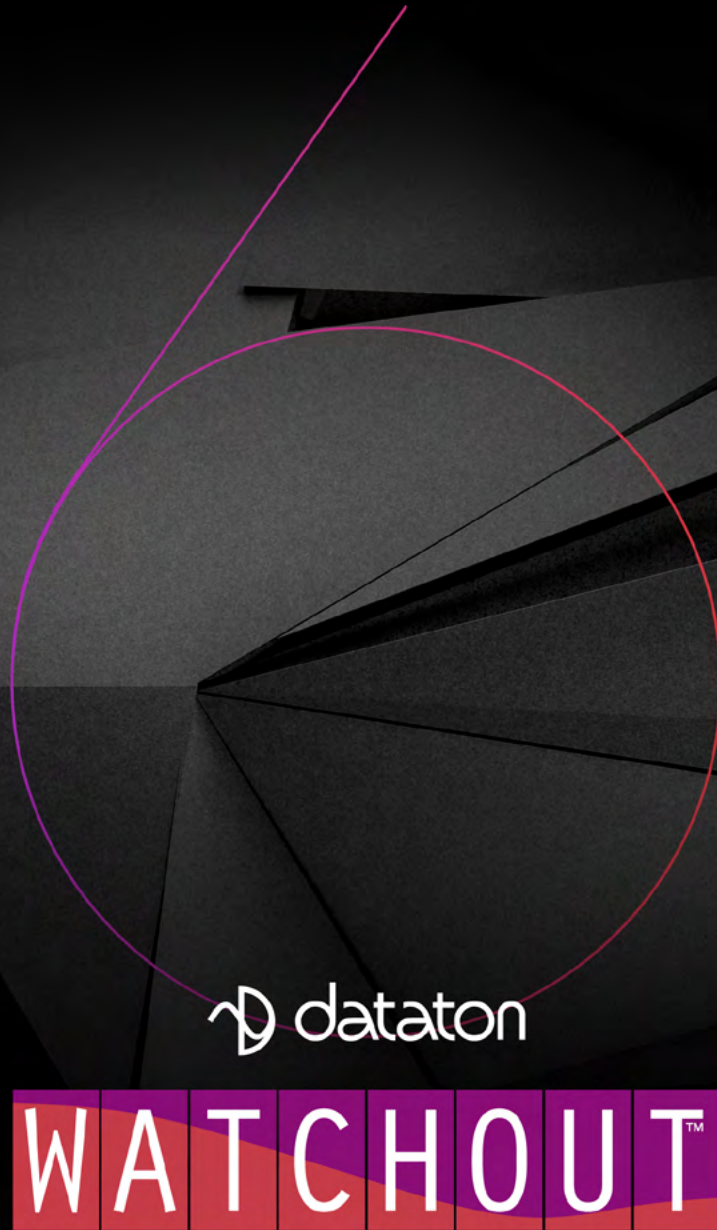




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Products or manufacturers mentioned do not constitute a recommendation or endorsement by Dataton.

User resources

Join the WATCHOUT forum! By users and for users, this invaluable resource features thousands of (searchable) posts all about WATCHOUT.

forum.dataton.com

Visit the Knowledge Base for some FAQs:

<https://knowledge.dataton.com/knowledge>

If you have an issue and need to contact the support department, please visit the Help Center and submit a support ticket!

<https://www.dataton.com/helpcenter>

1. INTRODUCTION

Welcome to Dataton WATCHOUT, the leading multi-display production and presentation system. Use it to create stunning collages combining images, video, lighting, 3D and interactivity. Present your shows using projectors for large, seamless images. Hook up WATCHOUT to monitors, LED walls or other creative screen arrangements. Or project onto complex three-dimensional objects using the 3D video mapping capabilities.

ABOUT THIS MANUAL

This manual is divided into the following parts:

- An introduction to give you the big picture. Start here if you're a new user or just having your first look at WATCHOUT. You'll also find basic instructions on how to install the program and configure your computers.
- A reference section, describing all windows, menus, commands and other details. Refer to this section to learn more about specific functions.
- A number of appendices with additional information related to particular areas of the product, such as live video inputs and external control protocols.

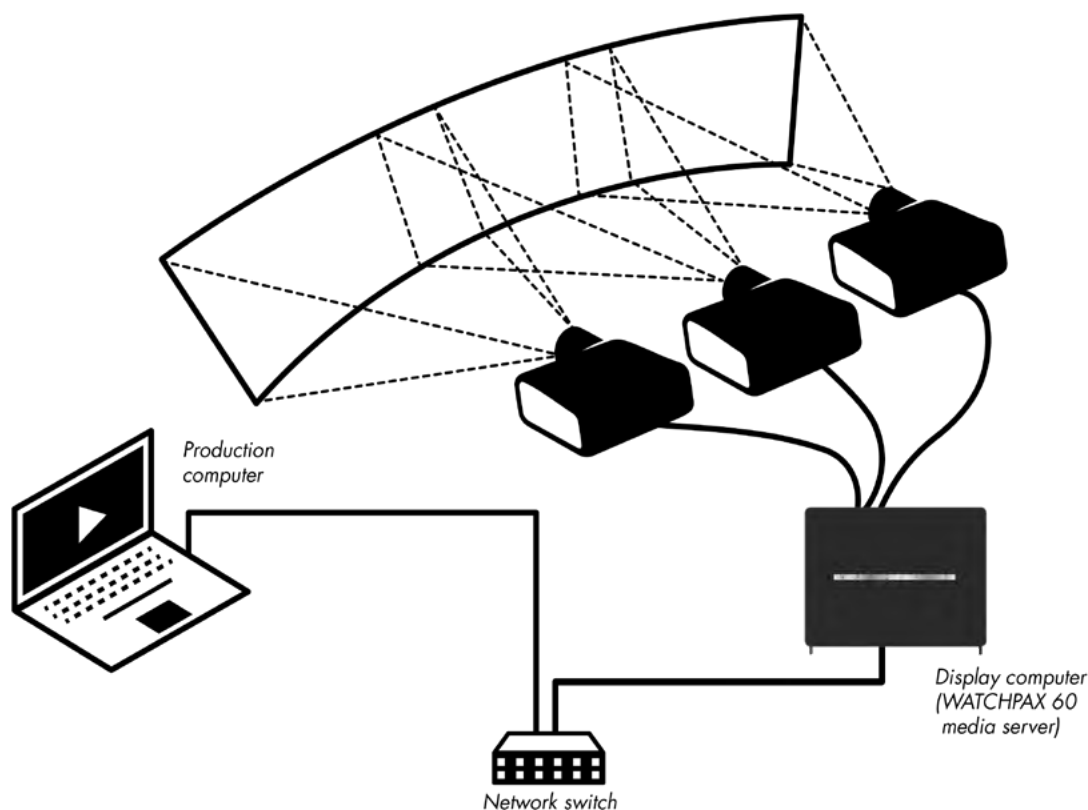
WATCHOUT VERSION 6

This manual refers to WATCHOUT version 6. The latest version of the software and its documentation can always be obtained from:

<http://www.dataton.com/downloads>

SYSTEM OVERVIEW

This section provides an introduction to the various components in a basic WATCHOUT system, and how they fit together. Note that each computer in a system running WATCHOUT must have a WATCHOUT license key connected. Dataton WATCHPAX media servers have built-in license keys.



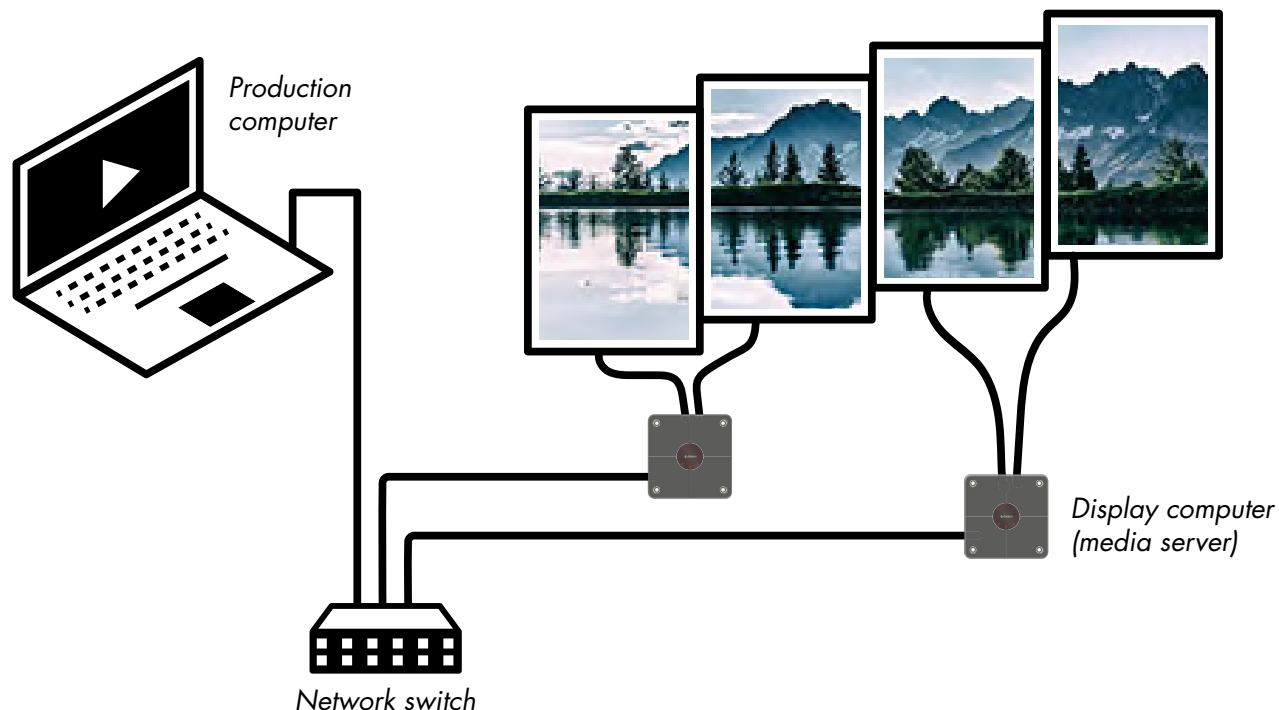
In the illustration, a laptop running WATCHOUT is used as the production computer. This connects to a network switch, which is then connected to a Dataton **WATCHPAX 60** media server. The WATCHPAX unit could also be a self-build display computer running WATCHOUT software. Both the production and display computers need to be equipped with a WATCHOUT license key.

HINT: When connecting a single display computer to the production computer, a network switch may not be required.

Depending on the graphics card, a self-build display computer can drive up to six displays. Dataton WATCHPAX media servers offer four to twelve channel outputs, depending on model; WATCHPAX 40 offers four outputs and WATCHPAX 20 two outputs. The display devices connect using appropriate cables, such as DisplayPort, DVI, SDI or HDMI. Which cables to use depends on the display devices as well as the outputs from the display computer.

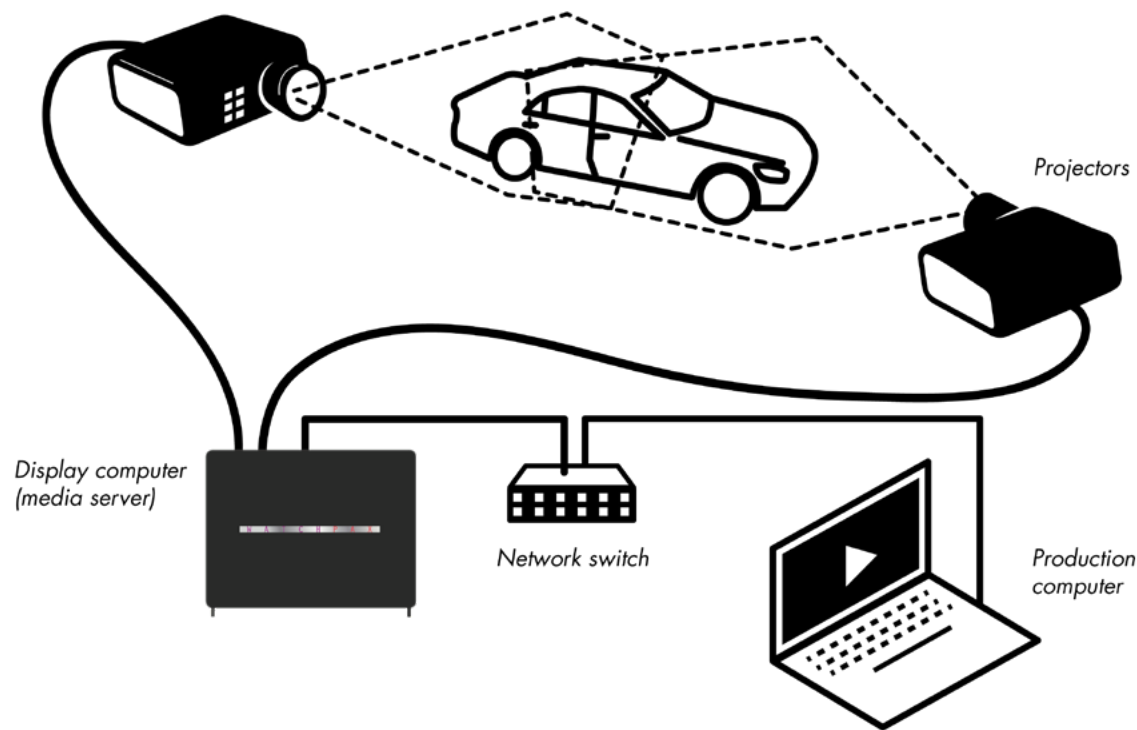
The next example shows four, vertically rotated screens controlled by two Dataton **WATCHPAX 20** media servers.

The system is programmed using WATCHOUT production software running on the laptop. Alternatively, you can use Dataton **WATCHNET** to schedule presentations or for interactive control.



In WATCHOUT, you can arrange the displays in the Stage window as they are placed on the wall – including the gaps between display surfaces. WATCHOUT takes care of distributing the content across any number of display computers.

The last example shows how you can project onto a physical object using a **3D Mapping Projector**. The hardware hookup is very similar to the first example. The production and staging workflow is quite different, however, involving various 3D techniques such as modelling, UV-mapping and texturing, as well as precise calibration of the projectors' positions (see "Calibrate").



Projecting onto a physical object using 3D mapping projectors.

PRODUCTION COMPUTER

This is the focal point for your WATCHOUT production work. It is where you collect all the source material, or media, to create your presentation. Using the WATCHOUT production software (see [“Software Overview”](#)), you simply drag media into your presentation, positioning it in the Stage window and along the Timeline.

The production computer talks to the display computers through the network, transferring media files for you as required, as well as controlling the playback of the show. It can also be used for audio playback while running the show.

DISPLAY COMPUTERS/MEDIA SERVERS

Display computers connect to the display devices and handle all the hard work associated with rendering images and video. They also apply edge blends, geometry correction and can play audio.

The fact that the system can use multiple display computers means it is scalable to virtually any size: as more displays are added, you can also add more computing power to drive these displays. A display computer may drive up to six displays, depending on hardware and performance requirements. Dataton media servers (WATCHPAX range) offer up to 12 outputs, depending on model.

Use Dataton [WATCHPAX](#) media servers if you prefer something that’s ready to use out-of-the-box. Alternatively, configure your own Windows-based PC computer (see the chapter on [Installation](#) as well as the [tweak list](#)).

NETWORK

The network ties the parts together, allowing the production computer to manage all display computers. It is created by connecting the computers to a network switch.

As you add new media to your presentation, or revise existing media, these changes are automatically propagated, via the network, to the appropriate display computers. The network also transfers your display configurations, timeline programming and other aspects of your presentation. With all this material residing on the display computers, very little information needs to be sent over the network during playback, avoiding network congestion.

DISPLAY DEVICES

WATCHOUT can be used with virtually any display device that can be connected to a computer, such as projectors, LCD panels and LED walls.

MINIMAL SYSTEM CONFIGURATION

Although you can use the WATCHOUT production software on its own for practice, you won't be able to appreciate the full power of WATCHOUT until you start connecting display computers. The illustration shows a minimal system, consisting of the following components:

- Laptop computer running WATCHOUT production software, equipped with a WATCHOUT license key.
- Network, connecting the two computers together via a hub or switch.
- Computer running WATCHOUT display software and equipped with a WATCHOUT license key (Dataton WATCHPAX 60 media server in this case).
- Display device, for example, a monitor or a projector.

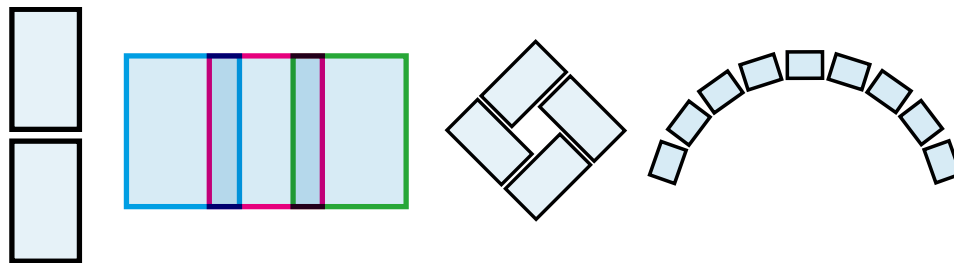


Don't forget that each computer in a system running WATCHOUT must have a WATCHOUT license key connected (see "[License Keys](#)").

NOTE: The production software can be used on its own without a license key. License keys are required for using the display software.

ALTERNATIVE DISPLAY LAYOUTS

WATCHOUT is very flexible in terms of how you arrange the displays. The illustrations below show some more unusual display arrangements. In addition, WATCHOUT also supports projection on curved surfaces and onto physical objects (3D mapping).



IMAGES, SOUND AND VIDEO

A WATCHOUT presentation uses multiple media, such as still images, video clips, sound files, etc. WATCHOUT accepts a wide variety of still image and video file formats. Transparency (alpha channel) is supported in both still images and video files. For more details on the various kinds of media supported by WATCHOUT, see the [Media](#) chapter.

LIVE FEEDS

In addition to pre-produced content, WATCHOUT can also incorporate live feeds of various kinds:

- Video camera, e.g., for integrating a live image of a speaker into the presentation.
- Other external feeds, such as a DVD player or a satellite link.
- Computer graphics, e.g., a PowerPoint presentation.

- RSS feeds or other external data sources managed through the WATCHOUT Dynamic Image Server (see “Dynamic Images”).

Some live feeds require additional hardware, such as capture cards, in order to bring the signal into WATCHOUT. In other cases, the external feed can be brought into the system through the network, (see “NDI video”).

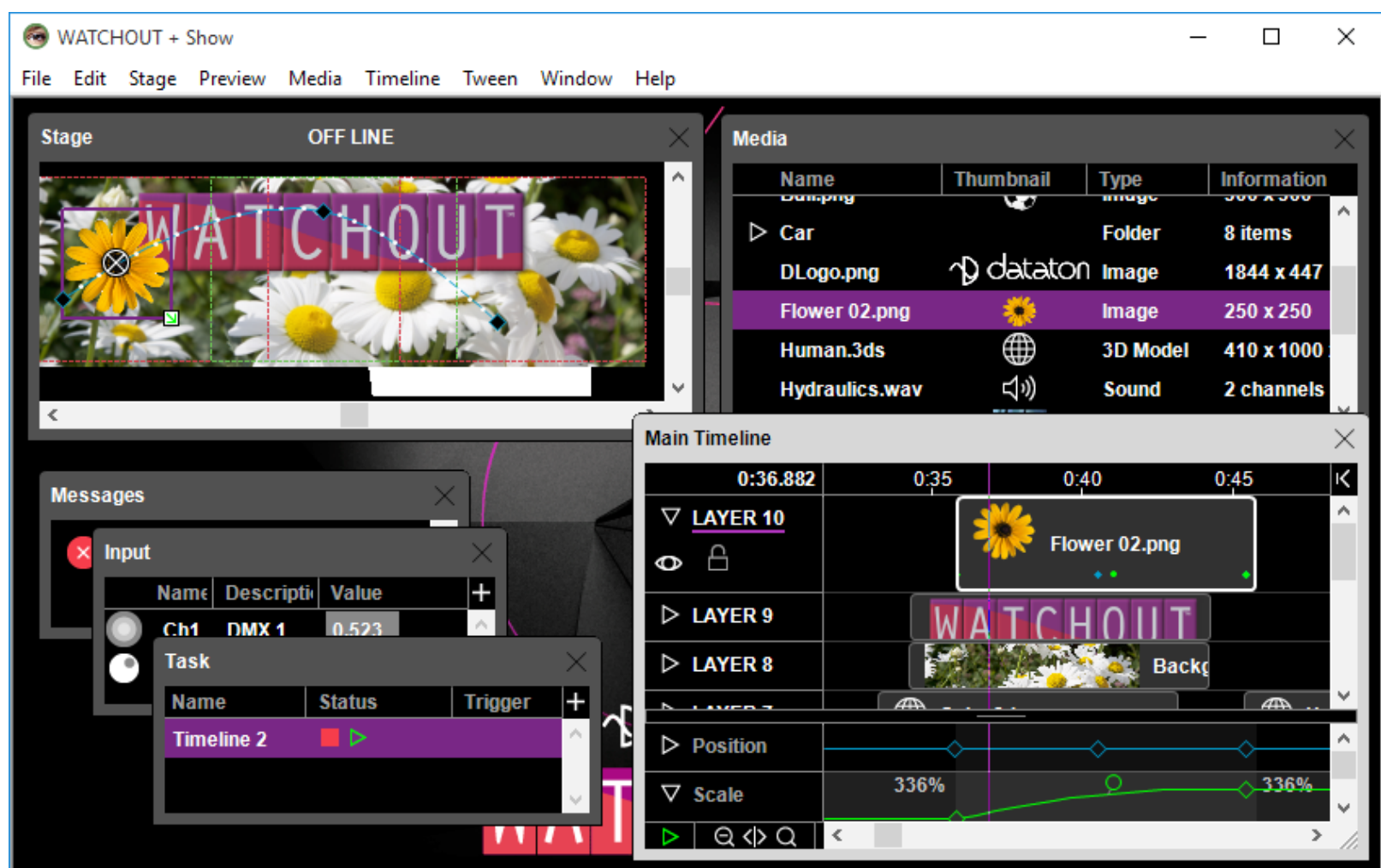
EXTERNAL CONTROL

Use [Dataton WATCHNET](#) to configure a touch panel as an interactive front-end that can be used from iPhone, iPad, or similar device, controlling any number of WATCHOUT clusters, as well as to schedule presentations and manage the system.

WATCHOUT can also be used together with other control systems and technologies to build powerful presentation environments. Connect other devices and systems to WATCHOUT using a computer network, serial port, MIDI, DMX-512, RTTrPM protocol or a timecode feed (see separate sections and appendices for details on external control options).

SOFTWARE OVERVIEW

This section provides a brief introduction to the WATCHOUT production software.



STAGE WINDOW

The Stage window allows you to organize displays and projectors to reflect their expected position. It also provides a preview of the end result, and allows you to manipulate the position and movement of images.

TIMELINE

Media files are dragged from your hard disk into a timeline window, where they appear as horizontal boxes called cues. Each cue features a thumbnail icon of the media. You determine timing and duration by adjusting the position and length of these cues. The horizontal layers in the timeline window represent the back-to-front stacking order of overlapping images.

In addition to the Main Timeline, shown above, you can add any number of Auxiliary Timelines through the Task window. Those timelines can be started and run independently of the main timeline.

MEDIA

As media is added, thumbnails representing the media files also appear in the Media window. This acts as a central repository for all media used in your presentation. It provides information about each media file, and allows the file to be easily accessed for editing or other purposes.

CUES AND TWEEN TRACKS

The cues in the timeline window can be enhanced by applying tween tracks. Tween tracks control the dynamic behavior of media on stage, such as position, scale or transparency. WATCHOUT sports a variety of tween track types, all providing real-time effects that can be programmed or even controlled live using external inputs (see “Cues”).

SYSTEM MANAGEMENT

Changes to the presentation are transferred to the display computers as you make them. This includes any media you have added, or modified. As the media files and cues are cached locally on each display computer, the show is ready to run at any time by simply pressing the spacebar.

WATCHOUT TRAINING VIDEOS

To learn more about WATCHOUT, check out the training videos available here:

<https://www.dataton.com/training/academy-training-videos>

DATATON ACADEMY

Dataton offers industry-certified training worldwide. For a list of training sessions and information on course content, please visit the Dataton website:

<https://www.dataton.com/training/academy>

WHERE TO GO FROM HERE

To use WATCHOUT for running actual, full-scale presentations, you need to hook up media servers and projectors (or other display devices) as shown in the illustration under [System Overview](#). You also need to acquire WATCHOUT [License Keys](#). The [Installation](#) chapter provides details on setting up and configuring a complete system.

2. INSTALLATION

This chapter tells you how to install the required software components and connect the hardware.

SOFTWARE

WATCHOUT is Microsoft Windows-based software. Obtain the “WATCHOUT Installer” by downloading it from

<https://www.dataton.com/downloads/watchout>

Run the installer and follow the on-screen instructions. This installs both the production and display software components, adding them to your Start menu.



INSTALLING QUICKTIME

In addition to WATCHOUT, you may also want to install Apple QuickTime, available from:

<https://support.apple.com/kb/DL837>



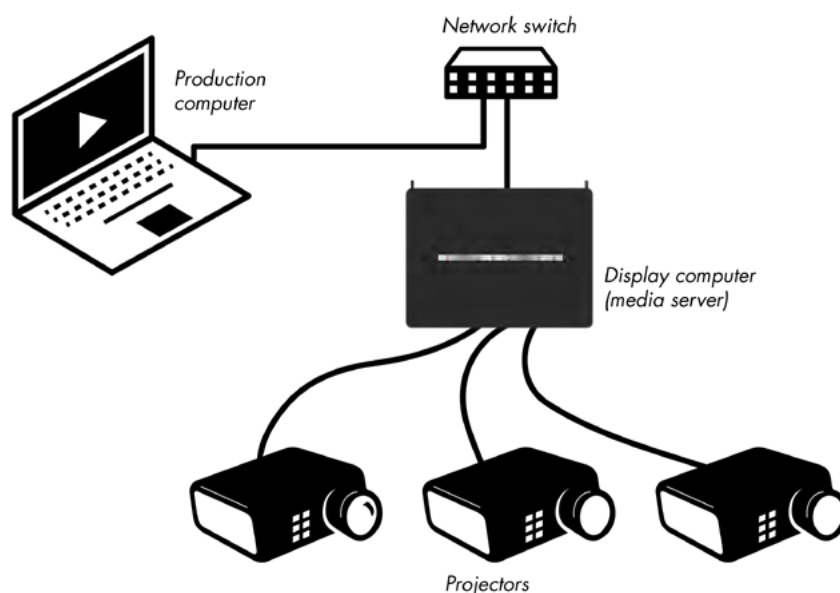
NOTE: QuickTime is not required by WATCHOUT. Install it only if you need to play video content encoded using legacy video codecs, or if you want to use the Audio or Video Export functions in the WATCHOUT INSTALLER production software.

NETWORK

The production computer and all display computers must be connected using an Ethernet network, which comes standard on most computers. Wireless networks are generally not recommended.

STAND-ALONE SYSTEM

For a minimal system configuration, connect all computers to a network switch.



For stand-alone operation of a WATCHOUT system, this is usually all you need to do in terms of hardware connection.

NOTE: If you're using just one display computer (possibly driving multiple displays), you can simplify the system even further by removing the switch and connecting the production computer directly to the display computer.

COMPUTER ADDRESSING

All WATCHOUT computers on the network must have a unique address. Addresses may be assigned automatically or manually. In most cases, automatic addressing is preferred, since it makes system setup and configuration easier, and avoids configuration errors such as assigning the same address to more than one computer. When using automatic addressing, use the [Network Window](#) in WATCHOUT to assign computer names.

Many networks support dynamically assigned addresses based on the [DHCP](#) standard, which is a form of automatic addressing. If that applies to your network, you're good to go. If your network doesn't support dynamic addressing, your computer will generally fall back on self-assigned addressing (also known as ["Link-Local"](#)), where each computer grabs an address for itself after first making sure that it isn't already in use.

NOTE: If using self-assigned addresses, ensure all computers on the network employ this method, or they will not be able to communicate with each other.

If you choose to use manual addressing, you must assign a fixed IP address to each computer (see ["Manual Addressing"](#)).

LICENSE KEYS

Each computer in the system requires a WATCHOUT license key, including the production computer. Plug the key into any free USB (Universal Serial Bus) port on the computer.



NOTE: Dataton WATCHPAX and WATCHMAX have internal licenses, and don't require any external license keys.

HINT: You can run the production software off-line without a license key connected. A key is needed when you go on-line to communicate with the display computers.

DISPLAY DEVICES

WATCHOUT can be used with any display technologies, such as projectors, LCD screens and LED wall processors. Generally speaking, you can use any display device that's compatible with the display card in the display computer (media server).

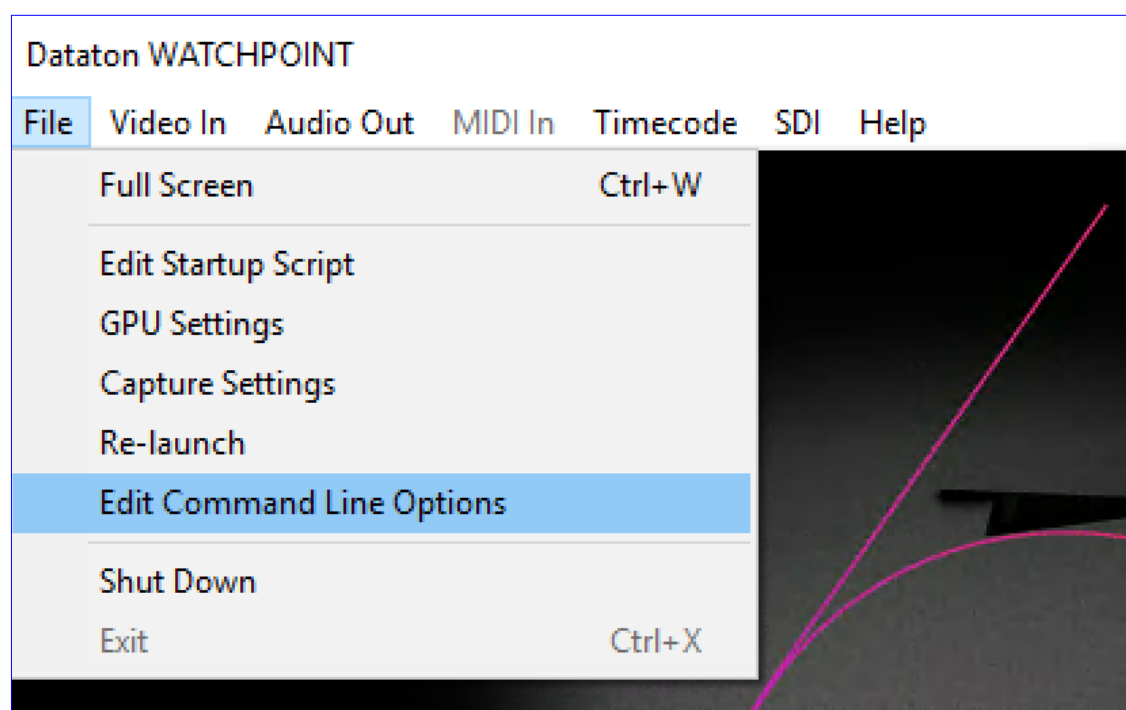
You can connect up to six display devices per display computer, depending on your computer's graphics configuration and other hardware capabilities. All displays must be connected to the same graphics card.

In addition, some of Dataton's own media servers have an additional eight outputs through SDI.

To configure the graphics card settings of Dataton media servers (WATCHPAX and WATCHMAX units) press Ctrl-W and select "GPU Settings" from the File menu. For non-Dataton display computers, please see ["Display Properties"](#) later in this chapter.

It is also possible to open the configuration panel for the capture card(s) installed in certain Dataton media servers. To do so, press Ctrl-W and select "Capture Settings" from the File menu.

Command-line options of newer generation of Dataton media servers, for example WATCHPAX 60, may be set through the "Edit Command Line Options" entry under the File menu.



SOUND

Sound can be provided through any of the display computers, or through the production computer. Simply connect the sound output from the computer (usually a 3.5 mm mini-jack) to the amplifier or powered speakers. For more details, see “[Sound Settings](#)” later in this chapter.



If you need to run the computer’s line-level audio signal a long distance, you should use an audio line level transformer. This converts the unbalanced signal coming from the computer to a balanced signal, thereby reducing the risk of hum and noise when connected to a professional audio amplifier.

USING MULTIPLE SOUND CHANNELS

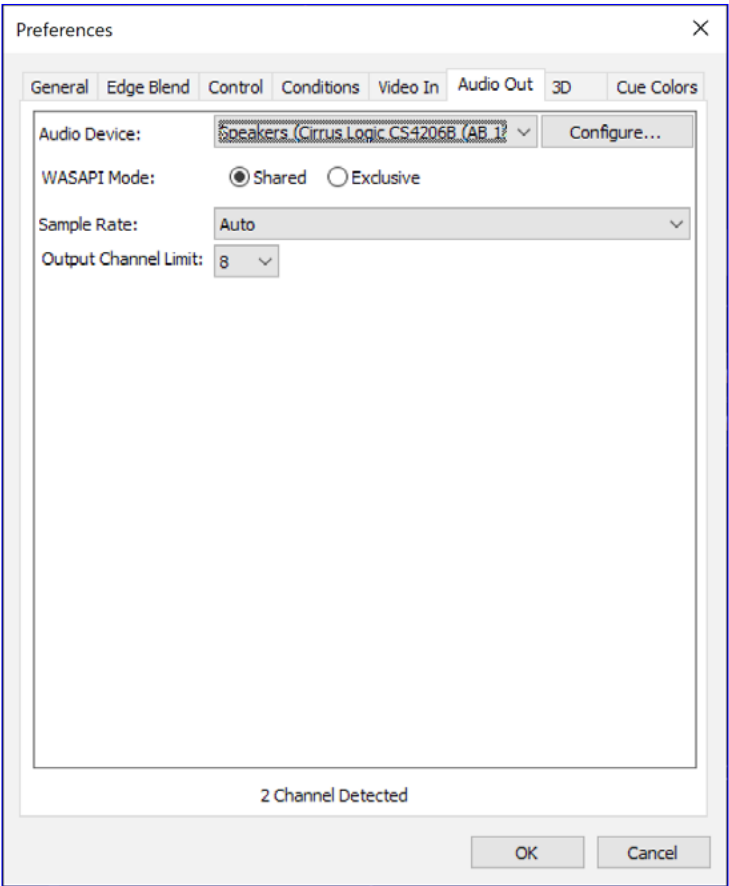
You can have multiple display computers playing at the same time, which gives you multiple audio channels. The synchronization between computers is generally good enough for multi-language support or special effects sound tracks, but not for true, phase-accurate, multi-channel sound reproduction.

Another option is to connect a multi-channel sound interface to your production or display computer. This kind of professional interface can handle multiple phase-accurate sound channels. Furthermore, many desktop-style computers support multi-channel playback using several 3.5 mm output jacks.

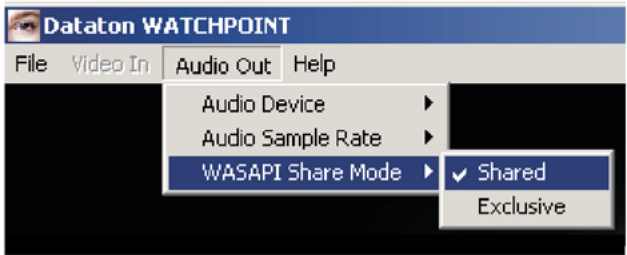
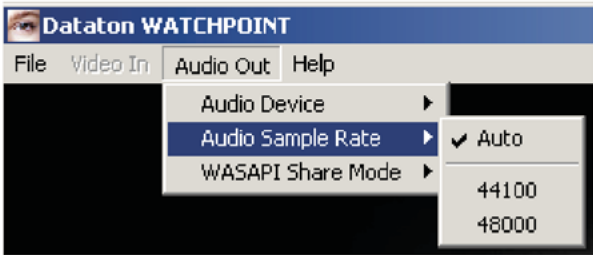
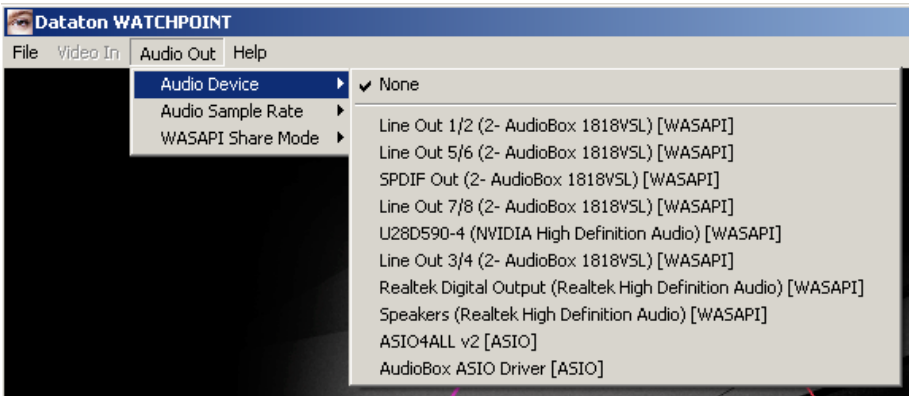
Audio Device Setting

Audio device settings include audio device selection, sample rate and WASAPI shared/exclusive mode. In the production software, this is done in the “Audio Out” tab of the Preferences dialog box. In the display software, press Ctrl-W to reveal the menu bar, then choose the desired device, sample rate etc.

WATCHOUT supports WASAPI and ASIO drivers. Identify the type of driver by looking at the suffix of the device name, [WASAPI] or [ASIO].



Audio device settings



LIVE VIDEO INPUT

WATCHOUT can integrate live video feeds using video input devices, such as capture cards or IP-based streaming. This may be a camera feed, a satellite link, or the image displayed by another computer (e.g., a Microsoft PowerPoint® presentation). For examples on some suitable video input solutions, see [“Live Video Input”](#).

FEEDING MULTIPLE DISPLAY COMPUTERS

The video signal must be fed to each computer on which it will appear. For instance, if your system uses five display computers, and you want to show a live video image straddling two of those five display areas, both those display computers must be fitted with an appropriate input device to capture the signal.

If you are feeding multiple display computers with an identical signal, a video distribution amplifier, matrix, splitter or switch may be required. Suitable devices are available from a wide range of manufacturers.

SOFTWARE DRIVER INSTALLATION

Most capture cards require specialized software drivers. Although the driver is sometimes delivered on a DVD with the card, it's often a good idea to check the manufacturer's web site for the latest driver version.

WATCHOUT CONFIGURATION

Configure each WATCHOUT display computer that is due to show live video as described under [Add Live Video](#). Optionally, you can also choose to show live video in the Stage window of the production computer (see ["Video In"](#) under Preferences).

