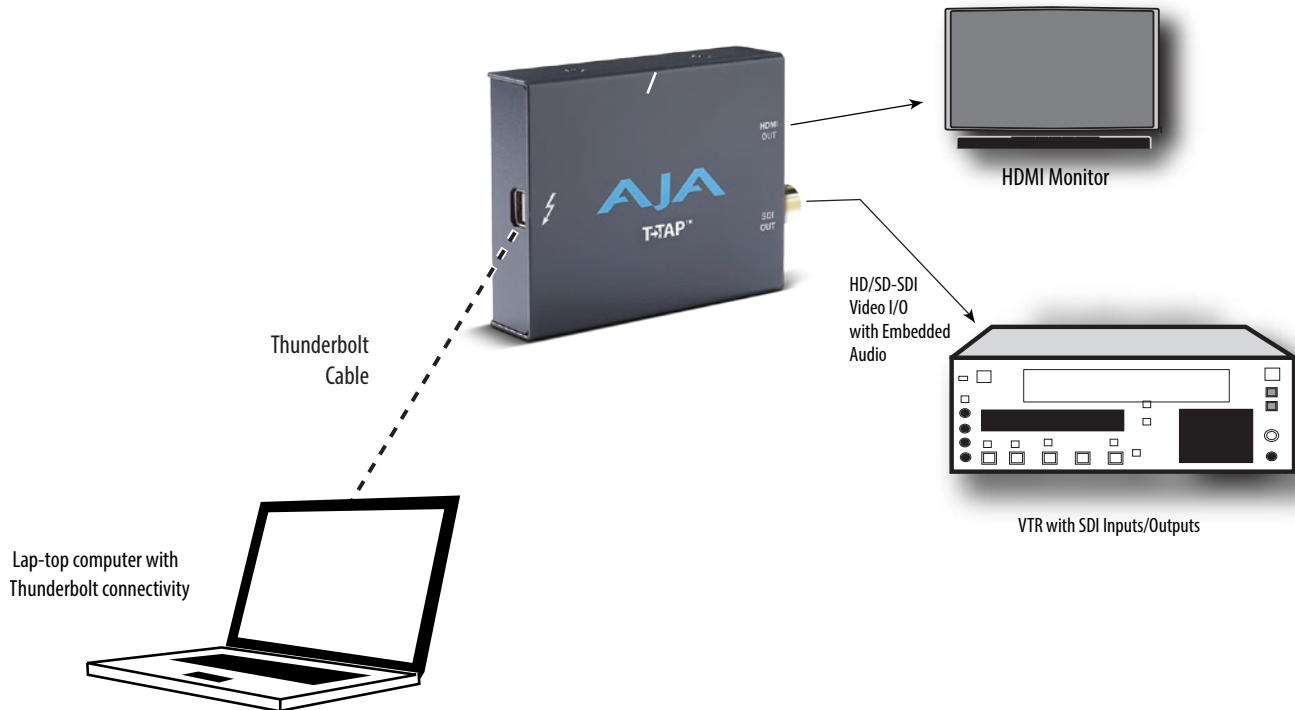
Connecting to your Computer

Your system may differ depending on VTRs, audio monitoring, and video monitoring.

1. Connect your computer via a Thunderbolt cable (not included) to the T-TAP Thunderbolt port. T-TAP power is delivered via this cable.
2. Connect an HDMI Video Monitor to the T-TAP HDMI Out connector.

3. Connect an SDI cable between the T-TAP SDI output BNC and your digital VTR SDI In. The T-TAP SDI connections has embedded audio so the VTR must be configured accordingly.

Figure 2. Typical T-TAP Laptop System Connections



Installing T-TAP Software

Go to the AJA website and download the latest AJA software installer, which includes a package of all the current software for AJA's KONA, Io, and T-TAP products, including the AJA Control Panel and AJA Control Room applications.

<https://www.aja.com/en/support/downloads/>

System software updates may occasionally become available 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 the AJA software package. This will prevent any hardware or software conflicts.*

Before installing the AJA software installer package, ensure that your capture/editing application is installed as detailed in its user documentation. You cannot use T-TAP 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.

Updating T-TAP Firmware

When you update your T-TAP software by downloading new versions from the AJA website, it is possible that some versions may also require a firmware update to update the software stored in non-volatile memory. Always carefully read the release notes that accompany each version to be installed. The release notes will

spell out all required software and hardware necessary to ensure a successful update of your T-TAP.

