Matrox MXO2

Installation and User Guide
(Windows version)

March 1, 2013

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Digital Video Solutions

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Introducing Matrox MXO2

This chapter lists the MXO2 system requirements, explains the battery requirements and guidelines, and describes the MXO2 documentation.

Welcome to Matrox MXO2

Matrox MXO2 products connect to your desktop computer or laptop to provide broadcast-quality video input/output, monitoring, and up/down/cross conversion. MXO2 streamlines your workflow with supported video editing applications, and provides WYSIWYG output when working with many popular compositing and animation programs. You also get HDMI video monitoring with calibration controls.

Matrox MXO2 products with Matrox MAX technology have a dedicated hardware processor that accelerates the encoding of H.264 files for resolutions ranging from iPod to HD. This lets you quickly and easily create H.264 files for Blu-ray Disc, the web, and mobile devices.

Matrox MXO2 system requirements

Matrox MXO2 products require a computer system with the following configuration:

- Intel i7 2.67 GHz CPU or greater.
- Microsoft Windows 7 Professional, Ultimate, or Home Premium (64-bit) with Service Pack 1.
- 4 GB of RAM (8 GB is recommended).
- One free PCIe slot on a desktop computer to install the Matrox PCIe host adapter, or one free ExpressCard/34 slot on a laptop to install the Matrox PCIe host ExpressCard/34 adapter.
- Storage requirements for Matrox ISO recording and Telestream Wirecast recording to disk:
  - Two 7200 RPM SATA II drives in a striped RAID array.

Supported programs

- Telestream Wirecast Studio and Telestream Wirecast Pro 4.2.4.
- Beta support for the following:
  - Adobe Premiere Pro 6.0.3, Media Encoder 6.0.3, Encore 6.0.2, Prelude 1.0.3, After Effects 11.0.2, Photoshop 13.0.1, and Flash Media Live Encoder 3.2.
  - Avid Media Composer 6.0.3.2 and 6.5.2, Symphony 6.0.3.2 and 6.5.2, and NewsCutter 10.0.3.2 and 10.5.2.
  - Autodesk 3ds Max 2013.
  - Autodesk Combustion 2008 (32-bit only).
  - eyeon Fusion 6.4.
  - NewTek LightWave 3D 10.

- Microsoft Expression Encoder 4.
- Livestream Procaster 20.3.7.

Check our website for equipment information

For up-to-date information about system requirements and MXO2-compatible devices, check the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

(i) **Important**   To use Matrox MXO2 with Avid editing software, you must use an Avid-certified system as listed in the System Recommendations section of the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

Battery requirements and guidelines for MXO2

📝 **Note**   This section does not apply to Matrox MXO2 Rack and Matrox MXO2 Mini as they cannot be powered by a battery.

As an alternative to using an AC outlet, you can use a battery to power Matrox MXO2 or MXO2 LE. To avoid damage to your MXO2 system and peripheral devices when using a battery, please observe the following requirements and guidelines. For instructions on how to connect a battery, see "Powering MXO2" on page 14 or "Powering MXO2 LE" on page 32.

- Use a standard self-protected (fused) battery with a nominal voltage of 12V, 13.2V, or 14.4V. A higher-voltage battery will damage your MXO2 system.
- Disconnect MXO2 from the battery when not in use. Do not leave MXO2 connected to the battery when not in use as this may damage your MXO2 system and/or battery.
- Do not power your MXO2 using your vehicle's battery via the power socket.

⚠ **Caution**   To avoid damage to your MXO2 system and peripheral devices, use a Matrox-recommended battery. For a list of batteries recommended for use with your MXO2, visit the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

About this manual

This manual provides you with information about installing and using your Matrox MXO2 hardware and software.

Style conventions

The following style conventions are used in this manual:

- The names of files, folders, and manuals appear in *italics*. For example:
  - The data is stored in the *Sample.wav* file.

– The file is located in your *C:\Windows\System* folder.

– Please refer to your *Matrox MXO2 Release Notes*.

• Menus and commands that you need to choose are displayed in the form **Menu > Command**. For example, **File > Save** means click **File** in the menu bar, then click **Save** in the menu that appears.

• The names of keys are displayed in small capital bold letters, such as the **CTRL** key.

• A plus (+) sign is used to indicate combinations of keys and/or mouse operations. For example:

– **CTRL+C** means to hold down the **CTRL** key while pressing the **C** key.

– **SHIFT+click** means to hold down the **SHIFT** key while you click an item with the mouse.

How video formats are expressed

With the exception of NTSC and PAL, all SD and HD video formats are expressed in the Matrox MXO2 documentation as follows:

VRp or **i** or **PsF @ n fps**

Where:

• **VR** is the vertical resolution. For 1440×1080 video, however, both the horizontal and vertical resolutions are specified.

• **p** or **i** or **PsF** represents progressive, interlaced, or progressive segmented frame video.

• **n fps** is the frame rate in frames per second.

Here are some examples:

• **486p @ 23.98 fps**   Represents 720×486 progressive video at 23.98 frames per second.

• **720p @ 59.94 fps**   Represents 1280×720 progressive video at 59.94 frames per second.

• **1440x1080i @ 29.97 fps**   Represents 1440×1080 interlaced video at 29.97 frames per second. This format is used for HDV 1080i material.

• **1080i @ 29.97 fps**   Represents full-size 1920×1080 interlaced video at 29.97 frames per second.

Last-minute information

Any important information that wasn't available for inclusion in this manual by publication time is provided to you in the *Matrox MXO2 Release Notes*.

2

Installing Your Matrox MXO2 Hardware and Software

This chapter explains how to install the Matrox MXO2 hardware and software.

Installing multiple Matrox MXO2 devices

You can choose to install multiple Matrox MXO2 devices to feed live video and audio to Telestream Wirecast for streaming and recording (see Chapter 15, "Using Matrox MXO2 with Telestream Wirecast"). All other applications used with your Matrox MXO2 hardware, such as Matrox A/V Tools and editing applications, support only one Matrox I/O device. If you have multiple Matrox I/O devices, you can use Matrox X.info to select the primary device that you want to use with these applications as explained in "Selecting your primary Matrox I/O device" on page 271.

Before you install your Matrox MXO2 hardware

Read the following information carefully before attempting to install Matrox MXO2 hardware.

Start with a functioning system

Before attempting any Matrox MXO2 installation, you should have a computer with a supported Windows operating system fully installed and functioning smoothly. This will avoid potential problems later on.

Avoid costly damage

Static electricity from your body can damage your Matrox PCIe host adapter or your computer. Although you may not notice it, static electricity is generated every time you move. It's often too small to cause a spark, but it can still cause damage to sensitive electronic components or at least reduce their life span.

To avoid damage, please observe the following precautions:

- Do not remove your Matrox PCIe host adapter from its antistatic bag until you're ready to install it. Before removing the card, place the package within easy reach of the area where you intend to perform the installation.

- You should avoid touching the chips and other components on the circuit board. Try to handle the card by its edges.

- Try to work in an area where the relative humidity is at least 50%.

- Do not wear wool or synthetic clothing. These fabrics tend to generate more static electricity than cotton, which is best for this kind of work.

- Turn off the power switches on your computer and its connected components.

Once you've opened your computer, drain static electricity from your body by touching a bare metal surface on your computer chassis before you install or remove any parts of your system. If you have a grounding wrist strap, use it while handling and installing any components in your computer.

Installing your Matrox PCIe adapter

The Matrox PCIe adapter is the interface between your MXO2 and computer. Matrox provides dedicated adapters for use with desktop computers or laptops. Use the Matrox PCIe host adapter with your desktop computer, and the Matrox PCIe host ExpressCard/34 adapter with your laptop.

Installing your PCIe host adapter (for desktops)

The Matrox PCIe host adapter is designed to operate in your desktop computer's PCIe slot. For detailed instructions on how to perform the following steps, refer to your computer's documentation.

1 Shut down your system, unplug the power cord and all the cables from the unit, and open your computer's chassis.

2 Insert the Matrox PCIe host adapter in an available PCIe slot in your computer, and secure the adapter into place.

3 Close your computer's chassis, and reconnect the power cord and all the cables to the computer.

Installing your PCIe host ExpressCard/34 adapter (for laptops)

The Matrox PCIe host ExpressCard/34 adapter is designed to operate in your laptop's ExpressCard/34 slot. You can install the Matrox PCIe host ExpressCard/34 adapter when your laptop is on or off.

To install the Matrox PCIe host ExpressCard/34 adapter, connect the Matrox PCIe cable to the host ExpressCard/34 adapter, and then insert the host adapter in your laptop's ExpressCard/34 slot until the adapter clicks into place. For details

on how to safely remove your Matrox PCIe host ExpressCard/34 adapter from your laptop, see .

PCIe cable

Matrox PCIe ExpressCard/34 adapter

ExpressCard/34 slot
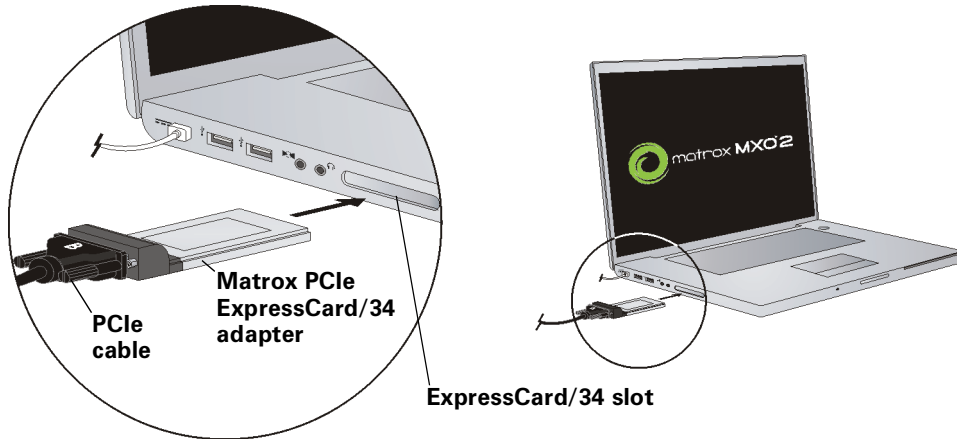
⚠ **Caution**   To ensure functionality and avoid damaging the PCIe cable or host connector, the side labeled "B" on the PCIe cable connector must face the top of the Matrox PCIe ExpressCard/34 adapter.

Removing your PCIe host ExpressCard/34 adapter

You can safely remove the Matrox PCIe host ExpressCard/34 adapter from your laptop at any time as follows:

ⓘ **Important**   Do not disconnect the PCIe cable from the Matrox PCIe host ExpressCard/34 adapter while your laptop is running. Instead, remove the adapter from your laptop with the Matrox PCIe cable attached.

1 Quit all video/audio applications that use your Matrox MXO2 hardware, such as Matrox A/V Tools.

2 With the Matrox PCIe cable attached, remove the Matrox PCIe host ExpressCard/34 adapter from your laptop's ExpressCard/34 slot.

📝 **Note**   The **Safely Remove Hardware** and **Eject** commands in Windows are not supported for removing your Matrox PCIe host ExpressCard/34 adapter.

If your system is running and MXO2 is connected to your laptop when you remove the Matrox PCIe host ExpressCard/34 adapter, the Matrox WYSIWYG icon (📺) on your Windows taskbar will turn red to indicate that your Matrox MXO2 hardware cannot be detected. When you re-insert the Matrox PCIe host ExpressCard/34 adapter with attached PCIe cable back into your laptop's ExpressCard/34 slot, the icon will return to its normal state once your MXO2 hardware is detected.

Installing Matrox Mtx.utils

Matrox Mtx.utils Setup installs the MXO2 device drivers, and all the software required to use your MXO2 hardware with supported programs. Before installing Matrox Mtx.utils, make sure that you've installed the third-party software that you'll be using with MXO2.

You can install Matrox Mtx.utils on a computer with or without the MXO2 hardware connected. To download and install the latest version of Matrox Mtx.utils, visit the MXO2 Support section of our website at www.matrox.com/video/support. You can also contact your Matrox representative for the latest software.

Remarks

- Matrox Mtx.utils Setup installs software for Matrox MXO2 as well as the Matrox CompressHD card. You can therefore use your Matrox MXO2 hardware with CompressHD. For details on installing CompressHD, see your *Matrox CompressHD Installation and User Guide*.
- If you want to use a Matrox Convert DVI product with MXO2 on the same system, you must install Matrox MtxConvert.utils instead of Matrox Mtx.utils. Matrox MtxConvert.utils is available in the "Downloads" section of the Matrox Support website under "Combo Software" for your Convert DVI product.

Updating your MXO2 firmware

When you install the MXO2 software while your MXO2 hardware is powered and connected to your computer, the Mtx.utils Setup program automatically verifies the firmware on your MXO2 hardware and updates it if required. If you install Mtx.utils on a computer without the MXO2 hardware, the next time you start your computer with your MXO2 hardware connected, Mtx.utils Setup will update your MXO2 firmware if needed.

⚠ **Caution** Do not disconnect or power off MXO2, or interrupt the firmware update during the update process. Doing so may damage your MXO2 hardware.

Installing the Matrox effect patterns

The Matrox plug-in for Adobe Premiere Pro includes Matrox wipes that you can apply to clips in your Matrox projects as explained in Chapter 9, "Setting Up Matrox Effects with Adobe Premiere Pro." In order to apply the Matrox wipes, you must install Matrox Mtx.utils as well as the Matrox effect patterns (GFX) files. The Matrox effect patterns are available for download with Matrox MXO2 software releases that support Adobe Premiere Pro in the MXO2 Support section of our website at www.matrox.com/video/support.

Installing additional Matrox WYSIWYG plug-ins or removing unneeded plug-ins

When you install Matrox Mtx.utils, you are prompted to install the Matrox WYSIWYG plug-ins for any supported programs that are currently installed on your system. If after you've installed Matrox Mtx.utils you want to install additional Matrox WYSIWYG plug-ins, or re-install or remove a currently installed plug-in, you can update your system by choosing **Start > All Programs > Matrox Mtx.utils > Update Matrox WYSIWYG Plug-ins.** You'll be prompted to specify which plug-ins you want to install, re-install, or remove. For more information about the programs supported and required settings, see Chapter 12, "Using the Matrox WYSIWYG Plug-ins."

Note   To install the Matrox WYSIWYG plug-in for a program, you must first install that program.

Installing the Matrox VFW software codecs on a system without the MXO2 hardware

The Matrox Video for Windows (VFW) software codecs let you render and play back Matrox *.avi* files in your VFW programs without having to install Matrox Mtx.utils and the Matrox MXO2 hardware. This flexibility allows you to use a remote editing workstation to create a rough cut of your project, and then copy the project and assets to your MXO2 system to finish the job.

Note   If you've installed Matrox Mtx.utils, you do not need to install the Matrox VFW software codecs because Matrox Mtx.utils installs all the Matrox codecs on your system.

The Matrox VFW software codecs are available for download in the "Downloads" section of the Matrox Support website at www.matrox.com/video/support.

Updating your display card's drivers

For the best performance when using your MXO2 system with Adobe Premiere Pro, you should update the drivers for your display card with the latest drivers available from your display card's manufacturer. For example, if you're using Adobe Premiere Pro with a supported NVIDIA display card for GPU acceleration, it's recommended that you update your system with the latest drivers for your card from NVIDIA.

Important   If you're using Matrox MXO2 with Avid editing software, you must use an Avid-certified system with a specific display card and driver as listed in the System Recommendations section of the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

Setting Matrox MXO2 as your default audio playback device

You can use Matrox MXO2 as your output device for playing back audio using Windows Driver Model (WDM)-based applications on your Windows system, such as Windows Media Player. To set MXO2 as your default sound playback device in Windows, do the following:

1 Choose **Start > Control Panel > Hardware and Sound > Sound**, and click the **Playback** tab.

2 Right-click **Matrox WDM audio device LE**, and click **Set as Default Device**.

📝 **Note** In order to monitor the audio channels that you're streaming in Telestream Wirecast, you must connect your speakers to the output of your sound card and set your default sound playback device to your sound card (not your Matrox device). For details on using Telestream Wirecast with your Matrox hardware, see Chapter 15, "Using Matrox MXO2 with Telestream Wirecast."

Note about using sleep and hibernation modes with MXO2

Before setting your computer to sleep or hibernation mode, make sure that you first quit any application that is using your Matrox MXO2 hardware.

Removing your Matrox MXO2 software

You can remove the various Matrox MXO2 software components as follows:

• To remove Matrox Mtx.utils from your computer, choose **Start > All Programs > Matrox Mtx.utils > Uninstall Matrox Mtx.utils**.

• To remove the Matrox effect patterns from your computer, choose **Start > All Programs > Matrox Effect Patterns > Uninstall Matrox Effect Patterns**.

• To remove the Matrox VFW software codecs from a computer without Matrox Mtx.utils, choose **Start > All Programs > Matrox VFW Software Codecs > Uninstall Matrox VFW Software Codecs**.

Your notes

3

Connecting External Devices to Matrox MXO2

This chapter shows how to supply power and connect external devices to Matrox MXO2.

Note This chapter explains how to connect external devices to Matrox MXO2 only. For another MXO2 product, see Chapter 4, "Connecting External Devices to Matrox MXO2 Rack," Chapter 5, "Connecting External Devices to Matrox MXO2 LE," or Chapter 6, "Connecting External Devices to Matrox MXO2 Mini."

Available MXO2 connections

Matrox MXO2 features a full compliment of professional inputs and outputs, and allows you to connect multiple devices for up to five user-selectable simultaneous video outputs.

MXO2 video connections

- One HD HDMI input and one HD/SD HDMI output, both with up to eight channels of embedded audio. The HDMI input/output supports YUV and RGB devices.
- One HD/SD SDI input with up to eight channels of embedded audio, and two HD/SD SDI outputs with up to 16 channels of embedded audio. Both SDI outputs simultaneously output the same video and embedded audio.
- One HD/SD analog component input/output, one S-Video input/output, and one composite input/output.
- Analog black burst reference input.

MXO2 audio connections

- Two balanced analog XLR inputs (stereo pair).
- Four balanced analog XLR outputs (two stereo pairs).
- One AES/EBU stereo input/output.
- Two unbalanced analog RCA inputs (stereo pair).
- Six unbalanced analog RCA outputs (for surround sound monitoring).

Powering MXO2

Supply power to MXO2 using an AC outlet via the Matrox external power supply and a power cord, or using a battery via the Matrox battery power cable. Matrox MXO2 connects to the battery via a 4-pin XLR connector. For information on how to connect your battery to portable video equipment, such as Matrox MXO2, contact the battery manufacturer. Before connecting MXO2 to a battery, please read the "Battery requirements and guidelines for MXO2" on page 3.

MXO2 power functionality

MXO2 features a power button that you can use to turn the MXO2 on and off. However, when power is supplied to MXO2 and it is connected to your computer, the MXO2 will turn on or off automatically when you start up or shut down your

system. That is, when you shut down your system, your MXO2 will turn off. Starting up your system turns your MXO2 on. To manually turn your MXO2 on, press the power button. To turn off your MXO2, press and hold the power button for at least two seconds.

(i) **Important**   When MXO2 is connected to a computer that is running, do not disconnect MXO2 from its power source, or power off MXO2. Shut down your computer before removing power from MXO2. If using a battery to power MXO2, ensure that the battery is sufficiently charged.

Caution   When disconnecting the power supply from MXO2, make sure that you slide back the casing on the connector to release the locking mechanism.
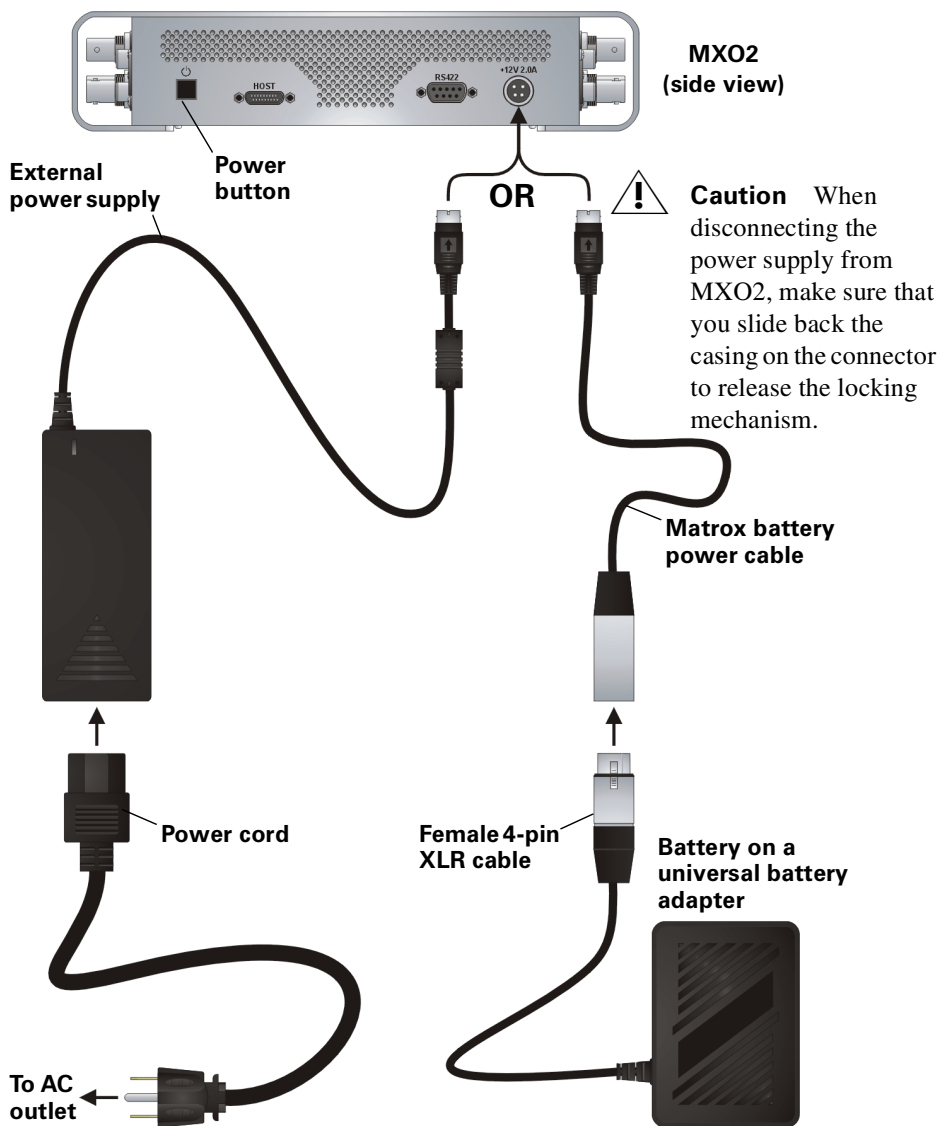
Powering MXO2

Connecting MXO2 to your computer

Connect MXO2 to your computer using the Matrox PCIe cable and the appropriate Matrox host adapter.

Ensuring proper PCIe cable connection

To ensure functionality and avoid damaging the PCIe cable or host connector when connecting MXO2 to your computer, the PCIe cable must be connected to your MXO2 and host connector as shown below:

To Matrox MXO2

"B" side of PCIe cable must face the side labeled "HOST" on MXO2.
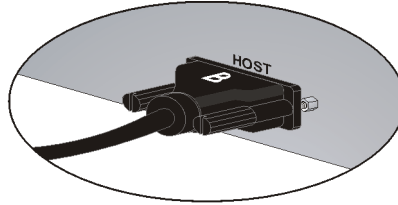
To Matrox PCIe ExpressCard/34 adapter

"B" side of PCIe cable must face the top of the Matrox PCIe ExpressCard/34 adapter.

To Matrox PCIe host adapter

"B" side of PCIe cable must face the side labeled "XI LINK" on the Matrox PCIe host adapter.
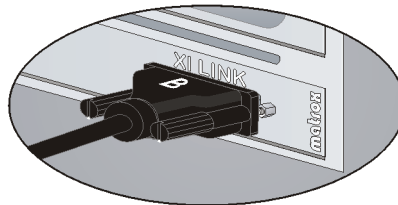
Using the Matrox PCIe host adapters

For MXO2 to be detected on your desktop computer, power must be supplied to MXO2 (see "Powering MXO2" on page 14), and it must be connected to your computer before starting up your system.

(i) **Important** Do not disconnect the Matrox PCIe cable from the adapter, or MXO2, when your computer is running. To safely remove the Matrox PCIe host ExpressCard/34 adapter from your laptop, see "Removing your PCIe host ExpressCard/34 adapter" on page 8.

MXO2 (side view)

⚠️ **Caution** To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 16.

PCIe cable

Matrox PCIe host adapter

Matrox PCIe host ExpressCard/34 adapter

OR

To your laptop's ExpressCard/34 slot (see "Installing your PCIe host ExpressCard/34 adapter (for laptops)" on page 7).

Connecting MXO2 to your computer
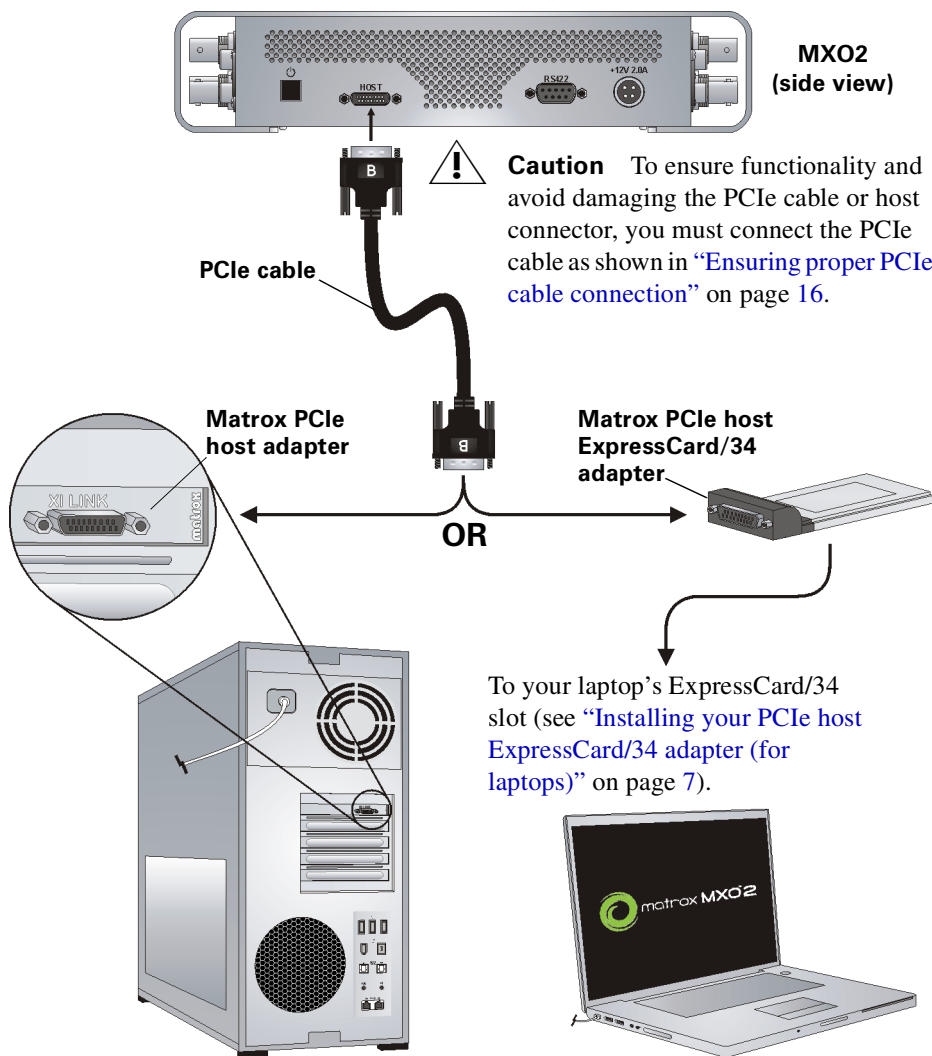
MXO2 RS-422 serial connection

MXO2's RS-422 serial connector lets you use RS-422 device control with a supported video editing application when capturing material and exporting your sequence to tape. This serial connection supports any device that uses the RS-422 SMPTE time code protocol, such as a VTR or digital disk recorder. For information on how to configure Matrox RS-422 device control settings in Adobe Premiere Pro, see "Setting up Matrox device control" on page 90.
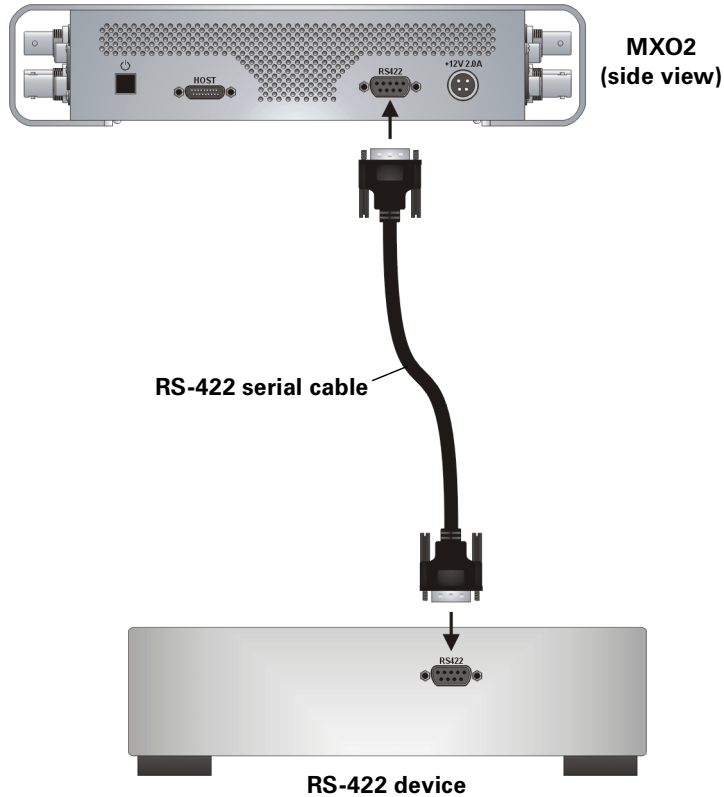
Typical Matrox MXO2 connections

In the following typical connection examples, we've connected a monitor to view the signal that will be recorded, and separate source and record decks. You may, however, use the same deck as both your source and record device by making the input and output connections to a single deck. For details on the Matrox MXO2 connectors, see Appendix B, "Matrox MXO2 Connectors."

Analog component video connections

In this illustration, we're using analog component connectors for video, XLR connectors for audio, and an HDMI connector for video monitoring. The video is genlocked using a tri-level sync generator.

Typical Matrox MXO2 connections

Digital video connections

In this illustration, we're using SDI connectors for video and audio, an SDI connector for video monitoring, and we're monitoring the audio on a surround sound speaker system through RCA connectors. The video is genlocked using a tri-level sync generator.

4
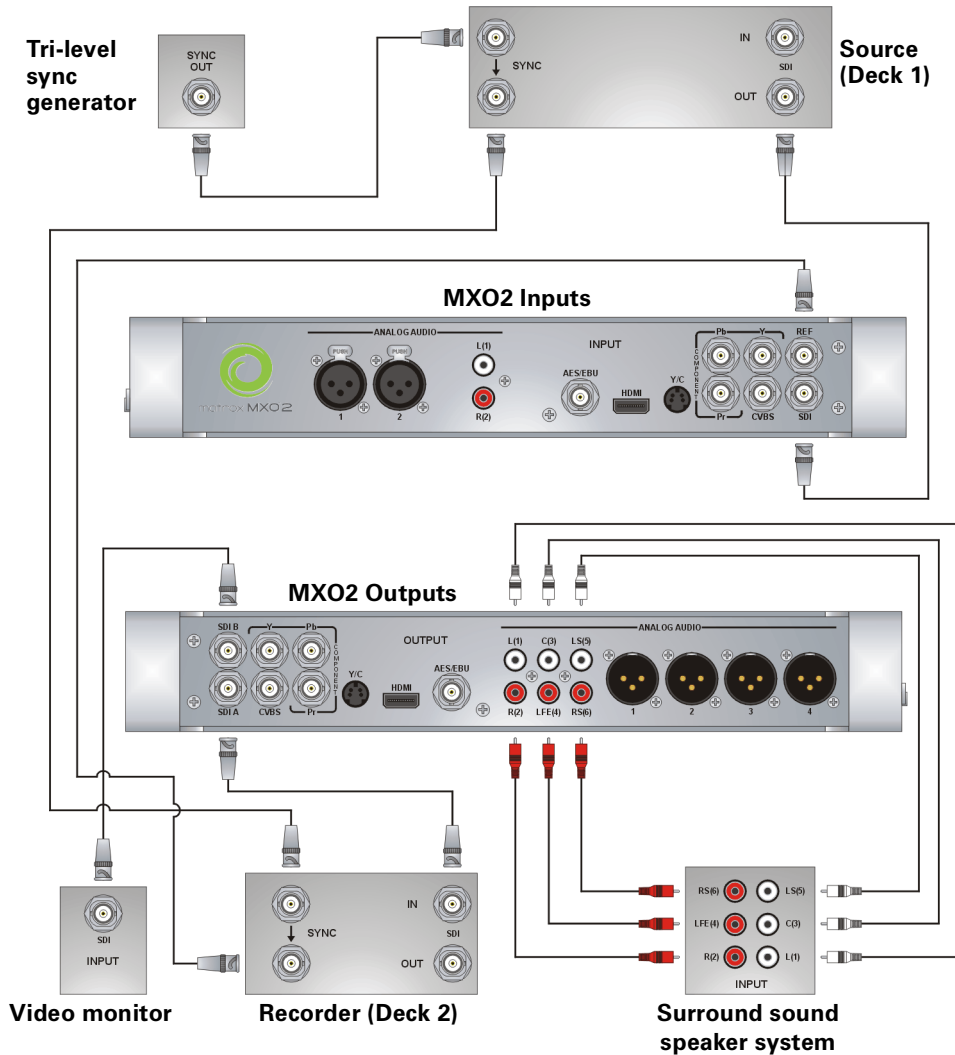
Connecting External Devices to Matrox MXO2 Rack

This chapter shows how to rack mount, supply power, and connect external devices to Matrox MXO2 Rack.

Note This chapter explains how to connect external devices to Matrox MXO2 Rack only. For another MXO2 product, see Chapter 3, "Connecting External Devices to Matrox MXO2," Chapter 5, "Connecting External Devices to Matrox MXO2 LE," or Chapter 6, "Connecting External Devices to Matrox MXO2 Mini."

Available MXO2 Rack connections

Matrox MXO2 Rack features a full compliment of professional inputs and outputs, and allows you to connect multiple devices for up to five user-selectable simultaneous video outputs.

MXO2 Rack video connections

- One HD HDMI input and one HD/SD HDMI output, both with up to eight channels of embedded audio. The HDMI input/output supports YUV and RGB devices.
- One HD/SD SDI input with up to eight channels of embedded audio, and two HD/SD SDI outputs with up to 16 channels of embedded audio. Both SDI outputs simultaneously output the same video and embedded audio.
- One HD/SD analog component input/output, one S-Video input/output, and one composite input/output.
- One analog black burst reference input and loop-through output.

MXO2 Rack audio connections

- Four balanced analog XLR inputs (two stereo pairs).
- Eight balanced analog XLR outputs (four stereo pairs).
- Two AES/EBU stereo inputs/outputs.

Rack mounting your MXO2 Rack

Use the supplied rackmount brackets to mount your Matrox MXO2 Rack to a standard 19-inch rack. The rackmount brackets can be used to either front or rear mount your MXO2 Rack. You can also mount MXO2 Rack so that it's recessed to allow more space for cables. MXO2 Rack takes up two vertical rack unit spaces.

1 Unpack the two rackmount brackets and their eight mounting screws.

⚠ **Caution** Use only the screws supplied with your MXO2 Rack to attach the rackmount brackets to your MXO2 Rack. If you use screws that are larger or longer than the ones supplied, you can damage your equipment.

2 Depending if you want to front or rear mount your MXO2 Rack, position the rackmount brackets so that the bracket face is either towards the front (connector side) or the back of your MXO2 Rack.

3 MXO2 Rack can be recess mounted to allow extra space for connectors and cables. Depending on your mounting needs, align the screw holes on each rackmount bracket with the desired screw holes on either side of the MXO2 Rack.

Front rackmounting

Rackmount bracket   **MXO2 Rack**

Rear rackmounting

Recessed rackmounting
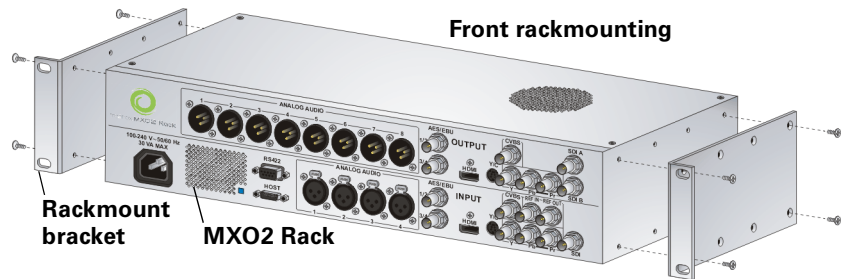
⚠️ **Caution**   For stability and safety, whichever mounting method you choose, make sure to fasten each rackmount bracket to MXO2 Rack using all four supplied screws.

4 Using a hand screwdriver only (**no power screwdrivers**), carefully tighten each screw until snug. **Do not overtighten!**

5 Fasten your MXO2 Rack to the standard 19-inch rack as per your rack's instructions.

Powering MXO2 Rack

You can power MXO2 Rack using an AC outlet and an IEC-C13 power cord. To turn off your MXO2 Rack, unplug it from the AC outlet while your computer is shut down.

(i) **Important**   When MXO2 Rack is connected to a computer that is running, do not disconnect MXO2 Rack from its power source. Shut down your computer before removing power from MXO2 Rack.

MXO2 Rack

IEC-C13
power cord

To AC
outlet
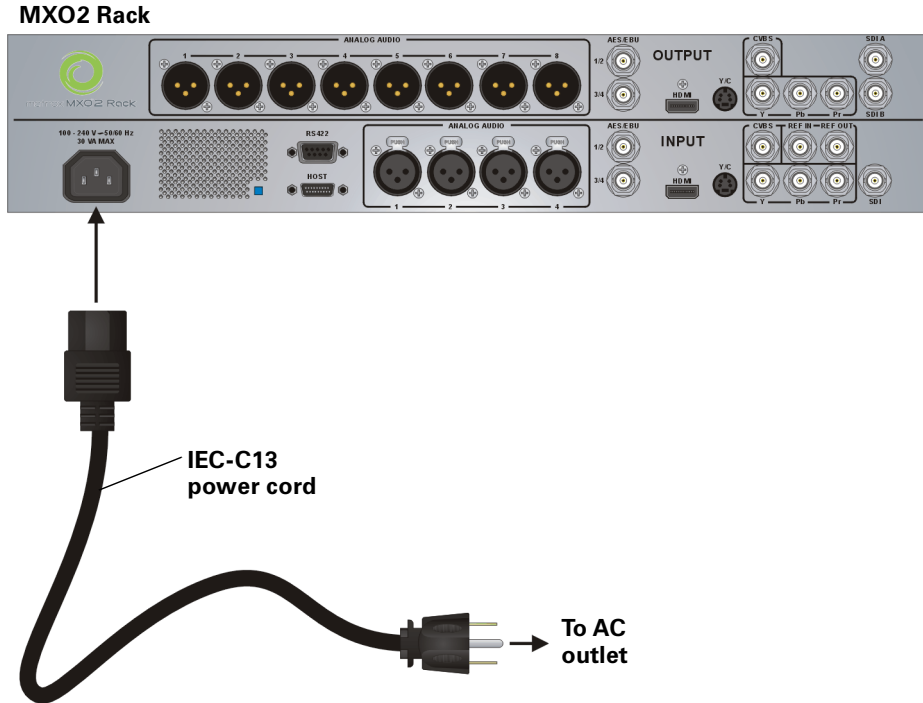
Connecting MXO2 Rack to your computer

Connect MXO2 Rack to your computer using the Matrox PCIe cable and the appropriate Matrox PCIe host adapter.

Ensuring proper PCIe cable connection

To ensure functionality and avoid damaging the PCIe cable or host connector when connecting MXO2 Rack to your computer, the PCIe cable must be connected to your MXO2 Rack and host connector as shown below:
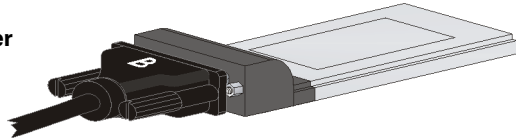
To Matrox MXO2

"B" side of PCIe cable must face the side labeled "HOST" on MXO2 Rack.
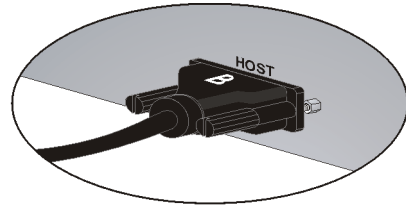
**To Matrox PCIe ExpressCard/34 adapter**

"B" side of PCIe cable must face the top of the Matrox PCIe ExpressCard/34 adapter.
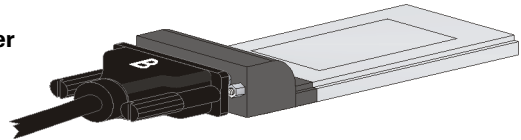
To Matrox PCIe host adapter

"B" side of PCIe cable must face the side labeled "XI LINK" on the Matrox PCIe host adapter.
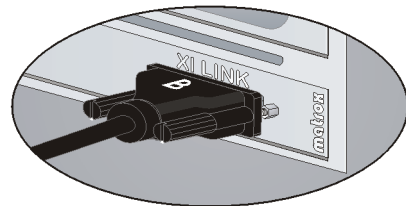
Using the Matrox PCIe host adapters

For MXO2 Rack to be detected on a desktop computer, power must be supplied to MXO2 Rack (see "Powering MXO2 Rack" on page 24), and it must be connected to your computer before starting up your system.

(i) **Important** Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 Rack, when your computer is running. To safely remove the Matrox PCIe host ExpressCard/34 adapter from your laptop, see "Removing your PCIe host ExpressCard/34 adapter" on page 8.

MXO2 Rack

PCIe cable

Matrox PCIe host adapter

! **Caution** To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 25.

Matrox PCIe host ExpressCard/34 adapter

OR

To your laptop's ExpressCard/34 slot (see "Installing your PCIe host ExpressCard/34 adapter (for laptops)" on page 7).

Chapter 4, Connecting External Devices to Matrox MXO2 Rack
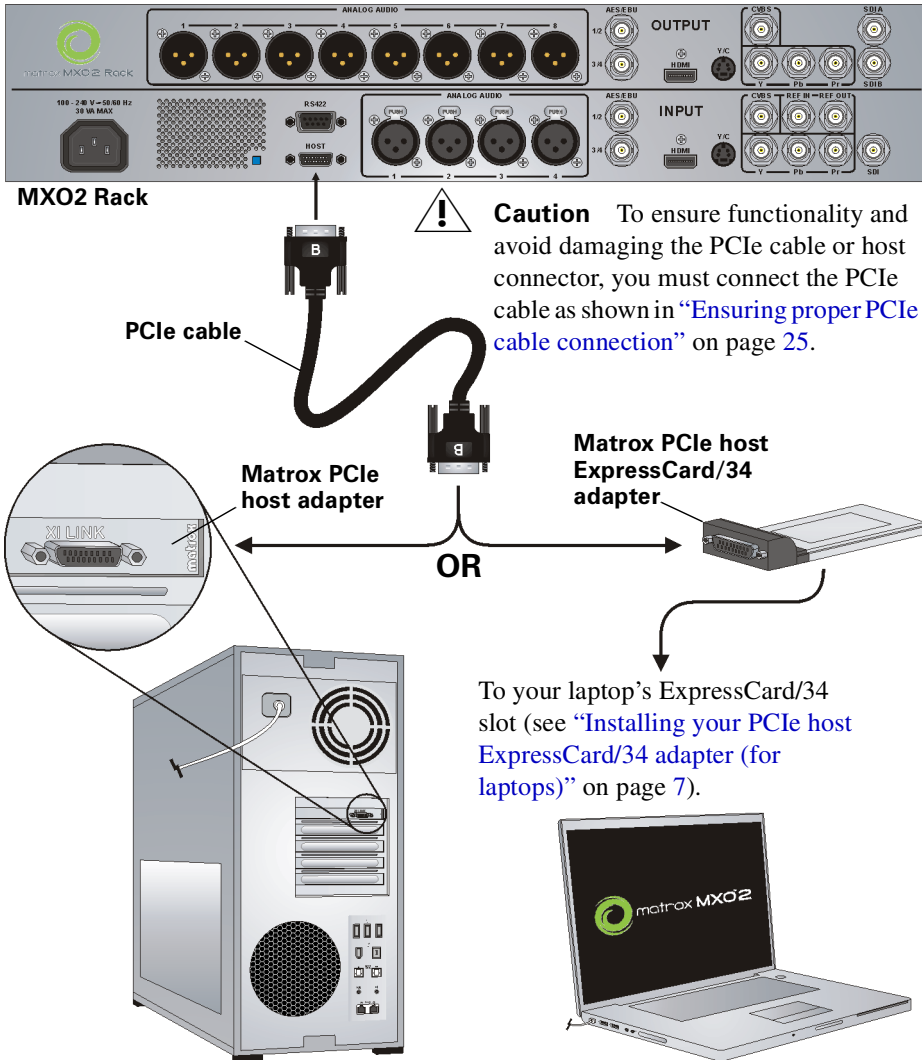
MXO2 Rack RS-422 serial connection

The Matrox MXO2 Rack RS-422 serial connector lets you use RS-422 device control with a supported video editing application when capturing material and exporting your sequence to tape. This serial connection supports any device that uses the RS-422 SMPTE time code protocol, such as a VTR or digital disk recorder. For information on how to configure Matrox RS-422 device control settings in Adobe Premiere Pro, see "Setting up Matrox device control" on page 90.
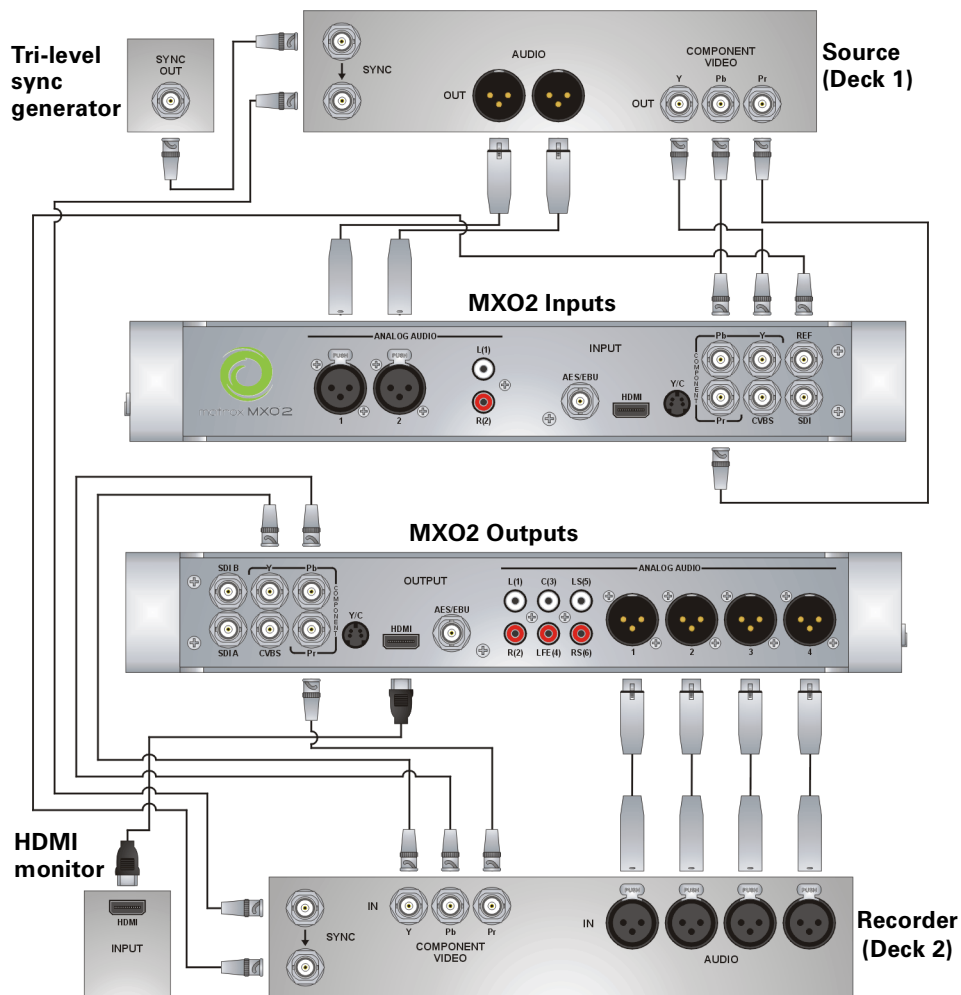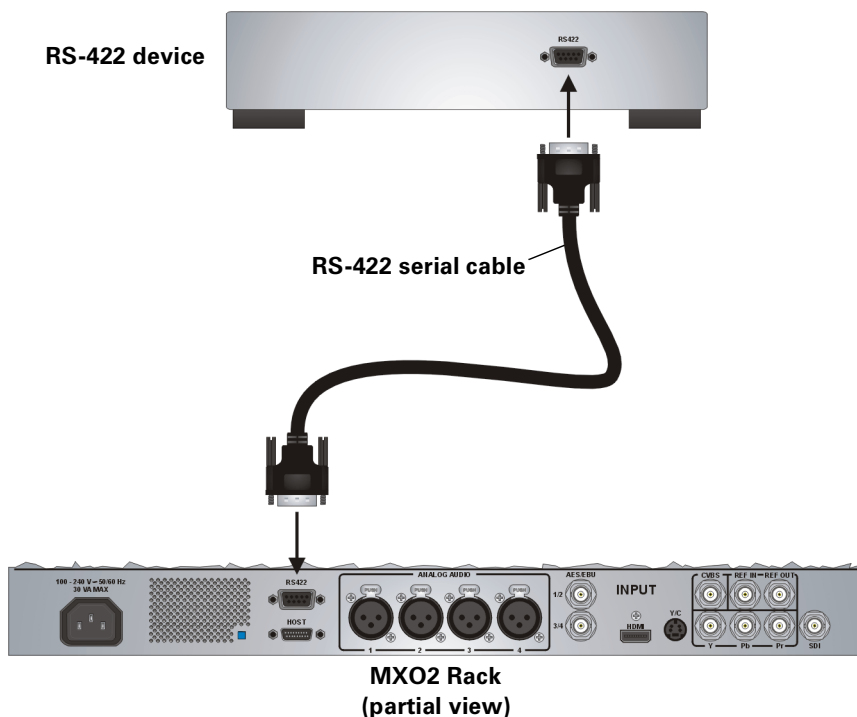
Typical Matrox MXO2 Rack connections

In the following typical connection examples, we've connected a monitor to view the signal that will be recorded, and separate source and record decks. You may, however, use the same deck as both your source and record device by making the input and output connections to a single deck. For details on the Matrox MXO2 Rack connectors, see Appendix B, "Matrox MXO2 Connectors."

Analog component video connections

In this illustration, we're using analog component connectors for video, XLR connectors for audio, and an HDMI connector for video monitoring. The video is genlocked using a tri-level sync generator.

Chapter 4, Connecting External Devices to Matrox MXO2 Rack
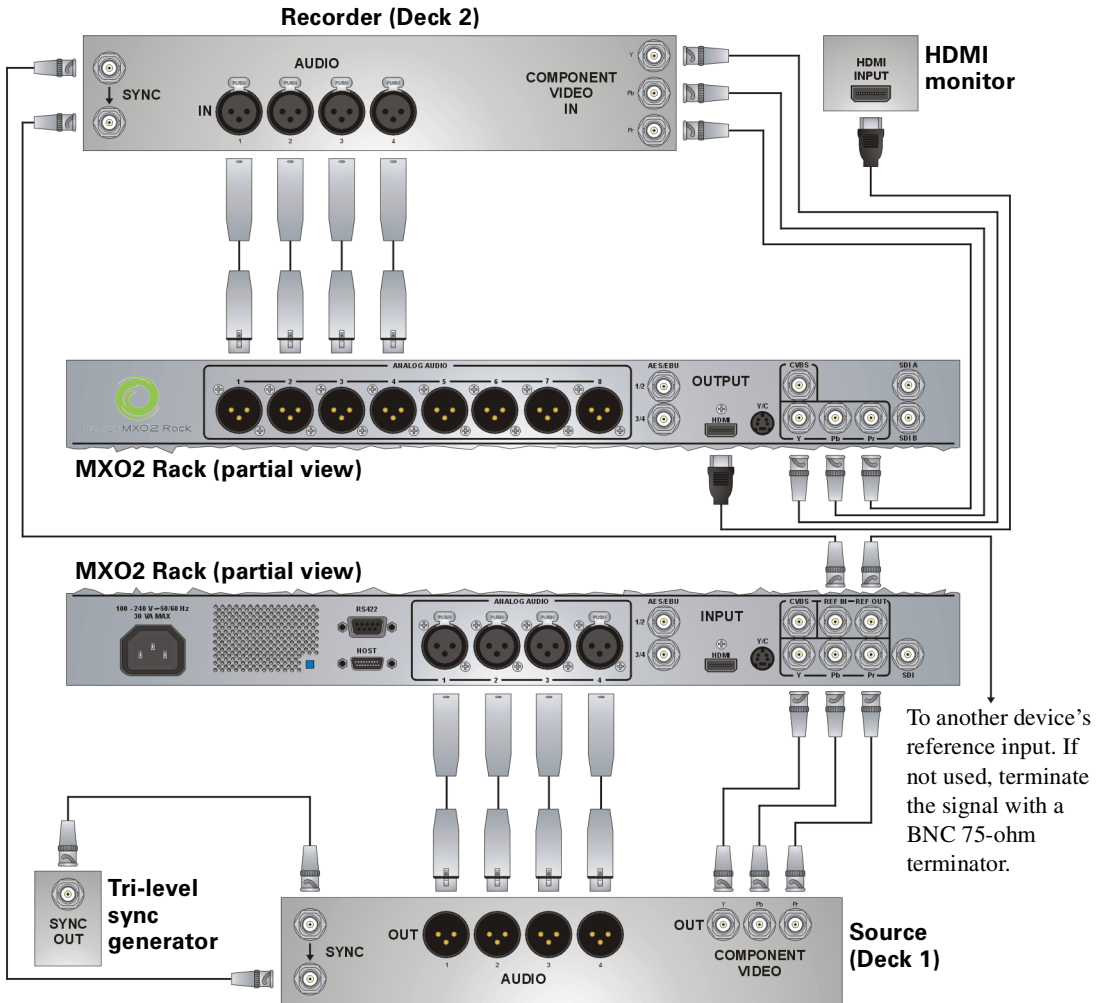
Digital video connections

In this illustration, we're using SDI connectors for video and audio, an SDI connector for video monitoring, and we're monitoring the audio on a surround sound speaker system through XLR connectors. The video is genlocked using a tri-level sync generator.
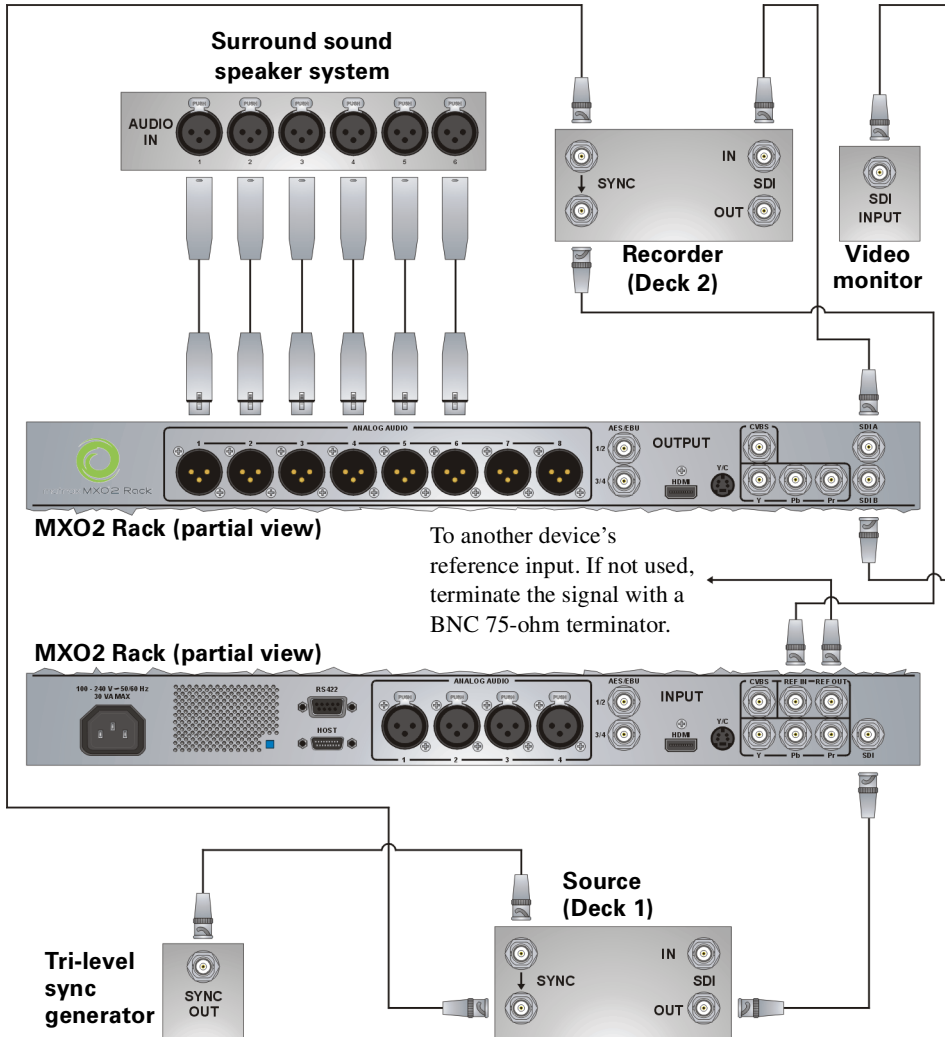
Typical Matrox MXO2 Rack connections

Your notes

5

Connecting External Devices to Matrox MXO2 LE

This chapter shows how to supply power and connect external devices to Matrox MXO2 LE.

📝 **Note** This chapter explains how to connect external devices to Matrox MXO2 LE only. For another MXO2 product, see Chapter 3, "Connecting External Devices to Matrox MXO2," Chapter 4, "Connecting External Devices to Matrox MXO2 Rack," or Chapter 6, "Connecting External Devices to Matrox MXO2 Mini."

Available MXO2 LE connections

Matrox MXO2 LE features a full compliment of professional inputs and output, and allows you to connect multiple devices for up to five user-selectable simultaneous video outputs.

MXO2 LE video connections

- One HD HDMI input and one HD/SD HDMI output, both with up to eight channels of embedded audio. The HDMI input/output supports YUV and RGB devices.
- One HD/SD SDI input with up to eight channels of embedded audio, and two HD/SD SDI outputs with up to 16 channels of embedded audio. Both SDI outputs simultaneously output the same video and embedded audio.
- One HD/SD analog component input/output, one S-Video input/output, and one composite input/output.
- Analog black burst reference input.

MXO2 LE audio connections

- Two balanced analog XLR inputs/ouputs (stereo pair).
- Two unbalanced analog RCA inputs/ouputs (stereo pair).

Powering MXO2 LE

Supply power to MXO2 LE using an AC outlet via the Matrox external power supply and a power cord, or using a battery. Matrox MXO2 LE connects to the battery via a 4-pin XLR connector. For information on how to connect your battery to portable video equipment, such as Matrox MXO2 LE, contact the battery manufacturer. Before connecting MXO2 LE to a battery, please read the "Battery requirements and guidelines for MXO2" on page 3.

MXO2 LE power functionality

MXO2 LE features a power button that you can use to turn the MXO2 LE on and off. To turn your MXO2 LE on, press the power button. To turn off your MXO2 LE, press and hold the power button for at least two seconds.

ⓘ **Important** When MXO2 LE is connected to a computer that is running, do not disconnect MXO2 LE from its power source, or power off MXO2 LE. Shut down

your computer before removing power from MXO2 LE. If using a battery to power MXO2 LE, ensure that the battery is sufficiently charged.
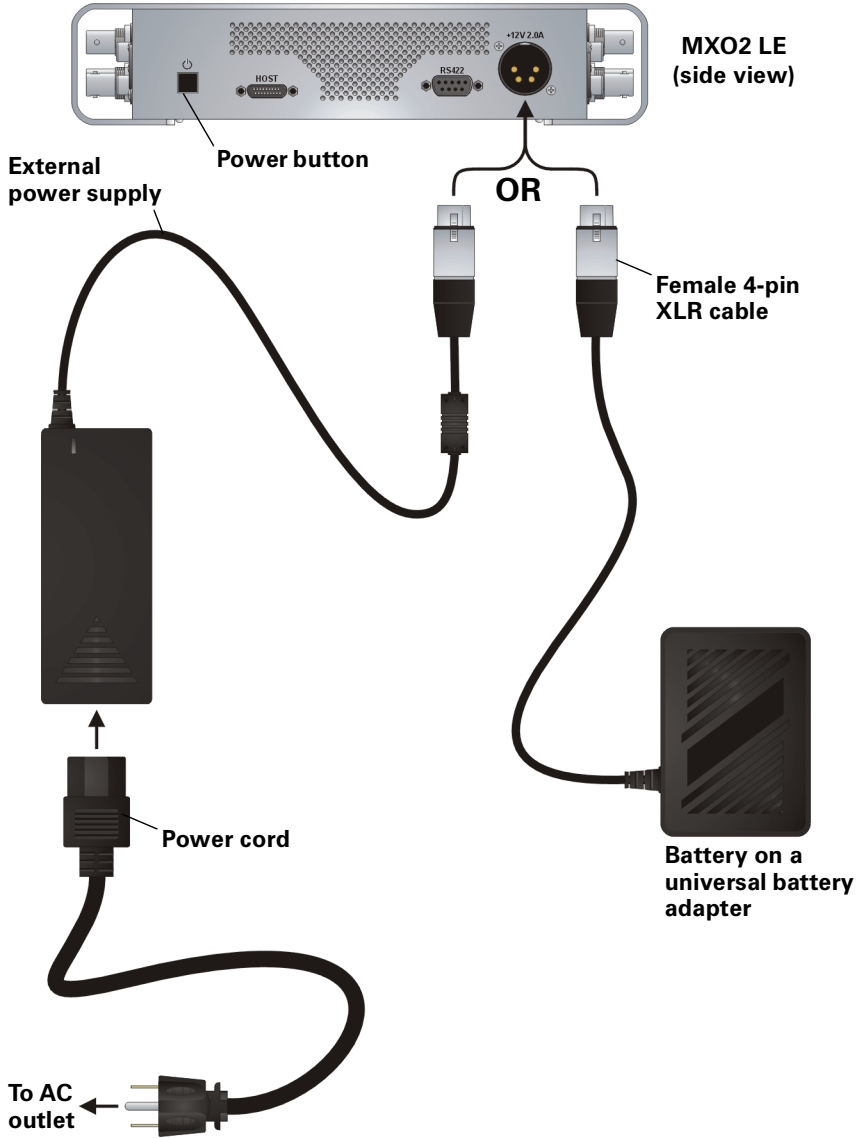
Connecting MXO2 LE to your computer
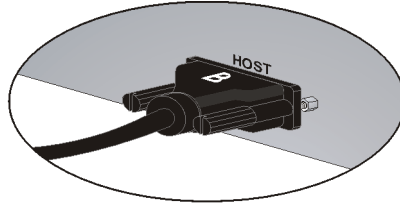
Connect MXO2 LE to your computer using the Matrox PCIe cable and the appropriate Matrox PCIe host adapter.

Ensuring proper PCIe cable connection

To ensure functionality and avoid damaging the PCIe cable or host connector when connecting MXO2 LE to your computer, the PCIe cable must be connected to your MXO2 LE and host connector as shown below:

To Matrox MXO2

"B" side of PCIe cable must face the side labeled "HOST" on MXO2 LE.
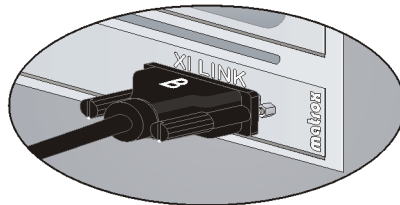
To Matrox PCIe ExpressCard/34 adapter

"B" side of PCIe cable must face the top of the Matrox PCIe ExpressCard/34 adapter.
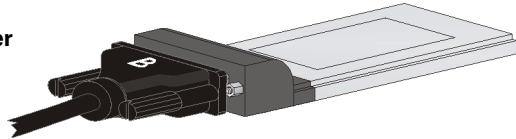
To Matrox PCIe host adapter

"B" side of PCIe cable must face the side labeled "XI LINK" on the Matrox PCIe host adapter.

Using the Matrox PCIe host adapters

For MXO2 LE to be detected on your desktop computer, power must be supplied to MXO2 LE (see "Powering MXO2 LE" on page 32), and it must be connected to your computer before starting up your system.

(i) **Important** Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 LE, when your computer is running. To safely remove the Matrox PCIe host ExpressCard/34 adapter from your laptop, see "Removing your PCIe host ExpressCard/34 adapter" on page 8.


MXO2 LE (side view)

⚠ **Caution** To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 34.

PCIe cable

Matrox PCIe host adapter

Matrox PCIe host ExpressCard/34 adapter

OR

To your laptop's ExpressCard/34 slot (see "Installing your PCIe host ExpressCard/34 adapter (for laptops)" on page 7).