MIDI AND DMX-512

WATCHOUT can communicate with other devices using the MIDI and DMX-512 industry standard protocols, as well as devices connected through a serial or network data link. MIDI communication requires a Windows compatible MIDI interface, which is often connected through a USB port. Follow the instructions included with your MIDI interface to install any required software or drivers.

See the chapter on [Inputs and Outputs](#), as well as [MIDI Show Control](#) for more details.

VNC SERVER SOFTWARE

If you want to use the Computer Screen media item in WATCHOUT to integrate a live computer display into your presentation over the network, for example, to display Excel or Powerpoint as part of a speaker-support presentation, you must install VNC server software on the remote computer. This must be a separate computer – it can not be one of the computers running WATCHOUT software.

NOTE: This software is not required for basic WATCHOUT functions. You only need to install this software if you want to use the “Computer Screen” feature (see “Add Computer Screen”).

VNC (Virtual Network Computing) server software is available for a wide variety of operating systems. The instructions below describe its installation under Windows. VNC is free software, available in several forms:

<http://www.realvnc.com/>

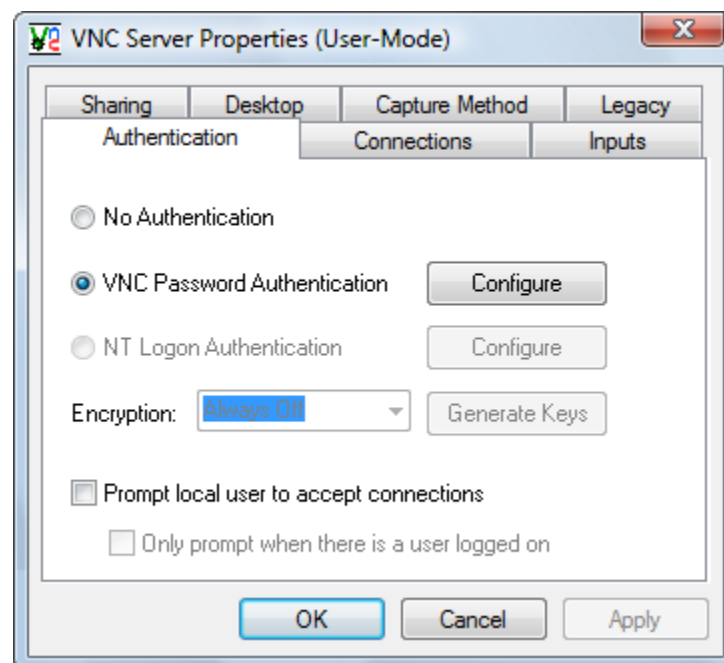
<http://www.uvnc.com/>

Download the VNC server software from one of the above locations, and follow the installation instructions. You’re advised to start the VNC server software as a user mode application.

For best performance, use a reasonably fast computer to run the VNC server software and the application you wish to incorporate into your presentation (for example, Powerpoint).

Make sure that the VNC server computer is connected to the WATCHOUT network, and has a fixed, known IP number in its TCP/IP settings. This IP number and other TCP/IP parameters must match the network to which it is connected. Also verify that its firewall is disabled, or that the VNC port 5900 is open in the firewall (see [Firewall Settings](#)).

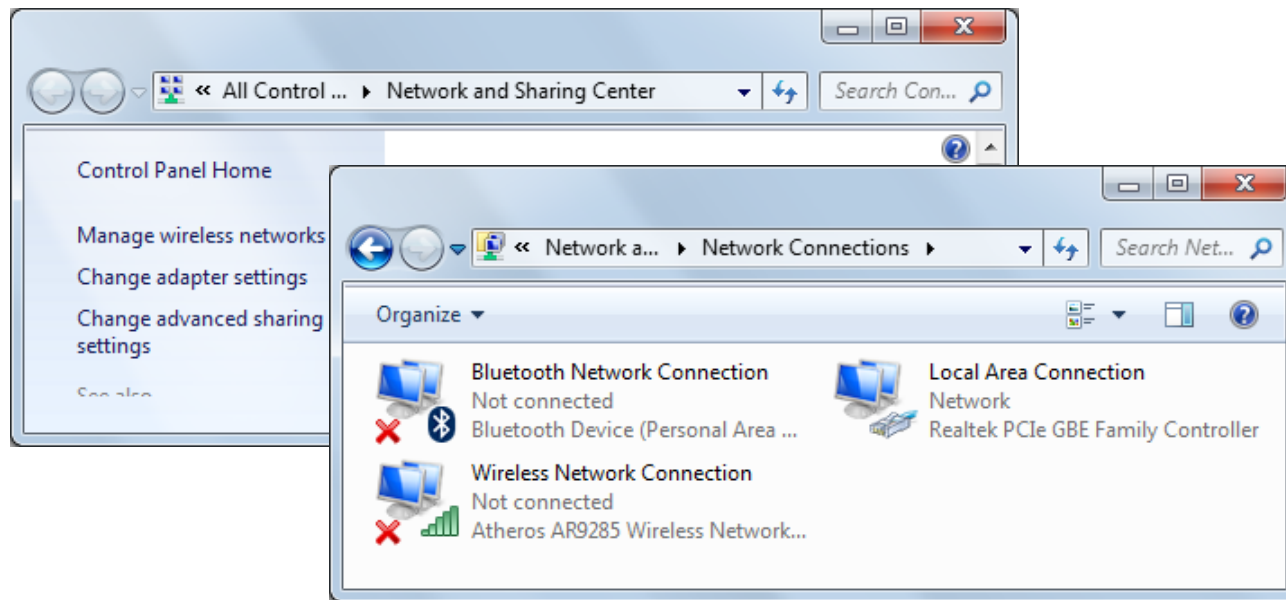
The first time you run the VNC server software, you will be prompted to enter a password. The VNC server software then appears as an icon in the lower right corner of the screen while running. Pointing at this icon displays the IP number of the VNC server. Double-click the icon to change the settings.



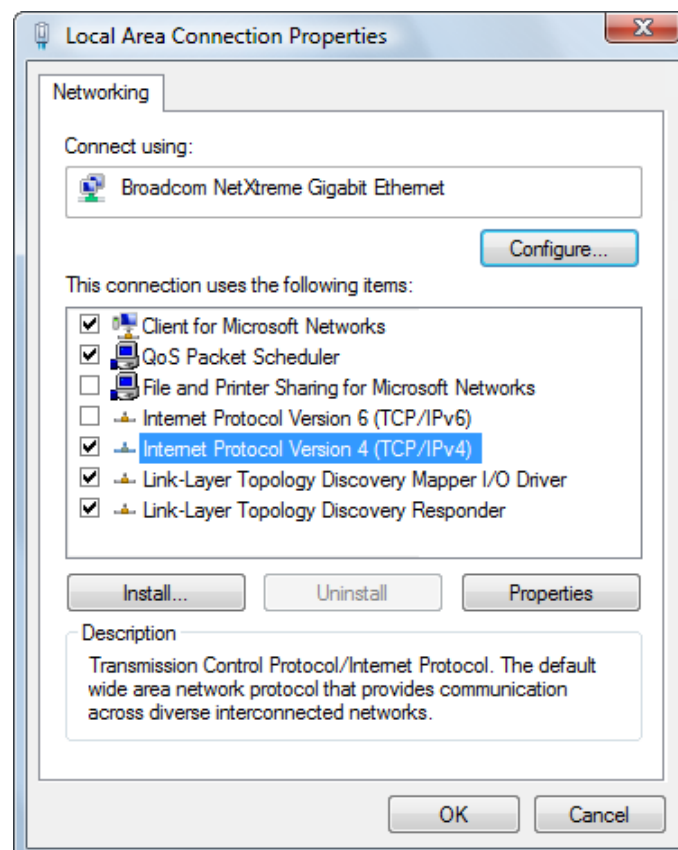
MANUAL ADDRESSING

Some, or all, computers in your system may need to have a network address assigned manually. This is particularly important for computers that need to be accessed by their network address (IP number) from other computers, such as when controlling WATCHOUT from a separate control system. To assign addresses manually, follow the instructions below.

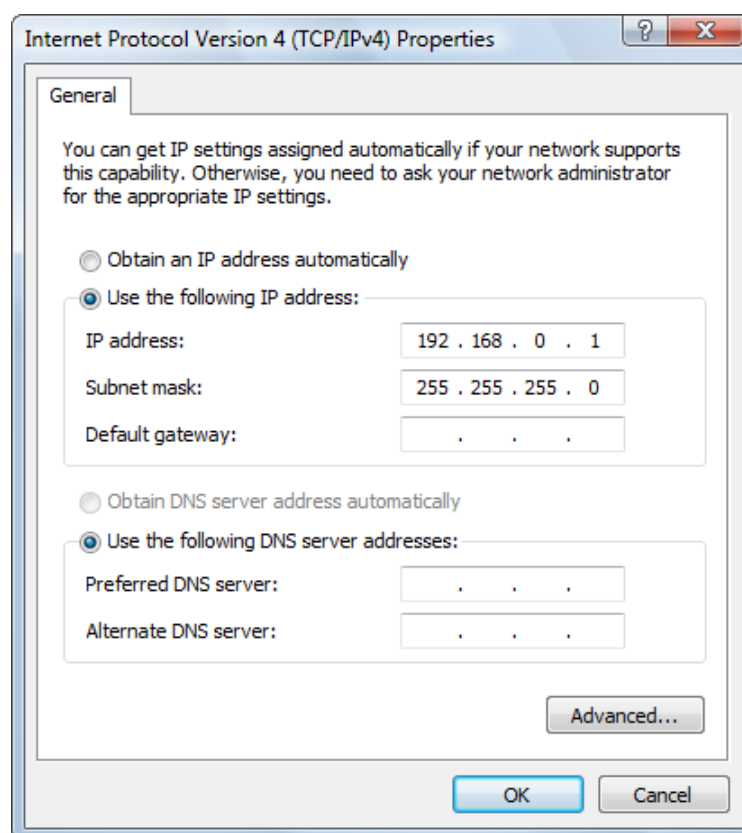
Right-click (Windows 10) or click (Windows 7) the Start button and choose Control Panel. Select "Small Icons" under "View by". Open the "Network and Sharing Center". Click "Change adapter settings", then right-click your "Ethernet" or "Local Area Connection" or and choose "Properties".



Ensure that "Internet Protocol Version 4 (TCP/IPv4)" is available and selected.



Choose "Internet Protocol Version 4 (TCP/IPv4)", click "Properties..." and enter the desired IP address and other settings as desired.

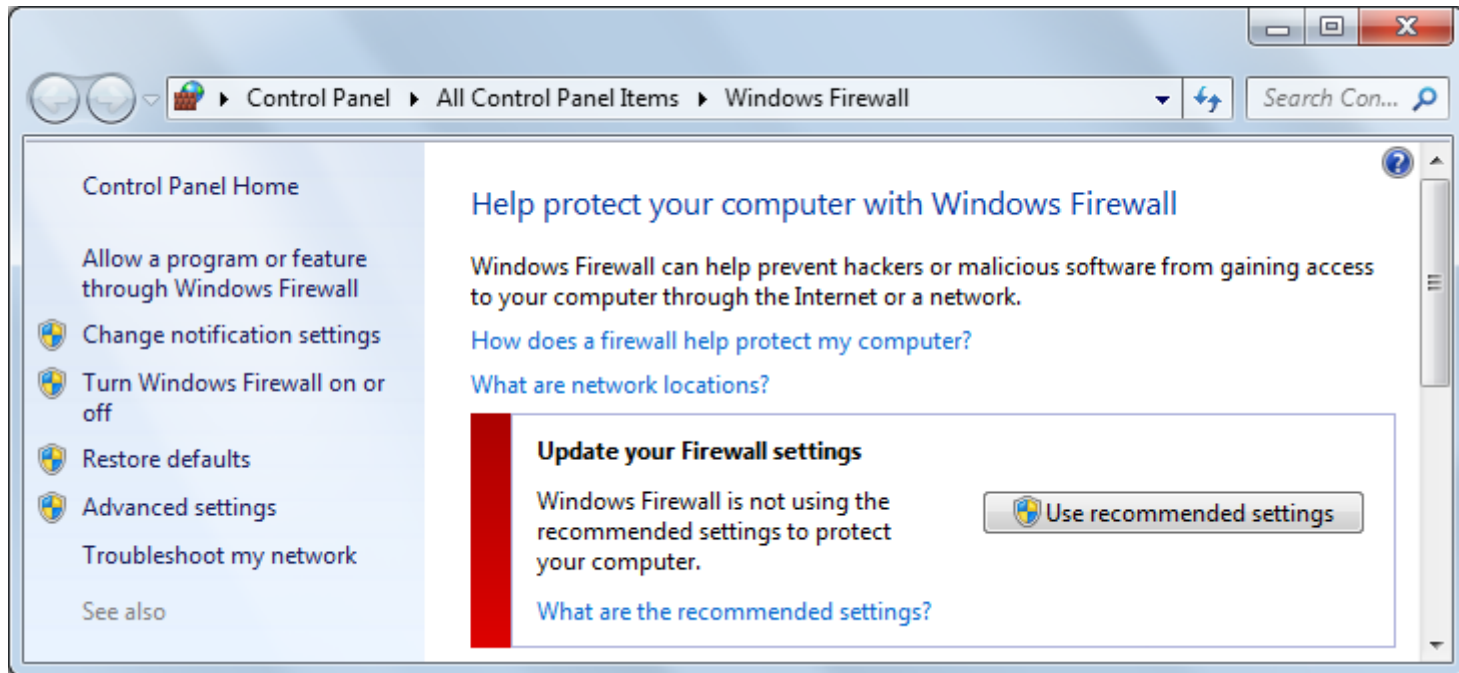


IMPORTANT: This example is applicable if you're building a stand-alone system. If your WATCHOUT subnet is connected to a larger network, you should consult your network administrator.

FIREWALL SETTINGS

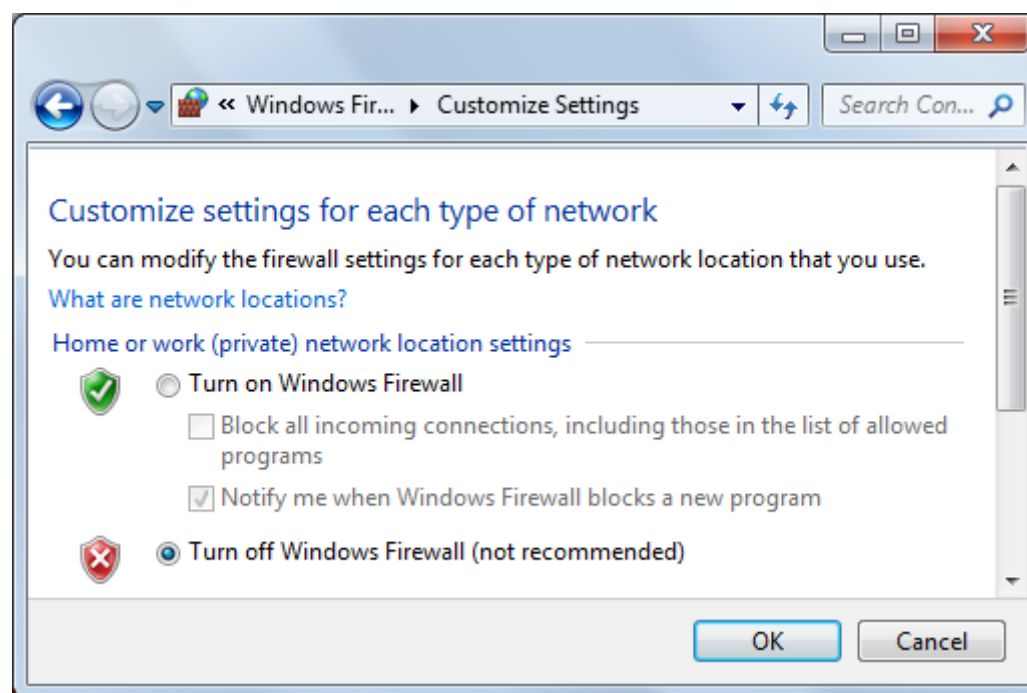
The Windows firewall may interfere with normal operation of WATCHOUT. You can avoid this either by disabling the firewall, or by configuring the firewall to allow WATCHOUT to function. To disable the firewall, open the “Windows Firewall” control panel, as shown below.

NOTE: Instead of disabling the firewall fully, you may configure it to allow WATCHOUT and related functions to pass. Consult your computer’s documentation on how to configure the Windows firewall.



If the firewall is on, click “Turn Windows Firewall on or off.” This opens the “Windows Firewall Settings” window, allowing you to turn off the firewall.

IMPORTANT: A WATCHOUT system should not be accessible from the Internet, or other external network. If you need to access the Internet from your system, use a separate firewall device to protect your complete system from security attacks.



The firewall feature should be turned off. Otherwise it may interfere with the ability to connect to and download media files to the display computers.

DISPLAY COMPUTER SETTINGS

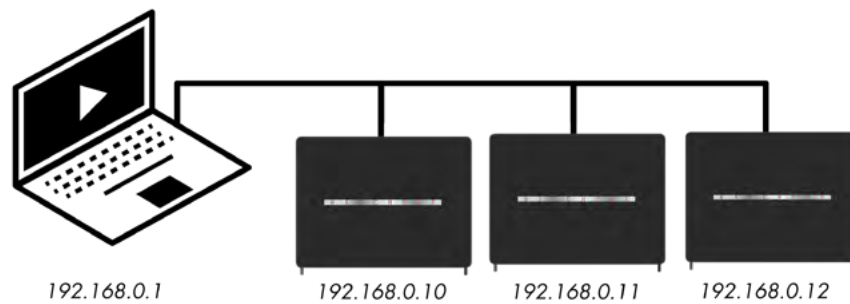
To achieve best performance and reliability in your WATCHOUT system, you need to adjust several settings on all your display computers. Most of the settings below are found by clicking (Windows 7) or right-clicking (Windows 10) the Start button and choosing Control Panel.

NETWORK

If you choose to use manual addressing for all your computers, follow the instructions given above under “Manual Addressing” to assign those addresses. Specify a unique IP number for each display computer by changing the last group of IP address digits.

NOTE: It is not usually necessary to assign addresses manually. When using automatic addressing, make sure you access display computers by name and not by address, in case automatically assigned addresses change (see “Computer”).

As an example: in a system consisting of one production computer and three display computers (in this case Dataton WATCHPAX servers), you would end up with IP addresses assigned like this:

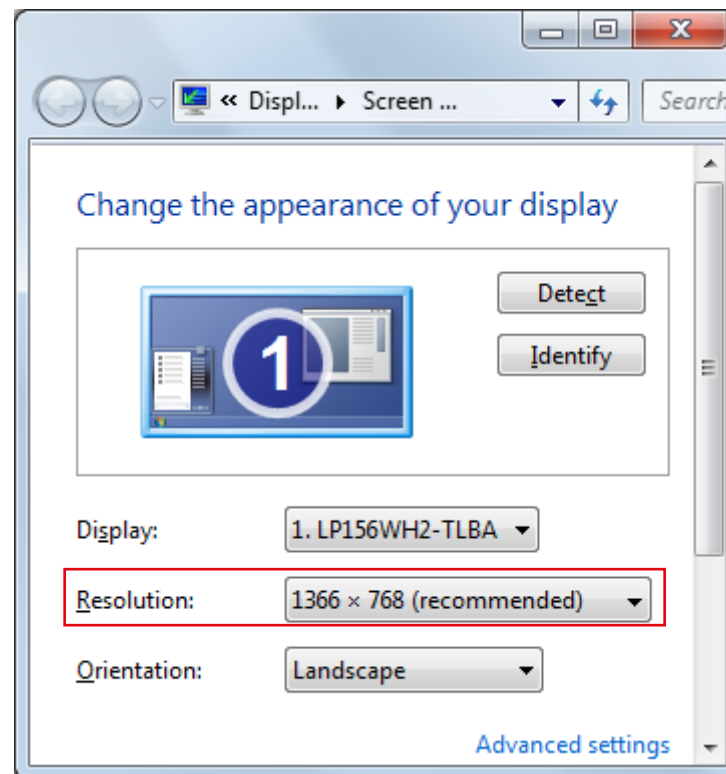


If your WATCHOUT subnet is not stand-alone but connected to a larger network, you should consult your network administrator for the correct IP number, subnet mask, and other parameters.

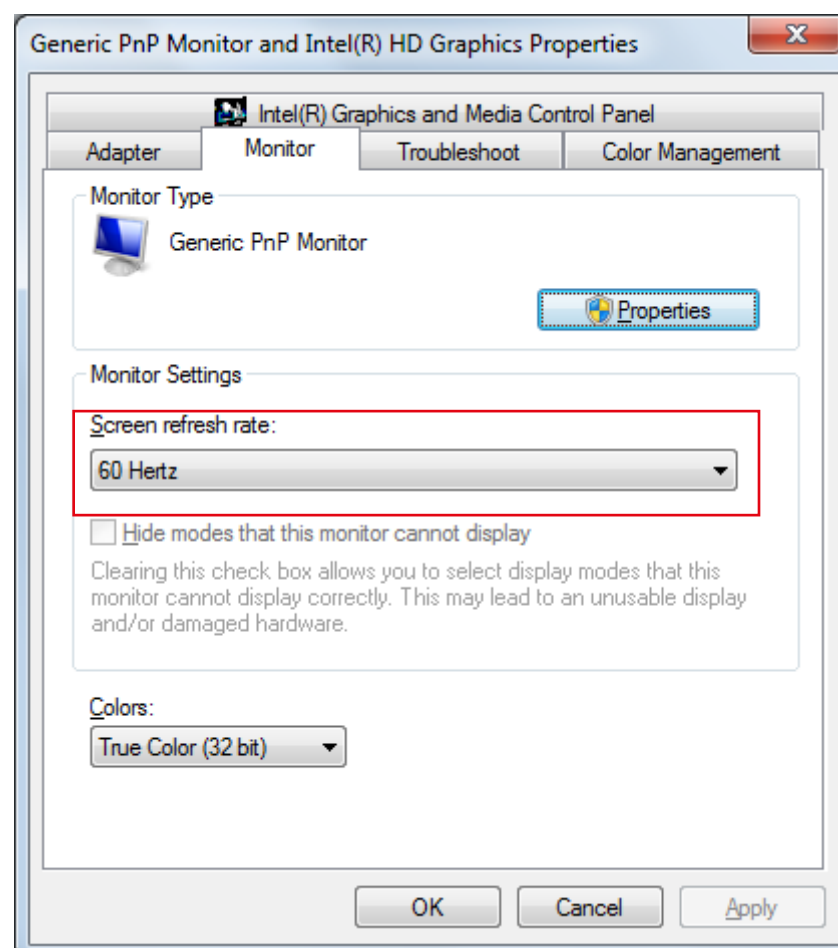
DISPLAY PROPERTIES

- In your computer’s Control Panel, choose “Display” then “Adjust Resolution.”

- Set “Resolution” to match the desired resolution for the display. If you have multiple displays connected, select each display and set its resolution and other parameters.



- Click “Advanced settings.”
- Click the Monitor tab and set “Screen refresh rate” as set in your WATCHOUT presentation (see “Display Framerate”), and click OK.



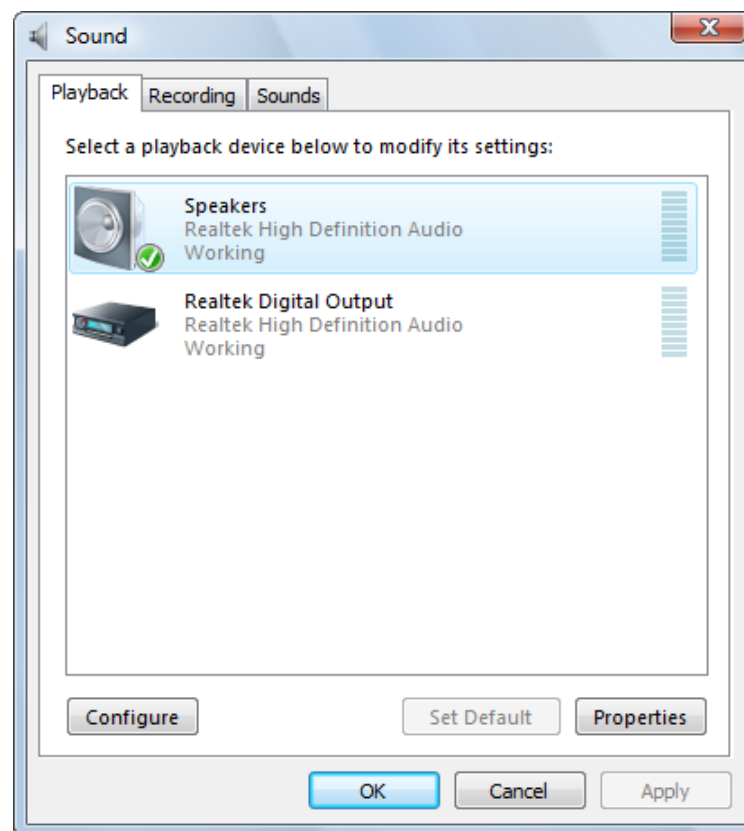
In most cases you should choose “60 fps” in the WATCHOUT Preferences dialog box, and set the display’s refresh frequency to 60 Hz.

Some system configurations don't allow you to change the refresh rate. In this case, the Refresh rate option will not be shown under the Adapter tab. This may vary depending on the display card, display card drivers and the display connected to the system.

IMPORTANT: While WATCHOUT will attempt to set the display resolution automatically, setting the resolution manually is usually preferable. The reason is that some display adapters don't allow WATCHOUT to set the most optimal display refresh frequency. By setting the display resolution and refresh frequency manually before starting WATCHOUT, you avoid the risk of getting a non-optimal display frequency.

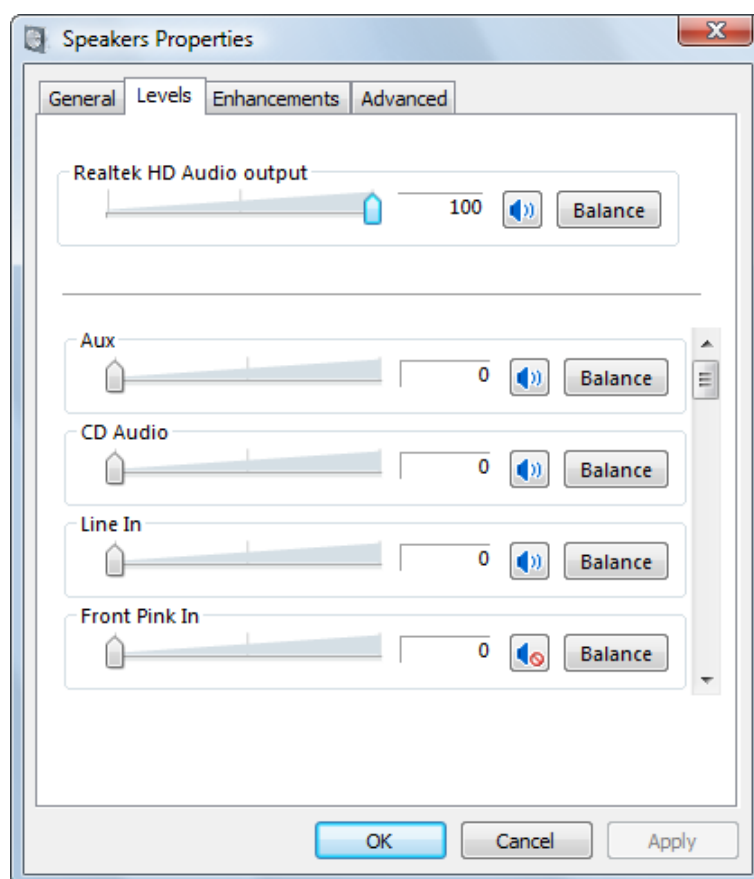
SOUND SETTINGS

When using a display computer for sound playback, you must enable the correct sound output and turn up its volume. Open the Sound control panel and make sure the correct output is activated. If not, select the desired playback device and click "Set Default".



The look of these windows may vary depending on the features of your audio interface.

Once you have selected the desired output in the list shown on the previous page, click Properties and turn up the volume under the Levels tab.



NOTE: In some cases, such as when dealing with multi-channel sound systems, you may also need to configure the sound outputs in WATCHOUT (see ["Audio Device Setting"](#)).

AUTO-STARTING WATCHOUT

If you want WATCHOUT display software to start automatically when you turn on your computer, install a shortcut to the display software in the Startup folder like this:

- Under Windows 10: open the Startup Items folder by pressing Windows-R to open the Run dialog box and entering "shell:startup" (without the quotes).
- Under Windows 7: click the Start button and choose "All Programs". Right-click on "Startup" and choose Open.
- Open your WATCHOUT installation folder and locate the program named WATCHPOINT, which is the WATCHOUT display software application.
- Using the right mouse button, drag WATCHPOINT from the WATCHOUT installation folder into the Startup folder, then choose "Create Shortcut here".
- Restart your computer to verify that the display software starts as desired.

IMPORTANT: Make sure you drag using the right mouse button to create a shortcut in the Startup folder. Do not move the WATCHPOINT program into this folder.

In addition to launching WATCHOUT, this shortcut can also pass on various optional parameters. These parameters can further control how WATCHOUT is started, as well as initiate various automatic actions. See the appendix on [Command Line Options](#) for full details.

NOTE: In some cases, other programs that also start automatically may load after WATCHOUT and interfere with WATCHOUT, for example causing it to not start in full screen mode. If so, use the ["-Delay"](#) command line option to delay the start of WATCHOUT as needed.

DISPLAY COMPUTER OPTIMIZATIONS

While the basic configuration of the display computer outlined above is sufficient in many cases, some computers require additional work to achieve best possible performance. This section provides some general hints and pointers on how to proceed.

NOTE: The information below does not apply to Dataton WATCHPAX and WATCHMAX units which are supplied ready tuned for WATCHOUT.

FORMATTING THE DISK AND INSTALLING WINDOWS

If you intend to use a computer primarily as a WATCHOUT display computer, it makes sense to re-format the hard disk and then install only Windows, required device drivers and WATCHOUT. This avoids many problems caused by various pieces of software that are often pre-installed on computers, or that may have accumulated over time.

NOTE: You don't have to re-format your hard disk in order to use WATCHOUT. This is an advanced procedure that helps in obtaining the best possible performance. You can apply all other adjustments described in this appendix even if you choose not to dedicate the computer to WATCHOUT.

To prepare your computer in this way, first make sure that the hard disk doesn't contain any important information. You should perform a backup if you're unsure about the content of the hard disk. Then start the computer from the Windows installation disk, and follow the on-screen instructions. Early on in the installation procedure, you will be asked where to install Windows. As part of this, you will get the opportunity to remove the existing partitions and create new ones, which you should do.

For best performance, create a smaller (50-100 GB or so) partition for Windows and any other applications you may want to install. This partition will become the C: drive. Leave the remainder of the disk unformatted for now.

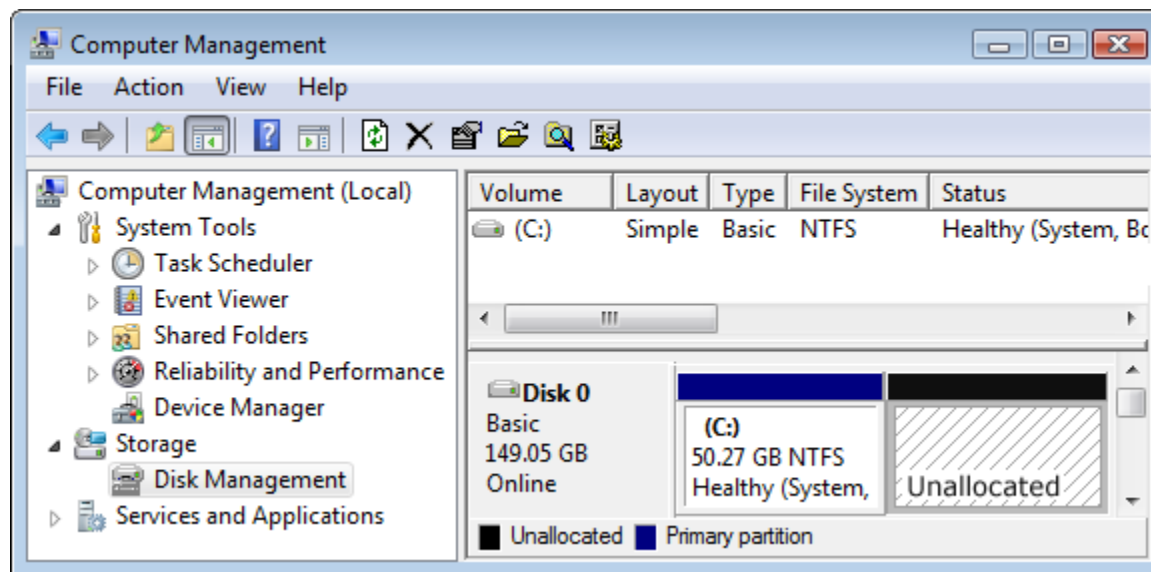
Proceed with installing Windows on the newly created, small partition. Once that's done, install required device drivers (graphics or sound card drivers, etc), and perform any additional adjustments mentioned in this appendix.

INSTALLING WATCHOUT

Before installing WATCHOUT, you need to format the remaining space of the hard disk:

- Right-click Start and choose Control Panel > Administrative Tools.
- Double-click Computer Management.
- Click Disk Management in the list. Right-click on the Unallocated space.
- Choose "New Partition".

Proceed with creating a primary partition of the maximum size.



If installing on a rotating-platter disk, choose the NTFS file system with an “Allocation Unit Size” of 32K on the last page of the “New Partition Wizard”. Generally, it is OK to also select “Perform a Quick Format”. Specifying a larger allocation size greatly reduces the tendency of disk fragmentation, at the cost of a small amount of wasted disk space. Given the fact that most WATCHOUT media files tend to be rather large, this should not have any practical disadvantages. This is not needed if you’re using a Solid State Disk drive.

Once the formatting is complete, the new partition will appear as the D: disk drive. Create a WATCHOUT folder on this disk, and install WATCHOUT here. When the WATCHOUT installer asks where to install WATCHOUT, choose the newly created WATCHOUT folder on the D: drive.

NOTE: Under Windows 7, the “Administrative Tools” option is hidden by default. To show it on the Start menu, right-click the task bar and choose Properties to display the “Taskbar and Start Menu Properties”. Click the “Start Menu” tab. Click the “Customize” button. In the list, make sure that “Display Administrative Tools” is enabled.

WINDOWS MEDIA CENTER

Under Windows 7, make sure you disable Windows Media Center: If not, this feature in Windows may interfere with some functions in WATCHOUT.

- Right-click (Windows 10) or click (Windows 7) the Start button and choose Control Panel.
- Select “View by: Small Icons” then choose Programs and Features.
- On the left-hand panel click on “Turn Windows Features on or off”.
- Scroll down to “Media Features” and expand it.
- Uncheck Windows Media Center.

NOTE: Windows Media Center is not available under Windows 10.

USER ACCESS CONTROL SETTINGS

The User Access Control (UAC) feature of Windows may interfere with certain functions in WATCHOUT, particularly when running on unattended display computers. UAC, per definition, assumes that there is a user. WATCHOUT display software is often run in an unattended way, with no user standing by to click buttons or type passwords. Furthermore, you generally shouldn’t run WATCHOUT on networks that have direct Internet access, or any other kind of unrelated (and possibly harmful) traffic. Under those specific circumstances, you’re better off without UAC, since it tends to cause more problems than it solves.

To turn off the UAC:

- Inside the Control Panel window, click User Accounts.
- Click Change User Account Control Settings.
- Drag the slider to Never Notify.
- Click OK.

HARDWARE SYNCHRONIZATION

While WATCHOUT's software-based synchronization across multiple display computers is generally sufficient, there are some cases when frame-accurate synchronization of display refresh cycles is required. An example is when using multiple display outputs or computers to drive a single LED wall. Since there are no edge-blend areas or display edges to cover up any minor discrepancies in this case, even minute differences in synchronization are readily apparent.

To eliminate tearing between the outputs of multiple display servers, all outputs must be locked to a common synchronization source. This can be accomplished by using workstation graphics cards in conjunction with synchronization cards. SDI outputs can be locked to external synchronization sources using the functionality of SDI-enabled Dataton media servers, together with the appropriate setting in WATCHOUT.

Examples of hardware-assisted synchronization solutions include:

- NVIDIA Quadro G-Sync II, when used in conjunction with select NVIDIA Quadro graphics cards.
- ATI FirePro S400 Synchronization Module, when used in conjunction with select AMD FirePro graphics cards.
- WATCHPAX 60 (model C) with synchronized SDI outputs.

NOTE: When using AMD graphics, you need the synchronization module to accomplish frame accurate synchronization even within a single graphics card. This is generally not the case when used with NVIDIA graphics.

For more details on hardware synchronization, see ["Use as Synchronization Chain Source"](#).

GENERAL PERFORMANCE

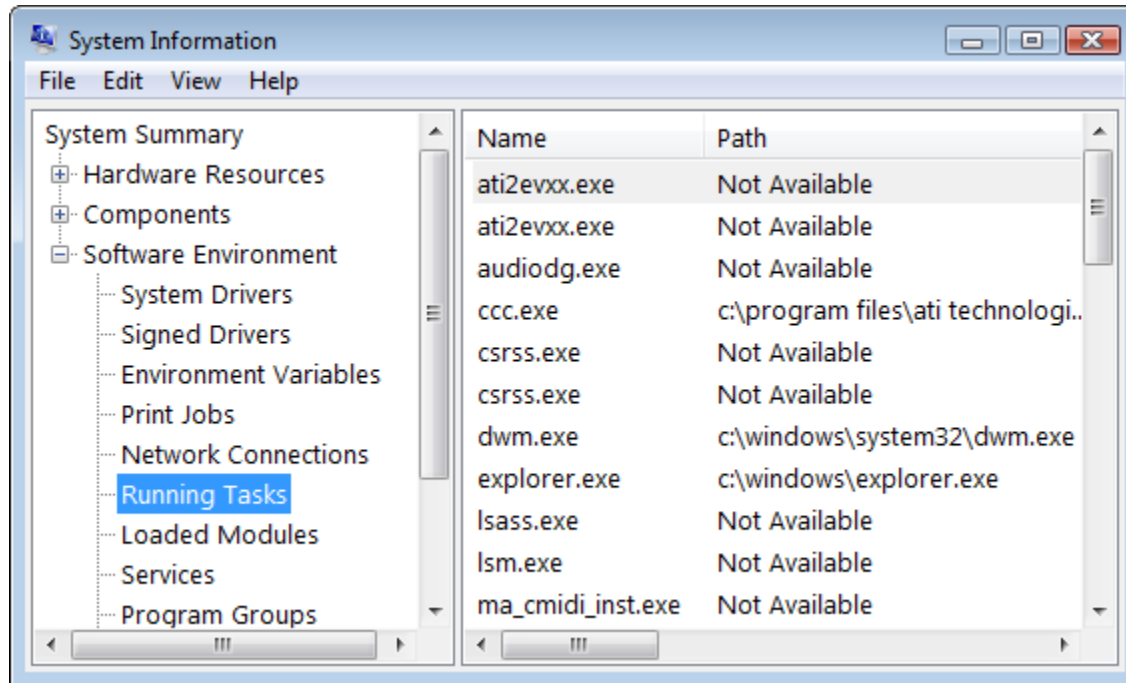
The performance of a PC is often degraded by numerous small programs and services running in the background. Such programs consume considerable system resources, and may serve no purpose on a WATCHOUT display computer. You can enhance performance by identifying and removing, or disabling, such programs.