Follow these instructions when a firmware update is required:

1. Connect T-TAP to a computer that has the AJA Software package installed.
2. Open the AJA Control Panel application, then go to the Firmware screen.
3. Select the desired firmware version and click Install.
4. After the install completes, power cycle T-TAP (for example, by unplugging and reconnecting the Thunderbolt cable).

Chapter 3 – Operation



Using T-TAP with Professional Video /Audio Software

After you install the T-TAP software and any AJA plug-ins to support your choice of 3rd-party software, you're then ready to begin playing back video and audio.

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

AJA Control Panel Overview

The AJA Control Panel is a software application that provides a simple visual window showing how the T-TAP interface is currently configured, and that allows you to make changes. Current settings—both those you changed and those you didn't—can be saved as a snapshot for recall at anytime. This lets you save settings associated with all your frequent tasks; then as you switch tasks you don't have to spend extra time resetting interface configurations—just load the previously saved settings for each task.

One thing you'll notice instantly about the Control Panel is that it represents a block diagram of how the unit is configured. The current status, output settings, and many other details can be viewed as a color-coded block diagram in the Control Panel.

To ensure you make the most of the software, launch the AJA Control Panel application and look at its display. Then refer to the "Basics" described here to fully understand what you're seeing and learn how to view and change the T-TAP system configuration.

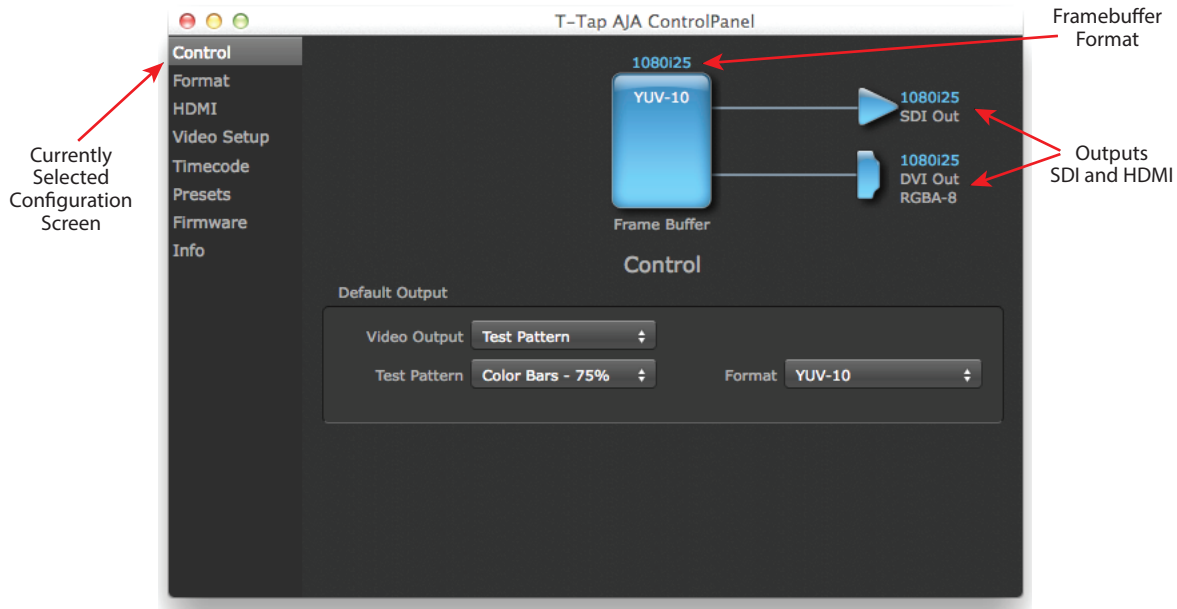
Following are some basic definitions you should know.

Block Diagram Area

The top area of the Control Panel shows a visual picture representing the processing (if any) that's currently occurring, including outputs, and system status. Lines between the framebuffer, and outputs show a video path. Where there are no lines, it shows there is no connection; this can be because an appropriate output isn't selected (such as PsF for HDMI).

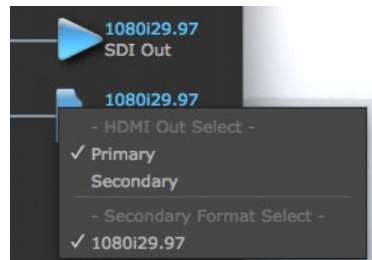
Icon objects on the block diagram screen (output icons, frame buffer, etc.—also called “widgets”—indicate their status by color (explained later) and can be clicked for context-sensitive information and choices. (These same choices can also be made from the Control Panel screens.)