Connecting MXO2 LE to your computer
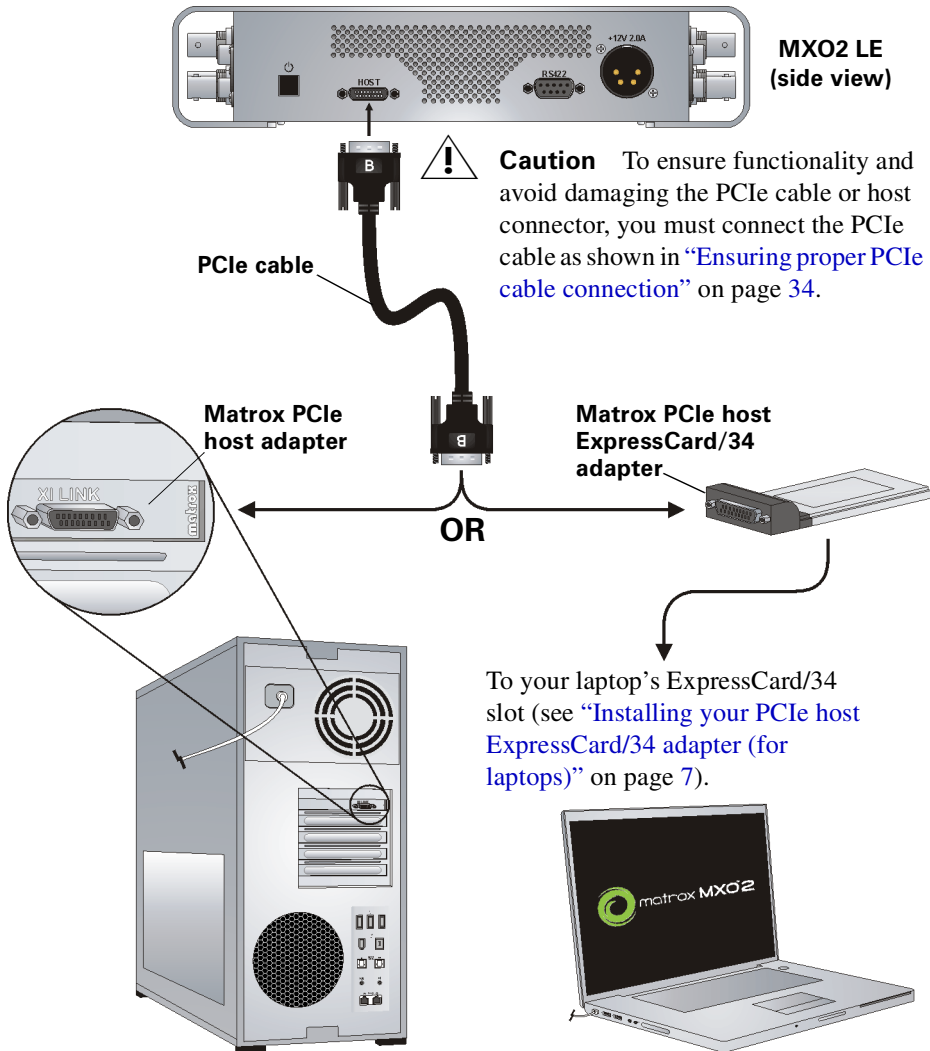
MXO2 LE RS-422 serial connection

MXO2 LE's RS-422 serial connector lets you use RS-422 device control with a supported video editing application when capturing material and exporting your sequence to tape. This serial connection supports any device that uses the RS-422 SMPTE time code protocol, such as a VTR or digital disk recorder. For information on how to configure Matrox RS-422 device control settings in Adobe Premiere Pro, see "Setting up Matrox device control" on page 90..
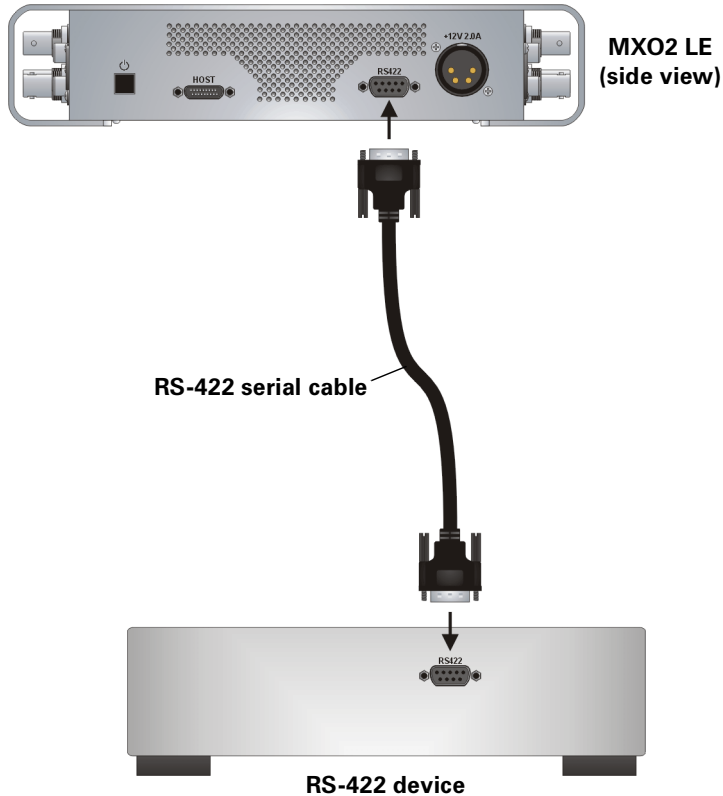
Typical Matrox MXO2 LE connections

In the following typical connection examples, we've connected a monitor to view the signal that will be recorded, and separate source and record decks. You may, however, use the same deck as both your source and record device by making the input and output connections to a single deck. For details on the Matrox MXO2 LE connectors, see Appendix B, "Matrox MXO2 Connectors."

Analog component video connections

In this illustration, we're using analog component connectors for video, XLR connectors for audio, and an HDMI connector for video monitoring. The video is genlocked using a tri-level sync generator.
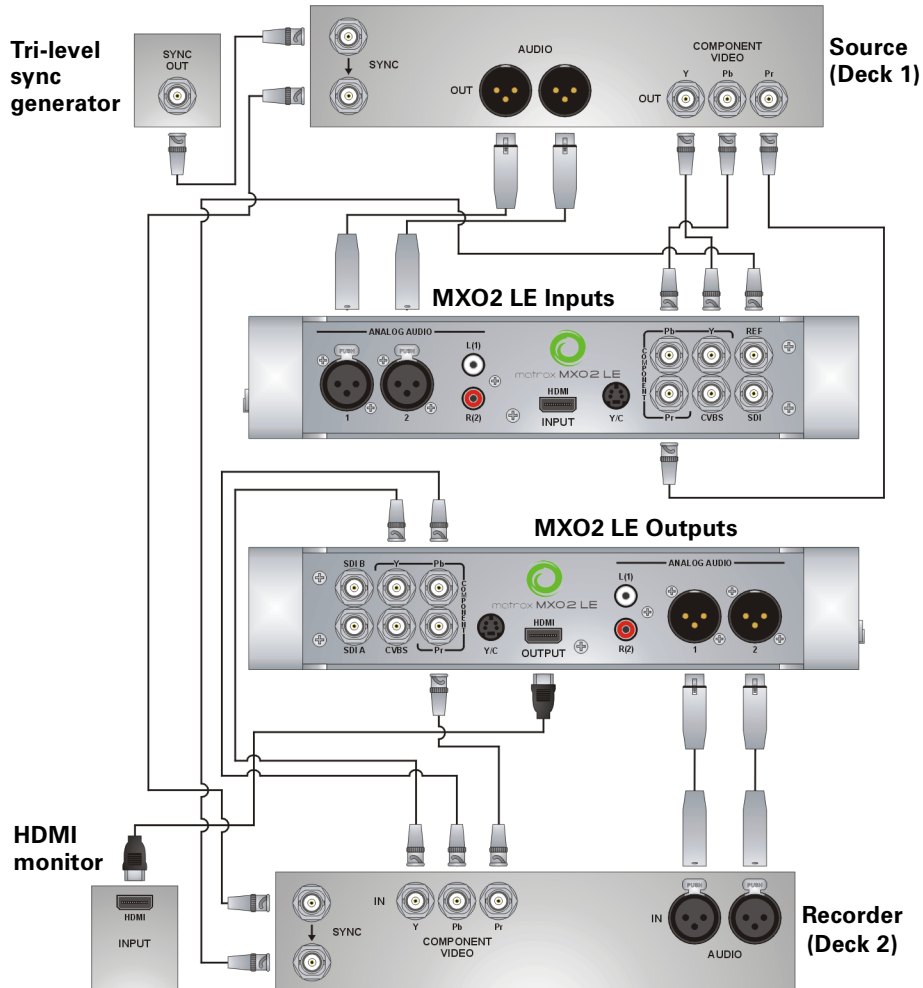
Typical Matrox MXO2 LE connections

Digital video connections

In this illustration, we're using SDI connectors for video and audio, an SDI connector for video monitoring, and we're monitoring the audio on a surround sound speaker system through an HDMI connector. The video is genlocked using a tri-level sync generator.

6
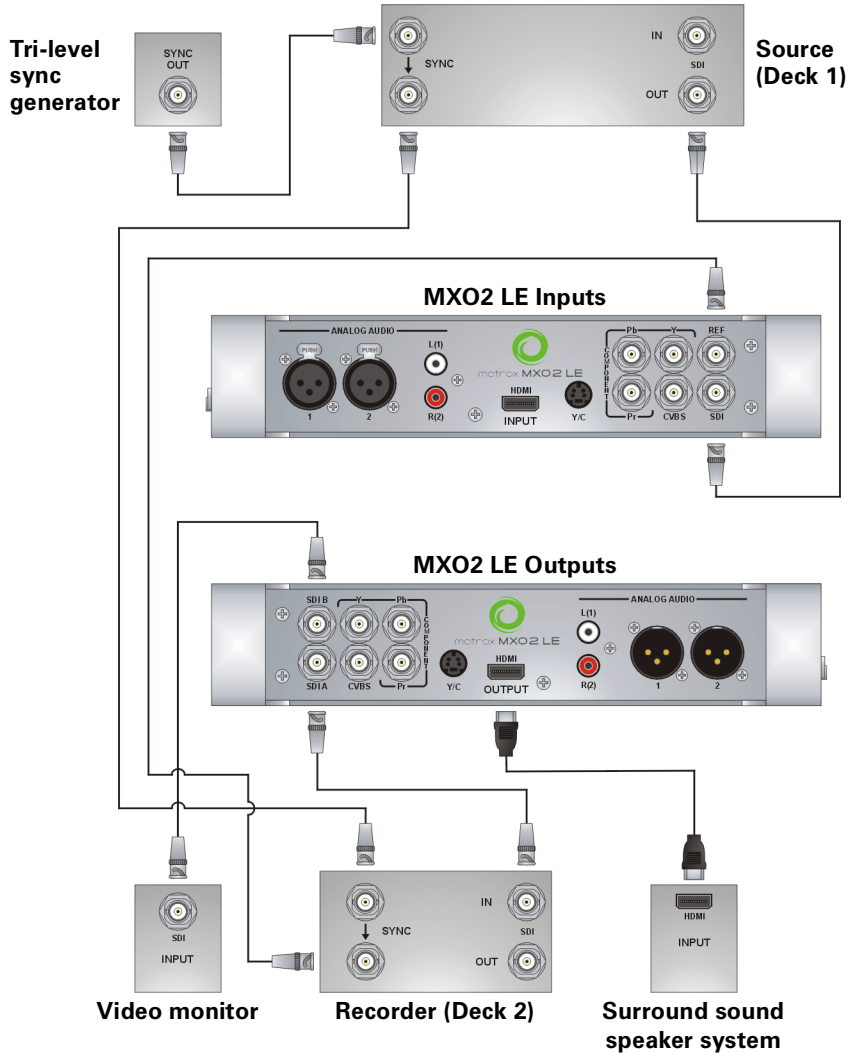
Connecting External Devices to Matrox MXO2 Mini

This chapter shows how to connect external devices to Matrox MXO2 Mini.

📝 **Note** This chapter explains how to connect external devices to Matrox MXO2 Mini only. For another MXO2 product, see Chapter 3, "Connecting External Devices to Matrox MXO2," Chapter 4, "Connecting External Devices to Matrox MXO2 Rack," or Chapter 5, "Connecting External Devices to Matrox MXO2 LE."

Available MXO2 Mini connections

Matrox MXO2 Mini provides inputs and outputs for connecting external devices, including HDMI, analog component, S-Video, and composite video devices.

MXO2 video and audio connections

- One HD HDMI input and one HD/SD HDMI output, both with up to eight channels of embedded audio. The HDMI input/output supports YUV and RGB devices.
- One HD/SD analog component input/output, or one S-Video input/output and one composite input/output.

📝 **Note** S-Video input/output is available by using the provided S-Video adapters (see "Connecting S-Video devices to MXO2 Mini" on page 44).

- Two unbalanced analog RCA audio inputs/outputs (stereo pair).

Powering MXO2 Mini

You can supply power to MXO2 Mini using an AC outlet via the Matrox external power supply cable. To turn MXO2 Mini off, unplug the Matrox external power supply cable from the AC outlet while your computer is shut down.

ⓘ **Important** When MXO2 Mini is connected to a computer that is running, do not disconnect MXO2 Mini from its power source. Shut down your computer before removing power from MXO2 Mini.

MXO2 Mini power supply and adapter plugs

MXO2 Mini provides an external power supply cable with international adapter plugs for use in different regions.

- To remove an adapter plug from the Matrox power adapter, hold down the button labeled **PUSH** on the power adapter, and then slide the adapter plug up until it releases from the power adapter.
- To insert an adapter plug into the Matrox power adapter, ensure that the adapter plug is properly aligned with the corresponding slot on the power adapter, and then slide the adapter plug down into the power adapter until it locks into place.

Adapter plug

Power adapter

Removing an adapter plug

Inserting an adapter plug

MXO2 Mini

Power supply cable

To AC outlet
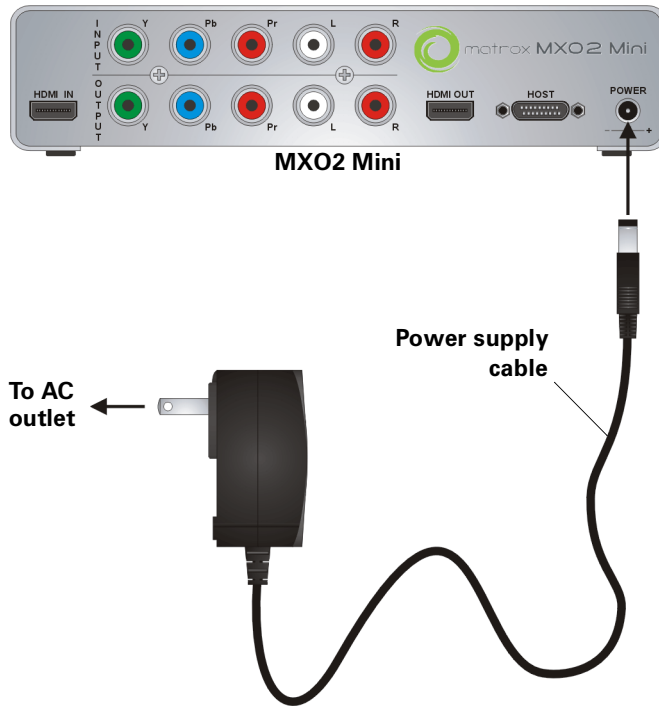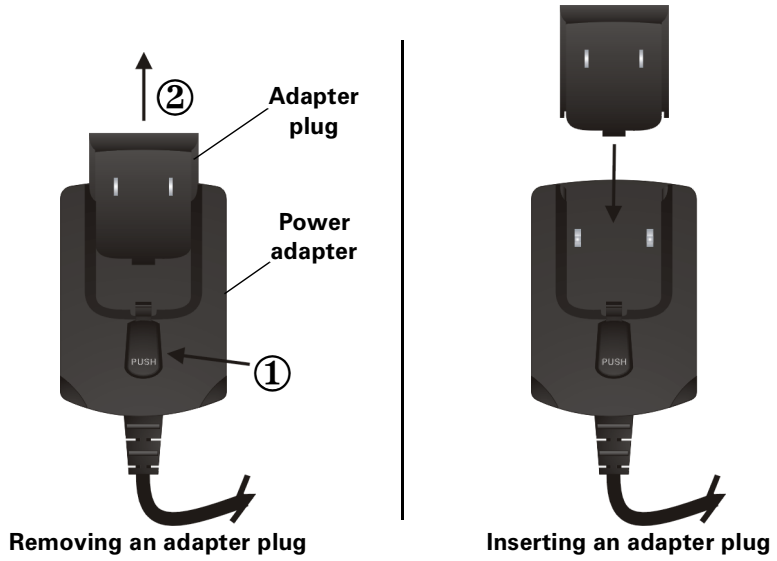
Powering MXO2 Mini

Connecting MXO2 Mini to your computer

Connect MXO2 Mini to your computer using the Matrox PCIe cable and the appropriate Matrox PCIe host adapter.

Ensuring proper PCIe cable connection

To ensure functionality and avoid damaging the PCIe cable or host connector when connecting MXO2 Mini to your computer, the PCIe cable must be connected to your MXO2 Mini and host connector as shown below:

To Matrox MXO2

"B" side of PCIe cable must face the side labeled "HOST" on MXO2 Mini.

To Matrox PCIe ExpressCard/34 adapter

"B" side of PCIe cable must face the top of the Matrox PCIe ExpressCard/34 adapter.
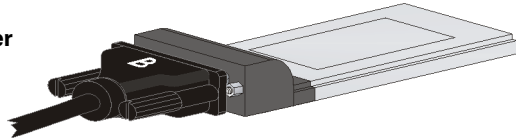
To Matrox PCIe host adapter

"B" side of PCIe cable must face the side labeled "XI LINK" on the Matrox PCIe host adapter.

Using the Matrox PCIe host adapters

For MXO2 Mini to be detected on your desktop computer, power must be supplied to MXO2 Mini (see "Powering MXO2 Mini" on page 40), and it must be connected to your computer before starting up your system.

(i) **Important**   Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 Mini, when your computer is running. To safely remove the Matrox PCIe host ExpressCard/34 adapter from your laptop, see "Removing your PCIe host ExpressCard/34 adapter" on page 8.

⚠ **Caution**   To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 42.

MXO2 Mini

PCIe cable

Matrox PCIe host adapter

Matrox PCIe host ExpressCard/34 adapter

OR

To your laptop's ExpressCard/34 slot (see "Installing your PCIe host ExpressCard/34 adapter (for laptops)" on page 7).

Connecting MXO2 Mini to your computer
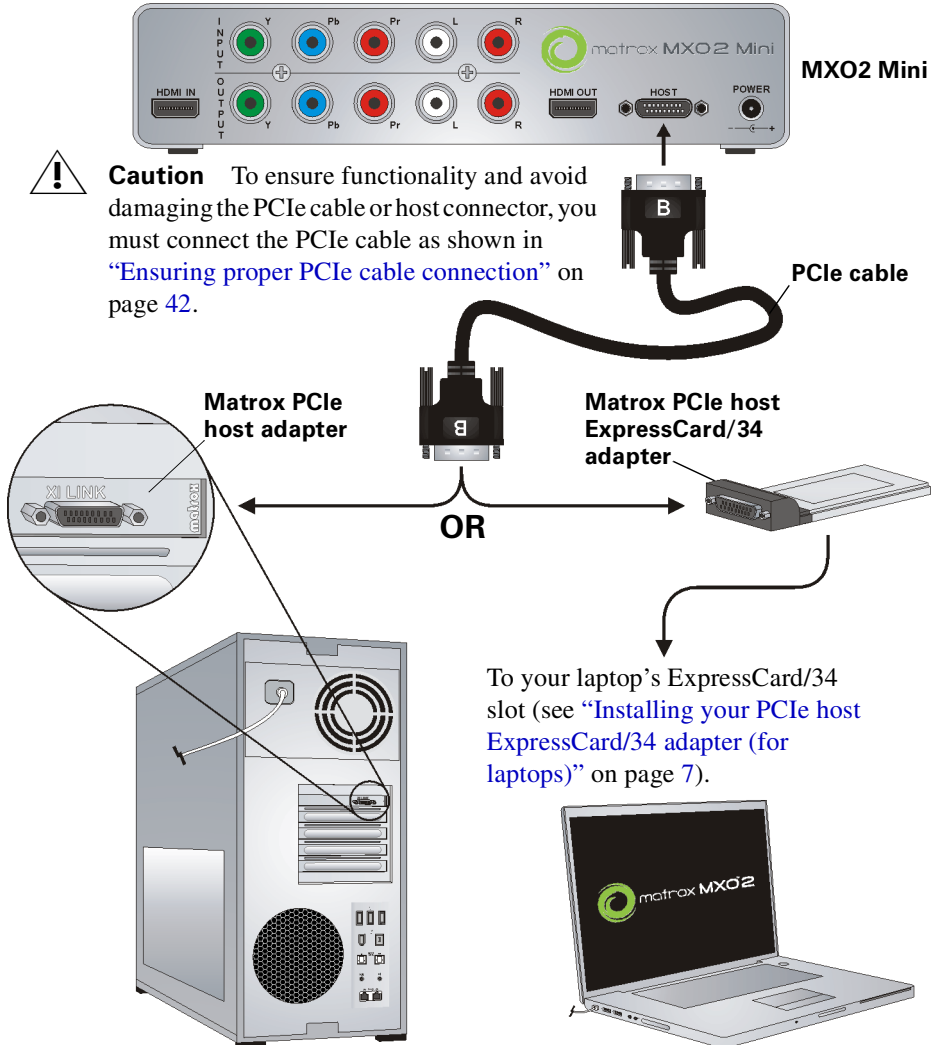
Connecting S-Video devices to MXO2 Mini

To support S-Video connections on MXO2 Mini, your MXO2 Mini kit includes two S-Video adapter cables (one for S-Video input and one for S-Video output).

Note When you connect an S-Video device to MXO2 Mini, you won't be able to connect an analog component device at the same time.
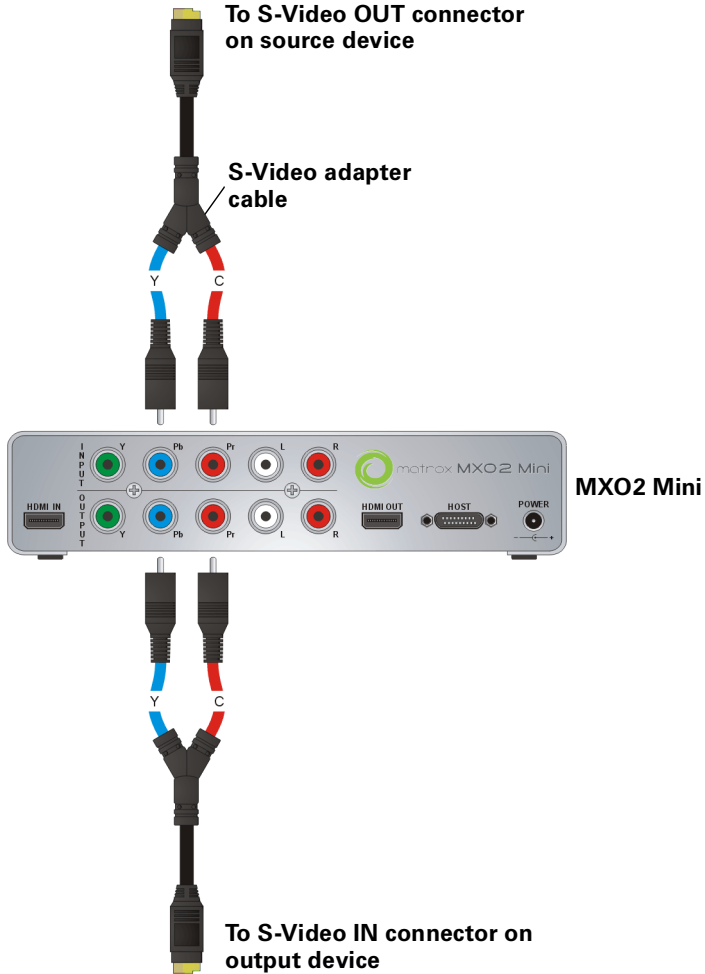
Typical Matrox MXO2 Mini connections

In the following typical connection examples, we've connected a monitor to view the signal that will be recorded, and separate source and record decks. You may, however, use the same deck as both your source and record device by making the input and output connections to a single deck. For details on the Matrox MXO2 Mini connectors, see Appendix B, "Matrox MXO2 Connectors."

Analog component video connections

In this illustration, we're using component connectors for video, RCA connectors for audio, and an HDMI connector for video monitoring. The video is genlocked to the input source using MXO2 Mini's built-in genlock.
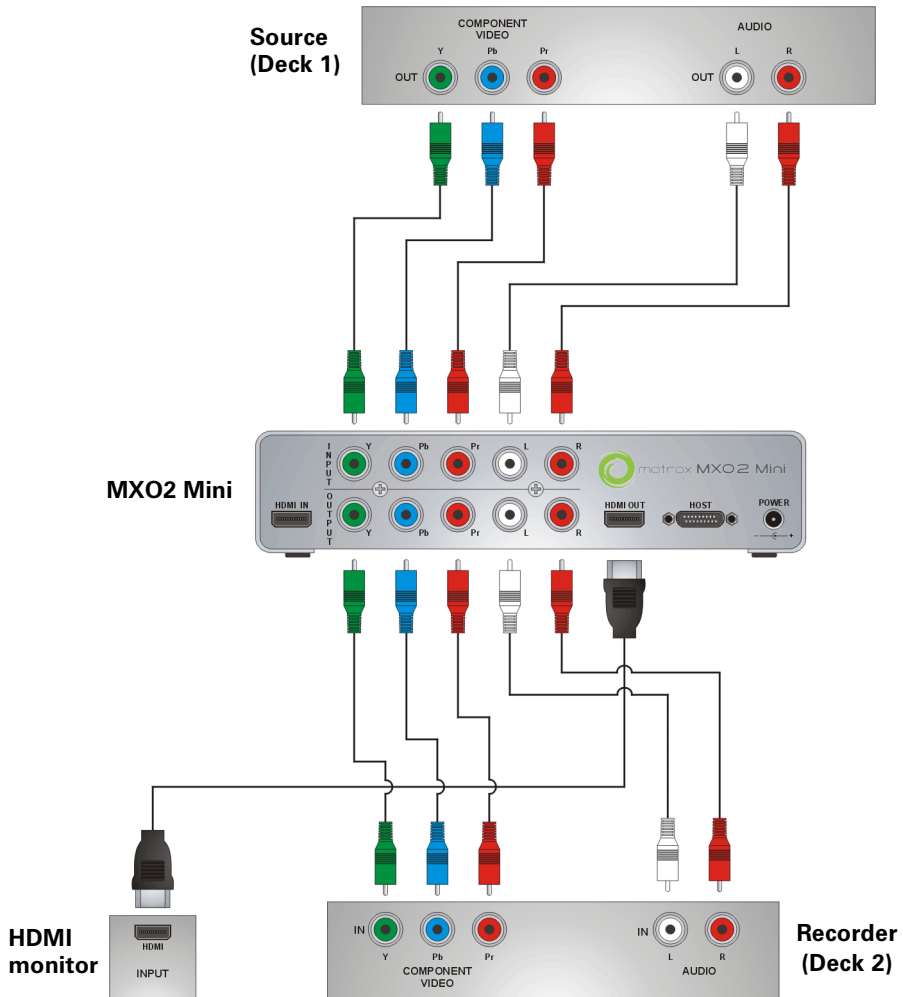
Typical Matrox MXO2 Mini connections

HDMI video connections

In this illustration, we're using HDMI for video, RCA connectors for audio, and S-Video for video monitoring. The video is genlocked to the input source using MXO2 Mini's built-in genlock.

When using HDMI connections, the embedded uncompressed HDMI audio is also available.

7
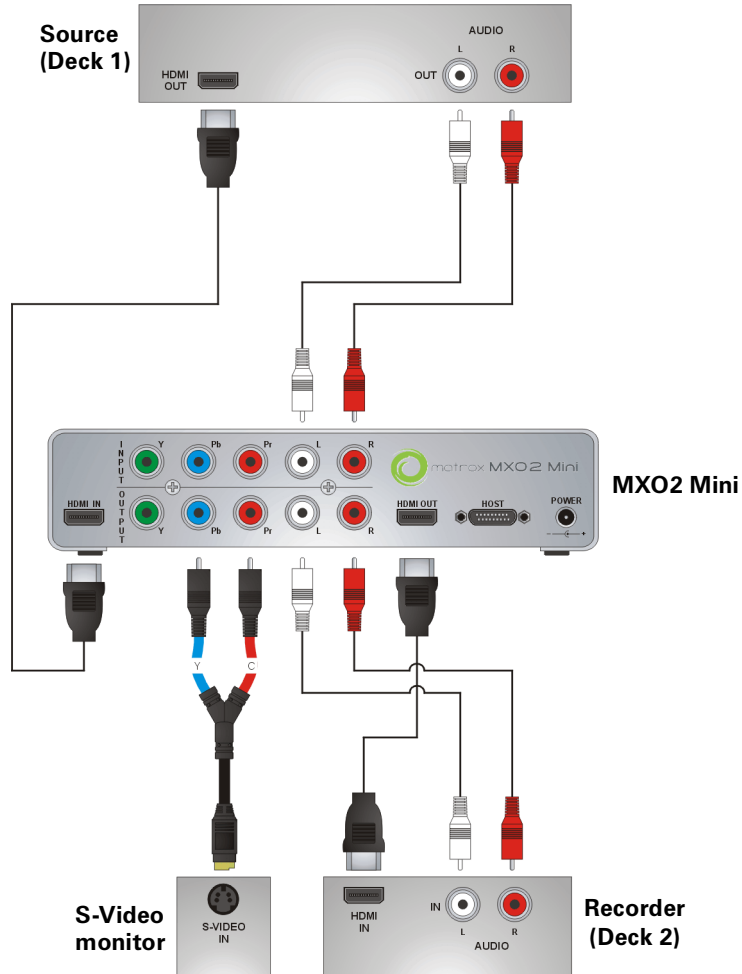
Calibrating Your HDMI Monitor for Video

This chapter explains how to use the Matrox HDMI Calibration Utility to calibrate your RGB HDMI monitor for video.

Overview

The Matrox HDMI Calibration Utility is a unique tool designed to calibrate your RGB HDMI monitor or television so that it performs like a traditional broadcast video monitor. This utility provides a wizard that walks you through the calibration process using specially designed patterns to effectively identify and compensate for the processing errors that may be present in your HDMI monitor. The Matrox HDMI Calibration Utility calibrates your monitor's black and white levels, white point, gamma response, and hue and chroma.

This utility is optimized for calibrating HDMI LCD/LED monitors or televisions that support 1:1 pixel mapping, which allows you to view the output on your HDMI monitor at its exact resolution without any scaling. Although instructions are provided for calibrating plasma HDMI monitors, and HDMI monitors that do not support 1:1 pixel mapping, a blue-only filter will be required for the color calibration (hue and chroma). Some HDMI monitors feature a built-in blue-only mode that you can use for color calibration. If your HDMI monitor does not have a built-in blue-only mode, you can use a proper third-party blue-only filter (for example, a blue gel filter, or blue-only calibration glasses) that completely blocks out all colors except for blue. Because some blue-only filters do not block out colors effectively, the Matrox HDMI Calibration Utility includes a blue-only filter test that you can use to determine if your blue-only filter is adequate for color calibration.

✎ **Note** To ensure that the Matrox HDMI Calibration Utility displays correctly, your computer screen's resolution must be 1280×800 or higher, and the Windows DPI scaling option for text must be set to the default size. For details on how to change your screen resolution and DPI scaling setting for text, see your Windows documentation.

Calibrating your HDMI monitor

The Matrox HDMI Calibration Utility provides on-screen instructions to calibrate your HDMI monitor. At the end of the calibration process, you must save your calibration settings to a file. Once saved, the calibration settings are automatically loaded as your system's current calibration settings. If you're calibrating more than one HDMI monitor, you can calibrate and save settings for each monitor and load the corresponding settings at any time (see). You can later choose to enable or disable the loaded calibration settings (see).

The Matrox HDMI Calibration Utility uses the Matrox WYSIWYG Control Panel to display the specially designed patterns that are required to calibrate your HDMI monitor. Therefore, you'll need to configure your Matrox WYSIWYG output settings as explained in this section. For more information about using the

Matrox WYSIWYG Control Panel, see "Configuring the Matrox WYSIWYG Control Panel" on page 200.

ⓘ **Important**　When running the Matrox HDMI Calibration Utility, make sure that you don't run any other application that uses your Matrox MXO2 hardware, such as Matrox A/V Tools, or another application that displays Matrox WYSIWYG output.

⇒ **To run the Matrox HDMI Calibration Utility:**

   1 Ensure that your HDMI monitor is connected to the HDMI output on your MXO2, turn the HDMI monitor on, and allow it to warm up for about 20 or 30 minutes.

   2 Right-click the 📺 icon on your Windows taskbar and configure your Matrox WYSIWYG output settings as follows:

   – **Enable WYSIWYG Output** must be selected.

   – Choose **Output Configuration** and on the **Video Output** page, set the HDMI output to **RGB - calibrated**. This is required in order to run the Matrox HDMI Calibration Utility and output the adjusted RGB HDMI video to your HDMI monitor.

   – All other required Matrox WYSIWYG output settings will be automatically set by the HDMI Calibration Utility.

   3 Click **OK** to save your video output settings.

   4 Right-click the 📺 icon on your Windows taskbar, and choose **Matrox HDMI Calibration Utility**.

   5 Follow the onscreen instructions to calibrate your HDMI monitor.

   6 When prompted at the end of the calibration process, save your calibration settings to a file anywhere on your system. Once saved, your settings are automatically loaded as your system's current HDMI calibration settings. You can later choose to enable or disable the loaded calibration settings (see "Enabling and disabling the Matrox HDMI calibration settings" on page 50).

✎ **Note**　The calibration settings file is saved as an *.mtx* file. If you cancel the HDMI calibration, or close the utility at any time before saving the calibration settings, the current calibration settings will be lost.

Loading Matrox HDMI calibration settings

After calibrating your HDMI monitor and saving your calibration settings to a file (see "Calibrating your HDMI monitor" on page 48), the calibration settings are automatically loaded as the current HDMI calibration settings for your system. You can, however, load another HDMI calibration settings file at any time, but only one calibration settings file can be loaded for your system at any given time. Once loaded, you can enable or disable the calibration settings (see "Enabling and disabling the Matrox HDMI calibration settings" on page 50).

✎ **Note** If your system has multiple users, the loaded calibration settings apply to the logged on user only.

1 Right-click the **TV** icon on your Windows taskbar, choose **Output Configuration** and on the **Video Output** page, set the HDMI output to **RGB - calibrated**.

2 Click **OK** to save your video output settings.

3 Right-click the **TV** icon on your Windows taskbar, and choose **Matrox HDMI Calibration Utility**.

4 From the **Welcome** page, click **Load Settings**.

5 When prompted, select your desired *.mtx* calibration settings file, and then click **Open**.

Enabling and disabling the Matrox HDMI calibration settings

The HDMI calibration settings that are loaded for your system (see "Loading Matrox HDMI calibration settings" on page 50) can be enabled or disabled. When using a program that supports Matrox MXO2 video output, you can configure the Matrox video output settings for that program to enable or disable the loaded HDMI calibration settings. For example, you can configure the MXO2 video output settings that you want to use with Matrox A/V Tools as explained in "Specifying your video output settings" on page 174 and "Specifying your video output settings (MXO2 Mini)" on page 178.

When you set the HDMI video output to **RGB - calibrated**, the video that is output from the MXO2 HDMI output will have the color settings that are saved in the currently loaded calibration file. This is used when you want to monitor video on your RGB HDMI monitor.

To disable the loaded calibration settings and output HDMI video from MXO2 with its native color settings, set the HDMI video output to **YUV** or **RGB - native**, depending on the HDMI device you connected to the MXO2 HDMI output. For example, you can set the HDMI video output to **RGB - native** when

you want to output native RGB HDMI video to an HDMI recorder to perform an export to tape.

Note   When you configure your Matrox WYSIWYG output settings, the settings apply to all programs that display Matrox WYSIWYG output. This means that when you set the HDMI video output to **RGB - calibrated** using the Matrox WYSIWYG Control Panel, the currently loaded calibration settings will be applied when you preview HDMI video using any program that displays Matrox WYSIWYG output, such as Adobe After Effects. For more information about using the Matrox WYSIWYG Control Panel, see "Configuring the Matrox WYSIWYG Control Panel" on page 200.

Your notes

8

Using Matrox MXO2 with Adobe Premiere Pro

This chapter explains how to define various settings for using Matrox MXO2 with Adobe Premiere Pro. This includes creating a new Premiere Pro project, and specifying your playback, capture, and export settings.

Running antivirus software with Adobe Premiere Pro

To avoid having dropped frames or other performance issues when working with Adobe Premiere Pro, make sure that you disable any antivirus scanning of files while running Premiere Pro. If possible, schedule your antivirus scanning at a time when you're not using Premiere Pro, such as overnight or on the weekend.

Displaying warnings in Adobe Premiere Pro's Events panel

Matrox MXO2 uses Adobe Premiere Pro's **Events** panel to issue certain error messages and warnings. To display these, choose **Window > Events**. For more information about using the **Events** panel, see your Adobe Premiere Pro documentation.

Creating a new Adobe Premiere Pro project

Creating a new Adobe Premiere Pro project involves specifying the location of your scratch disks and selecting a sequence preset.

To create a new project:

1 Start Adobe Premiere Pro and click the **New Project** icon. The **New Project** dialog box appears. You can leave all the settings on the **General** page at the default settings. For details on changing these settings, see your Adobe Premiere Pro documentation.

2 Click the **Scratch Disks** tab, and use the **Browse** button to select an appropriate A/V drive for each scratch disk type. When specifying the location of your scratch disks, make sure you follow the recommendations in your Adobe Premiere Pro documentation. For example, store your video and audio files on a separate hard drive dedicated to your media assets.

Tip Specifying the same scratch disk settings for all your projects will help shorten the amount of time it takes to open new or existing projects.

3 From the **Location** list, select where you want to save your project.

4 In the **Name** box, specify a name for your project.

5 Click **OK** to save your settings. The **New Sequence** dialog box opens on the **Sequence Presets** page.

6 Under **Available Presets**, select the preset that matches the type of sequence you want to create. Matrox MXO2 supports all the available presets, including custom presets that you create.

Note When you select any of the MPEG-2 I-frame, uncompressed 10-bit, or uncompressed 8-bit presets, the appropriate Matrox codec will be set for rendering your video previews. If you create a custom sequence preset using

a Matrox codec editing mode, you can specify the Matrox codec that you want to render your video previews. For more information, see "Defining your video preview settings" on page 69.

7   In the **Sequence Name** box, specify a name for your sequence.

8   Click **OK** to apply the settings.

About the Matrox 10-bit editing workflow

Matrox MXO2 supports a complete 10-bit editing workflow in Adobe Premiere Pro to give you the highest quality video. This means that you can capture and export clips to Matrox 10-bit uncompressed format for use in your sequence, render your video previews to Matrox 10-bit uncompressed format, and output your sequence at 10-bit on Matrox MXO2 for preview or export to tape.

⟹ **To use a Matrox 10-bit editing workflow:**

1   Create your sequence using one of the available presets under **Uncompressed 10-bit**. This automatically applies the appropriate settings for your video previews (the rendering codec is set to Matrox 10-bit uncompressed and maximum bit depth is enabled).

2   When you configure your video output settings on Matrox MXO2, set the bit depth for your video output to 10-bit (see "Specifying your video output settings" on page 56 and "Specifying your video output settings (MXO2 Mini)" on page 61).

3   Capture your clips to Matrox 10-bit uncompressed format for editing in your sequence (see "Specifying your video capture settings" on page 70).

4   If you add Matrox effects or other software effects to your sequence, you must render these sections in order to output them at 10-bit. Only 10-bit uncompressed clips without effects or with GPU-accelerated effects, and video previews that have been rendered using the Matrox 10-bit uncompressed codec can be output at 10-bit.

📝 **Note**   You can also export your sequence to a Matrox 10-bit uncompressed *.avi* file as explained in "Exporting to a Matrox .avi file" on page 84.

Defining your playback settings

In order to use your Matrox MXO2 hardware to output video and audio played back in Adobe Premiere Pro, you must set your video and audio devices to use the Matrox Player as follows:

1   Choose **Edit > Preferences > Playback**.

2   From the **Audio Device** list, select **Matrox Player.**

3   Under **Video Device**, select **Matrox Player**.

4 To configure your playback settings on Matrox MXO2, click **Setup** beside **Matrox Player** under **Video Device**.

The **Matrox Playback Settings** dialog box provides various settings that you can use to configure your Matrox MXO2 video and audio outputs as explained in the following sections.

Remarks

- The video output formats (if locked) and the audio output settings in the **Matrox Playback Settings** dialog box apply to your entire project. All other settings, however, are specific to your sequence. Any video output settings you specify for a particular video format will be applied the next time you create a new sequence in that same format. If you change any of the video output settings, the new settings will be applied to all previously created sequences that have that video format in your project. For example, if you create a new DV-NTSC sequence, the settings you apply for that sequence will also be applied to any previously created DV-NTSC sequences in your project.

- For the best quality output when previewing a sequence that has an interlaced video format, make sure that you choose **Display Both Fields** in the Program Monitor menu.

- You can also select **Matrox Player** as your video and audio devices in Adobe Prelude and Encore to use your Matrox MXO2 hardware to monitor video and audio played back in those applications. The settings provided for configuring your Matrox MXO2 video and audio outputs in Adobe Prelude and Encore are the same as for Premiere Pro (except the option to lock the video output formats is not available in Adobe Prelude and Encore).

Specifying your video output settings

This section explains how to specify your video output settings for Matrox MXO2, MXO2 Rack, and MXO2 LE. For MXO2 Mini, see .

You can specify various settings to configure the main and secondary outputs from your MXO2 system. Some of the settings are predetermined for you based on your sequence's video format. For a list of the supported video output formats, see .

➡ **To specify your video output settings:**

1 In the **Matrox Playback Settings** dialog box, click the **Video Output** tab.

2 Select **Lock output formats** if you want to ensure that the currently selected main and secondary video output formats for playback won't change when working in your project. When this option is cleared, your sequence's video output may change to a different format when you open a title or graphic in the Source Monitor or use the Multi-Camera Monitor.

ⓘ **Important**   When **Lock output formats** is selected, you won't be able to change the main and secondary video output formats, and the currently selected video output formats will be applied to **all** sequences in your project. Therefore, make sure that you've selected the output formats that you want (see step 3 below) before selecting this option. In order to specify different video output formats for each sequence in your project, the video output formats must not be locked.

Defining your playback settings

3 Under **Main Output** and **Secondary Output**, you can specify the settings you want for your main and secondary outputs from MXO2. Depending on your sequence's video format, you may not be able to change some of the settings.

- **Format**   Use this to select the video format you want for your outputs. Be aware that the format you select may not be supported on all the MXO2 outputs. For a list of the supported formats, see "Playback using Adobe Premiere Pro" on page 300.

- **Pulldown Method**   If this setting is available, select the pulldown method you want to be applied to your video output (**Standard 2:3** or **Advanced 2:3:3:2**). Depending on your sequence's frame rate and the current video output format, a pulldown method may automatically be selected.

- **Aspect Ratio Conversion**   Use this to specify how you want your video to be output when upscaling or downscaling:

  • **16x9 Letterbox**   Outputs the widescreen 16:9 picture in letterbox mode by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

  • **4x3 Pillarbox**   Outputs the standard 4:3 picture in pillarbox mode by adding black bars to the left and right sides of the picture for display on a widescreen 16:9 television screen.

  • **Anamorphic**   Outputs the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

  • **Center Cut**   Outputs the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

  • **Center Zoom**   Outputs the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

✎ **Note**   When aspect ratio conversion is applied to both the main and secondary outputs, the same setting will be applied to both outputs.

4 Under **Analog Output**, you can specify your analog output format, NTSC setup level, and output type:

- **Format**   Use this to specify whether you want the format for the analog outputs to be the same as the main or secondary output.

- **Output Type**   Specifies the analog video output type. If you're outputting SD analog video, the output type will be set to **All Available** to

indicate that the output will be available on all the analog outputs. If you're outputting HD analog video, the output type will be set to **Component**.

– **Setup (NTSC)**   Use this to select the setup level you want for your NTSC analog video. This affects both the NTSC analog video input and output.

- **0 IRE**   Applies a setup level of 0 IRE. You should select this option only when working with a commercial DV device that uses the Japanese analog NTSC setup of 0 IRE. For example, if the video appears too bright when you play back DV clips on your NTSC monitor, you can change the setup to 0 IRE to output your DV clips at the correct brightness.

- **7.5 IRE**   Applies the standard NTSC setup level of 7.5 IRE.

– **YUV/RGB**   Select **YUV** or **RGB - native** to set the type of video signal that is sent from the component output. For example, select **RGB - native** if you connected the component output to a device that accepts an RGB signal.

5 Under **HDMI Output**, you can specify your HDMI output format and type.

– **Format**   Use this to specify whether you want the format for your HDMI output to be the same as the main or secondary output.

– **YUV/RGB**   Select the type of video signal that you want to be sent from the HDMI output:

- **YUV**   Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.

- **RGB - calibrated**   Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading calibration settings using the Matrox HDMI Calibration Utility, see Chapter 7, "Calibrating Your HDMI Monitor for Video."

- **RGB - native**   Outputs native RGB HDMI video that does not apply any calibration compensation. This is useful when you want to output RGB HDMI video to a device other than an HDMI monitor or television, such as an HDMI recorder to perform an export to tape.

– **3D Viewing Mode**   Select the 3D signal type that you want to be sent from the HDMI output to your 3D monitor:

- **Disabled**   Select this if you're not outputting 3D video, or to disable 3D video output. You can still monitor 3D video, but you must select the correct viewing mode on your 3D monitor manually.

- **Side-by-side**   Outputs horizontally compressed side-by-side 3D video (also referred to as side-by-side horizontal).

- **Over/Under**   Outputs over/under 3D video (also referred to as top bottom).

📝 **Note**   This feature may not be supported on some 3D monitors.

6 Under **SDI Output**, specify whether you want the format for your SDI output to be the same as the main or secondary output.

7 Under **Advanced**, you can specify advanced video output settings.

   – **Analog SC/H Phase**   Use this slider to advance or delay your analog video output's subcarrier phase with respect to the horizontal sync of the genlock source (for composite video only).

   – **Allow Super White/Allow Super Black**   Select **Allow Super White** to allow the highest luminance level of your video output to exceed the standard maximum white level. Select **Allow Super Black** to allow the lowest luminance level of your video output to fall below the standard black level. These options apply to all video outputs.

📝 **Note**   Super white and super black should not be allowed when producing your final video production for broadcast.

8 Under **Video Bit Depth**, select either **8-bit** or **10-bit** to indicate the bit depth that you want for your video output.

ⓘ **Important**   Only 10-bit uncompressed clips without effects or with GPU-accelerated effects, and video previews that have been rendered using the Matrox 10-bit uncompressed codec can be output at 10-bit. For more information about using this feature, see "About the Matrox 10-bit editing workflow" on page 55.

9 Click **OK** to save your settings.

Specifying your video output settings (MXO2 Mini)

You can specify various settings to configure your main analog output and secondary HDMI output from the MXO2 Mini. Some of the settings are predetermined for you based on your sequence's video format. For a list of the supported video output formats, see "Playback using Adobe Premiere Pro" on page 300.

➡ **To specify your video output settings:**

1 In the **Matrox Playback Settings** dialog box, click the **Video Output** tab.

2 Select **Lock output formats** if you want to ensure that the currently selected main and secondary video output formats for playback won't change when working in your project. When this option is cleared, your sequence's video output may change to a different format when you open a title or graphic in the Source Monitor or use the Multi-Camera Monitor.

ⓘ **Important** When **Lock output formats** is selected, you won't be able to change the main and secondary video output formats, and the currently selected video output formats will be applied to **all** sequences in your project. Therefore, make sure that you've selected the output formats that you want (see step 3 below) before selecting this option. In order to specify different video output formats for each sequence in your project, the video output formats must not be locked.

Defining your playback settings

3 Under **Analog Output (Main)**, you can specify the settings you want for
your analog output from MXO2 Mini. Under **HDMI Output (Secondary)**
you can specify the settings you want for your secondary HDMI output.
Depending on your sequence's video format, you may not be able to change
some of the settings.

– **Format**   Use this to select the video format you want for your outputs.
For a list of the supported formats, see "Playback using Adobe Premiere
Pro" on page 300.

– **Pulldown Method**   If this setting is available, select the pulldown
method you want to be applied to your video output (**Standard 2:3** or
Advanced 2:3:3:2). Depending on your sequence's frame rate and the
current video output format, a pulldown method may automatically be
selected.

– **Setup (NTSC)**   Use this to select the setup level you want for your
NTSC analog video. This affects both the NTSC analog video input and
output.

• **0 IRE**   Applies a setup level of 0 IRE. You should select this option
only when working with a commercial DV device that uses the
Japanese analog NTSC setup of 0 IRE. For example, if the video
appears too bright when you play back DV clips on your NTSC
monitor, you can change the setup to 0 IRE to output your DV clips at
the correct brightness.

• **7.5 IRE**   Applies the standard NTSC setup level of 7.5 IRE.

– **Aspect Ratio Conversion**   Use this to specify how you want your
video to be output when upscaling or downscaling:

• **16x9 Letterbox**   Outputs the widescreen 16:9 picture in letterbox
mode by adding black bars at the top and bottom of the picture for
display on a standard 4:3 television screen.

• **4x3 Pillarbox**   Outputs the standard 4:3 picture in pillarbox mode by
adding black bars to the left and right sides of the picture for display on
a widescreen 16:9 television screen.

• **Anamorphic**   Outputs the widescreen 16:9 picture as horizontally
compressed 4:3 video, which retains the picture's full vertical
resolution for display on a widescreen television. To display the video
with the correct proportions on an NTSC or PAL monitor, select the
16:9 display setting on the monitor.

• **Center Cut**   Outputs the widescreen 16:9 picture by evenly cropping
the left and right sides of the picture for display on a standard 4:3
television screen.

- • **Center Zoom**   Outputs the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.
- – **Output Type** (for analog output)   For your main analog output, you can select **Component**, or **Composite & S-Video** if you're outputting SD analog video. If you're outputting HD analog video, the output type will be set to **Component** (and the composite and S-Video outputs will be invalid).
- – **YUV/RGB** (for analog output)   Select **YUV** or **RGB - native** to set the type of video signal that is sent from the component output. For example, select **RGB - native** if you connected the component output to a device that accepts an RGB signal.
- – **YUV/RGB** (for HDMI output)   Select the type of video signal that you want to be sent from the HDMI output:
  - • **YUV**   Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.
  - • **RGB - calibrated**   Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading calibration settings using the Matrox HDMI Calibration Utility, see Chapter 7, "Calibrating Your HDMI Monitor for Video."
  - • **RGB - native**   Outputs native RGB HDMI video that does not apply any calibration compensation. This is useful when you want to output RGB HDMI video to a device other than an HDMI monitor or television, such as an HDMI recorder to perform an export to tape.
- – **3D Viewing Mode**   Select the 3D signal type that you want to be sent from the HDMI output to your 3D monitor:
  - • **Disabled**   Select this if you're not outputting 3D video, or to disable 3D video output. You can still monitor 3D video, but you must select the correct viewing mode on your 3D monitor manually.
  - • **Side-by-side**   Outputs horizontally compressed side-by-side 3D video (also referred to as side-by-side horizontal).
  - • **Over/Under**   Outputs over/under 3D video (also referred to as top bottom).

📝 **Note**   This feature may not be supported on some 3D monitors.

4 Under **Advanced**, select **Allow Super White** to allow the highest luminance level of your video output to exceed the standard maximum white level. Select **Allow Super Black** to allow the lowest luminance level of your video output to fall below the standard black level. These options apply to both the main analog output and secondary HDMI output.

Defining your playback settings

Note   Super white and super black should not be allowed when producing your final video production for broadcast.

5   Under **Video Bit Depth**, select either **8-bit** or **10-bit** to indicate the bit depth that you want for your video output.

Important   Only 10-bit uncompressed clips without effects or with GPU-accelerated effects, and video previews that have been rendered using the Matrox 10-bit uncompressed codec can be output at 10-bit. For more information about using this feature, see "About the Matrox 10-bit editing workflow" on page 55.

6   Click **OK** to save your settings.

Specifying your genlock settings for playback

Note   This section does not apply to Matrox MXO2 Mini.

You can select the source to which you want to genlock all devices connected to your MXO2 system during playback, as well as adjust the timing settings for all video outputs from MXO2.

For examples of how to connect an external sync source to your system, see "Typical Matrox MXO2 connections" on page 19, "Typical Matrox MXO2 Rack connections" on page 28, and "Typical Matrox MXO2 LE connections" on page 37. When using Matrox device control with an analog RS-422 device, you need to connect an external broadcast-quality analog sync source, such as a tri-level sync generator, as shown in the illustrations.

To specify your genlock settings for playback:

1   In the **Matrox Playback Settings** dialog box, click the **Genlock** tab.

2   Under **Genlock Source**, select one of the following:

- **Internal** Genlock to MXO2's internal reference signal. Select this option only if you don't have an external sync generator or other reliable external video sync source.

- **Black Burst Broadcast Quality** Genlock to an external analog sync source connected to the reference (REF) input on MXO2. This must be a stable sync source, such as an external sync generator (bi-level black burst for SD or tri-level sync for HD), or a source VTR that has a built-in TBC.

- **SDI**, **Composite**, **Component**, **S-Video**, and **HDMI Input** Genlock to your SDI, composite, component, S-Video, or HDMI video source connected to the video input on MXO2.

> **Note** The status of your genlock source will be displayed, such as **Locked** or **Not Locked**, to indicate whether or not MXO2 is presently locked to your selected genlock source. When you change the genlock source, distorted video and silent audio will be output until MXO2 locks to the new genlock source.

3 Under **Genlock Video Format**, select your genlock source's video format. If you can't select a video format, make sure that your genlock source matches the specified video format. When the genlock source is set to **Internal**, the genlock video format is set to your main video output format.

4 Under **Advanced Settings**, drag the **Horizontal Delay** and **Vertical Delay** sliders to adjust the horizontal and vertical timing of your video outputs with respect to your genlock source. This lets you compensate for cable delays within your system.

5 Click **OK** to save your settings.

Specifying your audio output settings

The audio output page lets you adjust various settings for your audio output from your MXO2 system. For example, you can adjust the volume of your analog audio output before or while playing back clips.

To specify your audio output settings:

1 In the **Matrox Playback Settings** dialog box, click the **Audio Output** tab.
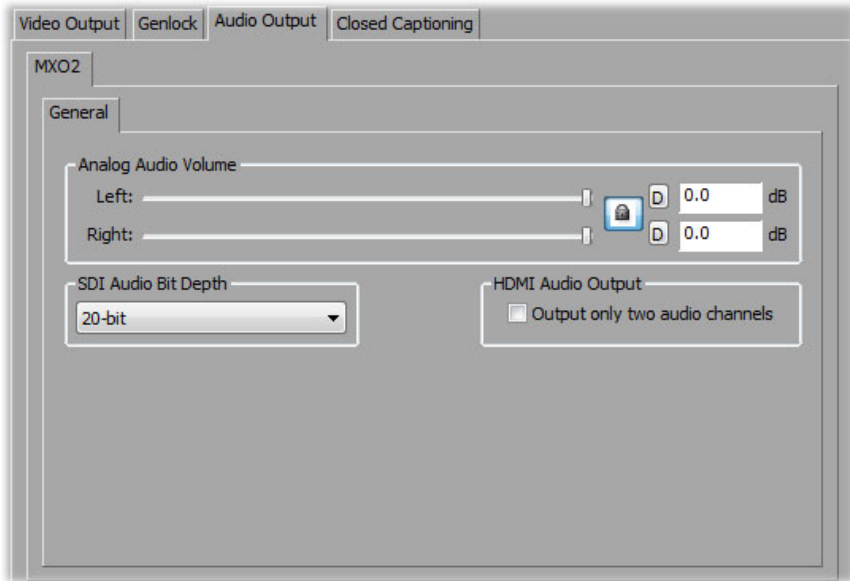
2 Under **Analog Audio Volume**, drag the sliders to adjust the volume of your analog audio output. By default, the sliders are locked so that they move together. To move each slider independently, click the lock button (🔒) to disable it.

3 Under **SDI Audio Bit Depth**, select the bit depth you want for your embedded SDI audio output (**20-bit** or **24-bit**). This setting is not available on MXO2 Mini.

4 Under **HDMI Audio Output**, select **Output only two audio channels** if you want to output two audio channels from the MXO2 HDMI output, instead of eight channels. This option is especially useful for HDMI monitors that don't accept more than two audio channels.

5 Click **OK** to save your settings.

Specifying your closed captioning settings

📝 **Note**   This section does not apply to Matrox MXO2 Mini.

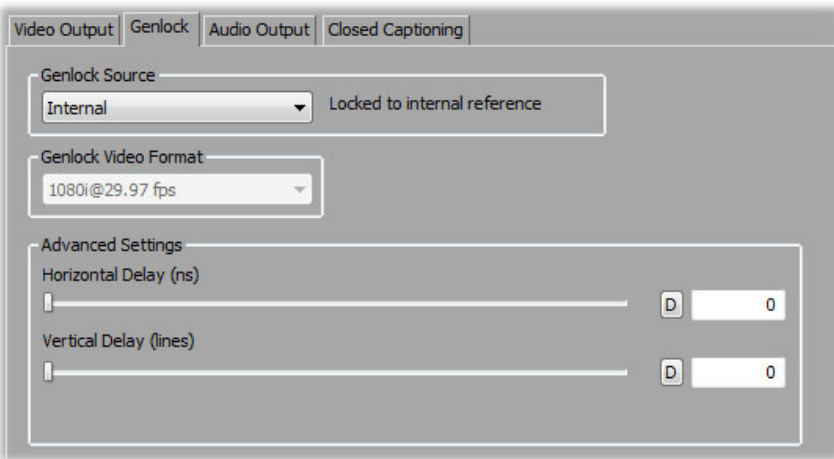You can specify various settings for playing back and exporting to tape closed captions that you've attached to your sequence on Matrox MXO2. For example, you can choose to embed the closed captioning data in the SDI VANC output for display on an SDI video monitor that supports closed captioning. You can also choose to overlay the closed captions on all the Matrox MXO2 video outputs for display on video monitors that don't have a closed captioning feature.

For details on how to attach a closed caption data file to your sequence, see your Adobe Premiere Pro documentation. To determine your video monitor's capabilities for displaying closed captioning, check your video monitor's documentation.

⟹ **To specify your closed captioning settings:**

1   In the **Matrox Playback Settings** dialog box, click the **Closed Captioning** tab.
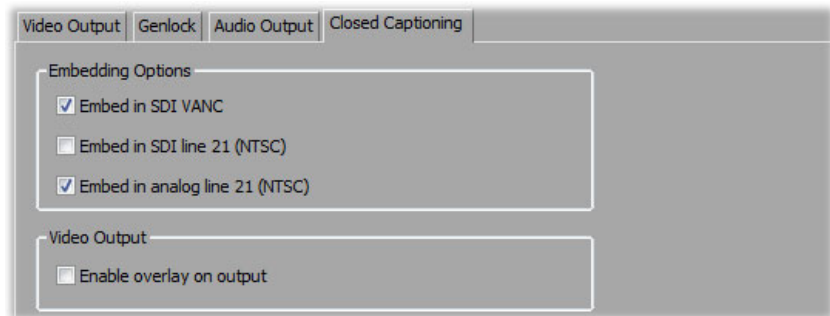
2   Under **Embedding Options**, select the options that you want for embedding the closed captioning data in the Matrox MXO2 video output during playback:

   – **Embed in SDI VANC**   Select this to embed the closed captioning data in the SDI video output's VANC for display on an SDI video monitor.

   – **Embed in SDI line 21 (NTSC)**   Select this to embed the closed captioning data in line 21 of the VBI portion of the SDI video output for display on an SDI NTSC video monitor.

   – **Embed in analog line 21 (NTSC)**   Select this to embed the closed captioning data in line 21 of the VBI portion of the analog video output for display on an analog NTSC video monitor.

ⓘ **Important**   Embedding closed captioning in the video output is supported only when the frame rate of the video output matches your sequence's frame rate. If the frame rate is converted at the output, such as when you apply a

pulldown, you can still display the closed captions by selecting **Enable overlay on output** as explained below.

3 Under **Video Output Display**, select **Enable overlay on output** to overlay the closed captions on all the MXO2 video outputs, which lets you display closed captioning on video monitors that don't have a closed captioning feature. This option will be available only if closed captioning display is enabled in the Adobe Premiere Pro Program Monitor menu.

Remarks

– When **Enable overlay on output** is selected, the bit depth of your video output is forced to 8-bit, and you won't be able to change the bit depth setting on the **Video Output** page. Therefore, if you want to output 10-bit video, you must clear this option before changing the bit depth setting for your video output.

– Selecting **Enable overlay on output** may cause dropped frames in your video output. If you select this option and also choose to embed the closed captioning in the video output, you should turn off the closed captioning feature for all video monitors connected to the MXO2 video outputs to avoid simultaneously displaying both the embedded and overlaid closed captions.

4 Click **OK** to save your settings.

Defining your video preview settings

When you select an MPEG-2 I-frame, uncompressed 10-bit, or uncompressed 8-bit sequence preset, an appropriate Matrox preview file format and codec are automatically set for rendering your video previews on MXO2. When you create a custom preset using a Matrox codec editing mode, you can specify the Matrox codec that you want to use to render your video previews. To check your video preview settings, choose **Sequence > Sequence Settings**.
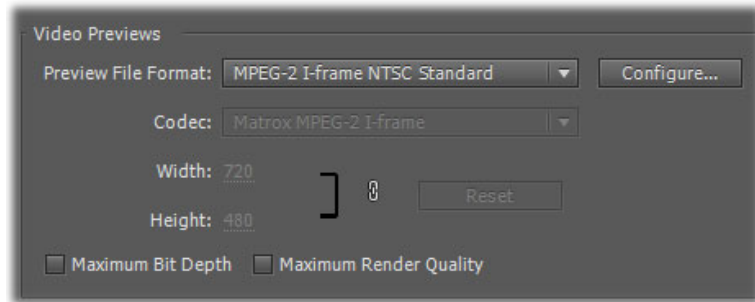
Depending on your sequence's video format, you can select a different preview file format or Matrox codec to render your video previews. For details on configuring the Matrox MPEG-2 I-frame codec settings, see "Selecting your MPEG-2 I-frame settings" on page 80.

Remarks

- For an SD sequence, make sure that the preview file format matches your sequence's format (standard or widescreen).

- To use the Matrox MPEG-2 I-frame codec for rendering video previews in an NTSC or 486p sequence, select the appropriate MPEG-2 I-frame preview file format, such as **MPEG-2 I-frame NTSC Standard** for a Matrox NTSC standard sequence.

- If you set the bit depth for your video output on MXO2 to 10-bit, you must use the Matrox 10-bit uncompressed codec for rendering video previews. You must also select **Maximum Bit Depth** in order to output 10-bit video when the playback is paused. For more information, see "About the Matrox 10-bit editing workflow" on page 55.

For details on specifying additional settings for your video previews, see your Adobe Premiere Pro documentation.

Defining your capture settings

The **Matrox Capture Settings** dialog box has pages that you can use to specify your settings for capturing video and audio in Adobe Premiere Pro on Matrox MXO2. For information about the supported capture formats, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats." For a list of the supported video output formats for monitoring the video that you're capturing, see "Supported video output formats for monitoring" on page 311.

If you want to capture material from an RS-422 device using Matrox device control, see "Setting up Matrox device control" on page 90. For details on how to capture material in Adobe Premiere Pro, see your Adobe Premiere Pro documentation.

Note   When you specify your capture settings on Matrox MXO2, VU meters can be displayed to let you monitor your audio input levels. For more information, see "Monitoring audio levels for capture" on page 76.

Specifying your video capture settings

Matrox MXO2 lets you capture your video to an MPEG-2 I-frame or uncompressed format to create *.avi* files for use in your Adobe Premiere Pro projects. If you want to capture to an SD format, such as NTSC, you can choose to capture your video to an *.m2v* file for DVD authoring using Adobe Encore. For details about specific limitations when capturing to Matrox *.m2v* files, see "Notes about capturing to Matrox .m2v files" on page 79.

▭▷ **To specify your video capture settings:**

1 Choose **Project > Project Settings > General**.

2 From the **Capture Format** list, select **Matrox AVI** to capture to an *.avi* file, or **Matrox M2V** to capture to an *.m2v* file.

3 Click the **Configure** button, then click the **Video Capture Settings** tab.
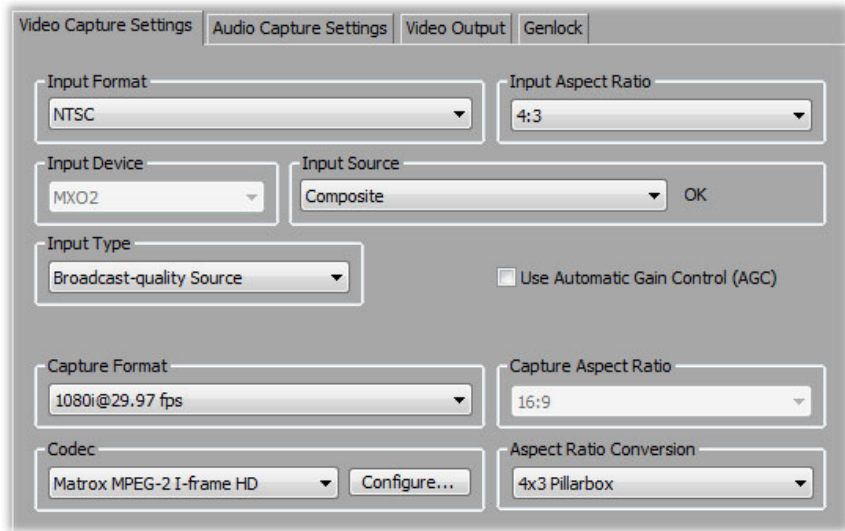
4 Under **Input Format**, select the video format that matches your source video. For a list of the video input formats supported on the various MXO2 inputs for capturing clips, see "Supported input formats" on page 294.

5 Under **Input Aspect Ratio**, select the aspect ratio of your SD source video (4:3 or 16:9). For example, to capture SD video that was recorded using the standard TV screen format, select **4:3**. To capture SD video that was recorded using the widescreen 16:9 format, select **16:9**. If you're capturing HD video, the **Input Aspect Ratio** will be set to **16:9**.

6 Under **Input Source**, select the type of input you want to capture. For example, to capture material from your HDMI source, select **HDMI**. The available input sources depend on your selected input format.

✎ **Note** If Matrox MXO2 can't detect your source device when you start a capture, you'll receive an error message. Either black video will be captured or the capture won't be able to start until a valid input signal is present. In either case, you must make sure that your source device is switched on and properly connected to MXO2 to properly capture the video.

7 Under **Input Type**, select the type of equipment you're using for capture:

– **Broadcast-quality Source** Select this if your source device is broadcast-quality. This setting provides the best capture results for most devices.

– **Consumer-quality Source** Select this if you're having problems capturing video because your source device doesn't meet broadcast-quality standards. For example, the capture may be interrupted

when you try to capture from certain composite and S-Video devices, especially from low-quality VCRs. If this happens, selecting **Consumer-quality Source** will allow the video to be captured, but you may experience dropped frames during the capture.

✎ **Note** For any change to the input type to take effect, you must restart Premiere Pro and open your project again.

8 Select **Use Automatic Gain Control (AGC)** if you want the gain of your composite or S-Video input signal to be adjusted automatically to compensate for very bright or dark images. This improves the brightness or contrast of your picture.

9 Under **Capture Format**, select the format to which you want to capture your source video. The formats available depend on your selected input format. If required, your source video will be scaled during capture to match your capture format. For a list of the supported capture formats, see "Supported capture formats for Adobe Premiere Pro" on page 295.