IDENTIFYING BACKGROUND PROGRAMS

To identify any unwanted background applications or services:

- Close all open windows.
- Under Windows 10; open the Control Panel and click "Administrative Tools" then double-click "System Information."
- Under Windows 7; click Start, type "System Information" and press Enter.
- Select "Software Environment, Running Tasks" in the list to the left (see illustration below).

The list to the right displays all currently running programs. Look specifically for tasks whose path is anything but “c:\windows\system...”. To see which programs are started automatically, choose “Software Environment, Startup Programs” in the list to the left.



HINT: The names listed in the Running Tasks and Startup Programs lists are often cryptic, and may be hard to associate with a particular program. In this case, looking at the path leading to the program’s file can provide a valuable hint. In particular, if the program is installed under “c:\Program Files\...”, you should be able to learn more by looking inside its installation folder.

REMOVING BACKGROUND PROGRAMS

Once you have identified any undesired background programs, you should either remove or disable them. If you know you won’t need a background program, remove it from the computer.

To remove a program, open the “Programs and Features” control panel, choose the program, and click “Uninstall”. Follow the subsequent instructions on how to remove or uninstall the program.

If you’re uncertain about removing the program, or if the program doesn’t appear in the “Programs and Features” control panel, you may choose to disable it instead. This can sometimes be done with configuration options in the program itself. Other programs don’t offer this capability, forcing you to either uninstall the program or disable it using other means.

Background programs often identify themselves by an icon on the taskbar, in the lower right corner of the screen. Right-click such an icon to open its menu. Sometimes the menu includes a “Disable”, “Close” or “Do Not Load” item. It may include “Open”, “Configure” or “Properties” items that allow you to set various options, including the automatic loading of the program at start-up. After disabling a program in this way, restart the computer to verify that the program is no longer active. Some programs only allow you to disable them temporarily, and will then load again the next time you start the computer.

Another way to locate and disable startup programs is by using the Windows Task Manager (Windows 10):

- Press Ctrl-Alt-Delete.
- Select “Task Manager”.
- Click the “Startup” tab.

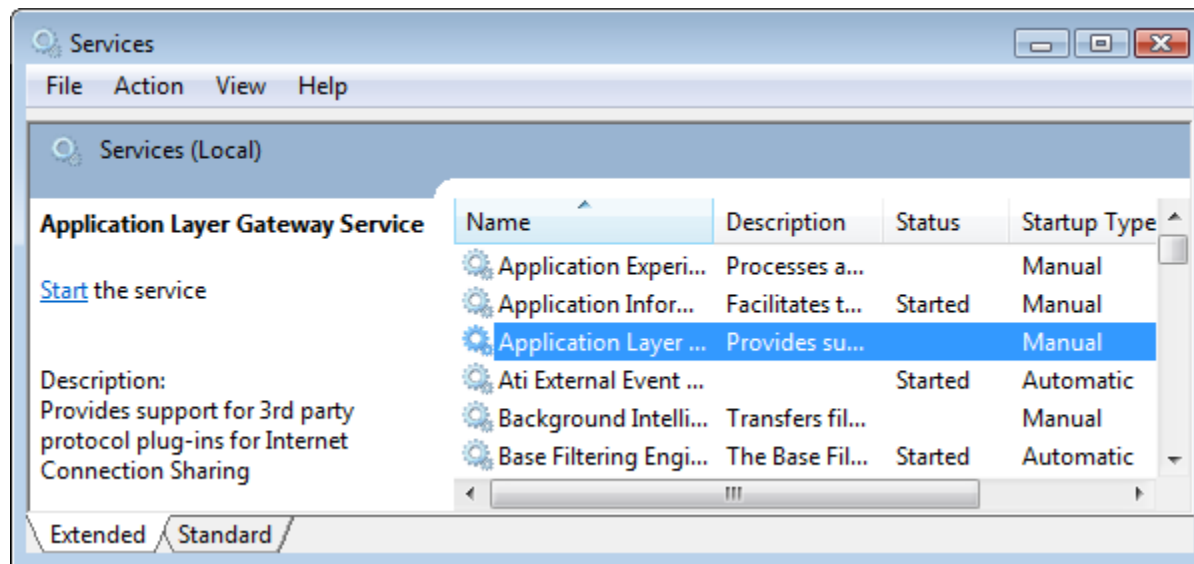
- Locate undesired startup items and disable those by right-clicking and choosing “Disable”.

NOTE: Under Windows 7, the “msconfig” utility can perform similar functions.

SYSTEM SERVICES

Most background activities are not run as regular programs, but as System Services. To view system services:

- Right-click Start and click Control Panel > Administrative Tools.
- Double-click Services.
- Sort by “Status” to see all Running services together.



This list provides detailed information on each service. Select a service in the list for a description. There are numerous services, many of which are not needed on a computer dedicated to running WATCHOUT display software. Not all services are running – only those listed as “Started”. To disable a service, double-click it and set its “Startup Type” to Disabled.

For more information on what the various services do, and which ones you may disable (or set to “Manual”), visit one of the many web sites dedicated to tweaking Windows for better performance.

DISABLING AUTOMATIC UPDATES

While keeping your computer up-to-date with the latest system software version is generally a good idea, it may not apply to your display computers. Windows 10 will automatically download and install new system software in the background (assuming it has Internet access), which may interfere with show playback, display on-screen prompts, or similar. In many versions of Windows 10, this feature can not be easily disabled.

One way to avoid automatic updates is to make sure your WATCHOUT system doesn’t have Internet access. That’s often a good idea anyway to make sure nothing from outside interferes with your presentation. When that’s not possible, you can prevent automatic updates by disabling the Windows System Service responsible for this functionality:

- Proceed as described above under “System Services”.
- Locate the service named “Windows Update”.
- Right-click the service and chose Properties.
- Set “Startup Type” to Disabled.

Keep in mind that once disabled, your computer will no longer receive any updates. You may want to occasionally reset this setting to its default value and re-start your computer with Internet access to allow it to update if you're concerned with keeping the operating system up-to-date.

See here for more details on this topic:

<http://www.thewindowsclub.com/turn-off-windows-update-in-windows-10>

USING A SOLID STATE DRIVE

Whenever possible, choose an SSD, or other high-performance solid-state storage solution, for storing your WATCHOUT show data on each display computer. This avoids the problem of disk fragmentation, and provides much faster access to the media files. This is particularly important when driving multiple displays, or when playing image sequences or other lossless video formats.

OTHER ISSUES

This section lists some other issues known to cause problems from time to time. The WATCHOUT forum also contains some details on configuring WATCHOUT as well as general troubleshooting:

<http://forum.dataton.com/forum/2-watchout-forum/>

VIDEO PLAYBACK

Some DVD player programs – often included with graphics cards or DVD drives – may interfere with the ability of WATCHOUT to play back video content (including some related audio formats). To solve this problem, uninstall the DVD player application and all its components.

SOUND PLAYBACK

You need to install the proper software driver for your sound interface. The driver received with your computer, operating system or sound card is usually sufficient, but you should check the sound card manufacturer's web site to make sure you have the latest driver version installed – particularly if you're experiencing problems relating to sound playback.

When installing or updating sound card driver software, avoid installing other associated software. Additional software is often provided that will run as background applications. You may have to check for and remove such software after installing/upgrading sound card drivers

DEFECT DRIVERS

Performance and reliability problems may be caused by defect software drivers. Such problems can be hard to diagnose. More often than not, it's easier to start from scratch by re-formatting the hard disk and re-installing Windows and required device drivers only.

CLONING A COMPUTER

A WATCHOUT system typically uses multiple, identical playback computers. Performing the above trouble-shooting and tuning operations on multiple computers is tedious. An alternative is to get one display computer working properly, and then clone its hard disk to the others. This, of course, assumes that they all have the same hardware configuration.

A fast and convenient method for cloning the hard disk is to use True Image, from Acronis:

<http://www.acronis.com/>

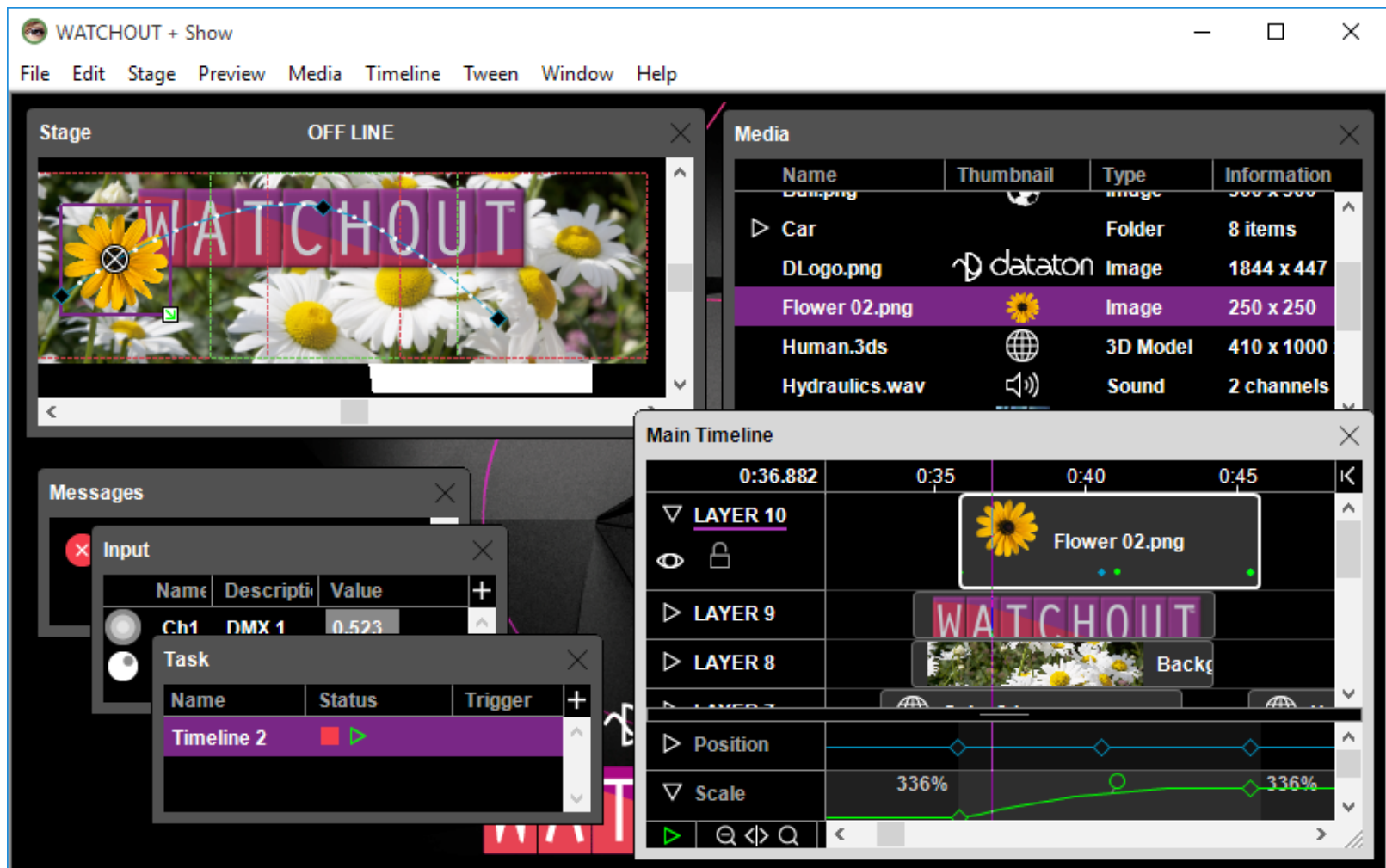
Using this program, you can clone a hard disk to another computer either across a network or using a CD-ROM.

IMPORTANT: While the cloning procedure copies everything on the hard drive, it does not automatically perform any firmware (BIOS) or similar upgrade. You may need to perform any motherboard upgrades manually after cloning the disk.

3. WINDOWS

All WATCHOUT windows reside inside a desktop window, with a menu bar running along its top. You can resize the desktop window by dragging any of its outer borders or corners. Minimize or maximize it using the buttons in the upper right corner. Clicking the close box is equivalent to choosing Quit on the File menu.

Move a WATCHOUT window by dragging its title bar. Resize a window by dragging any of its corners or outer borders.



Clockwise from top left. The Stage window shows the display areas and a preview of the presentation. The Media window lists all media used in your presentation. The Main Timeline window shows the layers, cues and tween tracks. Other windows are described later in this chapter.

Opening Windows

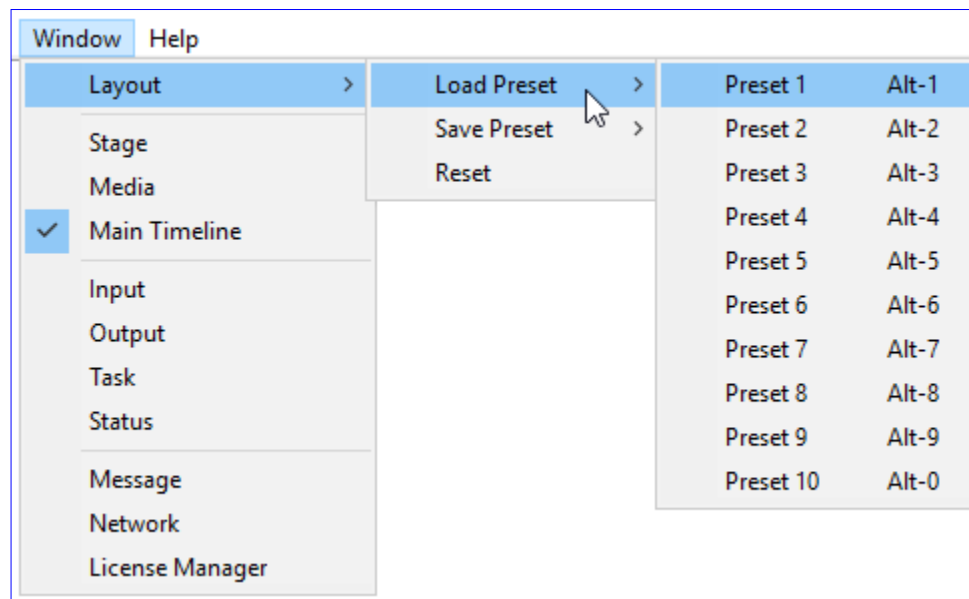
Many windows are opened through the Window menu. Hence, if you accidentally close a window, look here to re-open it. To open an Auxiliary Timeline window, double-click its task in the Task window.

Window Layouts

Window layouts can be saved and loaded in the Layout submenu of the Window menu. To save a layout, just select a preset under the "Save Preset" submenu, or use the keyboard shortcut Ctrl+Alt+<n>, where <n> is the number of the preset.

To load a layout, select the corresponding preset under the "Load Preset" submenu, or hit Alt+<n>.

The layout can also be reset to the default layout (as seen when creating a new show), by selecting “Reset” in the Layout menu.



Loading a preset window layout:

Popup Menu

A right-click contextual popup menu has been added to most of the windows in WATCHOUT. In general, the contents of the popup menu reflect the Edit menu. The contents of the menu may change dynamically, however, depending on where you click, and what is currently selected.

More information on what commands can be found in which context, see the sections about each window.

STAGE WINDOW

The Stage window is used to add and arrange the display areas used in the presentation. It also provides a preview of your presentation as you move along the timeline, and lets you position media on stage. The title bar shows the ON/OFF LINE status. While on line, the production software controls the display computers. The following gestures can be used in the Stage window:

- Control-click to zoom in (changing the preview scale).
- Control-drag to zoom in to the specified area.
- Control-Shift-click to zoom out.
- Control-Alt-drag to pan the window (scrolling its content).

HINT: The commands on the Stage and Preview menus govern the behavior of the Stage window and its preview functionality.

ADDING DISPLAYS AND PROJECTORS

To add a display device to the Stage window, choose one of the Add... commands on the Stage menu. See “[Add 2D Display/Projector](#)” and following sections in the [Commands](#) chapter for details.

You can also add a display device using the right-click popup-menu. To do so, make sure the Stage window is selected, then right-click anywhere in the Stage (not on a display). The popup-menu gives you the same options as the Stage menu. The display device is then created at the position you right-clicked.

SETTING THE STAGE SCALE

Set the viewing scale for displays and images using the “**Scale**” command on the Stage menu. Alternatively, you can interactively set the scale by clicking in the Stage window while holding down the Control key. This displays a magnifying glass that allows you to zoom in at the clicked location. Drag with the magnifying glass to zoom to a specific area. Control-Shift-Click to zoom out.

ADDING MEDIA

Add media to your presentation by dragging it to the desired location in the Stage window. A corresponding cue will be added to the timeline window at the currently selected layer and time position. Alternatively, drag the media to a timeline. To remove the media from the Stage window, remove the corresponding cue from the timeline.

POSITIONING MEDIA ON STAGE

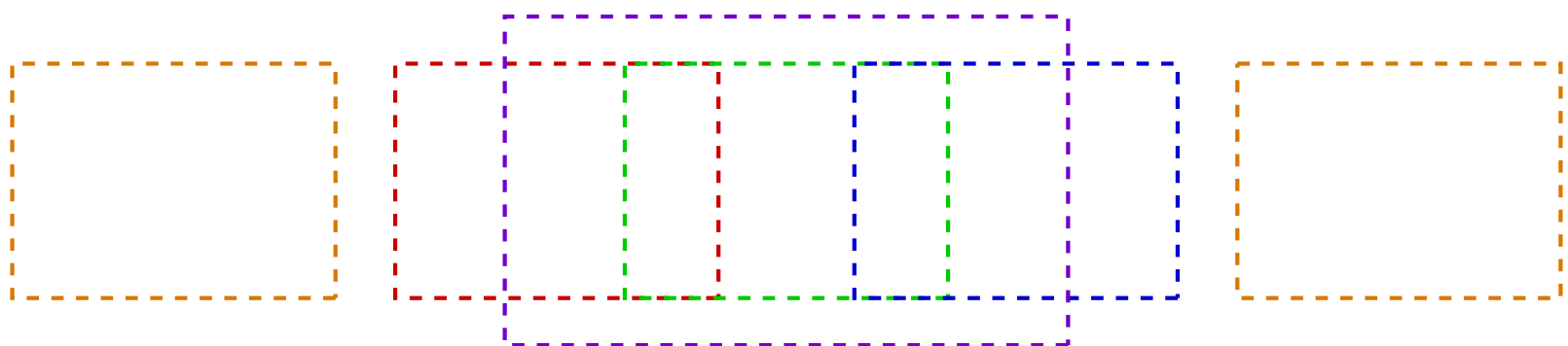
You can position media on stage by dragging its preview in the Stage window. To do so, first select the timeline window, then drag the image in the Stage window. Press the Shift key to constrain the move. Double-click a Cue or an individual Position tween point to edit the position numerically (see “**Initial Stage Position**” and “**Position**”).

IMPORTANT: To change a position tween point, first click the tween point to go to its exact time position, then move the image. If you don’t go to the tween point first, a new tween point may be added instead.

USING STAGE TIERS FOR COMPLEX DISPLAY ARRANGEMENTS

The straightforward method of adding displays to the stage, as described on the previous page, works fine in most cases. However, more complex display arrangements call for a different approach.

Assume, for example, that you want to make a display layout consisting of a main area with three overlapping (edge blended) projectors, plus one detached projector on either side, and finally a high-resolution plasma display showing the center part of the screen. This plasma display could be placed outside the theater, as a preview display. The detached projection screens on either side of the center area will generally be used as part of the main show, but will occasionally show different images to augment the center screen.



Desired display layout: Side displays (orange), main center area (red, green, blue), a larger, separate display (purple).

Merely adding all six displays to the stage will not work as desired for the following reasons:

- The large, separate display overlapping the three projectors in the center will cause WATCHOUT to attempt to edge blend all these four displays (overlapping displays automatically get an edge-blend gradient).

- Panning large images sideways on the main center area, or on the side screens, will make those images intrude on the adjacent display areas. That's fine while using all five projectors as a single, large canvas, but not when using the side displays independently.

You can overcome these problems by placing each set of displays on their own stage tier. Stage tiers act as independent, named levels on the stage. Edge blending occurs only among displays on the same tier. Furthermore, timeline layers can be associated with specific tiers only, preventing their images from spilling onto displays on other tiers.



Top: The tier named "Separate", with its single high-resolution display. Middle: The tier "Sides". Bottom: The tier "Main" with the three overlapped projectors.

To create additional tiers, choose "Tier: Add" on the Stage menu. To add displays to a specific tier, first select that tier on the Tier sub-menu of the Stage menu. To associate a timeline or a layer with a stage tier, see ["Stage Tiers"](#).

ROTATING THE VIEW OF THE STAGE WINDOW

When working with 3D content, images positioned in 3D space, or rotated around their X or Y axes, it is sometimes hard to see where things are if you only view them from the front. For instance, if you want to make one image orbit another image along a horizontal plane, the motion path will look like a straight line when viewed from the front. Choose "Top" under ["View"](#) on the Stage menu to view the stage from the top.

Likewise, for vertical motion, the stage can be viewed from the left. By alternating between these three views, you can create elaborate three-dimensional motion paths.

HINT: To view stage content from an arbitrary angle, add a ["3D Mapping Projector"](#) and select its View tab. Position the projector as desired in the Stage window, and use it as a camera to visualize any part of the stage.

PREVIEWING WITHOUT PERSPECTIVE

The Stage window generally shows images in 3D space using the perspective set in Preferences. Deselect "Perspective" on the Preview menu to view and edit images using an ortographic (non-perspective) view.

POPUP MENU

The contents of the right-click menu in the Stage window depend on where you click in the stage area, and whether the Stage window is selected or not.

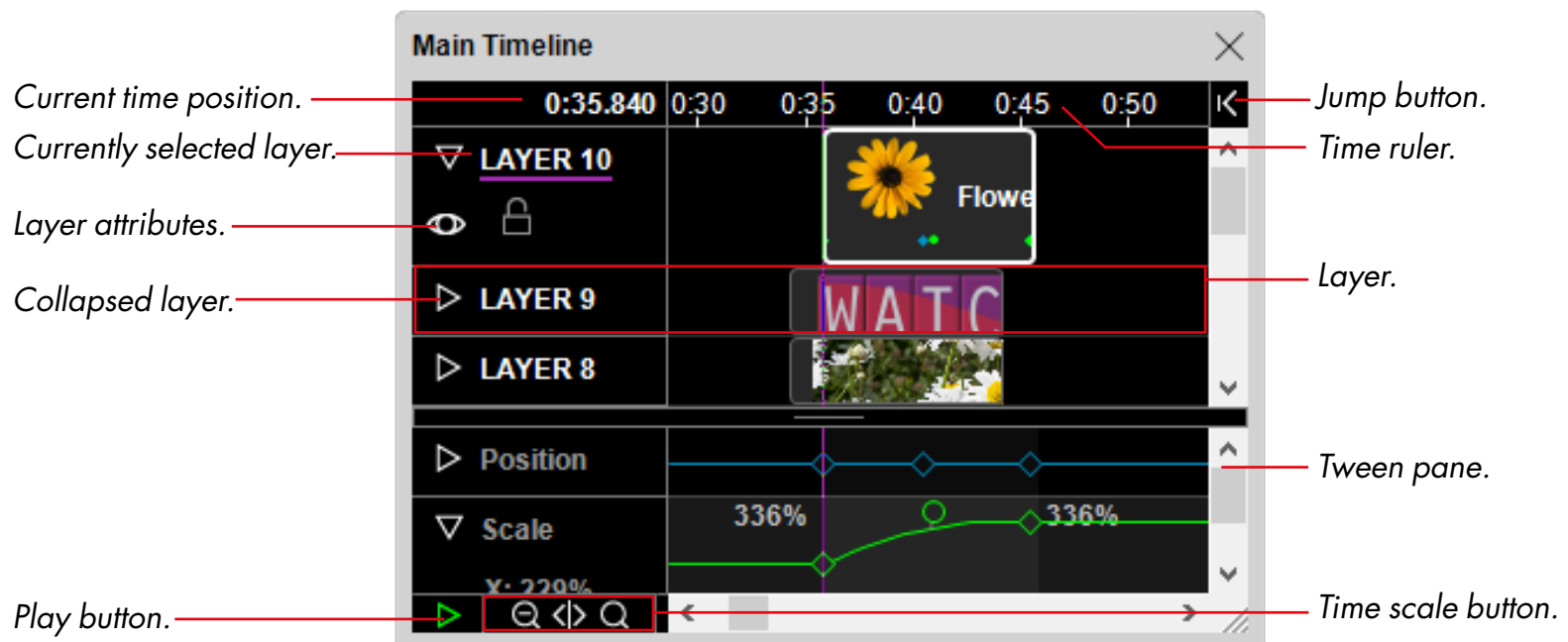
If the Stage window is selected you can right-click on display devices and modify them that way. For example, you can move them to a different Stage Tier. If you right-click where there is no display device, you essentially get the same command options as the Stage menu. If the Stage window is not selected, menu options are the same as right-clicking in the Timeline window.

STAGE LIST

The right-most part of the Stage window can be used to show a hierarchical list view, called stage list, showing all the display devices and which stage tier they are on. This list can be activated from the Stage menu, or from the right-click menu in the Stage window. The list view can be used, for example, to drag display devices between different stage tiers. You can also center the stage view on a specific display device by right-clicking on it and select "Go To".

MAIN TIMELINE WINDOW

The timeline window holds the cues that make up your presentation. Cues are arranged along layers, representing the back-to-front stacking order of images on stage. Increasing layer numbers move the image closer to the front.



TIME POSITION INDICATOR

The current time position is indicated by a vertical line through the Timeline window. Its color indicates the "Click Jumps to Time" mode.

SETTING THE CURRENT TIME POSITION

Click the time ruler to jump to a time position. To set the time numerically, choose "Timeline Settings" on the Timeline menu. To go to the beginning of a cue, or to a tween point, click it with "Click Jumps to Time" selected on the Timeline menu.

ADJUSTING THE TIME SCALE

Click the magnifying glass areas of the time scale button to zoom in and out by a fixed amount. Pressing the '+' and '-' keys on the numeric keypad has the same effect. Drag the center of the button to change the scale gradually.

THE JUMP BUTTON

Click the jump button, located to the right of the time ruler, to jump to the current time position if scrolled out of view, or to jump back to the previous start time. Pressing the asterisk key on the numeric keypad has the same effect.

STARTING AND STOPPING

Click the play button to start and stop playback. If the stage is online, this also controls playback on screen. Pressing the spacebar is equivalent to clicking the play button. Pressing 0 on the numeric keypad starts playback, Esc stops playback.

USING THE SCROLL WHEEL

By default, the scroll wheel on the mouse scrolls windows vertically. The scroll wheel can be combined with the following modifier keys in the timeline window:

- Shift: Scrolls the timeline horizontally.
- Control: Moves the current time position in 0.1 second increments.
- Control+Shift: Moves the current time position in 1 second increments.

ADDING CUES

To add a cue, drag media from your hard disk or the Media window to a timeline or the Stage window (see “Cues”).

SELECTING THE CURRENT LAYER

Click the name of a layer to make it the currently selected layer. When pasting an individual cue, it will be pasted at the current time and layer. Likewise, when adding media by dragging into the Stage window, a new cue will appear at the currently selected time and layer.

CHANGING LAYER HEIGHT

Click the collapse triangle to minimize and restore the layer height. Shift-click to collapse/expand all layers. An expanded layer shows details about its attributes, as well as tween point indicators along the bottom of cues on that layer.

ADDING AND REMOVING LAYERS

Layers can be added, removed and renamed using the corresponding commands on the Timeline menu (see “Adding and Removing Layers”).

DISABLING LAYER PREVIEW

To disable the layer preview in the Stage window, click the eye symbol to turn it off. Shift-click to disable/enable all layers. Disabling a layer allows you to manipulate images in the Stage window that otherwise would have been covered by other images. Disabling a layer’s preview has no effect on its playback on screen.

LOCKING A LAYER

To lock a layer, click the padlock symbol. Cues on locked layers can’t be selected or changed nor can you add new cues to a locked layer.

LAYER NAME AND ATTRIBUTES

Other layer attributes may also be indicated in the layer header area:

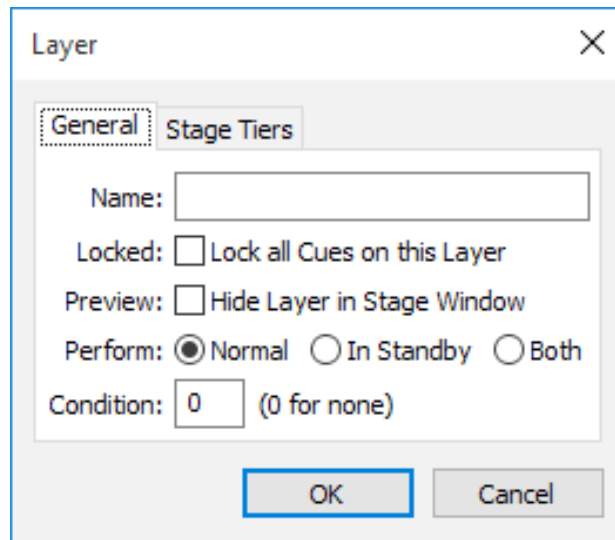
S: the layer applies only in Standby mode.

T: the layer is restricted to certain tiers only.

C: followed by a number: the layer is conditional, with the specified condition (see “Condition” below).

HINT: The layer name is shown in *italics* in the header area when any non-default attribute is applied. Expand the layer or open its “[Layer Settings](#)” to see what’s different.

To change the name or other attributes of a layer, first select the layer then choose “[Layer Settings](#)” on the Timeline menu, or simply double-click the layer name.



Lock all Cues on this Layer

This checkbox is equivalent to the padlock symbol in the layer’s header pane. Selecting it prevents cues on this layer from being changed or deleted.

Hide Layer in Stage Window

This checkbox is equivalent to the eye symbol in the layer’s header pane (see “[Disabling Layer Preview](#)”).

Perform Normal/In Standby/Both

By selecting “In Standby”, images and other media on this layer will perform only when in “[Standby](#)” mode. This allows you to keep, for example, a background image ready to be displayed at any time, thereby avoiding going to a black screen when activating the standby mode.

By selecting “Both”, cues on this layer will perform regardless of any Standby mode.

Normally, the Stage window doesn’t preview media controlled from such standby layers. You can override this using the “[Preview Standby Layers](#)” command on the Preview menu.

IMPORTANT: In order to be available to the Standby command at any time, media on standby layers consume processor and memory resources even while *not* in standby. Avoid using multiple standby layers at the same time or playing video or other heavy-duty content on standby layers. Generally, use only a single, large background image at a time.

Condition

Media associated with cues on a conditional layer will perform only when that condition is enabled in the Preferences dialog box (see “[Enable Layer Conditions](#)”). This can be used, for example, to keep multiple language versions of a show in the same file, allowing the correct language version to be activated by enabling its associated condition.

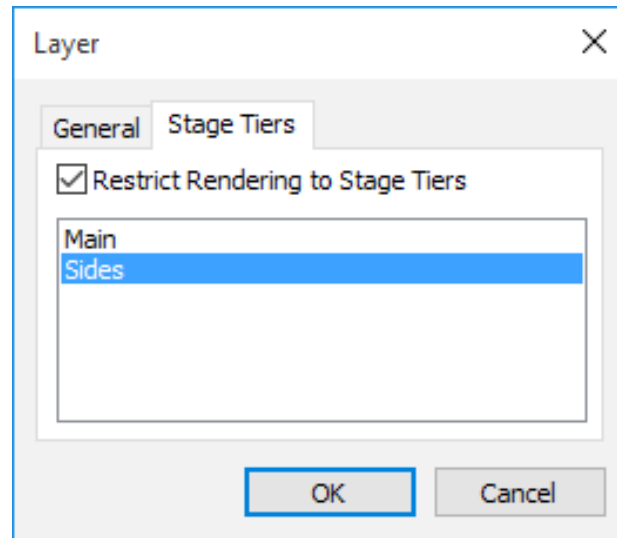
Normally, the Stage window previews media on enabled conditional layers only. You can override this using commands on the Preview menu.

NOTE: The name of a conditional or standby layer is shown in *italics* in the Timeline window.

Stage Tiers

Normally, cues appear on displays on all stage tiers. Select “Restrict Rendering” to restrict images presented by cues on this layer to a specific stage tier or set of tiers. Select the desired set of tiers in the list. See [“Using Stage Tiers for Complex Display Arrangements”](#) for more details.

NOTE: You must add tiers to the Stage window before you can assign layers to specific tiers (see [“Tier”](#)).



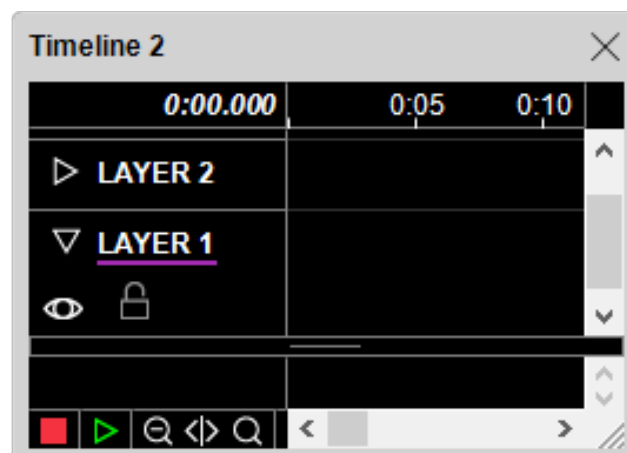
IMPORTANT: Restrictions applied here are in addition to any restrictions applied to the enclosing compositions and timeline. A Layer can only apply further restrictions. It can not remove any restrictions applied by enclosing compositions/timeline.

POPUP MENU

The right-click popup menu of the timeline window basically contains the same commands as the Timeline menu. However, if you right-click on a media cue you will also be able access the commands of the tween menu.

AUXILIARY TIMELINE WINDOW

The window associated with an auxiliary timeline is very similar to the Main Timeline window. To create an auxiliary timeline, choose “Add Auxiliary Timeline” from the window menu of the Task window (see [“Task Window”](#)). Open its window by double-clicking its name in the Task window.

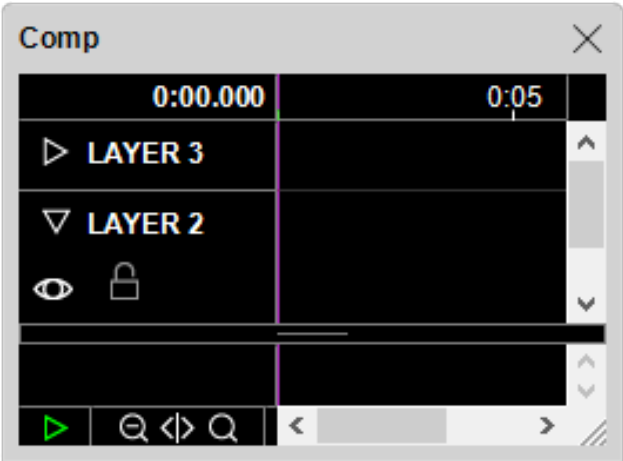


Name the auxiliary timeline by choosing “Timeline Settings” on the Timeline menu while the auxiliary timeline’s window is active.

An auxiliary timeline can be stopped – indicated by a red Stop button in its lower left corner as well as in the Task window. When stopped, it doesn’t contribute to the stage. For more details, see “Auxiliary Timeline”.

COMPOSITION WINDOW

The window associated with a composition resembles the Main Timeline window in the way it is operated. However, its purpose is quite different. Unlike the main timeline and auxiliary timelines, its output doesn’t appear directly on stage. Instead, you use the composition from another timeline similar to playing a video clip. See Compositions for details.

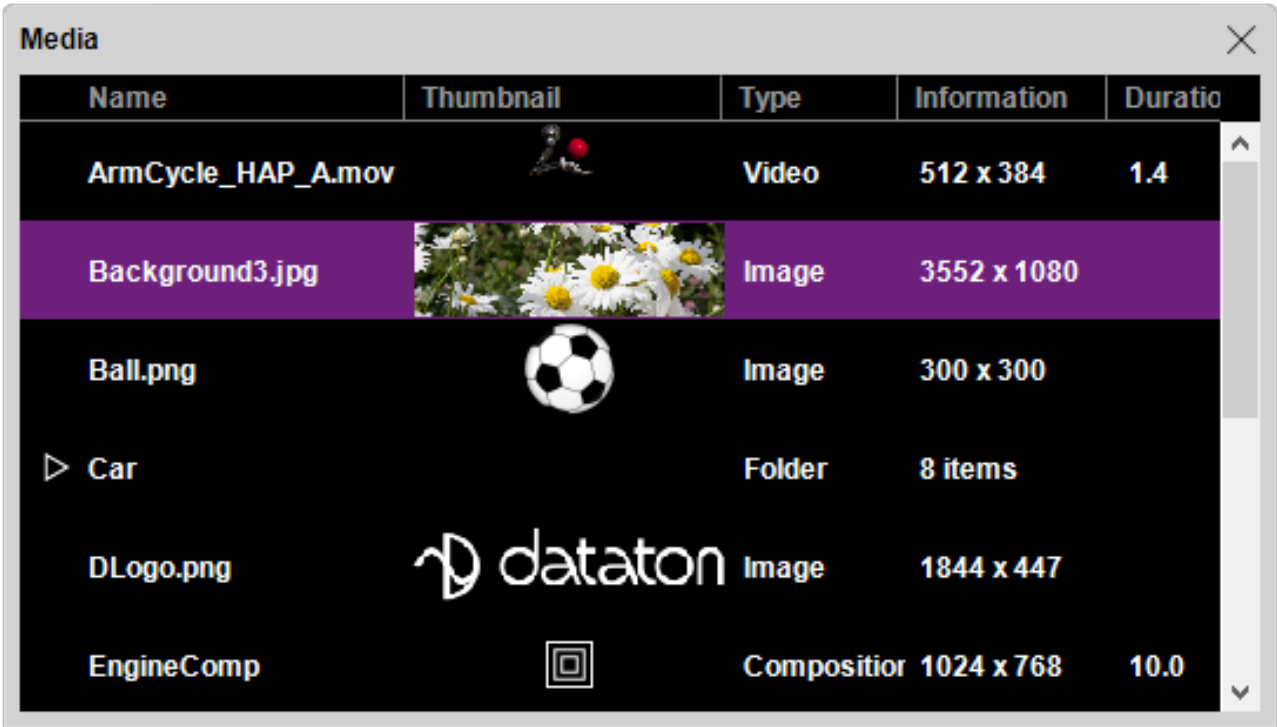


Create a composition by choosing “Add Composition” on the Media menu. A new composition item appears in the Media window. To open the timeline window of a composition, double-click its name in the Media window. Use the “Timeline Settings” command on the Timeline menu to change the name or other properties of a composition (such as its reference frame).