Figure 3. Block Diagram Area



Right-Clicking an Icon produces a context-sensitive menu.

Figure 4. Context-Sensitive Menu



AJA Control Panel, Block Diagram

Framebuffer

The framebuffer is the “engine” in T-TAP where active video operations take place using your 3rd-party applications, or even T-TAP itself. The framebuffer has a format (called the “Primary Format” and color space that it follows, as defined in the Configuration Screens or via external application software. It is important to realize that inside the host computer, many applications can use the T-TAP (as you switch from window to window) and it may not always be obvious which application currently controls it.

The upper-right corner of the Control Panel displays the name of the application controlling the T-TAP. In some cases, applications may not always properly “let go” of the Output interface as another takes over—you’ll be able to tell by looking at the Control Panel.

Figure 5. Controlling Application



Primary Format

The video format currently assigned to T-TAP. This is the format that the framebuffer will use and is shown in the Control Panel using the color blue. All icons in blue are the same as the Primary Format used by the framebuffer. Also any text descriptions in the block diagram that appear in blue also indicate that something is in the primary format.

Output Icons

The output icons are triangles that together with their color show the outputs and their status (selected, not selected, signal present or not, format, etc.). A complete video path is shown when outputs are connected with lines going from the framebuffer.

Figure 6. Output Icon Example



Color Meanings

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

- Blue: video is same format as the Primary Format (framebuffer)
- Red: the selected operation cannot be performed

Control Panel Configuration Screen links

The left side area of the T-TAP Control Panel provides navigation links to the various Screens categorized by topics. Clicking on a topic—or alternatively, a block diagram element—displays an information screen corresponding to that topic. Screens that can be selected are:

Control - Configures T-TAP operation and output timing.

Format - Select the framebuffer primary video format of outputs.

HDMI - Configure the HDMI Output

Video Setup - Configures Video such as Progressive Format and QuickTime Video Output Filter.

Conversion - Used to select 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.

Timecode - Monitor RP-188 timecode and configure timecode window burn output (Note: SMPTE 12M-2 is the updated name and specification for what was RP-188)

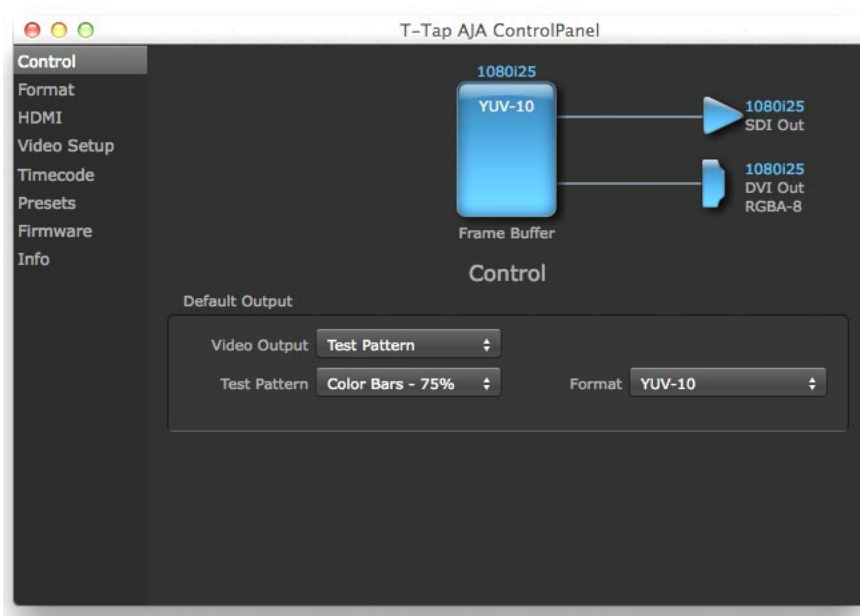
Presets - Add or delete saved preset configurations (handy for setting up the T-TAP for certain workflows and then saving it as a canned configuration for easy later recall)

Firmware - Enables installation of AJA card firmware.

Info - Displays status information and firmware version # of the T-TAP and how it is installed in the host computer. This information is generally intended for troubleshooting/support.

NOTE: You can use the Up/Down arrows on your keyboard to navigate link selections.

Control Screen



The T-TAP can be controlled by various software applications running on a host computer. The Control Screen is where you select how the T-TAP directs video and is used by application software. At the right-top of the block diagram it will show the current Default Output and the application currently controlling the T-TAP.

