



Intensity

OPERATION MANUAL

Mac OS X™
Windows XP™
December 2006

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Welcome

Thank you for purchasing Intensity.

We hope you share our dream of making the video industry truly creative by allowing everyone access to the highest quality video and sound. Intensity includes the same high quality video technology used in all Blackmagic Design video cards, so you won't be limited creatively.

I have always felt that everyone should have the possibility of self-actualization through creative expression. When you think about it, creativity, design and the arts are the true essence of humanity and is what makes us unique as a species. Television is a wonderful creative medium because it overloads the senses with exciting vision and sound, while being easy for viewers to experience.

Until now, the high quality video required for feature films, music videos, television commercials and episodic television production required massive equipment costs. Unfortunately this turned the television industry into an exclusive club. I think one of the most exciting things we have done at Blackmagic Design is make the highest quality video available to all of us - so now your creative abilities can make you the world's best.

We are really excited about what you'll do with your new Intensity!

The instruction manual you're reading now contains all the information you'll need for installing your Intensity card, plus extra instructions on using it as a powerful HDMI based editing, design and effects solution. Please take the time to check it out as there are lots of tips and tricks to help you.

Before you install Intensity, please visit our support page at www.blackmagic-design.com to download the latest updates to this instruction manual and Intensity driver software. We have more helpful tech notes on our support page, and you might find a newer version of the software and manual than was included on the CD with your Intensity card.

Lastly, please register your Intensity serial number with us, when you download the latest Intensity driver software, so we can keep you updated when new software is released.

Perhaps you can even send us your latest "show reel" of work completed on your Intensity and any ideas for changes to the Intensity software. We are constantly working on new features and improvements, so we would really love to hear from you!

Grant Petty

CEO, Blackmagic Design



Introducing Intensity

Intensity features the latest HDMI technology for the highest quality capture and playback on PCI Express computers with Mac OS X or Windows XP. Now you can edit using big-screen HDMI televisions and video projectors, or capture uncompressed quality directly from HDV cameras.

True HDMI digital connections

Intensity features HDMI input for connecting cameras and digital set-top boxes for the highest quality capture. Get the highest quality capture possible from HDV cameras by capturing from the camera's image sensor and bypassing the HDV compression chip. Because edit software cannot play back to HDV cameras for monitoring, Intensity is ideal to use for monitoring uncompressed HD, or HDV and even DV edits on the latest big screen televisions and video projectors by connecting to the built-in HDMI output.

Go beyond HDV video quality

HDV video compression suffers from not being full 1920 HD resolution, and the extra processing required makes editing difficult. With Intensity, you can now capture and playback full resolution HDTV uncompressed video for true broadcast and feature film quality editing. Totally eliminate HDV & DV compression quality problems and render much cleaner graphics while retaining deeper color and image detail. If you need lower data rate editing, you can also select from a range of professional compressed video capture modes. Intensity includes the same Blackmagic Design video technology used on Hollywood feature films – so quality won't limit your creativity.

Professional video standards

Instantly switch between HD and SD video standards including HDTV 1080i/59.94, 1080i/50, 720p/59.94, 720p/50, NTSC and PAL. Intensity allows capture in professional file formats which are fully compatible with Blackmagic Design's DeckLink and Multibridge capture cards, so you can deliver finished television programs, music videos and other work at broadcast standards.

Compatible with all video software

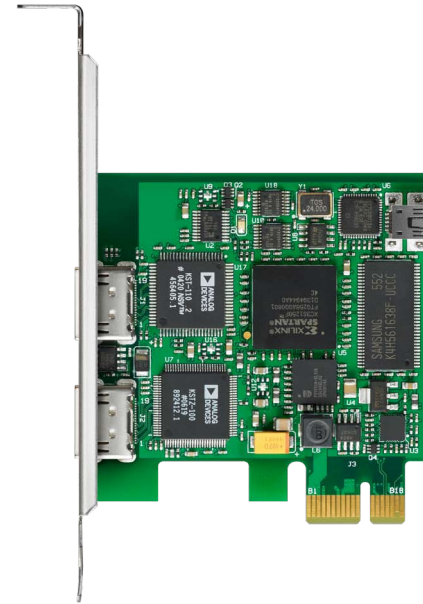
Compatible with QuickTime™ and DirectShow™, Intensity can use a wide range of video software for video capture and playback in either standard definition or high definition 4:2:2.

Intensity lets you customize your system for different tasks simply by selecting the video software you prefer to use. Use Final Cut Studio™ on Mac OS X™ or Premiere Pro™ on Windows XP™ for editing, then combine Adobe After Effects™ and Photoshop™ for broadcast design and paint. Then finish your job by using DVD authoring software to give your clients a DVD.

Copy protected video

HDMI video sources may output copy-protected, encrypted video. By-law Intensity is not allowed to capture from copy-protected HDMI sources, such as HDCP-encrypted video from DVD players and some set-top boxes.

Overview

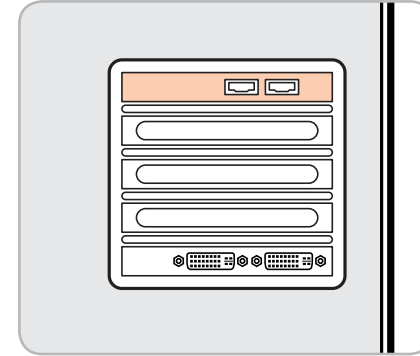


Installation for Capture and Playback

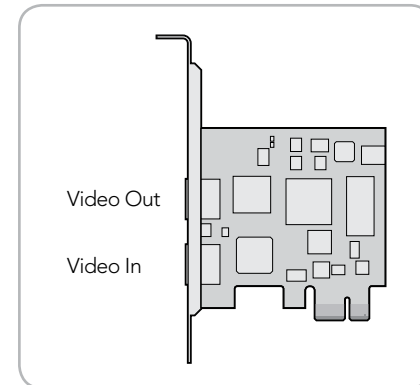
Connecting to your PCIe Mac or PC

1. Shut down and remove the power plug from the back of your computer. This is a safety precaution before opening your computer. Ensure that you are statically discharged by using a static strap.
2. Remove the side cover of your computer to gain access to the PCI Express slots.
3. Remove your Intensity card from the protective static bag making sure you don't touch the gold connectors on the base of the card.
4. Find a spare PCI Express slot within the computer, any slot will do. Intensity is a PCI Express 1 lane card and is compatible with 1,4,8 and 16 lane PCIe slots. Remove the metal port access cover and it's screw from the back of your computer.
5. Insert your Intensity PCI Express card and ensure it clicks firmly into place.
6. Secure the card with a screw and replace the side cover of your computer.
7. Connect HDMI devices, such as HDV cameras to Intensity's HDMI input.
8. Connect HDMI compatible large screen televisions or projectors to the HDMI output.

Note: This is also a great time to install disk arrays and extra memory into your computer.



Connect HDMI devices.



Connect HDMI devices.

Installation for Capture and Playback

Installing the software for Windows XP

Contents

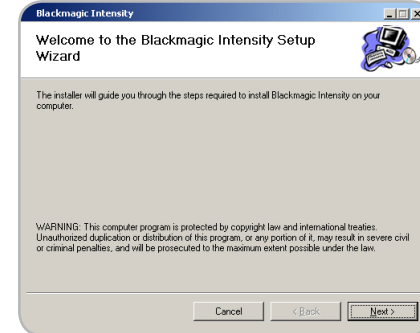
The Intensity software installer will install the following components for you:

- Blackmagic Intensity drivers.
- Premiere Pro™ Easy Setups, presets and enablers.
- Blackmagic Disk Speed Test.
- Blackmagic Capture

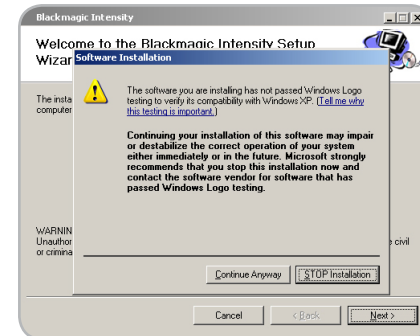
Note: Before installing any software or hardware you will need administrator privileges. Make sure that your applications such as Adobe Premiere Pro™ and QuickTime™ are installed before running the Intensity installer.