NOTE: When opening a composition, its preview will temporarily replace the normal content of the Stage window. This doesn’t affect the image shown by any display computers. Close the composition to restore the Stage window.

MEDIA WINDOW

The Media window lists all media items that have been added to the presentation. It provides a thumbnail preview of each item, along with a description of its name, type, location, size and other information, as appropriate.



- Double-click Name to edit the media specification.
- Double-click a Composition's name to open its timeline.
- Double-click a thumbnail to open media file in its associated application.
- Click the triangle next to a folder's name to reveal its content.

ADDING MEDIA

Add new media by dragging files from your hard disk into the Media window, or by choosing "Add Media File..." on the Media menu. Files dragged directly into the Timeline or Stage windows are automatically added to the Media window as well. Each media file used in your presentation will only appear once in the Media window, regardless of how many times it is used.

REMOVING MEDIA

Remove individual media items by selecting them and choosing "Clear" on the Edit menu. Remove all unused media items from the Media window by first choosing "Select Unused" on the Media menu. It is not possible to remove media that's currently in use in the presentation. Removing media list items in this way does not affect the files stored on your computer.

HINT: Use the Find command in the Timeline window to track down media references by the name of the media item or any other part of its file path.

LOCATION

Indicates the location of a media file. If the file is located in or under the folder in which the presentation itself is saved, the path to the file will be relative to this folder. Otherwise, it will be an absolute path, beginning with a '/'-character.

IMPORTANT: If possible, store media files in a sub-folder of the folder containing the presentation file, since this allows the use of relative path names. Doing so allows you to move the entire presentation to another folder, disk or computer intact. Using absolute path names may cause problems if the specified location is not available after moving the presentation.

HINT: If you change your mind concerning file locations, you may move the files to a more appropriate location (for example, to a subfolder of the folder containing the show file), and then use the **Find/Replace** command to update the locations in the Media window accordingly.

CHANGING THE FILE ASSOCIATION

You can change the file associated with a particular media list item by double-clicking its name and choosing another file. This will affect all cues associated with this media list item. You can only replace a media file with another of the same type.

EDITING THE MEDIA FILE

To open a media file in its associated application, double-click its thumbnail. This provides convenient access to a media file in order to view or edit it.

NOTE: Your computer must have been set up properly in order to associate each file type with the appropriate application.

HINT: You can open the media file associated with a cue by Alt-double-clicking the cue on its timeline.

REFRESHING MEDIA INFORMATION

After editing media files, update the Media list in WATCHOUT by choosing **Refresh** on the Media menu.

GROUPING MEDIA ITEMS INTO FOLDERS

Media items can be arranged into groups. Chose “New Folder” on the Media menu to create a folder then drag the desired media items onto the folder. Double-click the folder’s name to change it. Click the triangle to show or hide the content of the folder.

NOTE: Folders in the Media window have no relation to folders on your computer’s hard disk. They are merely a way to organize items in the Media window. Creating or removing folders from the Media window will not create or remove any folders on your hard disk.

ADDING A MEDIA PROXY

In some cases, media files can not simply be dragged into the Media list. Instead, you can add a proxy item to the Media window using the “Add Proxy” command on the Media menu. Examples where this is the case include:

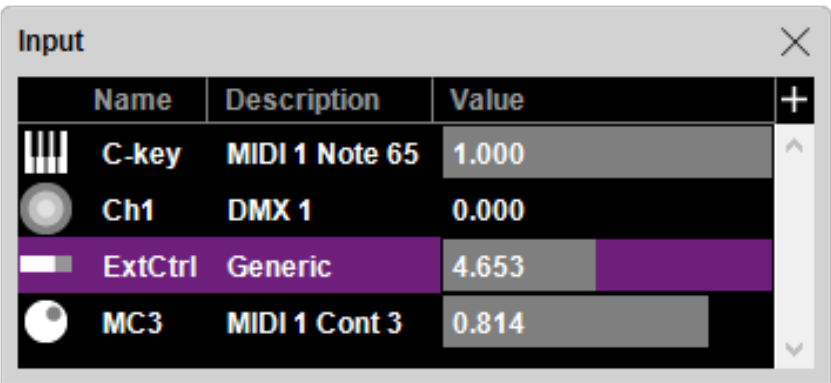
- A very large video that has been pre-split into multiple files (see “Pre-splitting a Large Video”).
- You want to incorporate stereoscopic video into your presentation, using separate left-eye/right-eye video files.
- The media may not yet be available, or may for other reasons need to be provided or replaced manually on the display computer at a later time.

POPUP MENU

The contents of the right-click menu in the Media window are basically the same as the Media menu. However, when you right-click on a composition you can also edit the properties of the composition, by selecting “Composition Settings...”, and duplicate it by selecting “Duplicate Composition”.

INPUT WINDOW

The Input Window lists external inputs available for use in expressions. Expressions are used to control tween track parameters and to trigger tasks.



- Click the plus-button in the top right corner to add more inputs.
- Drag horizontally in the Value field to simulate a change in value.

For details on the various kinds of inputs see “Inputs”. For more about expressions, see “Expression”.

OUTPUT WINDOW

The Output Window lists outputs allowing you to control external devices using cues.

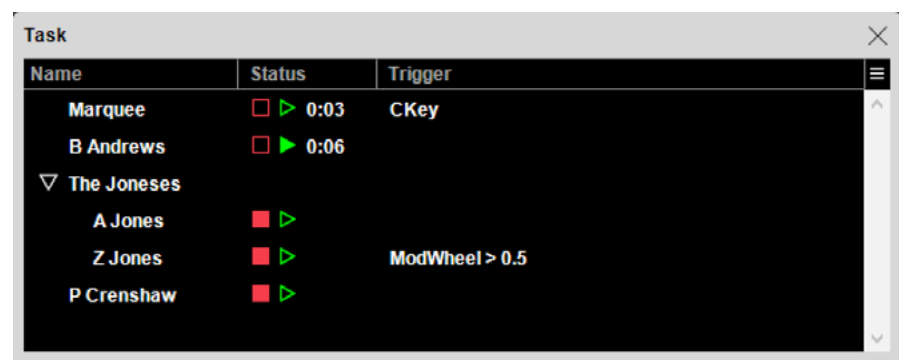


- Click the plus-button in the top right corner to add more outputs.
- Drag horizontally in the Value field a change the value manually.

To create a cue for an output, drag the output onto a timeline. See “Outputs” for more details.

TASK WINDOW

The Task window lists all the auxiliary timelines of your presentation, along with their status and triggering expression. Tasks (auxiliary timelines) may be organized in task folders.



- Tasks and task folders are added using the menu icon in the top right corner, or by using the right click menu.
- Double-click a task’s name to open its timeline.
- Double-click a task folder to change its name
- Drag tasks vertically in the list to re-arrange their front-to-back ordering on stage. Tasks may also be dragged in and out of task folders and re-arranged within the folders. Additionally, you can create nested folders by placing folders within folders.
- Click the menu icon, or right-click within the Task window, and select “Lock Task List” to lock the task list. This prevents tasks being re-arranged, deleted or added.

NOTE: Task folders have to be collapsed before further tasks, or folders, can be placed below them.

The status of each task is shown in the Status column. An auxiliary timeline can be in either of three states, as indicated by the two buttons.

The Status column indicates a timeline’s current run mode, letting you start or stop timelines manually.

-  A paused timeline.
-  A playing timeline.
-  A stopped timeline. While stopped, its cues have no effect on the stage.

The Expression column shows any expression that can be used to trigger a task. An auxiliary timeline can be started by either of the following events:

- Manually, for instance by clicking the Play symbol in the Task list.
- By external inputs, using its triggering expression (see “Expression”).
- By another timeline, using a Control cue set to target the auxiliary timeline (see “Control Cue”).

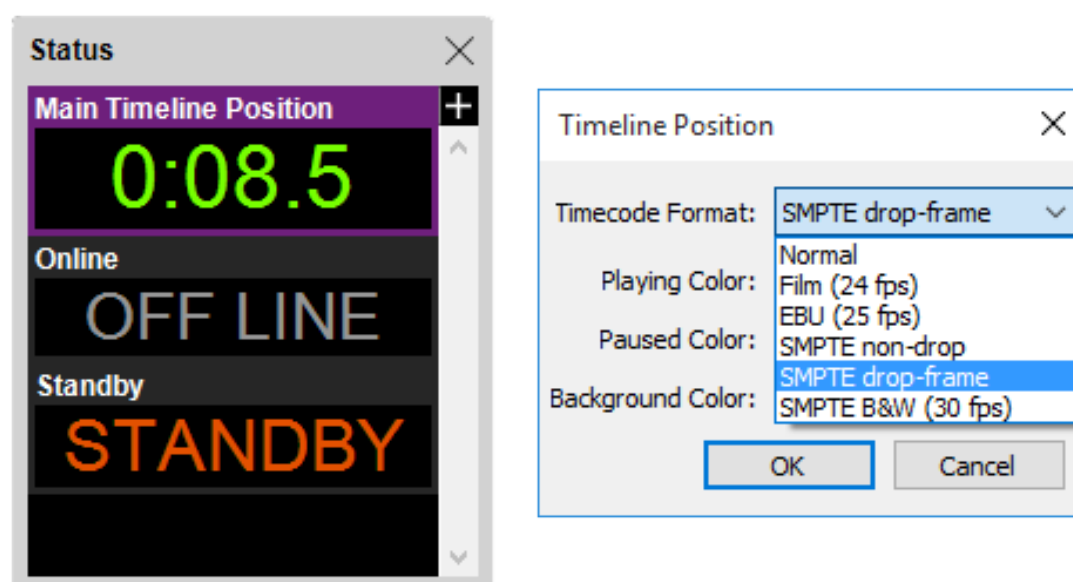
Changing the Stacking Order

An auxiliary timeline always performs in front of the main timeline on stage. When multiple auxiliary timelines are active at the same time, their front-to-back stacking order is typically controlled by their order in the Task window. To move an auxiliary timeline closer to the front, drag it towards the top of the Task window.

NOTE: This behavior can be overridden in the Timeline Settings dialog box of an auxiliary timeline. Here you can choose that it always starts out as frontmost, regardless of its position in the Task window (see “Auxiliary Timeline Settings”).

STATUS WINDOW

The status window provides a user-configurable set of status items that can be sized as desired.



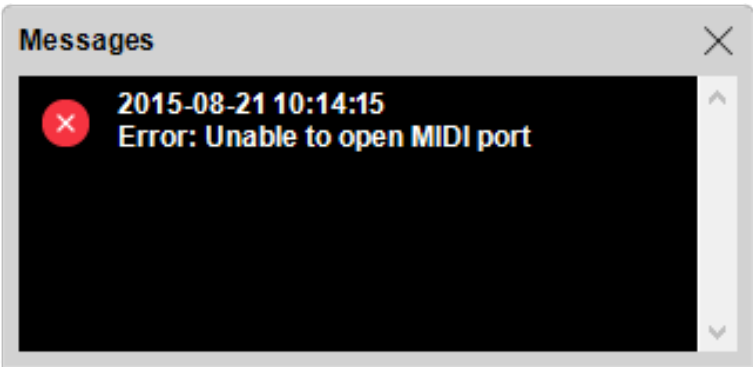
Status window, and the settings associated with the Main Timeline Position status item.

- To add more status items, click the plus-button in the top right corner.
- To configure a status item, double-click it in the Status window then change its settings (such as color and other properties).
- To remove a status item, select it with the mouse then choose “Clear” on the Edit menu.

HINT: The Main Timeline Position status item allows you to set the format in which the time position is displayed, including various EBU or SMPTE timecode formats, as shown above.

MESSAGE WINDOW

The Message window lists the messages sent to you by WATCHOUT. Such messages may originate from the production software or from the display computers. Some messages are merely informative while others indicate errors requiring your attention.



NOTE: The Message window appears automatically when a message is posted. To avoid this, move the window to the side instead of closing it.

Removing Messages

To remove messages, select them (either by Shift-clicking or by choosing "Select All" on the Edit menu) then choose "Clear" on the Edit menu.

NETWORK WINDOW

This window lists all WATCHOUT display computers found on the local network. It's a good place to start if you're having trouble connecting to display computers. It shows the IP number as well as any name of each display computer. If you're using Dataton WATCHPAX media servers, its serial number will be shown here too.

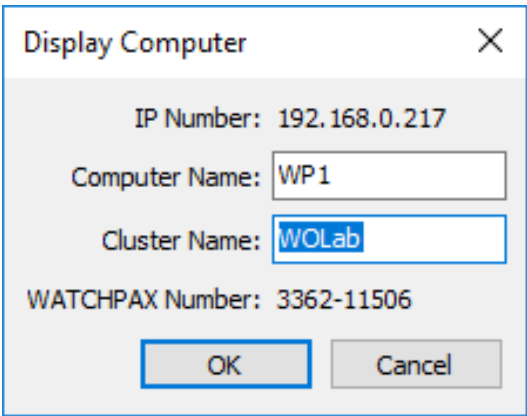
Display Computers Found on Local Network			
IP Number	Serial Number	Computer Name	Cluster Name
192.168.10.253	3363-10301	WP1	WOLab
192.168.10.200	3362-10780	WP2	WOLab
192.168.10.238			WOLab

ADDRESSING BY IP NUMBER OR BY NAME

Display computers may be addressed either by name or by IP number (see "Computer"). In most cases, addressing by name is preferable, since it allows IP numbers to be dynamically assigned, thereby reducing the need for manual configuration.

NOTE: Normally you should always use name addressing for any Dataton media servers in your system. It is possible, using a script command, to assign a fixed IP address to Dataton servers, but in most cases this is not needed.

To change the name of a display computer, double-click it in the list and enter the desired name. This name is stored in the display computer, and can subsequently be used when referring to that computer.



Display Computer

IP Number: 192.168.0.217

Computer Name: WP1

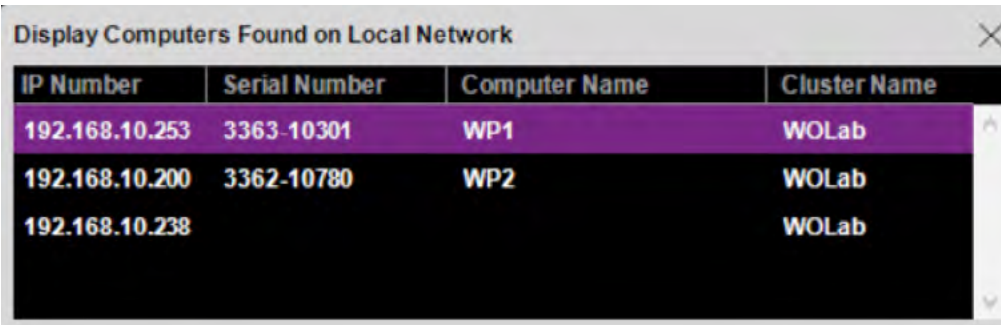
Cluster Name: WOLab

WATCHPAX Number: 3362-11506

OK Cancel

Assigning computer and cluster names.

If you have multiple display clusters on the same network, you may also want to assign cluster names. By using cluster names, you may reuse computer names within each cluster. This is advantageous when managing a network with several identical clusters. A show can then be transferred to each cluster merely by changing the cluster name in the Preferences dialog box, rather than changing the IP address in each display used in the show.

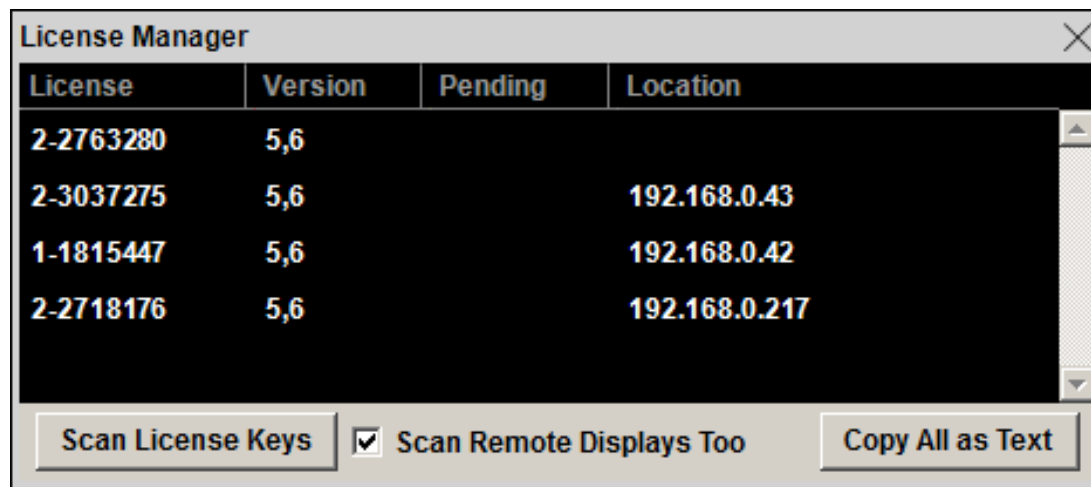


IP Number	Serial Number	Computer Name	Cluster Name
192.168.10.253	3363-10301	WP1	WOLab
192.168.10.200	3362-10780	WP2	WOLab
192.168.10.238			WOLab

Computer and cluster name assigned to Dataton media server with serial number 3363-10301.

LICENSE MANAGER WINDOW

This window lists the WATCHOUT software licenses found on your system, indicating the individual license number and the WATCHOUT versions for which it is valid.



Four WATCHOUT licenses, all valid for versions 5 and 6. The first one was connected locally, while the other ones were connected to display computers with IP addresses as indicated.

By default, only license keys connected to the production computer are shown. To add licenses to this list, connect them to the production computer, then click "Scan License Keys". Licenses connected to any remote display computers, that have one or more displays in the Stage window assigned to them, may also be included by selecting "Scan Remote Displays Too" before clicking "Scan License Keys". This is particularly useful if you're using Dataton media servers (where the license key can not be removed) or in a fixed installation scenario where computers may be hard to access.

The remote display computers don't have to be online for this to work. They just need to be connected to the network and have the display software running on them. Licenses seen on your system will remain in this list until explicitly removed. To remove licenses, select them in the list and choose "Clear" on the Edit menu, or on the right-click popup menu.

UPGRADING LICENSES

When a new, major version of WATCHOUT is released, licenses must be upgraded in order to be eligible for use with that version. Upgrading your licenses is a multi-step procedure:

- Make sure all relevant licenses are shown in the License Manager window. If you're unsure, first select all licenses and remove them by choosing "Clear" on the Edit menu, then re-scan the available licenses.
- Click "Copy All as Text" to obtain information about all the licenses.
- Send that information in an email, along with your order for the upgrade.
- Once your order has been processed, copy all text in the email containing the upgrade, then paste it into the License Manager window. New licenses appear in the "Pending" column.
- Click "Scan License Keys" to transfer the pending updates to all matching license keys or Dataton media servers seen on your system.
- Version 5 to 6 upgrade: <https://www.dataton.com/watchout-version-5-to-6-upgrade>

Please contact your Dataton reseller for more details on how to upgrade your system.

4. COMMANDS

This chapter describes the production software menus and their commands, as well as the dialog boxes that appear as the result of some commands

FILE MENU

The File menu provides commands related to the entire presentation, such as opening old presentations or creating new ones.

NEW

Creates a new presentation, specifying the name and location of the WATCHOUT show. It is generally a good idea to create a new folder for each new show. Store all media related to that show in subfolders of this folder. By keeping the show file and any folders containing its media together like this, WATCHOUT will use relative paths to all media files, making it easier to move the show to another disk, backing it up, etc.

HINT: To re-use objects such as display or projector arrangements, tasks and cues, simply copy them from the old presentation then paste them in the new one.

OPEN

Opens an existing WATCHOUT presentation. This command also verifies that all media files required by the show are still available. Messages appear in the Message window if anything is amiss.

OPEN RECENT

Provides a list of recently opened presentations. Choosing an item from the sub-menu opens the selected presentation.

SAVE

Saves the presentation that is currently open.

SAVE A COPY AS

Saves a copy of the presentation that is currently open. This is useful for saving backup copies without changing the name of the current presentation.

NOTE: Opening and using such a copy without changing it back to its original name will cause a new set of media to be downloaded to all display computers under the new show name.

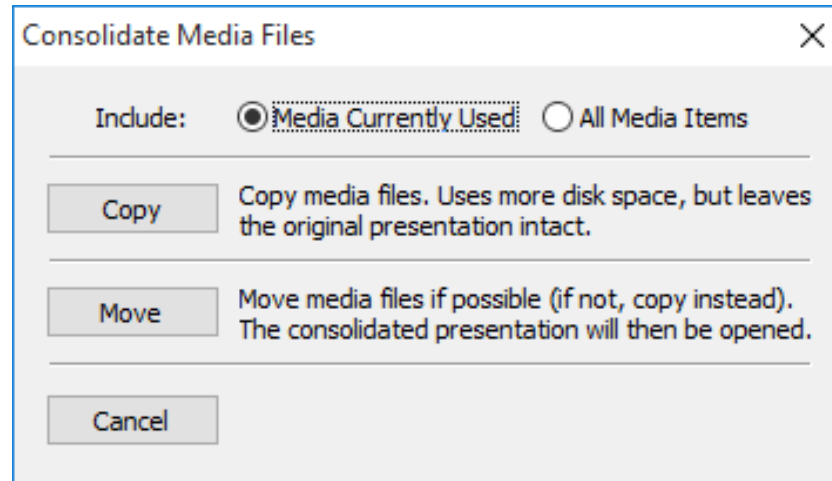
CONSOLIDATE TO

Moves or copies the entire presentation, including its media files, to a folder. You can use this command to consolidate all the relevant files into a folder on a removable drive, regardless of where those files are stored.

This command is also useful if you've been using media files stored on numerous servers or disks, or if you want to weed out unused media files intermixed with files actually used in the presentation.

In addition to collecting your media files, this command updates the access paths accordingly in the Media window, and stores this updated copy of the presentation file in the consolidated folder. When using Copy, the old presentation and its media files are not affected.

When you give this command, first choose an empty folder for your consolidated presentation. You are then presented with the dialog box shown below and can choose whether to copy or move the media files.



Include. Choose “Media Currently Used” to weed out unused items from the Media window, excluding those from the consolidation (the files will stay where they are). Choose “All Media Items” to include all media items and files listed in the Media window, regardless of whether they are actively used or not.

NOTE: Merely using a media item in a Composition does not count as being actively used, unless said composition is then also used from a timeline. Whenever in doubt, always choose “All Media Items” when consolidating a show.

Copy. Creates a new copy of your presentation, leaving the current media files and the presentation file as they are. This is the safest option, but may require more time and disk space, since it entails making new copies of the media files.

IMPORTANT: When choosing “Media Currently Used”, any unused media items (including compositions) are removed from the Media window in the consolidated version of the show. Unused media files are left in their old locations, and are not copied or moved.

Move. Instead of copying them, this moves all actively used media files residing on the same volume as the target folder. This is much faster and requires no additional disk space for files already located on the target volume. Media files residing on other disks, partitions or servers will be copied, however. The consolidated presentation is then opened automatically.

IMPORTANT: Since the Move option moves media files away from the locations specified in the original presentation, you will no longer be able to use the old presentation file. A new copy of the presentation file is created in the consolidated folder with the updated media file references.

AUTO SAVE

Activates/deactivates the auto save function. This can also be done in the Preferences dialog.

With this functionality activated, your show is saved automatically with a predetermined time interval. The interval may also be set in the Preferences dialog. Auto-saved files are stored in a special folder, with the same name as your show file followed by a “_autosave” suffix.

If you accidentally quit WATCHOUT without saving or there is a system failure, there may be a newer version of the show file stored in the auto save folder. If that is the case, the next time you open that show file you will be prompted to choose whether you want to load the newer auto-saved file instead.

EXPORT BUNDLE FOR WATCHNET

Saves the entire show, including all its media and other details, to a “WATCHOUT Bundle” file (with file extension WOB). This file can subsequently be imported into WATCHNET for deployment onto clusters managed by a WATCHNET server.

NOTE: A WOB file can not be read back into WATCHOUT. It’s intended for use with WATCHNET only. If you want to archive a show, use the “[Consolidate To](#)” command instead.

EXPORT BUNDLE UPDATE

Creates a bundle update file, containing only the changes made to a show since a specific “WATCHOUT Bundle” file was exported – referred to as the base bundle for the update. The new bundle update file, with file extension WOBU, can then be imported to a WATCHNET server that already has the base-bundle file.

Since the bundle update file contains only the changes relative to its base bundle, it is generally much smaller, making it faster and easier to deploy to a WATCHNET server. When exporting a bundle update, you must select an existing WOB file containing an earlier version of the show you’re exporting. The new bundle update file has the same initial name as the WOB file upon which it is based, plus a time stamp acting as its version number.

IMPORTANT: A bundle update file can only be used by a WATCHNET server that already has the bundle file on which it is based. The update file only contains the differences between the old and new show versions and can not be used on its own.

EXPORT MOVIE

Exports the main timeline of your show as a QuickTime movie. The movie file can then be sent off for client approval, posted to a web site, or similar.

NOTE: Before choosing this command, set up the Stage window to define the scale and area to be exported. Only the displays currently visible in the Stage window will be exported. This can be used to export a smaller portion of a very large stage. Areas outside the displays that are currently visible in the Stage window will be cropped or blanked out in the resulting file. Also, if your show uses conditional layers, set the desired set of layer conditions in the Preferences box before exporting.

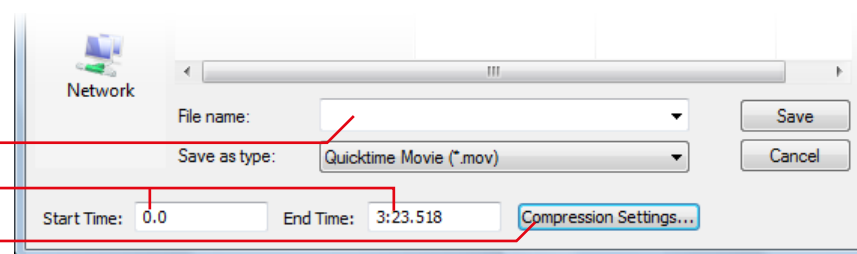
When you choose the “Export Movie” command, a Save dialog will be shown, allowing you to name the resulting movie file. This dialog box also allows you to limit which part of the timeline to export, and to control the compression being used. The formats available may vary depending on the version of Quicktime you have installed.

Navigate to the desired folder.

Name of the new movie.

Portion of timeline to save.

How to compress the movie.



NOTE: This command requires QuickTime installed on your production computer.

Exporting an Auxiliary timeline

To export an auxiliary timeline, first open and select its window, then choose “Export Movie” on the File menu.

EXPORT AUDIO

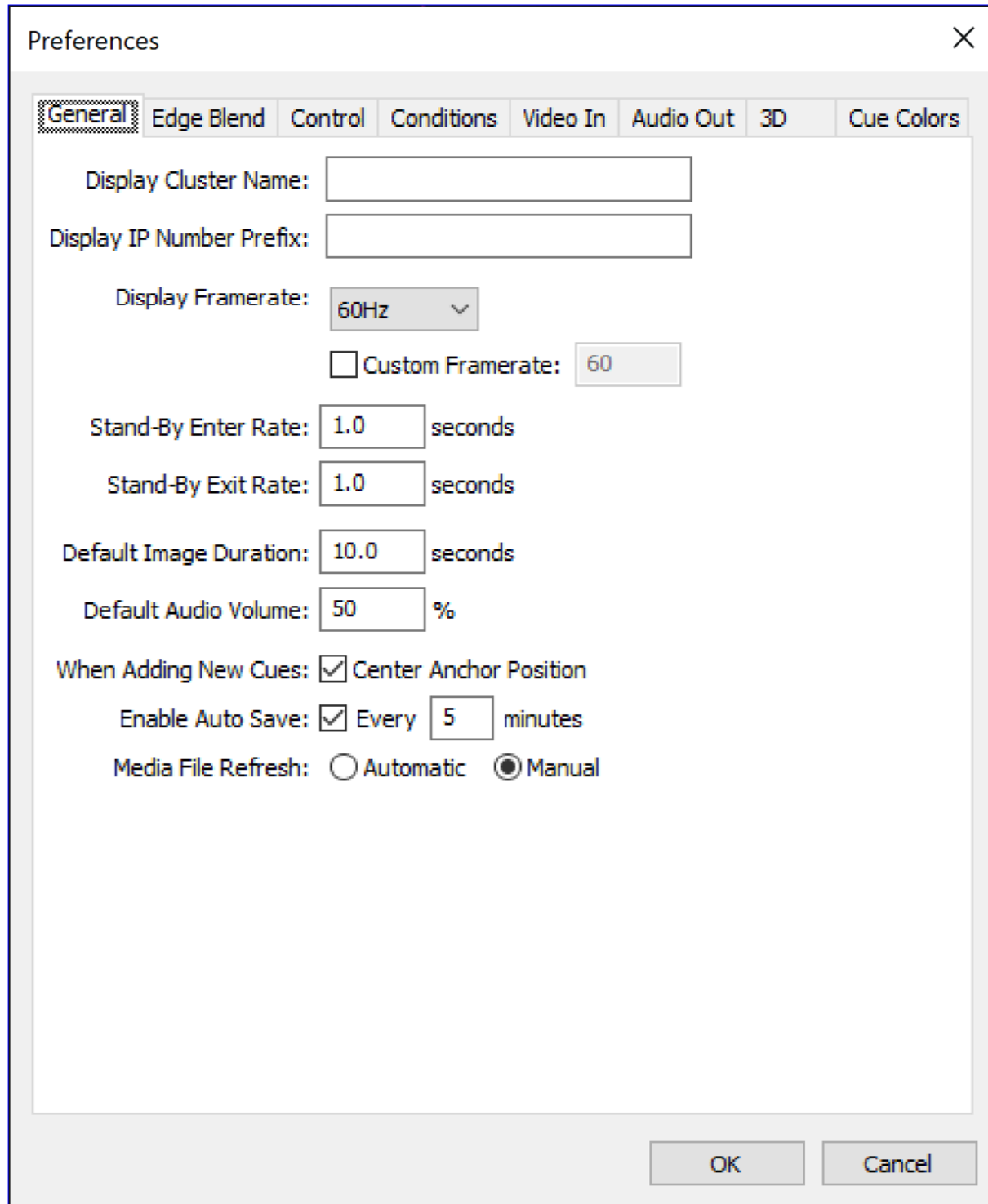
Exports a stereo mix-down of the audio from the main timeline of your show, as a WAVE-file.

QUIT

Quits WATCHOUT after optionally saving any changes.

PREFERENCES

Allows you to specify miscellaneous settings of the presentation.



NOTE: These settings are stored with the presentation, and do not apply to other shows made on the same production computer.

Display Cluster Name

Specifies the name of the display cluster. This is useful when you have multiple clusters on the same network, especially when several clusters have the same configuration of displays, and you're using computer names, rather than IP addresses, to specify display computers.

NOTE: A “display cluster” refers to a set of displays that work together to present a single show. Often, you have only a single cluster on your local network, in which case naming is not necessary. However, in some cases – particularly in fixed installations – you may have several independent display clusters on the same network, all updated from a single production computer, or using Dataton WATCHNET.

Display IP Number Prefix

When using fixed IP addresses for display computers, the IP addresses usually only differ in the last few digits (see illustration under “[Network](#)”). By entering the common initial part in this field, you then only have to enter the last few digits into the specifications dialog box of each individual display.

IMPORTANT: You must enter the period that separates the last two groups of digits here. The complete IP address is made by simply concatenating the contents of the “Display Address Prefix” field with the contents of the display’s Computer field.

Display Framerate

Specifies the frame-rate used by the display computers. This setting lets WATCHOUT optimize its behavior to match the frame-rate of any video being used in the presentation, as well as the display devices. Your display computers should use a matching refresh rate (see “[Display Properties](#)”).

Standby Rates

Specifies the fade out and fade in rates for the standby command (see “[Standby](#)”).

Default Image Duration

Display duration used for new image cues added to timelines. You change the duration of cues by dragging either end of the cue.

Default Audio Volume

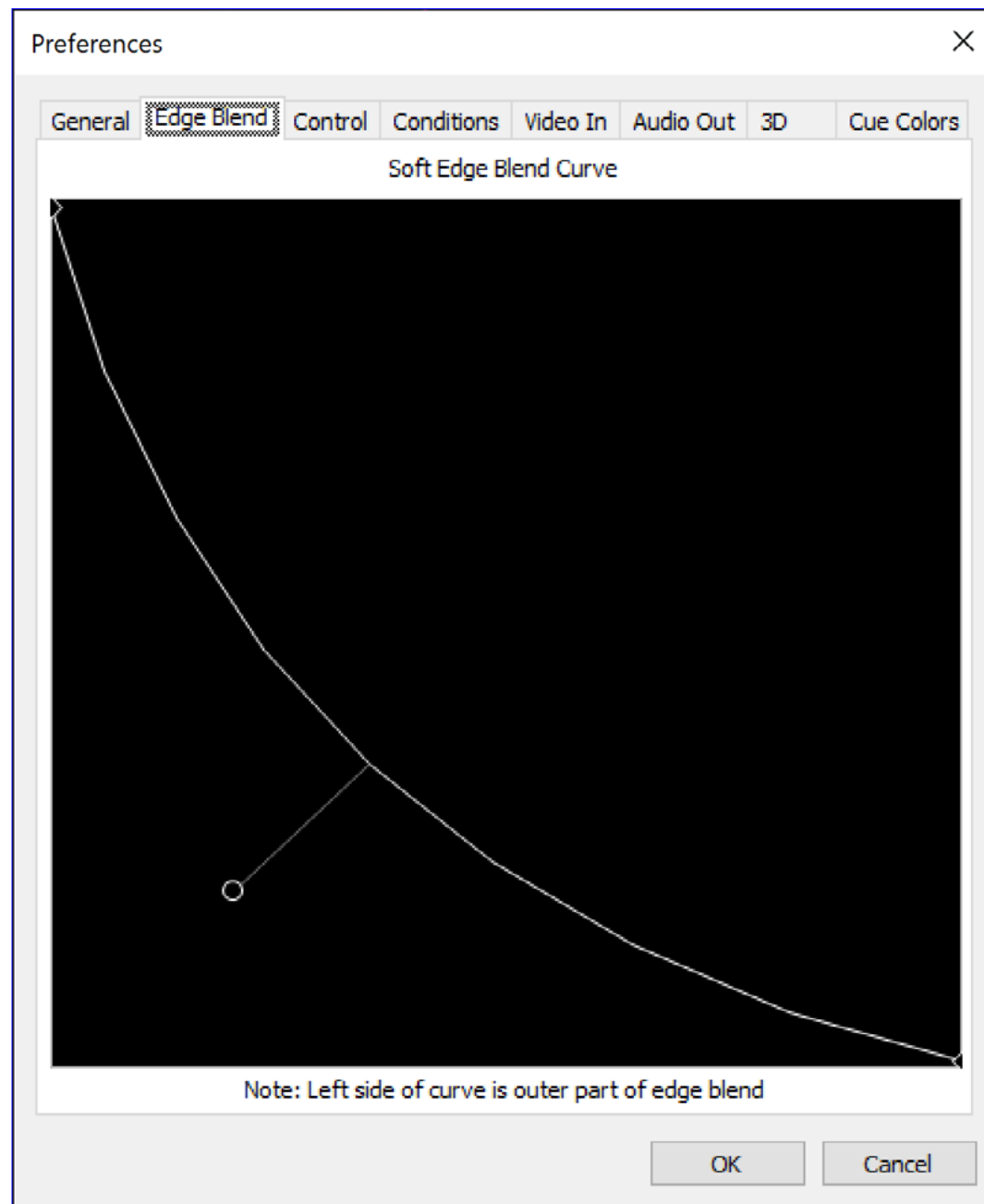
Volume level used to play audio *not* governed by a Volume tween track. Set this to a value below 100% to provide for some additional headroom when controlling the playback volume.

Center Anchor Position

When checked, the anchor point will be aligned with the center of the image as you drag an image to a timeline or the Stage window (see “[Anchor Position](#)”).

Edge Blend

Drag the round dot to adjust the edge blend curve. It is possible to add more points to the curve, but this is generally not required. The same curve is applied to all edges. The left of the curve corresponds to the outer (dark) edge of the gradient. Your display computers must be online for you to see the effect of the edge blend curve while changing it.



IMPORTANT: Before attempting to adjust the edge blend curve, make sure your projectors are set up properly. If not, it may be impossible to get a proper edge blend.

Double-click a point to view and edit its value numerically, or to change its type. This also allows you to copy the edge blend curve from one presentation to another.

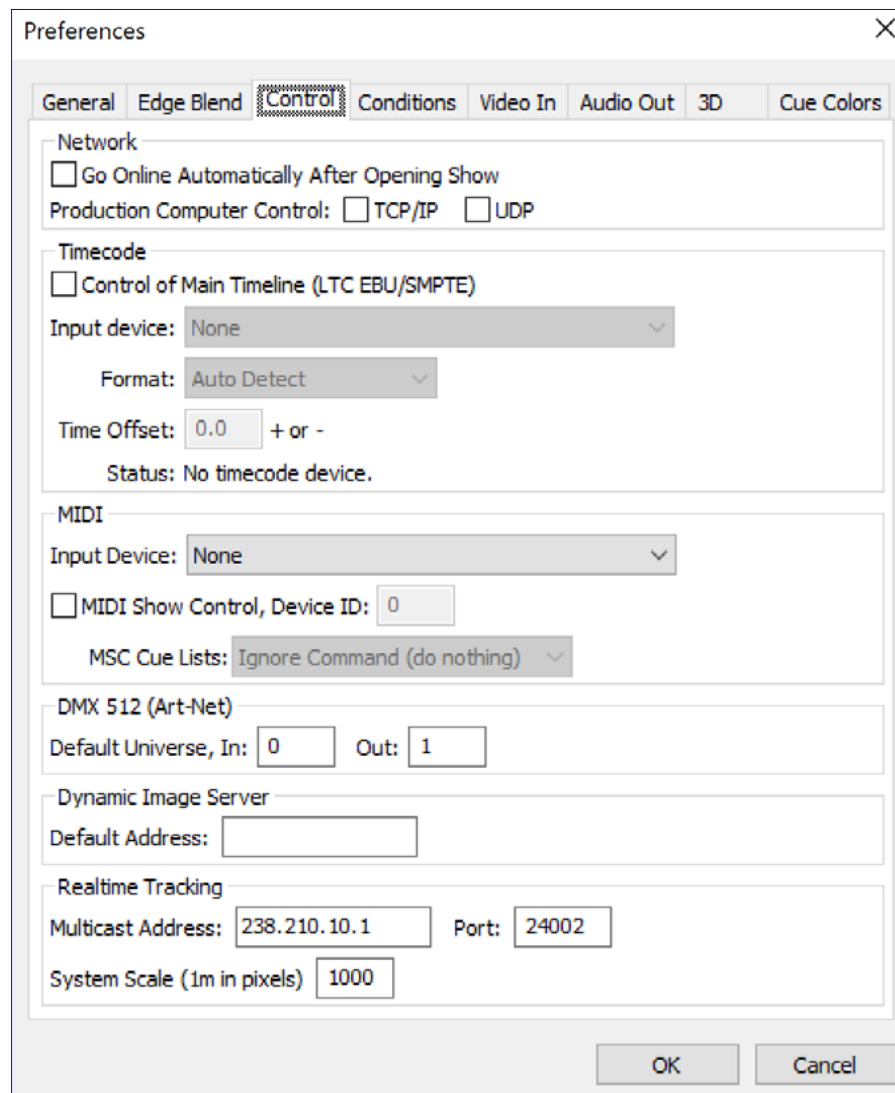
HINT: Enlarge the window for better precision in adjusting the curve.