Default Output

This is where you select what T-TAP will output as a default when no application has control of the board, such as when the Finder is active. Since T-TAP can be controlled by multiple software applications and its own control panel, the output can change dynamically. When you select many video applications, they will grab control of the T-TAP outputs. These settings determine what happens when an application that doesn't grab the T-TAP outputs is active.

Default Output Choices and Their Meanings

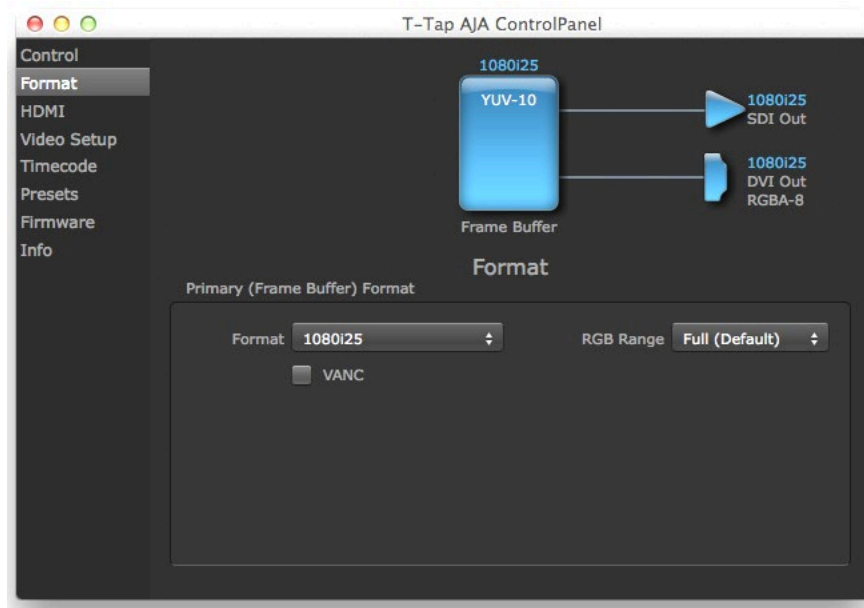
Video Output - This selection directs T-TAP to output either a selected Test Pattern or Hold the Last Application output, whenever an application isn't controlling T-Tap.

Hold Last Application - Directs T-TAP to hold and output the last frame of video from the last application to control T-TAP. This can be helpful when operating in an environment where you're switching back and forth between multiple application windows.

Test Pattern - This selection determines the particular Test Pattern for output when no other application is using the T-TAP and Test Pattern is selected for the Video Output. 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 YUV 10-bit or 8-bit output via a pulldown menu.

Format Screen



The Format screen shows the video format currently in use by the T-TAP framebuffer (called the Primary Format) and allows you to change it. Throughout the Control Panel, choices are always presented based on what T-TAP can do with the signals available and the outputs selected.

Video Format (Primary)

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 T-TAP's framebuffer. When a change is made via the Video Format pull-down or by clicking an icon (widget) and selecting a new format via a contextual menu, the block diagram will change to reflect the new format.

RGB Range

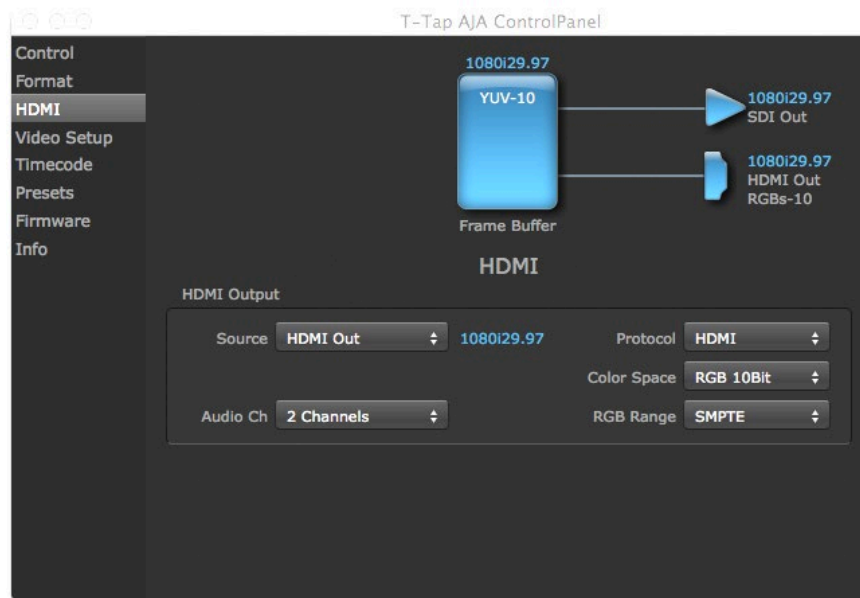
The RGB Range pulldown menu allows you to select either Full range (0-1023) or SMPTE range (typically 64-940) for RGB color output.