10 If you're capturing HD video to an SD format, under **Capture Aspect Ratio**, select **4:3** to capture video to the standard TV screen format, or **16:9** to capture to the widescreen 16:9 format. For all HD capture formats, the **Capture Aspect Ratio** is set to **16:9**. When capturing SD video to an SD format, the **Capture Aspect Ratio** is set to match the **Input Aspect Ratio**.

11 Under **Codec**, select the codec that you want to use for the capture. When capturing to an *.m2v* file, the codec is set to **Matrox MPEG-2 IBP**.

 – **Matrox 8-bit Uncompressed** Captures video to 8-bit uncompressed format.

 – **Matrox 10-bit Uncompressed** Captures video to 10-bit uncompressed format.

 – **Matrox MPEG-2 I-frame** Captures video to MPEG-2 intra-frame format using the 4:2:2 Profile @ Main Level at a selected data rate (SD resolution only).

 – **Matrox MPEG-2 I-frame HD** Captures video to MPEG-2 intra-frame format using the 4:2:2 Profile @ High Level at a selected data rate (HD resolution only).

12 If you're capturing to a Matrox MPEG-2 format, click the **Configure** button to configure your MPEG-2 settings. For details on the available settings, see "Selecting your MPEG-2 I-frame settings" on page 80 or "Selecting your MPEG-2 IBP settings" on page 82. Once you've configured your settings, click **OK** to return to the **Matrox Capture Settings** dialog box.

13 Under **Aspect Ratio Conversion**, specify the type of aspect ratio conversion that you want to be applied to your captured video (used when upscaling or downscaling video during capture only):

– **16x9 Letterbox**   Captures the widescreen 16:9 picture as letterbox video by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

– **4x3 Pillarbox**   Captures the standard 4:3 picture as pillarbox video by adding black bars at the left and right sides of the picture for display on a widescreen 16:9 television screen.

– **Center Cut**   Captures the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

– **Center Zoom**   Captures the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

Note   When capturing to an SD 16:9 format, such as NTSC 16:9, the video will be captured as horizontally compressed 4:3 (anamorphic) video. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

14 Click **OK** to save your settings.

Specifying your audio capture settings

You can specify various audio capture settings, such as to specify your input source and the type of audio files (either stereo *.wav* or mono *.wav*) that you want to create when capturing audio on Matrox MXO2.

Remarks

• When you capture to an *.avi* file on Matrox MXO2, the clip's video and audio are saved to the *.avi* file, and the clip's audio is also saved to one or more separate *.wav* files. You could choose to edit the separate *.wav* files using an audio post-processing application.

• When you capture to an *.m2v* file on Matrox MXO2, the clip's associated audio is always saved to one or more separate *.wav* files.

To specify your audio capture settings:

1 Choose **Project > Project Settings > General**.

2 From the **Capture Format** list, select **Matrox AVI** to capture to an *.avi* file, or **Matrox M2V** to capture to an *.m2v* file.

3 Click the **Configure** button, then click the **Audio Capture Settings** tab:
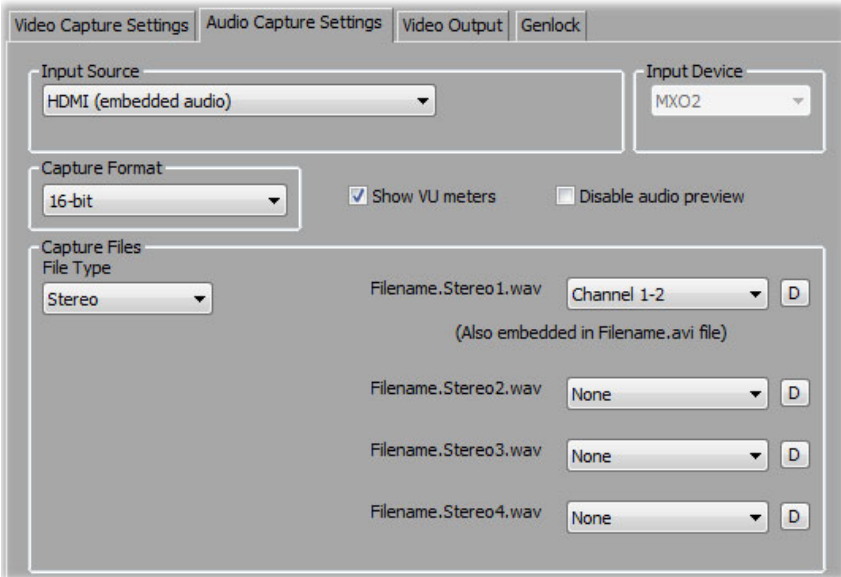
4 Under **Input Source**, select your audio source. For example, if you want to capture the embedded audio of your HDMI source, select **HDMI (embedded audio)**. Your audio input source may be set for you based on your selected video input source.

✎ **Note** When capturing HDMI embedded audio, only uncompressed embedded audio is supported.

5 Under **Capture Format**, select the bit-depth for your captured audio files.

6 If you want the VU meters to be displayed each time you configure your Matrox MXO2 capture settings or open the **Capture** panel to start a capture, select **Show VU meters**. For details on using the VU meters, see "Monitoring audio levels for capture" on page 76.

7 If you experience dropped frames during capture, select **Disable audio preview** to disable the audio preview only while you're capturing material (for *.avi* captures only).

8 Under **Capture Files**, indicate whether you want to capture to stereo or mono audio files, and select which channels you want to save to separate *.wav* files.

  − From the **File Type** list, select **Stereo** to save your captured audio to stereo *.wav* files, or **Mono** to save your captured audio to mono *.wav* files. If you're capturing an *.m2v* clip, the **File Type** will be set to **Stereo**.

  − From the **Filename** lists, select which stereo pairs or mono channels you want to save to your *.wav* files (up to four stereo files or up to eight mono

files depending on the type of audio being captured). Select **None** for the particular *.wav* files you don't want to be created, or click the **D** (default) button for each **Filename** list if you want to capture only channels 1 and 2. When Matrox MXO2 saves each *.wav* file, it assigns a *.Stereo.wav* or *.Mono.wav* suffix to the base name you gave for the associated video file. For example, if you've named your video file *MyFile.avi*, the associated stereo audio files would be named *MyFile.Stereo1.wav*, *MyFile.Stereo2.wav*, etc.

Remarks

– The channels that you choose to save to the first stereo.*wav* file or first two mono.*wav* files will be embedded in the associated *.avi* file. When you import your *.avi* file to the **Project** panel, the clip's separate *.wav* files will also be imported, and the embedded audio in the *.avi* file will be ignored. The clip's *.avi* file and first associated *.wav* file, however, will appear as a single Movie clip in your project. The embedded audio in the *.avi* file will be used only if the *.avi* file does not have any associated *.wav* files. Therefore, if you perform audio post processing on your *.avi* files, make sure you delete the associated *.wav* files so that only the embedded audio in the *.avi* files will be used in your project.

– When performing an audio-only capture, Matrox MXO2 supports capture of only one stereo pair. Your first stereo or first two mono channels will be saved to a single stereo *.wav* file (any other channels will be ignored). When MXO2 saves the *.wav* file of an audio-only capture, it does not assign the *.Stereo.wav* suffix to the filename.

9 Click **OK** to save your settings.

Monitoring audio levels for capture

If you select **Show VU meters** on the **Audio Capture Settings** page, each time you configure your Matrox MXO2 capture settings or open the **Capture** panel to start a capture in Adobe Premiere Pro, VU meters will be displayed to let you monitor the levels of your currently selected audio input source.
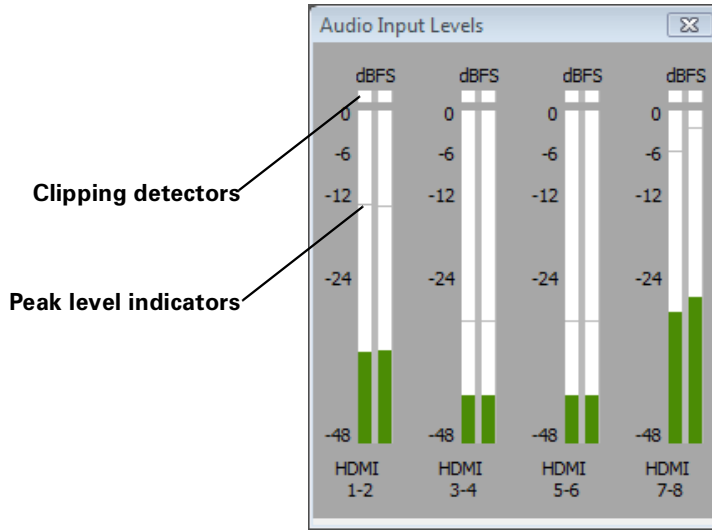
As you play your audio source, the color of the input level is green at or below –12 dBFS, yellow between –12 and –6 dBFS, and red above –6 dBFS. The clipping detectors will "light up" (become red) whenever audio clipping occurs. The peak level indicators are thin lines that show the highest level recently reached. These indicators will show the peak level for about two seconds or until a higher peak level is reached.

If needed, adjust the audio level on your source device to keep the average input level between –30 and –10 dBSF.

Specifying your video output settings for previewing captured clips

While capturing clips on Matrox MXO2, you can preview your captured video using the MXO2 video outputs. You can specify various video output settings for previewing your captured video as follows:

1 Choose **Project > Project Settings > General**.

2 From the **Capture Format** list, select **Matrox AVI** to capture to an *.avi* file, or **Matrox M2V** to capture to an *.m2v* file.

3 Click the **Configure** button, then click the **Video Output** tab.

4 The settings provided are the same as explained in "Specifying your video output settings" on page 56 and "Specifying your video output settings (MXO2 Mini)" on page 61. However, the main and secondary video output settings will be set for you based on your selected capture format. For a list of the supported video output formats for previewing your captured video, see "Supported video output formats for monitoring" on page 311.

5 Click **OK** to save your settings.

Note   The video output settings that you select for capture will be applied the next time you capture clips to the same format. For example, the video output settings you select for clips captured to NTSC format will be retained for the next time you capture NTSC clips. Your new video output settings will also be applied to all sequences in your project that have that video format.

Specifying your genlock settings for capture

Note   This section does not apply to Matrox MXO2 Mini.

You can select the source to which you want to genlock all devices connected to your MXO2 system during capture, as well as adjust the timing settings for all video outputs from MXO2.

For examples of how to connect an external sync source to your system, see "Typical Matrox MXO2 connections" on page 19, "Typical Matrox MXO2 Rack connections" on page 28, and "Typical Matrox MXO2 LE connections" on page 37. When using Matrox device control with an analog RS-422 device, you need to connect an external broadcast-quality analog sync source, such as a tri-level sync generator, as shown in the illustrations.

To specify your genlock settings for capture:

1 Choose **Project > Project Settings > General**.

2 From the **Capture Format** list, select **Matrox AVI** to capture to an *.avi* file, or **Matrox M2V** to capture to an *.m2v* file.

3 Click the **Configure** button, then click the **Genlock** tab.

4 The settings provided are similar to the genlock settings for playback (see "Specifying your genlock settings for playback" on page 64), except the settings apply only during capture.

Remarks

– To avoid inaccurate In/Out points during batch capture, you must select an external sync source.

– If you want to genlock to your video input source, make sure that you select the correct genlock source before starting your capture. For example, if you'll be capturing HDMI video and you want to genlock to your video input, make sure that you select **HDMI Input** as your genlock source. If you later choose to capture analog video, you'll need to change your genlock source to **Analog Input**.

5 Click **OK** to save your settings.

Notes about capturing to Matrox .m2v files

When capturing to Matrox *.m2v* files, keep the following points in mind:

- Automatic scene detection (Scene Detect) is not supported, but batch capture is supported.

- An associated *.xmp* metadata file is created for all captured and logged (offline) *.m2v* clips. These files are created in your specified video capture folder, and contain time code and other information that you provided for your *.m2v* clips, such as tape name, description, and scene. You can open the *.xmp* files in Adobe Bridge. Take care not to delete the *.xmp* files and always keep them with their associated *.m2v* files. Otherwise, you won't be able to batch capture logged *.m2v* clips, and the time code information won't appear for your *.m2v* clips in the **Project** panel.

- Matrox *.m2v* files are to be used for DVD authoring with Adobe Encore. However, if you want to use your Matrox *.m2v* clips in Adobe Premiere Pro, be aware of the following issues:

  – The associated *.wav* files for your *.m2v* clips are not automatically imported to the **Project** panel.

  – When performing a batch capture of *.m2v* clips, the captured video and audio clips won't be automatically imported to the **Project** panel. Because you won't be able to link the logged (offline) clips to the captured files on disk, you'll have to import the batch captured *.m2v* clips manually. As well, if you recapture clips using batch capture, captured video clips will be imported automatically only if you choose to delete the original media files from disk.

  – When you place a Matrox *.m2v* clip on a video track, an empty associated *.wav* clip will be placed on an audio track beneath it. To get rid of this clip, select it in the sequence and choose **Clip > Unlink**. Once you've unlinked the *.wav* from the *.m2v*, you can select the *.wav* clip on the audio track and delete it.

  – It's recommended that you don't add handles (extra frames) to your captured *.m2v* clips. If you do, the handles will be appropriately trimmed from the video when you add the clip to your sequence, but the handles won't be trimmed from the associated audio.

Selecting your MPEG-2 I-frame settings

When using the Matrox MPEG-2 I-frame or Matrox MPEG-2 I-frame HD codec to capture or render video, you can specify various settings for the MPEG-2 I-frame compression.

⟹ **To select your MPEG-2 I-frame settings:**

1 Click the **Configure** button. This displays a dialog box similar to the following:
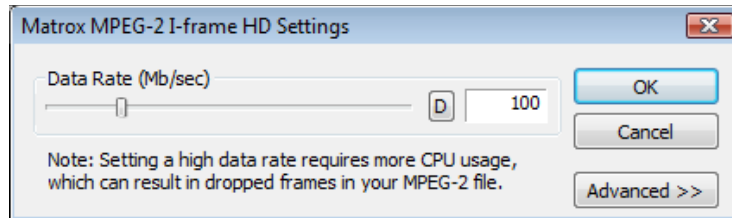
2 Drag the **Data Rate** slider until your desired data rate is displayed. The higher the data rate you select, the better the video quality will be. The range of available data rates depends on whether you're using the Matrox MPEG-2 I-frame HD or SD format.

ⓘ **Important** Depending on the capabilities of your system, you may drop frames if you select a data rate higher than 125 Mb/sec.

3 To apply advanced settings to your MPEG-2 I-frame file, click the **Advanced** button.

✎ **Note** The default advanced settings should provide good results for most applications. We recommend that you change these settings only when needed for special purposes.
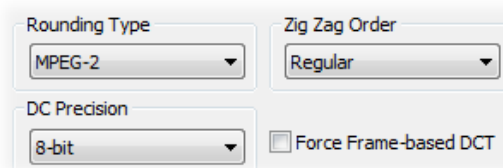
4 Under **Rounding Type**, select one of the following:

– **MPEG-2** Rounds the AC coefficients up to the nearest whole number when calculating the quantization coefficient.

– **Matrox Custom** Truncates the AC coefficients to the lowest whole number when calculating the quantization coefficient. In some cases, this setting may yield less artifacts in graphics.

5 Under **DC Precision**, select the bit-depth precision of the DC intra block.

📝 **Note**   The higher the DC precision value that's used to capture or render your video, the more likely that the DC content will be increased at the expense of the AC content in the encoded stream. This may result in lowering the overall quality of the compressed stream at a specified data rate.

6   Under **Zig Zag Type**, select one of the following:

– **Regular**   Sets the regular (default) zig zag scanning pattern of the AC coefficient of the DCT block as defined in the ISO/IEC 13818-2 (figure 7-2) specification documentation.

– **Alternate**   Sets an alternate zig zag scanning pattern of the AC coefficient of the DCT block as defined in the ISO/IEC 13818-2 (figure 7-3) specification documentation. Use this setting when capturing or rendering video at a high data rate (that is, at a data rate of about 50 Mb/sec for SD video, or 100 Mb/sec or higher for HD video).

7   Select the **Force Frame-based DCT** setting to render macroblocks as frames rather than as fields. In some cases, graphics will yield less artifacts if this option is selected.

8   Click **OK** to save your settings.

Selecting your MPEG-2 I-frame settings

Selecting your MPEG-2 IBP settings

When capturing video to a Matrox *.m2v* file using Adobe Premiere Pro, the codec is set to Matrox MPEG-2 IBP. You can specify various settings for the MPEG-2 IBP compression.

⟹ **To select your MPEG-2 IBP settings:**

1 Click the **Configure** button. This displays a dialog box similar to the following:
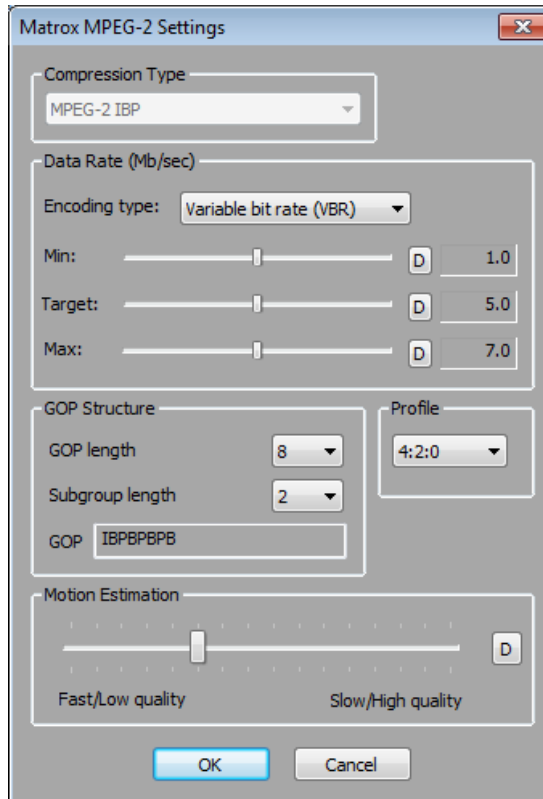
2 Under **Data Rate (Mb/sec)**, you can select the encoding type and data rate for the MPEG-2 IBP compression.

– **Encoding type**   From this list, select one of the following:

• **Constant bit rate (CBR)**   Video is compressed at your selected target data rate, which is useful when you need to limit or predict the size of your *.m2v* file. However, if your video is very complex (such as scenes with many colors or sharp edges), you'll need to select a high data rate to avoid having frames of very blocky video in your file.

- **Variable bit rate (VBR)** Video is compressed at varying data rates based on the complexity of the video. The target data rate you select is used as the average data rate for the compression.
  - **Min**, **Target**, and **Max** sliders Use these sliders to select your desired data rate. The higher the target data rate you select, the better the video quality will be. Only the **Target** slider will be available if you selected **Constant bit rate (CBR)**. If you selected **Variable bit rate (VBR)**, all three sliders will be available so that you can set the minimum, target, and maximum data rates for the video compression.

Note Adobe Encore requires CBR-encoded *.m2v* files longer than about two minutes to be transcoded. VBR-encoded *.m2v* files do not require transcoding in Adobe Encore.

3 Under **GOP Structure**, you can customize the GOP structure for the MPEG-2 IBP compression as follows:

- **GOP length** Determines the number of frames in the GOP (Group of Pictures).
- **Subgroup length** Determines the subgroup length of B-frames and P-frames in the GOP, after the initial I-frame. For example, a subgroup of 3 appears as "BBP," and a subgroup of 2 appears as "BP." The available subgroup lengths depend on your selected GOP length.

4 Under **Profile**, select one of the following MPEG-2 profiles:

- **4:2:0** This profile uses 4:2:0 luminance/chrominance sampling and is suitable for broadcast transmission and distribution on DVD. You must select this profile if you're capturing to an *.m2v* file for DVD authoring.
- **4:2:2** This profile uses 4:2:2 luminance/chrominance sampling and is suitable for high-quality distribution and archiving.

5 Under **Motion Estimation**, drag the slider to adjust the quality of the motion estimation used for the video compression. The default setting gives good results for most video. However, if you have a lot of fast motion in your video, such as fast-paced sports footage, you can get better results by dragging the slider to the right (towards **Slow/High quality**). This improves the quality of the motion estimation, but decreases the speed of the video compression. Alternately, if you have mostly slow-paced video, you may want to drag the slider to the left (towards **Fast/Low quality**) to decrease the quality of the motion estimation and speed up the video compression.

6 Click **OK** to save your settings.

Selecting your MPEG-2 IBP settings

Exporting to a Matrox .avi file

Several software codecs are included with Adobe Premiere Pro so that you can export your video to different formats. Your Matrox MXO2 system adds several Matrox codecs to the ones included with Premiere Pro to allow you to export your sequence to a Matrox .*avi* file.

If you have a Matrox MXO2 product with MAX technology, you can also export your sequence to a Matrox MAX H.264 file as explained in Chapter 17, "Using the Matrox MAX H.264 Codec with Adobe Software."

⇒ **To export your sequence to a Matrox .avi file:**

1 Unless you want to export your entire sequence, position the work area bar over the section of the sequence you want to export.

2 Choose **File > Export > Media**. This opens the **Export Settings** dialog box.
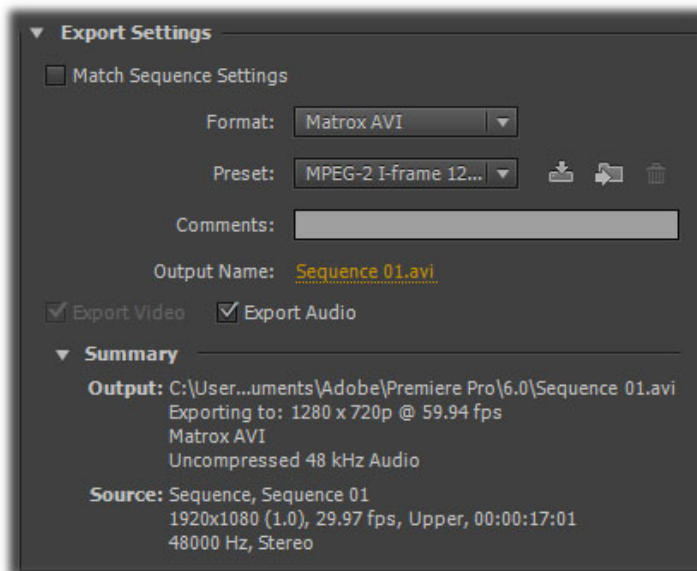
3 From the **Format** list, select **Matrox AVI**.

📝 **Note** Although the **AVI** format also lets you export your sequence to a Matrox .*avi* file using Matrox codecs, it uses Video for Windows (VFW) codecs only. To obtain the best performance when exporting material from Adobe Premiere Pro to a Matrox .*avi* file, you must select the **Matrox AVI** format for your exports.

4 From the **Preset** list, select the video format you want for your exported file.

5 Select **Export Audio** if you want to export both video and audio (**Export Video** is always selected.)

> **Note** Exported audio will be embedded in your *.avi* file. Matrox MXO2 does not support audio-only exports to an *.avi* file.

6 Click the **Video** tab. Under **Codec**, an appropriate Matrox codec is automatically selected for you based on your selected preset. You can change the codec if you want.
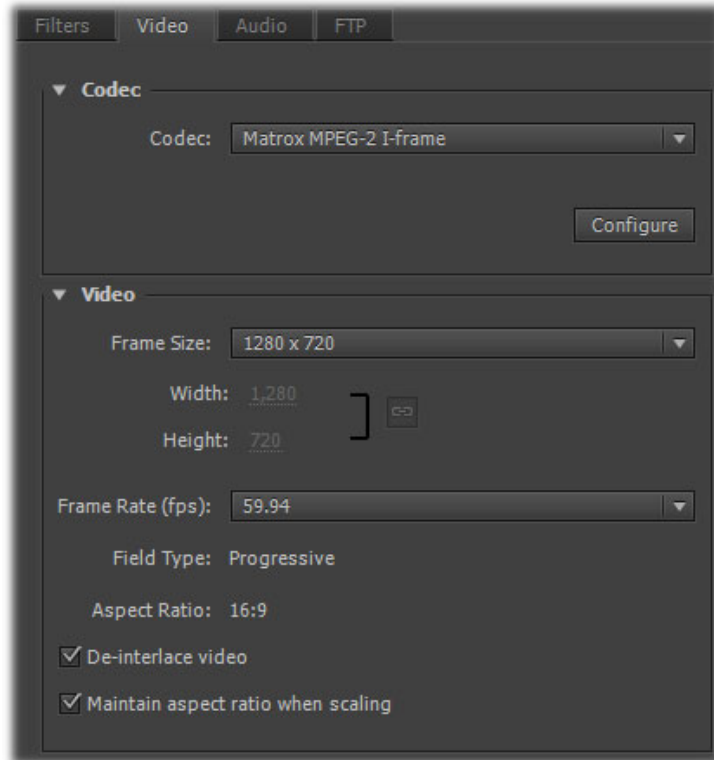
– **Matrox DV/DVCAM**   Renders video to DV or DVCAM format.

– **Matrox DVCPRO**   Renders video to DVCPRO format.

– **Matrox DVCPRO50**   Renders video to DVCPRO50 format.

– **Matrox DVCPRO HD**   Renders video to DVCPRO HD format.

– **Matrox MPEG-2 I-frame**   Renders video to MPEG-2 intra-frame format using the 4:2:2 Profile @ Main Level (for SD resolutions) or High Level (for HD resolutions) at a selected data rate.

– **Matrox 8-bit Uncompressed**   Renders video to 8-bit uncompressed format.

– **Matrox 10-bit Uncompressed**   Renders video to 10-bit uncompressed format.

Exporting to a Matrox .avi file

7   If you're exporting to Matrox MPEG-2 I-frame format, click the **Configure** button to select your MPEG-2 I-frame settings (see "Selecting your MPEG-2 I-frame settings" on page 80).

8   Under **Video**, appropriate settings are applied based on your selected preset. You can customize these settings as follows:

   – **Frame Size**   Sets the width and height for your exported video. The available frame sizes depend on your selected codec.

   – **Frame Rate**   Sets the frame rate for the video format to which you are rendering. The available frame rates depend on your selected frame size.

   – **Field Type**   Specifies the order in which the video fields are displayed, such as **Upper First** for interlaced HD video, or **Progressive** for all progressive video formats. The available field types depend on your selected codec, frame size, and frame rate.

   – **Aspect Ratio**   This is set to **16:9** when exporting to HD. When exporting to SD, you can select **4:3** to export to the standard TV screen format, or **16:9** to export to the widescreen 16:9 format.

   – **De-interlace video**   If you're exporting interlaced video to a progressive format (such as 1080i to 720p), select this option to de-interlace the video for display on a monitor that displays lines progressively, such as an LCD or computer monitor. (This option won't be present if you're exporting to an interlaced format or your source video is progressive.)

   – **Maintain aspect ratio when scaling**   Select this option if you're scaling your source video for export, and you want to maintain your source video's aspect ratio. Your source video will be exported as pillarbox video when exporting to a larger aspect ratio, or letterbox video when exporting to a smaller aspect ratio. If this option is not selected, scaled video that doesn't match the specified aspect ratio for export will be exported as anamorphic video.

9   From the **Source Range** list in the **Source** panel, select the range you want to export, such as **Work Area**.

10   Click **Queue** to send your export request to Adobe Media Encoder, or click **Export** to immediately start your export.

For information about other export settings and using Adobe Media Encoder, see your Adobe Media Encoder documentation.

Exporting an NTSC or 486p sequence to Adobe Premiere Pro 720x480 formats

When you choose **File > Export > Media** to export a sequence, Adobe Premiere Pro provides the MPEG2-DVD export format in the **Export Settings** dialog box, which lets you export your sequence to a DVD-compliant MPEG-2 file suitable for use with most DVD authoring programs, such as Adobe Encore. To export an NTSC or 486p sequence that has a Matrox codec editing mode to a 720×480 MPEG2-DVD format or any other Adobe Premiere Pro 720×480 format, you must select **Scale to Fill** from the **Source Scaling** menu on the **Output** panel of the **Export Settings** dialog box. For details on how to export to MPEG2-DVD and other Adobe Premiere Pro 720×480 formats, see your Adobe Premiere Pro documentation.

Adding a voice-over to your sequence

Matrox MXO2 supports voice-over, which allows you to record audio tracks as *.wav* files directly in the **Timeline** panel to add commentary to video clips, such as newsreels and documentaries.

📝 **Note** Matrox voice-over supports recording to standard, mono, and adaptive audio tracks only.

Connection and setup

1 Connect the microphone to the audio input on your source device and connect the audio output (analog or AES/EBU) from the source device to the corresponding audio input on your MXO2 hardware.

2 Choose **Edit > Preferences > Audio Hardware**.

3 From the **Default Device** list, select **Matrox ASIO Driver for Adobe Premiere Pro**, then click **ASIO Settings**.
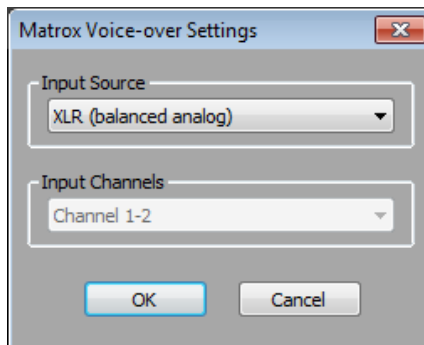
4 From the **Input Source** list, select the audio source type corresponding to the device to which the microphone is connected.

5 The audio input channels are set to **Channel 1-2**. On MXO2 Rack, make sure that your XLR or AES/EBU audio input source is connected to the channel 1/2 connector(s) only.

6 Click **OK** to save your settings, and then click **OK** to close the **Preferences** dialog box.

Recording your voice-over

You use Adobe Premiere Pro's Audio Mixer to record your voice-over. For further information on using the Audio Mixer, see your Adobe Premiere Pro documentation.

1 Choose **Window > Audio Mixer**, then select the sequence in which you want to record your voice-over (for example, **Window > Audio Mixer > Sequence 01**).

2 Position the current-time indicator in the **Timeline** panel where you want the voice-over to begin.

📝 **Note** If a track that you'll be recording your voice-over on already contains audio at the current-time indicator, the audio will be overwritten by your voice-over.

Enable track for recording

Volume

Play/Stop toggle   **Record**

3 In the **Audio Mixer** panel, click the **Enable track for recording** button (**R**) for each track on which you want to record audio. You can record your voice-over on multiple tracks at the same time.

4 If you enable recording for a mono track, you can select **Matrox Left** or **Matrox Right** from the Track Input Channel menu at the top of the panel to indicate which channel you want to record on that track.

5 Select **Meter Input(s) Only** in the Audio Mixer menu to display the MXO2 audio input levels in the meters.

📌 **Tip** You can click the **Solo Track** button (**S**) for a track on which you'll be recording audio to mute the audio playback of other audio tracks in your sequence.

Adding a voice-over to your sequence

6   Test the audio input levels by speaking into the microphone, and watch the levels in the meters. If needed, adjust the audio level on your source device so that the input levels are sufficiently high but not clipping.

7   Click the **Record** button ( ) to prepare the sequence for recording.

8   Click the **Play** button ( ) to start recording your voice-over.

✎   **Note**   During recording, there's a slight delay in the audio preview of your voice-over. To mute the preview, click the **Mute Track** button (**M**) or you can choose to lower the track volume by dragging the **Volume** slider.

9   Click the **Stop** button ( ) to stop recording. Your voice-over will be added to the selected audio tracks as *.wav* files.

Setting up Matrox device control

Matrox device control lets you control any device that supports the RS-422 SMPTE time code protocol when capturing or exporting material to tape in Adobe Premiere Pro. To use this device control, you must connect your source device or recorder as follows:

- **Matrox MXO2, MXO2 Rack, and MXO2 LE**   Connect the RS-422 connector on your MXO2 hardware to the serial device control port on your source device or recorder using an RS-422 serial cable (see "MXO2 RS-422 serial connection" on page 18, "MXO2 Rack RS-422 serial connection" on page 27, or "MXO2 LE RS-422 serial connection" on page 36).

- **Matrox MXO2 Mini**   Matrox MXO2 Mini does not have an RS-422 connector. You can, however, use a suitable adapter to connect the serial device control port on your source device or recorder to your computer. For a list of supported device control adapters, see the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

⟹   **To configure your Matrox device control settings:**

1   Choose **Edit > Preferences > Device Control**.

2   From the **Devices** list, select **Matrox RS-422 Device Control**.

3 Click **Options** to display the following dialog box:

Matrox RS-422 Device Control Settings

Port :   Matrox RS-422

Time Source :   LTC

Time Base :   30 fps Drop Frame

Use VTR's internal cue ☐

Capture

Time Code Offset :   0   frames

Export to Tape

Device Edit Mode :   Basic Edit

Mark In Time Code Offset :   3   frames

Mark Out Time Code Offset :   0   frames

Playback Offset :   5   frames

OK   Cancel
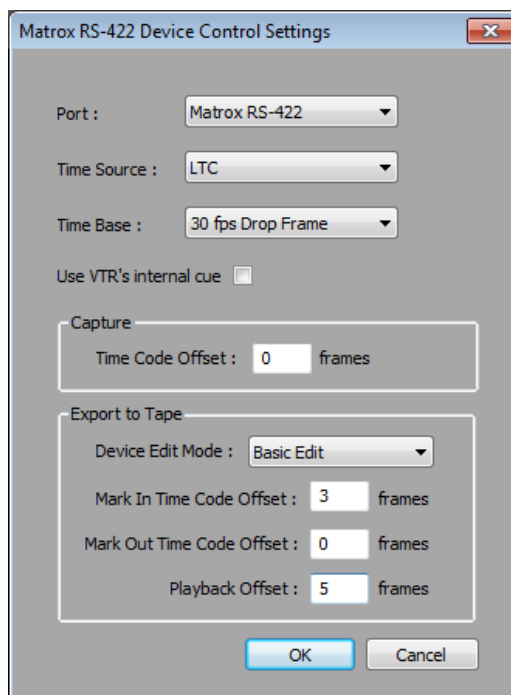
4 From the **Port** list, select **Matrox RS-422** if you've connected your device to the RS-422 connector on your MXO2 hardware (not available on MXO2 Mini). For MXO2 Mini, select the COM port on your computer to which you've connected your device.

5 From the **Time Source** list, select the time source to be used for controlling your device:

– **LTC**   Longitudinal Time Code recorded on a track adjacent to the video (this is the default time source). This type of time code can be read at all tape speeds, except still.

– **VITC**   Vertical Interval Time Code that is recorded onto the vertical blanking interval of the video. This type of time code can be read whenever an image is displayed, but not usually during high-speed operation.

– **LTC+VITC**   Select this if you want your device to decide which type of time code to use in different operational modes (recommended only if you're sure that the two types of time code match on your tape).

– **Control Track**   Select this if you want to use only your tape's control track as the time source. Because using the control track is not as reliable

Setting up Matrox device control

as LTC or VITC for device control, you should select this option only if you're having problems using the time code on your tape.

6 From the **Time Base** list, select the time base that matches your tape, such as **30 fps Drop Frame** if you're using NTSC video with drop frame time code, or **25 fps** if you're using PAL video.

7 Select **Use VTR's internal cue** if the Matrox device control is having problems cueing your VTR, such as when you cue to a specific In or Out point. Because using the VTR's internal cueing method slows down the cueing, you should select this option only if you're experiencing problems cueing to a time code when using Matrox device control.

8 Under **Capture**, use the **Time Code Offset** to specify the number of frames to adjust the start time for capture, if needed. For example, if your captures are starting three frames too early (that is, three frames before your specified In point), enter a time code offset of 3. Alternately, if your captures are starting three frames too late, enter a time code offset of -3.

9 Under **Export to Tape**, you can specify various settings that enable you to obtain a frame-accurate export to tape. For an example of how to calibrate your device for frame-accurate recording, see "Obtaining a frame-accurate export to tape using Matrox device control" on page 97.

   – **Device Edit Mode** Select one of the following modes to specify the editing capabilities of your recorder:

   • **Auto Edit** Select this if your recorder supports edit commands and has auto edit capabilities. Devices that support this mode perform frame-accurate recording. Therefore, you won't need to make any adjustments to the Mark In and Out time code offsets, and those settings won't be available.

   • **Basic Edit** Select this if your recorder supports edit commands, but does not have auto edit capabilities. When using this mode, you may need to adjust the Mark In time code offset, but the recording should be accurate at the Out point.

   • **Edit Not Supported** Select this if your recorder doesn't support any edit commands. In this case, you will probably need to specify both a Mark In and a Mark Out time code offset, and you won't be able to perform an insert edit (the options to perform an insert edit won't be available in the **Matrox Export to Tape** dialog box).

   Tip If you're not sure if your device supports edit commands, try performing an export to tape using the different edit modes, starting with **Auto Edit**. If your device doesn't support the selected edit mode, the recording will either not start or nothing will get recorded on the tape.

   – **Mark In/Out Time Code Offset** These offsets specify the number of frames to adjust the recording start and stop times if the recording doesn't

start at your specified In point and stop at your specified Out point on the tape. For example, if the recording starts three frames before the In point, set the **Mark In Time Code Offset** to 3 (or -3 if the recording starts three frames too late). You should adjust the Mark In time code offset first, because once this setting is accurate your device may also be accurate at the Out point.

– **Playback Offset**   Specifies the number of frames to offset the playback of your sequence for export to tape. For example, if playback starts too late and you're missing the first three frames of your sequence recorded on the tape, enter an offset of -3. Alternately, if playback starts too early and the first three frames of your sequence are repeated, enter an offset of 3. Before changing this offset, you must first make any required adjustments to the Mark In and Mark Out time code offsets.

10 Click **OK** to save your settings.

For details on capturing with device control, see your Adobe Premiere Pro documentation. For information about exporting your sequence to tape, see "Exporting your sequence to tape" on page 94.

Requirements for using Matrox device control

When using Matrox device control, keep the following points in mind:

- You must set your device to Remote or VTR mode.

- When using an analog RS-422 device on MXO2, MXO2 Rack, or MXO2 LE, you must genlock to an external broadcast-quality analog sync source. If you're using an SDI RS-422 device and you don't have an external broadcast-quality analog sync source, you can genlock to your SDI video source for capture. For export to tape, you can set your genlock source to the MXO2 internal reference and configure the setting on your deck to genlock to the SDI video input. For details on how to set your genlock source, see "Specifying your genlock settings for playback" on page 64 and "Specifying your genlock settings for capture" on page 77.

- You must stripe your tapes with continuous and consecutive time code. You can stripe your entire tape with time code by recording black video for the duration of the tape. Avoid having the time code counter reset to 00:00:00:00 during the striping.

- When capturing material, make sure that you don't specify any preroll or time code offset value in the **Device Control** section of the **Settings** pane. Instead, a preroll of about five seconds will automatically be applied, and you must specify any required time code offset in the **Matrox RS-422 Device Control Settings** dialog box.

Exporting your sequence to tape

To export your Adobe Premiere Pro sequence to tape without using device control, simply play back your sequence and record the output from any of the available outputs on your MXO2 system. If your recorder supports RS-422 device control, you can export your sequence to tape using Matrox device control as explained in "Exporting to tape using Matrox device control" on page 94."

Avoiding issues when using Matrox device control

Keep the following points in mind when exporting to tape using Matrox device control:

- To avoid having discontinuous (broken) time code recorded onto your tape when using Matrox device control, set your recorder to generate time code internally based on time code already present on the tape (this setting is called INT REGEN on some devices). Don't use free run or external time code regeneration mode.

- Because Matrox device control requires a preroll, don't start the export to tape within the first ten seconds on your tape or at a time code less than 00:00:10:00.

- To avoid repeated frames or broken time code when performing an assemble edit using Matrox device control, add ten seconds or more of black video or color bars to the end of your sequence.

Exporting to tape using Matrox device control

With Matrox device control, you can perform either an insert or assemble edit to record your Adobe Premiere Pro sequence onto tape as follows:

1 Open your project, activate the sequence that you want to export to tape, and position the work area bar over the section of the sequence that you want to export.

2 If you haven't already done so, render all sections that are identified with a red or yellow render bar.

📝 **Note** Adobe Premiere Pro will automatically render sections that have a red render bar when you start an export to tape, but to avoid having dropped frames you must render both the red and yellow sections before performing a Matrox export to tape.

3 Make sure that you've properly connected your RS-422 recorder and configured Matrox device control as explained in "Setting up Matrox device control" on page 90.

4 Load a striped recordable tape into your recorder, and set your recorder to Remote or VTR mode.

5 Choose **File > Export > Tape** to display the following dialog box:
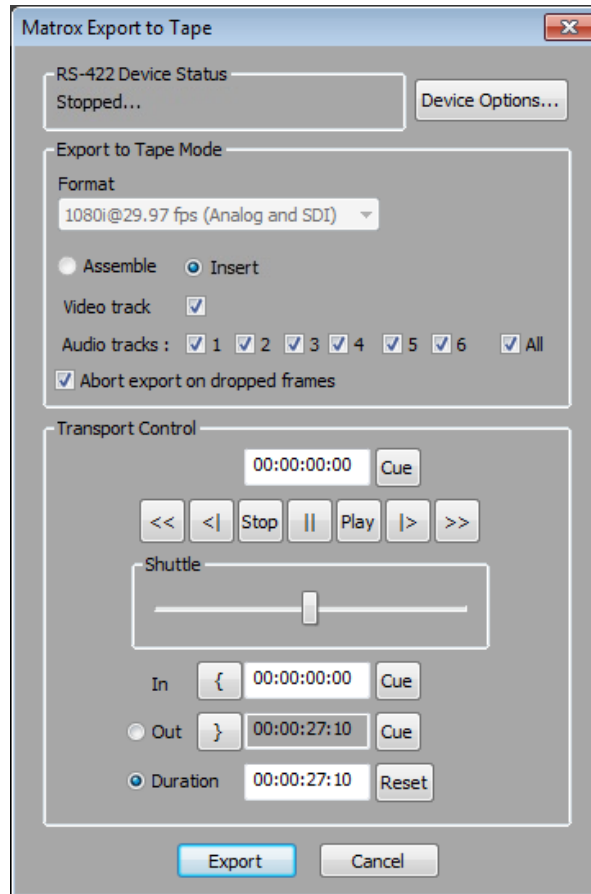
6 To review or change your device control settings, click **Device Options**.
This displays the **Matrox RS-422 Device Control Settings** dialog box as
explained in "Setting up Matrox device control" on page 90 (except you
won't be able to change the specified port).

7 Under **Export to Tape Mode**, you can specify the type of export you want
to perform and the tracks you want to be recorded:

– **Format**   Determines the video format for the export to tape. The
available formats depend on your currently selected video output settings
(see "Specifying your video output settings" on page 56 and "Specifying
your video output settings (MXO2 Mini)" on page 61).

– **Assemble**   Records all tracks (video and audio) sequentially onto the
tape. The control track and previously recorded material on the tape will
be replaced with the material recorded from your sequence.

Exporting your sequence to tape

    – **Insert**   Records selected tracks (video and/or audio), without affecting the control track. This lets you perform a video or audio dub. For example, you can choose to record only video, only selected audio tracks, or video and selected audio tracks from your sequence.

✎ **Note** Check your device's documentation to determine its recording capabilities for assemble and insert editing. To perform an insert edit, the edit mode for Matrox device control must be set to **Auto Edit** or **Basic Edit** as explained in "Setting up Matrox device control" on page 90.

    – Select **Abort export on dropped frames** if you'd like the export to tape to automatically stop when dropped frames are encountered. You'll get a warning if the export to tape is aborted due to a dropped frame.

8 Use the transport controls to play back your tape. The current time code of your tape appears in the text box above the transport controls. You can also use the **J**, **K**, and **L** shortcut keys to control the shuttle. Press **J** to shuttle left, **L** to shuttle right, and **K** to stop. Pressing **J** or **L** multiple times increases the speed of the shuttling.

9 Specify where you want the recording to start and stop as follows:

    – Click the **Set In Point** button ({) to specify where you want the recording to start, or enter the required time code in the **In** box.

    – Click the **Set Out Point** button (}) to specify where you want the recording to stop, or enter the required time code in the **Out** box. Alternately, you can select **Duration** and enter the duration you want for the recording. The Out point will then be calculated for you. By default, the duration is set to the duration of the work area. You can click **Reset** at any time to set the duration back to the duration of the work area.

✎ **Note** When **Out** is selected, the duration is calculated based on your selected In and Out points. When **Duration** is selected, the Out point is calculated based on your specified In point and duration.

10 Click **Export** to start the export to tape.

Obtaining a frame-accurate export to tape using Matrox device control

In order to obtain a frame-accurate export to tape when using Matrox device control, there are various settings that you may need to adjust in the **Matrox RS-422 Device Control Settings** dialog box:

- The **Mark In Time Code Offset** and **Mark Out Time Code Offset** determine when your device starts and stops recording on the tape. If the recording doesn't start on the tape at your specified In point and stop at your specified Out point, you can adjust these offsets so that the recording starts/stops earlier or later.

✎ **Note** Adjusting the Mark In and Out time code offsets won't be required if your recorder has auto edit capabilities and you set the edit mode for export to tape to **Auto Edit** as explained in "Setting up Matrox device control" on page 90.

- The **Playback Offset** determines when your sequence starts playing back. Depending on your system, you may need to adjust this offset so that your sequence starts playing back earlier or later.

Here's an example of how to calibrate your RS-422 device for frame-accurate export to tape:

1 Stripe an NTSC tape with continuous and consecutive time code starting at 00:00:00:00.

2 Create a new Matrox NTSC sequence with a bars and tone clip at least ten seconds long containing time code starting at 00:00:00:00. Make sure you place the clip at the start of your sequence.

📌 **Tip** You can create a bars and tone clip by right-clicking in the **Project** panel and choosing **New Item > Bars and Tone**. You can add time code to the clip by applying a Timecode effect as explained in your Adobe Premiere Pro documentation.

3 Set up Matrox device control with the **Mark In Time Code Offset**, **Mark Out Time Code Offset**, and **Playback Offset** for export to tape set to 0 (see "Setting up Matrox device control" on page 90).

4 Export your sequence to tape and set the In point for the recording to 00:00:10:00 and the Out point for the recording to 00:00:20:00 (see "Exporting to tape using Matrox device control" on page 94).

5 When the export to tape is finished, play back your tape and check where the recording started. For example, if the bars and tone clip started recording at 00:00:09:25 on your tape (five frames before your specified In point), then you need to set the **Mark In Time Code Offset** to 5. Alternately, if the recording started at 00:00:10:05 (five frames after your specified In point), then you need to set the **Mark In Time Code Offset** to -5.

Exporting your sequence to tape

6   Make any required adjustment to the **Mark In Time Code Offset** in the **Matrox RS-422 Device Control Settings** dialog box, and perform another export to tape with the same settings (In point at 00:00:10:00 and Out point at 00:00:20:00.)

7   When the export to tape is finished, play back your tape and make sure that your bars and tone clip stopped recording at 00:00:20:00 (the recording should have started at 00:00:10:00). For example, if the recording stopped at 00:00:19:25 (five frames before your specified Out point), then you need to set the **Mark Out Time Code Offset** to 5.

8   Once you've made any required adjustments to the Mark In and Out time code offsets and ensured that your bars and tone clip starts and stops recording at your specified In and Out points, perform another export to tape with the In point for the recording set to 00:00:30:00.

9   When the export to tape is finished, go to 00:00:30:00 on your tape, and check which frame from your sequence has been recorded. You should see frame 00:00:00:00 from your bars and tone clip at 00:00:30:00 on your tape, with no repeated frames. For example, if frame 00:00:00:00 has been repeated for the next five frames, then your sequence started playing back five frames too early and you need to set the **Playback Offset** to 5. Alternately, if you see frame 00:00:00:05 from your bars and tone clip recorded at 00:00:30:00, then the sequence playback started five frames too late and you need to set the **Playback Offset** to -5.

9

Setting Up Matrox Effects with Adobe Premiere Pro

This chapter explains how to set up Matrox effects such as color corrections and wipes using the Matrox plug-in for Adobe Premiere Pro.

Available effects

The Matrox plug-in for Adobe Premiere Pro lets you set up the following Matrox effects in your Adobe Premiere Pro projects[1]:

- Color corrections.
- Chroma key and luma key effects.
- Chroma clamper effect.
- Wipes.

When you install Matrox Mtx.utils, all the Matrox effects are added to Adobe Premiere Pro. You set up Matrox effects in your projects the same way as other effects included with your Adobe software. For example, you apply a Matrox wipe to your clips in Adobe Premiere Pro just as you would any other type of transition, except that the controls provided let you create a Matrox wipe, as explained in this chapter. For instructions on setting up Adobe Premiere Pro effects and transitions, refer to your Adobe documentation.

Tip You can filter the **Effects** panel to show only the effects and transitions that are accelerated by your Matrox hardware by clicking the button at the top of the **Effects** panel.

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[1] The Matrox color correction, chroma key, luma key, and chroma clamper effects are also available in Adobe After Effects.

How to apply a Matrox video effect in Adobe Premiere Pro

The Matrox plug-in for Adobe Premiere Pro allows you to apply several Matrox video effects to your clips. To apply a Matrox video effect, drag the desired effect from the **Effects** panel onto the clip in the **Timeline** panel.

By default, the Matrox video effects are found in the **Matrox** bin under **Video Effects**.

✎ **Tips**

- You can also apply preconfigured Matrox video effects found in the **Matrox Effect Presets** bin under **Presets**.
- If you can't see the **Effects** panel, choose **Window > Effects**. If you can't see the **Effect Controls** panel, choose **Window > Effect Controls**.

How to apply a Matrox video transition in Adobe Premiere Pro

In Adobe Premiere Pro, the Matrox wipe transitions are found in the **Matrox** bin under **Video Transitions** in the **Effects** panel.

There are numerous methods to create transitions in Premiere Pro. Use the method that works best for you to apply your Matrox wipes. For information on applying transitions, see your Adobe Premiere Pro documentation.

Applying a mask to your Matrox effects

The Matrox color correction, chroma key, and luma key effects allow you to add a mask to define the area where you want to apply your effect. For example, you may want to apply a color correction to only one area of your clip and leave the rest of the clip untouched.

⟹ **To adjust the mask properties:**

Click the triangle next to **Mask** to expand the property list.
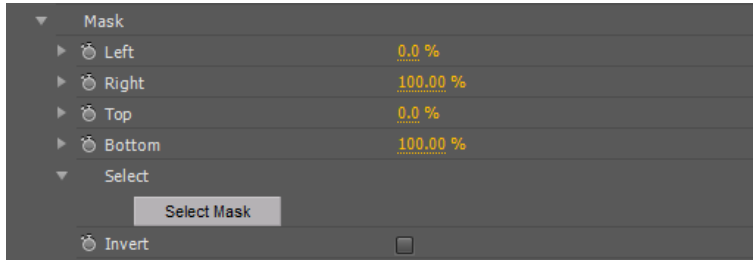
The properties under **Mask** let you control the area on the clip where you want to apply the mask. You can enter the values you want in the text boxes or drag the appropriate sliders (**Left**, **Right**, **Top**, and **Bottom**).

- **Left**   Adjusts the left edge of your mask.
- **Right**   Adjusts the right edge of your mask.
- **Top**   Adjusts the top edge of your mask.
- **Bottom**   Adjusts the bottom edge of your mask.
- **Select Mask**   Displays a dialog box in which you can apply your mask settings (see "Using Select Mask" on page 103).
- **Invert**   Inverts the mask so that your effect is applied outside the mask, instead of within the mask.

Using Select Mask

To apply a mask to your Matrox effect using the **Select Mask** dialog box, click the triangle next to the **Select** property to expand it, then click the **Select Mask** button:
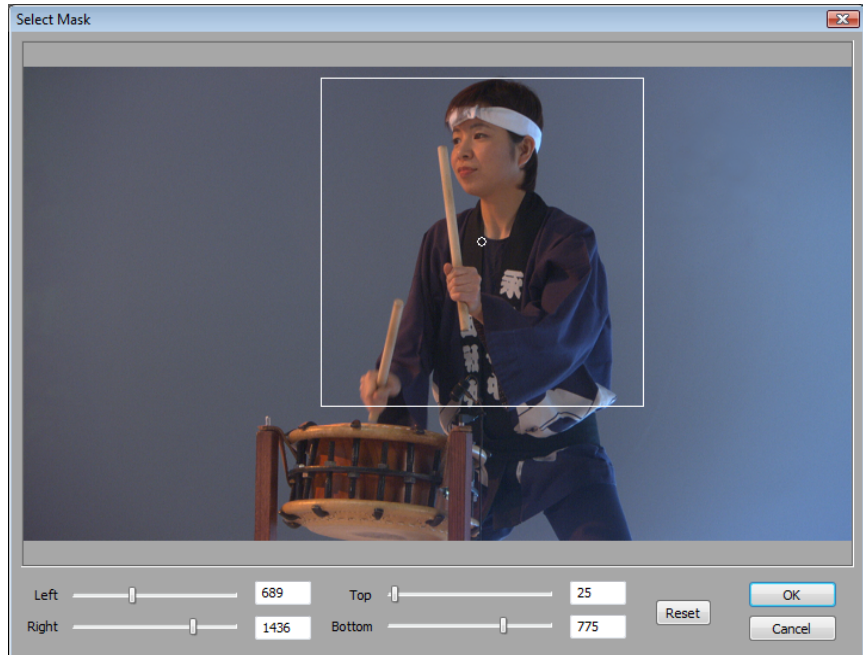
The **Select Mask** dialog box allows you to apply a mask in two ways:

- Click and drag directly in the **Select Mask** window to create the rectangular area where you wish to apply the mask.

  You can resize the mask area by dragging any side of the rectangle. For example, dragging the right side of the rectangle adjusts the right edge of the mask area. To resize the entire mask area at once, drag one of the corners (the corner that's diagonally opposite the corner you are moving will remain stationary).

- Use the **Left**, **Right**, **Top**, and **Bottom** controls to adjust any edge of your mask by a given number of pixels. You can enter values in the text boxes or drag the sliders to resize your mask area. For example, drag the **Left** slider to adjust the left edge of your mask area.

Creating a Matrox primary color correction

Color correction is important for all productions, whether you want to achieve continuity when cutting between shots, ensure broadcast safe levels, or establish and emphasize a "look." Matrox color correction provides basic proc amp control, three-way color correction complete with master, shadows, midtones, and highlights control, and input and output level control. You can also easily match colors with a reference shot. For more information about color matching, see "Matching colors between two clips" on page 115.
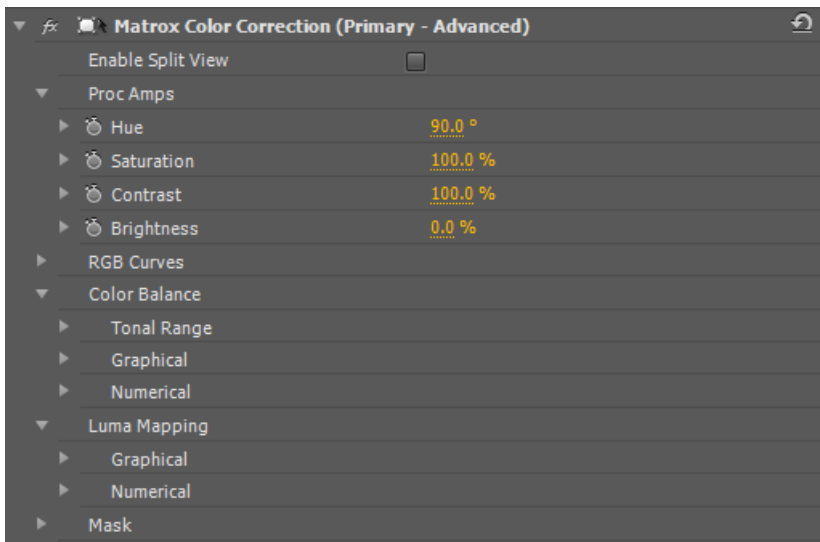
Tip Adobe Premiere Pro includes a workspace setup that is optimized for working with clips and effects to facilitate color correction. To prepare your workspace for color correction, choose **Window > Workspace > Color Correction**.

⟹ **To set up a Matrox primary color correction:**

Click the triangle next to **Matrox Color Correction (Primary)** or **Matrox Color Correction (Primary - Advanced)** to expand the property list.

Note The **RGB Curves** and **Tonal Range** settings are available only with the advanced versions of the Matrox primary and secondary color correction effects. Because the advanced versions of these effects require additional system resources, you should apply them only if you want to use the **RGB Curves** or **Tonal Range** settings.

- **Enable Split View**   Select this option to split your clip into two sections in the Program Monitor and on your video monitor. One section will display your clip as you adjust the color correction controls, and the other section of

the clip will remain unchanged. For more information, see "Using Split View" on page 106.

(i) **Important**   This option is for preview only. You should clear it before you render your clip, otherwise the split will appear in your video output.

- **Proc Amps**   The processing amplifier (proc amp) controls allow you to adjust different aspects of your clip:
  - **Hue**   Adjusts the tint of the colors in the image.
  - **Saturation**   Adjusts the saturation (vividness) of the image's colors.
  - **Contrast**   Adjusts the difference in luminance between the lightest and darkest areas of the image.
  - **Brightness**   Adjusts the level of black in the image.
- **RGB Curves**   Lets you use curves to adjust the red, green, and blue color channels of your clip individually, or use a master curve to adjust all color channels simultaneously. For more information, see "Using RGB curves" on page 108.
- **Color Balance**   These controls let you adjust the mixture of colors in your clip.
  - **Tonal Range**   Allows you to fine-tune the tonal ranges of your clip by reducing the range of pixels included for shadows, midtones, or highlights. For more information, see "Adjusting tonal range" on page 110.
  - **Graphical**   Allows you to see a graphical representation of your changes when you adjust the color balance settings. You can also modify most of the color balance settings directly within the graph. For more information, see "Using the color balance graph" on page 111.
  - **Numerical**   Lets you adjust your color balance settings numerically by entering values in the text boxes, or by dragging the corresponding sliders. You can adjust the **Hue**, **Saturation**, and **Luminance** for each tonal range.
    - **Master (Hue**, **Saturation**, and **Luminance)**   Affects all areas of your clip from the lightest white to the darkest black.
    - **Shadows (Hue**, **Saturation**, and **Luminance)**   Affects the darkest areas of your clip.
    - **Midtones (Hue**, **Saturation**, and **Luminance)**   Affects the areas with tones between the darkest and lightest areas of your clip.
    - **Highlights (Hue**, **Saturation**, and **Luminance)**   Affects the lightest areas of your clip.
- **Luma Mapping**

- **Graphical**   Allows you to see a graphical representation of your changes when you adjust the luma mapping settings. You can also modify the luminance of your clip directly within the graph. For more information, see "Using the luma mapping graph" on page 117.

- **Numerical**   Lets you adjust the luma mapping settings numerically by entering values in the text boxes, or by dragging the corresponding sliders.

  - **Input Levels (Black** and **White)**   These controls let you fine-tune your clip's brightness and contrast by changing the luminance value that represents black, white, or gray. Doing so expands or compresses the range of luminance levels in your clip, which increases or decreases your clip's tonal range.

    For example, by increasing the black value, you set black in your clip to a higher luminance value, which compresses the luminance range and darkens your clip proportionally.

  - **Output Levels (Black** and **White)**   These controls let you map the values under **Input Levels** to any level of black and white. You can reduce contrast in your clip, or reverse the luminosity of your clip by setting black to a higher value than white.

  - **Gamma**   Use this to adjust the midtones in your clip without adjusting black or white.

- **Mask**   Allows you to apply a mask to your effect. For more information, see "Applying a mask to your Matrox effects" on page 102.

Using Split View

The Split View option allows you to split your clip in two for preview on your Program Monitor and your video monitor. One section displays your clip as you adjust the color correction controls, while the other section of the clip remains unchanged.

There are two ways to enable Split View. You can select the **Enable Split View** option in the **Effect Controls** panel, or work directly in Adobe Premiere Pro's Program Monitor using your mouse.

Working with Split View in the Program Monitor

To activate the Split View controls in the Program Monitor, click the Transform icon ([icon]) beside the name of the Matrox color correction effect in the **Effect Controls** panel. The Split View button will appear in the upper left corner of the Program Monitor:

Split View button

Enable Split View by clicking the Split View button. You can then drag the handles on the corners of the split rectangle to define the area you want to split. You can also drag the split rectangle to move it to a specific region of your clip. The area within the split view rectangle will display any color correction you make, while the area outside remains unchanged.

In the following example, the split view rectangle has been moved to display the color correction in the area surrounding part of the Chinese character on the wall:
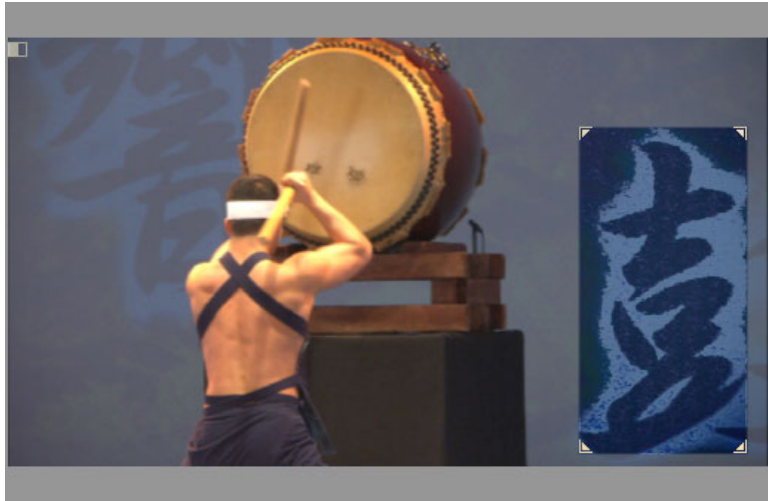
Remarks

- The Split View option is for preview only. You should disable it before rendering your material, otherwise the split will appear in your video output.

- If you enable Split View and create a mask outside the split view rectangle, you will not be able to see it. The mask will only be visible when you move the split view rectangle directly over it. If you invert a mask that is not in the split view rectangle area, the whole clip will be inverted since the mask is ignored.

Using RGB curves

Note   The **RGB Curves** settings are available only with the advanced versions of the Matrox primary and secondary color correction effects.

With RGB curves, you can individually adjust the red, green, and blue color channels across the entire tonal range of your clip, or adjust all three color channels simultaneously with a master curve. RGB curves allow you to achieve color effects that would be difficult, if not impossible, to achieve using the **Color Balance** settings, and also give you a high degree of control over the color channels in each tonal range. For example, you can easily add a red, green, or blue tint to your clip, or use the master curve as a way to adjust the brightness and contrast of your clip.

Each curve is displayed on a grid with the horizontal axis representing the input or current pixel value, and the vertical axis representing the output value of the pixel after the curve adjustment is applied. By default, a curve starts as a straight line with two end points, one at the bottom left of the grid (shadows), and the other at the top right of the grid (highlights). Before any adjustments are made, each point on the curve has the same input and output value.
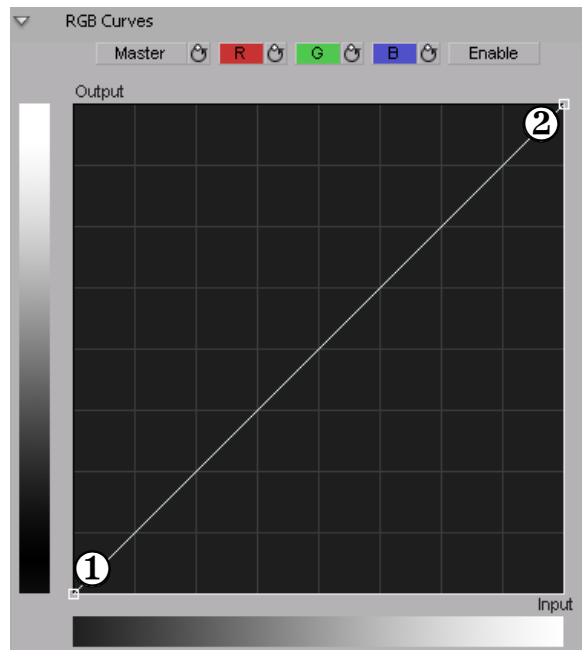
| ① Default end point (shadows) | ② Default end point (highlights) |

Click the **R**, **G**, or **B** button to select the curve corresponding to the color channel you want to adjust, or click the **Master** button for the master curve, and then drag the curve to obtain your desired effect. For example, click the **R** button and drag the top right end point towards the top left of the grid to increase the slope of the curve and add red to the clip. Drag that same point towards the bottom right of the grid to decrease the slope of the curve and remove red from the clip. Clicking the **Enable** button will show/hide any adjustments you have made to the RGB channels at any time (you do not need to click **Enable** to start adjusting the curves).

Tip For increased precision, hold down the **ALT** key while you drag the curve, or the **CRTL** key to change your cursor into a crosshair that will help you align your curve to the grid.

You can add up to 14 control points to each curve in addition to the two default end points. These control points act as anchors that allow you to lock your curve so adjustments can be applied only to specific tonal ranges. Click on a curve to add control points, and hold the **SHIFT** key while clicking a control point to delete it (end points cannot be deleted). Adjusting the points in the top right area of the grid affects highlights, the middle area affects midtones, and the bottom left area affects shadows. For example, the following S-shaped master curve adds contrast in the midtones range, without creating any completely black or white areas.

Creating a Matrox primary color correction
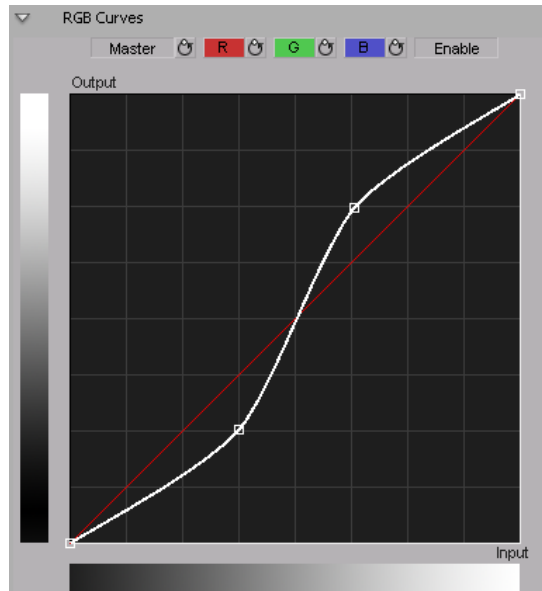
If you want to reset the **Master**, **R**, **G**, or **B** curve to its default setting at any time, click the appropriate Reset button.

Red curve Reset button

📌 **Tip** By applying a mask to your clip, you can adjust the RGB channels for that specific area of your clip, or invert the mask to isolate that same area from being affected by your RGB adjustments.
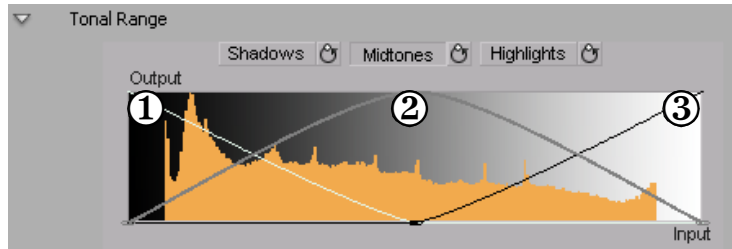
Adjusting tonal range

✎ **Note** The **Tonal Range** settings are available only with the advanced versions of the Matrox primary and secondary color correction effects.