Intensity software

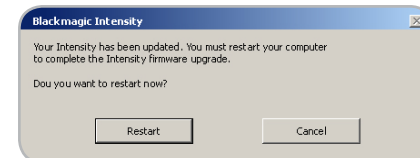
1. The CD supplied with your Intensity contains the Intensity software. Before you install, check you have the latest driver. Visit www.blackmagic-design.com/support/software
2. Open the "Intensity Installer" folder and launch the "Intensity Installer" application.
3. Click **Next**, **Continue Anyway** and **Next** buttons and the drivers will be installed.
4. Now restart your machine to enable the new software drivers.



Intensity Setup Wizard.



Click "Continue Anyway".



Restart your PC!

Installation for Capture and Playback

Installing the software for Mac OS X

Contents

The Intensity software installer will install the following components for you:

- Blackmagic Intensity drivers.
- Blackmagic QuickTime™ codecs.
- Final Cut Pro™ Easy Setups, presets and enablers.
- Blackmagic Disk Speed Test.
- Blackmagic On-Air for live production.

Note: Before installing any software or hardware you will need administrator privileges. Make sure that your applications such as Final Cut Pro are installed before running the Intensity installer. If you want to use the included On-Air software for live mixing you will need to install two Intensity cards, as one is used for each of the two connected HDMI cameras.

Intensity software

1. The CD supplied with your Intensity contains the Intensity software. Before you install, check you have the latest driver. Visit www.blackmagic-design.com/support/software
2. Open the "Intensity Installer" disk image and launch the "Intensity Installer" application.
3. Click **Continue**, **Agree** and **Install** buttons and the drivers will be installed on your system.
4. Now restart your machine to enable the new software drivers.



Intensity Installer components.



Follow install prompts.



Restart your Mac!

Third Party Applications

Adobe Premiere Pro 2.0

Adobe Premiere Pro™ is a powerful real-time video and audio non-linear editing application. Full presets for Premiere Pro are included with Intensity and will have been automatically loaded into your system during the installation process. Premiere Pro must be installed on your system before running the Intensity installer.

Note: If necessary, reinstall the Intensity software after installing Premiere Pro.

Setting up

1. Launch Premiere Pro.
2. Open a **New Project**
3. Select the appropriate Blackmagic preset for your project. e.g. **NTSC** or **PAL**
4. Type the name of your project.
5. Select your disk array as the location for your media and click **OK**

Playback

As a quick test to make sure everything is connected correctly, use the Premiere Pro test media (bars and tone). Copy a test clip, which matches the format of your project e.g. NTSC 8 bit. Take your media from within your Premiere Pro project and drop it into the timeline. You should now see the image on both your computer desktop and your Intensity HDMI output. If you can't see any video on your Intensity output, check the HDMI connections again.

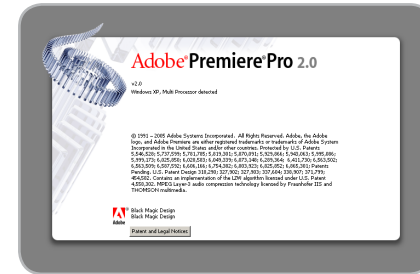
Note: Your HDMI display needs to be powered on before starting your PC. If necessary, restart your PC to ensure Intensity detects the display during startup.

Capture

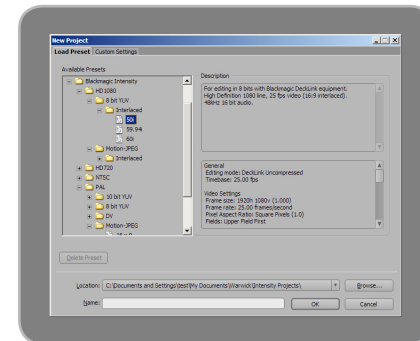
To capture choose: **File > Capture** (F5)

To immediately capture, click the red record button [G]. If you wish to log the clip using device control, enter the desired "In and Out points" using either the "In" and "Out" buttons, or manually, by typing in the timecode and clicking "Log". The empty clip will now appear in the bin window. Repeat this until you have logged all of the clips you wish to batch capture.

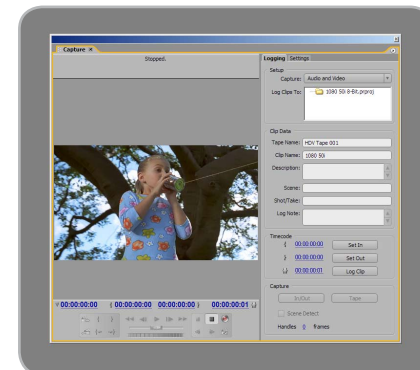
Note: If you can't see video in the capture video, switch off your video source (e.g. camera or deck) then switch it back on to ensure it detects the Intensity card.



Adobe Premiere Pro.



New Project.



Capture.

Third Party Applications

Adobe Premiere Pro

Audio

Intensity features support for ASIO audio drivers. This allows Premiere Pro to use Intensity as an ASIO audio device. When you first start your Premiere Pro project, make sure you select the audio device you wish to use – either Intensity with 2 channels of audio, or a selected sound card. This can be selected through **Edit > Preferences > Audio Hardware**. You can also select the mix of the multi-channel audio from this menu.

Device Control

Selection of the Serial Device Control is configured via:

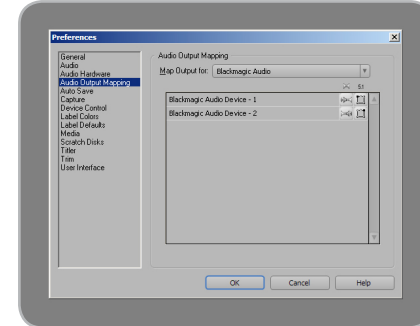
Edit > Preferences > Device Control > Options

Protocol: Refer to your camera or deck manual for information on which protocols it supports.

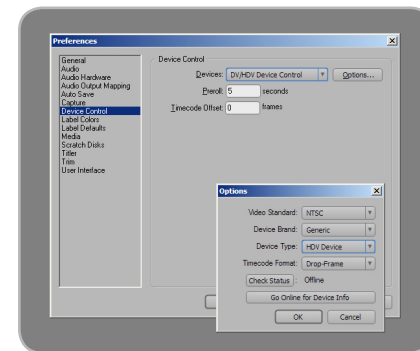
Port: The Firewire port will appear in the list of available communication ports.

Time Source: It is recommended that VITC and LTC timecode option is selected.

Timebase: This setting should be modified only when you are changing formats.
e.g. PAL 25 fps change to NTSC 29.97 fps.



Audio hardware.



Device Control.

Third Party Applications

Apple Final Cut Pro

Apple Final Cut Pro™ is a powerful real-time video and audio non-linear editing application. In conjunction with your new Intensity, Final Cut Pro will allow you to work in every video standard from DV up to uncompressed 4:2:2 high definition video.

“Easy Setups” for Final Cut Pro will have been added automatically during the Intensity installation process if Final Cut Pro is previously installed. It’s important to install Final Cut Pro before installing the Intensity software.