A checkbox labeled VANC, when checked, allows Vertical Ancillary Data to be included in the output signal.

For a complete list of video formats supported by T-TAP, see ["T-TAP Tech Specs" on page 22](#).

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.”

HDMI Output Screen



The T-TAP's HDMI output is shown and configured in this screen.

Source

(Used for KONA/IO products only) The Source pulldown menu allows you to choose between the primary and secondary video format for output.

Pulldowns are also provided for configuring the video Protocol, Color Space, RGB Range, and Audio Channels:

Protocol

The Protocol 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.

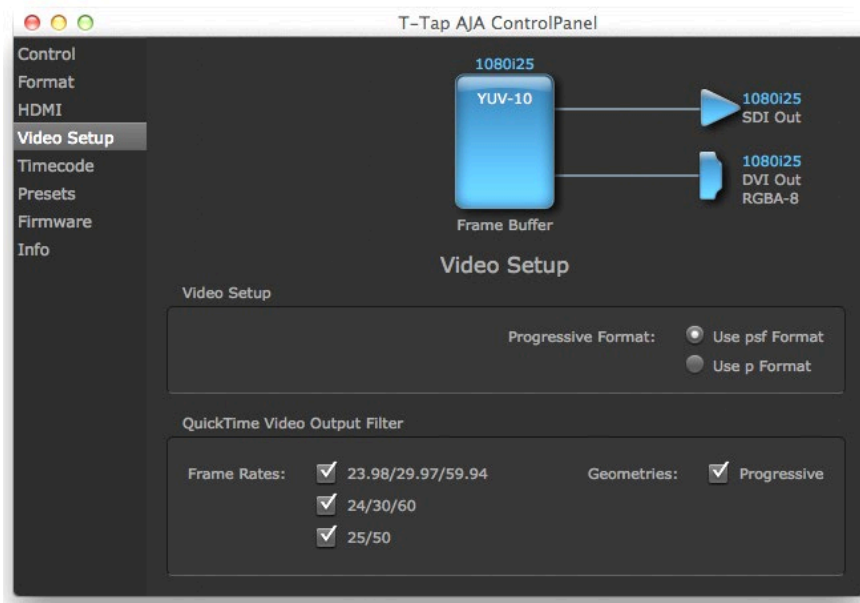
RGB Range

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

Audio Channels

An Audio Channel pulldown allows you to select the number of embedded audio channels (2 or 8) for the HDMI output.

Video Setup Screen



T-TAP provides a high-quality digital video output in interlaced (i), progressive (p), or progressive segmented frame (PsF) formats. This screen shows the current settings for frame formatting of the digital video output, and allows you to re-configure it when desired.

Progressive Format

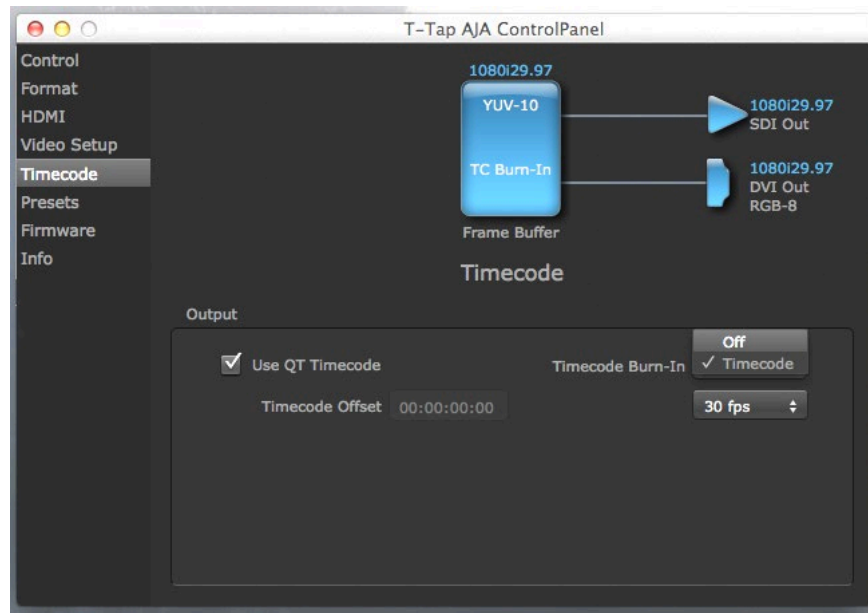
Choose between progressive (p) and progressive segmented frame (PsF) format for your digital output.