Using the tonal range curves allows you to fine-tune the range of pixels that are affected when you make a color correction to the shadows, midtones, or highlights of your clip using the color balance graph. For more information, see "Using the color balance graph" on page 111.

The histogram shows the distribution of pixels in each tonal range of your clip. In the following example, the histogram represents a clip with a high amount of shadows (left), a lesser amount of midtones (middle), and an even lesser amount of highlights (right).

① **Shadows** ② **Midtones** ③ **Highlights**

Click the **Shadows**, **Midtones**, or **Highlights** button to select the curve corresponding to the tonal range you want to adjust, and then drag the curve as desired to reduce the number of pixels to be included in each tonal range.

✎ **Note** You cannot increase the number of pixels in a tonal range. For example, you can't extend the shadows curve into the highlights range.
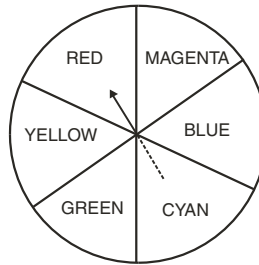
Using the color balance graph

The color balance graph allows you to modify the **Color Balance** settings for each tonal range directly within the color maps. You can also perform an auto balance or a color match using the buttons beneath the color maps. For more information, see "Performing an auto balance" on page 114 and "Matching colors between two clips" on page 115. Depending on which color map you use, you can adjust your clip globally, or only the shadows, midtones, or highlights.
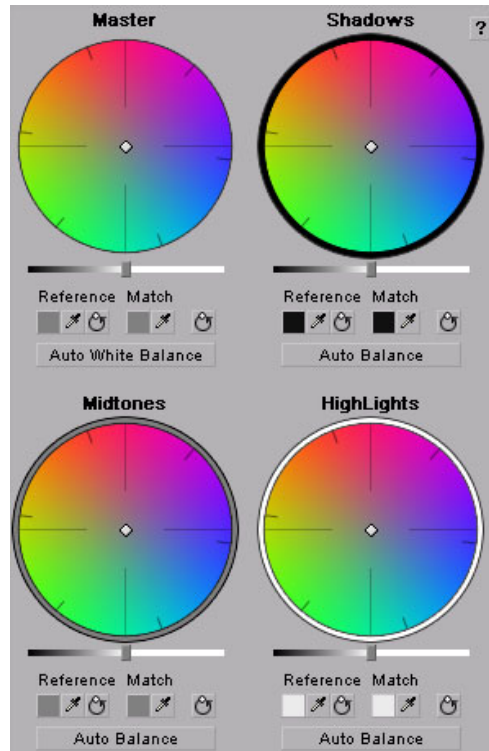

You can drag the handle in the center of any color map to adjust the color balance (**Hue** and **Saturation**) for a specific tonal range, such as to adjust the color balance globally throughout your clip using the **Master** color map, or adjust the color balance of only the shadows using the **Shadows** color map. Drag the handle toward a color you want to increase in your clip, or away from a color you

want to decrease. For example, if you move the handle towards red, you also decrease cyan by the same amount, as shown in the following diagram:

Tip For increased precision, hold down the **ALT** key while you drag the handle.

If you want to reset the color balance (**Hue** and **Saturation)** setting, click the Reset Color Balance button under the color map you are using.
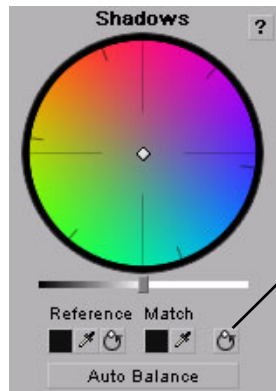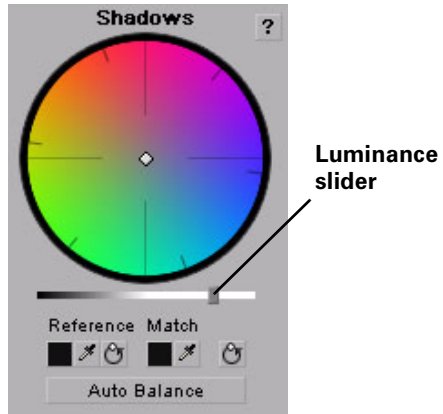

Reset Color Balance button

To adjust the luminance for a tonal range, drag the corresponding luminance slider under the appropriate color map. For example, if you want to adjust the

luminance for only the shadows, drag the luminance slider under the **Shadows**
color map.

**Luminance
slider**

Performing an auto balance

Before matching colors, you can perform an auto balance on your target clip to automatically apply a color shift to your clip to compensate for different lighting conditions. To do this, click the **Auto Balance** button under the corresponding color map and use the eyedropper to select the area you want to correct in your clip. For example, to balance your clip's highlights, click the **Auto Balance** button under the **Highlights** color map, and click (or click and drag) on the lightest area of your clip. The auto balance is performed immediately.
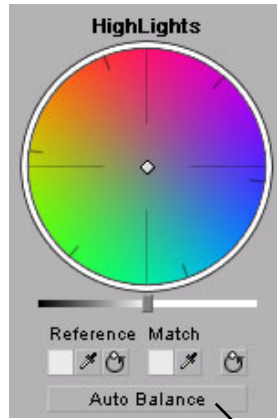

Auto Balance button

📝 **Note** To perform an auto white balance, click the **Auto White Balance** button under the **Master** color map, and click (or click and drag) on a white or light gray area of your clip.

Matching colors between two clips

You can perform a color match to match colors between two clips (such as skin tone, sky, etc.). The color match lets you select colors from a reference clip to match to your target clip. You can affect the colors globally (**Master**), or just the **Shadows**, **Midtones**, or **Highlights**.

You can select the colors for your reference color and match color by either clicking the Color Picker button or the eyedropper.

Color Picker button   **Eyedropper**
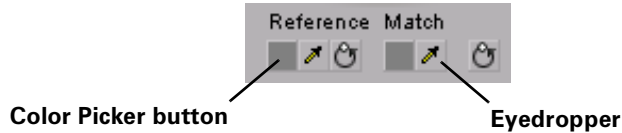
The eyedropper can be used in two ways:

- Click the eyedropper button and click on the desired color in your clip.
- Click the eyedropper button and click and drag anywhere on your clip to create a rectangular area containing the color you want to select. The selected color will be an average of the pixel information contained within the rectangle.

To perform a color match:

1 Prepare your workspace for color correction by choosing **Window > Workspace > Color Correction**.

2 Open your target clip (clip that contains the colors you want to correct) in the Source Monitor.

📝 **Note** For best results when using a target clip that has multiple effects applied to it, create a nested sequence and open it in your Source Monitor before performing the color match. For more information about creating nested sequences, see your Adobe Premiere Pro documentation.

3 Apply the **Matrox Color Correction** effect to your target clip on the timeline.

4 Use the controls under the Reference Monitor to move to a frame in your reference clip that contains the colors you want to match.

5 Use the controls under the Source Monitor to go to the frame in your target clip that contains the colors you want to match to your reference clip.

Creating a Matrox primary color correction

6 Select a reference color from your reference clip by using the Reference Color eyedropper under the color map you want to affect (**Master**, **Shadows**, **Midtones**, or **Highlights**).
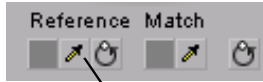
Reference Color eyedropper

7 For example, to match a very dark color in your reference clip to your target clip, click the Reference Color eyedropper under the **Shadows** color map, and click (or click and drag) on the desired color in your reference clip.

8 Select a match color from your target clip in the Source Monitor window by using the Match Color eyedropper under the corresponding color map (**Master**, **Shadows**, **Midtones**, or **Highlights**).
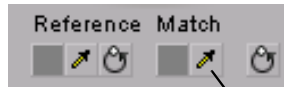

Match Color eyedropper

Using the luma mapping graph

To modify your luma mapping values directly in the graph, click the triangle next to the **Luma Mapping Graphical** property to expand it:

- **Map**   This is the default view when you first expand the **Graphical** property. You can drag the handles in the graph to adjust the **Input** and **Output** levels for black and white, as well as the **Gamma**.
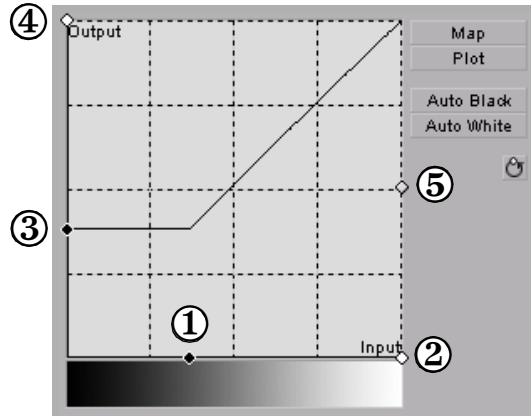
① Input Black Level	② Input White Level	③ Output Black Level	④ Output White Level	⑤ Gamma

- **Plot**   Click this button to plot the luminance values in the current frame of your clip to the histogram (the plot will reflect any color correction changes you've made). Each luminance value present in your image appears as a vertical line in the histogram. A longer line indicates a higher amount of pixels in your image of that line's luminance value. You can drag the handles

in the graph to adjust the **Input** and **Output** levels for black and white, as well as the **Gamma**.
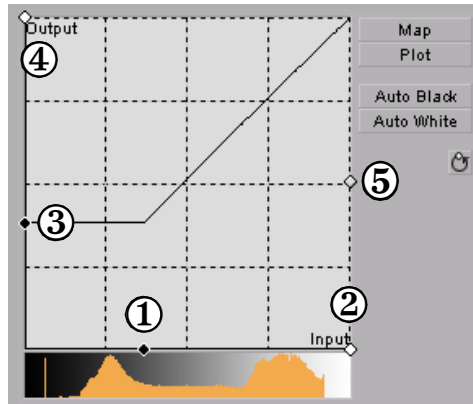

① Input Black Level	② Input White Level	③ Output Black Level	④ Output White Level	⑤ Gamma

- **Auto Black**   Click this to define the darkest pixels in your clip as black. The intermediate luminance values are proportionally redistributed.
- **Auto White**   Click this to define the lightest pixels in your clip as white. The intermediate luminance values are proportionally redistributed.

Note   If you want to restore the default luminance values at any time, click the Restore Default Values button.

Restore Default Values button

Creating a Matrox secondary color correction

Matrox secondary color correction offers all the properties found in Matrox primary color correction, with the added capability of limiting the color correction to a specific range of pixels using the selective key properties. For example, secondary color correction can be used to change the color of a dress, deepen the background sky color, or to achieve an effect where only one object or person remains in color while the rest of the image becomes black and white. For details on how to isolate a color and make the rest of the clip black and white, see "Creating a color pass effect" on page 128.

Tip Adobe Premiere Pro includes a workspace setup that is optimized for working with clips and effects to facilitate color correction. To prepare your workspace for color correction, choose **Window > Workspace > Color Correction**.

To set up a Matrox secondary color correction:

Click the triangle next to **Matrox Color Correction (Secondary)** or **Matrox Color Correction (Secondary - Advanced)** to expand the property list.
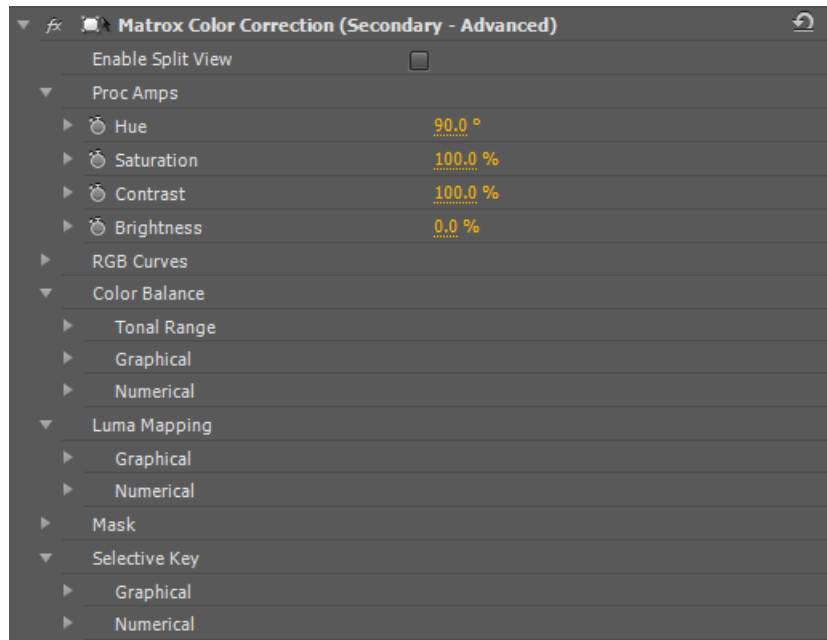
Note The **RGB Curves** and **Tonal Range** settings are available only with the advanced versions of the Matrox primary and secondary color correction effects. Because the advanced versions of these effects require additional system resources, you should apply them only if you want to use the **RGB Curves** or **Tonal Range** settings.

- **Enable Split View**   Select this option to split your clip into two sections in the Program Monitor and on your video monitor. One section will display your clip as you adjust the color correction controls, and the other section of the clip will remain unchanged. For more information, see "Using Split View" on page 106.
- **Proc Amps**   The processing amplifier (proc amp) controls allow you to adjust different aspects of your clip:
  - **Hue**   Adjusts the tint of the colors in the image.
  - **Saturation**   Adjusts the saturation (vividness) of the image's colors.
  - **Contrast**   Adjusts the difference in luminance between the lightest and darkest areas of the image.
  - **Brightness**   Adjusts the level of black in the image.
- **RGB Curves**   Lets you use curves to adjust the red, green, and blue color channels of your clip individually, or use a master curve to adjust all color channels simultaneously. For more information, see "Using RGB curves" on page 108.
- **Color Balance**   These controls let you adjust the mixture of colors in your clip.
  - **Tonal Range**   Allows you to fine-tune the tonal ranges of your clip by reducing the range of pixels included for shadows, midtones, or highlights. For more information, see "Adjusting tonal range" on page 110.
  - **Graphical**   Allows you to see a graphical representation of your changes when you adjust the color balance settings. You can also adjust and modify most of the color balance settings directly within the graph. For more information, see "Using the color balance graph" on page 111.
  - **Numerical**   Lets you adjust your color balance settings numerically by entering values in the text boxes, or by dragging the corresponding sliders. You can adjust the **Hue**, **Saturation**, and **Luminance** for each tonal range.
    - **Master (Hue**, **Saturation**, and **Luminance)**   Affects all areas of your clip from the lightest white to the darkest black.
    - **Shadows (Hue**, **Saturation**, and **Luminance)**   Affects the darkest areas of your clip.
    - **Midtones (Hue**, **Saturation**, and **Luminance)**   Affects the areas with tones between the darkest and lightest areas of your clip.
    - **Highlights (Hue**, **Saturation**, and **Luminance)**   Affects the lightest areas of your clip.
- **Luma Mapping**

Chapter 9, Setting Up Matrox Effects with Adobe Premiere Pro

- **Graphical** Allows you to see a graphical representation of your changes when you adjust the luma mapping settings. You can also modify the luminance of your clip directly within the graph. For more information, see "Using the luma mapping graph" on page 117.

- **Numerical** Lets you adjust your luma mapping settings numerically by entering values in the text boxes, or by dragging the corresponding sliders.

  - **Input Levels (Black** and **White)** These controls let you fine-tune your clip's brightness and contrast by changing the luminance value that represents black, white, or gray. Doing so expands or compresses the range of luminance levels in your clip, which increases or decreases your clip's tonal range.

    For example, by increasing the black value, you set black in your clip to a higher luminance value, which compresses the luminance range and darkens your clip proportionally.

  - **Output Levels (Black** and **White)** These controls let you map the values under **Input Levels** to any level of black and white. You can reduce contrast in your clip, or reverse the luminosity of your clip by setting black to a higher value than white.

  - **Gamma** Use this to adjust the midtones in your clip without adjusting black or white.

- **Mask** Allows you to apply a mask to your effect. For more information, see "Applying a mask to your Matrox effects" on page 102.

- **Selective Key** The selective key settings allow you to apply the color correction effect to a specific range of pixels in your clip. Performing a selective key is similar to performing a chroma or luma key, however, with a selective key you are applying color correction to the keyed area instead of transparency. For example, if you use the selective key properties to select red as your **Hue** color, the color correction will be applied to the red regions in your clip. You can enable each keyer (**Hue**, **Saturation**, and **Luma**) individually, or enable all three at the same time to get the desired results.

  - **Graphical** Allows you to see a graphical representation of your changes when you adjust the selective key **Numerical** settings. You can also modify the settings directly within the graph and perform an auto key. For more information, see "Using the selective key graph" on page 124.

  - **Numerical** Lets you adjust your key settings numerically by entering values in the text boxes, or by dragging the corresponding sliders.

    - **Hue Key** This type of key lets you select areas to be keyed (affected by the color correction) based on their hue.

      - **Enable** Select this to enable the **Hue Key** properties and hue key indicator in the selective key graph.

Creating a Matrox secondary color correction

- **Hue**   Use this to rotate the indicator around the perimeter of the color spectrum so that you can select different hues (colors) on which to key.
- **Aperture**   Use this to widen or narrow the aperture of the indicator to increase or decrease the range of colors on which you want to key.
- **Softness**   Sets the amount of softness applied to the range of colors specified in the aperture region.

- **Saturation Key**   This lets you select colors to be keyed (affected by the color correction) based on their saturation value. Pale colors have a low saturation value, while vivid colors have a high saturation value.
  - **Enable**   Select this to enable the **Saturation Key** properties and saturation key indicator in the selective key graph.
  - **Low Clip**   Use this to select the lower saturation values to be keyed.
  - **Low Gain**   Use this to set the range of saturation values you want to be partially affected based on the value set by the **Low Clip** control. As you increase the **Low Gain** setting, more pixels are partially affected by the color correction. If you decrease the **Low Gain** control, less pixels are partially affected.

    A **Low Gain** setting of 100 provides the widest range for maximum color correction. Alternately, a gain setting of 0 creates a key where saturation values are either completely affected or left untouched. You can think of the **Low Gain** control as defining an "Affected to Untouched" range for keying the pale colors in your image.

  - **High Gain**   This control is similar to the **Low Gain** setting, except you use it to set the range of higher saturation values you want to be partially affected based on the value set by the **High Clip** control. As you increase the **High Gain** setting, less pixels are partially affected by the color correction. If you decrease the **High Gain** setting, more pixels are partially affected. You can think of the **High Gain** control as defining an "Untouched to Affected" range for keying the vivid colors of your image.

  - **High Clip**   This control is similar to **Low Gain**, except you use it to select the higher saturation values to be keyed.

📝 **Note**   The values you can select using the **Low Clip** and **Low Gain** controls are dependent on the **High Clip** and **High Gain** controls, and vice versa. This prevents the low and high controls from keying on the same values.

- **Luma Key**   This type of key lets you select areas to be keyed (affected by the color correction) based on their luminance value.
  - **Enable**   Select this to enable the **Luma Key** properties and luma key indicator in the selective key graph.

- **Low Clip** Use this to select the lower (darker) luminance values to be keyed. A **Low Clip** setting of 0 represents black, and a setting of 255 represents white. Intermediate settings represent different shades of gray, from very dark to very light gray.

- **Low Gain** Use this to set the range of luminance values you want to be partially affected based on the value set by the **Low Clip** control. As you increase the **Low Gain** setting, more luminance values become partially affected by the color correction.

  A **Low Gain** setting of 100 provides the widest range for maximum color correction. Alternately, a gain setting of 0 creates a key where the luminance values are either completely affected or left untouched. You can think of the **Low Gain** control as defining an "Affected to Untouched" range for keying the dark areas of your image.

- **High Gain** This control is similar to **Low Gain**, except you use it to set the range of luminance values you want to be partially affected based on the value set by the **High Clip** control. You can think of the **High Gain** control as defining an "Untouched to Affected" range for keying the lighter areas of your image.

- **High Clip** This control is similar to **Low Clip**, except you use it to select the higher (brighter) luminance values to be keyed.

  Note The values you can select using the **Low Clip** and **Low Gain** controls are dependent on the **High Clip** and **High Gain** controls, and vice versa. This prevents the low and high controls from keying on the same luminance values.

- **Invert Key** Select this to invert the key selection, giving you the opposite result of what you originally selected.

- **Show Key as Output** Select this to display the matte used to define your selective key region. This enables you to further refine your key. Areas that are completely affected by the color correction are white, untouched areas are black, and gray areas are partially affected.

- **Expand Outside Mask** Applies the color correction settings outside the mask area. This setting is especially useful when setting up a color pass effect where you have several objects of the same color but want to retain the color for only one object. For more information, see "Creating a color pass effect" on page 128.

Using the selective key graph

The selective key graph allows you to modify your selective key settings (**Hue Key**, **Saturation Key**, and **Luma Key**) directly in the graph. You can also perform an auto key.

- **Map**   This is the default view when you first expand the graphical property. You can drag the handles to move the indicator to different regions in the graph to adjust the **Hue Key**, **Saturation Key**, and **Luma Key** settings.
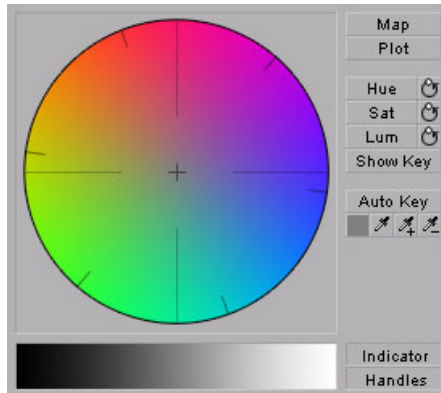

In order to see the indicator and handles, you have to enable the key setting you want to use. For example, if you want to adjust the **Hue Key** properties, you need to click the **Hue** button in the selective key graph or select the **Enable** option in the **Hue Key** numerical properties. In the following graph, the **Hue** properties have been enabled.
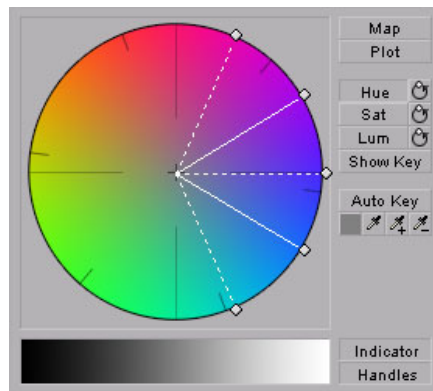

- **Plot**   Click this button to plot the colors and luminance values that are present in the current frame of your clip. You can drag the handles to move the indicator to different regions in the graph to adjust the **Hue Key**, **Saturation Key**, and **Luma Key** properties. The luma plot histogram shows

each luminance value present in your image as a vertical line. A longer line indicates a higher amount of pixels in your image of that line's luminance value.
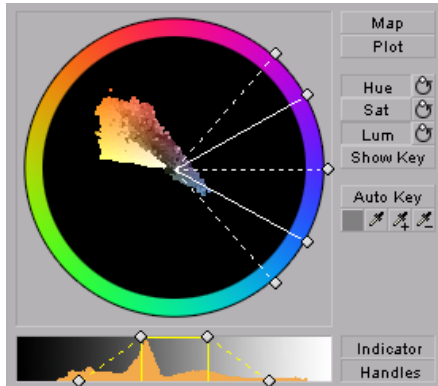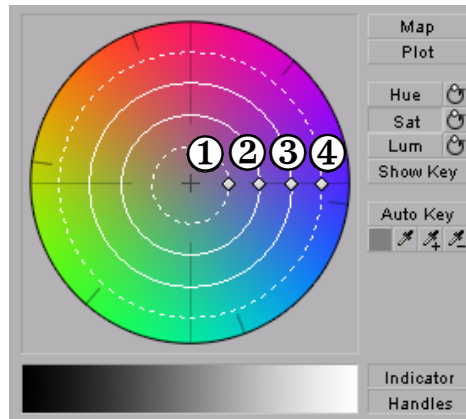

- **Hue**   Click this button to enable or disable the **Hue Key** properties (**Hue**, **Aperture** and **Softness**). When enabled you will be able to see the **Hue Key** indicator and handles to modify the **Hue Key** properties in the selective key graph.
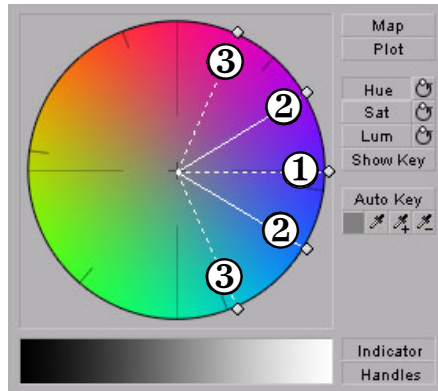
| ① Hue	② Aperture	③ Softness

- **Sat**   Click this button to enable or disable the **Saturation Key** properties (**Low Clip**, **Low Gain**, **High Gain**, and **High Clip**). When enabled you will

be able to see the **Sat Key** indicator and handles to modify the **Saturation Key** properties in the selective key graph.

①**Low Clip**　②**Low Gain**　③**High Gain**　④**High Clip**

- **Lum**　Click this button to enable or disable the **Luma Key** properties (**Low Clip**, **Low Gain**, **High Gain**, and **High Clip**). When enabled you will be able to see the **Lum Key** indicator and handles to modify the **Luma Key** properties in the selective key graph.
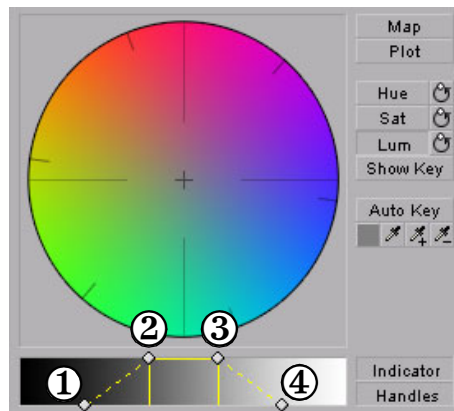
①**Low Clip**　②**Low Gain**　③**High Gain**　④**High Clip**

- For both the **Saturation Key** and **Luma Key** properties, you can lock and move all the handles at the same time in the selective key graph by pressing **SHIFT** and then dragging any handle. If you press **CTRL** you can lock and move either the **Low Clip** and **Low Gain** handles or **High Gain** and **High Clip** handles.

Note If you want to reset the hue, saturation, and luma key properties to the default settings at any time, click the appropriate Reset button.

**Saturation Key
Reset button**

Hue	
Sat	
Lum	

- **Show Key** Click this button to display the matte used to define your selective key region. This enables you to further refine your key. Areas that are completely affected by the color correction are white, untouched areas are black, and gray areas are partially affected.

- **Auto Key** Click this button to automatically key on the most common color at the current frame (except gray). Selecting **Auto Key** affects values for the **Hue Key**, **Saturation Key**, and the **Luma key** properties. Alternately, you can use the auto key eyedropper to select a color on which you want to key.

Auto Key

**Auto key
eyedropper**
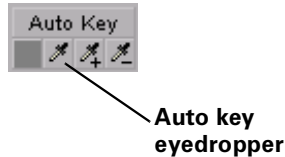
- The auto key eyedropper can be used in two ways:
  - Click the eyedropper button and click on a color on which you want to key.
  - Click the eyedropper button and click and drag anywhere on your clip to create a rectangular area containing the color on which you want to key. The selected color will be an average of the pixel information contained within the rectangle.

You can further refine your auto key color by using the plus and minus eye-droppers.

Auto Key

**Plus and minus
eyedroppers**
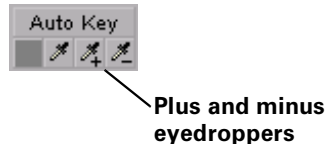
For example, if you selected light red as your auto key color and would like a dark red color in your clip to be included in the auto key, you can use the plus eyedropper to select that dark red in your clip. To remove colors from your auto key, use the minus eyedropper.

Note The Show Key mode and any color correction applied will be temporarily deactivated in the Program Monitor when using an eyedropper.

Creating a Matrox secondary color correction

This allows you to see the original colors of your clip before any modifications were made.

- **Indicator**   Click this button to turn the indicator lines on or off.
- **Handles**   Click this button to turn the handles for the indicator lines on or off.

Creating a color pass effect

You can use the Matrox secondary color correction to create a color pass effect to convert your clip to black and white, with the exception of one specified color. This can be useful if you want to isolate a single color to make it prominent.

In the following example, the pink color of the girl's shirt has been retained, while the rest of the clip has been converted to black and white:

Pink shirt is isolated, while the rest of clip is grayscale.

⇒ **To perform a color pass effect:**

1 Click the Auto Key eyedropper in the selective key graph and click and drag anywhere on your clip to create a rectangular area containing the color you want to isolate.

2 Under **Proc Amps**, set the **Saturation** to 0.

3 Select **Invert Key**.

If you have more than one object of the same color but you want to isolate only one of those objects, you can apply a mask and use the **Expand Outside Mask** option to isolate the area that contains the color you want to remain intact. For example, if you have a clip that has two roses that are the same red and you would like only one of them to remain red, you can do the following.

⇒ **To perform a color pass effect using the Expand Outside Mask option:**

1 Click the auto key eyedropper in the selective key graph and click and drag anywhere on your clip to create a rectangular area containing the color you want to isolate.

2 Under **Proc Amps** set the **Saturation** to 0.

3 Select **Invert Key**.

4 Apply a mask surrounding the colored object you want to remain intact (see the next section, "Applying a mask to your Matrox effects).

5 Select **Expand Outside Mask**.

Overview of the Matrox chroma key effects

You can apply a Matrox chroma key or chroma key shadow effect to make certain areas of a foreground image transparent based on a color in that image, so that an underlying image can show through.

In the following example of a chroma key effect, our foreground image is a video clip of a woman sitting in front of a green backdrop, and our underlying image is a video clip of a sand dune:

Foreground image

+
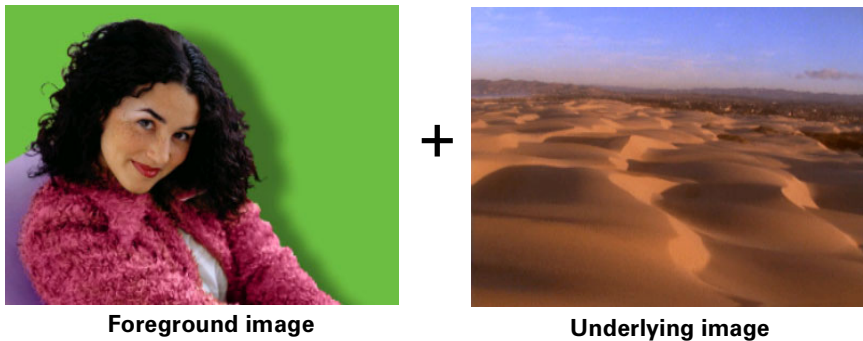
Underlying image

By chroma keying on the particular shade of green in the backdrop of the foreground image, the backdrop area becomes transparent and the corresponding area of the underlying image shows through in the composite image as follows:

=

Result of chroma key

ⓘ **Important**   The chroma key shadow effect includes controls for fine-tuning shadows in your effect. It is best to use the chroma key shadow effect when you are performing a chroma key without any additional effects. If you want to apply

additional effects to your chroma key, you will get more desirable results by using the chroma key effect without shadow controls. For example, if you want to apply an Adobe Motion effect to your chroma key, you should use the chroma key effect and not the chroma key shadow effect.

Creating a chroma key or chroma key shadow effect

To set up a Matrox chroma key or chroma key shadow effect, click the triangle next to **Matrox Chroma Key/Matrox Chroma Key Shadow** to expand the property list:
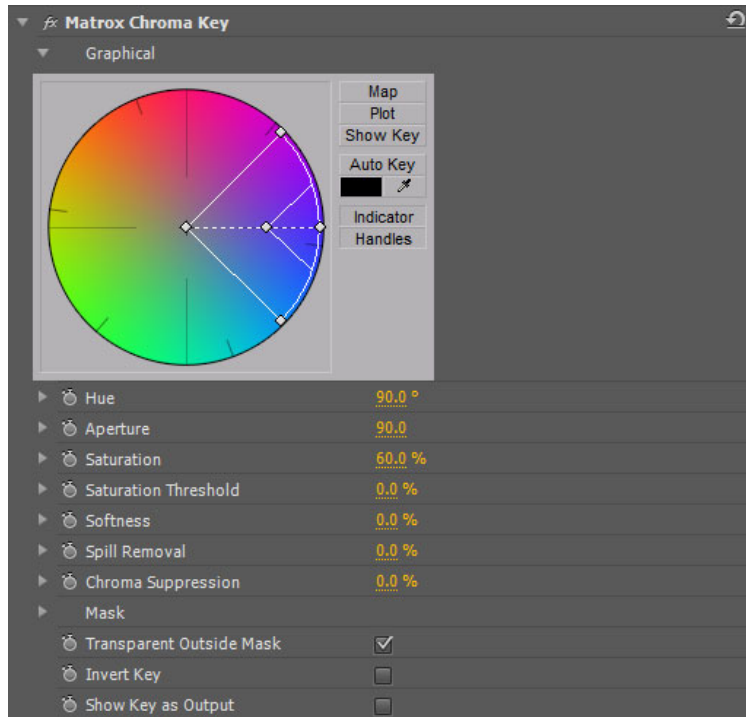
- **Graphical**   Provides a graphical representation of the chroma key controls that you can use to select your key colors, and also lets you perform an auto key.
  - **Map**   Lets you select your key colors within a circular graph that contains a color spectrum.
  - **Plot**   Displays a plot of the colors present in your clip so that you can select the particular colors on which you want to key.

- **Show Key**   Click this button to display the matte used to create your key effect. This enables you to further refine your key. For example, when you display the matte, your key color (such as green) appears as black, and opaque areas appear as white. If you notice some white spots that you want to key, you can adjust the key controls until the undesired white spots disappear.
- **Auto Key**   Click this button to automatically key on the most common color at the current frame in your clip (except gray).

For details on selecting key colors within the graph or performing an auto key, see "Using the chroma key graph to modify key colors and perform an auto key" on page 133.

✎ **Note**   You must expand the **Graphical** property in order to see the indicator when adjusting the chroma key controls.

- **Hue**   Use this to rotate the indicator around the perimeter of the color spectrum so that you can select different hues (colors) on which to key.
- **Aperture**   Use this to widen or narrow the aperture of the indicator to increase or decrease the range of colors on which you want to key.
- **Saturation**   Use this to select colors that have a particular saturation value. Pale colors have a low saturation value and are located at or near the center of the spectrum. Vivid colors have a high saturation value and are located at or near the perimeter of the spectrum. Because pale colors have low saturation, you'll find them more difficult to key on than the vivid colors.
- **Saturation Threshold**   Use this to proportionally increase or decrease the region outside of your saturation range. This controls how closely the **Saturation** value must match the key color before a region becomes transparent.

  For example, after applying a chroma key effect to a foreground image that includes dark areas or shadows that you want to preserve in your effect, you may find that these areas have become semi-transparent. By adjusting the **Saturation Threshold**, you can eliminate the key color from these dark areas, so that they'll become completely opaque.
- **Softness**   Use this to soften the edges of your key by blending parts of your foreground image with your underlying image. This makes certain areas of your foreground image partially transparent instead of completely transparent or opaque.
- **Spill Removal**   Use this to remove the contamination (spill) that your key color may leave on or around the edges of your foreground image. Spill is usually caused by light reflecting from your solid color backdrop (key color) onto your foreground image. **Spill Removal** replaces your key color from the "spill areas" with the opposite color in the spectrum, which returns a more natural look to these areas.

Creating a chroma key or chroma key shadow effect

- **Chroma Suppression**   Use this to remove any tint that your key color imposes on your foreground image. For example, if your solid color backdrop (key color) is green and you are using a person in your foreground image, the person's skin may have a green tint. You can adjust the **Chroma Suppression** to replace the green tint with the opposite color in the spectrum to return the person's skin to a more natural-looking color.

📝 **Note**   The following properties (**Luminance** and **Shadow Suppression**) are only available in the chroma key shadow effect.

- **Luminance**   Use this to adjust the luminance of your shadow. Negative values increase the brightness of the shadow, while positive values decrease the brightness.

- **Shadow Suppression**   Use this to make shadows in your clips less apparent. A higher value indicates less shadow.

- **Mask**   Allows you to apply a mask to your effect. For more information, see "Applying a mask to your Matrox effects" on page 102.

- **Transparent Outside Mask**   Select this option to apply transparency outside the mask area. This allows you to define a mask area where you want the keying to be performed, and show only your underlying image outside the mask. For more information, see "Applying a mask to your Matrox effects" on page 102.

- **Invert Key**   Select this to invert the key selection, giving you the opposite result of what you originally selected.

- **Show Key as Output**   Select this to display the matte used to create your key effect. This enables you to further refine your key. For example, when you display the matte, your key color (such as green) appears as black, and opaque areas appear as white. If you notice some white spots that you want to key, you can adjust the key controls until the undesired white spots disappear.

Using the chroma key graph to modify key colors and perform an auto key

To modify your key colors directly within the chroma key graph or perform an auto key, click the triangle next to the **Graphical** property to expand it:

- **Map** This is the default view when you first expand the **Graphical** property. You can drag the handles in the color spectrum to move the indicator to different regions in the cube to adjust the **Hue**, **Aperture**, **Saturation**, and **Saturation Threshold**.
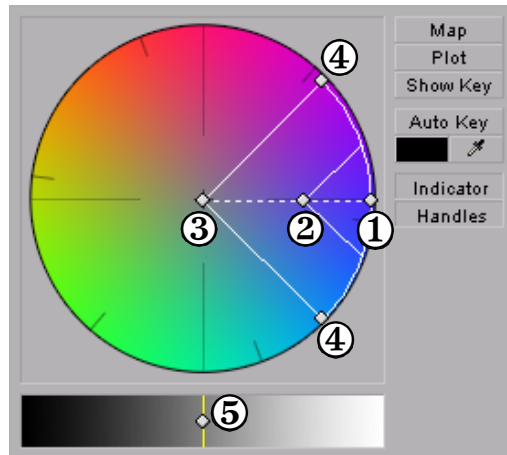
① **Hue**	② **Saturation**	③ **Saturation Threshold**	④ **Aperture**	⑤ Luminance

> **Note** This graph will contain a luminance spectrum only if you are creating a chroma key shadow effect. You can drag the handle in the luminance spectrum to adjust the **Luminance**.

- **Plot** Click this button to plot the colors and luminance values that are present in the current frame of your clip. You can drag the handles in the chroma plot graph to move the indicator to different regions in the graph to adjust the **Hue**, **Aperture**, **Saturation**, and **Saturation Threshold**. The luma plot histogram shows each luminance value present in your image as a

vertical line. A longer line indicates a higher amount of pixels in your image of that line's luminance value.
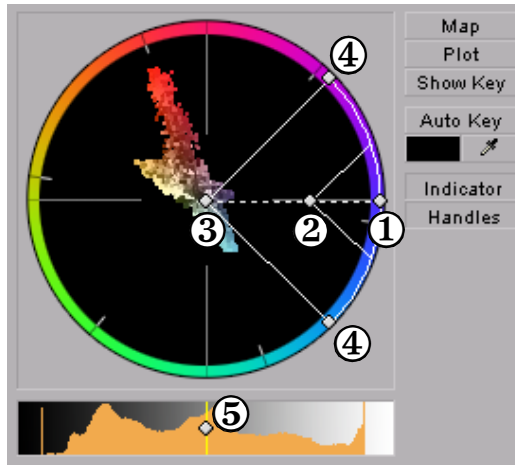
✎ **Note** The **Plot** graph will contain a luma plot histogram only if you are creating a chroma key shadow effect. You can drag the handle in the luma plot histogram to adjust the **Luminance**.

① Hue	② Saturation	③ Saturation Threshold	④ Aperture	⑤ Luminance

- **Show Key** Click this button to display the matte used to create your key effect. This enables you to further refine your key. For example, when you display the matte, your key color (such as green) appears as black, and opaque areas appear as white. If you notice some white spots that you want to key, you can adjust the key controls until the undesired white spots disappear.

- **Auto Key** Click this button to automatically key on the most common color at the current frame (except gray). Selecting **Auto Key** affects values for **Hue**, **Aperture**, **Saturation**, and **Saturation Threshold**. If your clip consists of a uniform key color that is evenly lighted, **Auto Key** will usually give you a good-quality chroma key. Alternately, you can use the eyedropper to select a color on which you want to key.

You can use the eyedropper in two ways:

- Click the eyedropper button and click on a color on which you want to key.

– Click the eyedropper button and click and drag anywhere on your clip to select a rectangular area containing colors on which you want to key.

Note The Show Key mode and any chroma key applied will be temporarily deactivated in the Program Monitor when using the auto key eyedropper. This allows you to see the original colors of your clip before any modifications were made.

- **Indicator** Click this button to turn the indicator on or off.
- **Handles** Click this button to turn the handles for the indicator on or off.

Overview of the Matrox luma key effect

You can apply a Matrox luma key to make certain areas of a foreground image transparent based on the luminance in that image, so that an underlying image can show through.

In the following example of a luma key effect, two video clips are combined to produce the effect of two cowboys riding through fire. Our foreground image is a video clip of a ring of fire against a black background, and our underlying image is a video clip of two men riding horses:

Foreground image   **Underlying image**

By luma keying on the particular luminance (brightness) of the black areas in the foreground clip, these areas become transparent and the corresponding areas of the underlying image show through in the composite image as follows:

Result of luma key

Creating a luma key effect

To set up a Matrox luma key effect, click the triangle next to **Matrox Luma Key** to expand the property list:
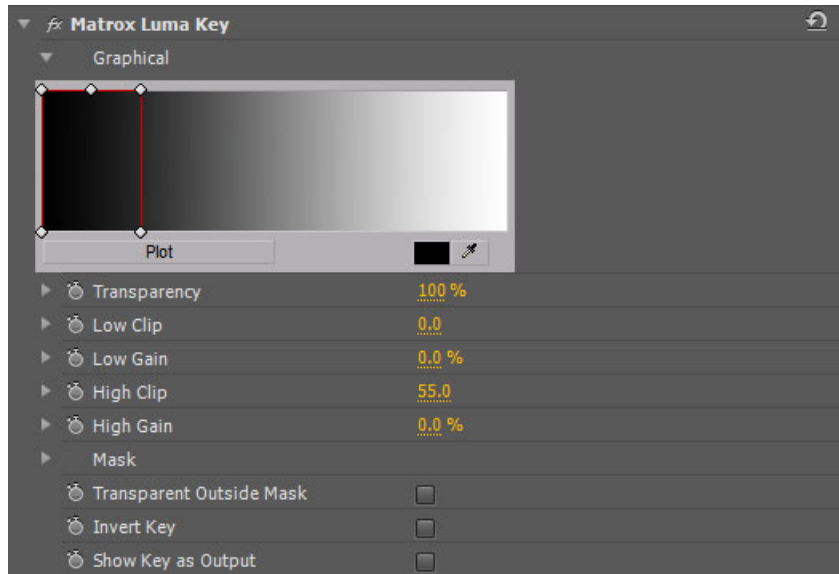
- **Graphical**   Allows you to see a graphical representation of your changes when you adjust the property settings. You can adjust the luma key properties directly in the graph to select the luminance values on which you want to key. For more information, see "Using the luma key graph" on page 138.

- **Transparency**   Use this control to set the transparency level of your key effect. Higher values indicate higher transparency. For example, a **Transparency** value of 100 makes the keyed area in your foreground image completely transparent, leaving the underlying image visible.

- **Low Clip**   Use this to select the lower (darker) luminance values to be keyed. A **Low Clip** setting of 0 represents black, and a setting of 255 represents white. Intermediate settings represent different shades of gray, from very dark to very light gray.

- **Low Gain**   Use this to set the range of luminance values you want to be partially transparent based on the value set by the **Low Clip** control. As you increase the **Low Gain** setting, more luminance values become partially transparent to give you a softer-edged key.

  A **Low Gain** setting of 100 provides the widest range for maximum softness. Alternately, a gain setting of 0 creates a hard key where the luminance values are either completely transparent or opaque. You can think

of the **Low Gain** control as defining a "Transparent to Opaque" range for keying the dark areas of your foreground image.

- **High Clip**   This control is similar to **Low Clip**, except you use it to select the higher (brighter) luminance values to be keyed.

- **High Gain**   This control is similar to **Low Gain**, except you use it to set the range of luminance values you want to be partially transparent based on the value set by the **High Clip** control. You can think of the **High Gain** control as defining an "Opaque to Transparent" range for keying the lighter areas of your foreground image.

  The values you can select using the **Low Clip** and **Low Gain** controls are dependent on the **High Clip** and **High Gain** controls, and vice versa. This prevents the low and high controls from keying on the same luminance values.

- **Mask**   Allows you to apply a mask to your effect. For more information, see "Applying a mask to your Matrox effects" on page 102.

- **Transparent Outside Mask**   Select this option to apply transparency outside the mask area. This allows you to define a mask area where you want the keying to be performed, and show only your underlying image outside the mask. For more information, see "Applying a mask to your Matrox effects" on page 102.

- **Invert Key**   Select this to invert the key selection, giving you the opposite result of what you originally selected

- **Show Key as Output**   Select this to display the matte used to create your key effect. This enables you to further refine your key settings. For example, when you display the matte, areas of your clip that are completely transparent appear as black, and opaque areas appear as white. If you notice some white spots that you want to key, you can adjust the key controls until the undesired white spots disappear.

Using the luma key graph

The luma key graph contains a luminance spectrum and a luminance eyedropper. You can drag the handles in the luminance spectrum to adjust the **Transparency**, **Low Clip**, **High Clip**, **Low Gain**, and **High Gain** properties.


Eyedropper

Plot

You can select luminance values on which to key by adjusting the **Low Clip** and **High Clip** handles, or you can use the luminance eyedropper to automatically pick the luminance value you want to key on. The eyedropper can be used in two ways:

- Click the eyedropper button and click on the color with the desired luminance value in your clip.

- Click the eyedropper button and click and drag anywhere on your clip to create a rectangular area containing the luminance values you want to select. The selected luminance will be an average of the luminance values contained within the rectangle.

Note Any luma key displayed in the Program Monitor will be temporarily deactivated when using the luminance eyedropper. This allows you to see the colors of your clip before any modifications were made.

You can also adjust the softness of your key with the **Low Gain**, **High Gain**, and **Transparency** handles. All these adjustments affect the shape and size of the luminance selector as follows:
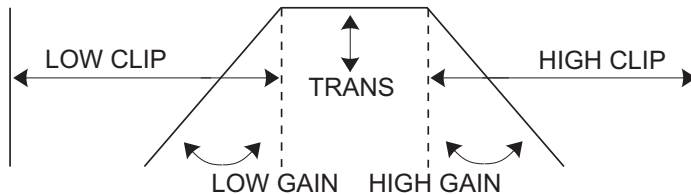
- **Plot** Click this button to see the luminance spectrum with a plot that shows each luminance value present in your image as a vertical line in the histogram. A longer line indicates a higher amount of pixels in your image of that line's luminance value. You can drag the handles in the luma plot spectrum to adjust the **Transparency**, **Low Clip**, **High Clip**, **Low Gain**, and **High Gain** properties. Any adjustments made affect the shape and size of the luminance selector in the **Luma Plot**.
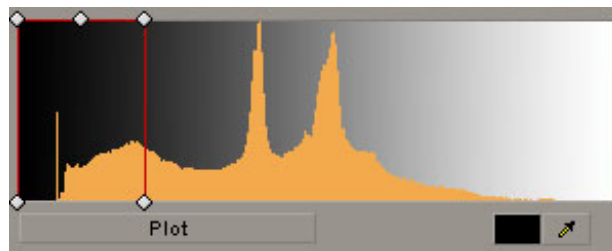
Creating a wipe transition

The Matrox wipe transitions support standard dissolves, SMPTE wipes, and organic wipes with soft edges and color borders.

⟹ **To set up a Matrox wipe transition:**

Click the transition's icon in your sequence, then click the **Custom** button in the **Effect Controls** panel. This opens the **Customize Matrox Wipes** dialog box:
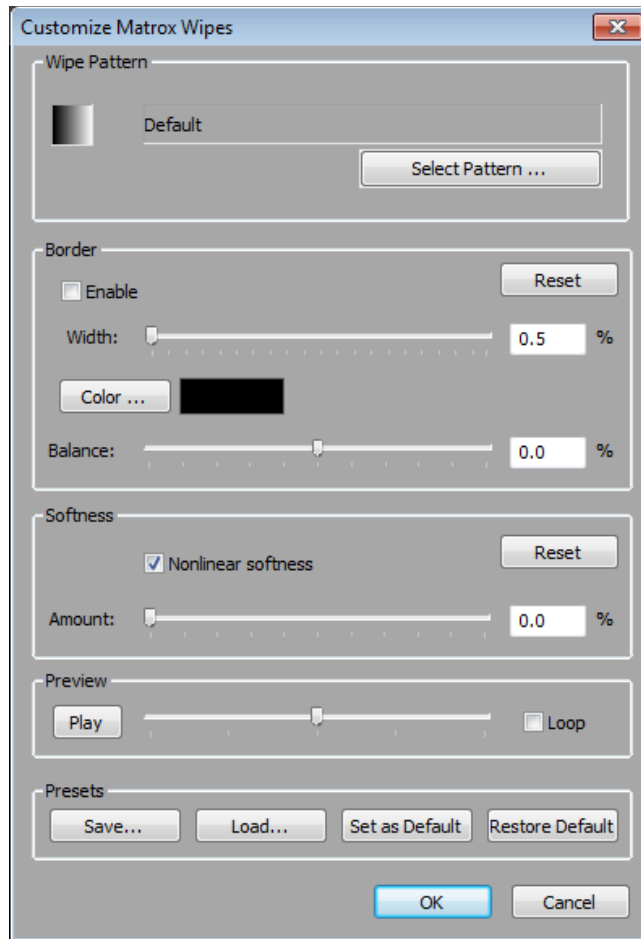
1 Under **Wipe Pattern**, click the **Select Pattern** button and choose a pattern for your wipe.

2 If you would like to add a border to your wipe, select **Enable** under **Border**.

  – **Width** Lets you adjust the width of your border by dragging the slider or entering a percentage in the text box.

- **Color** Click this button to select a color for your border.
- **Balance** Lets you adjust the prominence of the border between image A and image B. For example, positive values make the border more prominent in image B, while negative values make the border more prominent in image A.
- **Reset** Click this button to restore the default **Border** values.

3 Use the controls under **Softness** to create a soft edge on the border of your wipe.

- **Nonlinear softness** This option is selected by default. You may find it useful to clear this option when using certain wipe patterns. For example, nonlinear softness often provides better results when creating SMPTE wipes, while linear softness is usually preferable when creating organic wipes.
- **Amount** Lets you adjust the amount of softness by dragging the slider or entering a percentage in the text box. The higher the value, the less sharp the edge of your border or wipe will become.
- **Reset** Click this button at any time to restore the default **Softness** values.

4 Use the controls under **Preview** to preview your wipe transition on your video monitor (the preview will not appear in the Program monitor):

- Drag the slider beside the **Play** button to scrub through your transition.
- Click the **Play** button or press the **SPACEBAR** to play back your transition. Select **Loop** if you'd like the wipe to play back continuously until you click **Stop**.

You can adjust the wipe settings as your transition is playing to immediately see the result of your changes.

5 Use the controls under **Presets** to save and load your wipe transition settings. You can also create default settings for your wipe transitions.

- **Save** Allows you to save your organic wipe settings to a file for future use. When you click the **Save** button, the **Save As** dialog box opens and allows you to name your effect and save it as a Matrox wipe transition (*.mwt*) file.
- **Load** Click this button to load a previously created *.mwt* file.
- **Set as Default** Sets your current wipe settings as the default settings for Matrox wipe transitions.
- **Restore Default** Click this button to restore the default settings you specified using the **Set as Default** button.

For more information about setting up transitions, see your Adobe Premiere Pro documentation.

Using the Matrox chroma clamper effect

You can use the Matrox chroma clamper effect to ensure that when you've applied effects that perform color space conversion on part of a clip, the clip's colors remain constant throughout. Some Adobe Premiere Pro native effects perform color space conversions (YUV to RGB) that will clip RGB values to the acceptable range of 0-255 per color component. The clipping, however, is usually only required on clips that have very bright or highly saturated colors.

For example, if you split a clip that contains very bright or highly saturated colors and apply an Adobe basic 3D effect to one portion of the clip, you may notice minor color differences between the two halves on your video monitor. Applying the Matrox chroma clamper effect to the portion of the clip that does not have the Adobe effect ensures that colors remain constant throughout the clip.

10

Using Matrox MXO2 with Avid Editing Applications

This chapter explains how to define various settings for using Matrox MXO2 with Avid editing applications. This includes your playback and capture settings.

Creating a new project on Matrox MXO2

You can create a new project for editing on Matrox MXO2 as explained in your Avid documentation, with the following exceptions:

- Avid supports only standard raster dimensions for projects created on Matrox MXO2 hardware. This means that when you create an HD project on MXO2, the raster dimension will be set to 1280×720 for a 720p project, or 1920×1080 for a 1080i/p project. You can, however, still import, export, and play back thin raster material in your HD project.

- Matrox MXO2 supports YCbCr video only. If you set your project's color space to RGB, your Avid editing application will convert your material to YCbCr for output on Matrox MXO2. To capture video using your Matrox MXO2 hardware, your project's color space must be set to YCbCr.

Defining your playback settings

The **Matrox Playback Settings** dialog box provides settings that you can use to configure your video and audio outputs on Matrox MXO2 for playing back material in Avid editing applications. You can open the **Matrox Playback Settings** dialog box using any of the following methods:

- Choose **Tools > Hardware Setup**.
- Click the **Settings** tab in the **Project** window, and then double-click **Video Output** (this is the method explained in the step-by-step instructions).
- Click the **Hardware** tab in the **Audio Project Settings** dialog box, and then click the Hardware Setup button (⚙).

Note The Monitor Volume button (🔊) in the **Timeline** window can be used as a shortcut to open the **Matrox Playback Settings** dialog box, and therefore does not work as described in your Avid documentation. For details on how to adjust various audio output settings on MXO2, see "Specifying your audio output settings" on page 154.

Specifying your video output settings

This section explains how to specify your video output settings for Matrox MXO2, MXO2 Rack, and MXO2 LE. For MXO2 Mini, see "Specifying your video output settings (MXO2 Mini)" on page 148.

You can specify various settings to configure the main and secondary outputs from your MXO2 system. Some of the settings are predetermined for you based on your project's video format. For a list of the supported video output formats, see "Playback using Avid editing applications" on page 305.

⇒ **To specify your video output settings:**

1 Click the **Settings** tab in the **Project** window, and then double-click **Video Output**.

2 In the **Matrox Playback Settings** dialog box, click the **Video Output** tab.

3 Under **Main Output** and **Secondary Output**, you can specify the settings you want for your main and secondary outputs from MXO2. Depending on your project's video format, you may not be able to change some of the settings.

– **Format** Use this to select the video format you want for your outputs. Be aware that the format you select may not be supported on all the MXO2 outputs. For a list of the supported video output formats, see "Playback using Avid editing applications" on page 305.

– **Pulldown Method** Depending on your project's frame rate and the current video output format, the pulldown method may be automatically set to **Standard 2:3**.

– **Aspect Ratio Conversion** Use this to specify how you want your video to be output when upscaling or downscaling:

Defining your playback settings

- **16x9 Letterbox**   Outputs the widescreen 16:9 picture in letterbox mode by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

- **4x3 Pillarbox**   Outputs the standard 4:3 picture in pillarbox mode by adding black bars to the left and right sides of the picture for display on a widescreen 16:9 television screen.

- **Anamorphic**   Outputs the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

- **Center Cut**   Outputs the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

- **Center Zoom**   Outputs the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

Note   When aspect ratio conversion is applied to both the main and secondary outputs, the same setting will be applied to both outputs.

4 Under **Analog Output**, you can specify your analog output format, NTSC setup level, and output type.

- **Format**   Use this to specify whether you want the format for the analog outputs to be the same as the main or secondary output.

- **Output Type**   Specifies the analog video output type. If you're outputting SD analog video, the output type will be set to **All Available** to indicate that the output will be available on all the analog outputs. If you're outputting HD analog video, the output type will be set to **Component**.

- **Setup (NTSC)**   Use this to select the setup level you want for your NTSC analog video. This affects both the NTSC analog video input and output.

  - **0 IRE**   Applies a setup level of 0 IRE. You should select this option only when working with a commercial DV device that uses the Japanese analog NTSC setup of 0 IRE. For example, if the video appears too bright when you play back DV clips on your NTSC monitor, you can change the setup to 0 IRE to output your DV clips at the correct brightness.

  - **7.5 IRE**   Applies the standard NTSC setup level of 7.5 IRE.

- **YUV/RGB**   Select **YUV** or **RGB - native** to set the type of video signal that is sent from the component output. For example, select **RGB - native**

if you connected the component output to a device that accepts an RGB signal.

5 Under **HDMI Output**, you can specify your HDMI output format and type.

– **Format**   Use this to specify whether you want the format for your HDMI output to be the same as the main or secondary output.

– **YUV/RGB**   Select the type of video signal that you want to be sent from the HDMI output:

- **YUV**   Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.

- **RGB - calibrated**   Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading calibration settings using the Matrox HDMI Calibration Utility, see Chapter 7, "Calibrating Your HDMI Monitor for Video."

- **RGB - native**   Outputs native RGB HDMI video that does not apply any calibration compensation. This is useful when you want to output RGB HDMI video to a device other than an HDMI monitor or television, such as an HDMI recorder to perform an export to tape.

– **3D Viewing Mode**   Select the 3D signal type that you want to be sent from the HDMI output to your 3D monitor (this feature may not be supported on some 3D monitors):

- **Disabled**   Select this if you're not outputting 3D video, or to disable 3D video output. You can still monitor 3D video, but you must select the correct viewing mode on your 3D monitor manually.

- **Side-by-side**   Outputs horizontally compressed side-by-side 3D video (also referred to as side-by-side horizontal).

- **Over/Under**   Outputs over/under 3D video (also referred to as top bottom).

ⓘ **Important**   If your project's **Stereoscopic** setting is anything other than **Side by side**, **Over/Under**, or **Full**, make sure that you set the **3D Viewing Mode** to **Disabled**. For example, if your project's **Stereoscopic** setting is **Off** or **Leading Eye**, you must disable the 3D video output in order to properly view the HDMI output.

6 Under **SDI Output**, specify whether you want the format for your SDI output to be the same as the main or secondary output.

7 Under **Advanced**, you can specify advanced video output settings.

– **Analog SC/H Phase**   Use this slider to advance or delay your analog video output's subcarrier phase with respect to the horizontal sync of the genlock source (for composite video only).

– **Allow Super White/Allow Super Black**   Select **Allow Super White** to allow the highest luminance level of your video output to exceed the standard maximum white level. Select **Allow Super Black** to allow the lowest luminance level of your video output to fall below the standard black level. These options apply to all video outputs.

📝 **Note**   Super white and super black should not be allowed when producing your final video production for broadcast.

8 Click **OK** to save your settings.

Specifying your video output settings (MXO2 Mini)

You can specify various settings to configure your main analog output and secondary HDMI output from the MXO2 Mini. Some of the settings are predetermined for you based on your project's video format. For a list of the supported video output formats, see "Playback using Avid editing applications" on page 305.

⇨ **To specify your video output settings:**

1 Click the **Settings** tab in the **Project** window, and then double-click **Video Output**.

2 In the **Matrox Playback Settings** dialog box, click the **Video Output** tab.
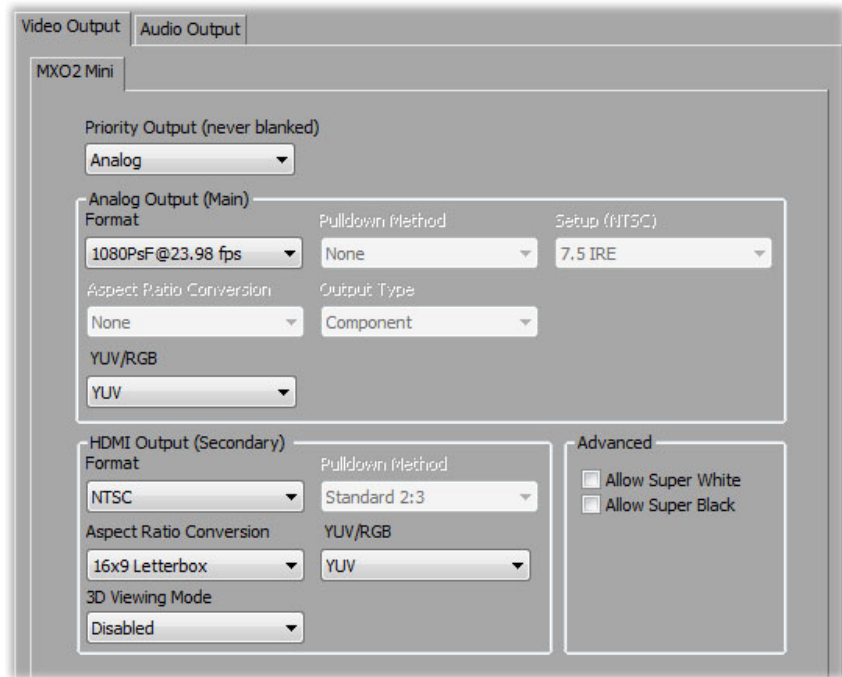
3 Under **Priority Output (never blanked)**, select either **Analog** or **HDMI** to indicate whether you want the analog or HDMI output to have priority (never be blanked) when MXO2 Mini needs to blank either the main or secondary output to perform additional scaling on the video output. Additional scaling is needed when your main and secondary output formats don't match and the video quality for playback is set to anything other than Full Quality. For example, if you select **Analog** as your priority output, then the secondary HDMI output will be blanked whenever MXO2 Mini needs to perform additional scaling on the video output.

4 Under **Analog Output (Main)**, you can specify the settings you want for your main analog output from MXO2 Mini. Under **HDMI Output (Secondary)** you can specify the settings you want for your secondary HDMI output. Depending on your project's video format, you may not be able to change some of the settings.

Defining your playback settings

- **Format**   Use this to select the video format you want for your outputs. For a list of the supported video output formats, see "Playback using Avid editing applications" on page 305.

- **Pulldown Method**   Depending on your project's frame rate and the current video output format, the pulldown method may be automatically set to **Standard 2:3**.

- **Setup (NTSC)**   Use this to select the setup level you want for your NTSC analog video. This affects both the NTSC analog video input and output.

  - **0 IRE**   Applies a setup level of 0 IRE. You should select this option only when working with a commercial DV device that uses the Japanese analog NTSC setup of 0 IRE. For example, if the video appears too bright when you play back DV clips on your NTSC monitor, you can change the setup to 0 IRE to output your DV clips at the correct brightness.

  - **7.5 IRE**   Applies the standard NTSC setup level of 7.5 IRE.

- **Aspect Ratio Conversion**   Use this to specify how you want your video to be output when upscaling or downscaling:

  - **16x9 Letterbox**   Outputs the widescreen 16:9 picture in letterbox mode by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

  - **4x3 Pillarbox**   Outputs the standard 4:3 picture in pillarbox mode by adding black bars to the left and right sides of the picture for display on a widescreen 16:9 television screen.

  - **Anamorphic**   Outputs the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

  - **Center Cut**   Outputs the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

  - **Center Zoom**   Outputs the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

- **Output Type** (for analog output)   For your main analog output, you can select **Component**, or **Composite & S-Video** if you're outputting SD analog video. If you're outputting HD analog video, the output type will be set to **Component** (and the composite and S-Video outputs will be invalid).

- **YUV/RGB** (for analog output)   Select **YUV** or **RGB - native** to set the type of video signal that is sent from the component output. For example, select **RGB - native** if you connected the component output to a device that accepts an RGB signal.

- **YUV/RGB** (for HDMI output)   Select the type of video signal that you want to be sent from the HDMI output:

  - **YUV**   Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.

  - **RGB - calibrated**   Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading calibration settings using the Matrox HDMI Calibration Utility, see Chapter 7, "Calibrating Your HDMI Monitor for Video."

  - **RGB - native**   Outputs native RGB HDMI video that does not apply any calibration compensation. This is useful when you want to output RGB HDMI video to a device other than an HDMI monitor or television, such as an HDMI recorder to perform an export to tape.

- **3D Viewing Mode**   Select the 3D signal type that you want to be sent from the HDMI output to your 3D monitor (this feature may not be supported on some 3D monitors):

  - **Disabled**   Select this if you're not outputting 3D video, or to disable 3D video output. You can still monitor 3D video, but you must select the correct viewing mode on your 3D monitor manually.

  - **Side-by-side**   Outputs horizontally compressed side-by-side 3D video (also referred to as side-by-side horizontal).

  - **Over/Under**   Outputs over/under 3D video (also referred to as top bottom).

(i) **Important**   If your project's **Stereoscopic** setting is anything other than **Side by side**, **Over/Under**, or **Full**, make sure that you set the **3D Viewing Mode** to **Disabled**. For example, if your project's **Stereoscopic** setting is **Off** or **Leading Eye**, you must disable the 3D video output in order to properly view the HDMI output.

5 Under **Advanced**, select **Allow Super White** to allow the highest luminance level of your video output to exceed the standard maximum white level. Select **Allow Super Black** to allow the lowest luminance level of your video output to fall below the standard black level. These options apply to both the main analog output and secondary HDMI output.

✎ **Note**   Super white and super black should not be allowed when producing your final video production for broadcast.

6 Click **OK** to save your settings.

Defining your playback settings

Specifying your genlock settings

✎ **Note** This section does not apply to Matrox MXO2 Mini.

You can select the source to which you want to genlock all devices connected to your MXO2 system, as well as adjust the timing settings for all video outputs from MXO2. For examples of how to connect an external sync source to your system, see "Typical Matrox MXO2 connections" on page 19, "Typical Matrox MXO2 Rack connections" on page 28, and "Typical Matrox MXO2 LE connections" on page 37.

✎ **Note** These genlock settings are used during playback only. During capture, MXO2 genlocks to your selected video input source.

⇨ **To specify your genlock settings:**

1 Click the **Settings** tab in the **Project** window, and then double-click **Video Output**.

2 In the **Matrox Playback Settings** dialog box, click the **Genlock** tab.

3 Under **Genlock Source**, select one of the following:

– **Internal** Genlock to MXO2's internal reference signal. Select this option only if you don't have an external sync generator or other reliable external video sync source.

– **Black Burst Broadcast Quality** Genlock to an external analog sync source connected to the reference (REF) input on MXO2. This must be a stable sync source, such as an external sync generator (bi-level black burst for SD or tri-level sync for HD), or a source VTR that has a built-in TBC.