Note: If necessary, reinstall the Intensity software after installing Final Cut Pro.

Setting up

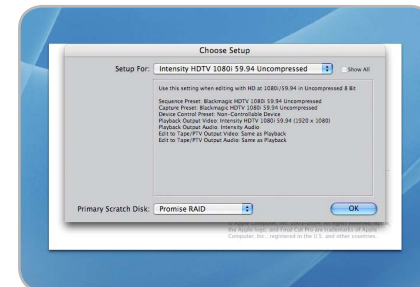
1. Launch Final Cut Pro.
2. The Easy Setup window will appear.
3. Click on the popup menu named **Setup for** and select a relevant Intensity Easy Setup. For each TV format (NTSC, PAL and HDTV) you will find a range of compressed and uncompressed file formats you can choose. For example, if you are working in NTSC format, you could choose one of the following “Easy Setups”:
 - Intensity NTSC Uncompressed
 - Intensity NTSC - DV

The “Easy Setup” you choose will be dictated partly by the speed of your disk array and partly by whether you already have movie clips in a particular format. If you have a fast disk array, you can choose uncompressed video for the highest quality video. If you only have a single disk for storage, you could choose either DV, DV50, DVCPRO HD or JPEG for professional quality compression. JPEG often looks better but unfortunately Apple have not yet implemented RT Effects with JPEG. If you need to add RT Effects, then DV, DV50 or DVCPRO HD would be a better choice.

4. Click on the popup menu named **Primary Scratch Disk** and select your disk array from the popup menu. Then click **OK**
5. Final Cut Pro will finish launching.



Final Cut Pro.



“Easy Setup” options.

Third Party Applications

Apple Final Cut Pro

Playback

As a quick test to make sure everything is connected correctly, use the Blackmagic test media (bars and tone) which can be found on the installer CD. Find a test clip which matches the format of your project, e.g. 1080i/59.94 and copy it to your disk array. Import this clip into your Final Cut Pro project and drop it into the timeline. You should now see the image on both your computer desktop and your large screen TV using the Intensity HDMI output.

If you can't see any video on your large screen HDMI output, check the HDMI connections again and ensure you have the correct output settings configured within Final Cut Pro by going to the **View > Video Devices**. In the same menu, make sure "External Video" is set to "All Frames".

Note: Your HDMI display needs to be powered on before starting your Mac. If necessary, restart your Mac to ensure Intensity detects the display during startup.

Capture

To capture, choose **File > Log & Capture**. (Command + 8)

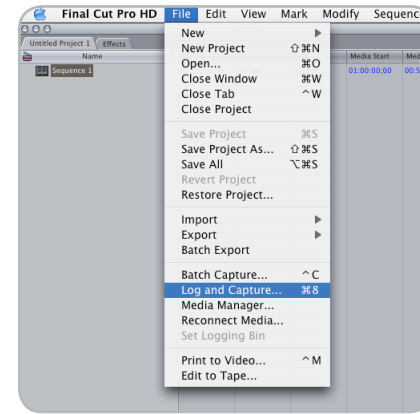
Your video deck or camera will respond in the same way as a clip in the timeline, via the "<spacebar>", "j", "k" and "l" keys.

It is important to set the correct tape number for your clip.

To immediately capture, click the **Capture Now** button.

If you wish to log the clip, enter the desired "in" and "out" points using either the "i" and "o" keys on your keyboard, or manually by typing in the timecode and clicking **Log Clip**. If you have the "Prompt" checkbox selected, Final Cut Pro will now ask you to name the clip. Name it and click **OK**; the clip will appear in your browser with a diagonal red line indicating that it's "offline". Repeat this until you have logged all of the clips you wish to capture in a batch.

Note: When capturing sequential clips from tape, Final Cut Pro will automatically suggest a name for each clip based on the previous clip. So, if your first clip is called "Mary, MCU", Final Cut Pro will suggest the next clip be called "Mary, MCU 01" etc. This can make logging large numbers of clips much faster.



Log and Capture.



Logging a clip.

Third Party Applications

Apple Final Cut Pro

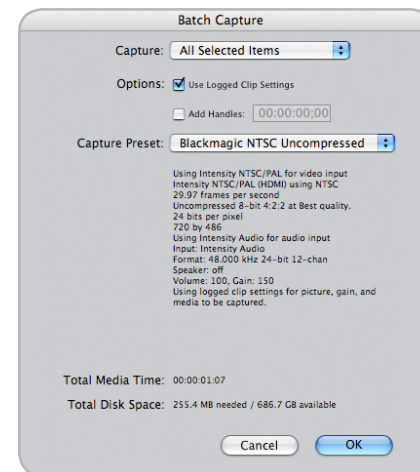
Batch Capture

Select the clips you wish to capture by drag selecting or shift-click. Go to and choose **File > Batch Capture** or click on the **Batch** button in the "Logging" tab of the "Log & Capture" window. (Control + C)

To set handles on the clips, go to and choose **File > Batch Capture** (Control + C). Enable the "Add Handles" box to capture additional frames ("handles") before and after the "In" and "Out" points of a clip.

RT Extreme Real Time Effects

Real Time Effects are one of the great features of Final Cut Pro, and with your Intensity you are fully compatible with Apple's RT Extreme™.



Batch Capture.

Third Party Applications

Adobe After Effects

It's very easy to set up playback and rendering in Adobe After Effects™ for a complete creative and design workstation that supports real time preview while working on your compositions.

First, open Adobe After Effects and select the television standard frame size and frame rate you wish to work with.

How to use Intensity as a preview output frame buffer

To allow your Adobe After Effects composition to be displayed in real-time from your Intensity, go to **Edit > Preferences > Video Preview**. Select **Blackmagic RGB** and the appropriate video standard. This lets you view your Adobe After Effects compositions in video colorspace on your broadcast monitor as you work. This means you will always see the correct color and interlace when working, and you don't have to wait until your composition is rendered to see what it looks like when output as video.

Create a New Composition

Go to the "Composition" menu and select **Composition > New Composition**. (Control + n for PC or Command + n for Mac) In the dialogue box, select an appropriate television standard from the pulldown menu. Click **OK**

For all HD standards select upper field first.

For NTSC and NTSC DV use 720 x 486 and select lower field first.

For PAL 720 x 576 and select upper field first for uncompressed video.

For PAL DV 720 x 576 and select lower field first.

For HD 1080i select 1920 x 1080 and select upper field first.

For HD 720p select 1280 x 720 and select "none" in the field render box.

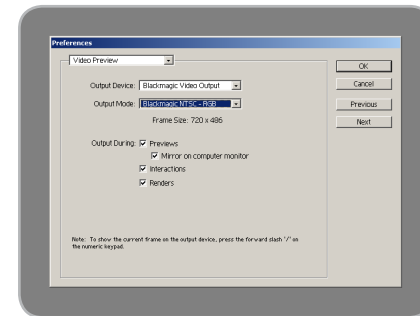
Rendering

When you have completed your composition, you will need to render to a pixel format supported by Intensity. Below is a list of supported codecs:

- Blackmagic 8 Bit QuickTime™ (uncompressed)
- Blackmagic 8 Bit AVI for Windows (uncompressed)
- Blackmagic Motion JPEG AVI for Windows (compressed)
- Apple QuickTime™ PhotoJPEG (compressed)
- Apple QuickTime™ DV - NTSC (compressed)
- Apple QuickTime™ DV - PAL (compressed)



Adobe After Effects.



Preferences.

Third Party Applications

Adobe Photoshop

Intensity includes Adobe Photoshop™ plug-ins, so you can directly capture and output still frames from within the Photoshop application itself. If you're working with HD/SD, you can even import and export 16 bit Photoshop images for full quality.