Overriding the Global Edge Blend

As an advanced alternative, you can disable the default edge blending on a per-display basis. This is done in the Advanced tab of the Display Settings dialog box. You can add individual edge masks using the Mask tab of the Display Settings dialog box, allowing you to control all aspects individually. However, in the vast majority of cases this is not required when using reasonably matched and calibrated projectors.

Control

This tab provides various options for external control of the WATCHOUT production software.



Control tab.

NOTE: For more control options, see [“Inputs”](#).

Go Online Automatically. When selected, WATCHOUT will automatically attempt to connect to the display computers when opening this show.

Production Computer Control (TCP and UDP). Activates external control of the WATCHOUT production software. This allows you to control your WATCHOUT presentation from a touch panel or other computers and control systems. The control protocol has provisions for positioning, starting and stopping the presentation, as well as other miscellaneous functions. See [Controlling the Production Software](#).

NOTE: This control feature is not to be confused with the display cluster control capability, described under [Control Protocol](#). While they both perform similar functions, one controls the production computer and the other controls the display computers directly, without the need for any production computer being present during playback.

Timecode Control of Main Timeline. Enables synchronization of the main timeline of the production software by an external timecode signal. When selected, specify which audio device will be used for timecode, the format of the expected timecode as well as any offset to be added to the external timecode to make it match up with the timeline. Use a negative offset if the external timecode specifies a later time position.

MIDI Show Control. Enables control of WATCHOUT using the MIDI Show Control protocol, available in many lighting consoles. See the appendix titled [MIDI Show Control](#) for details on the various options.

DMX-512 Universe. Specifies the Artnet protocol “universe” number to be used to receive and transmit DMX-512 data. This relates to the DMX-512 Input and Output respectively. See [DMX-512 Input](#) for more details on how to use DMX-512.

Default Dynamic Image Server Address. The default server address used by Dynamic Image media items, if not specified explicitly ([see “Add Dynamic Image”](#)).

Realtime Tracking. Specifies settings for a realtime tracking system to be used in conjunction with WATCHOUT. The tracking system sends it data on a multicast network address that may be specified together with its corresponding network port. It is also possible to set system-wide scaling for the data received from the tracking system. Please see the appendix titled [“E. TRACKING INPUT”](#) for details on how to incorporate realtime tracking into your show.

Enabled Layer Conditions. Specifies which layer conditions will be enabled. Each layer in the Timeline window can be associated with a condition, in which case media on that layer will only appear when the corresponding condition is enabled ([see “Condition”](#)). You can specify any combination of conditions.

Layer conditions are particularly useful together with external control of display clusters, ([see “Control Protocol”](#)).

NOTE: The Stage window normally previews media from enabled layers only. This behavior is governed by options on the “Preview” menu.

Video In

Associates video input cards in the production computer with video input device numbers, subsequently used in “Live Video” media. This allows you to view live video in the production computer, if desired. It serves the same purpose in the production computer as the “Video In” menu does in the display software (see illustration under [“Add Live Video”](#)).

NOTE: The “Video In” settings in the Preferences dialog box apply *only* to the production computer. Each display computer has its own, independent assignment of video input devices. This allows you to have different configurations of capture cards in the various computers.

If you don’t want to preview live video in the production computer’s Stage window, choose the “Thumbnail” stage preview mode in the “Live Video” media item. Doing so still allows you to assign video input device numbers for use in the display computers, while disregarding any setting for the corresponding video input device number in the production software. In this case, you can ignore the settings in the “Video In” section of the Preferences dialog box.

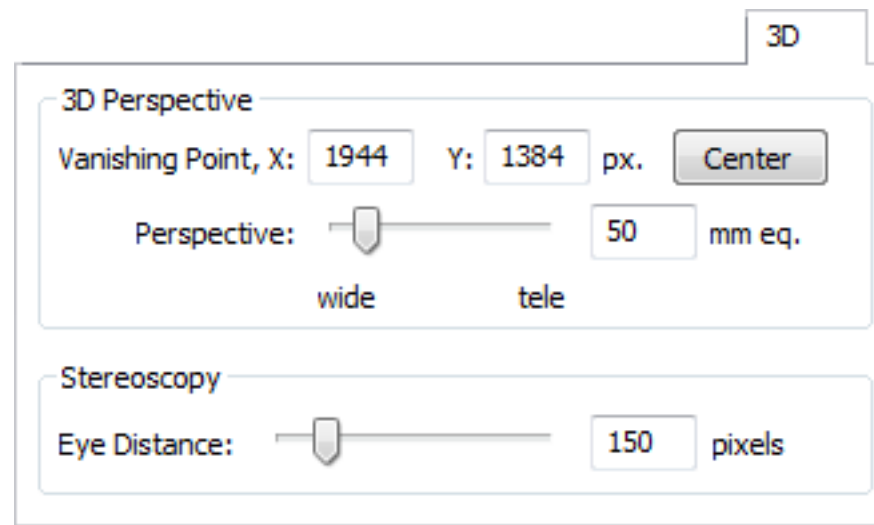
Audio Out

Associates audio output channel pairs in the production computer with audio output channel numbers, subsequently used in the “Output Channel Assignment” tab of a Sound cue ([see “Sound Cue Specifications”](#)). This allows you to play multi-channel audio through the production computer, if desired.

NOTE: The “Audio Out” settings in the Preferences dialog box apply *only* to the production computer. Each display computer has its own, independent assignment of audio output channel. This is accessed through the “Audio Out” menu shown by pressing Ctrl-W on a display computer ([see “Sound”](#)).

3D Perspective and Stereoscopy

These settings control the perspective of images and 3D objects rotated or moved in 3D space.



Vanishing Point. As images move away from the viewer along the Z axis, they move towards the vanishing point. In general, you want this point to be at the center of the stage, which can be accomplished by clicking the Center button. You can also enter the coordinate of the vanishing point manually. The position of the vanishing point is indicated by a symbol in the Stage window, displayed only while editing the settings in the Preferences dialog box.



Vanishing point symbol.

Perspective. Images rotated around the X or Y axes appear distorted according to the perspective. A smaller value results in a more exaggerated perspective. You may think of this value as controlling the focal length of a lens used to view the images, where a wide angle lens (smaller value) results in a more pronounced perspective. This value also controls the degree to which images moved along the Z axis (towards or away from the viewer) change their apparent size.

HINT: Sometimes, the perspective effect can make it harder to edit the position and orientation of images in the Stage window. If so, turn off the perspective using the Perspective command. That command affects the preview only – not images displayed on screen.

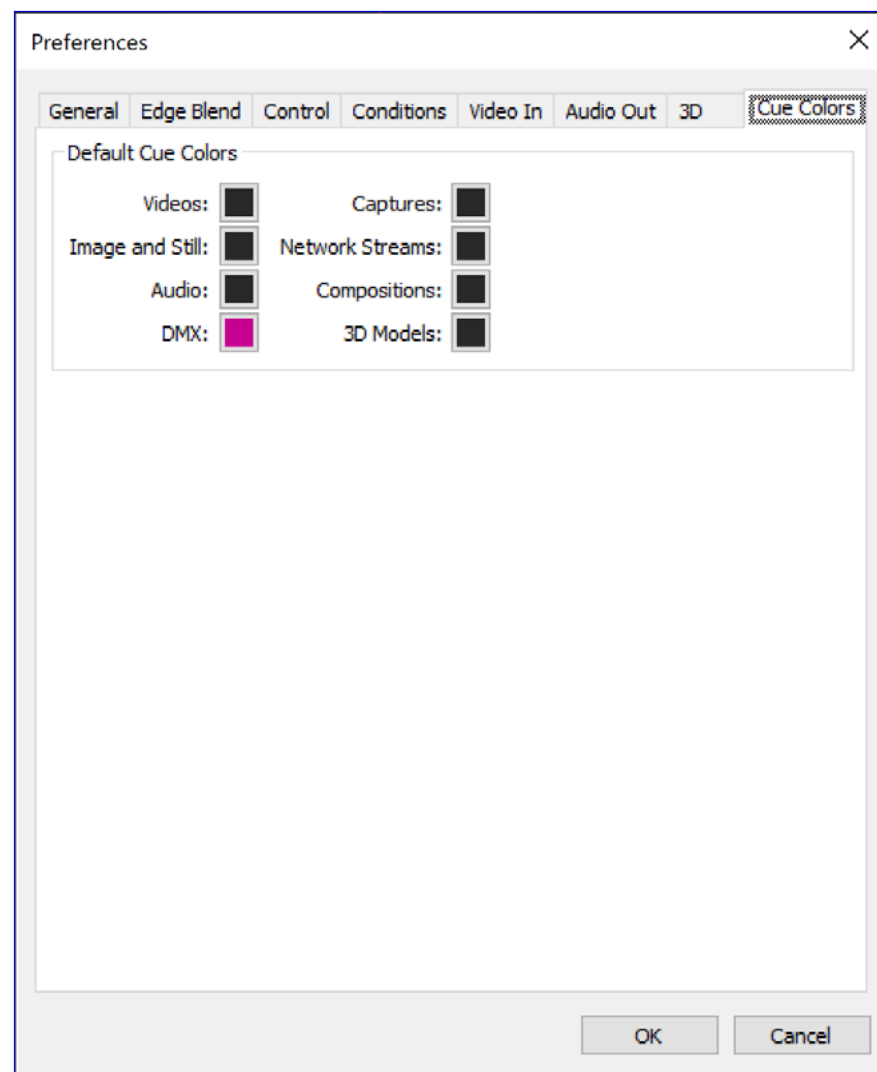
Eye Distance. When displaying images using stereoscopic projection, this setting controls the amount of left/right image separation that's applied as a function of the distance from the zero parallax plane (i.e., the screen). Depending on the physical size of the screen used to view the presentation, you may need to adjust this value. For comfortable viewing, the left/right separation should not exceed 60 mm on screen (approximately 2.4 inches).

IMPORTANT: This setting has no effect on stereoscopic video being used in your presentation, as the eye separation has already been baked into the video itself. Attempt to keep the amount of physical eye separation of stereoscopic video within the same limits as other stereoscopic images, as mentioned above.

Cue Colors

This tab enables you to select default cue colors for the various types of media cues available in WATCHOUT. Hover the mouse over one of the labels to display a small informational text about which cue types are affected by that default cue color.

Click a color indicator next to a label to bring up a color selection dialog in which a new default color may be selected.



Cue colors tab

EDIT MENU

The Edit menu contains commands applying to the current window or currently selected objects (for example, displays, cues or tween points).

UNDO/REDO

Reverts recent changes you've made to the presentation.

CUT

Transfers selected objects to the clipboard, allowing them to be pasted in elsewhere. Use this, for example, to move cues to another position along the timeline, or to other presentations.

COPY

Copies selected objects to the clipboard, allowing the copies to be pasted in elsewhere. Use this, for example, to transfer display configurations or cues between presentations.

NOTE: When transferring cues between presentations in this way, any media associated with these cues will transfer along with the cues, and will be automatically added to the Media window in the target presentation.

PASTE

Pastes the most recently cut or copied objects into the current window.

CLEAR

Removes selected objects without altering the contents of the clipboard.

SELECT ALL

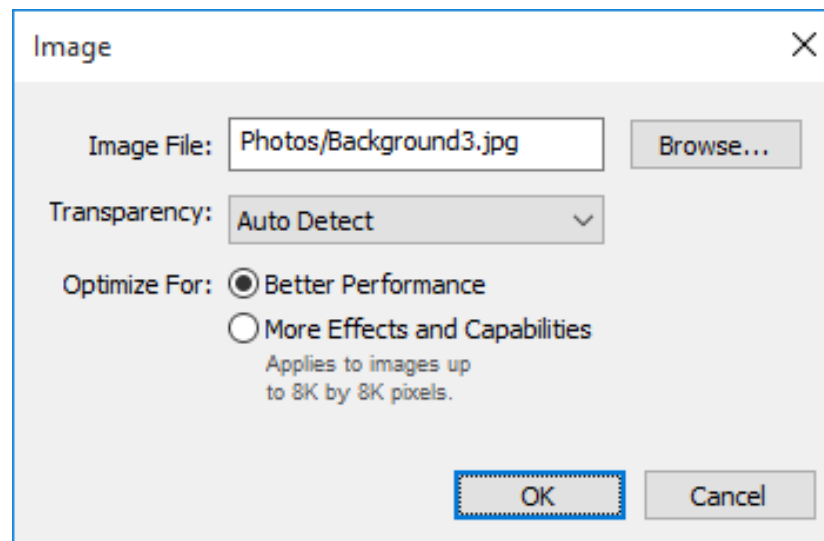
Selects all objects in the current window.

SELECT TO END

Applies to timeline windows. Selects all cues from the current time position and forward.

SPECIFICATIONS

Opens the Specifications dialog box for the selected object. This is equivalent to pressing the Enter key or double-clicking the object.

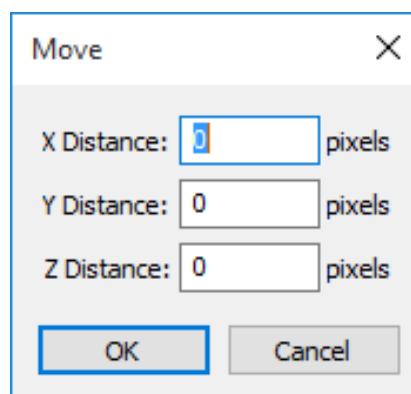


Example specifications dialog box for a still image.

See ["2D Display/Projector"](#) and ["Cue Specifications"](#) for more details. For media proxy items, see ["Add Proxy"](#).

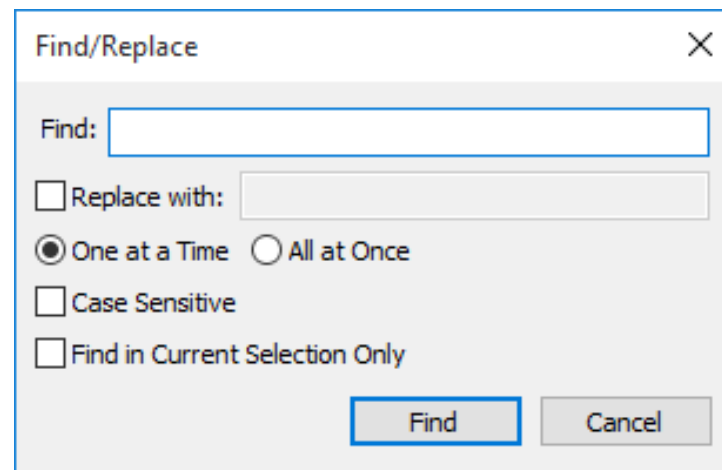
MOVE

Moves the selected objects by a specified number of pixels. Applies to cues and displays. When applied to cues, it moves the stage positions of media displayed by the cues.



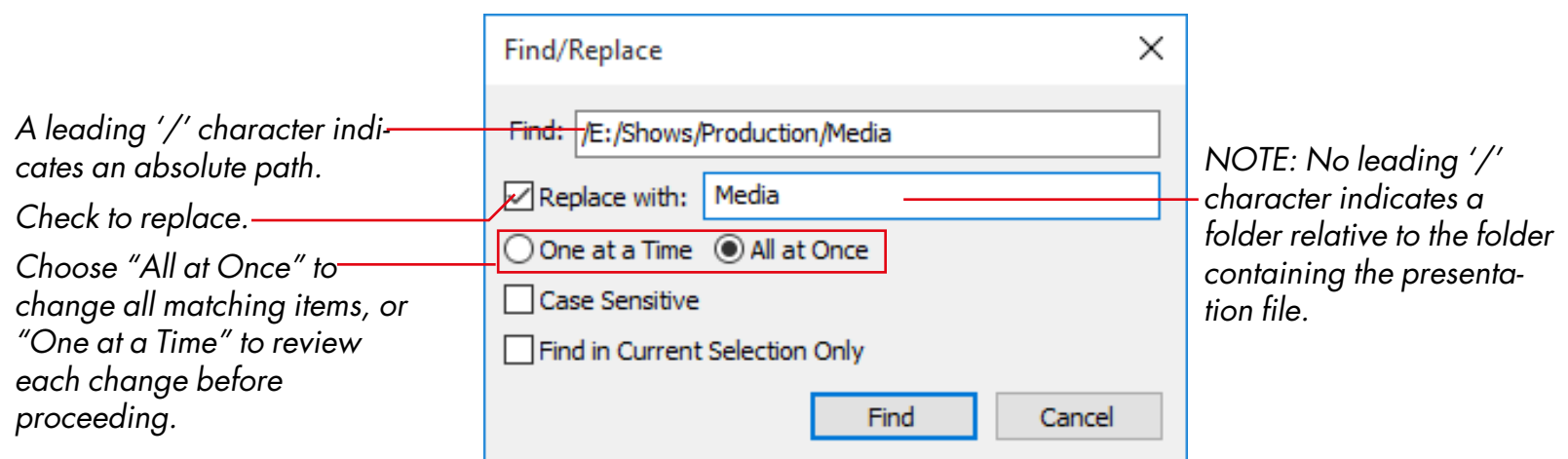
FIND/REPLACE

Finds and optionally replaces specified text. When applied to the Media window, this allows you to locate media items by specifying the name of the media file, or any part of its path name. The command operates on the information shown in the "File Location" column of the Media window, indicating the relative or absolute path to the media file.



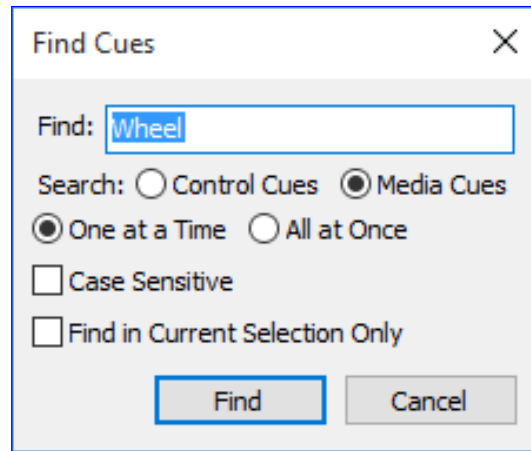
You can use the Replace function to update the path to media files after they have been moved to another disk or folder. For instance, if you start out with your media files on a shared server during the early stage of production, you may later want to move all media files into a sub-folder of the folder containing the presentation file. After transferring the files, use the Find/Replace command to change the absolute part of the path name (beginning with a '/' character) to a relative (that is, beginning with the name of a folder located in the same folder as your presentation).

As an example, assume that the media files were stored in a folder named "WATCHOUT/Production1/Media" on a network volume named "E:" during production. You have now copied these files into a folder named "Media" located in the same folder as the WATCHOUT presentation file. You would then enter the following values into the Find/Replace dialog box to update all relevant media paths accordingly.



FINDING CUES

The Find command can also be used in timeline windows. In this case, it allows you to search for Control cues by name or media cues by the name of their associated media. The latter is useful in finding cues using a particular media item. The timeline is first searched in the forward direction from the current time position. If not found, it is searched backwards.



USING QUICKFIND

The QuickFind feature allows you to jump straight to a Control cue by pressing a single function key on the keyboard. Simply name the cues F1, F2, F3, etc, and then press the corresponding function key. (see ["Using Find and QuickFind"](#))

FIND/REPLACE AGAIN

Repeats the most recent Find/Replace command.

SNAP

When this is enabled, objects exert gravity on each other as they are dragged with the mouse, making them snap together. This makes it easier to align images, cues and tween points.

- When dragged in the Stage window, images will snap to the edge, center or corner of displays and other images.
- Cues will snap to adjacent cues when dragged in a timeline window.
- Tween points snap to other tween points within the same cue, as well as to the beginning and end of the cue.
- Cues and tween points snap to the current time position. For this to work, first turn off ["Click Jumps to Time"](#) on the Timeline menu.

HINT: When working in a crowded stage window, it may be hard to see what's snapping to what. If so, zoom in on the area of interest (see ["Setting the Stage Scale"](#)) and disable the preview of layers that get in the way (see ["Disabling Layer Preview"](#)).

STAGE MENU

The Stage menu applies specifically to the contents of the Stage window.

ADD 2D DISPLAY/PROJECTOR

Adds a new display of the specified size to the Stage window. After adding a display, open its dialog box to enter its specifications (see ["2D Display/Projector"](#)).

Use this command to add flat panel displays (LCD, LED, etc) as well as projectors for flat surfaces. Also use it for projection on curved surfaces that can be managed using the geometry correction capabilities of WATCHOUT (see ["PREVIEW QUALITY"](#)). For projection mapping or projection onto 3D geometry, use "Add 3D Mapping Projector" instead (see below).

IMPORTANT: Displays and projectors can not be added while Online is selected on the Stage menu.

The secondary menu provides some common display sizes as shortcuts. You can, however, enter any size in the display's dialog box as long as it is supported by the physical display and the interface card in the display computer.

NOTE: Displays and projectors are added to the current stage tier (see "Using Stage Tiers for Complex Display Arrangements"). Move between tiers using the Cut and Paste commands.

ADD 3D MAPPING PROJECTOR

Adds a projector that can be freely positioned and rotated in the Stage window. While a 2D Display/Projector can be positioned and rotated on the X/Y plane, a 3D Projector can be positioned anywhere in 3D space, and can be pointed in any direction. Use this type of display device when projecting onto 3D geometry, such as a car or a piece of furniture, represented by a 3D model (see "3D Models").

For more details on how to use 3D Projectors, see "3D Mapping Projector".

ADD VIRTUAL DISPLAY

A virtual display is conceptually similar to regular 2D displays, with one important distinction. Rather than outputting its pixels to a physical display or projector through a graphics card, those pixels are made available for use within WATCHOUT itself.

When you add a virtual display, not only do you get a display rectangle in the Stage window, but you also get a new media item added to the Media window, with the same name as the virtual display. Use this media item as any other image media source in WATCHOUT. Anything that hits the virtual display on Stage will appear on this image.

One advantage of virtual displays is that they are not constrained to the dimensions supported by common displays and graphics cards, allowing you to use any reasonable width or height. This makes them useful for modeling LED walls, which often use modules of odd pixel dimensions. This video provides an introduction:

<http://www.dataton.com/producing-for-led-walls>

Another use for virtual displays is to generate dynamic textures for 3D models. While you can drop a simple image or video directly onto a 3D object as a texture, this doesn't give you much control over that image. If you instead use a Virtual Display to texture the 3D model, you have all the layering, compositing, tweening and real-time rendering capabilities of WATCHOUT at your disposal. This video provides an introduction:

<http://www.dataton.com/3d-texturing-using-virtual-displays>

For more details, see "Virtual Display".

SCALE

Sets the viewing scale of the Stage window. A larger preview gives you greater precision in positioning displays and images using the mouse.

HINT: In addition to these fixed scale factors, you can zoom to any area of interest using the mouse while holding down the Control key, or choose "Frame Displays" to scale the Stage window to enclose all displays (see next).

FRAME DISPLAYS

Scales and scrolls the Stage window to enclose all displays and projectors. This command is useful if you want to get an overview of your entire set of displays/projectors, or if you accidentally scrolled your displays out of view and can't seem to find them.

SCROLL TO ORIGO

Resets the scrolling of the Stage window so that its X/Y zero position is at the top/left of the window. It may occasionally be useful to place 3D projectors or content at negative stage coordinates. To do so, you need to scroll the stage window above or to the left of the zero point (origo). You can then use the “Scroll to Origo” command to reset the stage window’s scroll position.

NOTE: The zero point is indicated by gray lines in the Stage window.

VIEW

Rotates the Stage window preview so that you can view 3D models, motion paths and other elements from the left or top instead of the front. This is useful when positioning content in 3D space, or editing complex motion paths (see “Rotating the View of the Stage Window”).

TIER

Manages stage tiers, which are useful for building elaborate display arrangements (see “Using Stage Tiers for Complex Display Arrangements”).

Main

Selects the main stage tier. There’s always at least one stage tier. Any additional stage tiers will be listed below “Main” on this sub-menu.

NOTE: In order to add or manipulate displays, you must first select their stage tier using this menu. Inaccessible displays are shown with a dotted outline in the Stage window, and a small text will appear when you point at such a display, telling you which tier it resides on.

Add

Adds another tier to the stage, and selects it as the current tier. Any displays you add or paste will now go onto this tier.

Rename

Allows you to change the name of the currently selected stage tier.

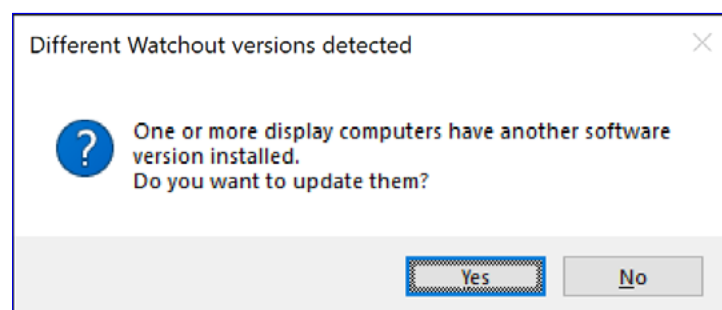
ONLINE

Connects the production computer to the display computers. Once connected, the display computers will follow as you jump around on the timeline and start/stop the presentation.

NOTE: Choosing “Online” also locks all displays in the Stage window. You must deselect “Online” in order to make any changes in the Stage window.

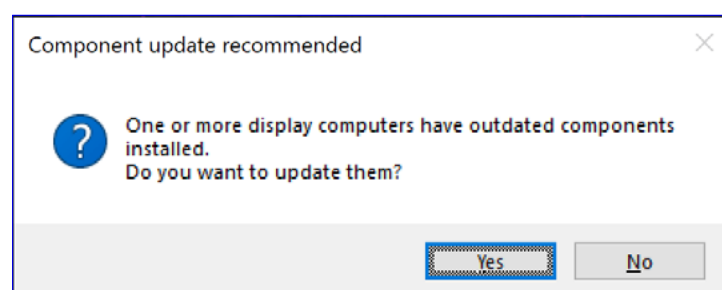
A stop sign inside a display in the Stage window indicates failed connection to that display computer. Other errors are reported in the Message window.

During the connection procedure, the production computer will verify that all display computers are using the same version as the production computer and have the same components installed. If any display computer is running a WATCHOUT version that differs from that of the production computer you will be asked whether or not you want to update it.



NOTE: Installing a different WATCHOUT version on the display computers using the production interface will also install any components that are present on the production machine.

If all display computers and the production computer are running the same version of WATCHOUT but there are components, e.g. NewTek NDI® HX, that are installed on the production machine and not on the display computers, then you will be asked if you want to update those as well.



IMPORTANT: The recommendation is to always run the same version of WATCHOUT, with the same installed components, on all display computers as well as on the production computer.

LIVE UPDATE

While selected, display computers are continuously updated with any changes made to the show. This greatly streamlines the production workflow as positioning of images and other precise adjustments become fully interactive, giving instant feedback on displays or projection surfaces.

IMPORTANT: In order to allow content to be freely positioned anywhere on stage, all content will be loaded onto all display computers when Live Update is selected. While this doesn't affect playback performance, it requires more time to initially transfer all media assets and will also consume more space on the display computers.

UPDATE

Updates all connected display computers with any changes you've made to the presentation, including transferring new or modified media files to the display computers. This command is not needed while in "Live Update" mode (see above).

STANDBY

Causes all display computers to fade to black, or to the image of any standby layer (see "Perform Normal/In Standby/Both") and also fades the audio. This is useful if you want to pause the show in a smooth way – possibly to jump to another position along the timeline. Give the command again to restore normal image display. While online in standby mode, an indicator is shown at the top of the Stage window.

HINT: A standby indicator can also be added to the Status window (see "Status Window").

The fade-out and fade-in times for the Standby command are set in the Preferences dialog box.

MANAGE DISPLAY COMPUTER

The commands on this sub-menu allow you to operate the display computers from the production computer. This is particularly useful if the display computers have no mouse or keyboard connected.

Remote Access

Opens a remote access window onto the desktop of displays selected in the Stage window. For this to work, WATCHOUT display software has to be running on the display computer. The WATCHOUT display software will be reduced to its window mode, allowing you to see the desktop of the display computer. While in this mode, you can interact directly with the display computer, for instance to delete files or similar housekeeping chores.

NOTE: Take care not to do anything that causes the display software to close, as doing so also terminates the remote access session.

End the remote access session by closing the desktop window of the display computer. WATCHOUT display software will be restored to its full screen mode by the Online command.

Power Down

Turns off the power of selected or all display computers. This quits WATCHOUT display software, terminates Windows and turns off the computer. As part of this procedure, the WATCHOUT production software also learns the hardware address of the display computers, which can then be used by the Power Up command.

Power Up

Sends a "Wake on LAN" command via the network to selected or all display computers. If properly configured, this will power up the computer(s) as if their power switch had just been pressed. Put a shortcut to the WATCHOUT display software into the Startup folder of the display computer to make it launch WATCHOUT automatically.

IMPORTANT: There are two prerequisites for this command to work:

- The computer must be configured to "Wake on LAN" (sometimes referred to as "Magic Packet"). This setting may be found under the "Power Management" tab of the Local Area Network Connection's Properties dialog box, or in the computer's BIOS settings.
- The production computer must at some point have given the Power Down command to that display computer, thus learning the hardware address of the computer's network card.

Rebuild Show Cache

Forces the selected display computer(s) to re-build the show cache for the show that is currently active.

Delete Other Shows

Deletes all shows on the selected display computer(s) except for the currently active show.

Download Log Files

Downloads all Log Files from the selected display computer(s). Once selected, you will be prompted for a destination folder. In the selected destination folder, a directory structure will be created that contains the downloaded log files for all selected display computer(s). If the display computer(s) in your show are addressed by IP-address, the subfolders in the directory structure will be named using IP-addresses, otherwise computer- and cluster names are used.

Download Dump Files

Downloads all Dump Files from the selected display computer(s). Once selected, you will be prompted for a destination folder. In the selected destination folder, a directory structure will be created that contains the downloaded dump files for all selected display computer(s). If the display computer(s) in your show are addressed by IP-address, the subfolders in the directory structure will be named using IP-addresses, otherwise computer- and cluster names are used.

PREVIEW MENU

The items on this menu control the preview of cues shown in the Stage window. These commands do not affect the display computers or what appears on their outputs.

CLICK SELECTS FRONTMOST IMAGE

When this option is selected, clicking an image preview in the Stage window always selects the corresponding cue in the Timeline window. While this is the most natural behavior in many cases, it may get in your way if you want to move an image that appears partially obscured behind another image. In this case, uncheck this menu option, select the cue corresponding to the image to be moved, then drag the image in the Stage window.

PREVIEW QUALITY

Control the overall preview quality of images in the Stage window using the following four commands.

Best Quality. Renders high quality preview of all cues except those explicitly set to “Preview: Reduced” (see “Preview”).

Video as Thumbnails. Uses low resolution thumbnails as video preview. This speeds up editing of presentations that have many large video clips playing at the same time.

Thumbnails. Uses low resolution thumbnails of images and video for the Stage window preview. While the image quality in this mode is very low, its performance is high – particularly when dealing with numerous, very large images.

Wireframe. Displays all images as boxes with the name of the media item, rather than showing the image. This is sometimes useful when trying to position images, or to track down images obscured by other images.

HINT: As an alternative to selecting global thumbnail preview for images or video, you can set individual cues to preview as thumbnails by selecting “Reduced” on the “Preview” pop-up menu in each cue.

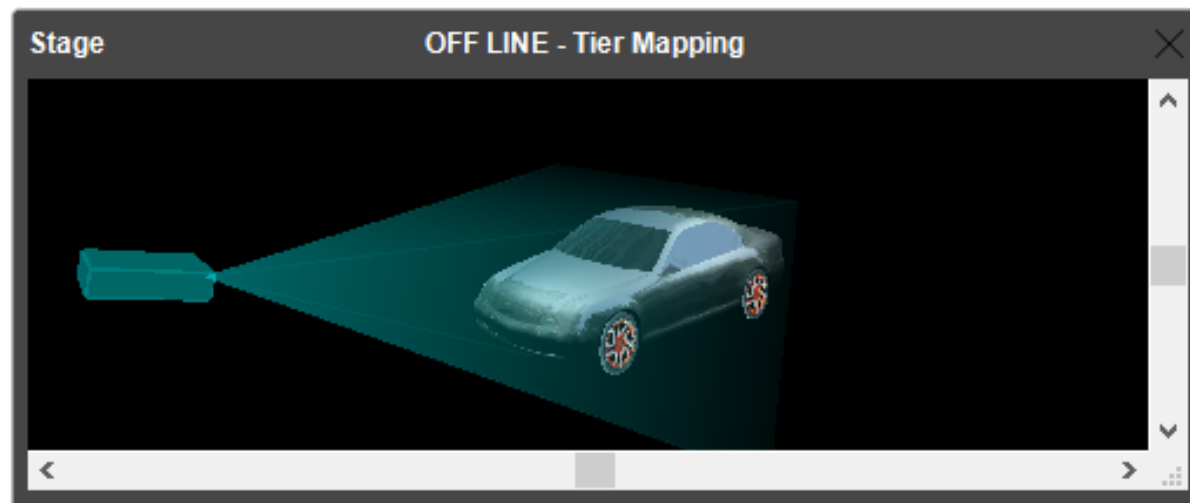
PERSPECTIVE

In general, you want the Stage preview to match what you see on screen in terms of media placement and perspective. However, the perspective view can make some editing operations harder. If so, you can turn off the perspective preview using this command, causing the Stage window preview to appear in an orthographic mode.

NOTE: The amount of perspective applied to images rotated or positioned in 3D space is controlled by the Perspective slider in the [Preferences](#) dialog box.

PROJECTOR BEAMS

Normally, the beam of a 3D Mapping Projector is shown only when the projector is selected in the Stage window. Use this command to always display projection beams.



Projector beams shown in Stage window.

HINT: The color of the beam is set in the projector's dialog box. When using multiple projectors, set them to different colors to tell them apart.

MASKED BY DISPLAYS

Masks images to the areas inside the displays. This provides a more accurate representation of what is actually shown by the display computers. However, it also makes it harder to edit the presentation, since images positioned outside the displays disappear.

OUTLINE DIMMED IMAGES

When an image is dimmed using an opacity tween track, it may become hard to see and manipulate in the Stage window. Selecting this option causes a thin frame to be displayed around such images, making them easier to see.

PREVIEW STANDBY LAYERS

When activated, the Stage window will show the same images as the display computers while in standby mode (that is, any images from standby layers – see ["Perform Normal/In Standby/Both"](#)). This allows you to edit such images through the Stage window.

However, in most cases, you probably prefer to see the normal images in the Stage window even while in standby mode, in order to preview and possibly edit those while the display computers show the standby images. This can be accomplished by un-checking the "Preview Standby Layers" menu item.

PLAY AUDIO MEDIA

By default, the production computer plays all audio cues. You can turn off this behavior using this menu option, thereby reducing the processing overhead associated with audio playback.

NO / ALL / ENABLED CONDITIONAL LAYERS

These three menu items control the extent to which images originating from conditional layers appear in the Stage window. (See ["Condition"](#) and ["Enabled Layer Conditions"](#) for more on conditional layers).

ENABLE LAYER CONDITIONS

Specifies which layer conditions will be enabled. Each layer in the Timeline window can be associated with a condition, in which case media on that layer will only appear when the corresponding condition is enabled. You can specify any combination of conditions.

Generally, you want images originating from enabled layers only to appear in the Stage window, which is accomplished by choosing “Enabled Conditional Layers”. To preview images from all conditional layers, regardless of whether or not they are enabled in the Preferences dialog box, select “All Conditional Layers”.

ALL / ACTIVE / SPECIFIC STAGE TIERS

Just as timeline layers can use conditions to enable/disable their cues (as described in the previous paragraph), timelines and their layers can also be associated with stage tiers. Cues on such timelines or layers will only appear on displays on those specific tiers. The commands in this group of the Preview menu control what’s shown in the Stage window in this case. By selecting “All Stage Tiers”, the Stage window will preview cues regardless of their stage tier association. Select “Active Stage Tier” to preview cues on layers associated with the tier specified on the Stage Tier sub-menu. Selecting “Specific Tiers” brings up a dialog box where you choose any combination of stage tiers to preview.

NOTE: Cues on timelines and layers not restricted to specific tiers will always be included in the preview, regardless of the preview mode chosen using these menu options.

BACKGROUND COLOR

Sets the background color of the Stage window. If your source material is hard to see on the default (black) background, then change to another color.

MEDIA MENU

The Media menu applies specifically to the contents of the Media window.

ADD MEDIA FILE

Opens a dialog box where you can choose files to be added to the Media window. Alternatively, simply drag the file into the Media, Stage or Timeline window.

ADD SOLID

Creates a solid, white rectangle of specified size (see “Solid”).

HINT: While the basic color of a Solid is always white, you can use a Color tween track to colorize it (see “Color”).

ADD TEXT

Adds a generated image for displaying text. Use this as an alternative to creating text using Photoshop or other applications. Text images created using this method can be edited directly inside WATCHOUT, thereby speeding up the production workflow. See “Text” for more details.