- **SDI**, **Composite**, **Component**, **S-Video**, and **HDMI Input**   Genlock to your SDI, composite, component, S-Video, or HDMI video source connected to the video input on MXO2.

Remarks

- The status of your genlock source will be displayed, such as **Locked** or **Not Locked**, to indicate whether or not MXO2 is presently locked to your selected genlock source. When you change the genlock source, distorted video and silent audio will be output until MXO2 locks to the new genlock source.

- If MXO2 is unable to lock to your genlock source, it will automatically lock to the internal reference. However, if MXO2 is unable to do this, you'll need to manually set the genlock to **Internal** or select a different genlock source.

4 Under **Genlock Video Format**, select your external genlock source's video format. When the genlock source is set to **Internal**, the genlock video format is set to your main video output format.

(i) **Important**   To ensure good output results, make sure that your genlock source's video format is compatible with the MXO2 video output format.

5 Under **Advanced Settings**, drag the **Horizontal Delay** and **Vertical Delay** sliders to adjust the horizontal and vertical timing of your video outputs with respect to your genlock source. This lets you compensate for cable delays within your system.

6 Click **OK** to save your settings.

Defining your playback settings

Specifying your audio output settings

The simultaneous audio outputs on your Matrox MXO2 hardware allow you to send your audio to a variety of devices at the same time. Your Avid editing application and Matrox provide various settings to configure your audio output on MXO2.

To specify your audio output settings:

1 Click the **Settings** tab in the **Project** window, and then double-click **Audio Project**.

2 In the **Audio Project Settings** dialog box, click the **Output** tab and specify your desired audio output settings as explained in your Avid documentation. To map tracks directly to audio output channels on your Matrox hardware, click the Mix Mode Selection button to select **Direct** or **Direct, surround tracks in SMPTE order**, depending on the version of your Avid editing application. You can then select an output channel on MXO2 for each audio track in your sequence.

Remarks

– For surround sound HDMI audio output, Matrox MXO2 supports the 5.1 and 7.1 SMPTE settings only (and the Direct SMPTE setting, if available).

– Matrox MXO2 supports the **Audio** tool so that you can monitor the global output level of your sequence. If needed, you can use the **Output Gain** (master attenuator) slider to adjust the overall output volume for all tracks.

3 Click the **Hardware** tab in the **Audio Project Settings** dialog box, and then click the Hardware Setup button (⚙).

4 Under **Analog Audio Volume**, drag the sliders to adjust the volume of your analog audio output. By default, the sliders are locked so that they move together. To move each slider independently, click the lock button (🔒) to disable it.

5 Under **SDI Audio Output Format**, select the bit depth you want for your embedded SDI audio output (**20-bit** or **24-bit**). This setting is not available on MXO2 Mini.

6 Under **HDMI Audio Output**, select **Output only two audio channels** if you want to output two audio channels from the MXO2 HDMI output, instead of eight channels. This option is especially useful for HDMI monitors that don't accept more than two audio channels.

7 Select **Use system sound card** if you want to use your system's sound card to output audio played back from your sequence. Make sure this option is cleared if you want audio to be output from your MXO2 system (this ensures accurate A/V sync during playback).

8 Click **OK** to save your settings.

Defining your playback settings

Defining your capture settings

The **Matrox Capture Settings** dialog box provides settings that allow you to capture material from any of your MXO2 system's video and audio inputs. The settings available are based on your project's video format and your input source (video is always captured to your project's video format). For information about the supported capture formats, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats." For a list of the supported video output formats for monitoring the video that you're capturing, see "Supported video output formats for monitoring" on page 311.

To capture video and audio on Matrox MXO2, make sure that your video input and audio input sources in the **Capture** tool are set to **Matrox**. For details on how to capture material using your Avid editing application, see your Avid documentation.

If you want to capture material using RS-422 device control, you can connect the RS-422 connector on Matrox MXO2, MXO2 Rack, or MXO2 LE to the RS-422 serial device control port on your source device (see "MXO2 RS-422 serial connection" on page 18, "MXO2 Rack RS-422 serial connection" on page 27, or "MXO2 LE RS-422 serial connection" on page 36). On Matrox MXO2 Mini, you must use a suitable adapter to connect the serial device control port on your source device or recorder to your computer. For a list of supported device control adapters, see the Matrox MXO2 Support section of our website at www.matrox.com/video/support.When configuring your deck for RS-422 device control, the RS-422 connector on your MXO2 hardware is usually identified as the COM3 port.

⟹ **To specify your capture settings:**

    1 Do one of the following:

       – Click the **Settings** tab in the **Project** window, and then double-click **Video Input**.

– In the **Capture** tool, click the Hardware Setup button (⚙).

Matrox Capture Settings

☐ Audio Punch-in mode   Configure...

Input Type
Broadcast-quality Source ▼

Video Input Source
Composite ▼   OK

Video Input Format   Input Aspect Ratio
NTSC ▼   4:3 ▼

Aspect Ratio Conversion   Video Output Format
4x3 Pillarbox ▼   1080PsF@29.97 fps ▼

Audio Input Source
AES/EBU (unbalanced digital stereo) ▼

☐ Use Automatic Gain Control (AGC)

OK   Cancel
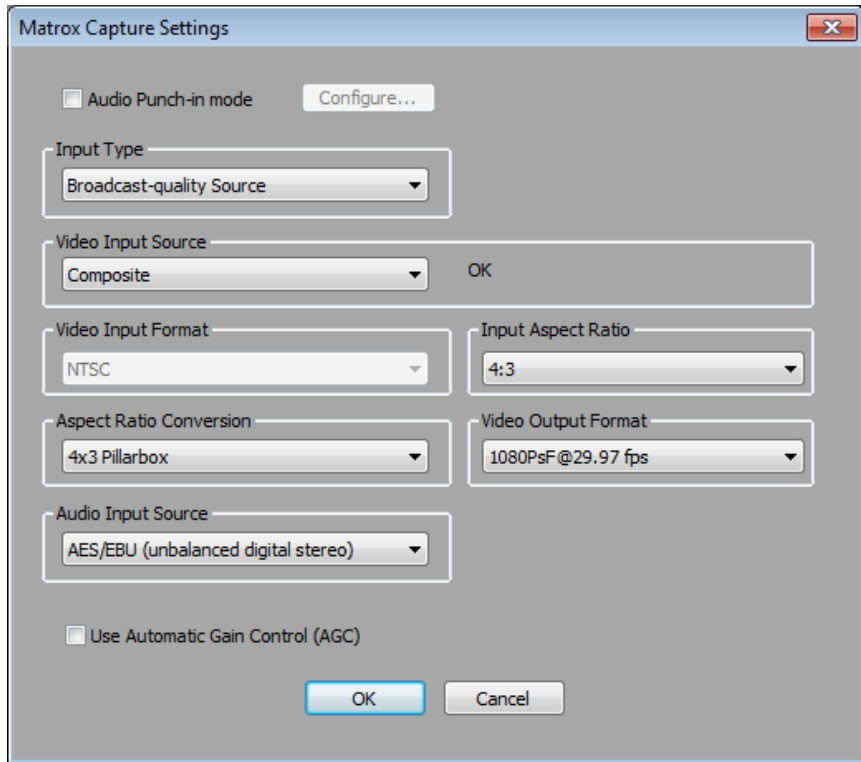
ⓘ **Important** In order to perform a capture, make sure that **Audio Punch-in mode** is **not** selected. This mode is used only for recording a voice-over as explained in "Adding a voice-over to your sequence" on page 160.

2 Under **Input Type**, select the type of equipment you're using for capture:

– **Broadcast-quality Source** Select this if your source device is broadcast-quality. This setting provides the best capture results for most devices.

– **Consumer-quality Source** Select this if you're having problems capturing video because your source device doesn't meet broadcast-quality standards. For example, the capture may be interrupted when you try to capture from certain composite and S-Video devices, especially from low-quality VCRs. If this happens, selecting **Consumer-quality Source** will allow the video to be captured, but you may experience dropped frames during the capture.

✎ **Note** For any change to the input type to take effect, you must restart your Avid editing application and open your project again.

Defining your capture settings

3   Under **Video Input Source**, select the type of video you want to capture. For example, to capture material from your composite source, select **Composite**. The available video input sources depend on your project's video format.

4   Under **Video Input Format**, select the video format that matches your source video. If required, your source video will be scaled during capture to match your project's video format. The formats available depend on your selected input source. For information about the supported capture formats, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

5   Under **Input Aspect Ratio**, select the aspect ratio of your SD source video (available only when capturing SD video in an HD project). For example, to capture SD video that was recorded using the standard TV screen format, select **4:3**. To capture SD video that was recorded using the widescreen 16:9 format, select **16:9**.

6   Under **Aspect Ratio Conversion**, specify the type of aspect ratio conversion that you want to be applied to your captured video (used when upscaling or downscaling video during capture):

   – **16x9 Letterbox**   Captures the widescreen 16:9 picture as letterbox video by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

   – **4x3 Pillarbox**   Captures the standard 4:3 picture as pillarbox video by adding black bars at the left and right sides of the picture for display on a widescreen 16:9 television screen.

   – **Center Cut**   Captures the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

   – **Center Zoom**   Captures the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

   – **None**   No aspect ratio conversion is applied. If your project and source video have different aspect ratios, the video will be captured as horizontally or vertically compressed (anamorphic) video.

7   If you're working in a 1080p project, under **Video Output Format**, select the format (p or PsF) that you want for previewing your captured video. For example, if you're capturing to 1080p @ 25 fps, you can choose to output 1080p or 1080PsF @ 25 fps video for preview.

8   Under **Audio Input Source**, select your audio source. For example, if you want to capture the embedded audio of your HDMI source, select **HDMI (embedded audio)**. Your audio input source may be set for you based on your selected video input source.

📝 **Note** When capturing HDMI embedded audio, only uncompressed embedded audio is supported.

9 Select **Use Automatic Gain Control (AGC)** if you want the gain of your composite or S-Video input signal to be adjusted automatically to compensate for very bright or dark images. This improves the brightness or contrast of your picture.

10 Click **OK** to save your settings.

Remarks

- To capture video on Matrox MXO2, your project's color space must be set to YCbCr.
- Matrox MXO2 supports the **Audio** tool so that you can monitor and adjust your audio input levels for capture.
- Capture on Matrox MXO2 is not supported for a 24p NTSC, 24pPAL, or 720p/29.97 project.
- When Matrox MXO2 is outputting video for previewing your captured video, attempting to open the **Matrox Playback Settings** dialog box will stop the video preview and the **Capture** tool will lose the focus. However, the **Matrox Playback Settings** dialog box will not open unless you attempt to open it a second time.

Adding a voice-over to your sequence

Matrox MXO2 supports the **Audio Punch-In** tool, which allows you to record audio directly into the **Timeline** to add voice-over narration, such as to add commentary to newsreels and documentaries.

Note The **Audio Punch-In** tool supports recording to mono tracks only.

Connection and setup

1 Connect the microphone to the audio input on your source device and connect the audio output (analog or AES/EBU) from the source device to the corresponding audio input on your MXO2 hardware.

2 Click the **Settings** tab in the **Project** window, and then double-click **Video Input**.

Matrox Capture Settings

☑ Audio Punch-in mode   Configure...

Input Type
Broadcast-quality Source

Video Input Source
Composite   OK

Video Input Format   Input Aspect Ratio
NTSC   4:3

Aspect Ratio Conversion   Video Output Format
4x3 Pillarbox   1080PsF@29.97 fps

Audio Input Source
AES/EBU (unbalanced digital stereo)

☐ Use Automatic Gain Control (AGC)

OK   Cancel
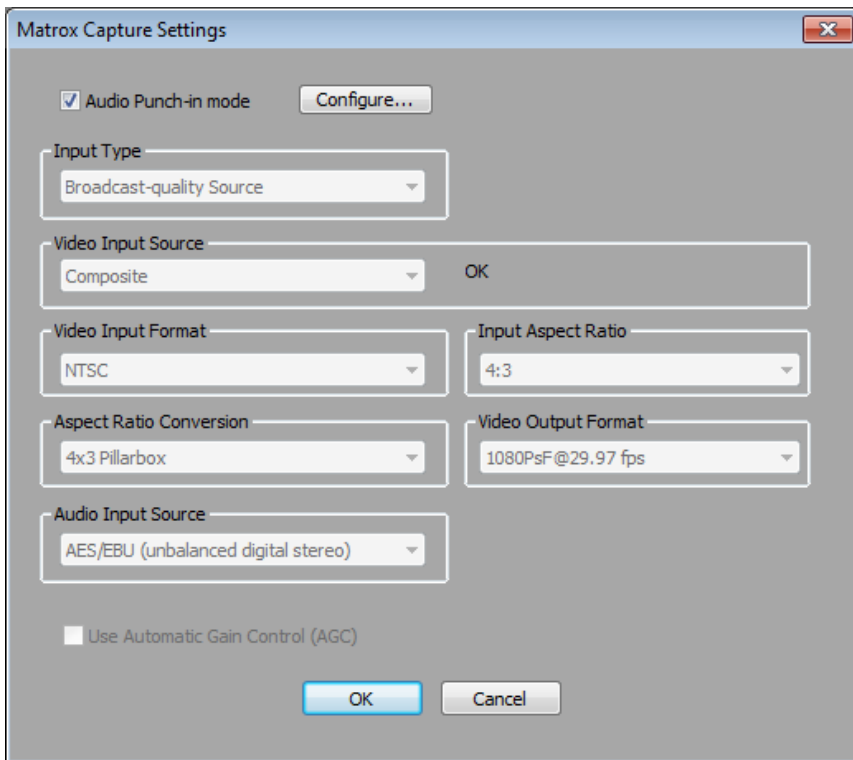
3 Select **Audio Punch-in mode** and click **Configure**.
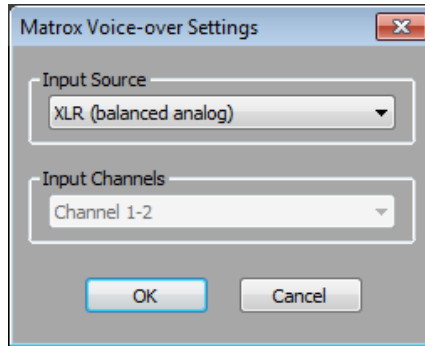
4 From the **Input Source** list, select the audio source type corresponding to the device to which the microphone is connected.

5 The audio input channels are set to **Channel 1-2**. On MXO2 Rack, make sure that your XLR or AES/EBU audio input source is connected to the channel 1/2 connector(s) only.

6 Click **OK** to save your settings, and then click **OK** to close the **Matrox Capture Settings** dialog box.

Important   When you've finished recording your voice-over, you'll need to clear **Audio Punch-in mode** before performing a capture as explained in "Defining your capture settings" on page 156.

Recording your voice-over

You use the **Audio Punch-In** tool to record your voice-over. The following steps provide guidelines for recording a voice-over. For details on using the **Audio Punch-In** tool, see your Avid documentation.

1 With a sequence loaded in the **Timeline**, choose **Tools > Audio Punch-In**.

Record button

Audio tool button

Stop button

Punch-in monitoring is disabled
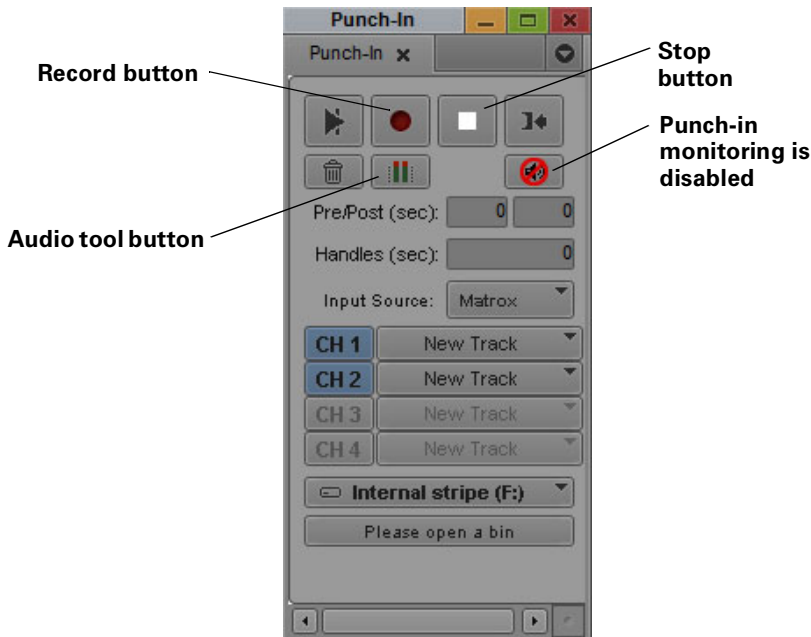
2 Make sure that the **Input Source** is set to **Matrox**.

3 Select the input channels that you want to record (**CH1** and/or **CH2**), and select the corresponding tracks on which you want to record. If you select an existing track, you can replace all or part of the audio on the track with your voice-over.

4 Click the **Audio** tool button ( ), and use the controls and meters in the **Audio** tool to test the audio input levels while speaking into the microphone. If needed, adjust the audio level on your source device so that the input levels are sufficiently high but not clipping.

✎ **Note** To see the meters in the **Audio** tool, make sure that the In/Out toggle buttons for channels 1 and 2 are set to **I** (for Input):

Input selected
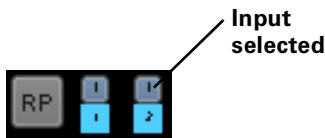
For details on using the **Audio** tool, see your Avid documentation.

5 Set In and Out points to specify the section of the **Timeline** to which you want to add your voice-over, and specify preroll and postroll values if desired.

6 When you're ready to start the voice-over, click the **Record** button (⬤).

7 Click the **Stop** button (⬛) to stop the recording. Your voice-over will be added as an audio clip on the **Timeline**.

📝 **Note** During recording, your voice-over will not be output to your Matrox MXO2 hardware, and audio punch-in monitoring is not supported.

Exporting your sequence to tape

You can record your sequence onto tape using device control or manually as explained in your Avid documentation. Before exporting to tape, set your desired playback settings as explained in "Defining your playback settings" on page 144. For a list of the supported video output formats, see "Playback using Avid editing applications" on page 305.

To export to tape without device control, simply play back your sequence and record the output from any of the available outputs on your MXO2 system. If your recorder supports RS-422 device control, you can connect the RS-422 connector on Matrox MXO2, MXO2 Rack, or MXO2 LE to the RS-422 serial device control port on your recorder (see "MXO2 RS-422 serial connection" on page 18, "MXO2 Rack RS-422 serial connection" on page 27, or "MXO2 LE RS-422 serial connection" on page 36). On Matrox MXO2 Mini, you must use a suitable adapter to connect the serial device control port on your source device or recorder to your computer. For a list of supported device control adapters, see the Matrox MXO2 Support section of our website at www.matrox.com/video/support. When configuring your deck for RS-422 device control, the RS-422 connector on your MXO2 hardware is usually identified as the COM3 port.

To record the output from your MXO2 system using device control with the **Digital Cut** tool, make sure that the **Output Mode** is set to **Real-Time**. For details on using the **Digital Cut** tool, see your Avid documentation.

ⓘ **Important** If you want to downconvert a 720p/23.976, 1080p/23.976, or 1080p24 sequence to SD to record a digital cut, you must change your project's format (project type) to SD. For example, to downconvert a 720p/23.976 or 1080p/23.976 sequence to NTSC to record a digital cut, you must change the project type to 23.976p NTSC. You can then select the output format that you want in the **Digital Cut** tool.

Your notes

11

Using Matrox A/V Tools

This chapter explains how to use Matrox A/V Tools to capture clips, grab single-frame images, and play back clips in a clip list.

About Matrox A/V Tools

Matrox A/V Tools is an application that allows you to capture and play back clips. With A/V Tools, you can:

- Capture analog, SDI[1], or HDMI video from your camera or VTR into *.avi* files on your computer.
- Use onscreen transport controls to navigate quickly and easily through clips on disk.
- Grab single-frame images and save them as *.tga* files, such as to create photo montages.
- Change the order of clips in your clip list by simply dragging and dropping clips into the sequence you want.

Starting Matrox A/V Tools

1 Choose **Start > Programs > Matrox Mtx.utils > Matrox AV Tools**.

2 The **Options** dialog box pops up every time A/V Tools starts. For information about the settings in the **Options** dialog box, see "Defining your A/V Tools options" on page 170. To close the **Options** dialog box and start working with A/V Tools, click **OK**.

---

[1] SDI is not supported on Matrox MXO2 Mini.

Using the Matrox A/V Tools interface

Once you've specified your A/V Tools options, a dialog box similar to the following appears:
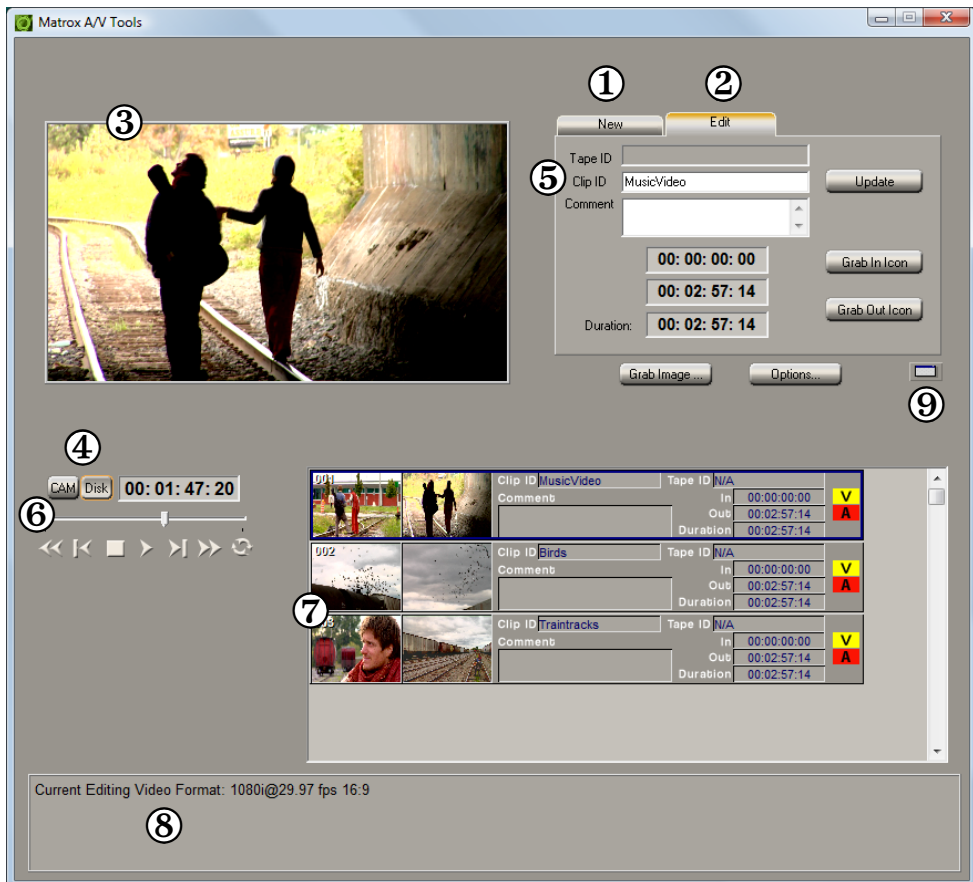
Here's a brief description of the **A/V Tools** dialog box:

① **New tab**   Use this tab to capture new clips to add to your clip list. See "Capturing clips" on page 191.

② **Edit tab**   Use this tab to edit clips, and update clip information. For details, see "Editing clips" on page 192.

③ **Preview Window**   Allows you to preview video from your camera, VTR, or clips on disk. The preview is also displayed on your video monitor.

④ **CAM and Disk buttons**   These buttons let you switch between the following modes:

- **CAM** mode lets you capture live video from your camera, or video on tape.

- **Disk** mode lets you play back captured clips in your clip list.

⑤ **Clip identification area**   This section contains several items to help you identify your clips.

- **Tape ID**   Displays the name that you've assigned to the tape in your VTR.

- **Clip ID**   Displays the base name for your new clips when using the **New** tab, or the name of the currently selected clip when using the **Edit** tab. For details, see "How A/V Tools assigns clip names" on page 191.

- **Comment**   Lets you enter comments that help you distinguish between clips in your clip list.

⑥ **Transport controls**   A set of common transport controls that lets you easily navigate through clips on disk. For more information, see "Navigating through clips with the transport controls" on page 168.

⑦ **Clip list**   A numbered list of clips and their properties. As you capture clips in A/V Tools, your clips are automatically added to the clip list. The clip list can be docked to the **Matrox A/V Tools** dialog box or float freely as a resizable window. For more information on using the clip list, see "Working with the clip list" on page 193.

⑧ **Status bar**   Displays information about the operation you're currently performing in A/V Tools, such as clip information and if frames are dropped during a capture.

⑨ **Float/dock clip list button**   This button lets you dock the clip list to the **Matrox A/V Tools** dialog box, or detach the clip list so that you can move and resize it. For more information, see "Detaching and resizing the clip list" on page 195.

Using the A/V Tools pop-up menu

When you right-click anywhere in the clip list, a pop-up menu appears containing commands for working with A/V Tools. All commands present in the A/V Tools pop-up menu are described in this chapter.

Navigating through clips with the transport controls

A/V Tools includes a common set of transport controls for navigating through clips on your hard drive when working in **Disk** mode.

Note   The transport controls are disabled in **CAM** mode.

The transport controls are much like those on your VTR:

Positioner

Loop button

Most of these controls perform standard transport functions, but some can be used for special tasks:

- **Scrub**   Drag the slider on the **Positioner** to scrub through any clip in your clip list.
- **Cue to In or Out point on disk**   Click the **Rewind** or **Fast Forward** button to cue to the beginning or end of a clip on disk.
- **View frame-by-frame**   Click the **Frame Reverse** or **Frame Advance** button.
- **Play a clip on disk repeatedly**   Click the **Loop** button, then click the **Play** button.

Keyboard Shortcuts	
Disk mode	**K**
Play	**B**
Rewind	**Z**
Fast Forward	**X**
Frame Advance	**'** (apostrophe)
Frame Reverse	**;** (semicolon)
Stop	**V**
Loop	**A**

Changing the time code display

A value in a time code field can be displayed as a time code or a specific number of frames. The first time you run A/V Tools, the fields display time codes. To toggle between the two formats, press **CTRL+SHIFT** while the insertion point (flashing vertical bar) is in any time code field.

For example, when working with NTSC clips, you could change a value of 24:04 (24 seconds, 4 frames) to 724 frames by pressing **CTRL+SHIFT**, and then switch back to time codes again by pressing **CTRL+SHIFT**.

The time code format of your tape is indicated by the separator between the seconds and frames digits in the time code fields as follows:

- A colon (**:**) indicates non-drop frame.
- A semicolon (**;**) indicates drop frame.

Defining your A/V Tools options

Before capturing or playing back clips with A/V Tools, you need to specify various options, such as your editing video format and your capture and playback settings.

⇒ **To define your options for A/V Tools:**

1 Click the **Options** button.
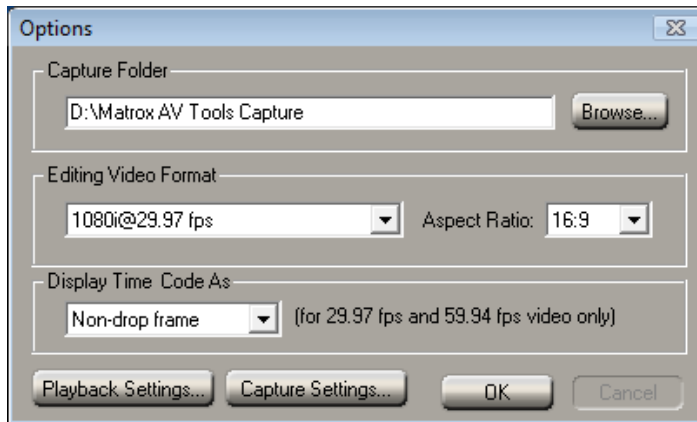
✎ **Note**   The **Options** dialog box automatically pops up every time A/V Tools starts.

2 Under **Capture Folder**, specify the folder where you want to store your captured clips. For more information, see "Selecting your capture folder" on page 172.

3 Under **Editing Video Format**, select the video format and aspect ratio you want for your clips. For example, select NTSC and 4:3 if you want to capture and play back NTSC clips with a standard 4:3 aspect ratio.

Remarks

– When you select an editing video format, many of the playback and capture settings are predetermined for you. All clips are captured to your selected video format, and clips added to the clip list must have the same frame size and frame rate. You can mix interlaced and progressive clips that have the same frame size and frame rate in a clip list.

– Once your editing video format has been defined, it cannot be changed. You can run multiple instances of A/V Tools if you want to capture or play back clips with a different video format.

– Your editing video format will automatically change if you load a *.dvl* file with a different format. For more information see, "Saving and loading a clip list" on page 193.

4 Under **Display Time Code As**, select the format that you want for displaying time codes in A/V Tools (applicable only if you're using a video format that has a frame rate of 29.97 or 59.94). The format used is indicated by the separator between the seconds and frames digits in the time code fields as follows:

– A colon (:) indicates non-drop frame.

– A semicolon (;) indicates drop frame.

5 Click the **Playback Settings** button to specify your playback settings (see "Defining your playback settings" on page 172).

6 Click the **Capture Settings** button to specify your capture settings (see "Defining your capture settings" on page 184). If capture is not supported for your selected editing video format, a message will be displayed to indicate that it is not supported. For information about the supported capture formats, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

7 Click **OK** to save your settings.

Selecting your capture folder

You can select the folder where you want A/V Tools to store your captured clips by typing the drive and folder name directly into the **Capture Folder** box, or by using the **Browse** button.

To ensure the best capture and playback performance of your clips, save them on one of your A/V drives.

A/V Tools will save your video and audio clips in a subfolder with the same name as the **Tape ID**. For example, if you selected *D:\Matrox AV Tools Capture* as your capture folder, all video and audio clips from tape "MyTape" will be saved in *D:\Matrox AV Tools Capture\MyTape*.

Defining your playback settings

The **Matrox Playback Settings** dialog box has several pages that you can use to specify various settings for working with A/V Tools. When you select your editing video format in the **Options** dialog box, many settings are optimized for you.

Specifying your general settings

To specify your general settings for playback in A/V Tools:

1   Click the **Options** button in the **Matrox A/V Tools** dialog box.

2   Click the **Playback Settings** button. This displays the **Matrox Playback Settings** dialog box.

   Note   You can also access the **Matrox Playback Settings** dialog box by right-clicking the clip list and selecting **Playback Settings**.

3   Click the **General** tab.
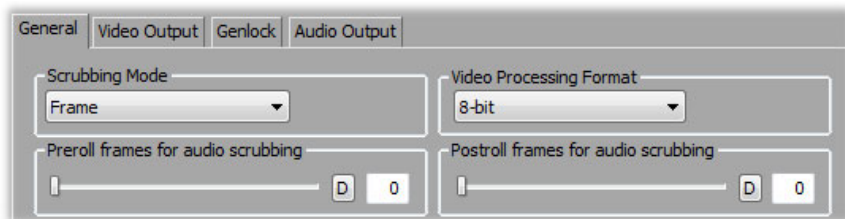
4   Under **Scrubbing Mode**, select **Frame**, **1st Field**, or **2nd Field** to indicate whether you want to display frames or only one field when you scrub your clips in the clip list using the transport controls. For example, you may want to scrub the first or second field to eliminate the flickering that can be seen in

your picture when you pause while scrubbing interlaced video. Scrubbing fields can also be used to check for any dropped fields that may have occurred in your video during a telecine process.

Note   When using a progressive editing video format, the scrubbing mode is set to **Frame**.

5 Under **Video Processing Format**, select either **8-bit** or **10-bit** to indicate the bit depth you want to use for processing video. This option is automatically set to **8-bit** when using a 1440×1080i/p editing video format.

Note   If you select a 10-bit video processing format, you'll be able to capture clips to Matrox 10-bit uncompressed format only.

6 Use the **Preroll/Postroll frames for audio scrubbing** sliders to specify the number of audio frames you want to be played before/after the location of the positioner when you scrub a clip. This lets you hear more audio to help you better identify sounds when scrubbing. For example, if you set the number of preroll frames for audio scrubbing to **3**, you will hear the audio for the current frame and three previous frames when you scrub a frame in a clip.

Note   To return a slider to it's default setting, click its **D** button. This button is available for all sliders in the Matrox dialog boxes.

7 Click **OK** to save your settings.

Defining your A/V Tools options

Specifying your video output settings

This section explains how to specify your video output settings for Matrox MXO2, MXO2 Rack, and MXO2 LE. For MXO2 Mini, see "Specifying your video output settings (MXO2 Mini)" on page 178.

You can specify various settings to configure the main and secondary outputs from your MXO2 system. Some of the settings are predetermined for you based on your editing video format. For a list of the supported video output formats, see "Playback using Matrox A/V Tools and Matrox WYSIWYG" on page 307.

⇒ **To specify your video output settings:**

1 Click the **Options** button in the **Matrox A/V Tools** dialog box.

2 Click the **Playback Settings** button. This displays the **Playback Settings** dialog box.

3 Click the **Video Output** tab.

4 Under **Main Output** and **Secondary Output**, you can specify the settings you want for your main and secondary outputs from MXO2. Depending on the editing video format you chose in the **Options** dialog box, you may not be able to change some of the settings.

– **Format**   Use this to select the video format you want for your outputs. Be aware that the format you select may not be supported on all the MXO2 outputs. For a list of the supported formats, see "Playback using Matrox A/V Tools and Matrox WYSIWYG" on page 307.

– **Pulldown Method**   If this setting is available, select the pulldown method you want to be applied to your video output (**Standard 2:3** or **Advanced 2:3:3:2**). Depending on your editing video format's frame rate and the current video output format, a pulldown method may automatically be selected.

– **Aspect Ratio Conversion**   Use this to specify how you want your video to be output when upscaling or downscaling:

• **16x9 Letterbox**   Outputs the widescreen 16:9 picture in letterbox mode by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

• **4x3 Pillarbox**   Outputs the standard 4:3 picture in pillarbox mode by adding black bars to the left and right sides of the picture for display on a widescreen 16:9 television screen.

• **Anamorphic**   Outputs the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

• **Center Cut**   Outputs the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

• **Center Zoom**   Outputs the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

Note   When aspect ratio conversion is applied to both the main and secondary outputs, the same setting will be applied to both outputs.

5 Under **Analog Output**, you can specify your analog output format, NTSC setup level, and output type:

– **Format**   Use this to specify whether you want the format for the analog outputs to be the same as the main or secondary output.

– **Output Type**   Specifies the analog video output type. If you're outputting SD analog video, the output type will be set to **All Available** to

Defining your A/V Tools options

indicate that the output will be available on all the analog outputs. If you're outputting HD analog video, the output type will be set to **Component**.

– **Setup (NTSC)**   Use this to select the setup level you want for your NTSC analog video. This affects both the NTSC analog video input and output.

• **0 IRE**   Applies a setup level of 0 IRE. You should select this option only when working with a commercial DV device that uses the Japanese analog NTSC setup of 0 IRE. For example, if the video appears too bright when you play back DV clips on your NTSC monitor, you can change the setup to 0 IRE to output your DV clips at the correct brightness.

• **7.5 IRE**   Applies the standard NTSC setup level of 7.5 IRE.

– **YUV/RGB**   Select **YUV** or **RGB** to set the type of video signal that is sent from the component output. For example, select **RGB** if you connected the component output to a device that accepts an RGB signal.

6 Under **HDMI Output**, you can specify your HDMI output format and type.

– **Format**   Use this to specify whether you want the format for your HDMI output to be the same as the main or secondary output.

– **YUV/RGB**   Select the type of video signal that you want to be sent from the HDMI output:

• **YUV**   Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.

• **RGB - calibrated**   Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading calibration settings using the Matrox HDMI Calibration Utility, see Chapter 7, "Calibrating Your HDMI Monitor for Video."

• **RGB - native**   Outputs native RGB HDMI video that does not apply any calibration compensation. This is useful when you want to output RGB HDMI video to a device other than an HDMI monitor or television, such as an HDMI recorder to perform an export to tape.

– **3D Viewing Mode**   Select the 3D signal type that you want to be sent from the HDMI output to your 3D monitor:

• **Disabled**   Select this if you're not outputting 3D video, or to disable 3D video output. You can still monitor 3D video, but you must select the correct viewing mode on your 3D monitor manually.

• **Side-by-side**   Outputs horizontally compressed side-by-side 3D video (also referred to as side-by-side horizontal).

- **Over/Under**   Outputs over/under 3D video (also referred to as top bottom).

Note   This feature may not be supported on some 3D monitors.

7 Under **SDI Output**, specify whether you want the format for your SDI output to be the same as the main or secondary output.

8 Under **Advanced**, you can specify advanced video output settings.

- **Analog SC/H Phase**   Use this slider to advance or delay your analog video output's subcarrier phase with respect to the horizontal sync of the genlock source (for composite video only).

Note   This setting is unavailable until a clip is added to the clip list and you click the **Disk** button.

- **Allow Super White/Allow Super Black**   Select **Allow Super White** to allow the highest luminance level of your video output to exceed the standard maximum white level. Select **Allow Super Black** to allow the lowest luminance level of your video output to fall below the standard black level. These options apply to all video outputs.

Note   Super white and super black should not be allowed when producing your final video production for broadcast.

9 Click **OK** to save your settings.

Defining your A/V Tools options

Specifying your video output settings (MXO2 Mini)

You can specify various settings to configure your main analog output and secondary HDMI output from the MXO2 Mini. Some of the settings are predetermined for you based on your editing video format. For a list of the supported video output formats, see .

⟹ **To specify your video output settings:**

1 Click the **Options** button in the **Matrox A/V Tools** dialog box.

2 Click the **Playback Settings** button. This displays the **Matrox Playback Settings** dialog box.

3 Click the **Video Output** tab.

General | Video Output | Audio Output

MXO2 Mini

Editing Video Format
1080i@29.97 fps

Analog Output (Main)
Format: 1080i@29.97 fps
Pulldown Method: None
Setup (NTSC): 7.5 IRE
Aspect Ratio Conversion: None
Output Type: Component
YUV/RGB: YUV

HDMI Output (Secondary)
Format: NTSC
Pulldown Method: None
Aspect Ratio Conversion: 16x9 Letterbox
YUV/RGB: YUV
3D Viewing Mode: Disabled

Advanced
☐ Allow Super White
☐ Allow Super Black

4 Under **Analog Output (Main)**, you can specify the settings you want for your analog output from MXO2 Mini. Under **HDMI Output (Secondary)** you can specify the settings you want for your secondary HDMI output. Depending on the editing video format you chose in the **Options** dialog box, you may not be able to change some of the settings.

– **Format** Use this to select the video format you want for your outputs. For a list of the supported formats, see .

- **Pulldown Method** If this setting is available, select the pulldown method you want to be applied to your video output (**Standard 2:3** or **Advanced 2:3:3:2**). Depending on your editing video format's frame rate and the current video output format, a pulldown method may automatically be selected.

- **Setup (NTSC)** Use this to select the setup level you want for your NTSC analog video. This affects both the NTSC analog video input and output.

  - **0 IRE** Applies a setup level of 0 IRE. You should select this option only when working with a commercial DV device that uses the Japanese analog NTSC setup of 0 IRE. For example, if the video appears too bright when you play back DV clips on your NTSC monitor, you can change the setup to 0 IRE to output your DV clips at the correct brightness.

  - **7.5 IRE** Applies the standard NTSC setup level of 7.5 IRE.

- **Aspect Ratio Conversion** Use this to specify how you want your video to be output when upscaling or downscaling:

  - **16x9 Letterbox** Outputs the widescreen 16:9 picture in letterbox mode by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

  - **4x3 Pillarbox** Outputs the standard 4:3 picture in pillarbox mode by adding black bars to the left and right sides of the picture for display on a widescreen 16:9 television screen.

  - **Anamorphic** Outputs the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

  - **Center Cut** Outputs the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

  - **Center Zoom** Outputs the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

- **YUV/RGB** (for analog output) Select **YUV** or **RGB - native** to set the type of video signal that is sent from the component output. For example, select **RGB - native** if you connected the component output to a device that accepts an RGB signal.

- **YUV/RGB** (for HDMI output) Select the type of video signal that you want to be sent from the HDMI output:

- **YUV**   Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.

- **RGB - calibrated**   Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading calibration settings using the Matrox HDMI Calibration Utility, see Chapter 7, "Calibrating Your HDMI Monitor for Video."

- **RGB - native**   Outputs native RGB HDMI video that does not apply any calibration compensation. This is useful when you want to output RGB HDMI video to a device other than an HDMI monitor or television, such as an HDMI recorder to perform an export to tape.

– **3D Viewing Mode**   Select the 3D signal type that you want to be sent from the HDMI output to your 3D monitor:

- **Disabled**   Select this if you're not outputting 3D video, or to disable 3D video output. You can still monitor 3D video, but you must select the correct viewing mode on your 3D monitor manually.

- **Side-by-side**   Outputs horizontally compressed side-by-side 3D video (also referred to as side-by-side horizontal).

- **Over/Under**   Outputs over/under 3D video (also referred to as top bottom).

Note   This feature may not be supported on some 3D monitors.

5 Under **Advanced**, select **Allow Super White** to allow the highest luminance level of your video output to exceed the standard maximum white level. Select **Allow Super Black** to allow the lowest luminance level of your video output to fall below the standard black level. These options apply to both the main analog output and secondary HDMI output.

Note   Super white and super black should not be allowed when producing your final video production for broadcast.

6 Click **OK** to save your settings.

Specifying your genlock settings

Note This section does not apply to Matrox MXO2 Mini.

You can select the source to which you want to genlock all devices connected to your MXO2 system, as well as adjust the timing settings for all video outputs from MXO2.

Note Before adjusting these settings, you must have a clip in the clip list and click the **Disk** button.

To specify your genlock settings:

1 Click the **Options** button in the **Matrox A/V Tools** dialog box.

2 Click the **Playback Settings** button. This displays the **Playback Settings** dialog box.

3 Click the **Genlock** tab.
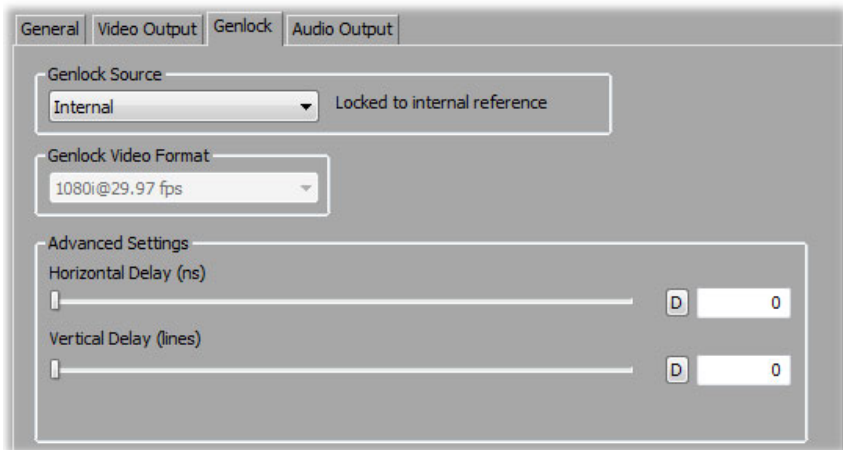
4 From the **Genlock Source** list, select one of the following:

– **Internal** Genlock to MXO2's internal reference signal. Select this option only if you don't have an external sync generator or other reliable external video sync source.

– **Black Burst Broadcast Quality** Genlock to an external analog sync source connected to the reference (REF) input on MXO2. This must be a stable sync source, such as an external sync generator (bi-level black burst for SD or tri-level sync for HD), or a source VTR that has a built-in TBC.

– **Analog Input**, **SDI Input**, and **HDMI Input** Genlock to your analog, SDI, or HDMI video source connected to the video input on MXO2.

Note The status of your genlock source will be displayed, such as **Locked** or **Not Locked**, to indicate whether or not MXO2 is presently locked to your

selected genlock source. When you change the genlock source, distorted video and silent audio will be output until MXO2 locks to the new genlock source.

5   Under **Genlock Video Format**, select your genlock source's video format. If you can't select a video format, make sure that your genlock source matches the specified video format. When the genlock source is set to **Internal**, the genlock video format is set to your main video output format.

6   Under **Advanced Settings**, drag the **Horizontal Delay** and **Vertical Delay** sliders to adjust the horizontal and vertical timing of your video outputs with respect to your genlock source. This lets you compensate for cable delays within your system.

7   Click **OK** to save your settings.

Specifying your audio output settings

The audio output page lets you adjust various settings for your audio output from your MXO2 system. For example, you can adjust the volume of your analog audio output before or while playing back clips.

Note Before adjusting these settings, you must have a clip in the clip list and click the **Disk** button.

To specify your audio output settings:

1. Click the **Options** button in the **Matrox A/V Tools** dialog box.

2. Click the **Playback Settings** button. This displays the **Matrox Playback Settings** dialog box.

3. Click the **Audio Output** tab.
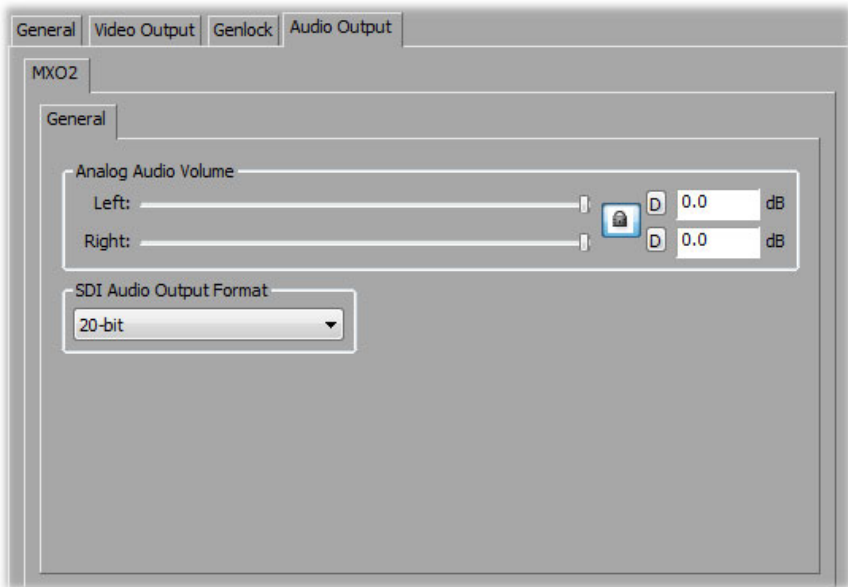
4. Under **Analog Audio Volume**, drag the sliders to adjust the volume of your analog audio output. By default, the sliders are locked so that they move together. To move each slider independently, click the lock button ( ) to disable it.

5. Under **SDI Audio Output Format**, select the bit depth you want for your embedded SDI audio output (**20-bit** or **24-bit**). This setting is not available on MXO2 Mini.

6. Click **OK** to save your settings.

Defining your capture settings

The **Matrox Capture Settings** dialog box has pages that you can use to specify your settings for capturing video and audio in A/V Tools. The settings available are based on your editing video format and your input source (video is always captured to your selected editing video format). For a list of the supported capture formats, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats." For a list of the supported video output formats for monitoring the video that you're capturing, see "Supported video output formats for monitoring" on page 311.

Note When you specify your capture settings in A/V Tools, VU meters will be displayed to let you monitor your audio input levels. For more information, see "Monitoring audio levels for capture" on page 190.

Specifying your video capture settings

You can capture video to MPEG-2 I-frame or uncompressed format, depending on your selected editing video format and source video format. For example, you can choose to capture analog NTSC clips to Matrox MPEG-2 I-frame *.avi* files.

To specify your settings for capturing video in A/V Tools:

1 Click the **Options** button in the **Matrox A/V Tools** dialog box.

2 Click the **Capture Settings** button. This displays the **Matrox Capture Settings** dialog box.

Note You can also access the **Matrox Capture Settings** dialog box by right-clicking the clip list and selecting **Capture Settings**.

3 Click the **Video Capture Settings** tab.
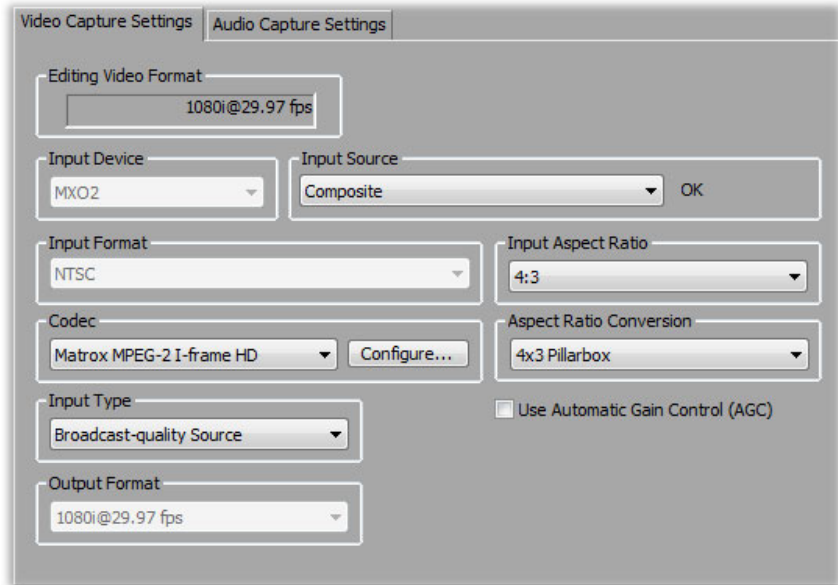
```
┌─────────────────────────────────────────────────────────────┐
│ Video Capture Settings │ Audio Capture Settings             │
│ ┌─ Editing Video Format ───────────────────────────┐        │
│ │              1080i@29.97 fps                      │        │
│ └───────────────────────────────────────────────────┘        │
│ ┌─ Input Device ──────────┐  ┌─ Input Source ─────────────┐  │
│ │ MXO2              ▼      │  │ Composite             ▼    │ OK│
│ └─────────────────────────┘  └────────────────────────────┘  │
│ ┌─ Input Format ──────────┐  ┌─ Input Aspect Ratio ───────┐  │
│ │ NTSC              ▼      │  │ 4:3                   ▼    │  │
│ └─────────────────────────┘  └────────────────────────────┘  │
│ ┌─ Codec ─────────────────┐              ┌─ Aspect Ratio Conversion ─┐ │
│ │ Matrox MPEG-2 I-frame HD ▼ │ Configure... │ 4x3 Pillarbox        ▼ │ │
│ └──────────────────────────┘              └──────────────────────────┘ │
│ ┌─ Input Type ────────────┐   ☐ Use Automatic Gain Control (AGC)       │
│ │ Broadcast-quality Source ▼ │                                         │
│ └─────────────────────────┘                                            │
│ ┌─ Output Format ─────────┐                                            │
│ │ 1080i@29.97 fps     ▼   │                                            │
│ └─────────────────────────┘                                            │
└─────────────────────────────────────────────────────────────┘
```

4 From the **Input Source** list, select the type of input you want to capture. For example, to capture material from your HDMI source, select **HDMI**.

5 From the **Input Format** list, select the video format that matches your source video. If required, your source video will be scaled during capture to match your editing video format. The formats available depend on your selected input source. For information about the supported capture formats, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

6 From the **Input Aspect Ratio** list, select the aspect ratio of your SD source video (4:3 or 16:9). For example, to capture SD video that was recorded using the standard TV screen format, select **4:3**. To capture SD video that was recorded using the widescreen 16:9 format, select **16:9**. If you're capturing HD video, the **Input Aspect Ratio** will be set to **16:9**.

7 Under **Codec**, select the codec that you want to use for the capture.

  – **Matrox 8-bit Uncompressed** Captures video to 8-bit uncompressed format.

  – **Matrox 10-bit Uncompressed** Captures video to 10-bit uncompressed format. This is the only codec available when using a 10-bit video processing format, and is not available when using an 8-bit format.

📝 **Note** If you want to capture to a format other than **Matrox 10-bit Uncompressed**, you can switch the video processing format (on the **General**

Defining your A/V Tools options

page) to 8-bit, and then change back to 10-bit after you've completed your capture.

- **Matrox MPEG-2 I-frame**   Captures video to MPEG-2 intra-frame format using the 4:2:2 Profile @ Main Level at a selected data rate (SD resolution only).

- **Matrox MPEG-2 I-frame HD**   Captures video to MPEG-2 intra-frame format using the 4:2:2 Profile @ High Level at a selected data rate (HD resolution only).

8 If you're capturing to a Matrox MPEG-2 I-frame format, click the **Configure** button to configure your settings. The MPEG-2 I-frame settings for capture in Matrox A/V Tools are the same as when you capture using Adobe Premiere Pro. For more details, see "Selecting your MPEG-2 I-frame settings" on page 80.

9 Under **Aspect Ratio Conversion**, specify the type of aspect ratio conversion that you want to be applied to your captured video (used when upscaling or downscaling video during capture only):

- **16x9 Letterbox**   Captures the widescreen 16:9 picture as letterbox video by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

- **4x3 Pillarbox**   Captures the standard 4:3 picture as pillarbox video by adding black bars at the left and right sides of the picture for display on a widescreen 16:9 television screen.

- **Center Cut**   Captures the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

- **Center Zoom**   Captures the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

Note   When capturing to an SD 16:9 format, such as NTSC 16:9, the video will be captured as horizontally compressed 4:3 (anamorphic) video. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

10 Select **Use Automatic Gain Control (AGC)** if you want the gain of your composite or S-Video input signal to be adjusted automatically to compensate for very bright or dark images. This improves the brightness or contrast of your picture.

11 From the **Input Type** list, select the type of equipment you're using for capture:

– **Broadcast-quality Source**   Select this if your source device is broadcast-quality. This setting provides the best capture results for most devices.

– **Consumer-quality Source**   Select this if you're having problems capturing video because your source device doesn't meet broadcast-quality standards. For example, the capture may be interrupted when you try to capture from certain composite and S-Video devices, especially from low-quality VCRs. If this happens, selecting **Consumer-quality Source** will allow the video to be captured, but you may experience dropped frames during the capture.

Note   For any change to the input type to take effect, you must restart Matrox A/V Tools.

12 If your editing video format is 1080p @ 23.98 fps, 25 fps, or 29.97 fps, from the **Output Format** list, select the format (p or PsF) that you want for previewing your captured video. For example, if you're capturing to 1080p @ 25 fps, you can choose to output 1080p or 1080PsF @ 25 fps video for preview.

13 Click **OK** to save your settings.

Specifying your audio capture settings

You can specify various audio capture settings, such as to specify the type of audio files (either stereo *.wav* or mono *.wav*) that you want to create when capturing audio in A/V Tools.

Remarks

- When you capture to an *.avi* file using A/V Tools, the clip's video and audio are saved to the *.avi* file, and the clip's audio is also saved to one or more separate *.wav* files. You could choose to edit the separate *.wav* files using audio post-processing software.

- The separate *.wav* files are not supported in the A/V Tools clip list, but you can import them into Adobe Premiere Pro.

⟹ **To specify your settings for capturing audio in A/V Tools:**

1 Click the **Options** button in the **Matrox A/V Tools** dialog box.

2 Click the **Capture Settings** button. This displays the **Matrox Capture Settings** dialog box.

3 Click the **Audio Capture Settings** tab.
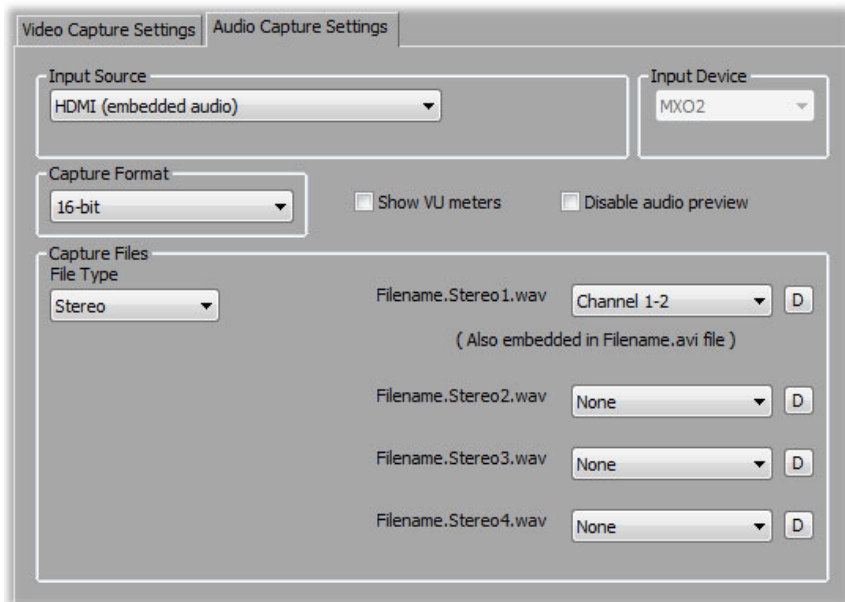
4 Under **Input Source**, select the audio input source you want to capture. This may be set for you based on your selected video input source.

📝 **Note**   When capturing HDMI embedded audio, only uncompressed embedded audio is supported.

5 Under **Capture Format**, select the bit-depth for your captured audio files.

6 If you want the VU meters to be displayed each time you configure your capture settings or start a capture in A/V Tools, select **Show VU meters**. This option is not available if you're working with 1080i @ 29.97 fps video and using a 10-bit video processing format. For details on using the VU meters, see "Monitoring audio levels for capture" on page 190.

7 If you experience dropped frames during capture, select **Disable audio preview** to disable the audio preview only while you're capturing material.

8 Under **Capture Files**, indicate whether you want to capture to stereo or mono audio files, and select which channels you want to save to separate *.wav* files.

— From the **File Type** list, select **Stereo** to save your captured audio to stereo *.wav* files, or **Mono** to save your captured audio to mono *.wav* files.

— From the **Filename** lists, select which stereo pairs or mono channels you want to save to your *.wav* files (up to four stereo files or up to eight mono files depending on the type of audio being captured). Select **None** for the particular *.wav* files you don't want to be created, or click the **D** (default) button for each **Filename** list if you want to capture only channels 1 and 2. When A/V Tools saves each *.wav* file, it assigns a *.Stereo.wav* or *.Mono.wav* suffix to the base name you gave for the associated video file. For example, if you've named your video file *MyFile.avi*, the associated stereo audio files would be named *MyFile.Stereo1.wav*, *MyFile.Stereo2.wav*, etc.

Note The channels that you choose to save to the first stereo.*wav* file or first two mono.*wav* files will be embedded in the associated *.avi* file.

9 Click **OK** to save your settings.

Defining your A/V Tools options

Monitoring audio levels for capture

If you select **Show VU meters** on the **Audio Capture Settings** page, each time you configure your capture settings or start a capture in A/V Tools, VU meters will be displayed to let you monitor the levels of your currently selected audio input source.

Note The VU meters won't be available if you're working with 1080i @ 29.97 fps video and using a 10-bit video processing format.

As you play your audio source, the color of the input level is green at or below –12 dBSF, yellow between –12 and –6 dBFS, and red above –6 dBFS. The clipping detectors will "light up" (become red) whenever audio clipping occurs. The peak level indicators are thin lines that show the highest level recently reached. These indicators will show the peak level for about two seconds or until a higher peak level is reached.

If needed, adjust the audio level on your source device to keep the average input level between –30 and –10 dBSF.

How A/V Tools assigns clip names

When using the **New** tab, **Clip ID** displays the base name for your new clips. For example, if the **Clip ID** is "MyClip," A/V Tools will assign the name *MyClip000.avi* to the first new clip you capture, and continue naming clips sequentially (for example, *MyClip001.avi, MyClip002.avi*, etc.). Before capturing new clips, you can change the **Clip ID** to any base name you like.

When editing clips using the **Edit** tab, **Clip ID** displays the name of the selected clip in the clip list. You can change the name by typing a new name in the **Clip ID** box on the **Edit** tab, then clicking **Update**. You can also change a clip ID directly in the clip list by typing a new name in the clip's **Clip ID** box, then pressing **ENTER**.

Note   Changing the clip ID for a captured clip will **not** change the clip's file name.

Capturing clips

With A/V Tools you can capture live video from your camera, or video on tape. Capturing saves the clips as *.avi* files on your computer's hard drive.

Note   A/V Tools does not support capture from tape with device control.

Capturing live video

1   In the **A/V Tools** dialog box, click the **CAM** button. To capture live video, your device must be set to Camera mode.

2   In the **Clip ID** box, type the base clip name you'd like to be assigned to your clip. For more information, see "How A/V Tools assigns clip names" on page 191.

3   Click **Capture**.

4   A/V Tools will start capturing the clip. To stop the capture, click the **Stop** button.

5   Your captured clip is added to the clip list with its duration and an icon representing the first and last frames of the clip.

Capturing from tape without device control

1 In the **A/V Tools** dialog box, click the **CAM** button. To capture video from tape, your device must be set to VTR mode.

2 In the **Tape ID** box, type a name for the tape presently loaded in your VTR.

3 In the **Clip ID** box, type the base clip name you'd like to be assigned to your clip. For more information, see "How A/V Tools assigns clip names" on page 191.

4 Press the Play button on your device. You will see the video play back in the A/V Tools Preview Window and on your video monitor.

5 Click **Capture**.

6 A/V Tools will start capturing the clip. To stop the capture, click the **Stop** button.

7 Your captured clip is added to the clip list with its duration and an icon representing the first and last frames of the clip.

Editing clips

Matrox A/V Tools lets you update the clip ID and comment information for clips in your clip list, as well as change a clip's In and Out icons.

Updating clip information

To update the clip ID and comment information for a clip, select the clip in the clip list and click the **Edit** tab. Type the new text in the text boxes, then click **Update**. For more information on the clip ID, see "How A/V Tools assigns clip names" on page 191.

Changing a clip's In and Out icons

In and **Out** icons are the small icons representing the first and last frames of a clip in the clip list. These icons can be changed to better represent your clip.

To change the In and Out icons of captured clips in the clip list:

1 Use the transport controls to play back your clip in the preview window and on your video monitor.

2 When you see the frame you want for the In icon, click **Grab In Icon**. A/V Tools automatically updates the icon.

3 When you see the frame you want for the Out icon, click **Grab Out Icon**.

Working with the clip list

The following sections explain how to add new clips to the clip list, play back clips, save and load clip lists, copy, move and delete clips, and how to detach and resize the clip list.

Adding clips

You can add a clip or a series of clips (*.avi* files) to the clip list using any of the following methods:

- Drag an *.avi* file from a file management program, such as Windows Explorer, to the clip list. If you're adding clips to an existing clip list, you can drag them to the bottom of the clip list, or place them in a specific position using the methods described in the section "Moving clips" on page 194.
- Right-click the clip list, then choose **Import Clip** from the pop-up menu (or double-click an empty area of the clip list). In the **Open** dialog box, select the *.avi* files you want to import, then click **Open**.

Playing back clips

You can play back your clips one at a time, or in the same sequence as they appear in the clip list. To play back your clips:

- Select a clip in the clip list and click the Play button on the transport controls.
- Right-click a clip on the clip list and choose **Play**.
- To play back multiple clips in sequence, select a range of clips in the clip list using **SHIFT+click** or select individual clips using control click, then use one of the afore-mentioned methods to play them back.

Saving and loading a clip list

To save a clip list, right-click the clip list. Choose **Save As** from the pop-up menu to save your current clip list as a *.dvl* file.

You can load a clip list (*.dvl*) using any of the following methods:

- Right-click the clip list. Choose **Open Clip List** or **Open Recent** to select a recently opened clip list.
- Drag a *.dvl* file from a file management program, such as Windows Explorer, to the clip list.
- Double-click the *.dvl* file in Windows Explorer to start A/V Tools and load the clip list. Make sure that A/V Tools is **not** running when you do this.

Remarks

- – The first time you double-click a *.dvl* file in Windows Explorer, you will need to specify Matrox A/V Tools as the program you want to use to open *.dvl* files.

- – If you load a *.dvl* file to a clip list that already contains clips, it will replace the current clip list. If needed, your editing video format in A/V Tools will be changed to match the video format of the clips in the loaded clip list.

Copying clips

You can copy a clip or a series of clips in the clip list using either of the following methods:

- Select the clips you want to copy, right-click the clip list, then choose **Copy** from the pop-up menu. Select a clip in the clip list, then choose **Paste** to paste the copied clips above the currently selected clip.

- Select the clips you want to copy, then **CTRL+drag** the clips and drop them into the sequence you want.

Note   When copying a clip, the clip's *.avi* file is not copied, only the reference to the clip on disk is copied. A/V Tools assigns the *-Copy* extension to the **Clip ID** of the copied clips.

Moving clips

You can change the order of clips in the clip list, such as to arrange clips in the order you want to play them back. To rearrange your clips, do any of the following:

- Select the clips you want to move, then drag and drop them into the sequence you want. If you drag clips up in the clip list, the clips are inserted above the black line. If you drag clips down in the clip list, the clips are inserted below the black line. Releasing the mouse button places the clips in the list and ripples the position of all subsequent clips in the clip list.

- Select the clips you want to move, then right-click the clip list. Choose **Cut** from the pop-up menu to cut the clips. Select a clip in the clip list, then choose **Paste** to paste the clip above the currently selected clip.

Deleting clips

Select the clips you want to delete, right-click the clip list, then choose one of the following from the pop-up menu:

- To delete only the selected clips from the clip list, choose **Delete Clip Only**.

- To delete the selected clips and their corresponding files from your hard drive, choose **Delete Clip + File**.

Detaching and resizing the clip list

You can change the size of your clip list to suit your needs. First, detach the clip list from the **Matrox A/V Tools** dialog box by clicking the **Float/dock clip list** button (▭) above the clip list. Now the clip list can be freely moved and resized. To resize the clip list, drag the sides or corner of the clip list as needed. You can also use the standard Windows **Maximize** and **Restore** buttons in the top right corner of the window.

After resizing, A/V Tools will automatically rearrange the clips in the clip list. To dock the clip list back to the **Matrox A/V Tools** dialog box, click the **Float/dock clip list** button, or click the **Close** button in the top right corner of the **Clip List** window. Once the window is docked again, A/V Tools will remember the previous size and location of the clip list for the next time you detach the clip list.

Grabbing a single-frame image

You can grab single-frame (still) images and save them as *.tga* files to use in your Adobe Premiere Pro projects. Your source video can be a clip on tape, a clip on disk, or live video.