Import an image into Photoshop

1. From Photoshop select **File > Import > Blackmagic Image Capture**
2. Select the "Video Input Format" and the "Image Bit Depth" and select **Capture Image**

Export an image from Photoshop

1. Select **File > Export > Blackmagic Image Export**
2. Select **Video Output Format** and then **Output Image**

Note: Once you have set the options in the "Export" window, each subsequent export will not display the window, so you can grab output frames much faster. However if you would like to change your export formats, hold the **Alt** key for PC or **Option** key for Mac, when selecting export.

How to create alpha channels for keying

Check the On-Air section of this manual for information on creating alpha channels in Adobe Photoshop and preparing graphics for keying over live video.

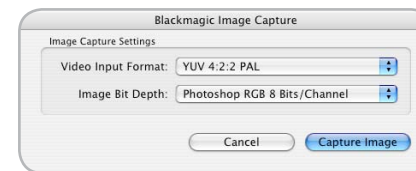


Image Capture.

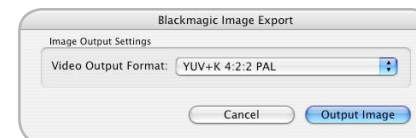


Image Export.

Blackmagic On-Air 2.0 for Mac Pro

Blackmagic On-Air is an exciting new utility which turns two Intensity cards into a live video mixer so you can easily mix between two HDMI cameras, such as the Sony HDR-HC3 Handycam®. Simply plug two Intensity cards into your Mac OS X Intel based computer and you get all the advantages of live HD video production.

Live production gives you instant results, because all mixing is live and when your event is complete, you have a finished television program ready to burn to DVD, or distribute via the internet. Live production is much easier than spending hours in a dark edit suite, so people who are not trained in video can get the advantages of professional video production.

Unfortunately one of the side effects of low cost non linear editing is the art of live television production is being lost! On-Air is perfect, because it uses NLE video cards for live production.

Live production is simply more fun. You're flying by the seat of your pants and you can't help but get emotionally connected to the event you're editing as it unfolds before you. Mistakes aren't a problem as you can also record to the video tape in each camera and drop those shots in later!

Blackmagic On-Air is a self contained two camera television studio designed to feature a complete interface within a single application window that fits on a 20 inch computer monitor. With two Intensity cards installed in the same machine, you can plug-in two cameras with HDMI and see the camera-view in the window, along with a graphics key input and the main program view.

Exciting new low-cost HDV cameras with HDMI outputs, means that anyone with a PCI Express-based Mac and a 1600 x 1000 pixels resolution computer monitor can perform SD or HD editing.

The first step is to launch Blackmagic On-Air and open the [Preferences](#). Set the Video format to match the output of your cameras, e.g. HDTV 1080i 59.94 or 720p 50. Decide whether you want to capture uncompressed video, or if you don't have a disk array, you can capture professional compressed video such as DV, DV50, JPEG or DVCPRO HD to your internal disk drive.



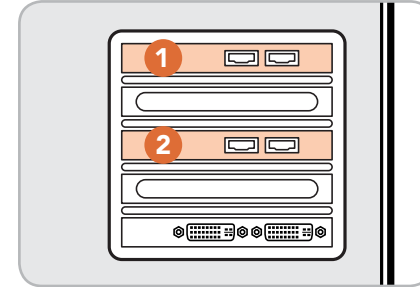
Blackmagic On-Air 2.0 for Mac Pro

Use two HDV cameras with HDMI output. Connect Camera 1 to Intensity card 1, and Camera 2 to Intensity card 2. Remember, Intensity card 1 is always the higher card in the PCIe slot and the furthest from the CPU. (See diagram on page 27)

The Blackmagic On-Air interface will preview live video from Camera 1 and Camera 2 combined with real-time program monitoring via the single window interface.

To capture live video using Intensity

1. Select **Preferences > Video Format** Select either 720p or 1080i compressed or uncompressed video and frame rate.
2. Select **Capture Location** For compressed video you can select your internal disk, however for uncompressed video you will need to select an external disk array.
3. Give your movie a filename.
4. Select audio source from **Intensity Audio** or **Intensity Audio 2** This option allows you to choose which camera provides the best audio source for your live capture i.e. Camera 1 being **Intensity Audio**, or Camera 2 being **Intensity Audio 2**.
5. Now choose mono or stereo audio by selecting **Channel 1** or **Channel 2**



Numbering of Intensity cards.



Connect cameras using HDMI.

Blackmagic On-Air 2.0 for Mac Pro

Your setup is now complete. Experiment with transitioning from Camera 1 to Camera 2, or between cameras and black (BLK), or even add a graphic (G) to your camera feed. For a smooth transition between cameras, set the number of frames for the transition and use the **AUTO TRAN** button.

To cut between cameras

1. Select **CUT** to quickly switch cameras, or use the t-bar to manually transition between Camera 1 and Camera 2.
2. Click on the **REC** button to record your mixed video to disk. Click **STOP** when you no longer wish to capture to disk. The captured QuickTime movies can be played back immediately and will include any mixes you have performed including graphics and fade to black.

Automatic transitions

One of the great features of Blackmagic On-Air is that it allows you to transition between Camera 1 and Camera 2 as either a **CUT**, a controlled transition using the t-bar or as a dissolve "transition" using a set number of frames.

Because the transition time is set in frames, video captured in 720p will need 60 frames for 1 second dissolve. For 1080i/59.94 you will need 30 frames for a 1 second dissolve, and for 1080i/50, 25 frames for a 1 second dissolve.

Easy A-B mode video mixing

Blackmagic On-Air features two separate modes of mixing which you can select between based on your past experience. Easy A-B mode mixing is the simplest, and is often the method people use first because it's easy to use. With Easy A-B mode, you select one camera on the top row and one on the bottom, and then move the t-bar up and down. When the t-bar is up, you see the camera selected on the top row, and with the t-bar down, you see the bottom row camera. On-Air defaults to this mode.

Professional mode video mixing

This mode is based on how television broadcasters use production switchers, and is preferred by people with professional live production experience. In this mode, the bottom row is called the "program" row, and the top row is called the "preview" row. Whatever camera is selected on the bottom row, it is always the one on-air. The top row has the camera selected that will be chosen when the t-bar is moved, or when the cut or transition button is pressed. Try it, and you will see how it works. This method of mixing is preferred by professionals, because when a live event gets busy, you always know what button to press to get a camera on-air - the bottom program row. This mode of mixing make sure you know what's on-air at all times in mission critical use at important events.

Using for Capture and Playback



Video from "Camera 1".



Video from "Camera 2".



25 frame dissolve.

Blackmagic On-Air 2.0 for Mac Pro

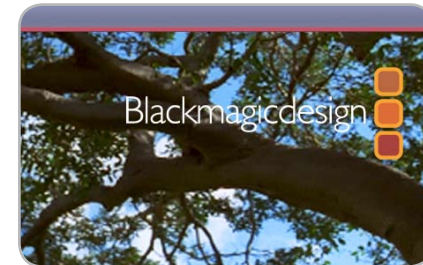
How to include a graphic or title

If you want to add a logo to your captured video, Blackmagic On-Air will enable you to over-lay a corporate logo or title over your live video. The third "camera" window is actually an image well for dropping in a graphic. If your graphic has an alpha it will automatically blend over live video.

1. Select or create a logo with an alpha channel, and save it in a format such as Photoshop, TIF or Targa that supports an alpha channel. The next page has some instructions on preparing graphics for video keying.
2. Drag and drop the logo into the **Graphic** panel of Blackmagic On-Air. Your logo will now appear in the bottom left window of Blackmagic On-Air.
3. To enable the over-layed graphic, simply select **G** for graphic on either "Camera 1" or "Camera 2" depending on which source you prefer.
4. Now you can easily transition from camera to the graphic. Reverse the transition to have the graphic fade away.