QuickTime Video Output Filter

The QuickTime Video Output Display Filter is designed to help manage the comprehensive list of video outputs that may be available to applications.

By selecting the checkbox next to specified parameters, the video outputs related to these specified parameters are enabled as possible video outputs for applications. For example, if the checkbox next to 25/50 is unchecked, 50Hz video outputs are deselected and would not be available to the user's editing application. To avoid confusion when working in a particular editorial environment, you might choose to leave 50Hz unchecked if working solely in a 60Hz editorial environment. The same might be true if you do not intend to work with true progressive 1080 material.

Timecode Screen



The timecode is used for both monitoring the RP-188 timecode embedded in the digital data stream and for selecting a timecode offset (if required) for the attached VTR—and sent during assemble-edit mode.

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

Use QuickTime Timecode

When checked, this directs T-TAP to output timecode from the QuickTime timecode track. When not checked, T-TAP uses the Output Timecode Offset value plus the number of frames into the movie. Note: not all QuickTime applications use or support timecode tracks—so sometimes the QuickTime timecode is missing or not meaningful.

Output Timecode Offset

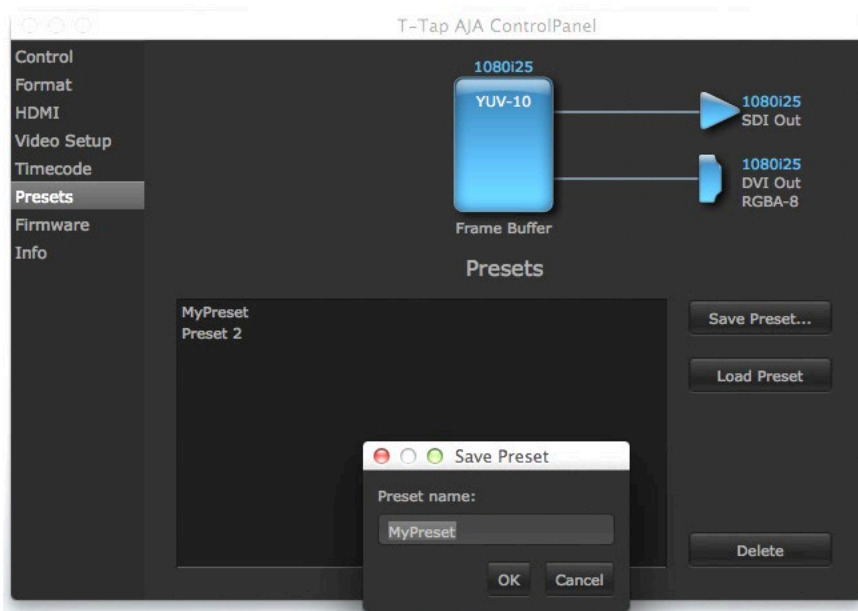
(Entry field and FPS pull-down). This text entry field allows you to specify a timecode offset for use with your editing application that supports user-controlled timecode offsets. Use that same value here as the “Output Timecode Offset” to ensure the timecode is synchronized.

Timecode Burn-in

This pulldown selects whether the timecode value is “burned-in” on video output from T-TAP. 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. This can be useful for synchronizing, choosing edit points, dailies, and many other purposes.

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.

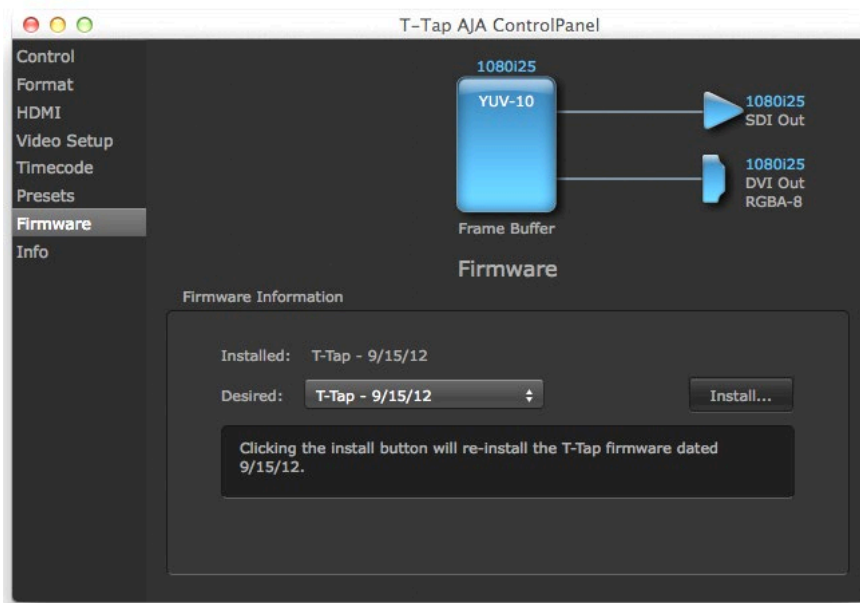
Presets Screen



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 re-configuration 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.