⟹ **To grab a single-frame image:**

1 Play back your source video. If it is on disk, you can use the transport controls to locate the clip

2 In the **A/V Tools** dialog box, click the **Grab Image** button to open the **Grab Image** dialog box.
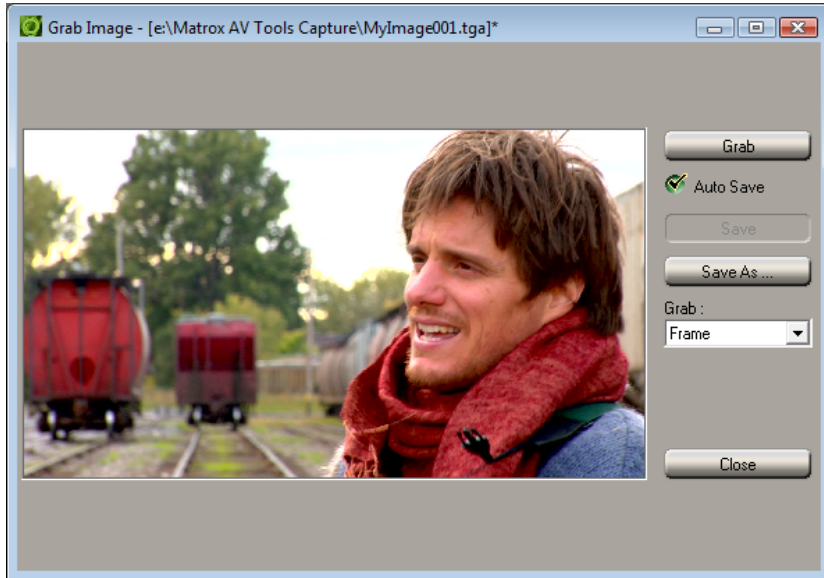
3 When the frame you want is displayed in the Preview Window, click the **Grab** button.

4 If you notice flickering in your image, you can choose to grab only one of the fields. From the **Grab** list, select **Field 1** or **Field 2**. One field contains the odd-numbered scan lines in the frame, and the other field contains the even-numbered lines. Select the field that best displays your image. A/V Tools interpolates between the two consecutive scan lines to create the missing field.

5 Click **Save** or **Save As** to save the image.

6 Click the **Close** button to return to the **Matrox A/V Tools** dialog box.

🖉 **Note** If you do not specify a file name in the **Save As** text box, or if you select **Auto Save**, A/V Tools will assign a default name to the first grabbed image (such as *MyImage01.tga* or a name based on the last name you used) and continue naming images sequentially.

Keyboard shortcuts

The following table provides a complete list of keyboard shortcuts available for using A/V Tools.

Keyboard Shortcuts	
Disk mode	K
CAM mode	B
Play	B
Rewind	Z
Fast Forward	X
Frame Advance	' (apostrophe)
Frame Reverse	; (semicolon)
Stop	V
Loop	A
Delete Clip Only	DELETE
Delete Clip + File	SHIFT+DELETE
Grab	F5
Auto Save	F6
Save	F7
Import Clip	CTRL+I
Select All	CTRL+A
Cut	CTRL+X
Copy	CTRL+C
Paste	CTRL+V
New Clip List	CTRL+N
Open Clip List	CTRL+O
Save Clip List	CTRL+S

Your notes

12

Using the Matrox WYSIWYG Plug-ins

This chapter explains how to use the Matrox WYSIWYG plug-ins available with Matrox MXO2 so that you can display the contents of your composition or animation on your video monitor.

Overview

Together with your Matrox MXO2 hardware, the Matrox WYSIWYG Control Panel and Matrox WYSIWYG plug-ins let you display the contents of your composition or animation on your video monitor. This lets you see the exact color temperature, safe-title area, and any interlaced artifacts as you work.

You can preview video played back using the following applications that are supported by the Matrox WYSIWYG plug-ins:

- Adobe After Effects.
- Adobe Photoshop.
- Autodesk 3ds Max.
- Autodesk Combustion.
- eyeon Fusion.
- NewTek LightWave 3D.

Configuring the Matrox WYSIWYG Control Panel

The Matrox WYSIWYG Control Panel lets you specify the settings you want for previewing video on your video monitor. To use the Matrox WYSIWYG Control Panel, right-click the 📺 icon on your Windows taskbar. If you don't see the icon, check your taskbar properties and make sure that you're showing the icons for your Matrox applications. If you still don't see the icon, choose **Start > All Programs > Matrox Mtx.utils > Matrox WYSIWYG Control Panel**.

The Matrox HDMI Calibration Utility uses the Matrox WYSIWYG Control Panel to display specially designed graphics for calibrating your HDMI monitor for video. For details on calibrating your HDMI monitor, see Chapter 7, "Calibrating Your HDMI Monitor for Video."

📝 **Note** By default, the Matrox WYSIWYG output to your video monitor is enabled. To disable it, clear the **Enable WYSIWYG Output** option in the Control Panel.

1 From the **Project Format** menu, select the format that matches your composition or animation, such as **NTSC 4:3**.

2 Choose **Output Configuration** to specify the video output settings you want for previewing your video. The available settings depend on your selected project format (editing video format), and are the same as those provided when using Matrox A/V Tools as explained in "Specifying your video output settings" on page 174 and "Specifying your video output settings (MXO2 Mini)" on page 178.

> **Note** The **Genlock** page is also available to let you adjust the genlock settings for your video output, if needed (not applicable to MXO2 Mini). For details, see "Specifying your genlock settings" on page 181.

3 From the **Preview Type** menu, select one of the following options for the preview:

– **Video** Select this to view your composition or animation.

– **Alpha Channel** Select this to view only your composition's or animation's grayscale alpha-key (matte) information.

4 From the **Scaling** menu, select one of the following options for your preview output:

– **Scale to fit** Select this to scale your output to fit your video monitor. The aspect ratio of your project format will be preserved.

– **Original Size** Select this to output your video without any scaling. If you are playing back HD clips in an SD project, your output will be centered on your video monitor.

Required steps to use the WYSIWYG plug-ins

The following sections list the steps required to use the Matrox WYSIWYG plug-in for each application in order to preview video on your video monitor.

> **Note** The following procedures may change with a subsequent release of the program.

Adobe After Effects

1 Start Adobe After Effects and import the footage you want to preview.

2 Drag the footage from the **Project** panel to the **Composition** panel.

Adobe Photoshop

1 Start Adobe Photoshop and open the file you want to preview.

2 Choose **File > Export > Matrox WYSIWYG Preview**.

Autodesk 3ds Max

1 Start Autodesk 3ds Max and open the file you want to preview.

2 Open the **Render Scene** dialog box by choosing **Rendering > Render Setup**.

3 Click the **Common** tab.

4 Under **Render Output**, click **Devices**.

5 In the **Select Image Output Device** dialog box, select **Matrox WYSIWYG Preview**, and click **OK**.

6 Click **Render**.

Autodesk Combustion

1 Start Autodesk Combustion and open the file you want to preview.

2 Choose **File > Preferences > Framebuffer**.

3 In the menu beside **Framebuffer Type**, select **Matrox WYSIWYG Preview**, and click **OK**.

eyeon Fusion

1 Start eyeon Fusion and open the file you want to preview.

2 Right-click on the file, and choose **View On > Matrox WYSIWYG Preview**.

NewTek LightWave 3D

1 Start NewTek LightWave 3D and load the file you want to preview by choosing **File > Load > Load Scene**.

2 Click the **Render** tab.

3 Under **Options** on the left hand side of the screen, click **Render Globals**.

4 From the **Render Display** menu, select **Matrox WYSIWYG Preview**.

5 Under **Render** on the left hand side of the screen, click **Render Frame**.

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Using MXO2 with Adobe and Microsoft Live Media Encoders

This chapter explains how to use your Matrox MXO2 system as an input device to feed live video and audio to Adobe Flash Media Live Encoder or Microsoft Expression Encoder.

Overview

You can use your Matrox MXO2 system as an input device to feed live video and audio to Adobe Flash Media Live Encoder or Microsoft Expression Encoder. This lets you stream media for broadcasting live events such as sports, concerts, news, educational seminars, and corporate meetings. For example, you can select any video and audio source connected to the MXO2 inputs as your A/V sources for use with Adobe Flash Media Live Encoder, scale the incoming video to the streaming format that you want using the MXO2 hardware scaler, and stream the live video and audio to a public distribution website or your dedicated IP hosting site. While working in your encoding application, live video and audio passthrough are provided so that you can monitor the source material that you're encoding using the MXO2 video and audio outputs.

Because the MXO2 hardware scaler is used to scale your incoming video, you don't need to perform any additional scaling in your encoding application. This feature provides high-quality scaling of HD and SD video for live media streaming, and frees up your system's CPU to perform other tasks.

Note You won't be able to use your streaming media application with MXO2 if you're currently running another application that uses your MXO2 hardware, such as Matrox A/V Tools. You must close other applications that use your MXO2 hardware before starting your streaming media application.

Specifying your settings for media streaming

The following instructions are guidelines for using MXO2 with Adobe Flash Media Live Encoder or Microsoft Expression Encoder.

1 Connect the video and audio input sources that you want to stream to the corresponding inputs on your MXO2 hardware.

Note If you want to stream HDMI or SDI embedded audio only, you must have a valid HDMI or SDI video source containing the audio that you want to stream, although the video won't be streamed. To perform audio-only streaming of other types of audio input, you'll need to select a video source when you configure your Matrox A/V settings, but this source doesn't need to be connected or have a valid video input signal unless you select an HDMI or SDI source.

2 Start your streaming media encoding application and select **Matrox A/V Input** as your source video and audio devices.

3 Click the button that your application provides for configuring your video device settings (you configure both your video and audio settings using the

source video device settings only). This displays a dialog box similar to the following:
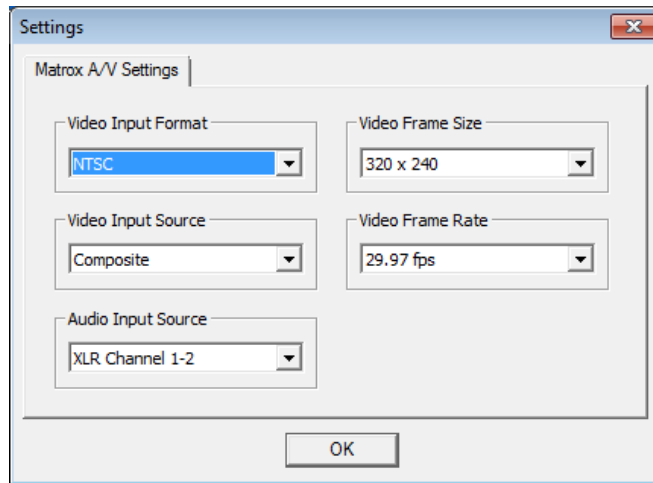
4 From the **Video Input Format** list, select the video format that matches your source video. For a list of the video input formats supported on the various MXO2 inputs, see "Supported input formats" on page 294.

**5** From the **Video Input Source** list, select the type of video input you want to stream. For example, to stream video from your composite source, select **Composite**. The available video input sources depend on your selected video input format.

6 From the **Audio Input Source** list, select your audio source. For example, if you want to stream channels 1 and 2 of your XLR (balanced analog) audio input, select **XLR Channel 1-2**. The available audio input sources depend on your selected video input source. You can stream stereo audio only (two input channels).

Note   When streaming HDMI embedded audio, only uncompressed embedded audio is supported.

7 From the **Video Frame Size** list, select the frame size you want for your streaming video. If required, your source video will be scaled to your selected frame size for use with your media encoding application.

8 From the **Video Frame Rate** list, select the frame rate that you want for your streaming video. The available frame rates depend on your selected video input format. For example, if your source video's frame rate is 29.97, you can select a frame rate of 14.98 or 29.97.

Important   To avoid having your media encoding application perform additional scaling or frame rate conversions, make sure that the video frame

size and frame rate specified in your application match the frame size and frame rate that you selected for your Matrox A/V settings.

9   Click **OK** to save your settings and return to your media encoding application. You should see your selected video source play back in your application's live preview window. If you don't see your source video, check that your Matrox MXO2 hardware and selected video source are properly connected.

10 If you want to stream audio only, clear the option to enable video encoding in your application.

11 If your application provides an audio input volume control, you can use it as needed to adjust the volume of the incoming audio for streaming.

For details on how to specify additional encoding settings and stream your live video and audio, refer to the documentation for your streaming media encoding application.

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Using Matrox MXO2 with Livestream Procaster

This chapter explains how to use your Matrox MXO2 system as an input device to feed live video and audio to Livestream Procaster.

Overview

You can use your Matrox MXO2 system as an input device to feed live video and audio to LivestreamProcaster. This lets you stream media for broadcasting live events such as sports, concerts, news, educational seminars, and corporate meetings. For example, you can select any video and audio source connected to the MXO2 inputs as your A/V sources for use with Procaster, and stream the live video and audio to your Livestream channel.

Note   You won't be able to use Procaster with MXO2 if you're currently running another application that uses your MXO2 hardware, such as Matrox A/V Tools. You must close other applications that use your MXO2 hardware before starting Procaster.

Specifying your settings for media streaming

This section provides instructions on how to use MXO2 as the input device for video and audio in LivestreamProcaster.

Note   To use Livestream Procaster, you must have a Livestream account. If you don't already have an account, you can register for one by clicking **Register** when you start Procaster.

1 Connect the video and audio input sources that you want to stream to the corresponding inputs on your MXO2 hardware.

2 Start Livestream Procaster, enter your username and password, then click **LOGIN**.
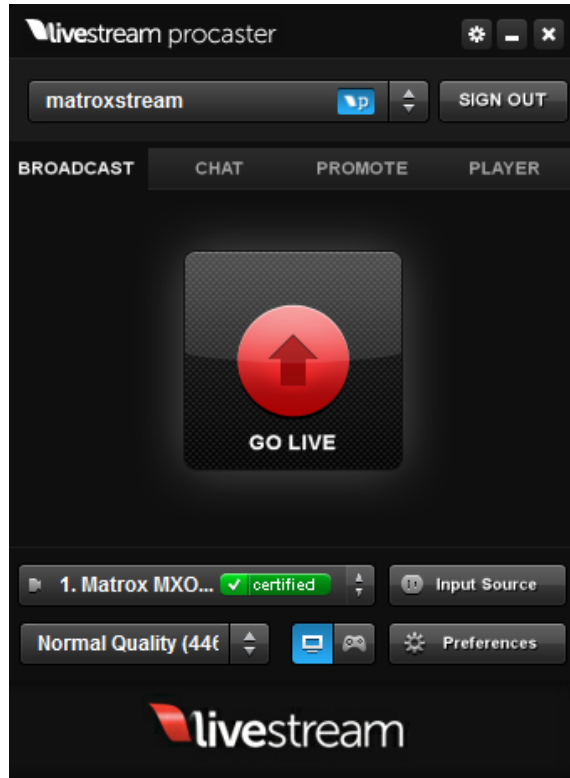
3 Below the **GO LIVE** button, your Matrox hardware will automatically be selected as your video input source.

4 Click **Input Source** to display the input source page, similar to the following example:
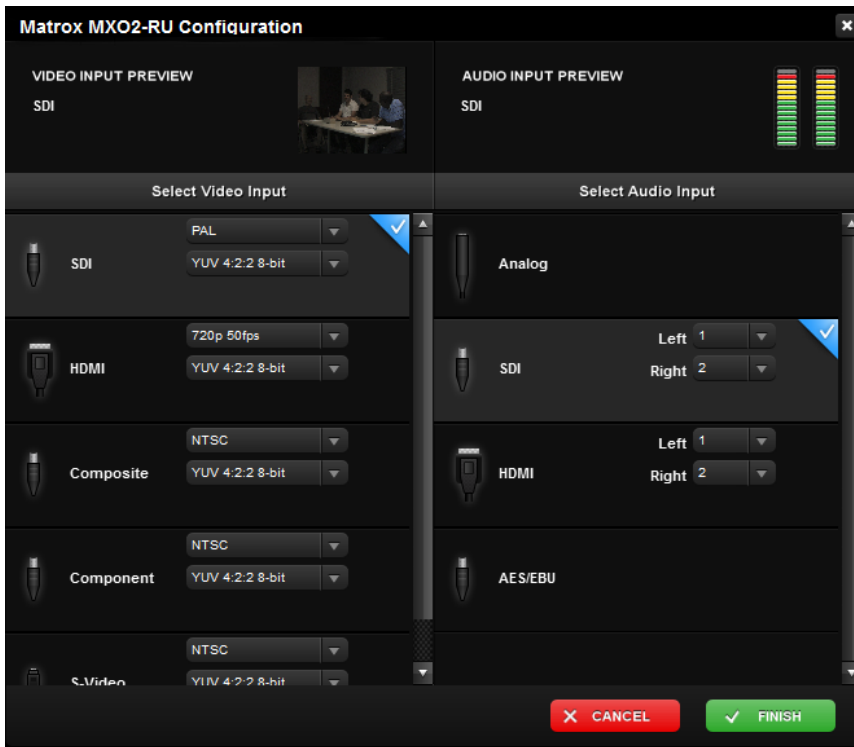
✎ **Note** The available video and audio inputs depend on your Matrox MXO2 hardware.

5 Under **Select Video Input**, select the video input source and format that match your source video. You should see a preview of your selected video source play back at the top of the page. If you don't see your source video, check that your Matrox MXO2 hardware and selected video source are properly connected. For a list of the video input formats supported on the various MXO2 inputs, see "Supported input formats" on page 294.

6 Under **Select Audio Input**, select the audio input that you want to stream. You can stream stereo audio only (two input channels). The levels for your audio input should appear at the top of the page.

7 Click **Finish** and select your desired encoding settings as explained in your Procaster documentation.

8 Click the **GO LIVE** button to start the streaming.

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Using Matrox MXO2 with Telestream Wirecast

This chapter explains how to stream and record your video and audio input feeds using Matrox MXO2 in Telestream Wirecast.

Overview

You can use Matrox MXO2 or any combination of Matrox I/O devices (MXO2 and Mojito MAX products) to feed live video and audio to Telestream Wirecast for streaming, and simultaneously record your original feeds to disk. The easy-to-use Matrox ISO recording tool lets you create high-quality ISO recordings of your feeds, ready for post-event editing in your favorite editing application.

Using Wirecast, you can choose any stereo pair for your streaming production. When streaming HDMI or SDI video, you can simultaneously record up to eight channels of embedded audio to disk using the Matrox ISO recording tool. You have complete flexibility to go from a simple stereo mix to surround sound for your post-event editing needs.

Specifying your settings for media streaming

This section provides instructions on how to use your Matrox hardware for video and audio streaming in Telestream Wirecast.

1 Connect the video and audio input sources that you want to stream to the corresponding inputs on your Matrox hardware.

2 In Telestream Wirecast, click ▨ to add a new Matrox shot for the input source that you want to stream, and then select your Matrox device (do **not** select Matrox A/V Input).

✎ **Note** If you have multiple Matrox I/O devices, you must add a Matrox shot for each input source that you want to stream, such as for input 1, input 2, and input 3 to stream from three devices.

3 For each Matrox shot added in step 2, select the shot, click ▨ , and then select your Matrox device as the audio source for the shot. Alternately, you can select a system audio source for your shot.

✎ **Note** For a Matrox device or system audio source to appear in the list of audio sources, a shot must have been added for that Matrox device or system audio source (see step 2).

4 To configure your source settings, choose **Sources > Show Sources Settings**.
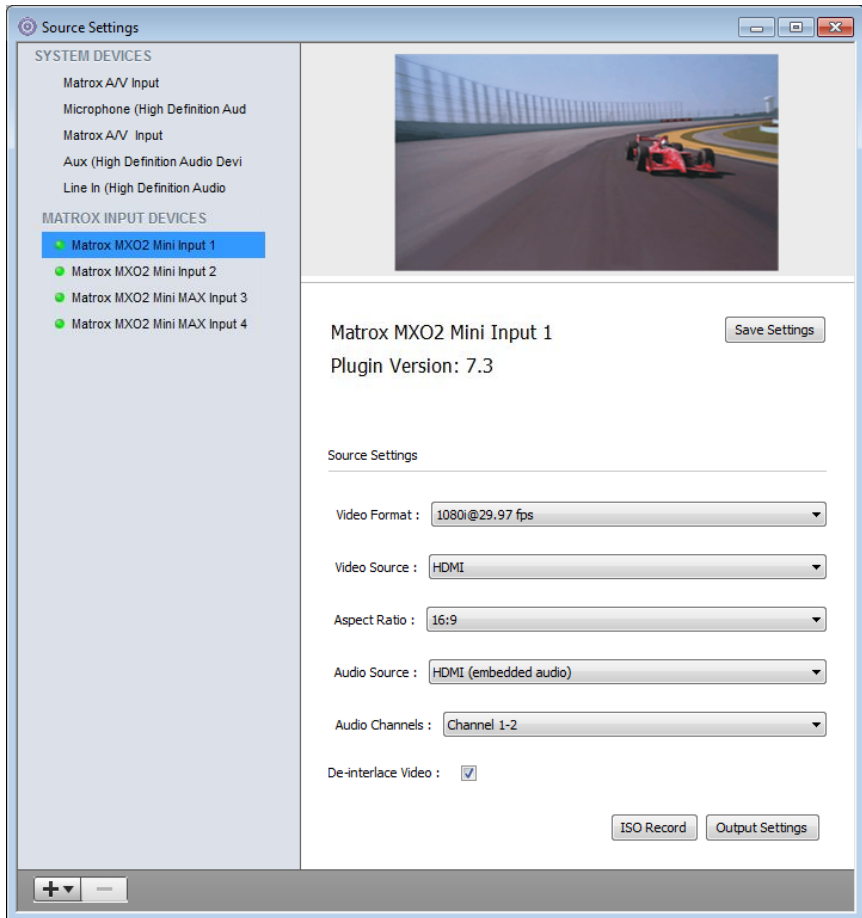
5 In the **Source Settings** dialog box, under **MATROX INPUT DEVICES**, select the Matrox device that you want to configure, and then specify the following settings:

– From the **Video Format** list, select the video format that matches your source video. For a list of the video input formats supported on the various MXO2 inputs, see "Supported input formats" on page 294.

– From the **Video Source** list, select the type of video input you want to stream. For example, to stream video from your HDMI source, select **HDMI**. The available video input sources depend on your selected video input format.

- **Aspect Ratio**   Specify the aspect ratio of your SD source video. For HD sources, this option is automatically set to 16:9.

- From the **Audio Source** list, select your audio source. For example, if you want to stream your HDMI embedded audio input, select **HDMI (embedded audio)**. The available audio input sources depend on your selected video input source. This setting is ignored if you selected a system audio source for your Matrox shot (see step 3).

Note   When streaming HDMI embedded audio, only uncompressed embedded audio is supported.

- **Audio Channels**   Based on your selected audio source, select the audio pair that you want to stream with your source video. Telestream Wirecast outputs one stereo pair when streaming.

- **De-interlace Video**   If your source video is interlaced (i) and you want to de-interlace your video before encoding, select **De-interlace Video**. This option is used to better display your encoded video on a monitor that displays lines progressively, such as an LCD or computer monitor.

6   Click **Output Settings** to specify the settings that you want for monitoring your source video and audio on your Matrox hardware as explained in "Specifying your output settings" on page 226.

7   Click **Save Settings** to save the source settings for the selected Matrox device. The saved source settings are automatically loaded when Wirecast opens, and when creating a new Wirecast document.

8   If you have multiple Matrox devices, repeat steps 5 to 7 to configure and save the required settings for each device.

9   Set any additional encoding options in Telestream Wirecast as you would normally, and then output your video.

Note   To scale your source video for streaming to another video format, use the scaling options that are available in Telestream Wirecast.

If you want to simultaneously record your original feeds to disk, see the next section, "Specifying your settings for Matrox ISO recording."

Specifying your settings for Matrox ISO recording

Your Matrox hardware not only sends your source feeds to Wirecast for streaming (see "Specifying your settings for media streaming" on page 212), it can also simultaneously record your original feeds to disk using the Matrox ISO recording tool. You can, however, record your feeds without streaming.

You can choose to record your input sources to disk using various Matrox codecs. You can use the Matrox MPEG-2 I-frame codec to create *.avi* files, a Matrox DV codec, such as DVCPRO or DVCPRO HD, to create *.mov* files, and the Matrox MAX H.264 codec on Matrox I/O devices that have MAX technology to create *.mp4* files.

Depending on your selected audio source, you can also choose to record up to eight audio channels as separate mono or stereo *.wav* or *.aac* files. A log file (*Record.Log*) is generated after every recording session, wherein you can view the events for each recording (see "Record log file" on page 226).

Note All settings in the **Matrox ISO Record** dialog box are automatically saved.

1 Connect the video and audio input sources that you want to record to the corresponding inputs on your Matrox hardware.

2 To configure your source settings, choose **Sources > Show Sources Settings**.
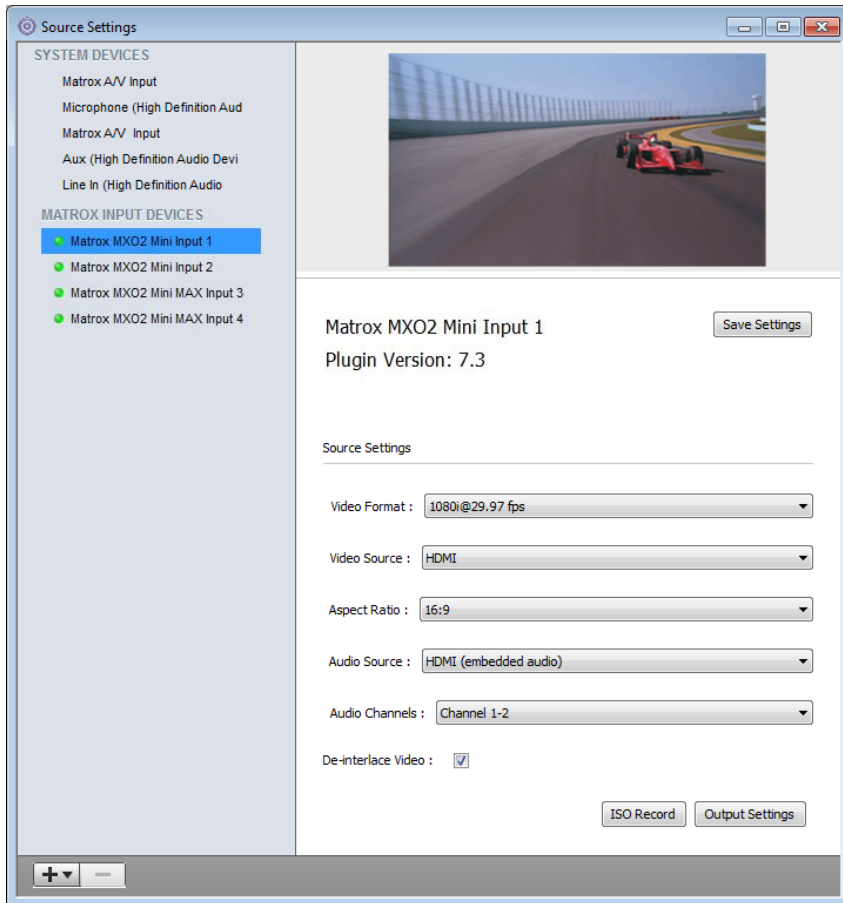
3 In the **Source Settings** dialog box, under **MATROX INPUT DEVICES**, select the Matrox device that you want to configure, and then specify your source settings for recording as follows:

– From the **Video Format** list, select the video format that matches your source video. If your video input is not presently connected because you want to connect it later during your recording session, select the video format that matches the input that you'll be connecting. For a list of the video input formats supported on the various MXO2 inputs, see "Supported input formats" on page 294.

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- From the **Video Source** list, select the type of video input you want to record. For example, to record video from your HDMI source, select **HDMI**. The available video input sources depend on your selected video input format.

- **Aspect Ratio**   Specify the aspect ratio of your SD source video. For HD sources, this option is automatically set to 16:9.

- From the **Audio Source** list, select your audio source. For example, if you want to record your HDMI embedded audio input, select **HDMI (embedded audio)**. The available audio input sources depend on your selected video input source.

📝 **Note**   When recording HDMI embedded audio, only uncompressed embedded audio is supported.

4 Click **Output Settings** to specify the settings that you want for monitoring your source video and audio on your Matrox hardware as explained in "Specifying your output settings" on page 226.

5 If you have multiple Matrox devices, repeat steps 3 and 4 to configure the source and output settings that you want for each device.

6 Click **ISO Record** to open the Matrox ISO recording tool:
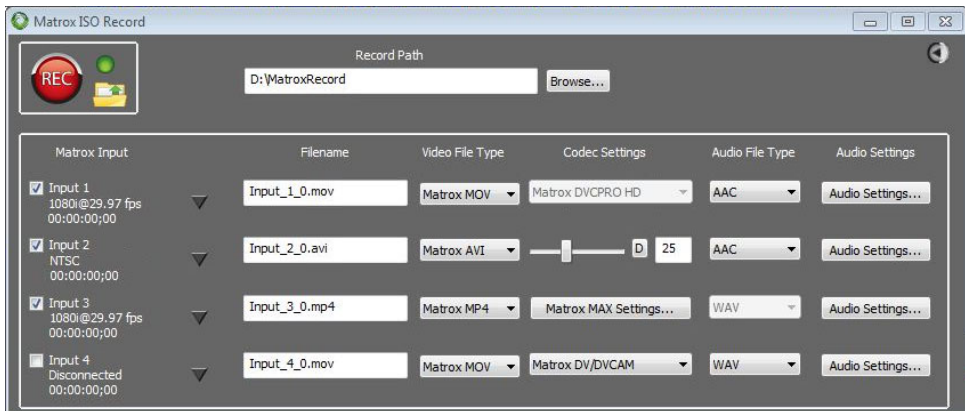
7 Select the settings that you want for recording as explained in "Specifying settings in the Matrox ISO recording tool" on page 218.

8 Click 🔴 to start recording your selected inputs. Click ⏹ to stop the recording session. You can also start and stop the recording of individual inputs during a recording session (see "Input recording" on page 223).

ⓘ **Important**   If the status light turns red when recording, this indicates that one or more of the selected inputs experienced dropped or skipped frames. After the recording session ends, check the *Record.Log* file to see the dropped/skipped events for your recording session (see "Record log file" on page 226).

Specifying your settings for Matrox ISO recording

9 Click to open Windows Explorer at the specified **Record Path** location to view the recorded video/audio files, including the record log file (*Record.Log*).

Once you've finished recording, you can import your recorded video and audio files into an editing application, such as Adobe Premiere Pro, for post-event editing.

Specifying settings in the Matrox ISO recording tool

To specify the settings that you want for recording your clips, select any Matrox device under **MATROX INPUT DEVICES** in the **Source Settings** dialog box, and then click the **ISO Record** button.
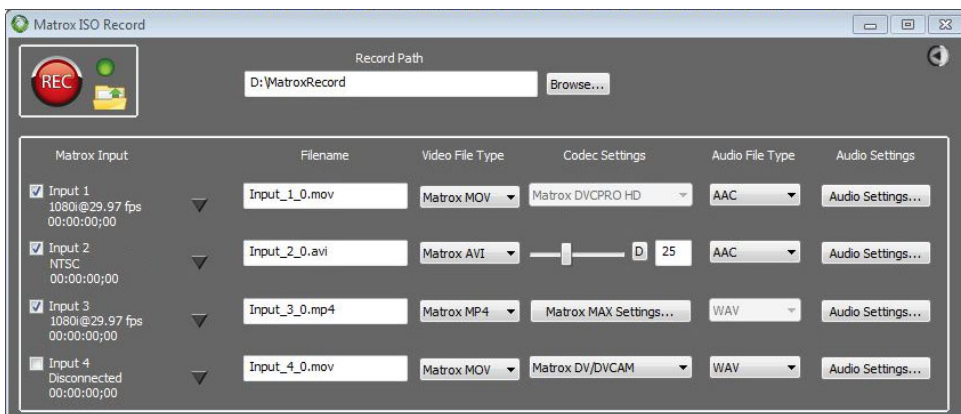
📝 **Note** You can hide or show the settings in the **Matrox ISO Record** dialog box by clicking or respectively.

Record path
Under **Record Path**, specify the destination where all your recorded clips will be stored, or click **Browse** to select the location that you want. Every recording session generates a separate subfolder within the specified location, in the form YYYY-MM-DD HHMMSS, which contains the recorded video and audio files, and the log file (*Record.Log*) for that recording session.

Input selection
Under **Matrox Input**, select the Matrox input(s) that you want to record. You can also select or clear an input during a recording session (see "Input recording" on page 223). You must have a valid input signal in order for an input to be recorded. For more information on the input states and how they affect recording, see "Input states and video formats" on page 225."

Preset selection

If you'd like to load a preset to apply Matrox ISO record settings to an input, click ▼ beside the input, choose **Load Preset**, and select the preset that you want in the displayed dialog box. Matrox presets are provided for recording *.mp4* files on devices that have Matrox MAX technology. For more details on this feature, see "Saving and loading record presets" on page 221.

✎ **Note** When you load a preset, the video file type, codec settings, audio file type, and audio settings are applied according to the preset. You can customize any of these settings if needed as explained in the following sections. You can also copy and paste the settings from one Matrox input to another as explained in "Copying and pasting record settings" on page 222.

Filename

In the **Filename** box for each Matrox input, specify the base name for your recorded files. A default base name is provided, but you can change this name if you want. The base name applies to both the video and audio files that are recorded, but the naming conventions for video and audio files differ (see "Matrox ISO recording file naming conventions" on page 222").

Video file type selection

Under **Video File Type** for each Matrox input, select one of the following:

- **Matrox AVI** Creates an MPEG-2 I-frame *.avi* file with embedded stereo PCM (WAV) audio.
- **Matrox MOV** Creates an *.mov* file in a selected DV format, such as DVCPRO or DVCPRO HD, with embedded stereo or mono PCM (WAV) audio. This option is not available for 1080p @ 24 fps source video.
- **Matrox MP4** Creates a Matrox MAX H.264 *.mp4* file with embedded stereo AAC audio. This option is available only for Matrox I/O devices that have Matrox MAX technology.

✎ **Note** Audio will be embedded in the file only if you choose to record audio with your video (see "Audio settings" on page 220).

Codec settings

Under **Codec Settings**, specify the settings that you want for each Matrox input as follows:

- If the **Video File Type** is set to **Matrox AVI**, use the provided slider to select the data rate (in Mb/sec) at which the Matrox MPEG-2 I-frame codec will record your source video to disk. The last setting for an SD or HD source is automatically saved and loaded when an SD or HD source is connected to the input. Click ⬚D to set the data rate to the default value for an SD or HD input source.

- If the **Video File Type** is set to **Matrox MOV** and your source video is HD, the codec will be set to **Matrox DVCPRO HD**. For SD source video, you can select one of the following codecs for recording your video:
  - **Matrox DV/DVCAM**   Records video to DV or DVCAM format.
  - **Matrox DVCPRO**   Records video to DVCPRO format.
  - **Matrox DVCPRO50**   Records video to DVCPRO50 format.
- If the **Video File Type** is set to **Matrox MP4**, click **Matrox MAX Settings** to customize the Matrox MAX H.264 codec settings. The settings are the same as when you export clips as explained in "Specifying your Matrox MAX H.264 settings" on page 248.

Audio file type

When recording a video input, you can also record the input from your selected audio source. If you choose to record audio (see "Audio settings" below), audio will be embedded in the resulting video file. Unless you choose to record embedded audio only, separate *.wav* or *.aac* audio files will also be created.

Under **Audio File Type** for each Matrox input, select the type of separate audio files that you want to create:

- **WAV**   Records PCM audio to separate *.wav* files.
- **AAC**   Records AAC audio to separate *.aac* files.

Audio settings

Click **Audio Settings** for each Matrox input to specify the settings that you want for your recorded audio:
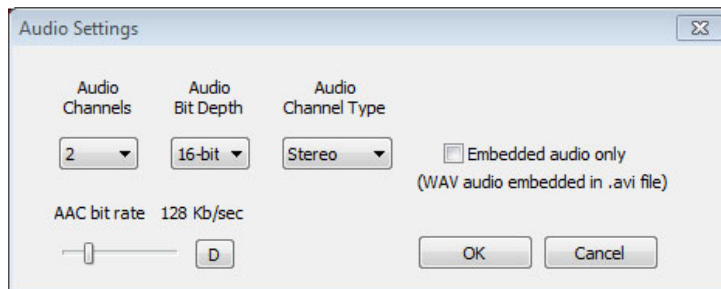
- **Audio Channels**   Specifies the number of channels to record from your selected audio source:
  - When **0** is selected for this option, the audio input is not recorded. Therefore, audio will not be embedded in the video file, and separate audio files will not be created.
  - When **2**, **4**, **6**, or **8** is selected, the Matrox ISO recording tool embeds the first audio pair (channel 1-2) from your audio source in the video file.

Unless you choose to record embedded audio only, separate *.wav* or *.aac* audio files will be created for the first two, four, six, or eight audio channels from your audio source respectively (the number of available audio channels depends on your selected audio source).

- **Audio Bit Depth** If **2**, **4**, **6**, or **8** is selected for **Audio Channels**, select the bit depth that you want for your recorded audio.

- **Audio Channel Type** If **2**, **4**, **6**, or **8** is selected for **Audio Channels**, select the channel type that you want for your recorded audio:

  – **Mono** Creates a separate *.wav* or *.aac* audio file for every selected channel. For example, if four audio channels are selected, four mono audio files will be created. The embedded audio in an *.mov* file will also be mono (not supported for embedded audio in an *.avi* or *.mp4* file, which is always stereo).

  – **Stereo** Creates a separate *.wav* or *.aac* audio file for each audio pair selected. For example, if four audio channels are selected, two stereo audio files will be created. The embedded audio in an *.avi*, *.mov*, or *.mp4* file will also be stereo.

✎ **Note** Separate *.wav* audio files can have a maximum file size of 4 GB. See "WAV audio recording" on page 224 for the approximate maximum duration for a separate *.wav* audio file based on the audio settings. This limitation does not apply to separate *.aac* audio files.

- **Embedded audio only** Select this if you want to embed the first audio pair (channel 1-2) in the video file only. Separate audio files will not be created (the **Audio File Type** will be ignored). If you're recording to an *.avi* or *.mp4* file, the **Audio Channel Type** will be set to **Stereo**.

- **AAC bit rate** For AAC audio, drag the bit rate slider to select the bit rate (in kilobits per second) that you want for your recorded audio. This slider is available for separate *.aac* audio files and embedded audio in *.mp4* files only.

Saving and loading record presets

Once you've specified the Matrox ISO record settings that you want for a Matrox input, you can save your settings as a custom preset and load the preset at any time to apply those settings to an input in the **Matrox ISO Record** dialog box. Matrox presets are provided for recording *.mp4* files on devices that have Matrox MAX technology. You can load and customize these presets as needed to suit your needs.

- To save your settings for a Matrox input as a custom preset, click ▼ beside the input and choose **Save Preset**. You'll then be prompted to enter a name for your preset. Because the video file type is saved in the preset, you should include the video file type, such as AVI, in your preset name so that you can easily identify your custom presets.

- To load a preset for a Matrox input, click ▼ beside the input, choose **Load Preset** and select the preset that you want in the displayed dialog box. Only presets that are compatible with your input's video format will be listed, and a Matrox preset will be listed only if your input is for a device that has Matrox MAX technology.

✎ **Note** To delete a custom preset, select the preset and click 🗑.

Copying and pasting record settings

If you have multiple Matrox inputs in the **Matrox ISO Record** dialog box, you can copy and paste your record settings from one input to another.

- To copy the settings for a Matrox input, click ▼ beside the input and choose **Copy**.

- To paste the copied settings to another Matrox input, click ▼ beside the input and choose **Paste**. The video file type, codec settings, audio file type, and audio settings that are compatible with your Matrox input are applied. Default settings will be applied for any incompatible settings.

✎ **Note** Settings for the **Matrox MP4** video file type can be pasted only to an input for a device that has Matrox MAX technology.

Matrox ISO recording file naming conventions

The base name specified under **Record Path** in the **Matrox ISO Record** dialog box applies to both the video and audio files that are recorded, but the naming conventions for video and audio files differ as follows:

- **Video files** Recorded *.avi*, *.mov*, and *.mp4* video files contain the base name, Matrox input, and recording number using the following convention:

  basename_input_recordingnumber.avi, or *.mov*, or *.mp4*

  For example, if the base name for input 1 is *Record* and the **Video File Type** is set to **Matrox AVI**, the resulting file will be named *Record_1_0.avi*. You can also have more than one recording for a Matrox input. In this case, the files are differentiated by a recording number. This occurs when:

  - You clear and then re-select an input during a recording session. This creates a different file for each selection sequence. For example, if you're recording input 1 to an *.avi* file with the base name *Record*, and you select input 1 three times during a recording session, the resulting video files will be *Record_1_0.avi*, *Record_1_1.avi*, and *Record_1_2.avi*.

  - You disconnect the source from your selected input during a recording session, and then reconnect a source to that input. For example, if you're recording the video connected to input 1 to an *.avi* file, and then you connect a source with the same or a different video format to the input, the resulting video files will be *Record_1_0.avi* and *Record_1_1.avi*. If you

connect a source with a different video format, however, you must select the source's video format in the **Source Settings** dialog box.

- **Audio files**   If you're recording to separate *.wav* or *.aac* audio files, the audio files are named the same as the video files, except that they also include the audio channel type (mono or stereo) and an incremental suffix using the following convention:

basename_input_recordingnumber_channeltypesuffix.wav or *.aac*

For example, if you're recording input 1 to separate *.wav* files with the base name *Record*, **Audio Channels** is set to **8**, and **Audio Channel Type** is set to **Stereo**, the resulting audio files will be named *Record_1_0_Stereo1.wav*, *Record_1_0_Stereo2.wav, Record_1_0_Stereo3.wav,* and *Record_1_0_Stereo4.wav*. If **Mono** is selected as the **Audio Channel Type**, eight files will be created instead of four, and the files will be named *Record_1_0_Mono1.wav, Record_1_0_Mono2.wav, Record_1_0_Mono3.wav,* and so on.

Record functionality

This section describes the Matrox ISO recording functionality regarding the recording session, record time code, and input recording.

Recording session

A recording session begins when you click 🔴 , and ends when you click ⏹ . You must have a valid input signal in order for your selected input to be recorded. See "Input recording" on page 223 for the input recording methods.

ⓘ **Important**   If the status light turns red when recording, this indicates that one or more of the selected inputs experienced dropped or skipped frames. After the recording session ends, check the *Record.Log* file to see the dropped/skipped events for the recording session (see "Record log file" on page 226).

Record time code

Starting a recording session also starts the record time code for a selected input. Depending on the video input frame rate, the time code is displayed in either drop frame (HH:MM:SS;FF) or non-drop frame (HH:MM:SS:FF) SMPTE format. Drop frame format is used for NTSC, 23.98 fps, 29.97 fps, and 59.94 fps video, and non-drop frame format is used for all other video frame rates, such as PAL and 25 fps. If you select an input at any time during a recording session, the record time code for that input starts when you select the input. A recording's time code stops only when the recording ends for that input. See "Input recording" on page 223 for information on stopping an input recording.

Input recording

This section describes the various ways of recording an input source, and stopping an input recording.

Recording methods:

- **Selecting an input and then starting a recording session**   If an input is selected with a valid video signal when you start a recording session, a recording is created for that input. If the selected input is invalid or disconnected, the recording will start once a valid signal is connected to the input. See "Input states and video formats" on page 225 for information on how to determine the video format of an "invalid input."

- **Selecting an input during a recording session**   You can select an input at any time during a recording session to begin recording that input. If you clear and then re-select an input during the same recording session, a separate file will be created for each selection sequence. The files are differentiated by a recording number (see "Matrox ISO recording file naming conventions" on page 222).

- **Connecting an input source during a recording session**   You can connect a valid input source to an unselected input during a recording session, and then select the input to record your source feed.

To stop an input recording:

- **Clear an input during a recording session**   Clearing a selected input during a recording session stops the recording for that input. This is done without affecting the recording of other selected inputs.

- **Disconnect an input during a recording session**   If you disconnect a selected input's source, the recording will stop. You can later connect a source with the same or a different format to start recording to a new file. If you connect a source with a different video format, however, you must select the source's video format in the **Source Settings** dialog box.

- **Stop the recording session**   Click 🔴 to stop the recording session. The input recording will stop for your selected input.

WAV audio recording

When you record audio to separate *.wav* files along with your video, the *.wav* files can have a maximum file size of 4 GB. This means that depending on your specified audio settings, the *.wav* audio file has a maximum duration. This restriction does not apply to the embedded audio in the video file, which can last as long as the associated video. The following table lists the approximate maximum duration for a separate *.wav* audio file based on the audio settings:

Audio Channel Type	Audio Bit Depth	Approximate Maximum Duration
Mono	16-bit	12 hours
	24-bit	6 hours

Audio Channel Type	Audio Bit Depth	Approximate Maximum Duration
Stereo	16-bit	6 hours
	24-bit	3 hours

Record status

The **Matrox ISO Record** dialog box includes a record status indicator. If the indicator remains green throughout the entire recording session, all recordings completed without any dropped or skipped frames. If dropped or skipped frames occur during a recording, the indicator turns red for the duration of the recording. Check the *Record.Log* file to see the dropped/skipped events for your recording session (see "Record log file" on page 226).

Record status indicator
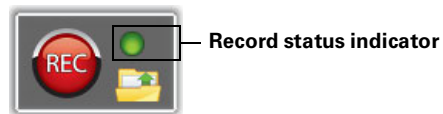
Input states and video formats

The video format that you selected in the **Source Settings** dialog box for your Matrox device is displayed in the **Matrox ISO Record** dialog box.

Input indicator
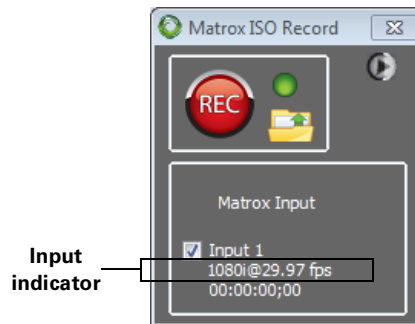
The following input states are displayed:

- **Valid input signal**   When a signal that matches the video format selected for your Matrox device is connected to the input, such as 1080i @ 29.97 fps, the video format is displayed under the input label. If the input is selected for recording, the resulting video file will be in the displayed video format.

✎ **Note**   For *.mp4* files, the created file will always be in a progressive video format. For example, 1080i @ 29.97 fps source video will be recorded to an *.mp4* file as 1080p @ 29.97 fps, and NTSC source video will be recorded as 480p @ 29.97 fps.

Specifying your settings for Matrox ISO recording

- **No input signal/Invalid input signal**   If your Matrox hardware detects no input signal or an invalid signal for an input, **Disconnected** or **Invalid Input Signal** will be displayed. If the input is selected, the input indicator switches between displaying the state (**Disconnected** or **Invalid Input Signal**) and the expected video format for that input. To record the input, you must connect a source that matches the displayed video format. If needed, change the video format for your Matrox device in the **Source Settings** dialog box as explained in "Specifying your settings for Matrox ISO recording" on page 215.

Record log file

After every recording session (see "Recording session" on page 223) a record log file (*Record.Log*) is generated. The *Record.Log* file is located in the same folder that contains the files for that recording session. When dropped or skipped frames occur during a recording session, the *Record.Log* file provides a breakdown of the events by input, and the time code of when the events occurred.

Specifying your output settings

To specify the output settings that you want for monitoring your source video and audio on your Matrox hardware, select your Matrox device under **MATROX INPUT DEVICES** in the **Source Settings** dialog box, and then click the **Output Settings** button.
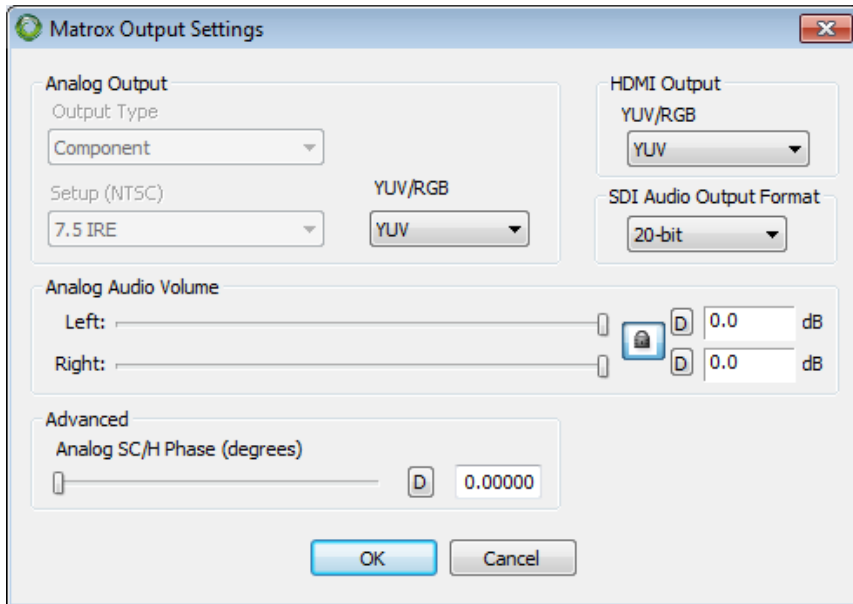
✎ **Note** In order to monitor the audio channels that you're streaming, you must connect your speakers to the output of your sound card (not your Matrox hardware), and make sure that your sound card is set as your default sound playback device in the Windows Control Panel. For a list of the supported video output formats for monitoring your source video, see "Supported video output formats for monitoring" on page 311.

1 Under **Analog Output**, you can specify the settings you want for your analog output from MXO2.

– **Output Type** Specifies the analog video output type. If you're outputting SD video on MXO2, MXO2 Rack, or MXO2 LE, this will be set to **All Available** to indicate that the output will be available on all the analog outputs. On MXO2 Mini, you can select **Component**, or **Composite & S-Video** if you're outputting SD video. When outputting HD analog video, the output type will be set to **Component** (on MXO2 Mini, the composite and S-Video outputs are invalid when outputting component video).

– **Setup (NTSC)** Use this to select the setup level you want for your NTSC analog video:

• **0 IRE** Applies a setup level of 0 IRE. You should select this option only when working with a commercial DV device that uses the Japanese analog NTSC setup of 0 IRE. For example, if the video appears too bright when you preview DV video on your NTSC monitor, you can change the setup to 0 IRE to output the video at the correct brightness.

• **7.5 IRE** Applies the standard NTSC setup level of 7.5 IRE.

– **YUV/RGB** Select **YUV** or **RGB** to set the type of video signal that is sent from the component output. For example, select **RGB** if you connected the component output to a device that accepts an RGB signal.

2 Under **HDMI Output**, select the type of video signal that you want to be sent from the HDMI output:

– **YUV** Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.

– **RGB - calibrated** Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading calibration settings using the Matrox HDMI Calibration Utility, see Chapter 7, "Calibrating Your HDMI Monitor for Video."

– **RGB - native** Outputs native RGB HDMI video that does not apply any calibration compensation. Select this when you want to disable the currently loaded Matrox HDMI calibration settings and output RG**B**

HDMI video from MXO2 using its native color settings for previewing video on your HDMI monitor.

3 Under **SDI Audio Output Format**, select the bit depth you want for your embedded SDI audio output (**20-bit** or **24-bit**). This setting is not available on MXO2 Mini.

4 Under **Analog Audio Volume**, drag the sliders to adjust the volume of your analog audio output. By default, the sliders are locked so that they move together. To move each slider independently, click the lock button ( ) to disable it.

5 Under **Advanced**, you can use the **Analog SC/H Phase** slider to advance or delay your analog video output's subcarrier phase with respect to the horizontal sync of the genlock source (for composite video only). This setting is not available on MXO2 Mini.

6 Click **OK** to save your settings.

16

Using the Matrox Video for Windows Codecs

This chapter explains how to use the Matrox Video for Windows codecs to render material to Matrox .avi files.

Overview

When using Video for Windows (VFW) programs to render material to an *.avi* file, you can use a Matrox VFW codec to create a Matrox *.avi* file. For example, you may want to render an animation to a Matrox MPEG-2 I-frame *.avi* file for use in your Adobe Premiere Pro projects on Matrox MXO2.

When rendering compositions or animations that have an alpha channel, you can select a "+ Alpha" Matrox VFW codec to render to a Matrox uncompressed or MPEG-2 I-frame *.avi* file that contains the alpha-key information. This *.avi* file will be automatically keyed when you place the clip in an Adobe Premiere Pro sequence.

The following sections explain the various settings that you need to make to render material to a Matrox *.avi* file using a VFW program. For details on exporting a sequence in Adobe Premiere Pro, see "Exporting to a Matrox .avi file" on page 84.

Note Although Matrox has tested many VFW programs, there may be certain operational limitations when using the Matrox VFW codecs with some of these programs (as well as with untested programs).

Using VFW programs without the MXO2 hardware

If you installed the Matrox VFW software codecs for use without the MXO2 hardware (see "Installing the Matrox VFW software codecs on a system without the MXO2 hardware" on page 10), you can render and play back Matrox *.avi* files using your VFW program without having the MXO2 hardware. For example, if you captured clips to Matrox MPEG-2 I-frame format using Adobe Premiere Pro, you could edit and play back those clips on a system without the MXO2 hardware, assuming that you installed the Matrox VFW software codecs on that system.

Before you start rendering

Before you start rendering material to a Matrox *.avi* file, make the following settings in your VFW program:

- Set the frame size (width and height) of your rendered material to full-screen, depending on the codec that you'll be using.
  - DV/DVCAM, DVCPRO, DVCPRO50, or MPEG-2 I-frame SD:
    - 720 × 480 to render to NTSC or 486p format.
    - 720 × 576 to render to PAL or 576p format.
  - Uncompressed SD:
    - 720 × 486 to render to NTSC or 486p format.
    - 720 × 576 to render to PAL or 576p format.
  - MPEG-2 I-frame HD:
    - 1280×720 to render to 720p format.
    - 1440×1080 to render to 1440×1080i/p format.
    - 1920×1080 to render to full-size 1080i/p format.
  - DVCPRO HD or Uncompressed HD:
    - 1280×720 to render to 720p format.
    - 1920×1080 to render to 1080i/p format.
- Set the appropriate frame rate for the video format to which you are rendering. For example, if you are rendering to PAL format, set the frame rate to 25 fps.
- If available, select the "Recompress" option. This allows you to render video using the same compression format, frame size, and frame rate as your source video but using a different data rate, scanning mode (interlaced or progressive), or bit depth (8-bit or 10-bit).
- If you'll be rendering audio, set the audio sample rate to 48 kHz and the sample size to 16-bit (mono or stereo).
- For best results, make sure that there is no data rate limit set in your program for rendered material. This ensures that your *.avi* files will be rendered at the particular data rate you select.

Note Before rendering a lot of material, check that your rendered animations and transitions such as wipes and slides play back smoothly. If they appear jumpy, try adjusting the field dominance or field order for your rendered material.

Selecting color space conversion options

When you render material to an *.avi* file using a Matrox VFW codec, you can determine how you want the luminance levels and chroma information to be processed during the color space conversion that's performed during the render.

Note The default settings for color space conversion provide good results for most applications. We recommend that you change these settings only when needed for special purposes.

To select the color space conversion options you want:

1 Choose **Start > All Programs > Matrox Mtx.utils** (or **Matrox VFW Software Codecs**) **> Matrox VFW Codec Configuration**.

2 In the provided dialog box under **Color Space Conversion**, select the options you want:
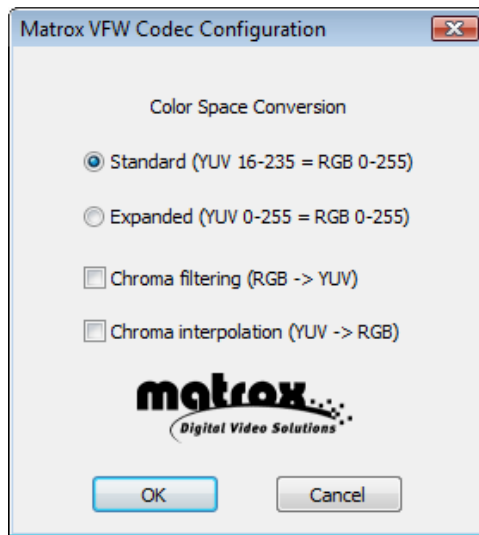
– **Standard** Renders video using standard broadcast luminance levels. Super black and super white luminance levels are clipped.

– **Expanded** Renders video using the full range of luminance levels. Super black and super white luminance levels are retained. You may want to use this setting, for example, to render material on which you'll be applying luminance key effects.

Important When rendering RGB graphics, selecting **Expanded** will create super black and/or white in your rendered images. For example, all black in your RGB graphics will become super black, and white will become super white. To render your RGB graphics with standard black and white levels, set your luminance range to **Standard**.

– **Chroma filtering** and **Chroma interpolation** Select these options to adjust the chroma bandwidth of RGB graphics. This improves images that have abrupt changes between different colors, such as a blue box on a black or white background. You should select these options for most animation and compositing work (computer-generated material). For most video editing programs, however, it's best that you **not** select these options. If you find that your rendered images appear to be blurred, try clearing one or both of these options.

3 Click **OK** to save your settings. Any change you make to your selected luminance range setting (such as switching from **Standard** to **Expanded**) will only take effect the next time you start your VFW program.

Rendering material to a Matrox VFW .avi file

When you render material to an *.avi* file, such as when you render a finished composition or an animation, you must select the compressor (codec) you want to create the file. The compressor determines the quality of your rendered video. Refer to your program's documentation for instructions on how to select a compressor for your *.avi* file.

If you want to export material from Adobe Premiere Pro to a Matrox *.avi* file, it's recommended that you use the Matrox AVI export format as explained in .

⟹ **To create a Matrox VFW .avi file:**

1 Select one of the following codecs from your program's list of available compressors:

– **Matrox DV/DVCAM** Renders video to DV or DVCAM format.

– **Matrox DVCPRO** Renders video to DVCPRO format.

– **Matrox DVCPRO50** Renders video to DVCPRO50 format.

– **Matrox DVCPRO HD** Renders video to DVCPRO HD format.

– **Matrox MPEG-2 I-frame** Renders video to MPEG-2 intra-frame format using the 4:2:2 Profile @ Main Level at a selected data rate (SD resolution only).

– **Matrox MPEG-2 I-frame + Alpha** Renders video to MPEG-2 intra-frame format with alpha using the 4:2:2 Profile @ Main Level at a selected data rate (SD resolution only).

– **Matrox MPEG-2 I-frame HD** Renders video to MPEG-2 intra-frame format using the 4:2:2 Profile @ High Level at a selected data rate.

– **Matrox MPEG-2 I-frame HD + Alpha** Renders video to MPEG-2 intra-frame format with alpha using the 4:2:2 Profile @ High Level at a selected data rate.

- **Matrox Uncompressed SD**   Renders video to 8-bit or 10-bit uncompressed SD format.
- **Matrox Uncompressed SD + Alpha**   Renders video to 8-bit or 10-bit uncompressed SD format with alpha.
- **Matrox Uncompressed HD**   Renders video to 8-bit or 10-bit uncompressed HD format.
- **Matrox Uncompressed HD + Alpha**   Renders video to 8-bit or 10-bit uncompressed HD format with alpha.

✎ **Note**   The Matrox Offline HD codec is not supported for rendering clips. This codec is provided only for playback of legacy Matrox Axio offline HD projects.

2 If you've selected a Matrox codec that requires configuration, click the button provided by your program that allows you to configure your codec settings. For more details, see the following sections.

Configuring the Matrox DVCPRO HD codec

When you choose to configure the Matrox DVCPRO HD codec, a dialog box similar to the following appears:
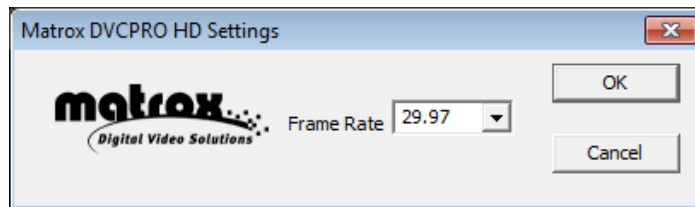
From the **Frame Rate** list, make sure that you select the frame rate that matches the frame rate specified for rendering video in your editing application.

Configuring the Matrox Uncompressed codecs

When you choose to configure a Matrox Uncompressed codec (SD or HD resolution), a dialog box similar to the following appears:
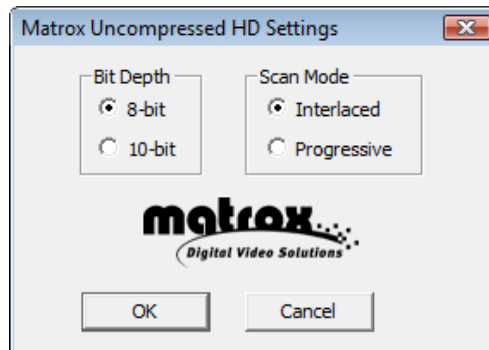
1 Under **Bit Depth**, select the bit depth you want for your video.

📝 **Note** Matrox RT.X2 does not support 10-bit uncompressed video.

2 Under **Scan Mode**, select the scan mode of your video.

3 Click **OK** to save your selection. The settings you selected will be used each time you render material with your program, until you change the settings again.

Configuring the Matrox MPEG-2 I-frame codecs

When you choose to configure a Matrox MPEG-2 I-frame codec (SD or HD resolution), a dialog box similar to the following appears:
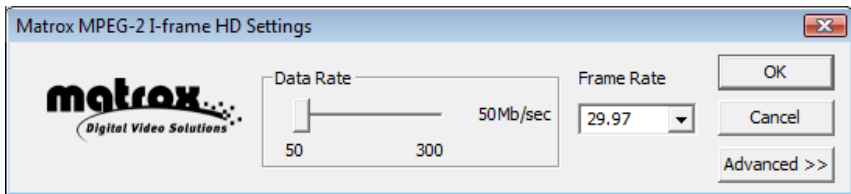
1 Drag the **Data Rate** slider until your desired data rate is displayed. The higher the data rate you select, the better the video quality will be. Depending on the capabilities of your system, however, you may not be able to smoothly play back video at a high quality using your VFW program.

2 Beside **Frame Rate**, select a frame rate from the list. Make sure the frame rate you select is appropriate for the format to which you are rendering.

3 To apply advanced settings to your MPEG-2 I-frame file, click the **Advanced** button.

📝 **Note** The default advanced settings should provide good results for most applications. It's recommended that you change these settings only when needed for special purposes.
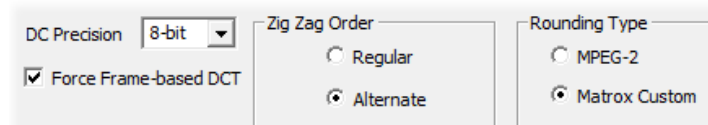
4 Beside **DC Precision**, select the bit-depth precision of the DC intra block. The higher the DC precision value that's used to render your video, the more likely that the DC content will be increased at the expense of the AC content in the encoded stream. This may result in lowering the overall quality of the compressed stream at a specified data rate.

5 Under **Zig Zag Order**, select one of the following:

Rendering material to a Matrox VFW .avi file

  – **Regular**   Sets the regular (default) zig zag scanning pattern of the AC coefficient of the DCT block as defined in the ISO/IEC 13818-2 (figure 7-2) specification documentation.

  – **Alternate**   Sets an alternate zig zag scanning pattern of the AC coefficient of the DCT block as defined in the ISO/IEC 13818-2 (figure 7-3) specification documentation. Use this setting when capturing or rendering video at a high data rate (for example, at a data rate of 100 Mb/sec or higher).

6 Under **Rounding Type**, select one of the following:

  – **MPEG-2**   Rounds the AC coefficients up to the nearest whole number when calculating the quantization coefficient.

  – **Matrox Custom**   Truncates the AC coefficients to the lowest whole number when calculating the quantization coefficient. In some cases, this setting may yield less artifacts in graphics.

7 Select the **Force Frame-based DCT** setting to render macroblocks as frames rather than as fields. In some cases, graphics will yield less artifacts if this option is selected.

8 Click **OK** to save your settings. The settings you selected will be used each time you render material with your program, until you change the settings again.

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Using the Matrox MAX H.264 Codec with Adobe Software

This chapter explains how to use the Matrox MAX H.264 codec on your Matrox MXO2 product with MAX technology or Matrox CompressHD card to export material to Blu-ray Disc and other media formats from Adobe Media Encoder, Premiere Pro, and Encore.

Exporting to Matrox MAX H.264 files using Adobe Media Encoder

If you have a Matrox MXO2 product with MAX technology or your system includes a Matrox CompressHD card, you can use the Matrox MAX H.264 codec on MXO2 or CompressHD to quickly and easily export material to H.264 files for Blu-ray Disc and other media formats from Adobe Media Encoder. Matrox presets are provided for creating *.264* elementary stream files in HD formats that are supported for Blu-ray Disc authoring using Adobe Encore, and *.mp4* files for creating files suitable for the web and mobile devices.

Your Matrox *.264* elementary stream files can be imported to Adobe Encore without having to transcode the files. If you prefer, you can choose to transcode your material to Matrox H.264 format for Blu-ray Disc authoring directly within Encore as explained in "Transcoding for Blu-ray Disc authoring in Adobe Encore" on page 245.

If you'd like to capture clips directly to Matrox MAX H.264 files, see Chapter 18, "Using Matrox MAX H.264 Capture."

Remarks

- When the Matrox MAX H.264 codec on your MXO2 is in use for export, your MXO2 inputs and outputs won't be available. You'll be able to continue working in Adobe Premiere Pro, but the video preview and output won't be updated until the encoding is complete. In order to perform a capture, use Matrox A/V Tools, or use the Matrox WYSIWYG plug-ins, you'll have to wait until the encoding is complete. These limitations, however, don't apply if your system includes a Matrox CompressHD card. In this case, the Matrox MAX H.264 codec on your CompressHD card will be used for the encoding, and your MXO2 hardware will be available for other tasks (except when embedding closed captioning in an exported Matrox *.mp4* file).

- When you export an Adobe Premiere Pro sequence, the speed of the export is affected by the rendering of any non-realtime sections of the sequence. If your sequence's video format matches your export format and you've rendered previews of non-realtime sections, you can select **Use Previews** in the **Export Settings** dialog box prior to performing your export. When you do this, Premiere Pro won't need to render the non-realtime sections for which you've already created preview files.

- If you want to export a single Adobe Premiere Pro sequence, you may find it more convenient and get faster results if you don't export from Adobe Media Encoder, and instead perform a direct export from Adobe Premiere Pro. You'll also need to perform a direct export if you want closed captioning in your sequence to be embedded in your exported Matrox *.mp4* file. For details

on this feature, see "Performing a direct export of an Adobe Premiere Pro sequence" on page 243.