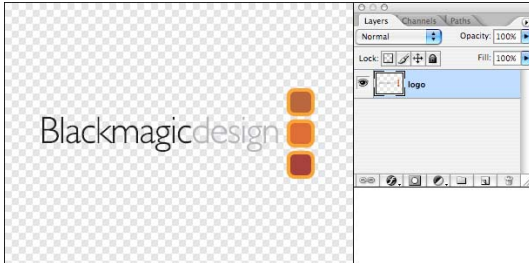
Insert logo or graphic.



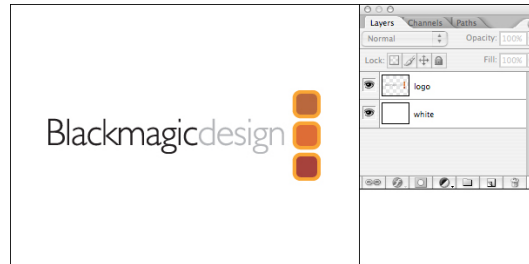
Graphic over live video.

Blackmagic On-Air 2.0 for Mac Pro

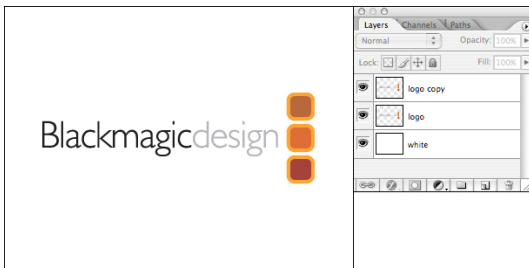
How to create alpha channels for keying



1. Open your logo in Photoshop.



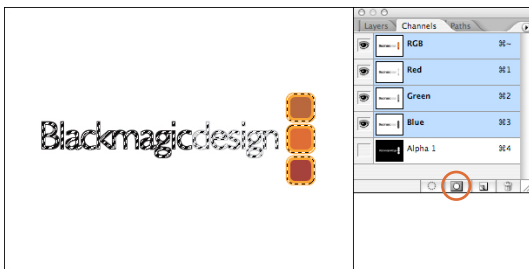
2. To make your graphic easier to see, make a new layer, fill it with white and send to the back.



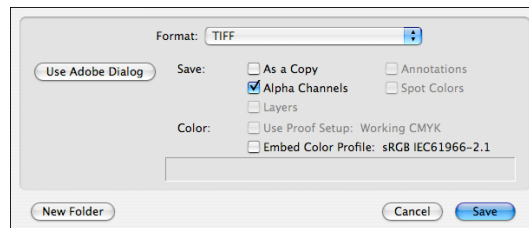
3. Duplicate the logo layer.



4. Select the bottom logo and apply the *minimum* filter. This will expand the graphic slightly so it keys better.



5. Select the layer transparency from the top logo by command or control clicking on the layer thumbnail and click *Save selection as channel*.



6. Flatten and save with alpha channels. Your graphic will be in RGBA format for On-Air or NLE use.

Using Blackmagic Disk Speed Test to check your disk (PC)

If you want to check your disk array speed for uncompressed video, Blackmagic Disk Speed Test can be run to check the array speed and provide the results in video frame rates. This makes it much easier to understand how various disk arrays will handle video capture and playback at various video resolutions and frame rates.

Disk Speed Test provides more accurate results for large disk arrays, as often the manufacturer provided speed results only check small data blocks; so you only get an indication of the cache speed of the disk and not the sustained data rate of the disk. Video uses sustained data rates and only Disk Speed Test provides a long burst of data for more accurate results.

When using Disk Speed Test, you need to account for disk seeking, so it's best to add a healthy margin to the results. If a disk array tests at 32 frames per second HD 1080, it doesn't mean you can do 29.97 HD capture and playback, as the margin is too tight. When checking the results, look at the 8 bit YUV 4:2:2 video sections, as intensity uses the 8 bit uncompressed video format.

Blackmagic Disk Speed Test

Select Disk Volume to Run Test On: Media (M:)

Disk Read Speed Results

Data Read Rate in MB/s	328.9
------------------------	-------

Disk Write Speed Results

Data Write Rate in MB/s	276.1
-------------------------	-------

8 Bit YUV 4:2:2 Frame Rates

	Disk Read	Disk Write
HDTV 1080 fps	83	69
HDTV 720 fps	187	157
NTSC fps	492	413
PAL fps	415	349

10 Bit RGB 4:2:2 Frame Rates

	Disk Read	Disk Write
HDTV 1080 fps	41	34
HDTV 720 fps	93	78
NTSC fps	246	206
PAL fps	207	174

10 Bit YUV 4:2:2 Frame Rates

	Disk Read	Disk Write
HDTV 1080 fps	62	52
HDTV 720 fps	140	117
NTSC fps	369	310
PAL fps	311	261

12 Bit RGB 4:2:2 Frame Rates

	Disk Read	Disk Write
HDTV 1080 fps	36	30
HDTV 720 fps	81	68
NTSC fps	215	181
PAL fps	181	152

Run Test

Disk Speed RAID results after testing a disk array.

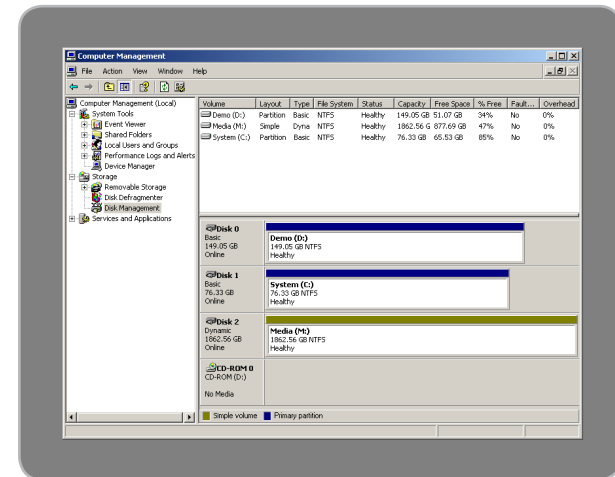
Building uncompressed disk arrays (PC)

When you're working with uncompressed HD video, the internal hard disk will not be fast enough. You need a high speed disk array. These can be purchased pre-built, or you can build your own using two hard disks for SD or at least eight hard disks for HD. The first step is to install and connect the hard disks.

If you intend to run your disk array as a software stripe, you will need to make sure that “host RAID” is disabled. Use the “Disk Management” tool in “Computer Management” within Windows XP™ to set up your software RAID, or refer to third party instructions when using pre-configured hardware RAIDs.

Further information can be obtained via the Windows XP™ Help and Support. Search and review the section on “Dynamic Disks”. This section will provide you with information on configuration steps on striping your disk array. Due to disk seeks, when calculating the data rates required for your disk system, it is a good idea to add a safety margin due to fluctuations in disk speed. Disk speeds can be increased by adding more disks. Serial ATA (SATA) disks can reduce to half their speed as they become full, so in a 2-disk SATA array you should aim for a 100% safety margin. In an 8-disk SATA array, a 30% safety margin should be adequate. Generally the more disks in the array, the better.

Note: Other vendors and third parties may provide different data rates for uncompressed video, the above recommendations are tested for use with Intensity.