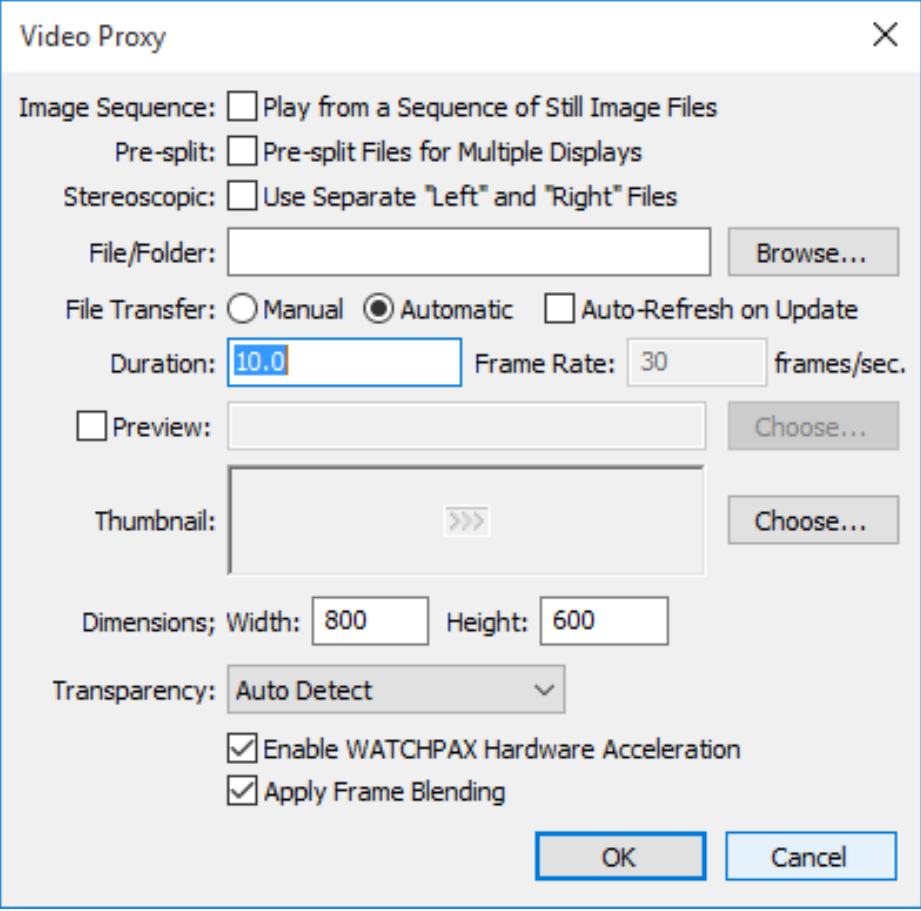
ADD PROXY

Adds a proxy media item of the kind specified. Use a proxy to handle media that can not be added simply by dragging into the Media window, as in the following cases:

- The media file isn’t recognized by the production computer in the manner you want, for instance, a sequence of still images that you would like to treat as if it were a video file.
- The media file is a large movie or still image that has been pre-split into multiple files (see “Pre-splitting a Large Video”).
- You want to incorporate stereoscopic video into your presentation, using separate left-eye/right-eye video files.

- The media may not yet be available, or may – for other reasons – need to be provided or replaced manually on the display computer at a later time.

Use a media proxy to accommodate any of these cases. Once a media proxy has been added to the media list, it can be used on the timeline just like other media items.

A screenshot of a 'Video Proxy' dialog box. The dialog has a title bar with a close button. It contains several sections of controls. The first section has three checkboxes: 'Image Sequence: Play from a Sequence of Still Image Files', 'Pre-split: Pre-split Files for Multiple Displays', and 'Stereoscopic: Use Separate "Left" and "Right" Files'. Below these is a 'File/Folder:' text field with a 'Browse...' button. The next section has 'File Transfer:' with three radio buttons: 'Manual', 'Automatic' (which is selected), and 'Auto-Refresh on Update'. Below this are 'Duration:' and 'Frame Rate:' text fields. The 'Duration' field contains '10.0' and the 'Frame Rate' field contains '30', followed by the text 'frames/sec.'. Below these are two more sections, each with a checkbox and a text field: 'Preview:' and 'Thumbnail:'. Each has a 'Choose...' button to its right. The 'Thumbnail' field contains a small icon of a video frame. Below these are 'Dimensions; Width:' and 'Height:' text fields, with '800' and '600' respectively. Below these is a 'Transparency:' dropdown menu set to 'Auto Detect'. At the bottom are two checked checkboxes: 'Enable WATCHPAX Hardware Acceleration' and 'Apply Frame Blending'. At the very bottom are 'OK' and 'Cancel' buttons.

Available options vary based on the kind of proxy added.

Image Sequence

This option applies to video proxy only. Select this option to treat a folder of numbered still images as a video.

IMPORTANT: In order to play image sequences, a very fast, solid state (e.g. SSD), storage subsystem is required.

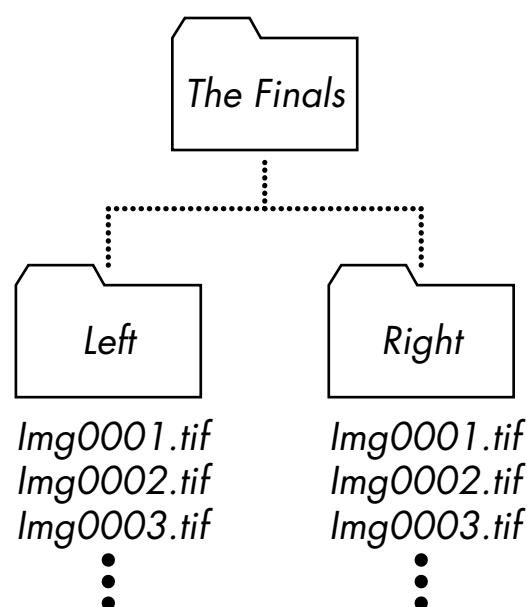
After selecting this option, click the Browse button and choose the folder containing the image sequence. The names of the files inside the folder have the following restrictions.

- The files must be of type TIFF, PNG, JPEG, TGA or DDS, with uncompressed TGA being the recommended format for best performance. For DDS images, the only texture format supported are DXT1, DXT5 and RGBA.
- All files must have the same extension.
- Files must be numbered consecutively.
- The number of digits in the name must be the same for all files.
- The sequence can start at any number, but would typically start at 1.
- The files names must all begin with the same initial string of characters.
- The sequence number must come immediately before the period, followed by the file extension.

Here are some valid examples:

- `Img0001.tiff`, `Img0002.tiff`, `Img0003.tiff`
- `Spring2015_00001.tif`, `Spring2015_00002.tif`, `Spring2015_00003.tif`

You can also use image sequences for stereoscopic video and video pre-split for designated displays. In those cases, there are strict naming requirements. For stereoscopic image sequences, create a folder with the desired media name ("The Finals" in the example below). Inside this folder, create two subfolders named Left and Right. Those subfolders must contain the image sequence files for the corresponding eye.



For stereoscopic image sequences, use the same naming convention for all files in both the Left and Right folders.

NOTE: The identical file-naming convention outlined above applies to all files in both folders. Thus, if the files in the "Left" folder are named Left0001 .tiff, Left0002.tiff and the files in the right folder are named Right0001 .tiff, Right0002.tiff, the image sequence will not play since the initial string of characters are different.

For image sequences that are pre-split for designated displays, create a folder with the desired media name ("The Finals" in the example below). Inside this folder, create a folder for each display on which the video will appear, using the display's name as the folder name. As with stereoscopic image sequences, all files in all folders must use the same naming convention.

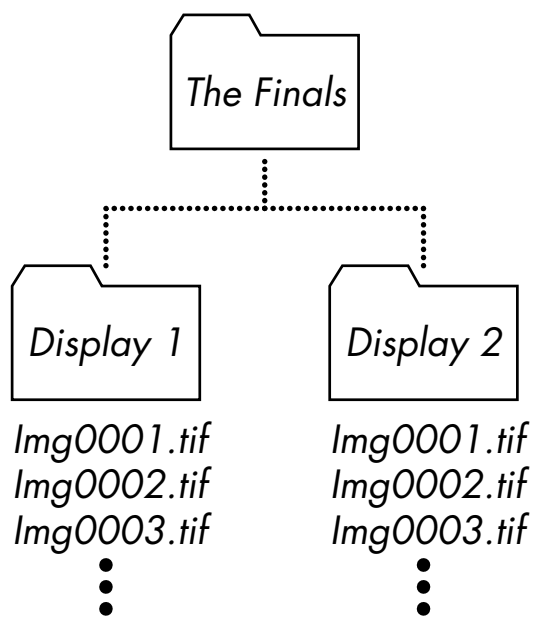


Image sequences pre-split for multiple displays.

If you want to combine both stereoscopic and pre-split image sequences, create a folder with the desired media name. Inside this folder create two folders for each display, named Display1-Left and Display1-Right (replacing "Display1" with the actual name of your displays). All files in all folders must use the same naming convention.

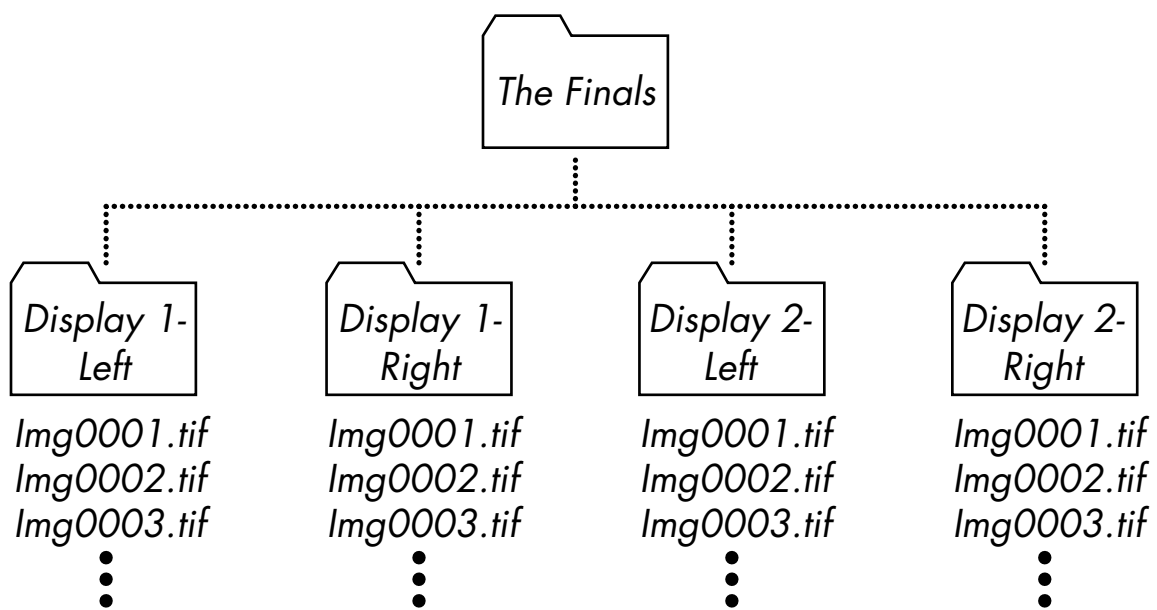


Image sequences pre-split for multiple displays.

Pre-split

This option applies to video and image proxies. Check this if you have pre-split a still image or large movie (see [“Pre-splitting a Large Video”](#)). In this case, the resulting files must be placed in a folder specified in the File/Folder field. This folder must contain one file per display intersecting the movie, each file named after its target display.

For example, assume you have a large video called “LargeMovie.mpg” that intersects two displays named “Display 1” and “Display 2”. You would then pre-split the video into two files. Name those files “Display 1.mpg” and “Display 2.mpg” and put them in a folder named “LargeMovie”. Finally, specify that folder in the File/Folder field of the video proxy. The same process would apply if you had a large image.

IMPORTANT: Always append the proper file extension to the name of either the video files or the folder containing the pre-split files. This ensures that the correct video playback mechanism is used. By default, Windows may not display filename extensions. To show file extensions, choose “Folder Options” on the Tools menu in Windows Explorer, click the View tab, and uncheck “Hide extensions for known file types”.

Stereoscopic

Select this option to play stereoscopic video. In this case, you must supply separate files corresponding to the left and right eye’s viewpoint. Those files must be placed in a folder selected using the Browse button. Name the files Left and Right respectively, appending the proper file type extension.

NOTE: WATCHOUT does not support active stereo (frame-sequential) but only left and right stereoscopic video.

You can combine Pre-split and Stereoscopic videos by naming each video according to the display as well as its eye affinity, separated by a dash. For instance, to present a stereoscopic pre-split across two edge-blended projection screen areas, name the files as follows:

Display 1-Left.mpg	Display 2-Left.mpg
Display 1-Right.mpg	Display 2-Right.mpg

File/Folder

The title of this field reads “Folder” if “Image Sequence”, “Pre-split” or “Stereoscopic” is selected, otherwise it reads “File”. In this field you specify the file or folder associated with the media item. Use the “Choose” button next to the field to choose an existing file/folder. If you set “File Transfer” to “Manual”, you should type the fictive, relative path to a file that may not exist on the production computer, but will be provided manually to the display computer.

File Transfer

Specifies whether the file will be transferred manually or automatically from the production computer to the display computers. Normally, you would choose “Automatic”. You may choose “Manual” if the file is to be provided later, directly to the display computer, or if the file is not yet available.

NOTE: If you choose “Automatic”, WATCHOUT will make sure that the file/folder you specified actually exists prior to closing the dialog box. If you choose “Manual”, it becomes your responsibility to provide the file, and WATCHOUT will not verify its existence.

Auto-Refresh on Update

If selected, an updated media file associated with this proxy will be transferred to the display computers whenever you use the Stage Update command, without first having to use the Media Refresh command.

IMPORTANT: When using this feature, media files must maintain their original size. If required, you can plan ahead by making the original larger than necessary to accommodate future changes.

Duration

Enter the duration of the media here. Applies to moving images (video, image sequences) and sound only.

Frame Rate

Enter the desired playback rate here. Applies only when “Image Sequence” is selected. Otherwise the frame-rate is specified by the video file itself.

HINT: You can modify the default playback rate of video in the cue playing the video (see “Playback Speed”).

Preview

Allows you to choose a scaled down version of a video for preview purposes. This is useful in cases where the full video is too heavy to play in the production computer. This may be due to the production computer being less powerful than the display computers, or when playing multiple video files simultaneously across many display computers.

Thumbnail

Allows you to choose a thumbnail image to represent the proxy in the Media window, inside cues and in the Stage window preview. If not specified, a default icon will be displayed.

Dimension

Specifies the size of the image. Applies to still and moving images.

Transparency

Allows you to specify whether the image contains transparent areas, as well as the form of transparency used. Normally, WATCHOUT determines this from the information in the media file, but when using a proxy, you must specify this manually. Setting this incorrectly may cause the image to display without transparency or not at all. Applies to still and moving images.

The types of transparency supported by WATCHOUT include:

- **None.** The image or video has no alpha channel.
- **Straight Alpha.** The transparency information affects the alpha channel of the image only.
- **Pre-multiplied with White.** The transparency affects both the alpha channel and the pixels in the image so that the pixels in fully transparent areas are white. This is often used in material produced for printing purposes.
- **Pre-multiplied with Black.** The transparency affects both the alpha channel and the pixels in the image so that the pixels in fully transparent areas are black. This is often used in material produced for video compositing purposes.

Enable WATCHPAX Hardware Acceleration

Applies only when playing certain video formats, such as H.264, on WATCHPAX. May improve video playback performance when playing high resolution video. This checkbox has no effect when using other display computers.

Apply Frame Blending

This setting often results in smoother video playback, at the possible expense of some loss in image sharpness. This is especially true when the frame-rate of the video is not an even multiple of the display computer's frame-rate (for instance, when playing 25 fps video on a display computer set to 60 fps). This is accomplished by blending adjacent frames together, weighted by their temporal position in the sequence.

ADD COMPOSITION

Add a Composition to the Media window. A composition allows you to group images together (including their tween tracks) in a way that can subsequently be used as a media item on other time-lines. Here are a few videos that show how to use compositions:

Compositions: <https://vimeo.com/134594131>

Composition example: <https://vimeo.com/134594382>

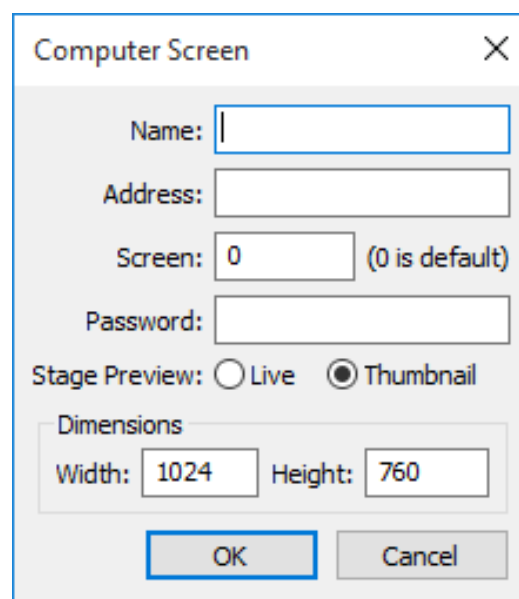
Scale, move and rotate compositions: <https://vimeo.com/134594385>

Nesting compositions: <https://vimeo.com/134594388>

See ["Restrict Rendering to Stage Tiers"](#) for a description of the fields in the dialog box shown by this command.

ADD COMPUTER SCREEN

This feature allows you to incorporate a live image of a computer screen into WATCHOUT. This can be used to show Excel graphics, Powerpoint slides, a web browser, or similar software applications, as part of your presentation.



The screenshot shows a 'Computer Screen' dialog box with the following fields and options:

- Name: [text input]
- Address: [text input]
- Screen: 0 (0 is default)
- Password: [text input]
- Stage Preview: ☐ Live ☒ Thumbnail
- Dimensions:
 - Width: 1024
 - Height: 760
- Buttons: OK, Cancel

The image displayed on the screen of the source computer is sent continuously via the network to the WATCHOUT display computers, where WATCHOUT composites it with other media. For example, you can put a plain Powerpoint presentation on top of a large, high-resolution background, thereby enhancing it with all the high-quality presentation capabilities of WATCHOUT.

To incorporate a computer screen into your presentation, follow these steps:

- Install, activate and configure VNC server software on the remote computer ([see "VNC Server Software"](#)).
- Add a Computer Screen media item to the Media list using this command on the Media menu. Configure it as described below.

- Drag the computer screen object from the Media list onto the Stage, and program it using cues as any other image element.

The same capabilities apply to computer screen images as any other images. For instance, you can program its position, scale and opacity. Since the images are sent across the network to all display computers, you can show the computer display across multiple display computers.

Computer Screen Settings

In the Computer Screen dialog box, type the IP number of the remote computer into the Address field, and the VNC password into the Password field. Set Dimensions to the size of the display of the VNC server (reducing the resolution may improve performance).

The Screen field is rarely used, and should generally be set to zero. It may be used with some implementations of VNC server software which support multiple screens or work-spaces.

Set “Stage Preview” to “Live” if you want to preview the Computer Screen in the Stage window of the production software. Otherwise, set this to “Thumbnail”. This setting affects the Stage window preview only – not what’s shown by the display computers.

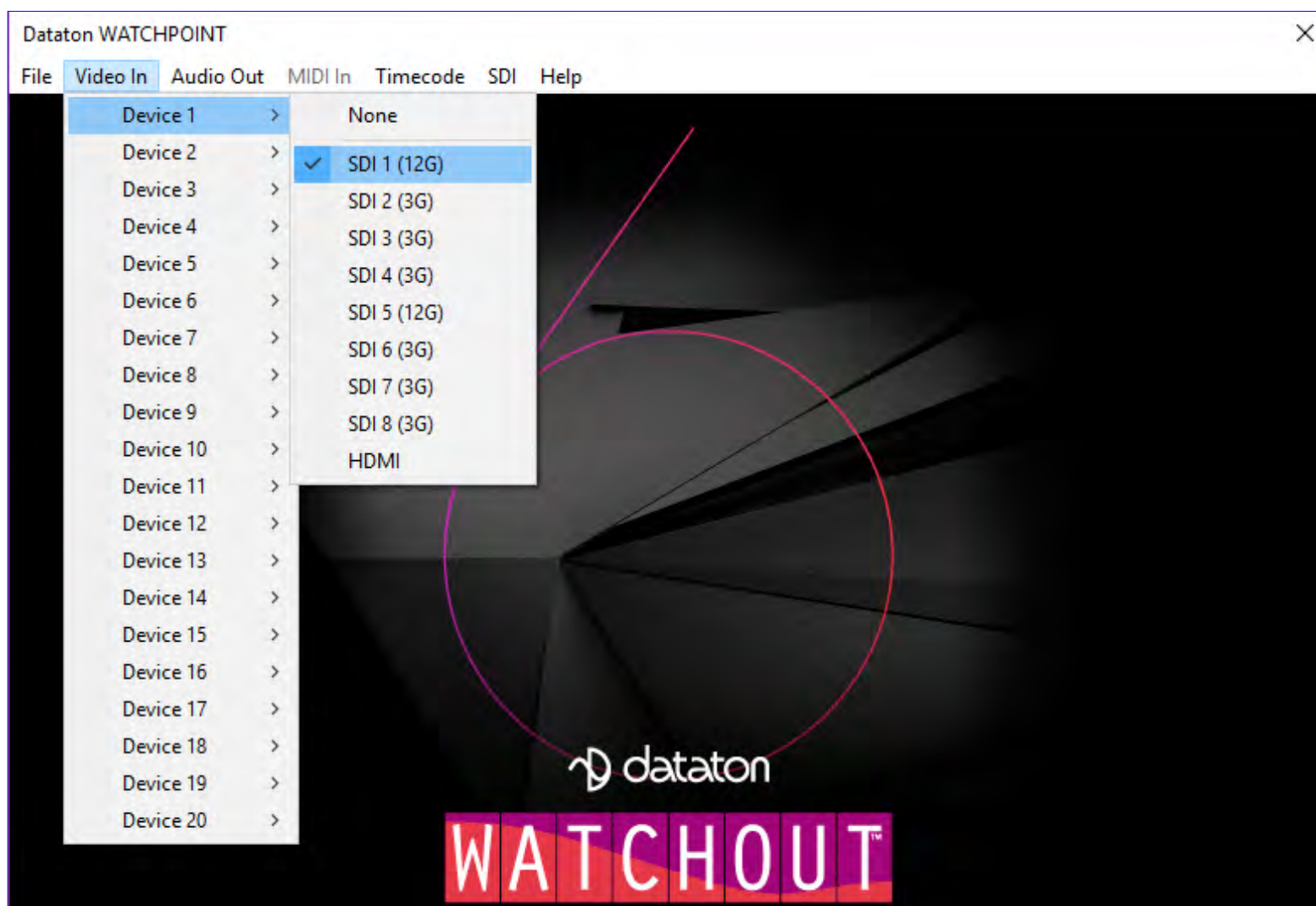
NOTE: The computer that’s being viewed does not require a WATCHOUT license key.

ADD LIVE VIDEO

This feature allows you to display live video, such as a camera feed, as part of your WATCHOUT presentation. The live video feed must be connected to each display computer that is expected to show it. For instance, if you want to show live video across two displays, the video signal must be fed to both display computers (typically using a video distribution amplifier). See [“Live Video Input”](#) for more details.

To activate the Live Video feature, follow these steps:

- Start WATCHOUT display software on the display computer.
- Press Ctrl-W to switch to window mode.
- On the “Video In” menu, make sure that your video input device is associated with the relevant device number.
- Connect a video source to the video input.



The “Video In” menu shown by pressing Ctrl-W on a display computer.

To use Live Video in your presentation, do as follows:

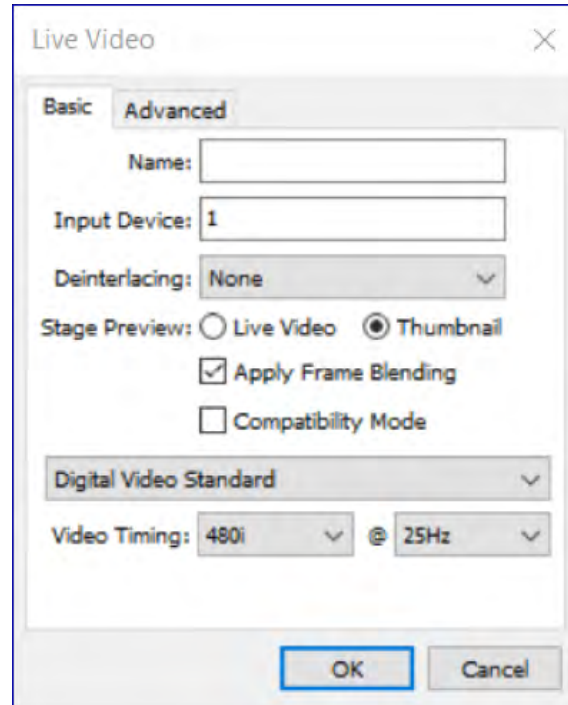
- Add a Live Video media item to the Media list using the command on the Media menu, configuring it as described below.
- Drag the Live Video object from the Media list onto the Stage or a timeline, just like any other media object.

Live Video supports the same capabilities as video played from disk, allowing you to program its position, scale, rotation and opacity.

To show live video across multiple displays, you must connect the video signal to each of those display computers. Furthermore, this video signal must be associated with the same input number on each display computer that is to display it.

Live Video Settings

In the Basic settings tab of the Live Video dialog box, set “Input Device” to the device number selected on the “Video In” menu and select a video standard appropriate for your video signal.



Deinterlacing. Video originating from some video cameras uses an interlaced signal, just like a PAL or NTSC TV set. Presenting such a video signal on a non-interlaced display device, such as a video projector or other display device designed to be used with computers, results in visual artifacts often referred to as “combing” around the edges of moving objects. Use the Deinterlacing pop-up menu, set to “Good Quality” or “Best Quality” to rectify this problem when required.

IMPORTANT: Do not use this feature unless necessary. Some video material and some cameras that can be set to a “progressive scan” mode do not need deinterlacing, and using it may reduce the image quality.

Stage Preview. Set to “Live” if you want to preview the Live Video in the Stage window of the production computer. Otherwise, set this to “Thumbnail”. This setting affects the Stage window preview only – not what’s shown by the display computers.

NOTE: In order to preview Live Video in the Stage window of the production computer, this computer must have the appropriate video capture capabilities, and the video signal to preview. Set the input associations for the production computer in Preferences (see “Video In”).

Apply Frame Blending. This setting may result in smoother video playback, at the possible expense of some loss in image sharpness. This is especially true when the frame-rate of the captured video is not an even multiple of the display computer’s frame-rate (for instance, when capturing 25 fps video on a display computer set to 60 fps). This is accomplished by blending adjacent frames together, weighted by their temporal position in the sequence.

NOTE: Frame blending, when applied to live video capture, increases the latency of the displayed video by about half a frame.

Compatibility Mode. Some video input interfaces have had problems with dropped frames. Selecting the compatibility mode may improve the performance on these input interfaces.

In the Advanced tab, select a “Signal Input” that is appropriate for your input signal source. If your input interface has multiple inputs for the same kind of signal, enter the desired input number in the field to the right of the “Signal Input” pop-up menu under the Advanced settings tab.



Trim Edges. The fringes of a video signal sometimes contain noise. These four fields allow you to selectively trim each of the edges of the video image to remove such noise.

Dimensions. With most video standards, the dimensions are fixed. However, when selecting “Other” on the “Video Standard” pop-up menu, you can manually enter the desired dimensions. Use this, for example, to enter the size of a computer signal brought into WATCHOUT using a DVI or DisplayPort capture card.

NOTE: The dimensions shown are after any edge trimming. For example, if the original image is 640 by 480 and you trim 10 pixels at each edge, the resulting dimensions become 620 by 460.

Using Multiple Video Inputs

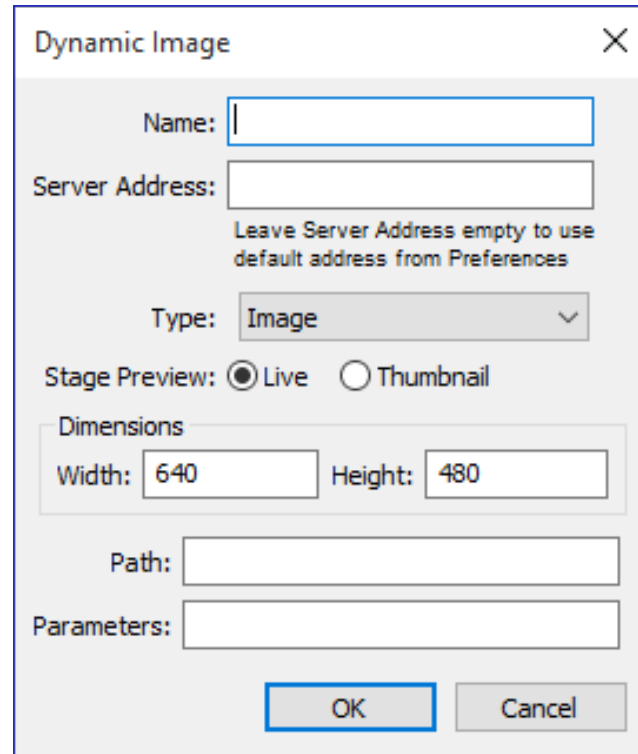
WATCHOUT supports up to twenty video input devices. The number of video inputs that can be displayed simultaneously depends on your computer hardware, type of video input device, etc.

Most video input devices have multiple connectors – sometimes for different kinds of video signals (for example, DVI and SDI). You specify which one to use in the Live Video media dialog box. Add more Live Video media objects to access different inputs on the same device.

NOTE: With some capture solutions, you can only display one input at a time. In this case, it’s generally not possible to make a clean switch back-to-back from one input to another on the same input device. You need to leave a couple of seconds between the end of the cue displaying one input and the beginning of the cue displaying the other.

ADD DYNAMIC IMAGE

Adds a media item for viewing images originating from a “WATCHOUT Dynamic Image Server” (see “Dynamic Images”).



Name. The name used to refer to the media item.

Server Address. The IP number of the computer running the dynamic image server application. If left blank, WATCHOUT will use the address specified in the Preferences dialog box.

Type. Specify whether the source is a still image, a Flash animation or an HTML web page.

Stage Preview. Controls whether the production software’s Stage window will display the live dynamic image or a static place-holder.

Width/Height. The dimensions of the dynamic image. Generally, this should match the actual source image file. When rendering HTML, specify the size to be rendered beginning from the top of the web page.

Path. The path to the content to be rendered. This can take either of two forms:

A local path on the dynamic image server itself, as a relative path (that is, one that doesn’t begin with a protocol specifier or a slash).

A fully qualified URL for an external web resource, accessible to the dynamic image server.

For example, if a file named “CNN_News.swf” is in a folder named DynImg, located in the WATCHOUT installation folder, set the path to:

`DynImg/CNN_News.swf`

HINT: Use the -f command line parameter of the dynamic image server to specify an alternate location of any locally served content (see “Alternate File Location”).

To access a web page over the Internet, set the path like this:

`http://www.bbc.com/weather/3448439`

HINT: To display only a portion of a web page, such as a weather map on a weather site, use a [Crop](#) tween track to crop out the relevant part of the image.

Parameters. Additional parameters passed to the dynamic image being served (see [“Dynamic Image Parameters”](#)).

NEW FOLDER

Adds a new folder to the Media window, allowing you to group related media items. Such a group of media in the Media window is independent of the folders on your hard disk, and serves merely as a means to organize items in the Media window.

LARGE THUMBNAILS

Displays larger thumbnail images in the Media window. This gives a better preview of each image, but reduces the number of items visible in the list.

NOTE: The size of wide thumbnails in the Media window is also affected by the width of the Thumbnail column. Make this column wider to see wide thumbnails.

REFRESH

Refreshes items in the Media list by reloading their information from the associated media files. A dialog is displayed allowing you to refresh media that has been changed, or all media, regardless of the file’s last modified time-stamp.

REFRESH AUTOMATICALLY

Activates a mechanism that recognizes when media files have been changed and automatically refreshes them. Example: You added an image file to your WATCHOUT show, but subsequently edited it in image editing software. When the image file is saved to disk, WATCHOUT detects that it has been changed/saved and will immediately add the updated image into your show.

This works well with simple media files such as images and 3D models. However, it does not work with streaming media such as video and audio.

SELECT UNUSED

Selects all unused items in the Media window. After reviewing the selection, you can choose Clear on the Edit menu to remove the unused media items.

IMPORTANT: Only media items directly or indirectly associated with cues on the Main Timeline, or any auxiliary timeline, are considered as being used. Specifically, media items used in compositions are only considered used when the composition itself is being used. Hence, you can prevent a composition and its media from being considered unused by adding it to an auxiliary timeline.

TIMELINE MENU

The Timeline menu applies specifically to the contents of timeline windows. It is only available when a timeline window is selected.

CLICK JUMPS TO TIME

Deselect this option to keep the time position stationary while manipulating cues and tween points. The state of this mode is reflected by the color of the current time indicator.

HINT: Turn off this option to use the current time indicator as a ruler for aligning cues and tween points. See [“Snap”](#) for more details.

ADD PLAY / PAUSE CONTROL CUE

Adds a Control cue at the current time and selected layer. When reached during playback, the cue will perform its programmed action (see “Control Cue”).

HINT: When using Control cues, dedicate a layer rather than mixing them with other cues. This makes them easier to find and prevents them from getting obscured by other cues.

ADDING AND REMOVING LAYERS

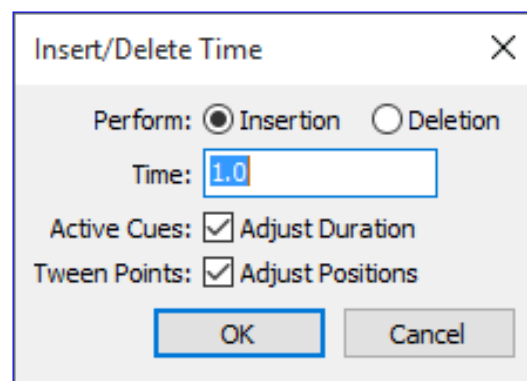
Choose “Append Layer” to append a layer to the timeline, or choose “Insert Layer” to insert a layer in front of the current layer. Choose “Delete Layer” to delete the current layer. A layer containing cues can not be deleted.

LAYER SETTINGS

Opens a dialog box that allows you to rename the layer as well as set various layer attributes (see “Layer Name and Attributes”).

INSERT/DELETE TIME

Open up a gap in time along a timeline, or to remove unwanted time, as specified by the “Insert/Delete” option.



Time

The amount of time to insert or delete. When deleting, the specified amount will be deleted starting from the current timeline position and forward.

CAUTION: When deleting time, any cues or tween points falling within the deleted time range will be shortened or deleted.

Active Cues

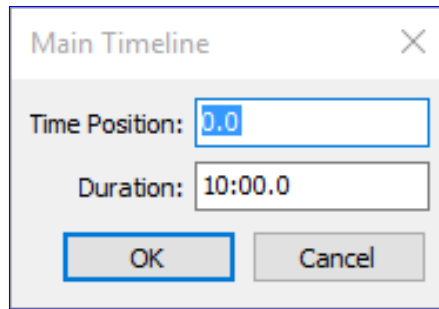
If “Adjust Durations” is selected, the duration of cues within the range of insertion or deletion will be adjusted accordingly. Deselect to only move the starting point of cues starting later along the timeline.

Tween Points

If “Adjust Positions” is selected, then also move or delete tween points ahead in time within active cues. Deselect to leave tween points where they are.

TIMELINE SETTINGS

Choosing this command while the Main Timeline Window is active will display the settings associated with the main timeline.

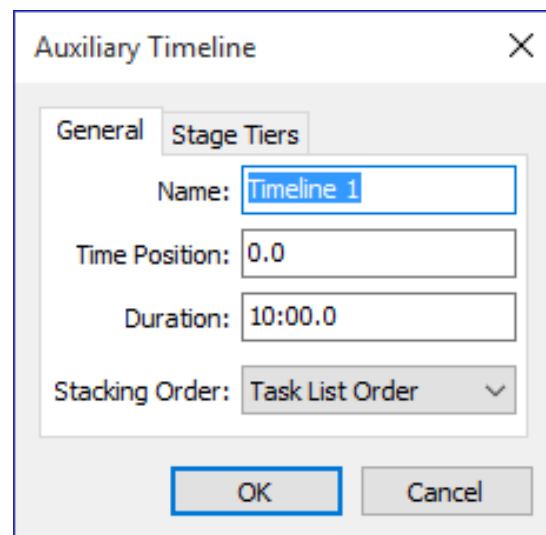


Duration. Determines the length of the timeline, and must always encompass all cues on the timeline. It is extended automatically as more cues are appended.

HINT: Typing a value into the “Time Position” field jumps to that time. This is often more accurate than trying to click a specific time in the time ruler.

AUXILIARY TIMELINE SETTINGS

Choose the “Timeline Settings” command to displays the settings for an active auxiliary timeline window.



Name. The name of the auxiliary timeline (shown in the Task window).

Time Position. Enter a new value here to jump to specified time position.

Duration. Determines the length of the timeline, and must always encompass all cues on the timeline. It is extended automatically as more cues are appended.

Stacking Order; Task List Order

This is the default stacking order. In this mode, multiple active auxiliary timelines render their images in the order in which they are listed in the Task window. You can change this order by dragging tasks up or down in the Task window, thereby affecting how multiple, active and overlapping auxiliary timelines interact on screen.

Stacking Order; Always on Top

In this mode, the auxiliary timeline will render its images on top of all other auxiliary timelines set to “Task List Order” or “Always on Top” when activated. This is useful, for example, when you have a group of mutually exclusive timelines, where each new timeline started should supersede the previous one.

HINT: You can then use a Control cue to stop the previous auxiliary timeline in the group (see “Control Cue”).

Stacking Order; Above Edge Blend

In this mode, the auxiliary timeline will render its images on top of all other timelines when activated. Furthermore, no edge blend will be applied to its images. This is useful in two specific cases:

- When displaying line-up images. During line-up you want to see the full image all the way out to the edge to make sure that the image fits precisely onto the display chip in the projector.
- When showing a live video image on a display partially intersecting other displays that are lacking capture cards for this live video input. Putting this live video image on an auxiliary timeline set to render above the edge blend avoids the feathered edge that would otherwise be applied to the intersecting areas.

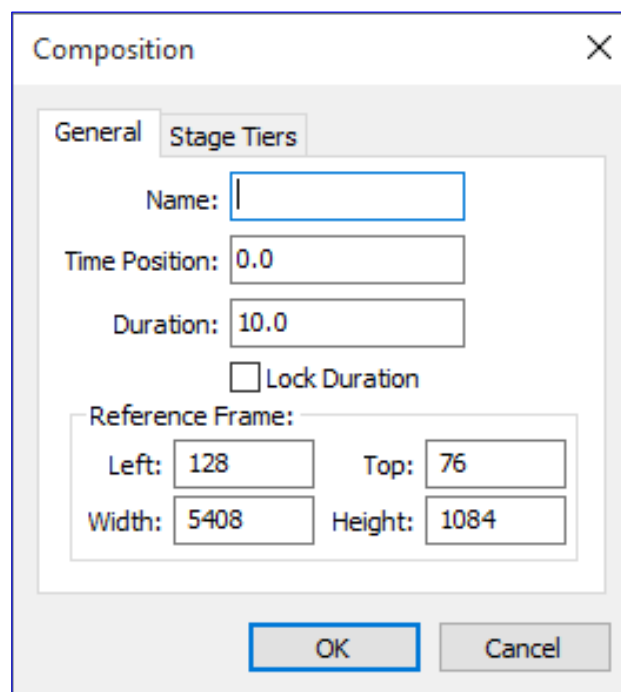
RESTRICT RENDERING TO STAGE TIERS

If selected, the timeline will be restricted to rendering onto selected stage tiers (see “Using Stage Tiers for Complex Display Arrangements”). This is similar to the corresponding setting for a timeline layer (see “Stage Tiers”), but affects the entire timeline.