To export material to a Matrox MAX H.264 file:

1   Start Adobe Media Encoder and add the clip, sequence, or composition that you want to export as explained in your Adobe documentation, then click **Settings** to display the **Export Settings** dialog box.
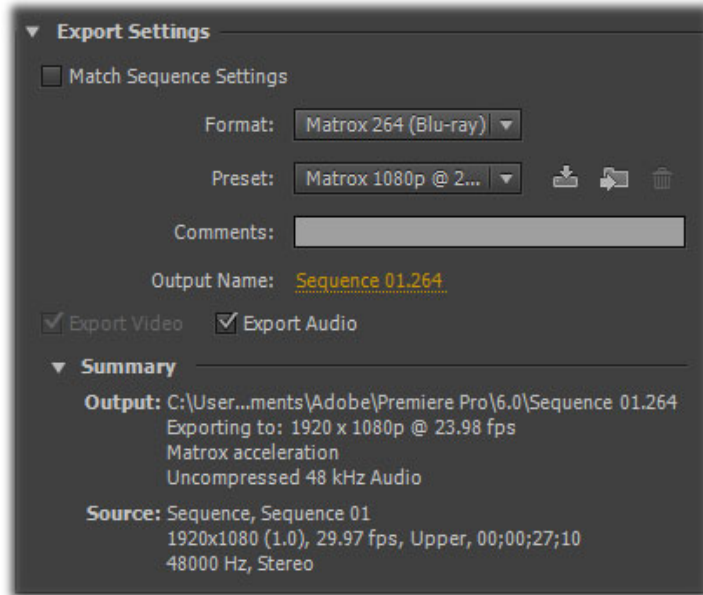
2   From the **Format** list, select one of the following Matrox formats:

– **Matrox 264 (Blu-ray)**   Creates a *.264* elementary stream file, which is supported for Blu-ray Disc authoring. Audio is exported as separate mono or stereo *.wav* files (PCM audio).

– **Matrox MP4**   Creates an *.mp4* file with embedded stereo AAC audio, which is suitable for the web and mobile devices.

3   From the **Preset** list, select the preset that matches the video format you want for your exported file. Appropriate video and audio settings are automatically set based on your selected preset.

> **Note**   If you're exporting to a Matrox *.mp4* file, two types of presets will be available—Fast Encode and High Quality. Select a Fast Encode preset for fast encoding that leverages your system's resources with your Matrox hardware. Select a High Quality preset for high-quality encoding that is performed entirely by your Matrox hardware, which frees your system's resources for other tasks.

Exporting to Matrox MAX H.264 files using Adobe Media Encoder

4 Select **Export Video** and **Export Audio** if you want to export both video and audio.

5 Click the **Video** tab to display the settings for your exported video.
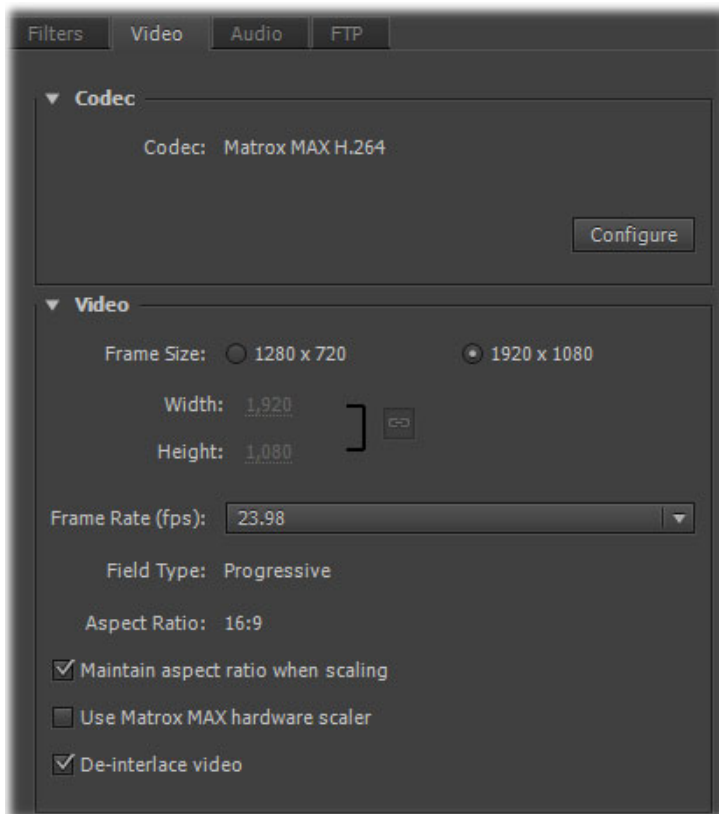
6 Under **Codec**, click **Configure** to customize your Matrox MAX H.264 codec settings as explained in "Specifying your Matrox MAX H.264 settings" on page 248.

Tip You can check the **Estimated File Size** at the bottom of the dialog box to determine the approximate file size of your exported material based on your currently selected settings. If needed, you can change your Matrox MAX H.264 settings to better meet your file size requirements, such as by selecting a different encoding type and lower data rate.

7 Under **Video**, you can customize the settings that you want for your exported video:

– **Frame Size** Sets the width and height for your exported video. When exporting to a Matrox *.264* file, the available frame sizes are **1920 x 1080** and **1280 x 720**. When exporting to a Matrox *.mp4* file, you can select a

frame size, or select **Custom (Square Pixels)** if you want to enter a custom size. If you enter an unsupported frame size, the closest supported frame size will be used.

– **Frame Rate**   Sets the frame rate for your exported video.

– **Field Type**   Indicates the order in which the video fields are displayed, such as **Upper First** for interlaced HD video, or **Progressive** for all progressive video formats.

– **Aspect Ratio**   This is set to **16:9** when exporting to HD. When exporting to SD, you can select **4:3** to export to the standard TV screen format, or **16:9** to export to the widescreen 16:9 format.

– **Maintain aspect ratio when scaling**   Select this option if you're scaling your source video for export, and you want to maintain your source video's aspect ratio. Your source video will be exported as pillarbox video when exporting to a larger aspect ratio, or letterbox video when exporting to a smaller aspect ratio. If this option is not selected, scaled video that doesn't match the specified aspect ratio for export will be exported as anamorphic video.

– **Use Matrox MAX hardware scaler**   Select this option if you're scaling your source video for export, and you want to use the Matrox MAX hardware scaler to perform the scaling. This gives good performance when scaling to an HD resolution. If you're downscaling to an SD or lower resolution, you can get a faster export by clearing this option, which allows Adobe to perform the scaling.

– **De-interlace video**   If you're exporting interlaced video to a progressive format (such as 1080i to 720p), select this option to de-interlace the video for display on a monitor that displays lines progressively, such as an LCD or computer monitor. (This option won't be present if you're exporting to an interlaced format or your source video is progressive.)

Exporting to Matrox MAX H.264 files using Adobe Media Encoder

8 Click the **Audio** tab to display the settings for your exported audio. The available settings depend on whether you're exporting to a Matrox *.264* or *.mp4* file.
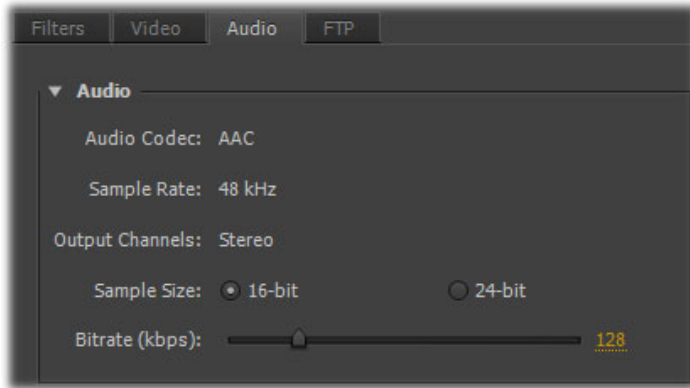
9 Under **Audio**, you can customize the settings that you want for your exported audio:

   – **Audio Codec**   This is set to **Uncompressed** when exporting to a Matrox *.264* file, or **AAC** when exporting to an *.mp4* file.

   – **Sample Rate**   This is set to **48 kHz**.

   – **Output Channels**   Specifies the audio channels to be exported (set to **Stereo** when exporting to a Matrox *.mp4* file).

   📝 **Note**   When exporting audio from an Adobe Premiere Pro sequence to a Matrox *.264* file, the available output channels depend on the type of audio tracks being exported. For example, you can select **Surround 5.1** to export 5.1 surround tracks to six mono *.wav* files. For a 16-channel track, you can select **Mono** or **Stereo** to export the audio to a single mono or stereo *.wav* file.

   – **Sample Size**   You can select **16-bit** or **24-bit**.

   – **Bitrate**   For AAC audio, drag the bitrate slider to select the bitrate you want for your exported audio.

10 Click **Start Queue** (▶) to start the export.

For more information about using Adobe Media Encoder and specifying export settings, see your Adobe Media Encoder or Premiere Pro documentation.

Performing a direct export of an Adobe Premiere Pro sequence

When you export an Adobe Premiere Pro sequence from within Adobe Media Encoder, additional processing is required to transfer the sequence from Premiere Pro to Media Encoder. If you want to export only a single sequence to a Matrox MAX H.264 file (*.264* or *.mp4* file), you may find it more convenient and get faster results by performing a direct export as explained in this section. If you'll be exporting to a Matrox *.mp4* file and you want the closed captioning in your sequence to be embedded in your exported file, you must perform a direct export from Adobe Premiere Pro because this feature is not supported when you export a sequence from Adobe Media Encoder.

Note   A direct export can't be used for batch encoding of Premiere Pro sequences. As well, you won't be able to work in Premiere Pro while your sequence is being exported. If you want to batch encode sequences to Matrox MAX H.264 files or continue to work in Premiere Pro while exporting, you must export from Media Encoder. To avoid problems, don't perform a direct export and use Media Encoder independently to export Matrox MAX H.264 files at the same time.

To perform a direct export of a Premiere Pro sequence:

1   Unless you want to export your entire sequence, position the work area bar over the section of the sequence you want to export.

2   Choose **File > Export > Media**.

3   In the **Export Settings** dialog box, select your desired Matrox format, preset, video settings, and audio settings as explained in "Exporting to Matrox MAX H.264 files using Adobe Media Encoder" on page 238 (see steps 2 to 9).

4 If you've attached a closed caption data file to your sequence and you'd like the closed captioning to be embedded in your exported Matrox *.mp4* file, under **Video**, select **Embed closed captioning in file**:
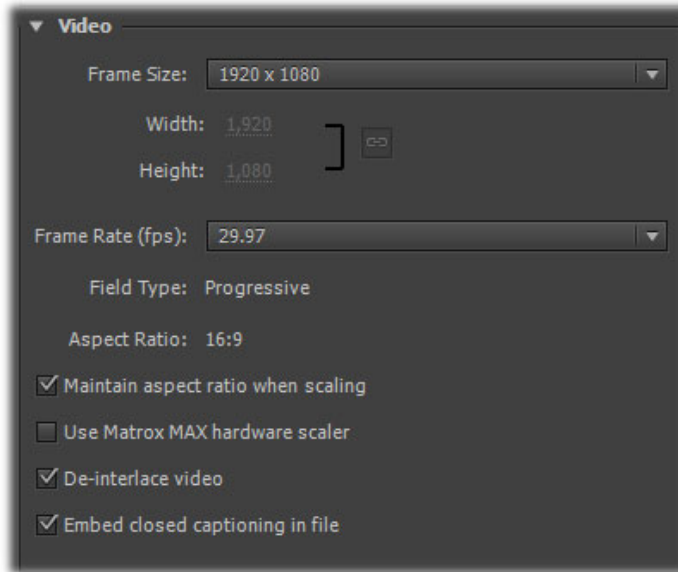
Remarks
- Your sequence can have either an attached *.mcc* or *.scc* data file. However, if you've attached an *.mcc* file to your sequence, it must contain CEA-608 data in order for the closed captions to be embedded in your exported Matrox *.mp4* file.
- Embedding of closed captioning is supported only when exporting a sequence that has a frame rate of 29.97 fps to an export format that also has a frame rate of 29.97 fps.
- The closed captioning in your Matrox *.mp4* file can be displayed when you play back the file using supported applications and mobile devices that are capable of playing back *.mp4* files with closed captioning. If you don't see the closed captioning when you play back your Matrox *.mp4* file, try changing the file's extension to *.m4v*.

5 From the **Source Range** list in the **Source** panel, select the range you want to export, such as **Work Area**.

6 Click **Export** to immediately start your export.

Transcoding for Blu-ray Disc authoring in Adobe Encore

Instead of exporting material to a Matrox *.264* file from Adobe Media Encoder or Premiere Pro and then importing the file into Adobe Encore for Blu-ray Disc authoring, you can choose to perform the transcoding directly within Encore. The transcoding will be accelerated using the Matrox MAX H.264 codec.

To transcode to Matrox H.264 format for Blu-ray Disc authoring:

1 Start Adobe Encore, create a new Blu-ray project, and import the asset (clip or Premiere Pro sequence) that you want to transcode as explained in your Adobe Encore documentation.

2 Right-click the clip or sequence in the **Project** panel, choose **Transcode Settings**, and click **Edit Quality Presets** to display the **Export Settings** dialog box:
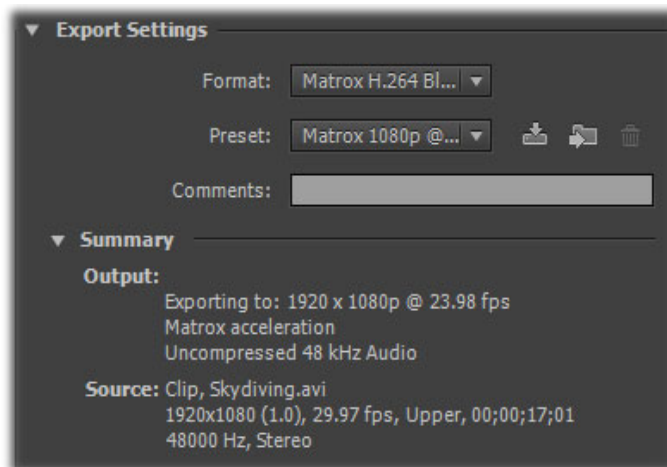
3 From the **Format** list, select **Matrox H.264 Blu-ray**, and from the **Preset** list, select the preset that matches the video format you want for the transcoding. Appropriate video and audio settings are automatically set based on your selected preset.

Note   Only Matrox presets that are compatible with your project's settings will be available. The Matrox presets transcode video to Matrox *.264* files and audio to *.wav* files. If you want to transcode *.wav* files that you've imported to Adobe Encore, you must use an Adobe preset.

4 Click the **Video** tab to display the settings for your transcoded video.
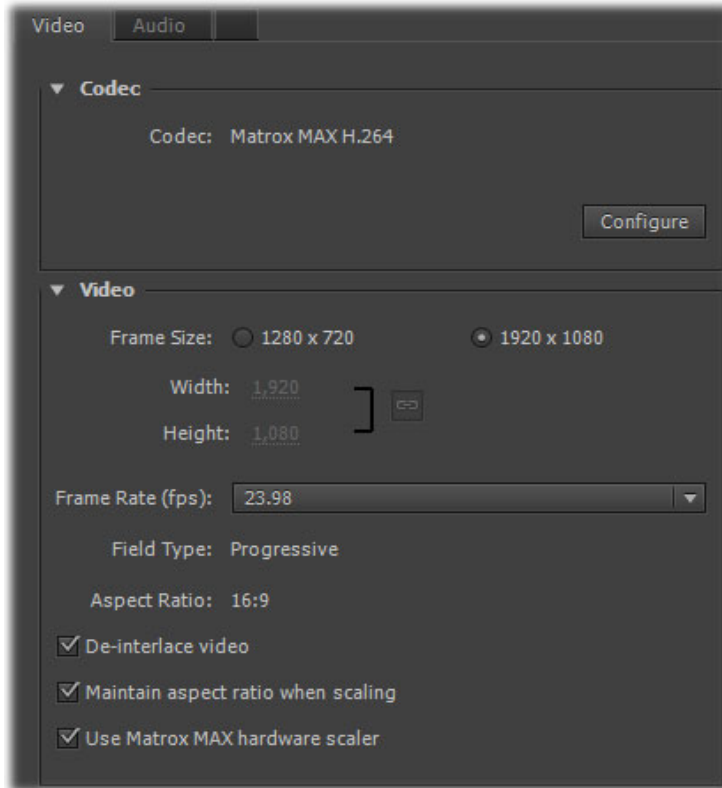
5 Under **Codec**, click **Configure** to customize your Matrox MAX H.264 codec settings as explained in "Specifying your Matrox MAX H.264 settings" on page 248.

🖈 **Tip**   You can check the **Estimated File Size** at the bottom of the dialog box to determine the approximate file size of your transcoded material based on your currently selected settings. If needed, you can change your Matrox MAX H.264 settings to better meet your file size requirements, such as by selecting a different encoding type and lower data rate.

6 Under **Video**, you can customize the settings that you want for your transcoded video:

   – **Frame Size**   Sets the width and height for your transcoded video.

   – **Frame Rate**   Sets the frame rate for your transcoded video.

   – **Field Type**   Indicates the order in which the video fields are displayed, such as **Upper First** for interlaced HD video, or **Progressive** for all progressive video formats.

- **Aspect Ratio**   This is set to **16:9**.

- **De-interlace video**   If you're transcoding interlaced video to a progressive format (such as 1080i to 720p), select this option to de-interlace the video for display on a monitor that displays lines progressively, such as an LCD or computer monitor. (This option won't be present if you're transcoding to an interlaced format or your source video is progressive.)

- **Maintain aspect ratio when scaling**   Select this option if you're scaling your source video for transcoding, and you want to maintain your source video's aspect ratio. Your source video will be transcoded as pillarbox video when transcoding SD video to HD for Blu-ray Disc authoring. If this option is not selected, scaled video that doesn't match the specified aspect ratio will be transcoded as anamorphic video.

- **Use Matrox MAX hardware scaler**   When scaling your source video for transcoding to HD for Blu-ray Disc, it's recommended that you select this option to use the Matrox MAX hardware scaler to perform the scaling.

7 Click the **Audio** tab to display the settings for your transcoded audio.
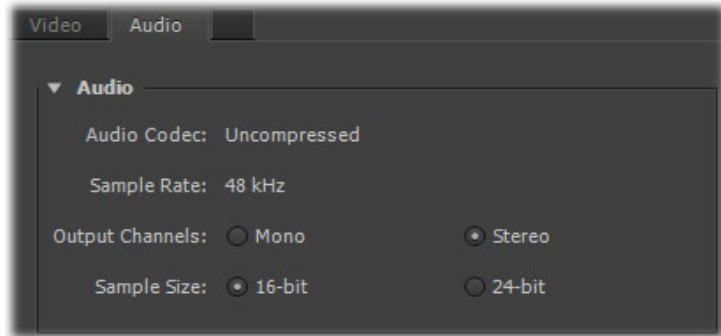
8 Under **Audio**, you can customize the settings that you want for your transcoded audio:

- **Audio Codec**   This is set to **Uncompressed**.

- **Sample Rate**   This is set to **48 kHz**.

- **Output Channels**   Specifies the audio channels to be transcoded.

Note   When transcoding audio from an Adobe Premiere Pro sequence to Matrox H.264 format for Blu-ray Disc authoring, the available output channels depend on the type of audio tracks being transcoded. For example, you can select **Surround 5.1** to transcode 5.1 surround tracks.

- **Sample Size**   You can select **16-bit** or **24-bit**.

Transcoding for Blu-ray Disc authoring in Adobe Encore

9   Click **OK** to save your settings. If you changed any of the preset settings, you'll be prompted to name the preset.

10 Right-click the clip or sequence that you want to transcode in the **Project** panel, and choose **Transcode Now** to start the transcoding.

For more information about using Adobe Encore and specifying transcode settings, see your Adobe Encore documentation.

Specifying your Matrox MAX H.264 settings

When creating Matrox MAX H.264 files (Matrox *.264* or *.mp4* files), appropriate codec settings are applied based on the Matrox preset you selected. If needed, you can customize the settings that you want for the H.264 compression.

⟹ **To select your Matrox MAX H.264 settings:**

1 Click the **Configure** button provided for the Matrox MAX H.264 codec settings.

2 Under **H.264 Level**, select the H.264 level that you want for your encoded video. The available levels depend on your encoded video's frame size and frame rate.

H.264 level	Maximum frame size	Maximum frame rate (fps)	Maximum data rate (Mb/sec)
2.0	352×288	29.97	2
3.0	720×576	29.97	10
3.1	1280×720	29.97	14
4.0	1920×1080	29.97	20
4.1	1920×1080	29.97	50
4.2	1920×1080	59.94	50

Remarks

– Use H.264 level 4.0 if you want to create Matrox MAX H.264 files intended for mass replication of Blu-ray Discs. You can use either level 4.0 or 4.1 if you want to author and burn individual copies that are compatible with Blu-ray Disc players.

– Use H.264 level 3.1 to create HD video for use with Apple iPad.

3 Under **Algorithm**, select the entropy coding method to be used during compression:

– **CABAC** Encodes the video stream using the H.264 Main profile. This is the only method available for Matrox *.264* files.

– **CAVLC** Encodes the video stream using the H.264 Baseline profile. This method is recommended when creating Matrox *.mp4* files at small frame sizes, such as for Apple iPhone devices or the web.

4 Under **Data Rate (Mb/sec)**, you can select the encoding type and various data rate settings for the H.264 compression.

– **Encoding Type** From this list, select one of the following:

• **Variable bit rate (VBR)** Video is compressed at varying data rates based on the complexity of the video and your specified minimum and maximum data rates. The Matrox MAX H.264 codec analyzes and encodes each frame to deliver the highest possible quality at your target data rate.

• **Constant bit rate (CBR)** Video is compressed at your specified target data rate, which is useful when you need to limit or predict the size of your video file. However, if your video is very complex (such as scenes with many colors, sharp edges, or transitions), you'll need to

specify a high target data rate to avoid having frames of blocky video in your file.

Note   When creating Matrox *.264* files for Blu-ray Disc authoring, it's recommended that you use a constant bit rate.

- **Target/Minimum/Maximum data rate**   Use these sliders to select your desired data rate. The higher the target data rate you select, the better the video quality will be. Only the **Target data rate** will be available if you selected **Constant bit rate (CBR)**. If you selected **Variable bit rate (VBR)**, all three sliders will be available so that you can set the target, minimum, and maximum data rates for the video compression.

Note   When customizing the settings for a Matrox *.264* file, be aware that Matrox *.264* files that have a data rate higher than about 30 Mb/sec may require transcoding in Adobe Encore. The maximum H.264 level and data rate accepted by Adobe Encore for Blu-ray Disc authoring with audio and video is level 4.1 at 35 Mb/sec.

- **Source video complexity**   (Variable data rate only) Specifies the complexity level of your source video. A complex video can be defined as containing scenes with many colors, sharp edges, or transitions. The Matrox MAX H.264 codec uses this setting to determine how much compression is required in order to deliver high-quality video at your specified target data rate. The default setting (15) is suitable for most moderately complex videos. For simpler or more complex videos, you may need to adjust this setting to obtain the highest-quality encoding possible while respecting your target data rate. If the size of your encoded video is good but the quality can be improved, lower the complexity level setting. Your video will then be encoded with less compression. If the quality of your encoded video is good but the size is larger than expected, raise the complexity level setting. Your video will then be encoded with more compression. In any case, you may need to try different settings to get your desired results.

- **Sample rate**   Determines how frequently the Matrox MAX H.264 codec verifies the current data rate while encoding and compares it to your selected target data rate. If a discrepancy exists between the current and target data rates, the current data rate is adjusted as specified by the **Data rate adjustment** setting (see below).

- **Data rate adjustment**   When the current encoding data rate does not match your specified target data rate, this setting determines how quickly the current data rate is adjusted to reach the target data rate. A gradual adjustment produces smoother transitions than a quick adjustment.

5 Under **GOP Structure**, select the GOP structure that you want to be used to encode your video:

– **GOP type**   Select one of the following GOP types (can be changed for CABAC encoding only):

  • **Simple GOP**   Offers a fixed structure in how frames are referenced, and may be more easily decoded than advanced GOPs. This is the recommended GOP type when creating Matrox *.264* files for Blu-ray Disc authoring.

  • **Advanced GOP (short/long)**   An advanced GOP has more structural flexibility than a simple GOP, is capable of using more reference frames, and therefore may provide better overall compression. For a "short" advanced GOP, the distance between P frames is always 4, and for a "long" advanced GOP, the distance between P frames is always 8. Advanced GOPs may not be compatible with some Blu-ray Disc players, and may cause stability issues in Adobe Encore when burning a Blu-ray Disc.

✎   **Note**   The GOP type provides standard default values for the GOP size and the distance between P frames. You can change these default values as explained below.

– **GOP size**   Drag the slider to select the number of frames in the GOP (must be a multiple of the distance between P frames). When creating a Matrox *.264* file for Blu-ray, the GOP size must be less than one second of video. For example, if the frame rate for your encoded video is 29.97 fps, the GOP size must be 29 frames or less.

– **Distance between P frames**   Drag the slider to select the number of frames between P frames in the GOP (can be changed for a simple GOP only).

6 Drag the **Noise Filter** slider to set the level of noise filtering that you want to apply to your video before encoding. Increasing the noise filter level reduces the amount of high frequencies in your source video by softening the high-detail portions of your video. Since high frequencies require more bits to encode, increasing the noise filter level leaves more bits available for the encoding of other frames, which can improve the overall quality of your encoded video. However, if you lose too much detail in your encoded video you may need to decrease the noise filter level.

7 Click **OK** to save your settings.

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Using Matrox MAX H.264 Capture

This chapter explains how to use the Matrox MAX H.264 Capture application to capture clips to various formats on Matrox MXO2 products with MAX technology or a Matrox CompressHD card.

Overview

The Matrox MAX H.264 Capture application lets you use your Matrox MXO2 product with MAX technology or a Matrox CompressHD card to capture clips directly to Matrox MAX H.264 files for Blu-ray Disc, the web, and mobile devices. You can also use this application to capture clips to Matrox MPEG-2 I-frame or uncompressed *.avi* files.

You can capture material from any of your MXO2's video and audio inputs, and monitor the source material that you're capturing using the MXO2 video and audio outputs. Matrox presets are provided for capturing clips to various formats for creating *.264*, *.mp4*, and *.avi* files. This includes presets for creating *.264* elementary stream files in HD formats that are supported for Blu-ray Disc authoring using Adobe Encore, and *.mp4* files suitable for the web and mobile devices. Your Matrox *.264* elementary stream files can be imported to Adobe Encore without having to transcode the files.

Remarks

- When performing a capture, your MXO2 hardware won't be available for use with any other application. For example, you'll be able to work in Adobe Premiere Pro, but you won't be able to perform a capture or export to a Matrox MAX H.264 file, and the video preview and output won't be updated until your capture is complete.

- If your MXO2 hardware is in use by another application while running the Matrox MAX H.264 Capture application, you'll get a warning and you won't be able to perform a capture or preview your video input until your MXO2 hardware becomes available.

- If you want to run Adobe Encore at the same time as the Matrox MAX H.264 Capture application, you must set your video and audio output devices in Encore to Adobe devices only.

How to capture clips

1 Connect the video and audio input sources from which you want to capture clips to the corresponding inputs on your MXO2 hardware.

2 Choose **Start > Programs > Matrox Mtx.utils> Matrox MAX H.264 Capture**.

3 Click **Input Settings** to select your video and audio input settings for capturing clips as explained in "Specifying your input settings" on page 256.

4 Click **Output Settings** to select your video and audio output settings for monitoring the source material that you're capturing as explained in "Specifying your output settings" on page 258.

5 Select a preset for the type of clips that you want to capture. The Matrox presets available depend on the frame rate of your video input source.

6 Click the **Advanced** button to review the settings provided by your selected preset and make any required changes as explained in "Specifying your capture format settings" on page 260.

7   Click **Capture** to specify where you want to store your captured clips, the base filename to use, and start capturing clips as explained in "Starting your capture" on page 264.

Specifying your input settings

To specify your video and audio input settings for capturing clips, click the **Input Settings** button.
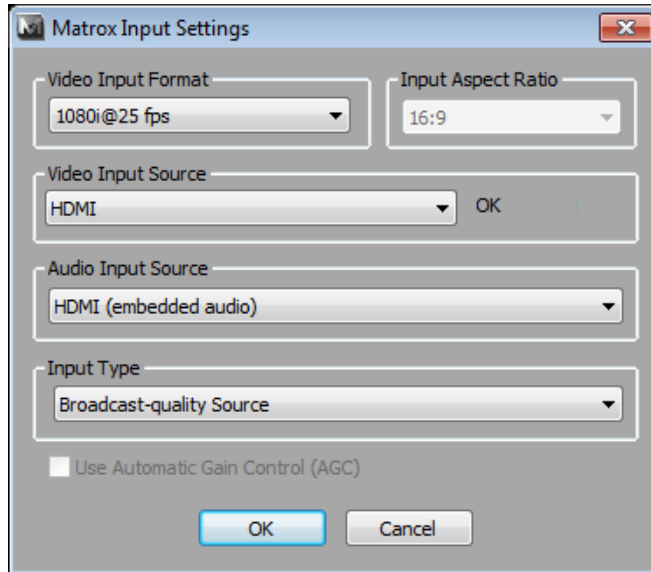
1   From the **Video Input Format** list, select the video format that matches your source video. For a list of the video input formats supported on the various MXO2 inputs for capturing clips, see "Supported input formats" on page 294.

✎   **Note**   If you select a 1080PsF video input format, you won't be able to capture to a 1080i format. As a workaround, select a 1080i video input format, even though your connected video input is actually 1080PsF.

2   From the **Input Aspect Ratio** list, select the aspect ratio of your SD source video (4:3 or 16:9). For example, to capture SD video that was recorded using the standard TV screen format, select **4:3**. To capture SD video that was recorded using the widescreen 16:9 format, select **16:9**. If you're capturing HD video, the **Input Aspect Ratio** will be set to **16:9**.

3   From the **Video Input Source** list, select the type of input you want to capture. For example, to capture material from your HDMI source, select **HDMI**. The available video input sources depend on your selected video input format.

4   From the **Audio Input Source** list, select your audio source. For example, if you want to capture the embedded audio of your HDMI source, select **HDMI (embedded audio)**. This may be set for you based on your selected video input source.

Note   When capturing HDMI embedded audio, only uncompressed embedded audio is supported.

5   From the **Input Type** list, select the type of equipment you're using for capture:

  – **Broadcast-quality Source**   Select this if your source device is broadcast-quality. This setting provides the best capture results for most devices.

  – **Consumer-quality Source**   Select this if you're having problems capturing video because your source device doesn't meet broadcast-quality standards. For example, the capture may be interrupted when you try to capture from certain composite and S-Video devices, especially from low-quality VCRs. If this happens, selecting **Consumer-quality Source** will allow the video to be captured, but you may experience dropped frames during the capture.

6   Select **Use Automatic Gain Control (AGC)** if you want the gain of your composite or S-Video input signal to be adjusted automatically to compensate for very bright or dark images. This improves the brightness or contrast of your picture.

7   Click **OK** to save your settings. Your selected video source will play back in the Preview Window of the **Matrox MAX H.264 Capture** dialog box.

Note   If your source video is HD and you choose to capture to a Matrox *.avi* file, video in the Preview Window will be scaled to quarter-size, and the frame rate of video played back in the Preview Window may also be reduced.

Specifying your input settings

Specifying your output settings

To specify the output settings you want for monitoring the source material that you're capturing, click the **Output Settings** button.

📝 **Note** For a list of the supported video output formats for monitoring the video that you're capturing, see .

1 Under **Analog Output**, you can specify the settings you want for your analog output from MXO2.

– **Output Type** Specifies the analog video output type. If you're outputting SD video on MXO2, MXO2 Rack, or MXO2 LE, this will be set to **All Available** to indicate that the output will be available on all the analog outputs. On MXO2 Mini, you can select **Component**, or **Composite & S-Video** if you're outputting SD video. When outputting HD analog video, the output type will be set to **Component** (on MXO2 Mini, the composite and S-Video outputs are invalid when outputting component video).

– **Setup (NTSC)** Use this to select the setup level you want for your NTSC analog video:

• **0 IRE** Applies a setup level of 0 IRE. You should select this option only when working with a commercial DV device that uses the Japanese analog NTSC setup of 0 IRE. For example, if the video appears too bright when you preview DV video on your NTSC monitor,

you can change the setup to 0 IRE to output the video at the correct brightness.

- **7.5 IRE**   Applies the standard NTSC setup level of 7.5 IRE.

– **YUV/RGB**   Select **YUV** or **RGB** to set the type of video signal that is sent from the component output. For example, select **RGB** if you connected the component output to a device that accepts an RGB signal.

– Under **HDMI Output**, select the type of video signal that you want to be sent from the HDMI output:

- **YUV**   Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.

- **RGB - calibrated**   Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading calibration settings using the Matrox HDMI Calibration Utility, see Chapter 7, "Calibrating Your HDMI Monitor for Video."

- **RGB - native**   Outputs native RGB HDMI video that does not apply any calibration compensation. Select this when you want to disable the currently loaded Matrox HDMI calibration settings and output RG**B** HDMI video from MXO2 using its native color settings for previewing video on your HDMI monitor.

2 Under **SDI Audio Output Format**, select the bit depth you want for your embedded SDI audio output (**20-bit** or **24-bit**). This setting is not available on MXO2 Mini.

3 Under **Analog Audio Volume**, drag the sliders to adjust the volume of your analog audio output. By default, the sliders are locked so that they move together. To move each slider independently, click the lock button (🔒) to disable it.

4 Under **Advanced**, you can use the **Analog SC/H Phase** slider to advance or delay your analog video output's subcarrier phase with respect to the horizontal sync of the genlock source (for composite video only). This setting is not available on MXO2 Mini.

5 Click **OK** to save your settings.

Specifying your capture format settings

When you select a capture preset, appropriate capture format settings are automatically applied for you. To review or change any of these settings, click the **Advanced** button.
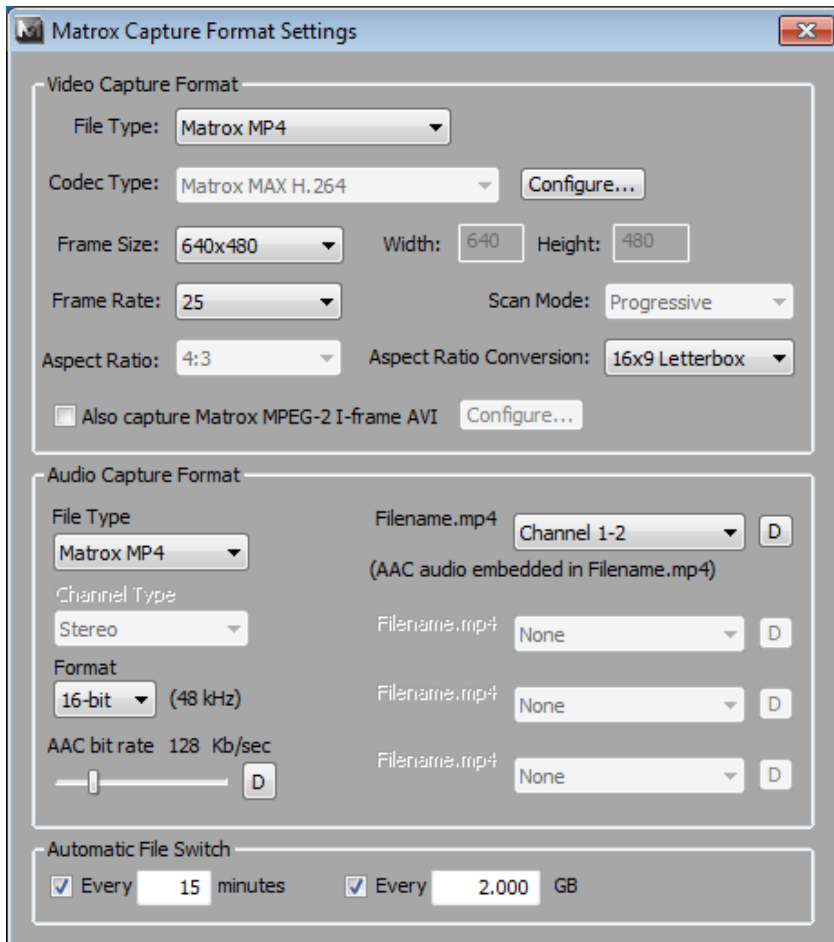
1 Under **Video Capture Format**, you can select the video format settings you want for your captured clips. For a list of the supported capture formats based on your selected video input format, see "Supported capture formats for Matrox MAX H.264 Capture" on page 298.

– **File Type**   Select one of the following Matrox formats:

• **Matrox 264 (Blu-ray)**   Creates a *.264* elementary stream file, which is supported for Blu-ray Disc authoring. Audio is captured as separate mono or stereo *.aac* files (AAC audio) or *.wav* files (PCM audio).

- **Matrox MP4**   Creates an *.mp4* file with embedded stereo AAC audio, which is suitable for the web and mobile devices. You can choose to also capture audio to separate *.wav* files (PCM audio), and select an option to simultaneously capture to a Matrox MPEG-2 I-frame *.avi* file in the same format as your source video.

- **Matrox AVI**   Creates an MPEG-2 I-frame or uncompressed *.avi* file. Audio is embedded in the *.avi* file and also captured as separate *.wav* files (PCM audio).

– **Codec Type**   If you're capturing to a Matrox *.264* or *.mp4* file, the codec will be set to **Matrox MAX H.264**. If you're capturing to a Matrox *.avi* file, select the codec that you want to use for the capture:

- **Matrox MPEG-2 I-frame**   Captures video to MPEG-2 intra-frame format using the 4:2:2 Profile @ Main Level (for SD resolutions) or High Level (for HD resolutions) at a selected data rate.

- **Matrox 8-bit Uncompressed**   Captures video to 8-bit uncompressed format.

- **Matrox 10-bit Uncompressed**   Captures video to 10-bit uncompressed format.

– **Configure**   Click this to configure your codec settings (for the Matrox MAX H.264 and MPEG-2 I-frame codecs only). The Matrox MAX H.264 settings are the same as when you export clips as explained in "Specifying your Matrox MAX H.264 settings" on page 248. The Matrox MPEG-2 I-frame settings are the same as when capturing clips using Adobe Premiere Pro as explained in "Selecting your MPEG-2 I-frame settings" on page 80.

– **Frame Size**   Sets the width and height for your captured video. The available frame sizes depend on your specified file type, codec, and source video format. When capturing to a Matrox *.264* or *.avi* file, only standard SD and/or HD frame sizes are available. When capturing to a Matrox *.mp4* file, you can select a frame size, or select **Custom** if you want to enter a custom size. If you enter an unsupported frame size, the closest supported frame size will be used.

– **Frame Rate**   Sets the frame rate for your captured video. When capturing to a Matrox *.264* or *.avi* file, an appropriate frame rate is automatically set based on your selected frame size and the frame rate of your source video. When capturing to a Matrox *.mp4* file, you can select a frame rate from the list of compatible frame rates. For example, if your source video is 29.97 fps, you can set the frame rate for your captured video to 14.98, 29.97, or 59.94. Frame rates of 50 and 59.94, however, are supported only when the frame size is set to 1280×720.

📝 **Note** When using the Matrox MAX H.264 codec to capture to a 1440×1080 or 1920×1080 progressive video format, the highest supported frame rate is 29.97 fps. The specified frame size and frame rate determine the H.264 levels available for your encoded video. For details on the maximum frame size and frame rate supported for each H.264 level, see "Specifying your Matrox MAX H.264 settings" on page 248.

- **Scan Mode** Determines the scan mode of your captured video (**Interlaced** or **Progressive**). This may be automatically set for you based on your specified file type, frame size, and source video format.

- **Aspect Ratio** This is set to **16:9** when capturing to HD. When capturing to SD, you can select **4:3** to capture to the standard TV screen format, or **16:9** to capture to the widescreen 16:9 format.

- **Aspect Ratio Conversion** If your source video and captured video have different aspect ratios, select the option that you want for the aspect ratio conversion:

  - **16x9 Letterbox** Captures the widescreen 16:9 picture as letterbox video by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

  - **4x3 Pillarbox** Captures the standard 4:3 picture as pillarbox video by adding black bars at the left and right sides of the picture for display on a widescreen 16:9 television screen. (This option is not available for frame sizes smaller than 720×576.)

  - **Anamorphic** Captures the video as horizontally or vertically compressed video (the aspect ratio of your source video is not maintained).

  - **Center Cut** Captures the widescreen 16:9 picture by evenly cropping the left and right sides of the picture for display on a standard 4:3 television screen.

  - **Center Zoom** Captures the standard 4:3 picture by evenly cropping the top and bottom edges of the picture for display on a widescreen 16:9 television screen.

- **Also capture Matrox MPEG-2 I-frame AVI** Select this if you're capturing to a Matrox *.mp4* file, and you'd like to simultaneously capture to a Matrox MPEG-2 I-frame *.avi* file in the same format as your source video. For example, if your source video is 1080i @ 29.97 fps, your Matrox *.avi* file will also be 1080i @ 29.97 fps. To configure your MPEG-2 I-frame codec settings, click **Configure**. The settings are the same as when capturing clips using Adobe Premiere Pro as explained in "Selecting your MPEG-2 I-frame settings" on page 80.

2 Under **Audio Capture Format**, you can select the audio format settings you want for your captured clips:

- **File Type**   Specifies the type of audio files to be captured:
  - **AAC**   Captures AAC audio to separate *.aac* files (for Matrox *.264* files only).
  - **WAV**   Captures PCM audio to separate *.wav* files. For Matrox *.mp4* files, stereo AAC audio will also be embedded in the *.mp4* file.
  - **Matrox MP4**   Captures stereo AAC audio that is embedded in the Matrox *.mp4* file (separate *.wav* files will not be created).

Note   When capturing to a Matrox *.mp4* file with simultaneous capture to a Matrox MPEG-2 I-frame *.avi* file, stereo audio will be embedded in the *.mp4* and *.avi* files. When capturing to a Matrox *.avi* file only, audio is always captured to separate *.wav* files, and the channels that you choose to save to the first stereo *.wav* file or first two mono *.wav* files will be embedded in the associated *.avi* file.

- **Channel Type**   Select **Stereo** to save your captured audio to stereo files, or **Mono** to save your captured audio to mono files. This is set to **Stereo** for embedded AAC audio in Matrox *.mp4* files.
- **Format**   Select the format for your captured audio (**16-bit** or **24-bit**).
- **AAC bit rate**   For AAC audio, drag the bit rate slider to select the bit rate (in kilobits per second) that you want for your captured audio.
- From the **Filename** lists, select which stereo pairs or mono channels you want to capture for each file.
  - When capturing to a Matrox *.mp4* file with only embedded AAC audio, you can select one stereo pair to be embedded in the *.mp4* file (only one **Filename** list will be available). When capturing to a Matrox *.mp4* file with separate *.wav* files, the channels that you choose to save to the first stereo *.wav* file or first two mono *.wav* files will be embedded in the associated *.mp4* file, and the associated *.avi* file if you're simultaneously capturing to a Matrox MPEG-2 I-frame *.avi* file.
  - When capturing to separate *.aac* or *.wav* files, you can select up to four stereo channels or up to eight mono channels, depending on the type of audio being captured. Select **None** for the particular files that you don't want, or click the **D** (default) button for each **Filename** list if you want to capture only channels 1 and 2. When Matrox MXO2 saves separate audio files, it assigns a *.Stereo* or *.Mono* suffix to the base name of the associated video file. For example, if you're capturing to separate *.wav* files and your video file is named *MyFile.001.264*, the associated stereo audio files will be named *MyFile.001.Stereo1.wav*, *MyFile.001.Stereo2.wav*, etc.

3 Under **Automatic File Switch**, you can indicate whether you want the capture to automatically switch to the next clip after a specified time or file

Specifying your capture format settings

size limit has been reached (available only when capturing to Matrox *.mp4* files without *.wav* or *.avi* files).

- **Every n minutes**   Select this option to specify the number of minutes after which you want the capture to switch to the next clip.

- **Every n GB**   Select this option to specify the maximum file size (in gigabytes) after which you want the capture to switch to the next clip.

Note   If you select both automatic file switch options, the capture will switch to the next clip based on the limit that is reached first (minutes or file size). Be aware that your captured clips won't have exactly the same duration or file size because the capture must always end at a GOP boundary.

4 If you'd like to save your changes as a custom preset, click the **Save** (🖫) button beside the preset list in the **Matrox MAX H.264 Capture** dialog box. You'll then be prompted to enter a name for your custom preset.

Note   To delete a custom preset, select the preset and click the **Delete** (🗑) button.

Starting your capture

Once you've specified your input, output, and capture format settings, you're ready to start capturing clips. To do this, click the **Capture** button.
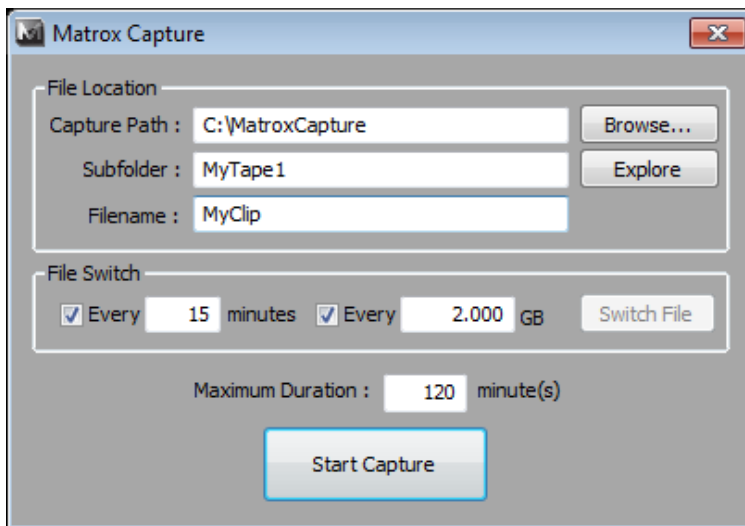
1 Enter the capture path and subfolder where you want to store your captured clips, or click **Browse** to select the location that you want.

2 A default filename will be provided as the base name for your captured clips. You can change this name if you want. When capturing to Matrox *.mp4* files using the automatic file switching feature, your clips will be numbered

sequentially with a three-digit suffix, such as *MyClip.000.mp4*, *MyClip.001.mp4*, and so on.

Note Each time you start a new capture, the base filename will be incremented accordingly with a *_n* suffix (for example, *_1*, *_2*, and so on).

3 Click **Explore** to open Windows Explorer. You can then go to your capture folder and delete any clips that you no longer need, and you'll be able to see your clips being added as they are captured.

4 If you're capturing to Matrox *.mp4* files without *.wav* or *.avi* files, you can select the automatic file switching options that you want, such as to switch to the next clip after a specified time limit. These options are the same as provided in the **Matrox Capture Format Settings** dialog box (see "Specifying your capture format settings" on page 260).

5 To limit the capture to a maximum duration, enter the duration (in minutes) that you want in the **Maximum Duration** box. The capture will automatically stop once this limit has been reached.

Note Keep the maximum duration close to the actual maximum that you want. If the maximum duration is a lot longer than you need, the file size of your clips will be larger.

6 Make sure that your video source is playing in the Preview Window, and click **Start Capture** to start the capture (the button will change to **Stop Capture**).

7 If you're capturing to Matrox *.mp4* files without *.wav* or *.avi* files, you can click **Switch File** at any time during the capture to switch the capture to the next file.

8 To stop the capture before the maximum duration is reached, click the **Stop Capture** button.

Your notes

19

Monitoring Your Matrox MXO2 System

This chapter explains how to use the Matrox X.info program to display important details about your Matrox MXO2 system and installed hardware.

Using X.info to display MXO2 information

The Matrox X.info program lets you display information about your Matrox MXO2 system and installed hardware, and provides warnings when certain problems arise, such as when the temperature of your MXO2 exceeds the maximum operating temperature. If you have multiple Matrox MXO2 devices, you can use X.info to select your primary Matrox I/O device.

Matrox X.info runs continuously to monitor your system, whenever your computer is turned on and the MXO2 is connected. You can open Matrox X.info to display system and hardware details by double-clicking the 🔳 icon on your Windows taskbar.

Note   If you do not see the icon, check your taskbar properties and make sure that you're showing the icon for Matrox X.info.

Displaying system information

To display information about your Matrox MXO2 system, select **System** from the **Display Information About** list. On this page, you can see **Install Information**, such as the install path and version of Matrox Mtx.utils.

You can also create an HTML log file of your system information, which can be useful for troubleshooting. To create this log, use the **Browse** button under **System Information Log** to select the path and name of the log, then click

Create. If **Open file after scan** is selected, the HTML system log opens after it is created.
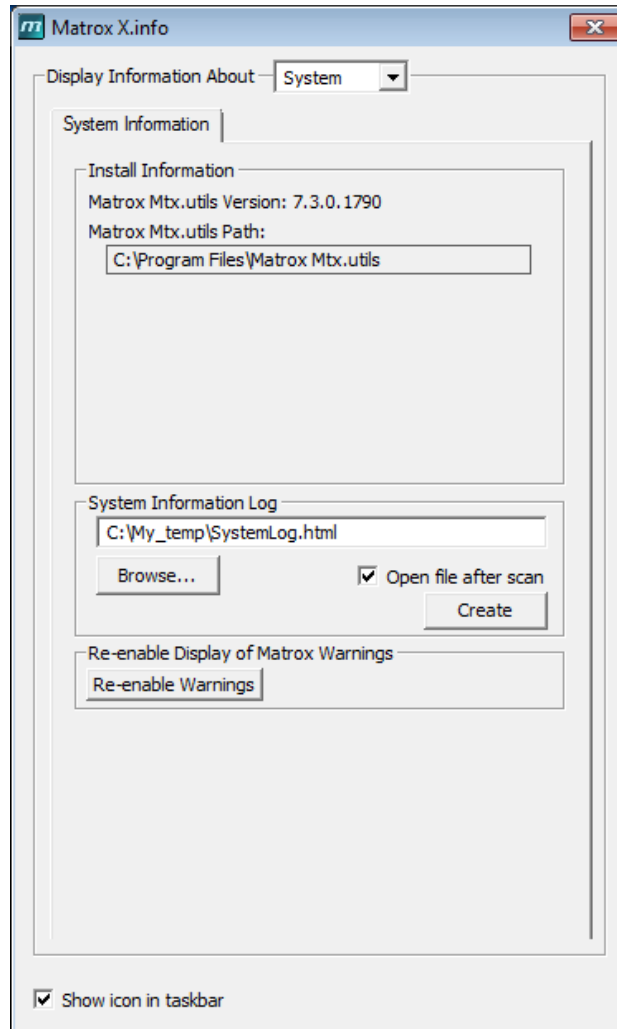
If you had previously turned off certain Matrox warnings and want them to be re-enabled, click **Re-enable Warnings**. For example, some Matrox warnings provide an option to turn off the warning (that is, you can select **Don't display this message again**). Clicking **Re-enable Warnings** allows these warnings to be displayed again.

Displaying hardware information

To display information about your Matrox MXO2 hardware, select **Hardware**
from the **Display Information About** list. This displays a page with hardware
information (for example, serial number and production date). You can also
monitor the current and maximum operating temperatures for your MXO2
hardware.

If you have multiple Matrox MXO2 devices, a separate tab will be provided to
display the hardware information for each device.
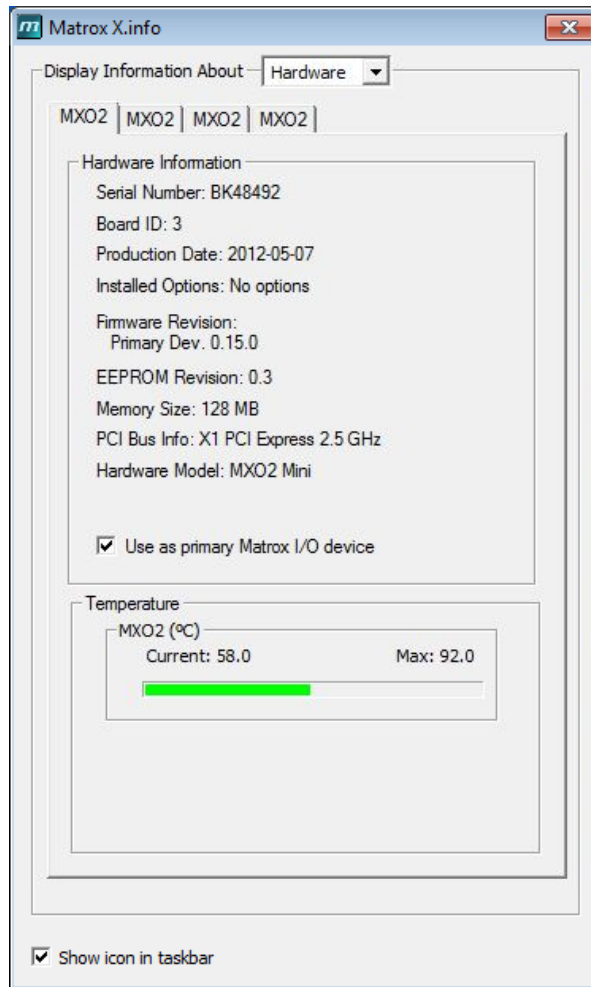
(i) **Important** Whether or not you have opened Matrox X.info, if your MXO2
exceeds the maximum operating temperature, you'll receive a warning message

with further instructions as explained in the section "Error notification" on page 271.

Monitoring your MXO2's operating temperatures

As shown in the X.info **Hardware** section, the **MXO2** page displays the current and maximum operating temperatures for your Matrox MXO2 hardware. To avoid damage to your Matrox MXO2, make sure that you don't operate your MXO2 at or near the maximum temperature for a prolonged period of time. You should target your MXO2 to operate at least 10°C below the maximum operating temperature.

You should monitor the temperature of your MXO2 periodically and take measures as needed to lower the room temperature and/or make sure that the MXO2 is not close to a heat source and the MXO2 ventilation holes are not obstructed.

Selecting your primary Matrox I/O device

If you've installed multiple Matrox MXO2 devices, you can use them all to feed live video and audio to Telestream Wirecast for streaming and recording (see Chapter 15, "Using Matrox MXO2 with Telestream Wirecast"). Other applications used with your Matrox MXO2 hardware, such as Matrox A/V Tools and editing applications, support only one Matrox I/O device, referred to as the primary device.

To select your primary Matrox I/O device, click the devices's tab and select **Use as primary Matrox I/O device**. In order for this setting to take effect, you'll need to close all applications that are using your Matrox I/O hardware. When you restart an application that supports only one Matrox I/O device, your selected primary device will be used with that application.

Note The option to select a primary device will be available in X.info only when multiple Matrox I/O devices are detected. If you don't select a primary Matrox I/O device, the first device detected in your system will be used as your primary device.

Error notification

X.info provides temperature warnings and warnings for other possible MXO2 hardware problems. Once X.info has detected a hardware problem, the **Matrox X.info Notification** dialog box will be displayed to give you details of the problem and further instructions. You will not be able to close this dialog box until the problem has been resolved.

Your notes

A

Understanding Pulldown

This appendix describes the available MXO2 pulldown methods.

Overview

Depending on your editing video format, a pulldown may be required to convert 23.98 fps video to 29.97 fps video for output on Matrox MXO2. When a pulldown is required for your video output, Matrox MXO2 performs either a standard 2:3 pulldown or an advanced 2:3:3:2 pulldown.

Standard 2:3 pulldown

Standard 2:3 pulldown is often used as part of the telecine process to transfer 24 fps film footage to 29.97 fps interlaced video. This pulldown method is also used to convert any 23.98 fps progressive video to 29.97 fps interlaced video, such as for converting 486p @ 23.98 fps video to NTSC.

In order to convert 24 fps film or 23.98 progressive video to 29.97 fps interlaced video, additional video frames, and more specifically video fields, must be created and added to the video sequence. For example, to convert a sequence of four film or progressive frames, five frames of video are needed for a total of 10 video fields. Therefore, one additional video frame or two video fields must be created. To accomplish this, the first and third frames of a four-frame film or progressive video sequence are each converted to two video fields. The second and fourth frames of the sequence are converted to three video fields to make up a total of five interlaced video frames.

The following diagram demonstrates the process:

Film frames @ 24 fps or progressive frames @ 23.98 fps

A	B	C	D

Video fields @ 29.97 fps

a1	a2	b1	b2	b3	c1	c2	d1	d2	d3

Frame A	Frame B	Frame C	Frame D	Frame E
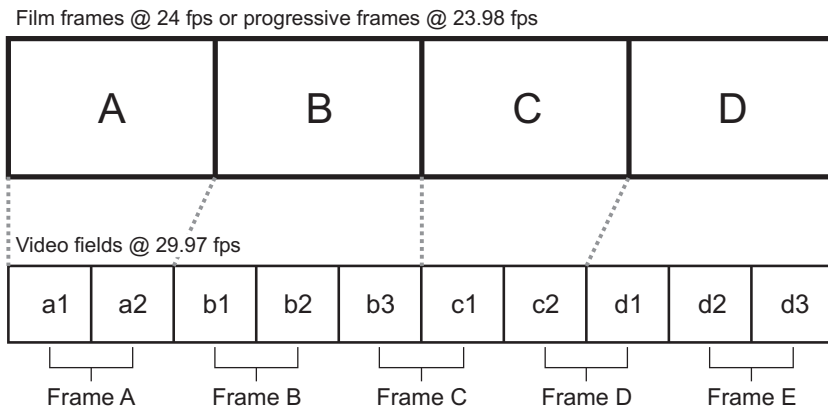
Standard 2:3 pulldown is accomplished by representing the first frame of film or progressive video (frame **A**) as two fields of video (fields **a1** and **a2**), the second frame (frame **B**) as three fields of video (fields **b1**, **b2**, and **b3**), the third frame (frame **C**) as two fields (fields **c1** and **c2**), and the fourth frame (frame **D**) as three fields (fields **d1**, **d2**, and **d3**). This sequence repeats six times each second.

Advanced 2:3:3:2 pulldown

Advanced 2:3:3:2 pulldown was developed as an alternative to the standard pulldown method for making frame rate conversions in DV video. It is used to convert 486p @ 23.98 fps video to NTSC (486i @ 29.97 fps) video. This conversion is used when video footage is acquired by a DV camera at 23.98 fps and recorded to DV tape with the recorder set for advanced pulldown (called 24PA or 24P Advanced mode on some devices). Advanced 2:3:3:2 pulldown differs from standard 2:3 pulldown in that the two middle frames of the video sequence are each converted to three video fields.

The following diagram demonstrates the process:

Progressive frames @ 23.98 fps

| A | B | C | D |

Video fields @ 29.97 fps

| a1 | a2 | b1 | b2 | b3 | c1 | c2 | c3 | d1 | d2 |

| Frame A | Frame B | Frame C | Frame D | Frame E |
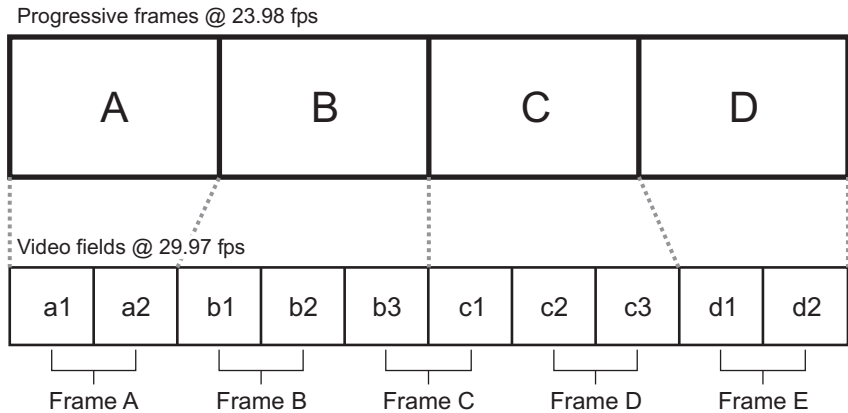
Advanced 2:3:3:2 pulldown is accomplished by representing the first frame of progressive video (frame **A**) as two fields of video (fields **a1** and **a2**), the second frame (frame **B**) as three fields of video (fields **b1**, **b2**, and **b3**), the third frame (frame **C**) as three fields (fields **c1**, **c2**, and **c3**), and the fourth frame (frame **D**) as two fields (fields **d1** and **d2**).

Your notes

B

Matrox MXO2 Connectors

This appendix describes the inputs and outputs for all MXO2 products.

Inputs

The following sections detail the MXO2, MXO2 Rack, MXO2 LE, and MXO2 Mini inputs.

MXO2 inputs

MXO2 Rack inputs

Matrox MXO2 Rack (partial view)

SDI (HD/SD)

Pr

Pb — Component video (HD/SD)

Y

Y/C (S-Video)

HDMI (HD only)

AES/EBU digital audio CH 3/4

CH 4

CH 3 — Analog audio (balanced)

CH 2

CH 1

External reference (REF) — IN — OUT

Composite video

AES/EBU digital audio CH 1/2

SDI

REF IN — REF OUT

Pr

Pb

CVBS — Y

Y/C

INPUT

HDMI

AES/EBU

1/2

3/4

ANALOG AUDIO

1   2   3   4

RS422

HOST

RS422 (see "MXO2 Rack RS-422 serial connection" on page 27)

Host (see "Connecting MXO2 Rack to your computer" on page 25)

100 - 240 V ~ 60/60 Hz 30 VA MAX

Power (see "Powering MXO2 Rack" on page 24)

MXO2 LE inputs

Analog audio
(unbalanced)
L (CH 1)

Component
video
(HD/SD)

External
reference
(REF)

Pb   Y

Matrox MXO2 LE

ANALOG AUDIO

PUSH   PUSH

L(1)

matrox **MXO2 LE**

Pb   Y   REF

C
O
M
P
O
N
E
N
T

1   2

R(2)

HDMI

INPUT

Y/C

Pr   CVBS   SDI

R (CH 2)
Analog audio
(unbalanced)

HDMI
(HD/SD)

Y/C
(S-Video)

Composite
video

CH 1   CH 2

Analog
audio
(balanced)

Component
video
(HD/SD)
Pr

SDI
(HD/SD)

MXO2 Mini inputs

Composite
video (CVBS)
Y

S-Video
(see "Connecting
S-Video devices to
MXO2 Mini" on
page 44)

Pb   Pr
(Y)   (C)

Power
(see "Powering
MXO2 Mini" on
page 40)

HDMI
(HD only)

Component video
(HD/SD)

Y   Pb   Pr

Analog audio
(unbalanced)

L   R
(CH 1) (CH 2)

Host
(see "Connecting
MXO2 Mini to your
computer" on
page 42)

Matrox MXO2 Mini

Input connector descriptions

This section describes the Matrox MXO2, MXO2 Rack, and MXO2 LE inputs. For MXO2 Mini inputs, see .

> **Note** Depending on your MXO2 hardware, some of the following connectors may not be available or may be available in a limited capacity only. Some connectors on your MXO2 hardware may not appear exactly as shown below.

(MXO2 and MXO2 LE)

(MXO2 Rack)

External reference (REF) Allows you to genlock all devices connected to your MXO2 system to an external genlock source (bi-level analog black burst for SD, or analog tri-level sync for HD). MXO2 Rack features an additional REF OUT connector with loop through that allows you to daisy chain the genlock reference input to another device's reference input.
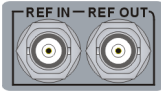
> **Important** If you connected an external genlock source to MXO2 Rack's REF IN connector, and you're not using the REF OUT connector, you must terminate the reference signal by connecting a BNC 75-ohm terminator to REF OUT.

To compensate for cable delays, timing-offset controls that align your video output relative to your external genlock source are available (see).

HDMI Provides an input for HD HDMI video (either YUV or RGB), and up to eight channels of uncompressed embedded audio, from a digital HDMI device. HDCP sources and SD video are not supported on this input. Connect a standard HDMI video/audio cable from a camera, VTR, or other video input source.

SDI Provides an input for use with a digital SDI device. This input supports HD-SDI and SD-SDI video, and up to eight channels of embedded audio. Connect an SDI video/audio cable from a camera, VTR, or other video input source.
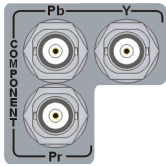
Component video (Y, Pb, Pr)   Provide inputs for use with an analog component device, and support HD and SD video. Connect component Y, Pb, Pr video cables from a camera, VTR, or other video input source.

Y/C (S-Video)   Provides an input for use with an analog S-Video device (SD only). Connect an S-Video cable from a camera, VTR, or other video input source.

Composite video (CVBS)   Allows you to input SD video from an analog NTSC or PAL device. Connect a composite video cable from a camera, VTR, or other video input source.

AES/EBU digital audio   Allows you to input stereo digital audio. Connect a coaxial BNC audio cable from a camera, VTR, audio mixer, or other audio input source.

> **Note**   Not available on MXO2 LE.
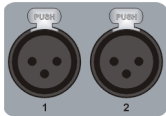
Analog audio (balanced)   Allows you to input balanced stereo analog audio. Connect XLR cables from a camera, VTR, audio mixer, or other audio input source.

Analog audio (unbalanced)   Allows you to input unbalanced stereo analog audio. Connect RCA cables from a camera, VTR, audio mixer, or other audio input source.

Input connector descriptions (MXO2 Mini)

This section describes the Matrox MXO2 Mini inputs. For other MXO2 products, see "Input connector descriptions" on page 282.

✎ **Note** Analog A/V cables connected to Matrox MXO2 Mini must be limited to less than three meters to comply with EEC and EMC directives.

HDMI Provides an input for HD HDMI video (either YUV or RGB), and up to eight channels of uncompressed embedded audio, from a digital HDMI device. HDCP sources and SD video are not supported on this input. Connect a standard HDMI video/audio cable from a camera, VTR, or other video input source.

Component video (Y, Pb, Pr) Provide inputs for use with an analog component device, and support HD and SD video. Connect component Y, Pb, Pr video cables from a camera, VTR, or other video input source.

✎ **Note** When you connect an analog component device to MXO2 Mini, you won't be able to connect an S-Video or composite device at the same time.
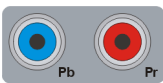
S-Video Input connectors **Pb** and **Pr** allow you to connect the MXO2 S-Video adapter cable for use with an analog S-Video device (SD only). Connect an S-Video cable, via the MXO2 S-Video adapter cable, from a camera, VTR, or other video input source. For an illustration on how to connect S-Video devices to MXO2 Mini, see "Connecting S-Video devices to MXO2 Mini" on page 44.

Composite video (Y) Allows you to input SD video from an analog NTSC or PAL device. Connect a composite video cable from a camera, VTR, or other video input source.

Analog audio (unbalanced) Allows you to input unbalanced stereo analog audio. Connect RCA cables from a camera, VTR, audio mixer, or other audio input source.

Outputs

The following sections detail the MXO2, MXO2 Rack, MXO2 LE, and MXO2 Mini outputs.

MXO2 outputs

MXO2 Rack outputs

SDI A (HD/SD)

SDI A

SDI B

SDI B (HD/SD)

Pr

Pr

Pb

Pb

Component video (HD/SD)

Composite video

CVBS

Y

Y

Y/C

Y/C (S-Video)

OUTPUT

HDMI

HDMI (HD/SD)

AES/EBU digital audio CH 1/2

AES/EBU

1/2

3/4

AES/EBU digital audio CH 3/4

8

7

6

5

4

3

2

1

ANALOG AUDIO

CH 8

CH 7

CH 6

CH 5

CH 4

CH 3

CH 2

CH 1

Analog audio (balanced)

Matrox MXO2 Rack (partial view)

matrox MXO2 Rack

MXO2 LE outputs

Component
video
(HD/SD)

SDI B
(HD/SD)   Y   Pb

Analog audio
(unbalanced)
L (CH 1)

Matrox MXO2 LE

Composite
video

Y/C
(S-Video)

HDMI
(HD/SD)

R (CH 2)
Analog audio
(unbalanced)

SDI A
(HD/SD)

Component
video
(HD/SD)
Pr

CH 1   CH 2
Analog
audio
(balanced)

MXO2 Mini outputs

Matrox MXO2 Mini

Y Pb Pr
Component video
(HD/SD)

L R
(CH 1) (CH 2)
Analog audio
(unbalanced)

HDMI
(HD/SD)

Host
(see "Connecting
MXO2 Mini to
your computer"
on page 42)

Power
(see "Powering
MXO2 Mini" on
page 40)

Pb Pr
(Y) (C)
S-Video
(see "Connecting
S-Video devices to
MXO2 Mini" on
page 44)

Composite
video (CVBS)
Y

Output connector descriptions

This section describes the Matrox MXO2, MXO2 Rack, and MXO2 LE outputs. For MXO2 Mini outputs, see "Output connector descriptions (MXO2 Mini)" on page 291.