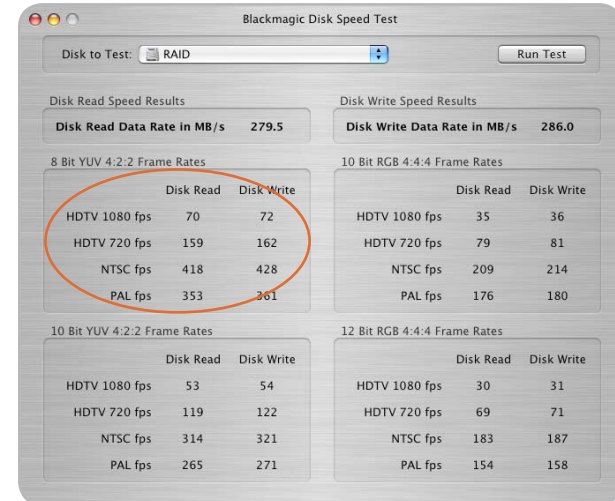
Disk Management.

Using Blackmagic Disk Speed Test to check your disk (Mac)

If you want to check your disk array speed, Blackmagic Disk Speed Test can be run to check the array speed, and to provide the results in video frame rates. This makes it much easier to understand how various disk arrays will handle video capture and playback at various video resolutions and frame rates.

Disk Speed Test provides more accurate results for large disk arrays, as often the manufacturer provided speed results only check small data blocks, so you only get an indication of the cache speed of the disk and not the sustained data rate of the disk. Video uses sustained data rates and only Disk Speed Test provides a long burst of data for more accurate results.

When using Disk Speed Test, you need to account for disk seeking, so it's best to add a healthy margin to the results. If a disk array tests at 32 frames per second HD 1080, it doesn't mean you can do 29.97 HD capture and playback, as the margin is too tight. When checking the results, look at the 8 bit YUV 4:2:2 video sections, as intensity uses the 8 bit uncompressed video format.



The screenshot shows the Blackmagic Disk Speed Test interface for a RAID disk. The 'Disk to Test' is set to RAID. The 'Run Test' button is visible. The results are displayed in four tables: Disk Read Speed Results, Disk Write Speed Results, 8 Bit YUV 4:2:2 Frame Rates, and 10 Bit RGB 4:4:4 Frame Rates. The 8 Bit YUV 4:2:2 Frame Rates table is circled in red.

Disk Read Speed Results		
Disk Read Data Rate in MB/s		
279.5		

Disk Write Speed Results		
Disk Write Data Rate in MB/s		
286.0		

8 Bit YUV 4:2:2 Frame Rates		
	Disk Read	Disk Write
HDTV 1080 fps	70	72
HDTV 720 fps	159	162
NTSC fps	418	428
PAL fps	353	361

10 Bit RGB 4:4:4 Frame Rates		
	Disk Read	Disk Write
HDTV 1080 fps	35	36
HDTV 720 fps	79	81
NTSC fps	209	214
PAL fps	176	180

10 Bit YUV 4:2:2 Frame Rates		
	Disk Read	Disk Write
HDTV 1080 fps	53	54
HDTV 720 fps	119	122
NTSC fps	314	321
PAL fps	265	271

12 Bit RGB 4:4:4 Frame Rates		
	Disk Read	Disk Write
HDTV 1080 fps	30	31
HDTV 720 fps	69	71
NTSC fps	183	187
PAL fps	154	158

Disk Speed RAID results after testing a disk array.

Using the Apple Xserve RAID Disk Array

When you're working with uncompressed HD video, your internal hard disk will not be fast enough. In this case you need a high speed disk array, such as the Apple Xserve RAID. The Apple Xserve RAID works great for both SD and HD when fully populated with 14 disks and at least 512 MB of RAM for each RAID controller. For maximum performance and stable capture and playback with uncompressed video we recommend the following settings:

Check **Use Controller Write Cache**

Uncheck **Allow Host Cache Flushing**

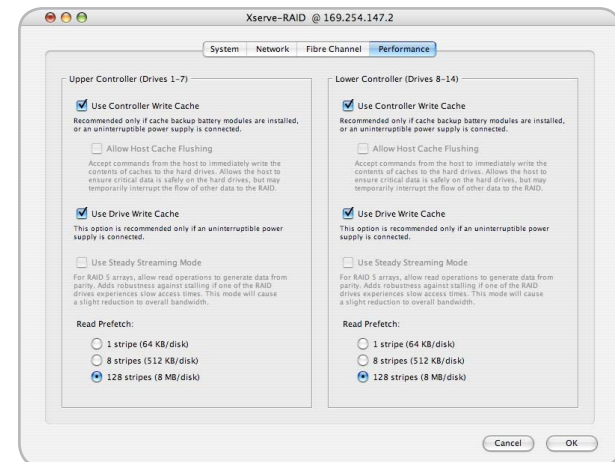
Check **Use Drive Write Cache**

Uncheck **Use Steady Streaming Mode**

Set "Read Prefetch" to **128 Stripes (8 MB/disk)** — If you observe dropped frames or jerky video, try 8 Stripes (512 KB/disk) as recommended by Apple.

Note: No single setting will work for all sizes and brands of disks.

These are the settings we have found delivers stable capture and playback with uncompressed video. Other settings might also provide optimal performance and we recommend you check with your local reseller before changing settings if you're unsure of what these controls do.



Apple Xserve RAID preferences.

Data Rates for Capture and Playback

The data rates for uncompressed video are quite high, and listed below are minimum recommended disk requirements for uncompressed and compressed standard definition and high definition video. Supported standards: HDTV 1080i/59.94, 1080i/50, 720p/59.94, 720p/50, NTSC and PAL.

Compressed Video			
Standard Definition – Mac OS X			
Frame Size	MB per second	MB per minute	GB per hour
720x486/29.97fps (NTSC)	4.6	275.4	16.1
720x576/25fps (PAL)	4.6	275.4	16.1
Standard Definition JPEG – Windows XP			
Frame Size	MB per second	MB per minute	GB per hour
720x486/29.97fps (NTSC)*	5.1	306	17.93
720x576/25fps (PAL)*	4.8	288	16.88
High Definition DVCPro HD – Mac OS X			
1280x720p/59.94fps	14	837.9	49.1
1920x1080/50i	14	837.9	49.1
1920x1080/59.94i	14	837.9	49.1
High Definition JPEG – Windows XP			
1280x720p/59.94fps*	5	300	17.58
1920x1080/50i*	11	660	38.67
1920x1080/59.94i*	13.19	791.21	46.36
Uncompressed Video			
Standard Definition 4:2:2			
Frame Size	MB per second	MB per minute	GB per hour
720x486/29.97fps (NTSC)	21.5	1288	75.5
720x576/25fps (PAL)	21.2	1274.4	75
High Definition 4:2:2			
1280x720p/59.94fps	106.8	6409.7	375.6
1920x1080/50i	100.3	6020.5	352.8
1920x1080/59.94i	120	7199.9	421.9

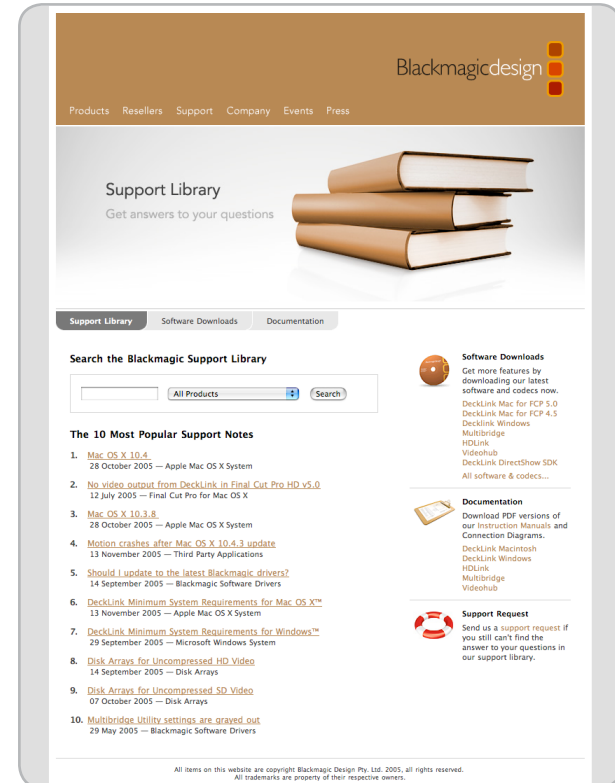
* Typical rates.