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.

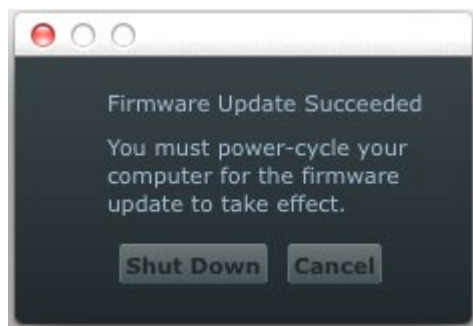
Firmware Screen



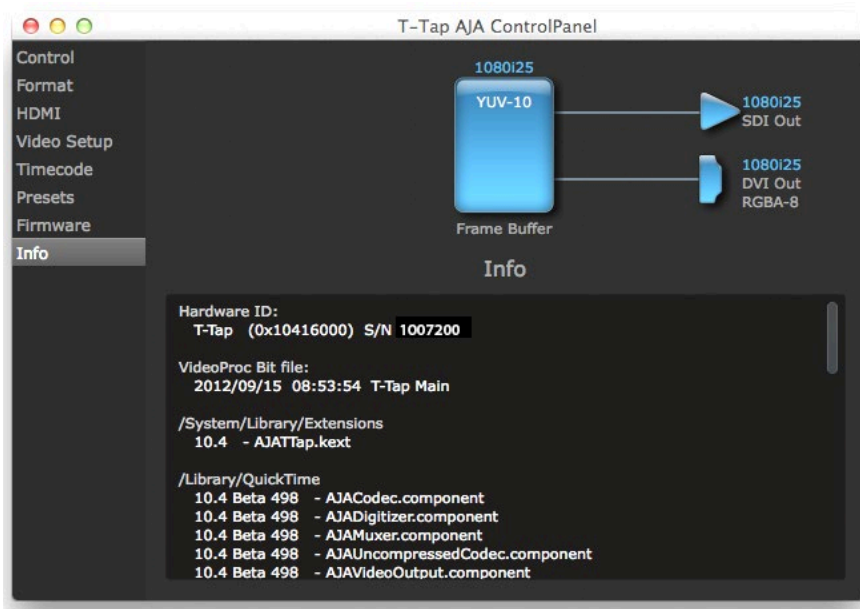
Use the Firmware Screen to access the firmware install screen. Click install to erase current firmware and load the firmware version contained in your current driver installation. Note the Installation message shown below.

You will be required to power-cycle your computer and T-TAP to finish the update.

Figure 7. Update Completed



Info Screen



This screen shows the T-TAP 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

Appendix A – Specifications

T-TAP Tech Specs

Video Formats

- (2K) 2048 x 1080PsF 23.98, 24 (4:2:2)
- (HD) 1080i 25, 29.97, 30
- (HD) 1080PsF 23.98, 24
- (HD) 1080p 23.98, 24, 25, 29.97, 30
- (HD) 720p 50, 59.94, 60
- (SD) 625i 25
- (SD) 525i 29.97

Video Outputs Digital

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

Audio Outputs Digital

- 8-Channel, 24-bit SMPTE-259 SDI embedded audio, 48 kHz sample rate, synchronous
- 8-Channel, 24-bit HDMI embedded audio, 48 kHz sample rate, synchronous

Size (w x d x h)

- 2.95" x 0.7" x 2.28" (75mm x 18mm x 58mm)

Weight

- 0.2 lb (0.1 kg)

Power

- 5V Thunderbolt bus powered; 6.5W max

Environment

- Safe Operating Temperature: 0 to 40 degrees C (32 to 104 degrees F)
- Safe Storage Temperature (Power OFF): -40 to 60 degrees C (-40 to 140 degrees F)
- Operating Relative Humidity: 10-90% noncondensing
- Operating Altitude: <3,000 meters (<10,000 feet)

Appendix B – Safety and Compliance

Federal Communications Commission (FCC) Compliance Notices

Class B Interference Statement

This equipment has been tested and found to comply with the limits for a Class B 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 B 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 B 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 B prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada. Cet appareil numérique de la Classe B 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, LICHTEINSTEIN, 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.