Note Depending on your MXO2 hardware, some of the following connectors may not be available or may be available in a limited capacity only. Some connectors on your MXO2 hardware may not appear exactly as shown below.

HDMI Provides an output for HD/SD HDMI video, and up to eight channels of embedded audio, to a digital HDMI device. HDCP is not supported on this output. This output supports 1:1 pixel mapping for accurate monitoring on your HDMI display of NTSC, PAL, 1280×720, and 1920×1080 video. Connect a standard HDMI video/audio cable to an HDMI monitor, VTR, or other digital HDMI device. You can also connect directly to a home theatre system for surround sound monitoring.

> **Note** The HDMI output supports YUV and RGB devices.

HDMI monitor calibration is available through this output. Use the Matrox HDMI Calibration Utility to calibrate your HDMI monitor (see Chapter 7, "Calibrating Your HDMI Monitor for Video").

SDI A and SDI B Provide two simultaneous outputs of the same HD-SDI or SD-SDI video, with up to 16 channels of embedded audio. For each output, connect an SDI video/audio cable to a video monitor, VTR, or other SDI device. You can also perform surround sound monitoring through the SDI output by connecting to a third-party device, such as an SDI audio de-embedder.
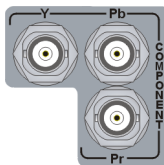
Component video (Y, Pb, Pr) Allows you to output HD or SD video to an analog component device. Connect component Y, Pb, Pr video cables to a video monitor, VTR, or other component device.

> **Note** The component output supports YUV and RGB devices.

Y/C (S-Video)   Provides an output for SD video to an analog S-Video device. Connect an S-Video cable to a video monitor, VTR, or other S-Video device.

Composite video (CVBS)   Allows you to output SD video to an analog NTSC or PAL device. Connect a composite video cable to a video monitor, VTR, or other NTSC or PAL device.

AES/EBU digital audio   Allows you to output stereo digital audio. Connect a coaxial BNC audio cable to a VTR, audio mixer, speakers, or other audio device.

> **Note**   Not available on MXO2 LE.
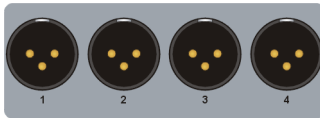
Analog audio (balanced)   Allows you to output balanced stereo analog audio. Connect XLR cables to a VTR, audio mixer, speakers, or other audio device.
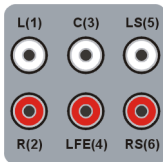
Analog audio (unbalanced)   Provide outputs for unbalanced analog audio. Matrox MXO2 offers outputs for channels one to six, or three stereo pairs suitable for 5.1 surround sound monitoring. Connect RCA cables to a VTR, audio mixer, speakers, or other audio device.

Output connector descriptions (MXO2 Mini)

This section describes the Matrox MXO2 Mini outputs. For other MXO2 products, see "Output connector descriptions" on page 289.

✎ **Note** Analog A/V cables connected to Matrox MXO2 Mini must be limited to less than three meters to comply with EEC and EMC directives.

HDMI Provides an output for HD/SD HDMI video, and up to eight channels of embedded audio, to a digital HDMI device. HDCP is not supported on this output. This output supports 1:1 pixel mapping for accurate monitoring on your HDMI display of NTSC, PAL, 1280×720, and 1920×1080 video. Connect a standard HDMI video/audio cable to an HDMI monitor, VTR, or other digital HDMI device. You can also connect directly to a home theatre system for surround sound monitoring.

✎ **Note** The HDMI output supports YUV and RGB devices.

HDMI monitor calibration is available through this output. Use the Matrox HDMI Calibration Utility to calibrate your HDMI monitor (see Chapter 7, "Calibrating Your HDMI Monitor for Video").

Component video (**Y, Pb, Pr**) Allows you to output HD or SD video to an analog component device. Connect component Y, Pb, Pr video cables to a video monitor, VTR, or other component device.

✎ **Note** The component output supports YUV and RGB devices. When you connect an analog component device to MXO2 Mini, you won't be able to connect an S-Video or composite device at the same time.
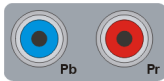
S-Video Output connectors **Pb** and **Pr** allow you to connect the MXO2 S-Video adapter cable for outputting SD video to an analog S-Video device. Connect an S-Video cable, via the MXO2 S-Video adapter cable, to a video monitor, VTR, or other S-Video device. For instructions on how to connect S-Video devices to MXO2 Mini, see "Connecting S-Video devices to MXO2 Mini" on page 44.

Composite video (Y)   Allows you to output SD video to an analog NTSC or PAL device. Connect a composite video cable to a video monitor, VTR, or other NTSC or PAL device.

Analog audio (unbalanced)   Provide outputs for unbalanced analog audio channels one and two, or one stereo pair. Connect RCA cables to a VTR, audio mixer, speakers, or other audio device.

C

Matrox MXO2 Supported Input and Capture Formats

This appendix provides information on the video input and capture formats that are supported on MXO2.

Supported input formats

The following table shows the video input formats that are supported on the MXO2 video inputs for capturing or recording video. For descriptions of the MXO2 inputs, see "Inputs" on page 278.

Video input format	Matrox MXO2 input				
	HDMI	SDI[1]	Component	S-Video	Composite
NTSC	—	✓	✓	✓	✓
PAL	—	✓	✓	✓	✓
720p @ 50 fps	✓	✓	✓	—	—
720p @ 59.94 fps	✓	✓	✓	—	—
1080i @ 25 fps	✓	✓	✓	—	—
1080i @ 29.97 fps	✓	✓	✓	—	—
1080PsF @ 23.98 fps	—	✓	✓	—	—
1080PsF @ 24 fps	—	✓	—	—	—
1080PsF @ 25 fps	✓	✓	✓	—	—
1080PsF @ 29.97 fps	✓	✓	✓	—	—
1080p @ 23.98 fps	✓	✓	—	—	—
1080p @ 24 fps	✓	✓	—	—	—
1080p @ 25 fps	✓	✓	—	—	—
1080p @ 29.97 fps	✓	✓	—	—	—
1080p @ 30 fps	✓	✓	—	—	—

[1] SDI is not supported on Matrox MXO2 Mini.

Supported capture formats for Adobe Premiere Pro

The following table lists the supported capture formats when using Adobe Premiere Pro to capture clips to Matrox *.avi* and *.m2v* files, based on your selected video input format. For a list of the video input formats supported on the various MXO2 inputs for capturing clips, see "Supported input formats" on page 294.

Video input format	Captured file format	
	Matrox AVI	**Matrox M2V**
NTSC	NTSC, 720p @ 59.94 fps, or 1080i/p @ 29.97 fps	NTSC
PAL	PAL, 720p @ 50 fps, or 1080i/p @ 25 fps	PAL
720p @ 50 fps	PAL, 720p @ 50 fps, or 1080i/p @ 25 fps	PAL
720p @ 59.94 fps	NTSC, 720p @ 59.94 fps, or 1080i/p @ 29.97 fps	NTSC
1080i @ 25 fps	PAL, 720p @ 50 fps, or 1080i @ 25 fps	PAL
1080i @29.97 fps	NTSC, 720p @ 59.94 fps, or 1080i @ 29.97 fps	NTSC
1080p/PsF @ 23.98 fps	486p @23.98 fps or 1080p @ 23.98 fps	—
1080p/PsF @ 24 fps	1080p @ 24 fps	—
1080p/PsF @ 25 fps	PAL, 720p @ 50 fps, or 1080p @ 25 fps	PAL
1080p/PsF @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080p @ 29.97 fps	NTSC
1080p @ 30 fps	1080p @ 30 fps	—

Supported capture formats for Avid editing applications

The following table lists the supported capture formats on Matrox MXO2 products, based on your project's video format and selected input source in Avid editing applications.

Project video format (capture format)[1]	Matrox MXO2 input				
	HDMI	SDI[2]	Component	S-Video	Composite
30i NTSC	NTSC[3], 720p @ 59.94 fps, or 1080i/p[4]/PsF @ 29.97 fps			NTSC	NTSC
23.976p NTSC	NTSC[3], 720p @ 59.94 fps, or 1080i/p[4]/PsF @ 29.97 fps			NTSC	NTSC
24p NTSC	—	—	—	—	—
25i PAL	PAL[5], 720p @ 50 fps, or 1080i/p[4]/PsF @ 25 fps			PAL	PAL
24p PAL	—	—	—	—	—
25p PAL	PAL[5], 720p @ 50 fps, or 1080i/p[4]/PsF @ 25 fps			PAL	PAL
720p/23.976	NTSC[3], 720p @ 59.94 fps, or 1080i/p[4]/PsF @ 29.97 fps			NTSC	NTSC
720p/25	PAL[5], 720p @ 50 fps, or 1080i/p[4]/PsF @ 25 fps			PAL	PAL
720p/29.97	—	—	—	—	—
720p/50	PAL[5], 720p @ 50 fps, or 1080i/p[4]/PsF @ 25 fps			PAL	PAL
720p/59.94	NTSC[3], 720p @ 59.94 fps, or 1080i/p[4]/PsF @ 29.97 fps			NTSC	NTSC
1080i/50 (25 fps)	PAL[5], 720p @ 50 fps, or 1080i @ 25 fps			PAL	PAL
1080i/59.94 (29.97 fps)	NTSC[3], 720p @ 59.94 fps, or 1080i @ 29.97 fps			NTSC	NTSC
1080p/23.976	1080p @ 23.98 fps	1080p[4]/PsF @ 23.98 fps		—	—
1080p/24	1080p @ 24 fps	1080p/PsF @ 24 fps	—	—	—
1080p/25	PAL[5], 720p @ 50 fps, or 1080p[4]/PsF @ 25 fps			PAL	PAL
1080p/29.97	NTSC[3], 720p @ 59.94 fps, or 1080p[4]/PsF @ 29.97 fps			NTSC	NTSC

[1] Video is always captured to the project's video format.
[2] SDI is not supported on Matrox MXO2 Mini.
[3] NTSC is not supported on the HDMI input.
[4] 1080p is not supported on the component input.
[5] PAL is not supported on the HDMI input.

Supported capture formats for Matrox A/V Tools

The following table lists the supported capture formats on Matrox MXO2 products, based on your editing video format and selected input source in Matrox A/V Tools.

Editing video format (capture format)[1]	Matrox MXO2 input				
	HDMI	**SDI[2]**	**Component**	**S-Video**	**Composite**
NTSC	NTSC[3], 720p @ 59.94 fps, or 1080i/p[4]/PsF @ 29.97 fps			NTSC	NTSC
PAL	PAL[5], 720p @ 50 fps, or 1080i/p[4]/PsF @ 25 fps			PAL	PAL
486p @ 23.98 fps	1080p @ 23.98 fps	1080p[4]/PsF @23.98 fps		—	—
486p @ 29.97 fps	—	—	—	—	—
576p @ 25 fps	—	—	—	—	—
720p @ 23.98 fps	—	—	—	—	—
720p @ 25 fps	—	—	—	—	—
720p @ 29.97 fps	—	—	—	—	—
720p @ 50 fps	PAL[5], 720p @ 50 fps, or 1080i/p[4]/PsF @ 25 fps			PAL	PAL
720p @ 59.94 fps	NTSC[3], 720p @ 59.94 fps, or 1080i/p[4]/PsF @ 29.97 fps			NTSC	NTSC
1440×1080i @ 25 fps	—	—	—	—	—
1440×1080i @ 29.97 fps	—	—	—	—	—
1440×1080p @ 23.98 fps	—	—	—	—	—
1440×1080p @ 25 fps	—	—	—	—	—
1440×1080p @ 29.97 fps	—	—	—	—	—
1080i @ 25 fps	PAL[5], 720p @ 50 fps, or 1080i @ 25 fps			PAL	PAL
1080i @ 29.97 fps	NTSC[3], 720p @ 59.94 fps, or 1080i @ 29.97 fps			NTSC	NTSC
1080p @ 23.98 fps	1080p @ 23.98 fps	1080p[4]/PsF @ 23.98 fps		—	—
1080p @ 24 fps	1080p @ 24 fps	1080p/PsF @ 24 fps	—	—	—
1080p @ 25 fps	PAL[5], 720p @ 50 fps, or 1080p[4]/PsF @ 25 fps			PAL	PAL
1080p @ 29.97 fps	NTSC[3], 720p @ 59.94 fps, or 1080p[4]/PsF @ 29.97 fps			NTSC	NTSC
1080p @ 30 fps	1080p @ 30 fps		—	—	—

[1] Video is always captured to the editing video format.

[2] SDI is not supported on Matrox MXO2 Mini.

[3] NTSC is not supported on the HDMI input.

[4] 1080p is not supported on the component input.

[5] PAL is not supported on the HDMI input.

Supported capture formats for Matrox MAX H.264 Capture

The following table lists the supported capture formats when using the Matrox MAX H.264 Capture application to capture clips to Matrox *.264*, *.mp4*, and *.avi* files, based on your selected video input format. For a list of the video input formats supported on the various MXO2 inputs for capturing clips, see "Supported input formats" on page 294.

Video input format	Captured file format		
	Matrox 264 (Blu-ray)	Matrox MP4	Matrox AVI
NTSC	720p @ 59.94 fps or 1080i @ 29.97 fps	720p @ 59.94 fps, Any_[1]p @ 14.98 fps, or Any_p @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080i/p @ 29.97 fps
PAL	720p @ 50 fps or 1080i @ 25 fps	720p @ 50 fps, Any_p @ 12.5 fps, or Any_p @ 25 fps	PAL, 720p @ 50 fps, or 1080i/p @ 25 fps
720p @ 50 fps	720p @ 50 fps or 1080i @ 25 fps	720p @ 50 fps, Any_p @ 12.5 fps, or Any_p @ 25 fps	PAL, 720p @ 50 fps, or 1080i/p @ 25 fps
720p @ 59.94 fps	720p @ 59.94 fps or 1080i @ 29.97 fps	720p @ 59.94 fps, Any_p @ 14.98 fps, or Any_p @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080i/p @ 29.97 fps
1080i @ 25 fps	720p @ 50 fps or 1080i @ 25 fps	720p @ 50 fps, Any_p @ 12.5 fps, or Any_p @ 25 fps	PAL, 720p @ 50 fps, or 1080i @ 25 fps
1080i @29.97 fps	720p @ 59.94 fps or 1080i @ 29.97 fps	720p @ 59.94 fps, Any_p @ 14.98 fps, or Any_p @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080i @ 29.97 fps
1080p/PsF @ 23.98 fps	720p @ 23.98 fps or 1080p @ 23.98 fps	Any_p @ 11.99 fps or Any_p @ 23.98 fps	486p @23.98 fps or 1080p @ 23.98 fps
1080p/PsF @ 24 fps	720p @ 24 fps or 1080p @ 24 fps	Any_p @ 12 fps or Any_p @ 24 fps	1080p @ 24 fps
1080p/PsF @ 25 fps	720p @ 50 fps	720p @ 50 fps, Any_p @ 12.5 fps, or Any_p @ 25 fps	PAL, 720p @ 50 fps, or 1080p @ 25 fps
1080p/PsF @ 29.97 fps	—	Any_p @ 14.98 fps or Any_p @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080p @ 29.97 fps
1080p @ 30 fps	—	Any_p @ 15 fps or Any_p @ 30 fps	1080p @ 30 fps

[1] Any_ represents a custom frame size that you can enter for your Matrox *.mp4* file as explained in "Specifying your capture format settings" on page 260.

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Matrox MXO2 Supported Output Formats

This appendix provides information on the video output formats that are supported on MXO2.

Supported video output formats for playback

This section lists the formats that are supported on the main and secondary MXO2 video outputs during playback, depending on the application used. For descriptions of the MXO2 outputs, see "Outputs" on page 285.

Playback using Adobe Premiere Pro

The following table shows the formats that are supported on the main and secondary MXO2 video outputs during playback using Adobe Premiere Pro, based on your sequence's video format (for sequence formats natively supported by MXO2 as well as custom formats).

✎ **Note** For sequence formats where the width, multiplied by the pixel aspect ratio, and the height correspond to a natively supported format, the available output formats will be the same as those listed for the native format. For example, a DVCPRO HD 960×720p @ 50 fps sequence has a pixel aspect ratio of 1.333 (960×1.333 = width 1280), and therefore supports the same output formats as listed for the native 720p @ 50 fps (1280×720p) format.

Sequence video format	Matrox MXO2 output	
	Main output[1]	**Secondary output[2]**
NTSC	NTSC	NTSC, 720p @ 59.94 fps, or 1080i/p[3]/PsF @ 29.97 fps
	720p @ 59.94 fps	NTSC or 720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC or 1080i @ 29.97 fps
	1080PsF @ 29.97 fps	NTSC or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
PAL	PAL	PAL, 720p @ 50 fps, or 1080i/p[3]/PsF @ 25 fps
	720p @ 50 fps	PAL or 720p @ 50 fps
	1080i @ 25 fps	PAL or 1080i @ 25 fps
	1080PsF @ 25 fps	PAL or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	
486p @ 23.98 fps	NTSC	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], or 1080i @ 29.97 fps
	1080PsF @ 23.98 fps	NTSC, 480p @ 59.94 fps[5], or 1080p[3]/PsF @ 23.98 fps
	1080p @ 23.98 fps[3,4]	

Sequence video format	Matrox MXO2 output	
	Main output[1]	Secondary output[2]
486p @ 29.97 fps	NTSC 480p @ 59.94 fps[4,5]	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080i/p[3]/PsF @ 29.97 fps
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], or 1080i @ 29.97 fps
	1080PsF @ 29.97 fps 1080p @ 29.97 fps[3,4]	NTSC, 480p @ 59.94 fps[5], or 1080p[3]/PsF @ 29.97 fps
576p @ 25 fps	PAL 576p @ 50 fps[4,5]	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080i/p[3]/PsF @ 25 fps
	720p @ 50 fps	PAL, 576p @ 50 fps[5], or 720p @ 50 fps
	1080i @ 25 fps	PAL, 576p @ 50 fps[5], or 1080i @ 25 fps
	1080PsF @ 25 fps 1080p @ 25 fps[3,4]	PAL, 576p @ 50 fps[5], or 1080p[3]/PsF @ 25 fps
720p @ 23.98 fps	NTSC 480p @ 59.94 fps[4,5]	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	1080i @ 29.97 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
	1080PsF @ 23.98 fps 1080p @ 23.98 fps[3,4]	720p @ 59.94 fps or 1080p[3]/PsF @ 23.98 fps
720p @ 25 fps	PAL 576p @ 50 fps[4,5]	PAL, 576p @ 50 fps[5], or 720p @ 50 fps
	720p @ 50 fps	PAL, 576p @ 50 fps[5], 720p @ 50 fps, 1080i/p[3]/PsF @ 25 fps
	1080i @ 25 fps	720p @ 50 fps or 1080i/p[3]/PsF @ 25 fps
	1080PsF @ 25 fps 1080p @ 25 fps[3,4]	
720p @ 29.97 fps	NTSC 480p @ 59.94 fps[4,5]	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i/p[3]/PsF @ 29.97 fps
	1080i @ 29.97 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
	1080PsF @ 29.97 fps 1080p @ 29.97 fps[3,4]	720p @ 59.94 fps or 1080p[3]/PsF @ 29.97 fps

Supported video output formats for playback

Sequence video format	Matrox MXO2 output	
	Main output[1]	Secondary output[2]
720p @ 50 fps	PAL 576p @ 50 fps[4,5]	PAL, 576p @ 50 fps[5], or 720p @ 50 fps
	720p @ 50 fps	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080i @ 25 fps
	1080i @ 25 fps	720p @ 50 fps or 1080i @ 25 fps
720p @ 59.94 fps	NTSC 480p @ 59.94 fps[4,5]	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080i @ 29.97 fps
	1080i @ 29.97 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
1440×1080i @ 25 fps	PAL	PAL
	720p @ 50 fps	720p @ 50
	1080i @ 25 fps	PAL or 1080i @ 25 fps
1440×1080i @ 29.97 fps	NTSC	NTSC
	720p @ 59.94 fps	720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC or 1080i @ 29.97 fps
1440×1080p @ 23.98 fps	NTSC 480p @ 59.94 fps[4,5]	NTSC or 480p @ 59.94 fps[5]
	720p @ 59.94 fps	720p @ 59.94 fps or 1080p[3]/Psf @ 23.98 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	1080PsF @ 23.98 fps	
	1080p @ 23.98 fps[3,4]	
1440×1080p @ 25 fps	PAL 576p @ 50 fps[4,5]	PAL or 576 @ 50 fps[5]
	720p @ 50 fps	720p @ 50 fps
	1080PsF @ 25 fps	PAL, 576p @ 50 fps[5], or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	
1440×1080p @ 29.97 fps	NTSC 480p @ 59.94 fps[4,5]	NTSC or 480p @ 59.94 fps[5]
	720p @ 59.94 fps	720p @ 59.94 fps
	1080PsF @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
1080i @ 25 fps	PAL	PAL or 1080i @ 25 fps
	720p @ 50 fps	720p @ 50 fps or 1080i @ 25 fps
	1080i @ 25 fps	PAL, 720p @ 50 fps, or 1080i @ 25 fps

Appendix D, Matrox MXO2 Supported Output Formats

Sequence video format	Matrox MXO2 output	
	Main output[1]	**Secondary output[2]**
1080i @ 29.97 fps	NTSC	NTSC or 1080i @ 29.97 fps
	720p @ 59.94 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
	1080i @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080i @ 29.97 fps
1080p @ 23.98 fps	NTSC	NTSC, 480p @ 59.94 fps[5], 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF@ 23.98 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	1080PsF @ 23.98 fps	
	1080p @ 23.98 fps[3,4]	
1080p @ 24 fps	1080PsF @ 24 fps[4,6]	1080p/PsF @ 24 fps[3,6]
	1080p @ 24 fps[3,4]	
1080p @ 25 fps	PAL	PAL, 576p @ 50 fps[5], or 1080p[3]/PsF @ 25 fps
	576p @ 25 fps[4,5]	
	720p @ 50 fps	720p @ 50 fps or 1080p[3]/PsF @ 25 fps
	1080PsF @ 25 fps	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	
1080p @ 29.97 fps	NTSC	NTSC, 480p @ 59.94 fps[5], or 1080p[3]/PsF @ 29.97 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	720p @ 59.94 fps or 1080p[3]/PsF @ 29.97 fps
	1080PsF @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
1080p @ 30 fps	1080p @ 30 fps[3,4]	1080p @ 30 fps[3]
Custom formats with a width greater than 1920 and an aspect ratio of 16:9 or greater (such as many RED formats)	Same output formats as for 1080i/p with the corresponding frame rate.	
All other custom formats[7]	NTSC	NTSC, 720p @ 59.94 fps, or 1080i/p[3]/PsF @ 29.97 fps
	PAL	PAL, 720p @ 50 fps, or 1080i/p[3]/PsF @ 25 fps
	480p @ 59.94 fps[4,5]	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080i/p[3]/PsF @ 29.97 fps
	576p @ 50 fps[4,5]	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080i/p[3]/PsF @ 25 fps
	720p @ 50 fps	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080i @ 25 fps
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080i @29.97 fps
	1080i @ 25 fps	PAL, 720p @ 50 fps, or 1080i @ 25 fps
	1080i @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080i @ 29.97 fps

Supported video output formats for playback

| Sequence video format | Matrox MXO2 output | |
	Main output[1]	Secondary output[2]
All other custom formats (cont'd)[7]	1080PsF @ 23.98 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	1080p @ 23.98 fps[3,4]	
	1080p @ 24 fps[3,4]	1080p/PsF @ 24 fps[3,6]
	1080PsF @ 25 fps	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	
	1080PsF @ 29.97 fp	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
	1080p @ 30 fps[3,4]	1080p @ 30 fps[3]

[1] Main output on MXO2 Mini is always analog.

[2] Secondary output on MXO2 Mini is always HDMI.

[3] 1080p is supported on the HDMI and SDI outputs only.

[4] Not available on MXO2 Mini.

[5] 480p @ 59.94 fps and 576p @ 50 fps are supported on the HDMI output only.

[6] 1080PsF @ 24 fps is supported on the SDI output only.

[7] For the best results, you should select a video output format with a frame rate that matches or is compatible with your sequence's frame rate.

Playback using Avid editing applications

The following table shows the formats that are supported on the main and secondary MXO2 video outputs during playback using Avid editing applications, based on your project's video format.

ⓘ **Important**   If the main and secondary output formats don't match and the video quality for playback is not set to Full Quality, the secondary output will be blanked on MXO2, MXO2 Rack, and MXO2 LE. On MXO2 Mini, however, either the main analog or secondary HDMI output will be blanked depending on whether you selected analog or HDMI as the **Priority Output (never blanked)** setting.

Project video format	Matrox MXO2 output	
	Main output[1]	**Secondary output**[2]
30i NTSC, 23.976p NTSC, or 24p NTSC	NTSC	NTSC, 720p @ 59.94 fps, or 1080i/p[3]/PsF @ 29.97 fps
	720p @ 59.94 fps	NTSC or 720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC or 1080i @ 29.97 fps
	1080PsF @ 29.97 fps	NTSC or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
25i PAL, 24p PAL, or 25p PAL	PAL	PAL, 720p @ 50 fps, or 1080i/p[3]/PsF @ 25 fps
	720p @ 50 fps	PAL or 720p @ 50 fps
	1080i @ 25 fps	PAL or 1080i @ 25 fps
	1080PsF @ 25 fps	PAL or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	
720p/23.976[5], 720p/29.97, or 720p/59.94	NTSC	NTSC, 480p @ 59.94 fps[6], or 720p @ 59.94 fps
	480p @ 59.94 fps[6]	
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080i @ 29.97 fps
	1080i @ 29.97 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
720p/25 or 720p/50	PAL	PAL, 576p @ 50 fps[6], or 720p @ 50 fps
	576p @ 50 fps[6]	
	720p @ 50 fps	PAL, 576p @ 50 fps[6], 720p @ 50 fps, or 1080i @ 25 fps
	1080i @ 25 fps	720p @ 50 fps or 1080i @ 25 fps
1080i/50 (25 fps)	PAL	PAL or 1080i @ 25 fps
	720p @ 50 fps	720p @ 50 fps or 1080i @ 25 fps
	1080i @ 25 fps	PAL, 720p @ 50 fps, or 1080i @ 25 fps
1080i/59.94 (29.97 fps)	NTSC	NTSC or 1080i @ 29.97 fps
	720p @ 59.94 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
	1080i @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080i @ 29.97 fps

Supported video output formats for playback

Project video format	Matrox MXO2 output	
	Main output[1]	Secondary output[2]
1080p/23.976[5]	NTSC	NTSC, 480p @ 59.94 fps[6], 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	480p @ 59.94 fps[6]	
	720p @ 59.94 fps	720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF@ 23.98 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[6], 720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	1080PsF @ 23.98 fps	
	1080p @ 23.98 fps[3,4]	
1080p/24[5]	1080PsF @ 24 fps[4,7]	1080p/PsF @ 24 fps[3,7]
	1080p@ 24 fps[3,4]	
1080p/25	PAL	PAL, 576p @ 50 fps[6], or 1080p[3]/PsF @ 25 fps
	576p @ 25 fps[6]	
	720p @ 50 fps	720p @ 50 fps or 1080p[3]/PsF @ 25 fps
	1080PsF @ 25 fps	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	
1080p/29.97	NTSC	NTSC, 480p @ 59.94 fps[6], or 1080p[3]/PsF @ 29.97 fps
	480p @ 59.94 fps[6]	
	720p @ 59.94 fps	720p @ 59.94 fps or 1080p[3]/PsF @ 29.97 fps
	1080PsF @ 29.97 fps	NTSC, 480p @ 59.94 fps[6], 720p @ 59.94 fps, or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	

[1] Main output on MXO2 Mini is always analog.

[2] Secondary output on MXO2 Mini is always HDMI.

[3] 1080p is supported on the HDMI and SDI outputs only.

[4] Not available on MXO2 Mini.

[5] To downconvert a 720p/23.976, 1080p/23.976, or 1080p24 sequence to SD to record a digital cut, you must change your project's format (project type) to SD (see "Exporting your sequence to tape" on page 163).

[6] 480p @ 59.94 fps and 576p @ 50 fps are supported on the HDMI output only.

[7] 1080PsF @ 24 fps is supported on the SDI output only.

Playback using Matrox A/V Tools and Matrox WYSIWYG

The following table shows the formats that are supported on the main and secondary MXO2 video outputs during playback using Matrox A/V Tools and the Matrox WYSIWYG plug-ins, based on your selected editing video format

Editing video format	Matrox MXO2 output	
	Main output[1]	Secondary output[2]
NTSC	NTSC	NTSC, 720p @ 59.94 fps, or 1080i/p[3]/PsF @ 29.97 fps
	720p @ 59.94 fps	NTSC or 720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC or 1080i @ 29.97 fps
	1080PsF @ 29.97 fps	NTSC or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
PAL or DV-PAL	PAL	PAL, 720p @ 50 fps, or 1080i/p[3]/PsF @ 25 fps
	720p @ 50 fps	PAL or 720p @ 50 fps
	1080i @ 25 fps	PAL or 1080i @ 25 fps
	1080PsF @ 25 fps	PAL or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	
486p @ 23.98 fps	NTSC	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], or 1080i @ 29.97 fps
	1080PsF @ 23.98 fps	NTSC, 480p @ 59.94 fps[5], or 1080p[3]/PsF @ 23.98 fps
	1080p @ 23.98 fps[3,4]	
486p @ 29.97 fps	NTSC	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080i/p[3]/PsF @ 29.97 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], or 1080i @ 29.97 fps
	1080PsF @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
576p @ 25 fps	PAL	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080i/p[3]/PsF @ 25 fps
	576p @ 50 fps[4,5]	
	720p @ 50 fps	PAL, 576p @ 50 fps[5], or 720p @ 50 fps
	1080i @ 25 fps	PAL, 576p @ 50 fps[5], or 1080i @ 25 fps
	1080PsF @ 25 fps	PAL, 576p @ 50 fps[5], or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	

Supported video output formats for playback

Editing video format	Matrox MXO2 output	
	Main output[1]	Secondary output[2]
720p @ 23.98 fps	NTSC	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	1080i @ 29.97 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
	1080PsF @ 23.98 fps	720p @ 59.94 fps or 1080p[3]/PsF @ 23.98 fps
	1080p @ 23.98 fps[3,4]	
720p @ 25 fps	PAL	PAL, 576p @ 50 fps[5], or 720p @ 50 fps
	576p @ 50 fps[4,5]	
	720p @ 50 fps	PAL, 576p @ 50 fps[5], 720p @ 50 fps, 1080i/p[3]/PsF @ 25 fps
	1080i @ 25 fps	720p @ 50 fps or 1080i/p[3]/PsF @ 25 fps
	1080PsF @ 25 fps	
	1080p @ 25 fps[3,4]	
720p @ 29.97 fps	NTSC	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i/p[3]/PsF @ 29.97 fps
	1080i @ 29.97 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
	1080PsF @ 29.97 fps	720p @ 59.94 fps or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
720p @ 50 fps	PAL	PAL, 576p @ 50 fps[5], or 720p @ 50 fps
	576p @ 50 fps[4,5]	
	720p @ 50 fps	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080i @ 25 fps
	1080i @ 25 fps	720p @ 50 fps or 1080i @ 25 fps
720p @ 59.94 fps	NTSC	NTSC, 480p @ 59.94 fps[5], or 720p @ 59.94 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080i @ 29.97 fps
	1080i @ 29.97 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
1440×1080i @ 25 fps	PAL	PAL
	720p @ 50 fps	720p @ 50
	1080i @ 25 fps	PAL or 1080i @ 25 fps
1440×1080i @ 29.97 fps	NTSC	NTSC
	720p @ 59.94 fps	720p @ 59.94 fps
	1080i @ 29.97 fps	NTSC or 1080i @ 29.97 fps

Appendix D, Matrox MXO2 Supported Output Formats

Editing video format	Matrox MXO2 output	
	Main output[1]	Secondary output[2]
1440×1080p @ 23.98 fps	NTSC	NTSC or 480p @ 59.94 fps[5]
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	720p @ 59.94 fps or 1080p[3]/Psf @ 23.98 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	1080PsF @ 23.98 fps	
	1080p @ 23.98 fps[3,4]	
1440×1080p @ 25 fps	PAL	PAL or 576 @ 50 fps[5]
	576p @ 50 fps[4,5]	
	720p @ 50 fps	720p @ 50 fps
	1080PsF @ 25 fps	PAL, 576p @ 50 fps[5], or 1080p[3]/PsF @ 25 fps
	1080p @ 25 fps[3,4]	
1440×1080p @ 29.97 fps	NTSC	NTSC or 480p @ 59.94 fps[5]
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	720p @ 59.94 fps
	1080PsF @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], or 1080p[3]/PsF @ 29.97 fps
	1080p @ 29.97 fps[3,4]	
1080i @ 25 fps	PAL	PAL or 1080i @ 25 fps
	720p @ 50 fps	720p @ 50 fps or 1080i @ 25 fps
	1080i @ 25 fps	PAL, 720p @ 50 fps, or 1080i @ 25 fps
1080i @ 29.97 fps	NTSC	NTSC or 1080i @ 29.97 fps
	720p @ 59.94 fps	720p @ 59.94 fps or 1080i @ 29.97 fps
	1080i @ 29.97 fps	NTSC, 720p @ 59.94 fps, or 1080i @ 29.97 fps
1080p @ 23.98 fps	NTSC	NTSC, 480p @ 59.94 fps[5], 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	480p @ 59.94 fps[4,5]	
	720p @ 59.94 fps	720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF@ 23.98 fps
	1080i @ 29.97 fps	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, 1080i @ 29.97 fps, or 1080p[3]/PsF @ 23.98 fps
	1080PsF @ 23.98 fps	
	1080p @ 23.98 fps[3,4]	
1080p @ 24 fps	1080PsF @ 24 fps[4,6]	1080p/PsF @ 24 fps[3,6]
	1080p @ 24 fps[3,4]	

Supported video output formats for playback

Editing video format	Matrox MXO2 output	
	Main output[1]	Secondary output[2]
1080p @ 25 fps	PAL 576p @ 25 fps[4,5]	PAL, 576p @ 50 fps[5], or 1080p[3]/PsF @ 25 fps
	720p @ 50 fps	720p @ 50 fps or 1080p[3]/PsF @ 25 fps
	1080PsF @ 25 fps 1080p @ 25 fps[3,4]	PAL, 576p @ 50 fps[5], 720p @ 50 fps, or 1080p[3]/PsF @ 25 fps
1080p @ 29.97 fps	NTSC 480p @ 59.94 fps[4,5]	NTSC, 480p @ 59.94 fps[5], or 1080p[3]/PsF @ 29.97 fps
	720p @ 59.94 fps	720p @ 59.94 fps or 1080p[3]/PsF @ 29.97 fps
	1080PsF @ 29.97 fps 1080p @ 29.97 fps[3,4]	NTSC, 480p @ 59.94 fps[5], 720p @ 59.94 fps, or 1080p[3]/PsF @ 29.97 fps
1080p @ 30 fps	1080p @ 30 fps[3,4]	1080p @ 30 fps[3]

[1] Main output on MXO2 Mini is always analog.

[2] Secondary output on MXO2 Mini is always HDMI.

[3] 1080p is supported on the HDMI and SDI outputs only.

[4] Not available on MXO2 Mini.

[5] 480p @ 59.94 fps and 576p @ 50 fps are supported on the HDMI output only.

[6] 1080PsF @ 24 fps is supported on the SDI output only.

Appendix D, Matrox MXO2 Supported Output Formats

Supported video output formats for monitoring

This section lists the formats that are supported on the MXO2 video outputs for monitoring your video while capturing, recording, or streaming using various applications. For descriptions of the MXO2 outputs, see "Outputs" on page 285.

Adobe Premiere Pro

The following table shows the formats that are supported on the MXO2 video outputs for monitoring your captured video, based on your selected capture format in Adobe Premiere Pro.

Capture format	Matrox MXO2 output				
	HDMI	SDI[1]	Component	S-Video	Composite
NTSC[2]	NTSC				
PAL[2]	PAL				
486p @ 23.98 fps	480p @ 59.94 fps	NTSC			
720p @ 50 fps	720p @ 50 fps			—	—
720p @ 59.94 fps	720p @ 59.94 fps			—	—
1080i @ 25 fps	1080i @ 25 fps			—	—
1080i @ 29.97 fps	1080i @ 29.97 fps			—	—
1080p @ 23.98 fps	1080p/PsF @ 23.98 fps		1080PsF @ 23.98 fps	—	—
1080p @ 24 fps	1080p/PsF @ 24 fps[3]		—	—	—
1080p @ 25 fps	1080p/PsF @ 25 fps		1080PsF @ 25 fps	—	—
1080p @ 29.97 fps	1080p/PsF @ 29.97 fps		1080PsF @ 29.97 fps		
1080p @ 30 fps	1080p @ 30 fps		—	—	—

[1] SDI is not supported on Matrox MXO2 Mini.
[2] NTSC and PAL are the only supported capture formats when capturing to a Matrox *.m2v* file.
[3] 1080PsF @ 24 fps is supported on the SDI output only.

Avid editing applications

The following table shows the formats that are supported on the MXO2 video outputs for monitoring your captured video, based on your project's video format in Avid editing applications.

Project video format (capture format)[1]	Matrox MXO2 output				
	HDMI	SDI[2]	Component	S-Video	Composite
30i NTSC or 23.976p NTSC	NTSC				
25i PAL or 25p PAL	PAL				
720p/23.976 or 720p/59.94	720p @ 59.94 fps			—	—
720p/25 or 720p/50	720p @ 50 fps			—	—
1080i/50 (25 fps)	1080i @ 25 fps			—	—
1080i/59.94 (29.97 fps)	1080i @ 29.97 fps			—	—
1080p/23.976	1080p/PsF @ 23.98 fps		1080PsF @ 23.98 fps	—	—
1080p/24 fps	1080p/PsF @ 24 fps[3]		—	—	—
1080p/25 fps	1080p/PsF @ 25 fps		1080PsF @ 25 fps	—	—
1080p @ 29.97 fps	1080p/PsF @ 29.97 fps		1080PsF @ 29.97 fps		

[1] Video is always captured to the project's video format.

[2] SDI is not supported on Matrox MXO2 Mini.

[3] 1080PsF @ 24 fps is supported on the SDI output only.

Matrox A/V Tools

The following table shows the formats that are supported on the MXO2 video outputs for monitoring your captured video, based on your editing video format in Matrox A/V Tools.

Editing video format (capture format)[1]	Matrox MXO2 output				
	HDMI	SDI[2]	Component	S-Video	Composite
NTSC	NTSC				
PAL	PAL				
486p @ 23.98 fps	480p @ 59.94 fps	NTSC			
720p @ 50 fps	720p @ 50 fps			—	—
720p @ 59.94 fps	720p @ 59.94 fps			—	—
1080i @ 25 fps	1080i @ 25 fps			—	—
1080i @ 29.97 fps	1080i @ 29.97 fps			—	—
1080p @ 23.98 fps	1080p/PsF @ 23.98 fps		1080PsF @ 23.98 fps	—	—
1080p @ 24 fps	1080p/PsF @ 24 fps[3]		—	—	—
1080p @ 25 fps	1080p/PsF @ 25 fps		1080PsF @ 25 fps	—	—
1080p @ 29.97 fps	1080p/PsF @ 29.97 fps		1080PsF @ 29.97 fps		
1080p @ 30 fps	1080p @ 30 fps		—	—	—

[1] Video is always captured to the editing video format.

[2] SDI is not supported on Matrox MXO2 Mini.

[3] 1080PsF @ 24 fps is supported on the SDI output only.

Matrox MAX H.264 Capture and Telestream Wirecast

The following table shows the formats that are supported on the MXO2 video outputs for monitoring the source material that you're capturing using the Matrox MAX H.264 Capture application, or streaming/recording using Telestream Wirecast, based on your selected video input format. For a list of the video input formats supported on the various MXO2 inputs, see "Supported input formats" on page 294.

Video input format	Matrox MXO2 output				
	HDMI	SDI[1]	Component	S-Video	Composite
NTSC	NTSC				
PAL	PAL				
720p @ 50 fps	720p @ 50 fps			—	—
720p @ 59.94 fps	720p @ 59.94 fps			—	—
1080i @ 25 fps	1080i @ 25 fps			—	—
1080i @ 29.97 fps	1080i @ 29.97 fps			—	—
1080PsF @ 23.98 fps	1080PsF @ 23.98 fps			—	—
1080PsF @ 24 fps	—	1080PsF @ 24 fps	—	—	—
1080PsF @ 25 fps	1080PsF @ 25 fps			—	—
1080PsF @ 29.97 fps	1080PsF @ 29.97 fps			—	—
1080p @ 23.98 fps	1080p @ 23.98 fps		—	—	—
1080p @ 24 fps	1080p @ 24 fps		—	—	—
1080p @ 25 fps	1080p @ 25 fps		—	—	—
1080p @ 29.97 fps	1080p @ 29.97 fps		—	—	—
1080p @ 30 fps	1080p @ 30 fps		—	—	—

[1] SDI is not supported on Matrox MXO2 Mini.

E

Matrox MXO2 Specifications

This appendix provides specifications for all Matrox MXO2 products, and Matrox PCIe host adapters.

Matrox MXO2 specifications

General

- **Video formats**   NTSC, PAL, NTSC-EIAJ, 1080i/p/PsF, 720p, 576p, 480p
- **Regulatory compliance**
  - FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
  - RoHS Directive 2002/95/EC
- **Dimensions**
  - Length   330 mm (13")
  - Width   241 mm (9.5")
  - Height   51 mm (2")
- **External AC/DC adapter**
  - 100-240 VAC 50-60 Hz
  - Input: IEC320-C14 inlet
  - Output: +12V DC, 3A max
  - Dimensions: L 104 mm × W 46 mm × H 36 mm (4.1" × 1.8" × 1.4")
- **Total power consumption**   15 watts

Connections

- **Genlock reference input**
  - HD analog tri-level sync or SD analog bi-level black burst
  - BNC connector (75 Ω), terminated
- **RS-422**   D-sub connector (9 pins)

Video

- **HDMI**
  - **HD input and output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (8-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
  - **SD output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (8-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
- **SDI**
  - **HDTV input**
    - HD-SDI with eight channels of embedded SDI audio

- 24-bit, 48 kHz
- Compliant with SMPTE 292M, SMPTE 299M
- BNC connector (75 Ω), terminated
- Equalized input for maximum cable length support
  - **HDTV output**
    - HD-SDI with 16 channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 292M, SMPTE 299M
    - BNC connector (75 Ω)
  - **SDTV input**
    - SD-SDI with eight channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 259M-C, SMPTE 272M
    - BNC connector (75 Ω), terminated
    - Equalized input for maximum cable length support
  - **SDTV output**
    - SD-SDI with 16 channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 259M-C, SMPTE 272M
    - BNC connector (75 Ω)
- **S-Video and composite video input**
  - **SDTV input**
    - PAL, NTSC, NTSC-EIAJ
    - BNC connector for composite (75 Ω), terminated
    - 4-pin mini-DIN S-Video connector (75 Ω), terminated
    - 12-bit ADC
    - 2x oversampling
    - Anti-aliasing filtering
    - Automatic gain control
  - **SDTV output**
    - PAL, NTSC, NTSC-EIAJ
    - BNC connector for composite (75 Ω)
    - 4-pin mini-DIN S-Video connector (75 Ω)
    - 12-bit DAC
    - 8x oversampling

Matrox MXO2 specifications

- **Analog component video input**
  - **HDTV input**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - Anti-aliasing filtering
  - **HDTV output**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 2x oversampling
  - **SDTV input**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - 4x oversampling
    - Anti-aliasing filter
  - **SDTV output**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 8x oversampling
- **Analog video performance**
  - **HDTV analog component video (passthrough)**
    - Frequency response Y: +/- 1.0 dB max to 28 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 12 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 50 dB, unified weighted
  - **SDTV S-Video and composite video (passthrough)**
    - Amplitude error: < 4%
    - Frequency response: +/- 0.5 dB max to 5 MHz
    - 2T pulse response: 1.0% max
    - Diff. Gain: < 2%, Diff. Phase: < 1 degree

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- S/N: > 58 dB, unified weighted
    - **SDTV analog component video (passthrough)**
        - Frequency response Y: +/- 0.5 dB max to 5 MHz
        - Frequency response Pb, Pr: +/- 1.0 dB max to 2 MHz
        - Component channel delay: < 8 ns
        - Component S/N (Y, Pb, Pr): > 54 dB, unified weighted

Audio

- **Unbalanced analog audio inputs**
    - 1x stereo pair
    - RCA connectors
    - Input impedance: Hi-Z
    - Line level with 18 db headroom (max level)
- **Unbalanced analog audio outputs**
    - 3x stereo pair
    - RCA connectors
    - Output impedance: 100 Ω
    - Line level with 18 db headroom (max level)
- **Balanced analog inputs**
    - 1x stereo pair
    - 2x XLR female connectors
    - Nominal levels: +4 dBu (+4 dBm)
    - Input impedance: Hi-Z
    - Headroom (max level): 18 db
- **Balanced analog outputs**
    - 2x stereo pair
    - 4x XLR male connectors
    - Nominal levels: +4 dBu (+4 dBm)
    - Output impedance: 50 Ω
    - Headroom (max level): 18 db
- **Unbalanced digital (AES/EBU) input**
    - 1x stereo pair
    - BNC connector (75 Ω), terminated
    - Maximum input level: 5 V_{p-p}
- **Unbalanced digital (AES/EBU) output**
    - 1x stereo pair

- – BNC connector
- – Output impedance: 75 Ω
- – Nominal output level: $1V_{p-p}$
- **Balanced and unbalanced analog audio performance**
  - – Sampling frequency: 48 kHz (using 64x oversampling)
  - – Quantization: 24 bits
  - – S/N: > 85 db
  - – THDN at 1 kHz, nominal level: < 0.05%

Environmental specifications
- Minimum/maximum ambient operating temperatures: 0 to 40º C
- Minimum/maximum storage temperature: –40 to 75º C
- Maximum altitude for operation: 3,000 meters
- Maximum altitude for transport: 12,000 meters
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Matrox MXO2 Rack specifications

General
- **Video formats**   NTSC, PAL, NTSC-EIAJ, 1080i/p/PsF, 720p, 576p, 480p
- **Regulatory compliance**
  - – FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
  - – RoHS Directive 2002/95/EC
- **Dimensions (without rackmount brackets)**
  - – Length   437 mm (17.2")
  - – Width   208 mm (8.2")
  - – Height   86 mm (3.4") (two rack units)
- **Dimensions (with rackmount brackets)**
  - – Length   483 mm (19")
  - – Width   208 mm (8.2")
  - – Height   89 mm (3.5") (two rack units)
- **AC power**
  - – 100-240 VAC 50-60 Hz
  - – Input: IEC320-C14 inlet
  - – Output: +12V DC, 3A max

- **Total power consumption**   15 watts

Connections

- **Genlock reference input**
  - HD analog tri-level sync or SD analog bi-level black burst
  - BNC connector (75 Ω)
- **Genlock reference output**
  - HD analog tri-level sync or SD analog bi-level black burst
  - Loop through
  - BNC connector (75 Ω)
- **RS-422**   D-sub connector (9 pins)

Video

- **HDMI**
  - **HD input and output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (8-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
  - **SD output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (8-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
- **SDI**
  - **HDTV input**
    - HD-SDI with eight channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 292M, SMPTE 299M
    - BNC connector (75 Ω), terminated
    - Equalized input for maximum cable length support
  - **HDTV output**
    - HD-SDI with 16 channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 292M, SMPTE 299M
    - BNC connector (75 Ω)

      – **SDTV input**
- SD-SDI with eight channels of embedded SDI audio
- 24-bit, 48 kHz
- Compliant with SMPTE 259M-C, SMPTE 272M
- BNC connector (75 Ω), terminated
- Equalized input for maximum cable length support

      – **SDTV output**
- SD-SDI with 16 channels of embedded SDI audio
- 24-bit, 48 kHz
- Compliant with SMPTE 259M-C, SMPTE 272M
- BNC connector (75 Ω)

- **S-Video and composite video input**
  - **SDTV input**
    - PAL, NTSC, NTSC-EIAJ
    - BNC connector for composite (75 Ω), terminated
    - 4-pin mini-DIN S-Video connector (75 Ω), terminated
    - 12-bit ADC
    - 2x oversampling
    - Anti-aliasing filtering
    - Automatic gain control
  - **SDTV output**
    - PAL, NTSC, NTSC-EIAJ
    - BNC connector for composite (75 Ω)
    - 4-pin mini-DIN S-Video connector (75 Ω)
    - 12-bit DAC
    - 8x oversampling

- **Analog component video input**
  - **HDTV input**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - Anti-aliasing filtering
  - **HDTV output**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)

Appendix E, Matrox MXO2 Specifications

- 12-bit DAC
- 2x oversampling
  - **SDTV input**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - 4x oversampling
    - Anti-aliasing filter
  - **SDTV output**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 8x oversampling
- **Analog video performance**
  - **HDTV analog component video (passthrough)**
    - Frequency response Y: +/- 1.0 dB max to 28 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 12 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 50 dB, unified weighted
  - **SDTV S-Video and composite video (passthrough)**
    - Amplitude error: < 4%
    - Frequency response: +/- 0.5 dB max to 5 MHz
    - 2T pulse response: 1.0% max
    - Diff. Gain: < 2%, Diff. Phase: < 1 degree
    - S/N: > 58 dB, unified weighted
  - **SDTV analog component video (passthrough)**
    - Frequency response Y: +/- 0.5 dB max to 5 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 2 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 54 dB, unified weighted

Matrox MXO2 Rack specifications

Audio

- **Balanced analog inputs**
  - 2x stereo pair
  - 4x XLR female connectors
  - Nominal levels: +4 dBu (+4 dBm)
  - Input impedance: Hi-Z
  - Headroom (max level): 18 db
- **Balanced analog outputs**
  - 4x stereo pair
  - 8x XLR male connectors
  - Nominal levels: +4 dBu (+4 dBm)
  - Output impedance: 50 Ω
  - Headroom (max level): 18 db
- **Unbalanced digital (AES/EBU) input**
  - 2x stereo pair
  - 2x BNC connector (75 Ω), terminated
  - Maximum input level: 5 V_{p-p}
- **Unbalanced digital (AES/EBU) output**
  - 2x stereo pair
  - 2x BNC connector
  - Output impedance: 75 Ω
  - Nominal output level: $1V_{p-p}$
- **Balanced analog audio performance**
  - Sampling frequency: 48 kHz (using 64x oversampling)
  - Quantization: 24 bits
  - S/N: > 85 db
  - THDN at 1 kHz, nominal level: < 0.05%

Environmental specifications

- Minimum/maximum ambient operating temperatures: 0 to 40º C
- Minimum/maximum storage temperature: –40 to 75º C
- Maximum altitude for operation: 3,000 meters
- Maximum altitude for transport: 12,000 meters
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Matrox MXO2 LE specifications

General

- **Video formats**   NTSC, PAL, NTSC-EIAJ, 1080i/p/PsF, 720p, 576p, 480p
- **Regulatory compliance**
  - FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
  - RoHS Directive 2002/95/EC
- **Dimensions**
  - Length   237 mm (9.3)"
  - Width   241 mm (9.5")
  - Height   51 mm (2")
- **External AC/DC adapter**
  - 100-240 VAC 50-60 Hz
  - Input: IEC320-C14 inlet
  - Output: +12V DC, 3A max
  - Dimensions: L 104 mm × W 46 mm × H 36 mm (4.1" × 1.8" × 1.4")
- **Total power consumption**   15 watts

Connections

- **Genlock reference input**
  - HD analog tri-level sync or SD analog bi-level black burst
  - BNC connector (75 Ω), terminated
- **RS-422**   D-sub connector (9 pins)

Video

- **HDMI**
  - **HD input and output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (8-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
  - **SD output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (8-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
- **SDI**
  - **HDTV input**
    - HD-SDI with eight channels of embedded SDI audio

- 24-bit, 48 kHz
- Compliant with SMPTE 292M, SMPTE 299M
- BNC connector (75 Ω), terminated
- Equalized input for maximum cable length support
  - **HDTV output**
    - HD-SDI with 16 channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 292M, SMPTE 299M
    - BNC connector (75 Ω)
  - **SDTV input**
    - SD-SDI with eight channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 259M-C, SMPTE 272M
    - BNC connector (75 Ω), terminated
    - Equalized input for maximum cable length support
  - **SDTV output**
    - SD-SDI with 16 channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 259M-C, SMPTE 272M
    - BNC connector (75 Ω)
- **S-Video and composite video input**
  - **SDTV input**
    - PAL, NTSC, NTSC-EIAJ
    - BNC connector for composite (75 Ω), terminated
    - 4-pin mini-DIN S-Video connector (75 Ω), terminated
    - 12-bit ADC
    - 2x oversampling
    - Anti-aliasing filtering
    - Automatic gain control
  - **SDTV output**
    - PAL, NTSC, NTSC-EIAJ
    - BNC connector for composite (75 Ω)
    - 4-pin mini-DIN S-Video connector (75 Ω)
    - 12-bit DAC
    - 8x oversampling

Appendix E, Matrox MXO2 Specifications

- **Analog component video input**
  - **HDTV input**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - Anti-aliasing filtering
  - **HDTV output**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 2x oversampling
  - **SDTV input**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - 4x oversampling
    - Anti-aliasing filter
  - **SDTV output**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 8x oversampling
- **Analog video performance**
  - **HDTV analog component video (passthrough)**
    - Frequency response Y: +/- 1.0 dB max to 28 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 12 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 50 dB, unified weighted
  - **SDTV S-Video and composite video (passthrough)**
    - Amplitude error: < 4%
    - Frequency response: +/- 0.5 dB max to 5 MHz
    - 2T pulse response: 1.0% max
    - Diff. Gain: < 2%, Diff. Phase: < 1 degree

Matrox MXO2 LE specifications

- S/N: > 58 dB, unified weighted
  – **SDTV analog component video (passthrough)**
    - Frequency response Y: +/- 0.5 dB max to 5 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 2 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 54 dB, unified weighted

Audio

- **Unbalanced analog audio inputs**
  – 1x stereo pair
  – RCA connectors
  – Input impedance: Hi-Z
  – Line level with 18 db headroom (max level)
- **Unbalanced analog audio outputs**
  – 1x stereo pair
  – RCA connectors
  – Output impedance: 100 Ω
  – Line level with 18 db headroom (max level)
- **Balanced analog inputs**
  – 1x stereo pair
  – 2x XLR female connectors
  – Nominal levels: +4 dBu (+4 dBm)
  – Input impedance: Hi-Z
  – Headroom (max level): 18 db
- **Balanced analog outputs**
  – 1x stereo pair
  – 2x XLR male connectors
  – Nominal levels: +4 dBu (+4 dBm)
  – Output impedance: 50 Ω
  – Headroom (max level): 18 db
- **Balanced and unbalanced analog audio performance**
  – Sampling frequency: 48 kHz (using 64x oversampling)
  – Quantization: 24 bits
  – S/N: > 85 db
  – THDN at 1 kHz, nominal level: < 0.05%

Appendix E, Matrox MXO2 Specifications

Environmental specifications

- Minimum/maximum ambient operating temperatures: 0 to 40º C
- Minimum/maximum storage temperature: –40 to 75º C
- Maximum altitude for operation: 3,000 meters
- Maximum altitude for transport: 12,000 meters
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Matrox MXO2 Mini specifications

General

- **Video formats**   NTSC, PAL, NTSC-EIAJ, 1080i/p/PsF, 720p, 576p, 480p
- **Regulatory compliance**
  - FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
  - RoHS Directive 2002/95/EC
- **Dimensions**
  - Length   166 mm (6.5")
  - Width   110 mm (4.3")
  - Height   40 mm (1.6")
- **Operating voltages and power consumption**
  - Included AC/DC adapter: 100-240 V AC 50-60 Hz (5 V DC, 3 A max)
  - MXO2 Mini unit: 5-25 V DC, 2.5 mm barrel-type connector
    - 9 watts power consumption

Connections

Video

- **HDMI video**
  - **HD input and output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (8-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
  - **SD output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (8-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)

- **Composite video** (not available if using analog component input/output)
  - **SDTV input**
    - PAL, NTSC, NTSC-EIAJ
    - RCA connector
    - 10-bit ADC
    - 4x oversampling
    - Anti-aliasing filtering
    - Automatic gain control
  - **SDTV output**
    - PAL, NTSC, NTSC-EIAJ
    - RCA connector
    - 12-bit DAC
    - 16x oversampling
- **S-Video** (not available when using analog component input/output)
  - **SDTV input**
    - PAL, NTSC, NTSC-EIAJ
    - RCA connectors
    - 10-bit ADC
    - 4x oversampling
    - Anti-aliasing filtering
    - Automatic gain control
  - **SDTV output**
    - PAL, NTSC, NTSC-EIAJ
    - RCA connectors
    - 12-bit DAC
    - 16x oversampling
- **Analog component video** (not available when using composite, or S-Video input/output)
  - **HDTV input**
    - EIA-770.3 compliant
    - RCA connectors
    - 10-bit ADC
    - Anti-aliasing filtering
  - **HDTV output**
    - EIA-770.3 compliant

Appendix E, Matrox MXO2 Specifications

- RCA connectors
- 12-bit DAC
- 4x oversampling
    - **SDTV input**
        - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
        - SMPTE/EBU N10 (PAL)
        - RCA connectors
        - 10-bit ADC
        - 2x oversampling
        - Anti-aliasing filter
    - **SDTV output**
        - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
        - SMPTE/EBU N10 (PAL)
        - RCA connectors
        - 12-bit DAC
        - 16x oversampling
- **Analog video performance**
    - **HDTV analog component video**
        - Frequency response Y: +/- 1.0 dB max to 28 MHz
        - Frequency response Pb, Pr: +/- 1.0 dB max to 12 MHz
        - Component channel delay: < 8 ns
        - Component S/N (Y, Pb, Pr): > 50 dB, unified weighted
    - **SDTV S-Video and composite video**
        - Amplitude error: < 4%
        - Frequency response: +/- 0.75 dB max to 5 MHz
        - Diff. Gain: < 2%, Diff. Phase: < 1 degree
        - S/N: > 54 dB, unified weighted
    - **SDTV analog component video**
        - Frequency response Y: +/- 0.75 dB max to 5 MHz
        - Frequency response Pb, Pr: +/- 1.0 dB max to 2 MHz
        - Component channel delay: < 8 ns
        - Component S/N (Y, Pb, Pr): > 54 dB, unified weighted

Audio

- **Unbalanced analog audio inputs**
  - 1x stereo pair
  - RCA connectors
  - Input impedance: > 10 kΩ
  - Line level with 18 db headroom (max level: +8 dBv)
- **Unbalanced analog audio outputs**
  - 1x stereo pair
  - RCA connectors
  - Output impedance: < 200 Ω
  - Line level with 18 db headroom (max level: +8 dBv)
- **Unbalanced analog audio performance**
  - Sampling frequency: 48 kHz (using 128x oversampling)
  - Quantization: 24 bits
  - S/N: > 90 db
  - THDN at 1 kHz, nominal level: < 0.02%
  - Frequency response: +/- 0.5 dB, 20 Hz to 20 kHz
  - Channel separation: > 100 db

Environmental specifications

- Minimum/maximum ambient operating temperatures: 0 to 40º C
- Minimum/maximum storage temperature: –40 to 75º C
- Maximum altitude for operation: 3,000 meters
- Maximum altitude for transport: 12,000 meters
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Matrox PCIe host adapter specifications

Matrox PCIe host ExpressCard/34 adapter (for laptops)

- Standard ExpressCard/34
- Dimensions: L 96 mm × W 33 mm × H 13 mm (3.8" × 1.3" × 0.5")

Matrox PCIe host adapter (for desktops)

- Standard low-profile PCIe (x1) card
- PCB dimensions
  - 66 mm × 69 mm (2.6" × 2.7")
  - overall thickness including components: 19 mm (0.75")

Your notes

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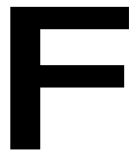
Matrox Customer Support

This appendix explains how you can register your Matrox product and obtain customer support.

How to get Matrox customer support

If you have a problem that you're unable to solve by referring to the documentation for your Matrox product, please contact your Matrox representative. He or she should be able to help you quickly correct any installation or system configuration problem.

If your representative is unable to solve your problem, contact Matrox for further information and assistance.

Registration

You can register your Matrox product in the Matrox Support section of our website at www.matrox.com/video/support.

Only registered users are entitled to customer support, software updates, special promotional offers, and access to our user forum.

Keep up to date with our website

In addition to registering your Matrox product, our website offers you up-to-the-minute information about Matrox products and software updates. Be sure to place our site in your favorites or bookmarks: www.matrox.com/video/support.

Contacting us

Matrox is proud to offer worldwide customer support. Please use the contact information for your Matrox product and area as provided on our website at www.matrox.com/video/support.

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Your notes

Compliance Statements

USA

FCC Compliance Statement
Remark for the Matrox hardware products supported by this guide
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING
Changes or modifications to this unit not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment. The use of shielded cables for connection of the equipment and other peripherals is required to meet FCC requirements.

Canada

(English) Industry Canada Compliance Statement
CAN-ICES-3 (A)/NMB-3 (A)
Remark for the Matrox hardware products supported by this guide
These digital devices do not exceed the Class A limits for radio noise emission from digital devices set out in the Radio Interference Regulation of Industry Canada.

(Français) Conformité avec les exigences de l'Industrie Canada
CAN-ICES-3 (A)/NMB-3 (A)
Remarque sur les produits matériels Matrox couverts par ce guide
Ces appareils numériques n'émettent aucun bruit radioélectrique dépassant les limites applicables aux appareils numériques de Classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

Europe

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(English) European user's information – Declaration of Conformity
Remark for the Matrox hardware products supported by this guide
These devices comply with EC Directive 2006/95/EC for a Class A digital device. They have been tested and found to comply with EN55022/CISPR22 and EN55024/CISPR24. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures. To meet EC requirements, shielded cables should be used to connect the equipment and other peripherals. Analog A/V cables connected to Matrox MXO2 Mini must be limited to less than three meters to comply with EEC and EMC directives. These products have been tested in a typical Class A compliant host system. It is assumed that these products will also achieve compliance in any Class A compliant system.

(Français) Informations aux utilisateurs Européens – Déclaration de conformité
Remarque sur les produits matériels Matrox couverts par ce guide
Ces unités sont conformes à la directive communautaire 2006/95/EC pour les unités numériques de classe A. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55022/CISPR22 et EN55024/CISPR24. Le fonctionnement de ces produits dans un environnement résidentiel peut causer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre les mesures appropriées. Pour respecter les impératifs communautaires, les câbles de connexion entre l'équipement et ses périphériques doivent être blindés. Afin de se conformer aux exigences des directives de la CEE et de l'EMC, les câbles analogiques audio/vidéo reliés à Matrox MXO2 Mini ne doivent pas dépasser trois mètres. Ces produits ont été testés dans un système hôte typique compatible classe A. On suppose qu'ils présenteront la même compatibilité dans tout système compatible classe A.

(Deutsch) Information für europäische Anwender – Konformitätserklärung
Anmerkung für die Matrox Hardware-Produktunterstützung durch dieses Handbuch
Diese Geräte entsprechen EG Direktive 2006/95/EC für ein digitales Gerät Klasse A. Sie wurden getestet und entsprechen demnach EN55022/CISPR22 und EN55024/CISPR24. In einer Wohnumgebung können diese Produkte Funkinterferenzen erzeugen, und der Benutzer kann genötigt sein, entsprechende Maßnahmen zu ergreifen. Um EG-Anforderungen zu entsprechen, müssen zum Anschließen des ausrüstung und anderer Peripheriegeräte abgeschirmte Kabel verwendet werden. Analoge A/V Kabel, die an Matrox MXO2 Mini angeschlossen werden, müssen eine Länge von weniger als drei Metern aufweisen um den EWG-und EMV-Richtlinien zu entsprechen. Diese Produkt wurden in einem typischen, der Klasse A entsprechenden, Host-System getestet. Es wird davon ausgegangen, daß diese Produkte auch in jedem Klasse A entsprechenden System entsprechend funktionieren.

(Italiano) Informazioni per gli utenti europei – Dichiarazione di conformità
Nota per i prodotti hardware Matrox supportati da questa guida
Questi dispositivi sono conformi alla direttiva CEE 2006/95/EC relativamente ai dispositivi digitali di Classe A. Sono stati provati e sono risultati conformi alle norme EN55022/CISPR22 e EN55024/CISPR24. In un ambiente domestico, questi prodotti possono causare radiointerferenze, nel qual caso all'utente potrebbe venire richiesto di prendere le misure adeguate. Per soddisfare i requisiti CEE, l'apparecchiatura e le altre periferiche vanno collegati con cavi schermati. I cavi analogici A/V collegati a Matrox MXO2 Mini devono essere limitati a meno di tre metri per essere conformi alle direttive di contabilità elettromagnetica e del EEC. Questi prodotti sono stati provati in un tipico sistema host conforme alla Classe A. Inoltre, si dà per scontato che questi prodotti acquisiranno la conformità in qualsiasi sistema conforme alla Classe A.

(Español) Información para usuarios europeos – Declaración de conformidad
Observación referente a los productos de hardware de Matrox apoyados por este manual
Estos dispositivos cumplen con la directiva de la CE 2006/95/EC para dispositivos digitales de Clase A. Dichos dispositivos han sido sometidos a prueba y se ha comprobado que cumplen con las normas EN55022/CISPR22 y EN55024/CISPR24. En entornos residenciales, estos productos pueden causar interferencias en las comunicaciones por radio; en tal caso el usuario deberá adoptar las medidas adecuadas. Para satisfacer las disposiciones de la CE, deberán utilizarse cables apantallados para conectar el equipo y demás periféricos. Los cables análogos de A/V conectados con Matrox MXO2 Mini se deben limitar a menos de tres metros para conformidad con las directivas del EEC y del EMC. Estos productos han sido sometidos a prueba en un típico sistema anfitrión que responde a los requisitos de la Clase A. Se supone que estos productos cumplirán también con las normas en cualquier sistema que responda a los requisitos de la Clase A.

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