Using your Intensity as a capture and playback card is exciting, but also complex due to the huge range of different software applications. Video data rates are also very high, so the disk array you use for uncompressed video storage can have a big impact on your system's performance.

Information about a wide range of disk array solutions and compatible application software would be outside the scope of this manual, however there are three ways to get more information.

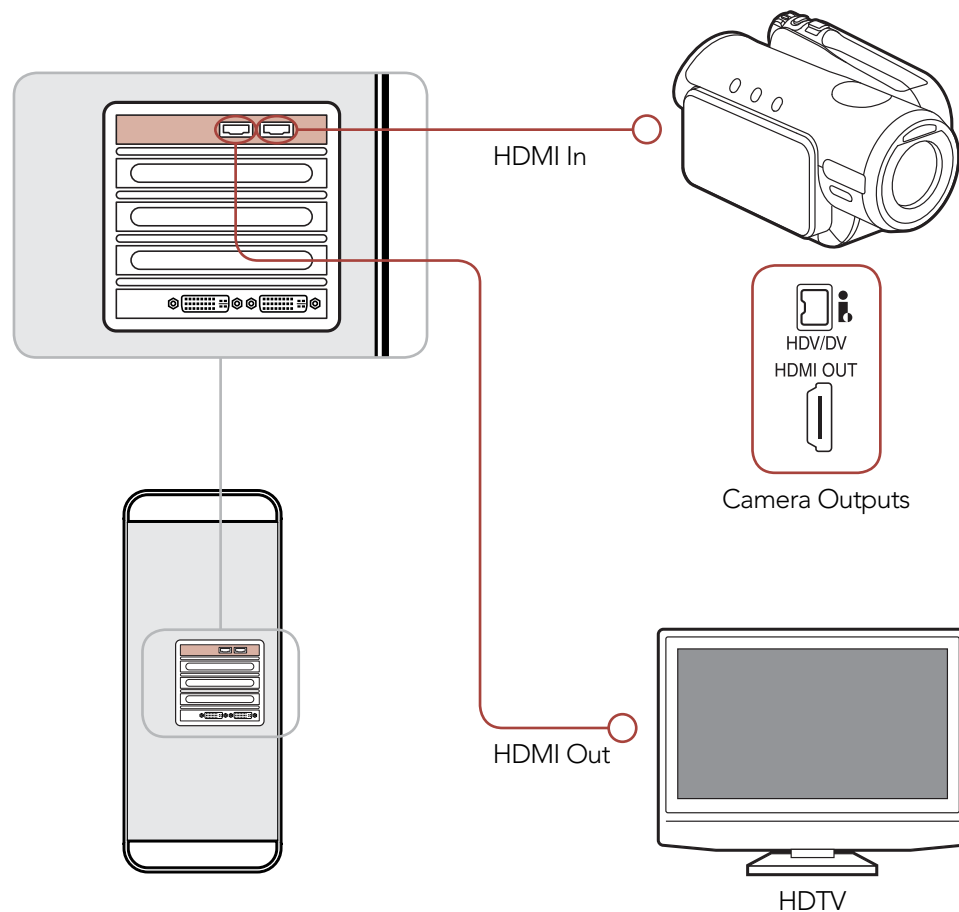
1. Check out the Blackmagic Design website www.blackmagic-design.com/support for the latest support information. We have a huge number of technical notes covering all the common questions we are asked.
2. Call your reseller. Your reseller will have the latest technical updates from Blackmagic Design and should be able to give you immediate assistance. We also recommend you check out the support options your dealer offers as they can arrange various support plans based on your workflow requirements. Your reseller will also understand your disk array configuration, and as disk array problems account for around 90% of support questions with NLE systems, your reseller or disk array vendor will be able to provide expert help.
3. The next option is to email us with your questions.
www.blackmagic-design.com/support/contact

Note: Please provide us with as much information as possible regarding your technical problem and system specifications so that we may try to reproduce your problem quickly. Also please let us know how to reproduce any problem you're having, so we can try it on our test systems before replying to your email.



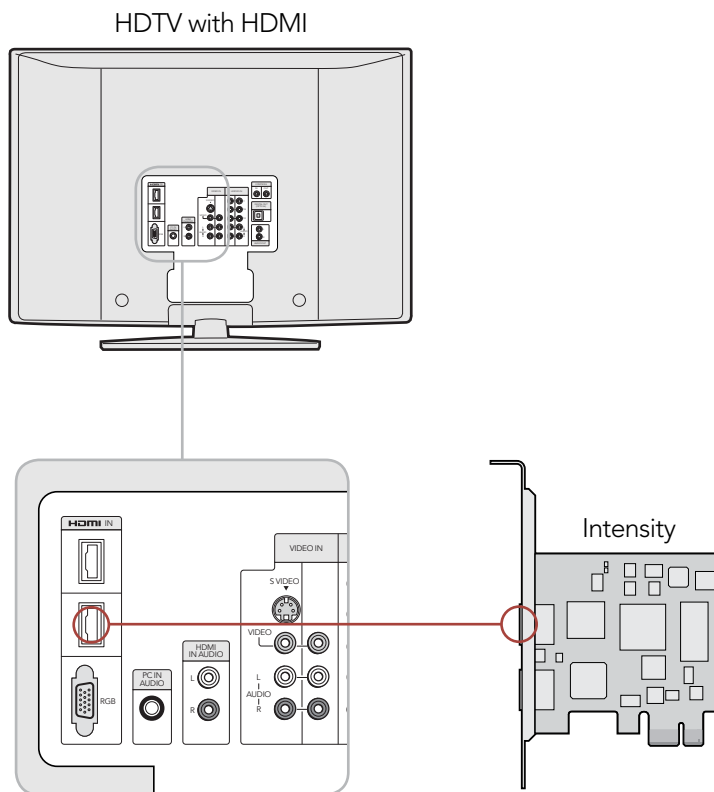
Typical Intensity Setup

Intensity uses HDMI for connecting video cameras, televisions and projectors to your computer for use with popular editing and design applications. Intensity captures video in real-time directly from the HDMI output on HDV cameras, and will playback directly to large screen HDTVs or HD projectors for client-monitoring and editing.