IMPORTANT: Tier restrictions are cumulative in that a composition or timeline layer can only restrict rendering further. It can not remove any restrictions applied at a higher level.

COMPOSITION SETTINGS

To displays its settings, choose “Timeline Settings” while a composition’s timeline window is active.



Name. The name of the composition (shown in the Media window).

Time Position. Enter a new value here to jump to specified time position.

Duration. Determines the length of the composition timeline. Set this to exactly match the active part of the timeline if you want to loop the composition, since the end of the composition determines the looping point (see “Looping”).

Lock Duration

When selected, the composition’s duration will not be automatically extended. This option is useful for compositions designed to be looped. Often such a loop is designed with a particular cycle time in mind, set as the duration of the composition. In this case, check this option to avoid having the duration extended accidentally as cues are added or edited.

Reference Frame

By default, the reference frame is set to enclose all displays on the current stage tier when the composition is created. You can set the reference frame to any size you want, but it is generally a good idea to make it about the same size as its content. This frame is displayed as a gray rectangle in the Stage window while the composition's timeline window is active. Furthermore, it is used to select and manipulate the composition as a whole when used as a media item on other timelines.

NOTE: The reference frame doesn't constrain or clip the content of the composition. Images may extend outside the reference frame if desired.

Restrict Rendering to Stage Tiers

If selected, the timeline will be restricted to rendering onto selected stage tiers (see ["Using Stage Tiers for Complex Display Arrangements"](#)). This is similar to the corresponding setting for a timeline layer (see ["Stage Tiers"](#)), but affects the entire timeline.

IMPORTANT: Tier restrictions are cumulative in that a composition or timeline layer can only restrict rendering further. It can not remove any restrictions applied at a higher level.

TWEEN MENU

The Tween menu is available when a media cue is selected. It allows you to add tween tracks to the cue. Likewise, tween tracks can be removed by unchecking the corresponding item on the Tween menu.

NOTE: The items available on the Tween menu vary depending on the selected media cue. For instance, Volume tweening is only available for sounds and videos – not for still images.

Read more about the various kinds of tween tracks under ["Tween Tracks"](#).

WINDOW MENU

This menu provides access to all standard windows, such as Stage, Media, Main Timeline, etc. Other windows, such as Composition and Auxiliary Timeline windows are appended to this menu while open, providing a quick way to switch among them. For more details on the various windows, please see ["3. Windows"](#).

NOTE: To open an Auxiliary Timeline or Composition window, double-click the corresponding entry in the Task and Media windows. A Composition window can also be opened by Alt-double-clicking a cue for that composition.

HELP MENU

This menu provides quick access to the WATCHOUT User's Guide and the release notes with the latest news on the current version.

5. DISPLAYS AND PROJECTORS

The term “display” is used throughout this manual to refer to any kind of image display device, such as projectors, monitors, LED walls, video wall cubes, etc. In WATCHOUT, displays are represented by objects added to the Stage window. In order to add or manipulate such objects, first select the Stage window by clicking its title bar.

DISPLAY TYPES

There are three different types of displays in WATCHOUT:

2D Display/Projector. Use this type to represent all flat display devices, as well as projectors when projecting onto a flat screen or a curved screen that can be managed by the Geometry Correction feature of WATCHOUT. When used with overlapping projectors, WATCHOUT automatically applies edge blending in overlapping areas.

3D Mapping Projector. Use this type when projecting onto a complex, 3-dimensional object, represented by a 3D model in WATCHOUT. No automatic edge blending is applied, but manual masking can be used to manage overlapping areas.

Virtual Display. A two-dimensional area of the stage from which you can “grab” the resulting pixels for use as a new media item. This is useful when dealing with displays that have odd resolutions, such as LED wall modules (subsequently managed through an LED wall processor), or to create dynamic textures for mapping onto 3D models

ADDING DISPLAYS

To add a display to the Stage window, choose “Add” at the top of the Stage menu, selecting the desired type of display. The “2D Display/Projector” sub-menu includes most standard display sizes. The size can be altered afterwards using the display’s dialog box, accessed by double-clicking the display object in the Stage window.

NOTE: Displays can be grouped into stage tiers. When using multiple tiers, new displays are added to the current tier. Likewise, you must select the proper tier before you can manipulate its displays ([see “Tier”](#)).

SELECTING DISPLAYS

Click a display to select it. Shift-click to select multiple displays. Alternatively, drag from a point outside all displays to use the selection rectangle. To de-select all displays, click outside all displays in the Stage window.

NOTE: You must activate the Stage window before you can select displays. To activate the Stage window, click its title bar. Displays can not be manipulated if “Online” on the Stage menu is active.

POSITIONING DISPLAYS

Drag a display to the desired position using the mouse. Press the Shift key while dragging to constrain the movement to horizontal or vertical only. For best precision, enter the exact position using the display’s dialog box.

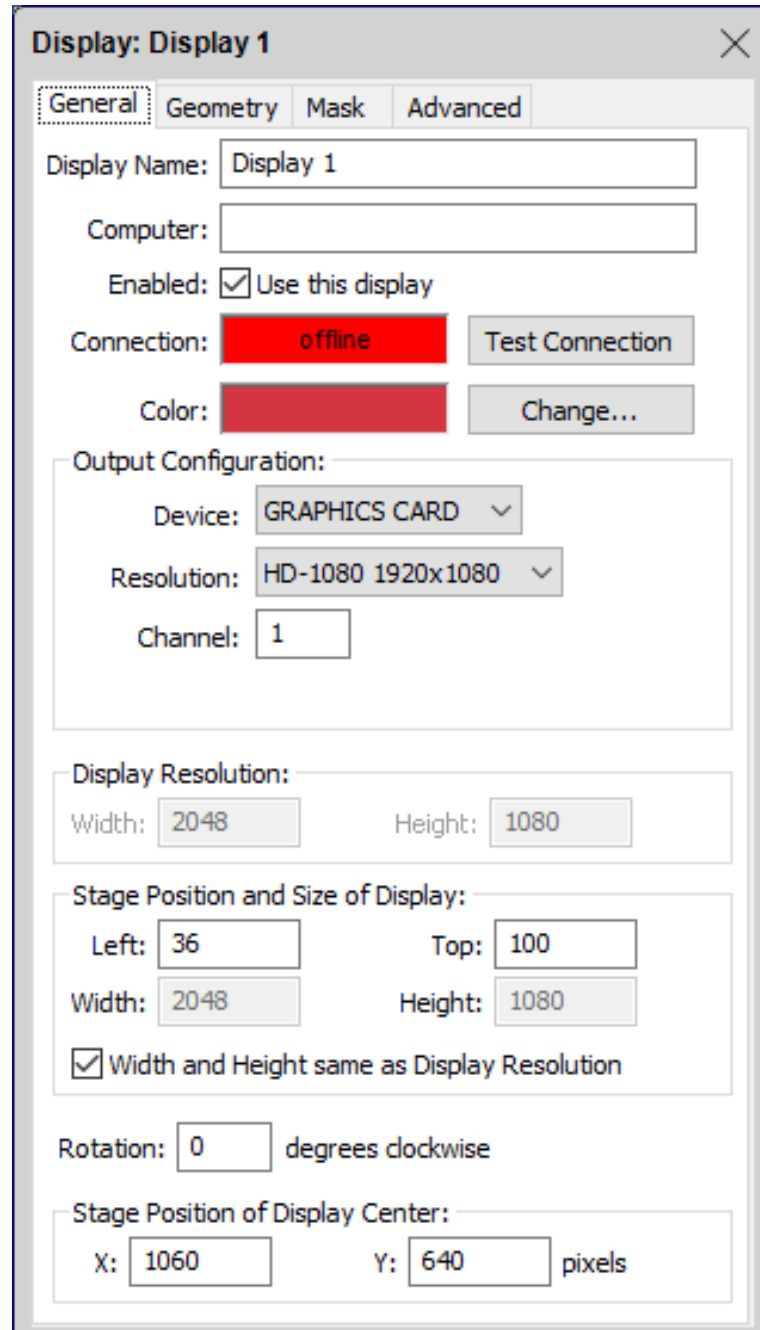
REMOVING AND DUPLICATING DISPLAYS

To remove a display, first select it, then choose “Cut” or “Clear” on the Edit menu. To duplicate it, first choose “Copy” then paste the duplicate back into the Stage window. When pasting a display, keep in mind that the duplicate initially occupies the *exact same location* in the Stage window as the original

did. You must move the duplicate to another location and change its name and computer assignment before using it.

2D DISPLAY/PROJECTOR

To be able to edit displays, you must activate the Stage window by clicking its title bar. Double-click a display to open its dialog box in a non-modal manner. This means you can work in other windows while having this dialog open, and you can have multiple display dialogs open at the same time.



Display: Display 1

General Geometry Mask Advanced

Display Name: Display 1

Computer:

Enabled: ☒ Use this display

Connection: offline Test Connection

Color: Change...

Output Configuration:

Device: GRAPHICS CARD

Resolution: HD-1080 1920x1080

Channel: 1

Display Resolution:

Width: 2048 Height: 1080

Stage Position and Size of Display:

Left: 36 Top: 100

Width: 2048 Height: 1080

☒ Width and Height same as Display Resolution

Rotation: 0 degrees clockwise

Stage Position of Display Center:

X: 1060 Y: 640 pixels

Name

Specifies the name of the display.

IMPORTANT: This name is also used to identify pre-split movie files (see "Pre-splitting a Large Video"). Thus, if you use such pre-split movies, you should not change the name of the display after creating those movies, or you'll have to rename the movies accordingly.

Computer

Specifies the name or IP number of the display computer to which this display device is connected. In most cases, using named computers is preferable (see "Addressing by IP Number or by Name").

Doing so makes your presentation more portable and independent of the network addressing method (see [“Computer Addressing”](#)).

When using the IP addressing method, the first part of their IP address is often identical, and only the last group of digits differ (as shown in the illustration under [“Network”](#)). In this case, you can enter the common part of the address in Preferences (see [“Display IP Number Prefix”](#)), and then enter only the last group of digits in the Display Specifications dialog box. For instance, if the complete address is “192.168.0.51”, you would put “192.168.0.” into the “Display IP Number Prefix” field in Preferences (note the trailing period), and then put 51 into the Address field in “Display Specifications”.

OUTPUT CONFIGURATION

Specifies the output configuration for the two types of displays that correspond to physical outputs (2D Display/Projector and 3D Mapping Projector).

Device

Determines which output card should be used; Graphics Card or SDI.

NOTE: SDI output is available only on WATCHPAX 60 model C.

Resolution

If the output device is set to SDI a limited number of resolutions are available. If the output device is set to Graphics Card, there is also an option of using a custom, user-defined, resolution.

Channel

Specifies which output channel to use on the Graphics Card or SDI board. For details on SDI channel assignment rules, please see [“SDI Channel Assignment”](#). For details regarding channel numbering on your specific hardware, please refer to its manual.

IMPORTANT: Assigning an SDI channel as an output will take precedence over input for multi-directional SDI channels.

SDI Link Type

This is only available when the selected output device is set to SDI and determines the link type for the current output channel. Four different types are available: Single-Link, Dual-Link, Quad-Link Quadrant and Quad-Link Interleaved. For details on the different link types, please see [“SDI Link Type”](#).

Enabled

Deselect “Use this display” to temporarily disengage the display device from your presentation.

NOTE: When deselected, WATCHOUT will not complain if it can’t connect to the corresponding display computer.

Connection

Indicates the on-line status of the associated display computer. You can use the “Test Connection” button to verify the ability to connect to that particular display computer. This may be useful when trouble-shooting a system.

Color and Change

Allows you to change the color of the display’s outline in the Status window.

Display Resolution

Physical resolution used by the display computer for the signal fed to its projector or other display device. WATCHOUT allows you to specify any resolution. However, the allowable settings are ultimately determined by the display device and graphics card.

Stage Position and Size

Determines the position and dimension of the display in the Stage Window. Normally, the dimension here matches the physical resolution of the display. You can override this by deselecting “Width and Height same as Display Resolution”, allowing you to enter different values. Doing so will make WATCHOUT scale the image to match the resolution.

HINT: This is particularly useful if you have to play a show made for a specific resolution on projectors that can’t handle that resolution.

Rotation

Rotates the display to an arbitrary angle. This allows you to use a vertical display format, as well as other creative display arrangements as shown in the illustration under “[Alternative Display Layouts](#)”.

NOTE: Edge blending will only work properly between displays that are on the same stage tier with the same rotation angle and stage size.

Stage Position of Display Center

This field is similar to the Left and Top fields in the “Stage Position of Display” field above, but indicates the center of the display rather than the top left corner. The center is often more relevant when the display is rotated to an arbitrary angle.

See common sections, later in this chapter, for the remaining tabs and fields in this dialog box.

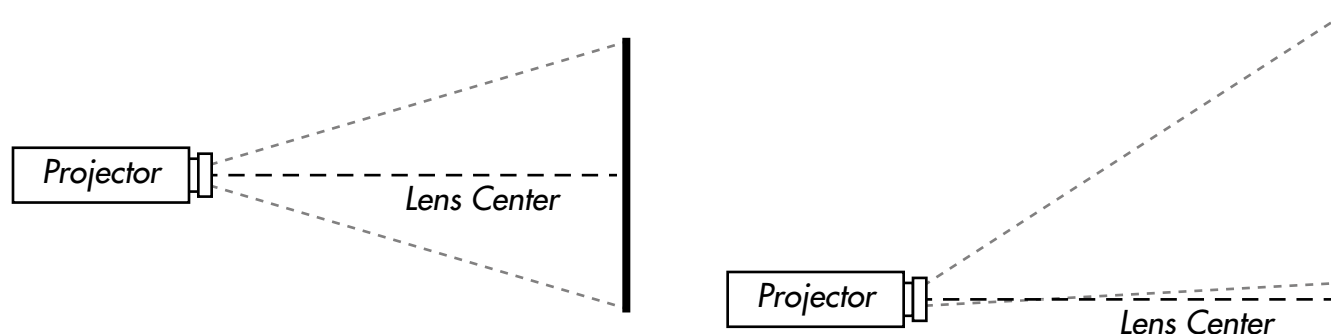
3D MAPPING PROJECTOR

Use this display type to wrap images around a three-dimensional object, such as a car or a sofa, by projecting onto the surface of the physical object.

See under “2D Display/Projector” for details on most fields in this dialog box.

Lens Shift

Many projectors can project their image off-axis. For example, most office grade projectors have a fixed shift that allows the projector to be placed horizontally on a desk, and yet project an image on a wall where the bottom of the image is at or above the desk’s level. Some professional grade projectors have adjustable lens shift – sometimes in both the vertical and horizontal directions.



On-axis projection and vertical lens shift of about 55 percent of the image height.

When mapping images onto a three-dimensional object, it is important to account for the lens shift in order to obtain a correct mapping. The lens shift is described as a percentage of the total image height and width. Hence, for a vertical lens shift upwards from the projector's center (as shown in the illustration to the right above), you specify a positive shift value. If the image is shifted so that its bottom coincides with the projector's center line, it is said to be 50%. That is, the image is shifted upwards by 50% of its total height.

The same applies in the horizontal direction, where a positive percentage value shifts the image to the right and negative to the left.

NOTE: Some projector manufacturers refer to a shift of half the image height as "100%". Furthermore, the lens shift stated by the projector manufacturer is often an approximation. You're advised to make your own assessment of this value rather than relying on the manufacturer's stated lens shift. Entering an incorrect value may impede your ability to use WATCHOUT's calibration feature to align the projector.

The lens shift can either be determined and entered manually, or it may be derived as part of the projector calibration (see "Calibrate"). In general, it is best to measure the lens shift ahead of time, and enter it manually. That works well for projectors with a fixed lens shift, but may sometimes be harder when using variable lens shift in an installation.

Lock Lens Shift During Calibration. Select this option if you've determined the lens shift accurately ahead of time. This stops WATCHOUT from attempting to calculate these parameters, which may simplify the calibration procedure.

POSITION

This tab in the dialog box specifies the location, target point, rotation and focal length of the projector. While the values may be edited numerically, you typically use the "Calibrate" tab instead to determine all these values automatically.

Position/Point At

Specifies the position and target position of the projector, in 3D space. The target position of a selected projector is indicated by a yellow point at the end of the projection beam in the Stage window. To change the position interactively, drag the projector in the Stage window. Likewise, to change the target position, drag the yellow point in the Stage window.

To orient the projector in 3D space, use the "View" commands on the Stage menu to rotate the Stage window in order to look from the top or from the side. Alternatively, use the "View" tab in this dialog box to move the projector while viewing the scene from the projector.

Rotation Around Optical Axis

Rotates the projector, allowing you to use the optimal angle to cover the projection object.

CAUTION: Some projectors have restrictions on how they may be mounted or rotated, due to air-flow and heat reasons. Always check the documentation before using a projector in any other orientation than horizontally.

Width / Distance Ratio

The focal length of the projector's lens, expressed as the ratio between the image width and projection distance. A small value here indicates a wide angle lens, while a larger value indicates a long throw lens.

Lock Zoom During Calibration

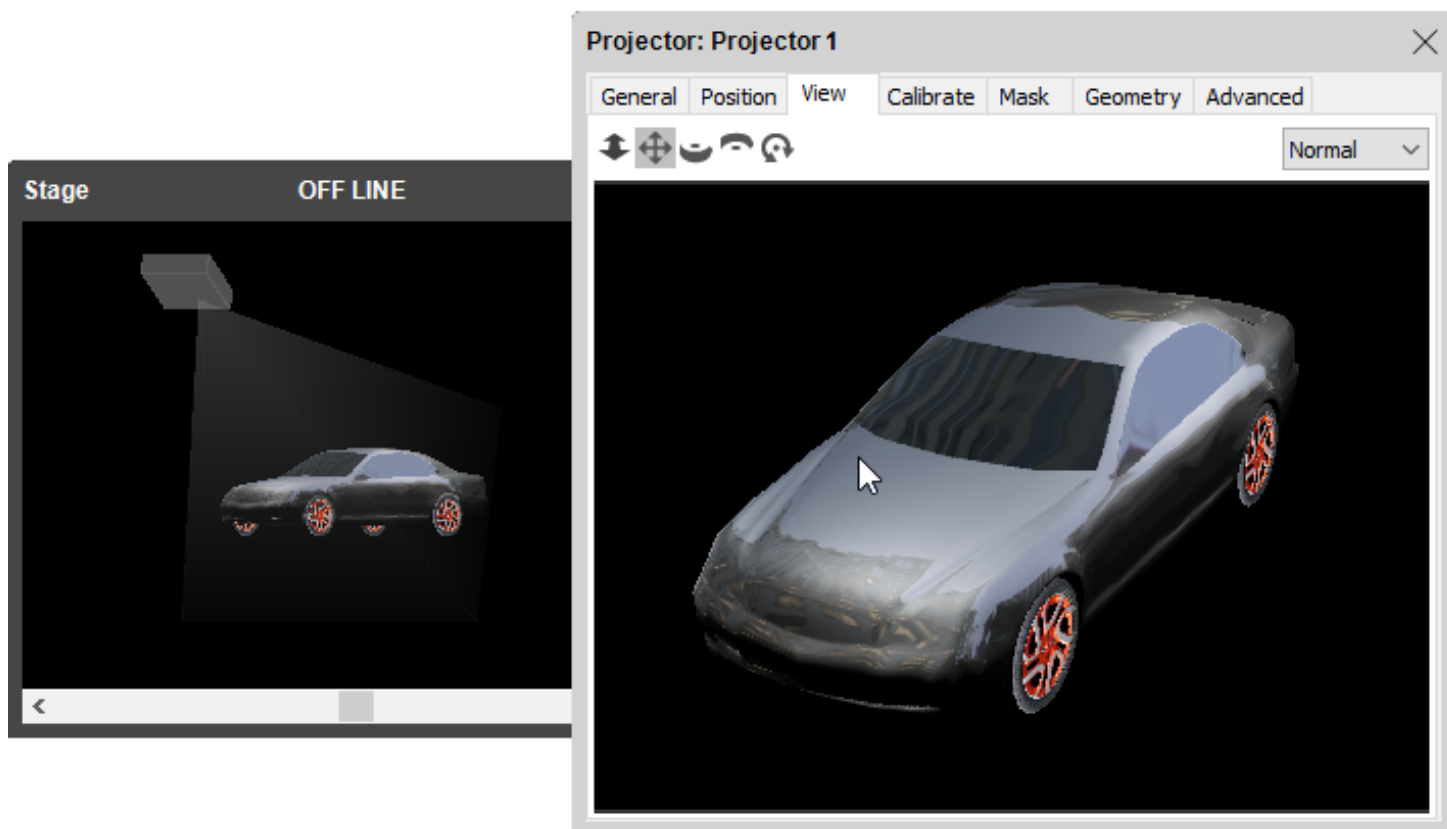
Checking this option will improve end-results if you are projecting onto objects that will vary in their distance from the projector. In order to get optimal results, the width / distance ratio (zoom) must be known from the projector specification.

VIEW

The View tab in the 3D Mapping Projector's dialog box shows the scene from the projector's viewpoint, as if looking through a camera's viewfinder. This has two important advantages:

- It allows you to position the projector interactively, using the controls along the top of the dialog box, which is often more intuitive than dragging the projector and its target point in the Stage window.
- It shows you the scene from the projector's viewpoint, allowing you to visualize the scene from any vantage point – not just the front, top and left views available in the Stage window.

As you adjust the view position using the controls along the top of the dialog box, the Stage window shows the effect this has on the projector. Moving the projector in this way also updates the numeric values in the Position tab accordingly.



Double-click a Projector in the Stage window and select the View tab to move the projector interactively using the controls along the top of the tab.

The controls along the top of the tab are:

-  **Track.** Move the projector forward or backwards.
-  **Dolly.** Move sideways and up/down.
-  **Orbit.** Orbit around the target.
-  **Pan.** Rotate projector around its center, moving the target.
-  **Rotate.** Rotate projector around its optical axis.

HINT: You can select a control and then drag in the view area, or simply drag the control. Press the initial letter on the keyboard to switch among the controls.

The menu in the top right corner controls the behavior of the physical projector connected to the display computer, with the following options:

Normal. Project the image displayed in the View tab.

Muted. Project nothing (black). Useful when calibrating a projector, in which case you may want to mute other projectors.

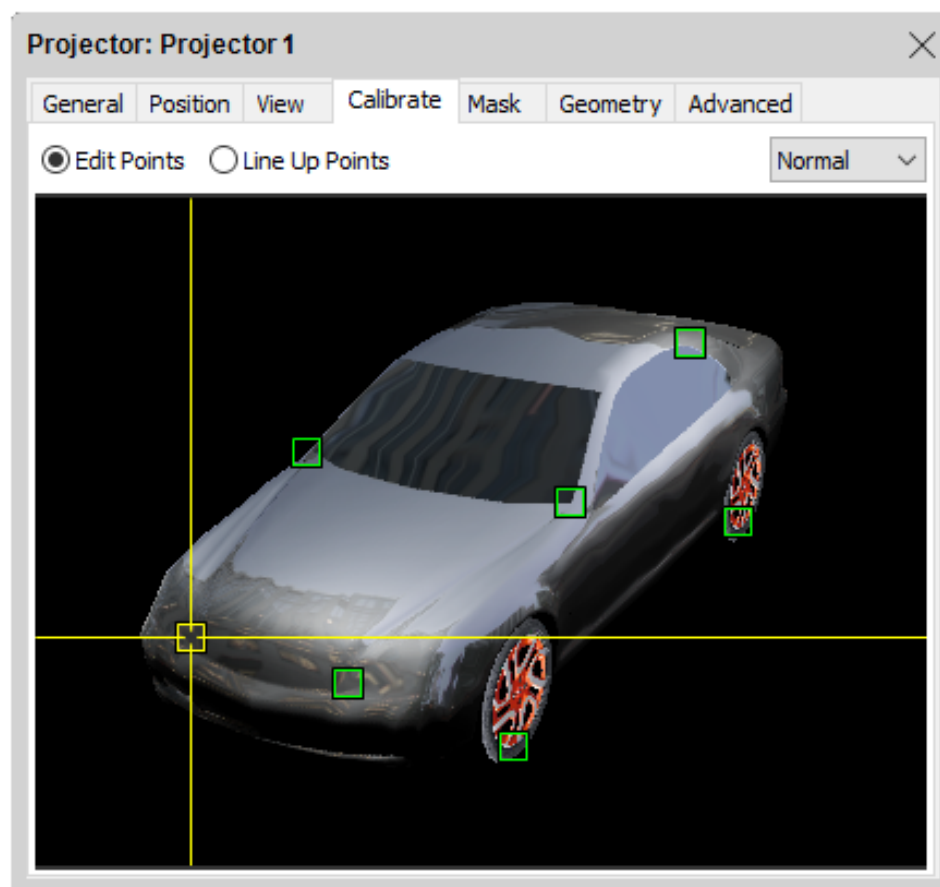
White. Project all white. Useful to see the coverage of the projector, to make sure it covers the mapping object.

White Masked. Project white, but include any masks defined on the Mask tab.

Pattern. Project a distinct pattern, which is useful when focusing the projector.

CALIBRATE

The Calibrate tab shows the same image as the View tab, but allows you to attach and adjust calibration points to the projector and the real-world projection object. This semi-automatic calibration method allows WATCHOUT to calculate all the settings on the Position tab (as well as, optionally, the lens shift values). This is useful when mapping images onto a physical, three-dimensional object.



Select the Calibrate tab and add calibration points to your physical 3D object.

To use this method, you must:

- Have a physical object to map images onto.
- Have a 3D model that accurately matches the physical object.
- Display the 3D model using a Cue on a timeline.

- Place the physical projector so it illuminates the object as desired.
- Use the View tab to position the projector inside WATCHOUT in roughly the same way.

Once that's done, select "Edit Points" on the Calibrate tab and start adding points. To add a point, you click somewhere inside the 3D model, as shown above. To add a point close to an edge, press the mouse down inside the model, then drag it towards the edge. Points can not be placed outside the model. You can add any number of points, but need to have at least six points. Calibration points should be placed at easily recognized positions on the model allowing you to accurately correlate the point in the Calibrate tab with the corresponding point on the physical object. Remove a point by selecting it and choosing Clear on the Edit menu.

HINT: Enlarge the dialog box to position points more accurately.

To calibrate the projector's position, do as follows:

- Select "Line Up Points".
- Grab and move one of the calibration points while looking at where it will be projected on the physical model.
- Move the point until it hits the same spot on the physical model.
- Do this for all calibration points until the image maps properly onto the model.

HINT: Use the tab key to switch between the "Edit Points" and "Line Up Points" modes, and arrow keys for precise positioning.

As you work your way through aligning the points onto the physical object, the color of the calibration lines may vary.

Yellow. The positioning of points on the model makes sense to WATCHOUT, allowing it to calibrate the projector's position accordingly (you'll also see the projector move in the Stage window, and the projected image move on the physical object).

Red. The position of some points doesn't make sense, and can not be used to calculate the projector's position.

Sometimes it may be hard to position the calibration points to avoid the red indicator lines. It's sufficient to have a single point off for this to happen. This can also be caused by incorrect **Lens Shift** values. If you're unsure about the actual lens shift, it's sometimes better to uncheck "Lock Lens Shift During Calibration," allowing WATCHOUT to calculate this as well.

NOTE: The 3D object must be stationary in the Stage window for this calibration to work. If you move the image in the Stage window, you need to start over with the calibration.

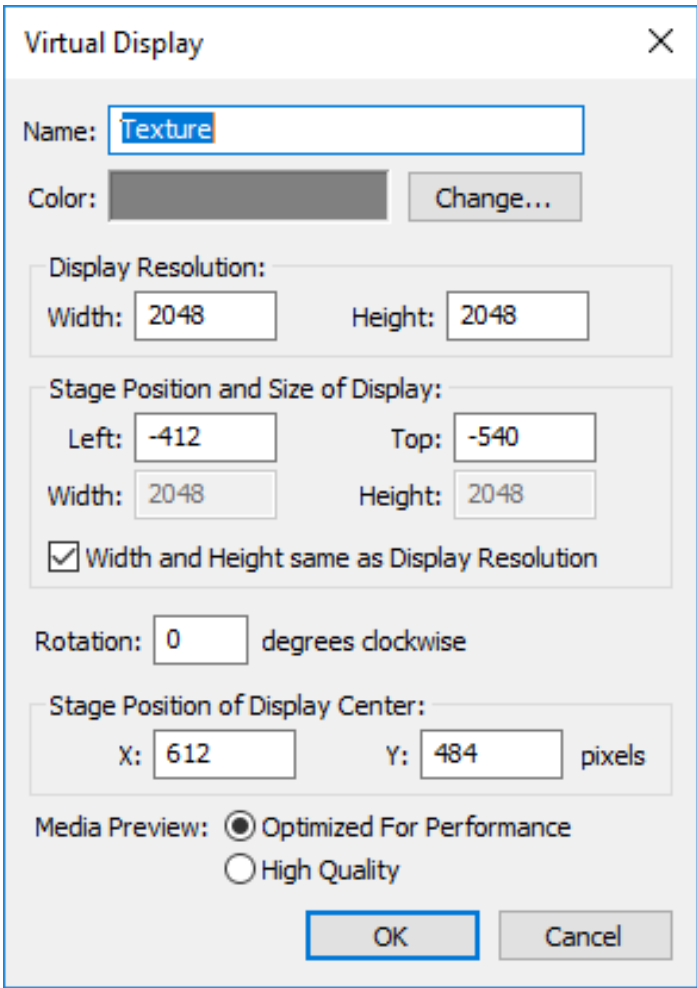
This video shows how the calibration feature is used:

<https://www.dataton.com/3d-projection-mapping-basics>

See common sections, later in this chapter, for the remaining tabs and fields in this dialog box.

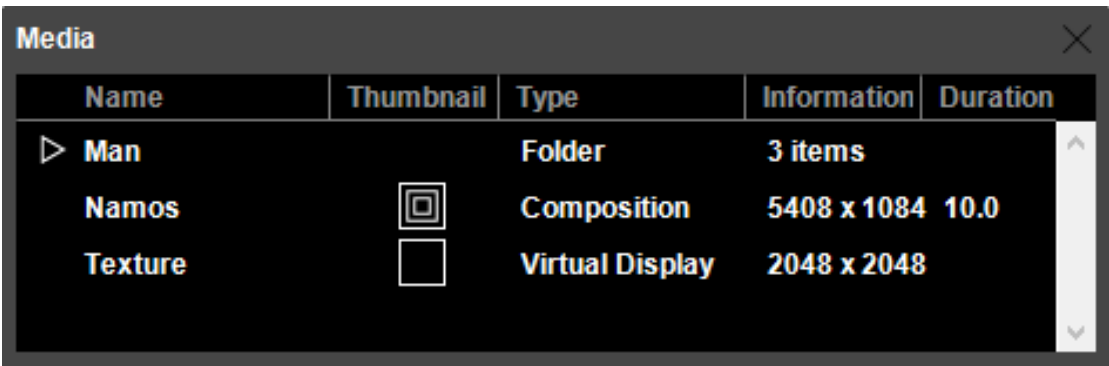
VIRTUAL DISPLAY

A virtual display is similar to a “2D Display/Projector” in many ways, except it is not associated with a physical display connected through a display computer. Instead, whatever is displayed on it is made available for reuse inside WATCHOUT itself.



A virtual display named “Texture” has been added to the Stage window.

When you add a virtual display you also get a new entry in the Media window with the same name.



The same virtual display also appears in the Media window.

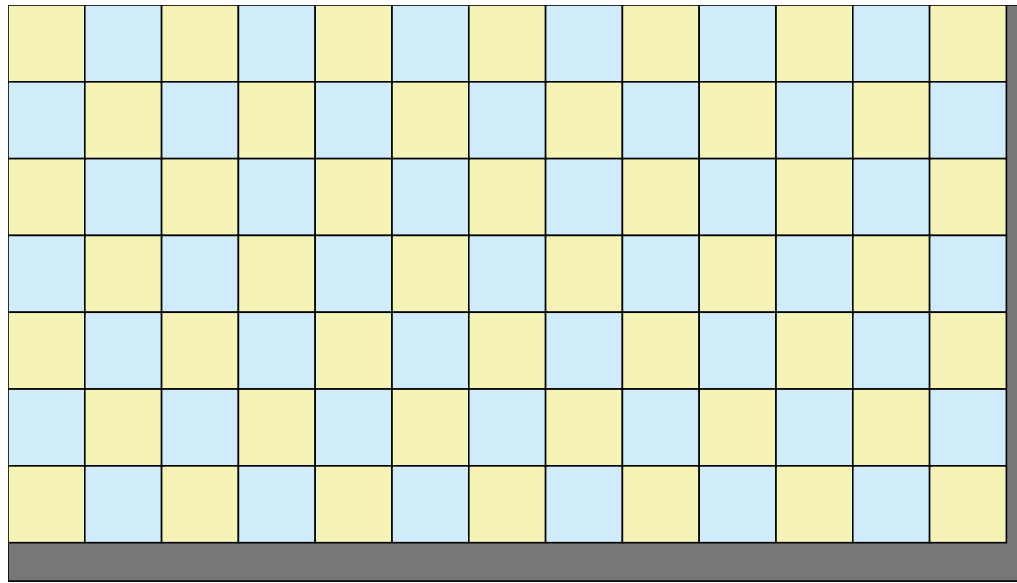
You can use this virtual display media anywhere you use other types of video or images in WATCHOUT, and you can apply all the same transformations and effects to it. This has two main applications:

- Manage LED wall modules, or other kinds of display devices with odd pixel dimensions, often connecting through some kind of processor, which manages several modules by mapping them into a common pixel space.

- Create textures for 3D objects using the full power of WATCHOUT, including multiple image and video layers, tween tracks, dynamic content (such as live video), etc.

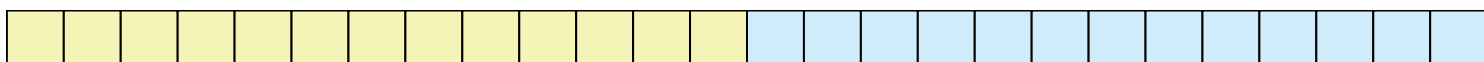
MANAGING LED WALL MODULES

LED walls are typically made up of a large number of square “LED tiles”. Each tile has a resolution based on its physical size and LED density, for instance 144 by 144 pixels. Due to this unusual resolution, and the common need for using a large numbers of tiles, the tiles aren’t connected directly to a display computer, as is the case with most other displays. Instead they’re connected through an “LED wall processor”. This processor accepts standard video formats, such as 1920x1080. The LED tiles it manages are then mapped into this pixel space by configuring the system and the processor accordingly. This mapping can be straightforward by placing all tiles in rows and columns to recreate most of the 1920x1080 display.



A large number of 144x144 pixel LED wall tiles mapped into a 1920x1080 pixel space.

More often, the pixel budget is used in more creative ways, for example as a narrow and very long strip.



26 modules making up a narrow strip of 3744 by 144 pixels.

When producing the presentation in WATCHOUT, you generally want to have the displays in the Stage window arranged in a way that resembles their physical arrangement, and not the arrangement fed to the processor. In the example with the long, narrow strip above, you want to be able to have text and images slide across that entire 3744 pixel wide display area.

While you can’t make a 3744 by 144 pixels regular “2D Display/Projector” in WATCHOUT (because no computer can output such an odd resolution), you *can* make a virtual display of that size. Images appearing on this virtual display can then be mapped onto a real display, as two copies of that single, long virtual display, like this:

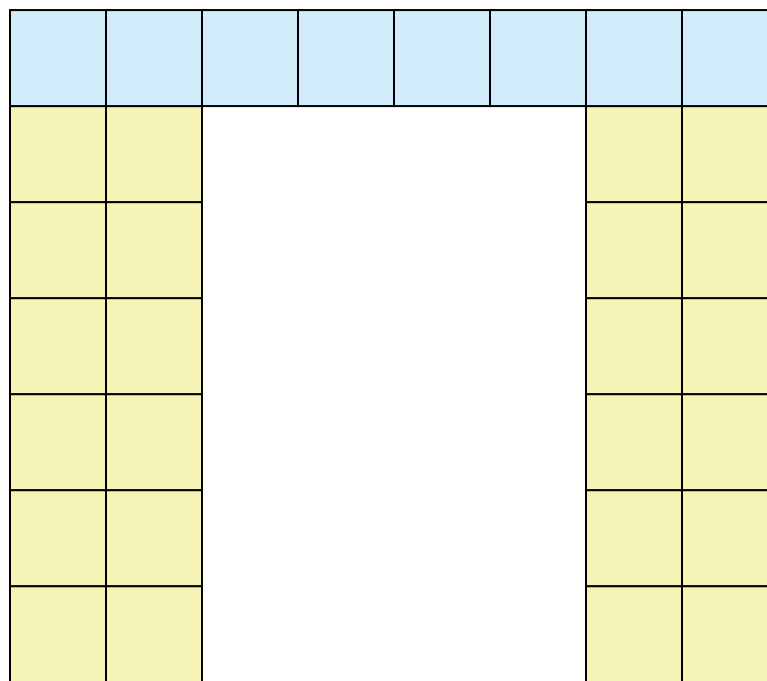


A long LED strip mapped twice onto a 1920x1080 pixel space.

The reason you need to map the long strip onto a real display is that the processor driving the LED will generally only accept standard video or computer resolutions, such as 1920x1080 in the example above. The processor will then do the reverse mapping, putting all the pixels back where they belong along the long, narrow strip of LED tiles.

IMPORTANT: When using virtual displays, always create as few virtual displays as possible. Do not create one virtual display per LED tile. In the example above, you could make either a single, long virtual display covering the entire 3744 pixels, or you could make two virtual displays side by side, each 1872 pixels wide (as shown by the colors above). Using a large number of virtual displays may degrade the performance of your system.

Here's another example of an arch-shaped structure built with the same kind of LED modules:



An arch-like structure built from 32 144-pixel LED modules.

Again when representing this in WATCHOUT, use as few virtual displays as possible, for example one for the blue strip along the top and one for each side. Then assemble the resulting three media objects onto a real "2D Display/Projector" using cues on a timeline in any appropriate manner to feed the pixels to the LED wall processor. This will then map them back onto the arch structure.

HINT: Use a set of cues on a paused auxiliary timeline to map the virtual display media elements onto the real display, leaving your main timeline clean and uncluttered for your production work.

See this video for a more visual description of how this is done:

<http://www.dataton.com/producing-for-led-walls>

CREATING DYNAMIC TEXTURES

While you *can* use a simple image or video to texture a 3D model, it gives you very little flexibility in how the content is played and positioned. For instance, you can't do any of the following using that simple method:

- Position an image anywhere on the 3D model (the entire image will be mapped into the UV space of the 3D model, with no control over its placement).
- Compose multiple images, video and other content using several layers to build the texture (only a single image element can be used).
- Change the content mapped onto the 3D model over time (only a single image element is used for the entire duration of the 3D model's cue).
- Loop a piece of video used to texture the model (since the video doesn't have a cue of its own, there's no place to turn on looping).