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 55103-1: 2009, CISPR 22: 2008

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

Immunity:

EN 55103-2: 2009

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

EN 61000-4-4: 2004+A1: 2010, EN 61000-4-5: 2005, EN 61000-4-6: 2007,

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 B 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 B. 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 B. 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.

Korea KCC Compliance Statement

B급 기기 (가정용 방송통신기자재)	이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.
Class B (Broadcasting Communication Equipment for Home Use)	As an electromagnetic wave equipment for home use (Class B), this equipment is intended to use mainly for home use and may be used in all areas.

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 B product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class B. 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

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

This is a Class B product based on the standard of the VCCI Council (VCCI V-3/2010.04). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

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

Avertissement! Débranchez cet appareil pendant les orages avec éclairs ou 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.



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! 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

Warranty and Liability Information

Limited Warranty

AJA Video Systems, Inc. (AJA Video) warrants that the product, not including storage modules, 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 storage modules, 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.

EXCEPT AS STATED ABOVE, AJA VIDEO AND ITS VENDORS DISCLAIM IN THEIR ENTIRETY ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. AJA VIDEO'S RESPONSIBILITY TO REPAIR OR REPLACE TIMELY REPORTED DEFECTIVE PRODUCTS IS THE WHOLE AND EXCLUSIVE REMEDY CUSTOMER IS PROVIDED.

THE PRODUCT IS NOT INTENDED, STATED, OR WARRANTED TO OPERATE UNINTERRUPTED OR ERROR-FREE. YOU UNDERSTAND AND ACKNOWLEDGE THAT THE PRODUCT IS NOT INTENDED TO BE USED AS THE SOLE OR PRIMARY DATA SOURCE OR TARGET FOR CRITICAL DATA, AND THAT IT IS YOUR RESPONSIBILITY TO IMPLEMENT REDUNDANT CAPTURE AND BACKUP SYSTEMS AS APPROPRIATE.

Limitation of Liability

UNDER NO CIRCUMSTANCES SHALL AJA VIDEO BE LIABLE IN ANY WAY FOR ANY LOST, CORRUPTED OR DESTROYED DATA, FOOTAGE OR WORK, OR FOR ANY OTHER INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR FOR ANY THIRD PARTY CLAIM, IN CONNECTION WITH THE PRODUCT, WHETHER RESULTING FROM DEFECTS IN THE PRODUCT, SOFTWARE OR HARDWARE FAILURE, OR ANY OTHER CAUSE WHATSOEVER, EVEN IF AJA VIDEO HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. AJA VIDEO'S LIABILITY IN CONNECTION WITH THIS PRODUCT SHALL UNDER NO CIRCUMSTANCES EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCT

Index

Symbols

3rd-Party Plugins 5

A

AJA Control Panel 5
Block Diagram 12
Overview 11
AJA Control Room 5
AJA DataCalc Application 6
AJA Software 5
AJA Support 2
AJA System Test 5, 6
AJA Utilities 5
Audio 5
Audio Channels 16

B

Block Diagram
AJA Control Panel 12
Block Diagram Area 12

C

Cable Connections 6
Color Meanings 13
Connecting To Your Computer 8
Control Panel
Block Diagram Area 12
Control Screen 14

D

Default Output 14
Drivers 5

F

Features 4
Firmware Screen 20
Firmware Update 9
Format Screen 15
Framebuffer 12

H

HDMI Output 7
HDMI Output Screen 16

I

Info Screen 21
Installation Overview 8
Installing T-TAP Software 9

L

Linux OS Retail Drivers 5

O

Output Icons 13

Output Timecode Offset 18
Overview 4

P

Presets Screen 19
Primary Format 4, 13, 15
Progressive Format 17
Protocol 16

Q

QuickTime Video Output Filter 17

R

RGB Range 15, 16

S

SDI Output 7
Secondary Format
Not Used By T-TAP 4
Software 5
Software Installation 9
Source 16
Storage Recommendation 6
System Requirements 6
System Tests 6

T

Technical Support 2
Tech Specs 22
Thunderbolt 7
Timecode Burn-in 18
Timecode Screen 18

U

Unpacking T-TAP 8
Updating T-TAP Firmware 9
Use QuickTime Timecode 18
Utilities 5

V

Video Format (Primary) 15
Video Setup Screen 17
Video Signal Formats 5