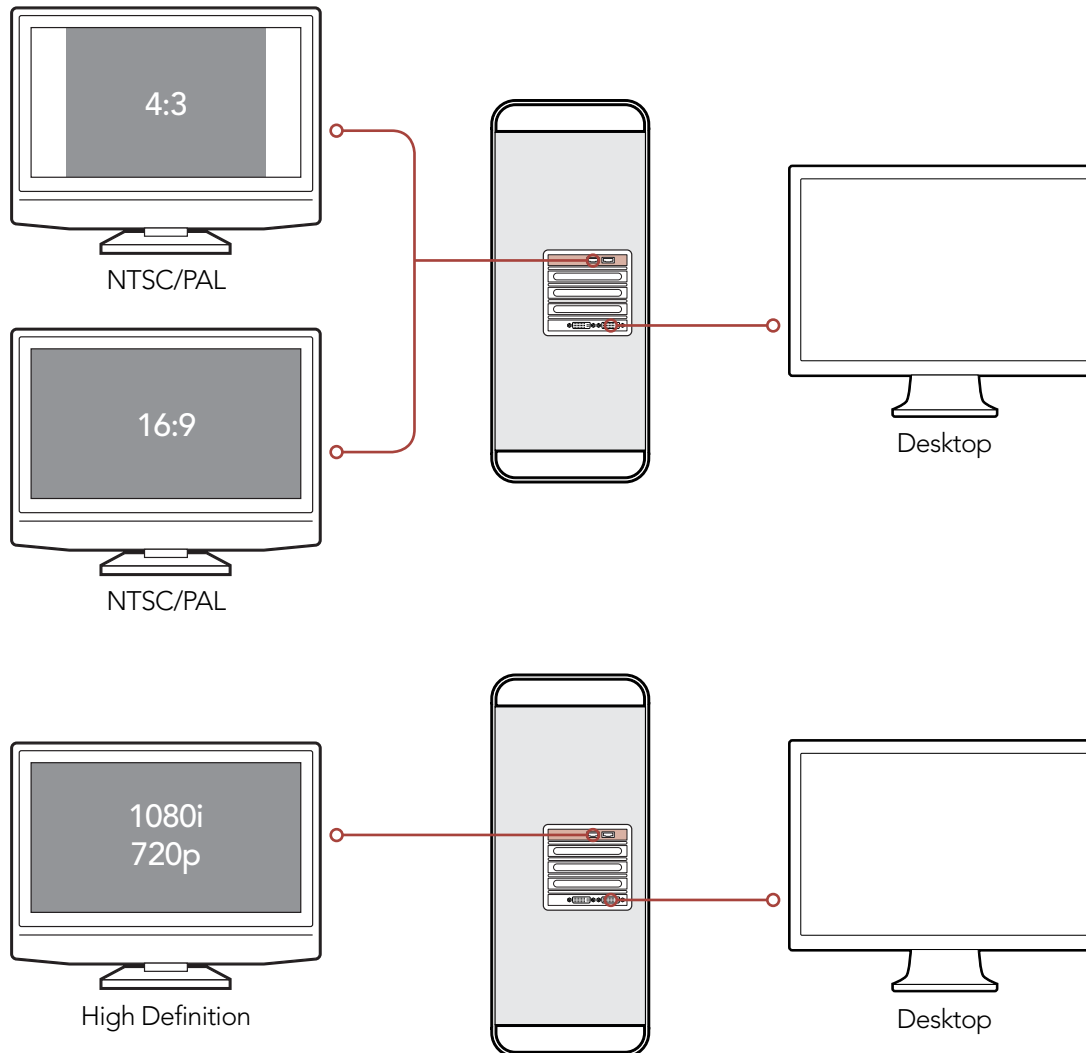
Connection to an HDMI HDTV

This example shows Intensity connected to a consumer HDTV with HDMI input. Connect the HDMI cable from the video output on your Intensity card into the HDMI video input on your HDTV for high definition monitoring.



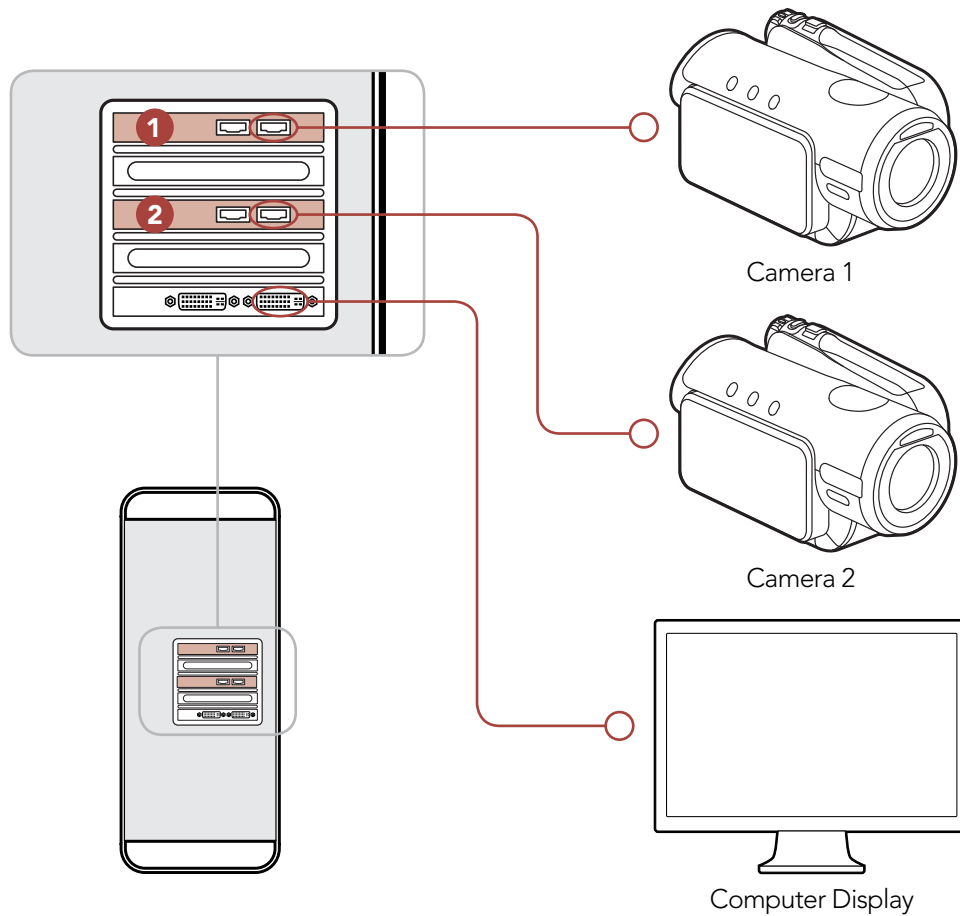
Monitoring using Intensity

When using a large screen HDTV with an HDMI input, Intensity can be used to client-monitor in either NTSC/PAL (4:3 and 16:9) or High Definition (1080i and 720p) formats.



Setup for Blackmagic On-Air

Blackmagic On-Air is a live video mixer that uses two Intensity cards. This application can live-edit between two HDV cameras recording directly to your local disk or external disk array.



12 Month Limited Warranty

Blackmagic Design warrants that this product will be free from defects in materials and workmanship for a period of 12 months from the date of purchase. If a product proves to be defective during this warranty period, Blackmagic Design, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, you the Customer, must notify Blackmagic Design of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to a designated service center nominated by Blackmagic Design, with shipping charges pre paid. Customer shall be responsible for paying all shipping charges, insurance, duties, taxes, and any other charges for products returned to us for any reason.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Blackmagic Design shall not be obligated to furnish service under this warranty: a) to repair damage resulting from attempts by personal other than Blackmagic Design representatives to install, repair or service the product, b) to repair damage resulting from improper use or connection to incompatible equipment, c) to repair any damage or malfunction caused by the use of non Blackmagic Design parts or supplies, or d) to service a product that has been modified or integrated with other products when the effect of such a modification or integration increases the time or difficulty of servicing the product. THIS WARRANTY IS GIVEN BY BLACKMAGIC DESIGN IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. BLACKMAGIC DESIGN AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. BLACKMAGIC DESIGN'S RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE WHOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER BLACKMAGIC DESIGN OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES. BLACKMAGIC DESIGN IS NOT LIABLE FOR ANY ILLEGAL USE OF EQUIPMENT BY CUSTOMER. BLACKMAGIC IS NOT LIABLE FOR ANY DAMAGES RESULTING FROM USE OF THIS PRODUCT. USER OPERATES THIS PRODUCT AT OWN RISK.

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