All of these restrictions, and more, can be alleviated by first mapping whatever content you want onto a virtual display, using the full capabilities of WATCHOUT, and then using the virtual display's media item as the texture for your 3D model.

To use this method, follow the steps below:

- Create a virtual display of the desired resolution.
- Render content onto that virtual display using multiple layers and cues, as you normally use WATCHOUT.
- Locate the media item corresponding to the virtual display in the Media window.
- Add the 3D model to your timeline, positioning it as desired.
- Make sure the 3D model's cue is selected.
- Drag the virtual display's media item from the Media window onto the selected 3D model in the stage window.

Usually, the virtual display will be square, with a resolution that's a power of 2, such as 2048 by 2048 pixels. That's not required by WATCHOUT, but is customary for 3D texturing. Discuss this with your 3D artist. If desired, create the virtual display on a separate tier to keep it out of sight for other displays and projectors (see "Stage Tiers"). The resolution to use for the virtual display should be based on the following factors:

- The resolution of the content you're going to place onto it. There's no point in using a higher resolution than that of the content that will be rendered onto it.
- The physical size of the object on which you are projecting. If it is a small object, or only going to be viewed from afar, you won't be able to see any very high resolution content anyway.
- The resolution of the projector used for the projection. Since you often only use a part of the projector's raster image to cover the 3D model, the resulting resolution is often well below that of the projector.

Check out this video for an overview of how this technique can be done. The video also discusses how to use multiple virtual displays to texture different areas of a 3D model (see "Using Multiple Textures").

<http://www.dataton.com/3d-texturing-using-virtual-displays>

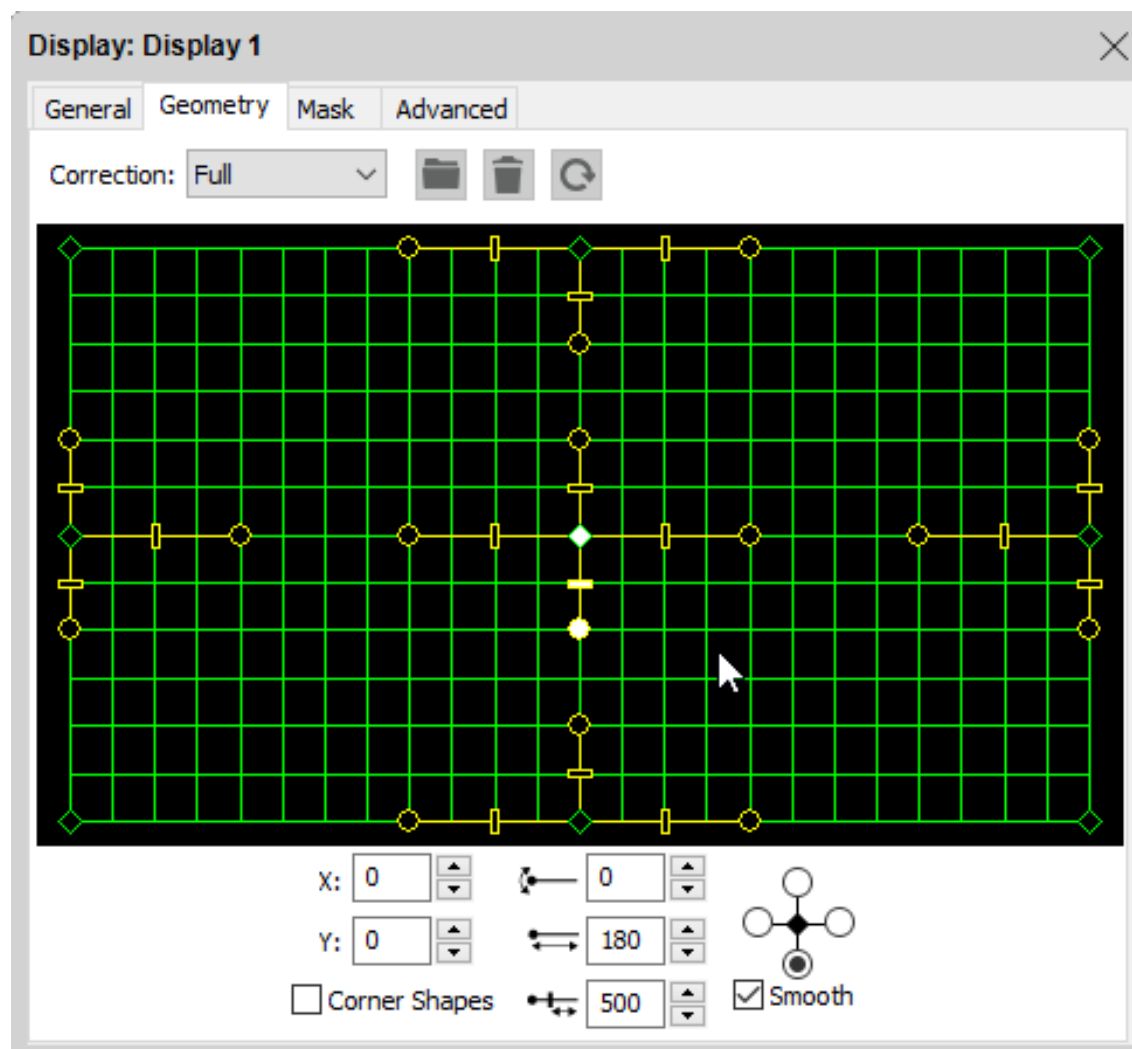
PREVIEW QUALITY

The quality of the virtual display media in the production software is lowered to increase performance. There is an option to view it in full quality by selecting the “High Quality” media preview setting in the virtual display dialog. This is useful, for example, when using the virtual display as a texture on a 3D model.

GEOMETRY CORRECTION

These settings allow you to compensate for any errors caused by projection off-axis (perspective), on a slightly curved surface or to account for any optical distortion.

NOTE: Projecting straight from the front onto a flat surface always gives the best image quality. Use geometry correction only when necessary.



Full geometry correction mode selected. Diamond-shaped handles move the correction points. Round handles adjust the curvature. Rectangular handles adjust the distribution between correction points.

Select the type of correction to be performed using the “Correction” menu, which has the following options:

None. No geometry correction.

Perspective. Provides perspective control, for use when projecting off-axis onto a flat screen.

Horizontal. Compensate for the screen curvature when projecting onto a horizontally curved screen.

Vertical. Compensate for the screen curvature when projecting onto a vertically curved screen.

Full. Maximum flexibility, for use when projecting onto spherically curved screen or other uneven topologies.



A screen requiring full geometry correction, as it is curved both horizontally and vertically.

The numeric fields at the bottom of the dialog box show values corresponding to the currently selected correction mode, point and handle. The buttons next to each numeric field adjust the value with single pixel accuracy.

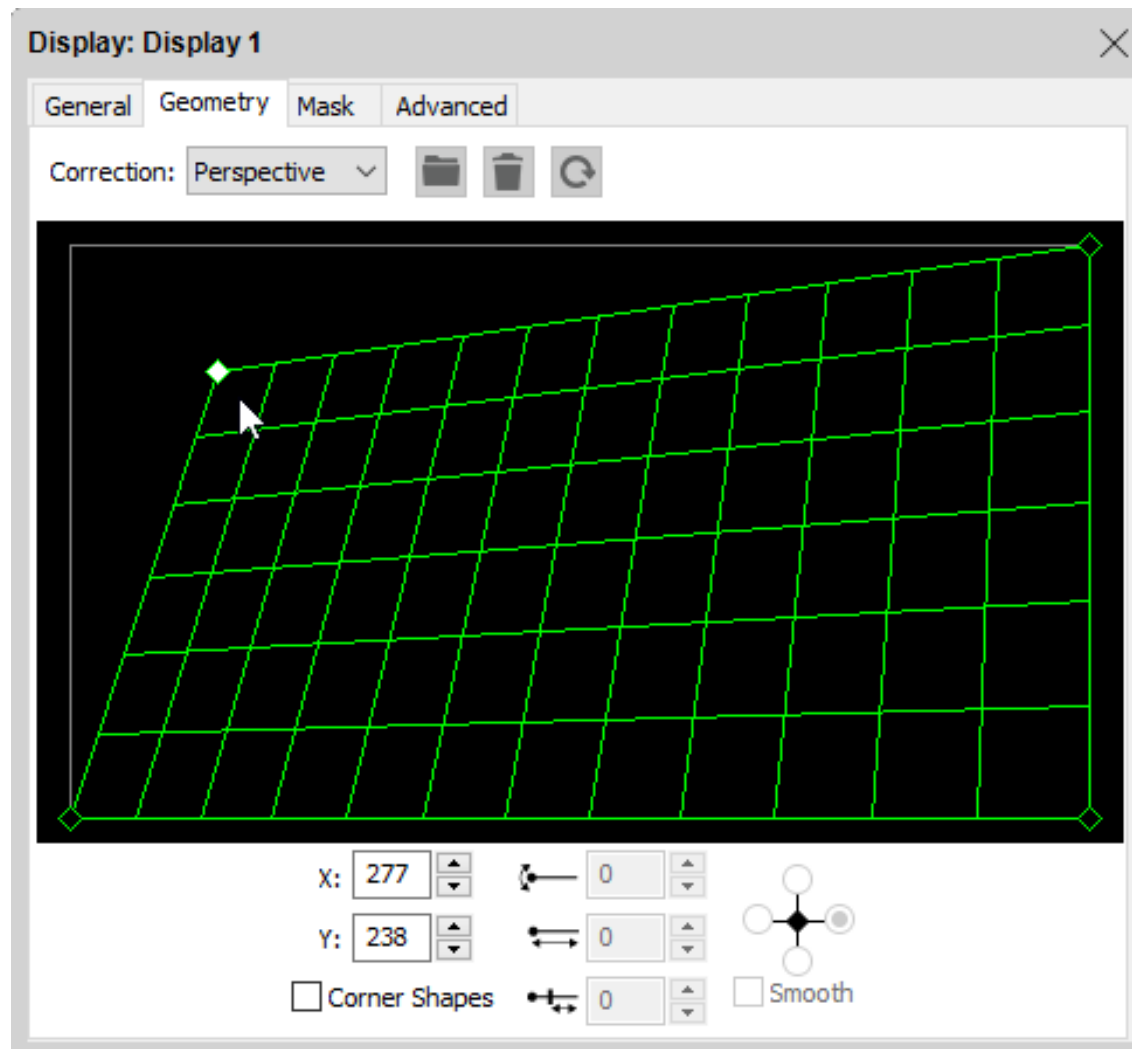
Corner Shapes. Adds bezier handles to the corners, allowing you to compensate for minor optical distortion, often associated with wide-angle lenses.

Smooth. Avoids abrupt kinks in points by keeping all tangents straight. Uncheck to allow opposing handles to move independently of each other.

HINT: Your display computers need to be online to see the changes live on screen as you make them.

PERSPECTIVE CORRECTION

To compensate for the keystone-shaped image caused by off-axis projection, choose Perspective on the Correction pop-up menu and drag the corners of the grid until the image appears rectangular on screen.

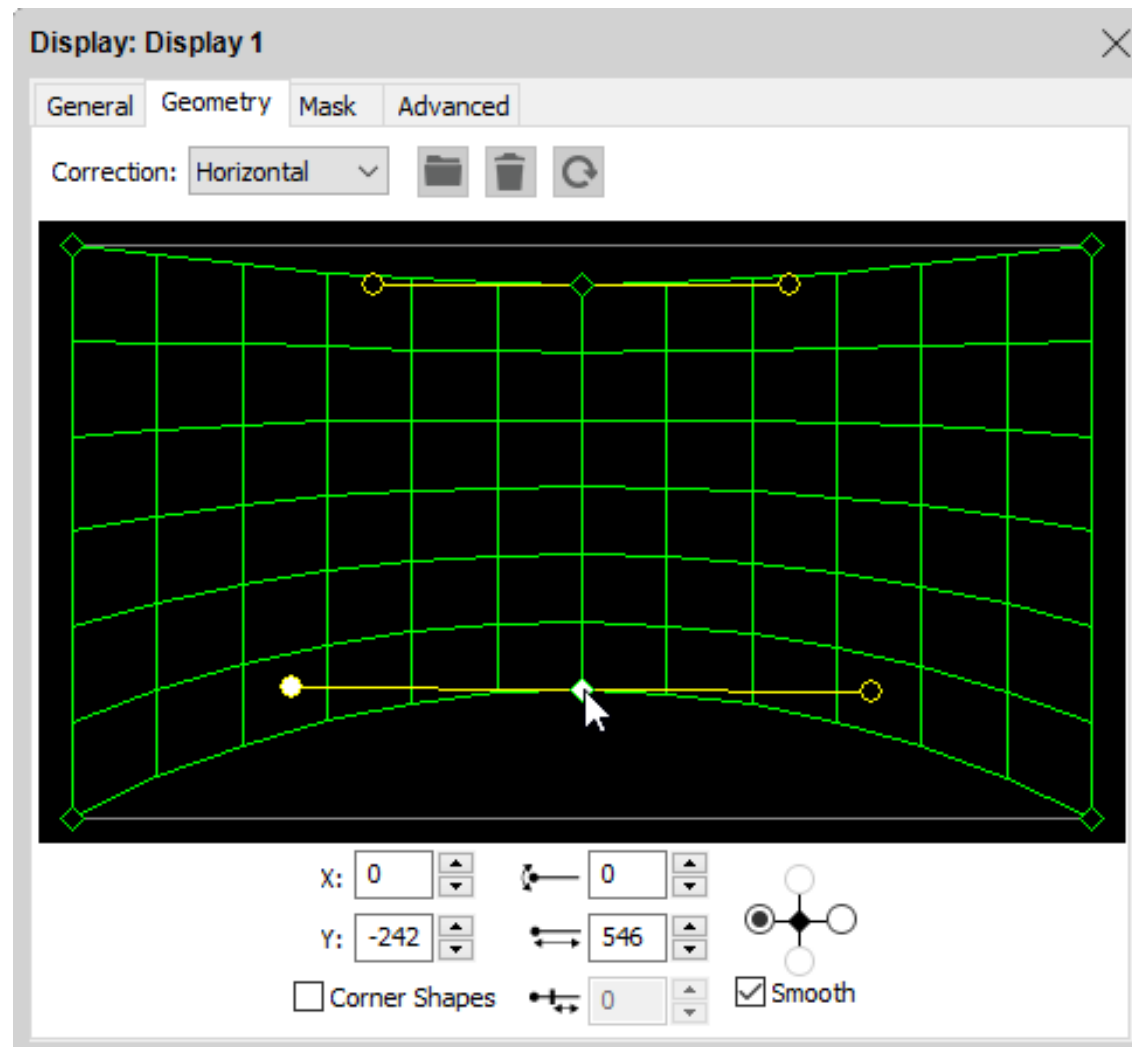


Drag a corner point to adjust the perspective. Enable "Corner Shapes" to compensate for optical distortion.

HINT: You can use the Copy and Paste commands on the Edit menu to transfer the geometry settings to other displays.

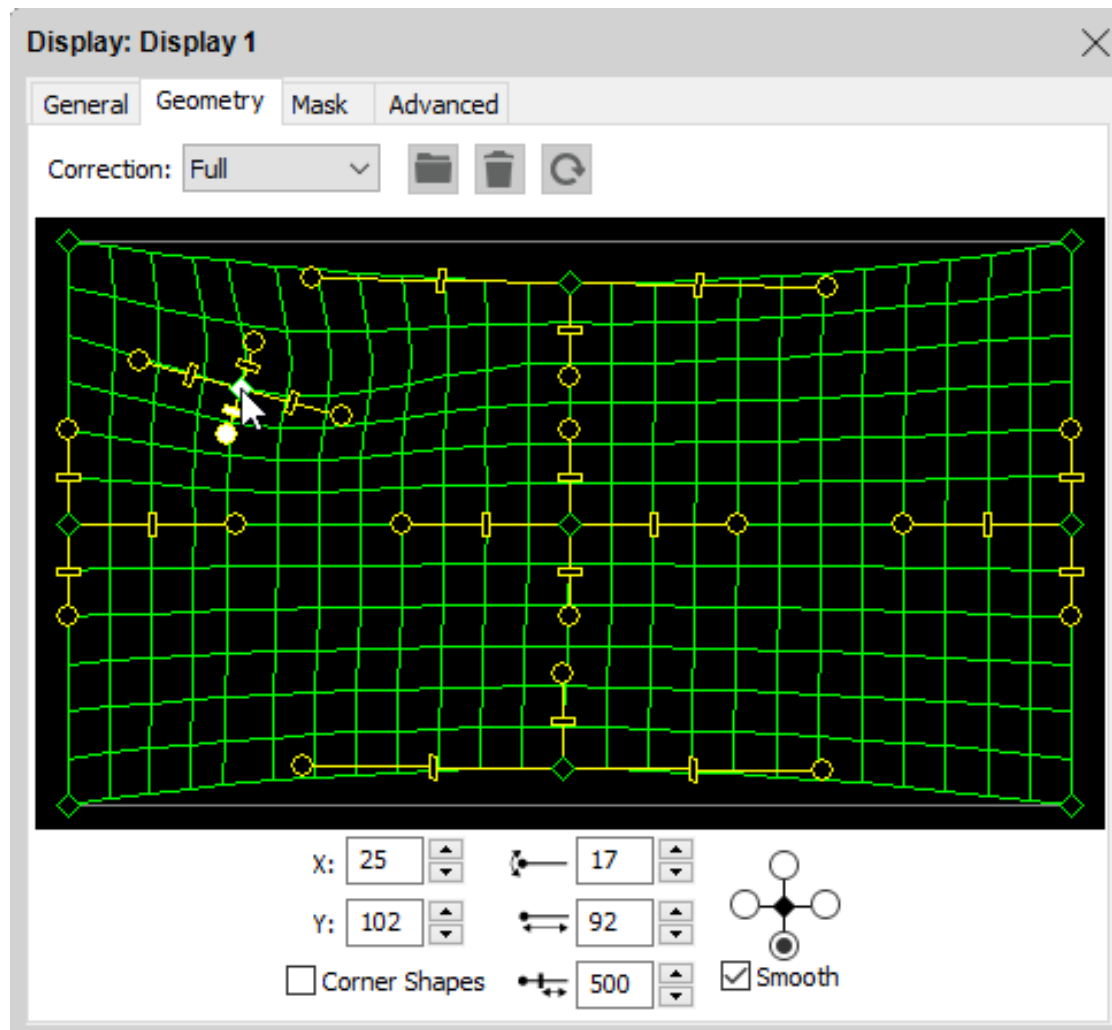
HORIZONTAL OR VERTICAL CORRECTION

Adds bezier handles to the top/bottom or left/right sides, allowing you to compensate for projection on a curved surface.



ADDING CORRECTION POINTS

In Full correction mode, you can add control points to the grid by Control-clicking the desired location. This can be used to handle geometry adjustments when projecting on asymmetric or uneven surfaces.



Control-click in grid to add points. To remove such a point, select it and press the Delete key.

HINT: Use the Copy and Paste commands on the Edit menu to transfer the geometry settings to other displays.

HINT: Correction points can be adjusted using the keyboard arrow keys.

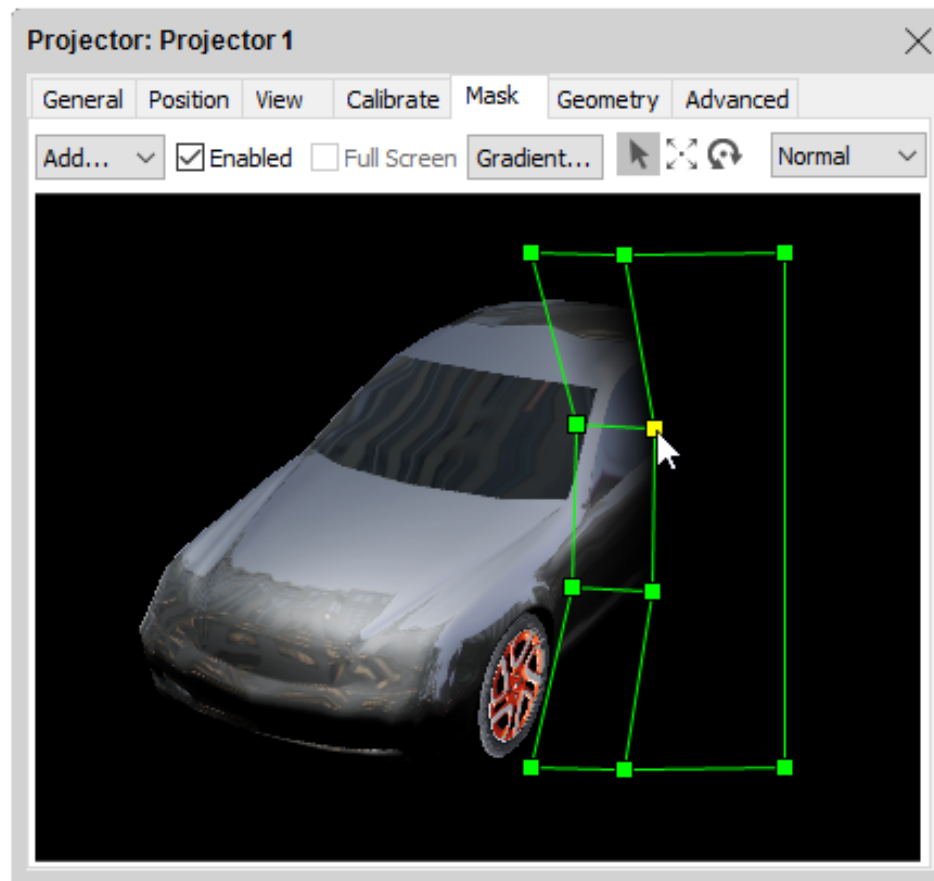
In some cases, when projecting onto complex geometry, you may be better off with a proper 3D model of the geometry, and then using the 3D mapping capabilities of WATCHOUT instead of trying to fit the image using geometry correction.

It may occasionally be advantageous to combine the two techniques. In general, you shouldn't need to use geometry correction for a "3D Mapping projector", assuming that the 3D model you have is an accurate representation of the object upon which you are projecting. But sometimes reality sets in, and things just don't fit perfectly. In this case, after using the calibration feature of WATCHOUT to calibrate the projector position as far as possible, apply some geometry correction as a last resort in order to better fit the image onto the model.

NOTE: Any geometry correction applied to a "3D Mapping projector" will be temporarily disabled while using the calibration feature, since the distortion caused by the geometry correction interferes with the calibration.

MASKING

WATCHOUT applies automatic edge blending to overlapping 2D display areas. This is sufficient for most basic multi-display applications. However, this automatic method doesn't work when mapping onto three-dimensional objects with multiple **3D Mapping Projectors**. In this case, any masking required to blend the projectors' edges must be applied manually.



A feathered mask added to a projector.

To add a soft mask to a projector, select its Mask tab and add the desired type of mask using the "Add..." menu:

Left, Right, Top, Bottom. Adds a mask along the specified edge. Use this to add custom edge-blend masks when the default one is insufficient, or as a starting point for another mask.

Rectangle. Adds a rectangular mask, with a feathered edge along all four sides.

Oval. Adds an oval mask, with feathered edge all around.

NOTE: The masks added using this menu are intended as starting points only. You can create any shape of mask from any starting point by manually moving, transforming or editing the mask. In the example above, a mask was created using "Add: Right", and then moved and scaled as desired using the tools along the top.

Once a mask has been added, you can select, move, scale and rotate it using the tools along the top:

 Select and Move.

 Scale.

 Rotate.

You can add any number of masks. Select which mask to manipulate using the arrow tool. The selected mask has a solid outline. When using the Scale or Rotate tools, an anchor point is shown. To scale or rotate around another point, move this anchor before scaling/rotating the mask.

HINT: You can use Copy and paste to copy the selected mask from one display to another, or between shows.

Uncheck “Enabled” to temporarily suppress a mask without removing it. This is useful when working with multiple masks across several projectors.

EDITING THE SHAPE OF A MASK

To edit individual points in a mask, rather than the mask as a whole, double-click the mask with the arrow tool. Selection points appear for all vertices in the mask. Select individual points, or drag to select multiple points. Selected points can be moved, scaled or rotated using the tools along the top. To add new points, click a line between two points using the Select tool (which shows a pen cursor to indicate this). Delete a point by selecting it and choosing Clear on the Edit menu.

The outer points along a mask’s edge define the width of the feathered area. Move the outer points closer to the inner ones to reduce the width. Delete outer points to remove the feathered area. Alternatively, double-click a point to open its dialog box and select this behavior.

HINT: Make sure there’s an image on stage that appears on the display, allowing you to see the feathered edge.

HINT: Masks and their points can be nudged using the keyboard arrow keys.

To stop editing a mask, click outside the mask with the arrow tool.

EDITING THE GRADIENT OF A MASK

By default, a linear gradient is applied to the edge of a mask. To change the curve of the gradient, select the mask and click the “Gradient...” button. This displays a dialog box similar to the one used to edit the standard edge blend gradient in the Preferences dialog box (see “Edge Blend”). Use the same technique as described there to edit the gradient curve.

IMAGE MASKS

Still images can also be used as display masks. To create an image mask, drag an image media item from the media list to the mask tab of a display dialog. This creates a grayscale mask version of the image, where darker colors are opaque, and brighter colors are more transparent. This is useful, for example, if you want to be able to draw your masks in another software application, for example Photoshop.

Once an image mask has been created, it can be scaled and rotated in the same manner as other masks. You can also set it to full screen mode (unlike other display masks) by checking the “Full screen” check box, which becomes available when an image mask is selected. In this mode, the image will be automatically stretched and placed to cover the whole display surface

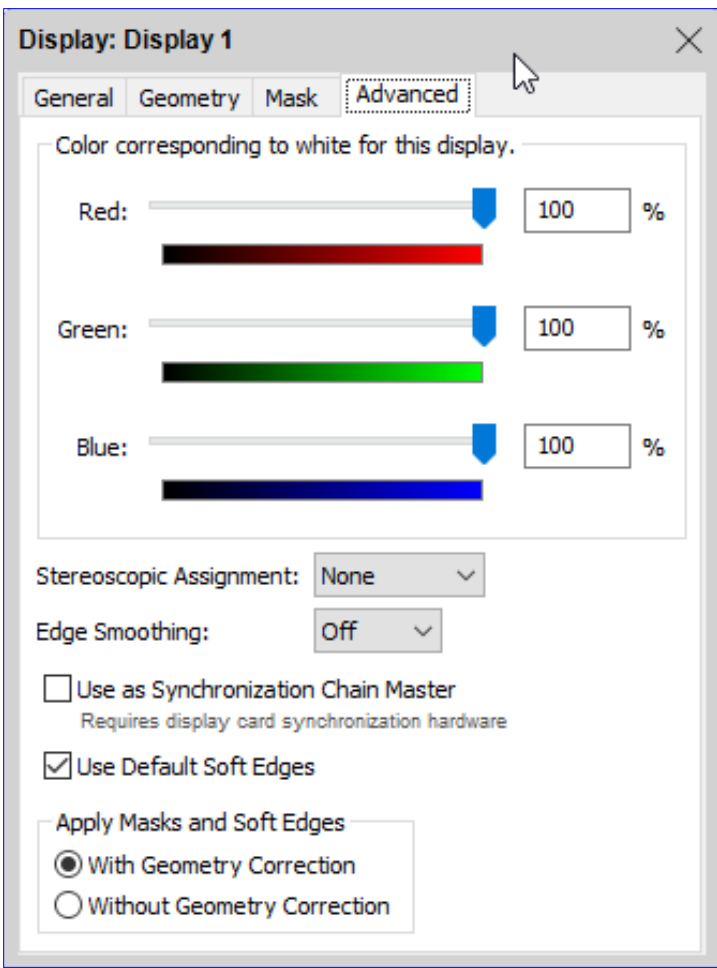
OTHER USES FOR MASKS

While this masking feature is primarily designed to handle projector blends for 3D mapping purposes, it can also be used as a general masking tool for both 3D and 2D projectors. For instance, if you’re projecting onto the outside wall of a building, you may want to mask out windows and other areas where projection is not desired. This can be accomplished by adding the required number of masks to the projector.

You can also use manual masking in place of the automatically generated edge blends, for example to blend between different types of projectors or where the automatic edge blending doesn't offer sufficient control. If you design your own custom masks, turn off the automatically generated blending masks by unchecking "Use Default Soft Edges" on the Advanced tab (see below – applies to 2D Projectors only).

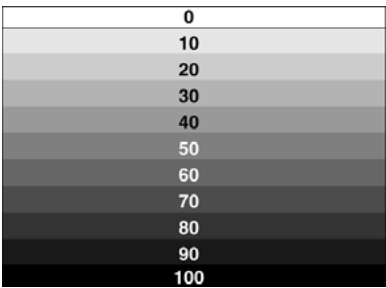
ADVANCED

This tab contains some miscellaneous and rarely used functions.



COLOR

Ideally, all displays in a system should be properly color matched. However, sometimes you may have to deal with projectors with different lamp life or other minor discrepancies. In such cases, WATCHOUT lets you adjust the white balance of a display device, making the overall image look more uniform. Use a colorimeter or an appropriate test image, such as the one shown on the right, when adjusting the white balance.



NOTE: Display computers need to be online for you to see the changes as you move the sliders.

Alternatively, use the color calibration features built into most projectors. These can often give better results when used by a skilled operator.

STEREOSCOPIC ASSIGNMENT

This setting applies to the "2D Display/Projector" only. Controls the stereoscopic channel reproduced by this display device. You must use separate projectors for the images reproduced for each eye in a stereoscopic presentation. Select the appropriate eye affinity on this menu. Leave this set to None for normal (non-stereoscopic) presentations.

For proper reproduction, each projector in a stereoscopic pair must be equipped with filters matching those used in the glasses worn by the viewers. Please contact your projector vendor for details on supported 3D projection technologies.

IMPORTANT: You must place the related left and right eye projectors at the same stage position. To avoid WATCHOUT attempting to create edge blends for those overlapping projection areas, place the set of left eye and right eye projectors on separate stage tiers (see “Using Stage Tiers for Complex Display Arrangements”).

EDGE SMOOTHING

Use this option to smooth out the jagged edges that can appear when for example rotating media, or when using geometry correction. The setting has four levels: Low, Medium, High, and Off.

This setting should be used with care if you don’t have a powerful graphics card, as it may have a negative effect on performance.

USE AS SYNCHRONIZATION CHAIN SOURCE

WATCHOUT synchronizes all computers in a display cluster via the network. This is sufficient in most cases. However, in some cases, frame-accurate synchronization of display refresh cycles is required. For instance:

- When driving a large LED wall using more than one display computer, or using multiple outputs from a display computer using AMD graphics cards.
- In broadcast applications, where all displays used on set must be locked to the house sync to avoid camera interference.

In such cases, WATCHOUT can be used with hardware synchronization solutions from AMD (S400) and NVIDIA (Quadro Sync), in conjunction with compatible, professional-grade graphics cards.

Both these solutions work in about the same way:

- All display computers must be equipped with synchronization cards and compatible graphics cards.
- One computer in the display cluster is designated as the synchronization source.
- A separate synchronization cable connects from the output(s) on the source to the performer cards.
- Optionally, a “house sync” (genlock) signal is connected to the synchronization source.
- The graphics cards’ and synchronization cards’ settings are configured according to the manufacturer’s recommendation.

Once this is done, enable “Use as Synchronization Chain Source” for a display connected to the display computer acting as the synchronization source.

IMPORTANT: For this hardware synchronization solution to work reliably, you may need to ensure that all displays are turned on before the display computers are powered up.

In addition, the SDI boards of Dataton media servers feature synchronization capabilities. For details on which type of synchronization your Dataton media server supports and how to set it up, please refer to its manual.

USE DEFAULT SOFT EDGES

This setting applies to the “2D Display/Projector” only. Uncheck this if you decide to make custom edge blend masks manually, rather than relying on the automatically generated edge blends, (see “Image Masks”).

NOTE: The automatically generated edge blend mask is sufficient in the vast majority of cases. Before you start creating individual edge blends manually, first make sure your projectors are well matched and set up properly. In particular, avoid any “high brightness” or “office” gamma setting modes, selecting more linear modes such as “film” or “photo” instead.

APPLY MASKS WITH/WITHOUT GEOMETRY

This setting allows you to specify if display masks and soft edges should be affected by geometry correction, or not.

USING MULTIPLE DISPLAY OUTPUTS

Depending on the graphics card, a self-build display computer running WATCHOUT can support up to six displays. Dataton media servers offer up to 12 simultaneous outputs from a single server. These displays operate independently of each other, and can be freely positioned and rotated.

To drive multiple displays from one computer, enter the output number of each display in its dialog box (see illustrations under “2D Display/Projector” and “3D Mapping Projector”). Use the same computer name or IP-number for these displays.

IMPORTANT: Connecting multiple displays to one computer increases the load on that computer. You will need a more powerful computer, with a multi-core CPU and a fast disk drive or SSD, to drive multiple displays. For best performance, you may need to limit the number of displays.

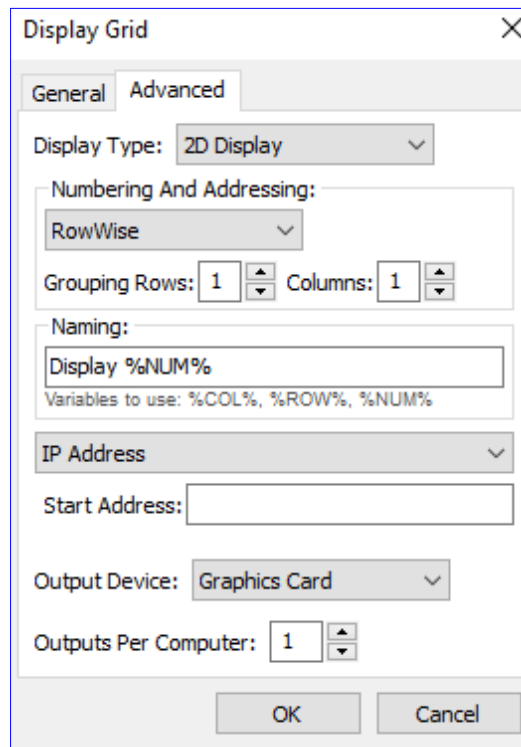
EDITING MULTIPLE DISPLAYS

You can edit properties of multiple displays, of the same type and targeting the same output device (Graphics Card or SDI), at once, by selecting them and then double-clicking one of them, or by right-clicking one of them and selecting “Specifications...”. This will open a display dialog in a modal manner, which means you can not work in any other window on the desktop while this dialog is open.

In this dialog you should only edit those properties that you want to be the same for all the displays you selected, for example color or address. If the address or name text fields are empty in this dialog, it means that those values are currently different for the displays you selected. Please note that the mask and geometry tabs are not visible in this dialog as these properties can not be edited in this way. The same goes for the view and calibration tabs of the 3D mapping projector.

CREATING MULTIPLE DISPLAYS

You can create multiple displays at once, formed in a grid, using the “Add Display Grid...” command, which can be found on the Stage menu, or on the right click menu of the stage.



Grid Size

Specifies the number of columns and rows in your display grid.

Display Resolution

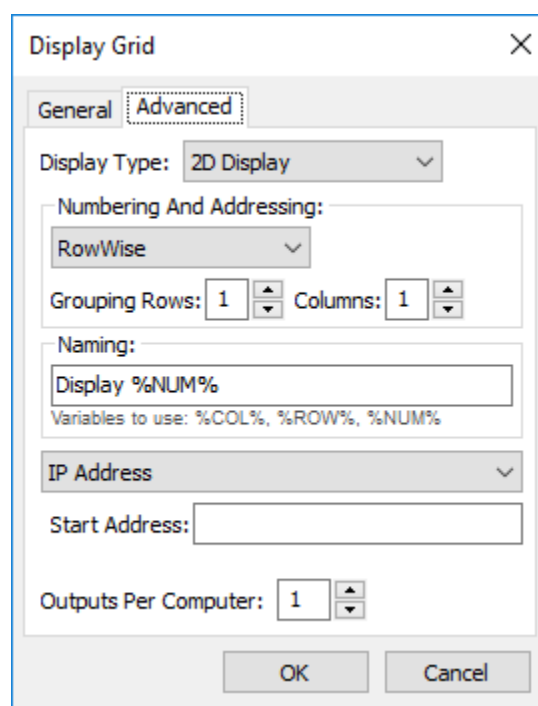
All the displays will have the same resolution.

Start Position

Specifies the top left corner of top left most display in the grid. If you used the right click menu to open this dialog, this value will be prefilled with the position where you clicked.

Spacing

Here you can specify how the displays should be separated/overlapped. Input a positive value to have the displays separated by that amount of pixels, or input a negative value to get an overlap with that amount of pixels.



Display Type

Here you can select if you want to create normal 2D displays, or virtual displays.

Numbering and Addressing

Specifies if the displays should be numbered/addressed in a rows or columns. You can also specify if the displays should be grouped in any way when numbering/addressing.

Naming

All displays should have unique names. This is why naming with variables is very useful. In the example dialog above, the variable %NUM% is used, which will be replaced with the number of each display. The numbering order can be specified as described in [“Numbering and Addressing”](#). Other variables you can use are %COL% and %ROW%, which represent the column and row number respectively.

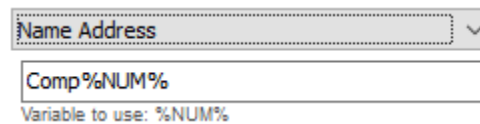
Addressing

Addressing of the multiple displays can be done in two ways: By IP or name address.

IP Address

By selecting “IP Address” in the selection box, as shown in the example dialog above, you can address the displays with IP addresses. In this case, just write the address of the first display computer in the text field, and the address will automatically be counted up for each new display computer. This numbering follows the rules specified in [“Numbering and Addressing”](#)

Name Address



The image shows a software dialog box for naming displays. At the top is a dropdown menu with 'Name Address' selected. Below it is a text input field containing the text 'Comp%NUM%'. Underneath the text field is a label that reads 'Variable to use: %NUM%'.

By selecting “Name Address”, as shown in the above image, you can specify named addresses for all the displays. This is done similarly as naming the displays (described in [“Naming”](#)), except you have only one variable available, %NUM%. This variable will be replaced with the computer number, to form the final address of each display. The numbering follows the rules specified in [“Numbering and Addressing”](#)

Output Device

The output device configuration for Graphics Card or SDI. For more information about output configuration, please see [“Output configuration”](#).

Outputs Per Computer

The number of outputs per display computer also affects the addresses of the displays and can be specified in the display grid dialog. The output number (if there is more than one) will be increased for each display created, making sure each display gets a unique address/output combination. The numbering follows the rules specified in [“Numbering and Addressing”](#).

DISPLAY SETUP

A display setup in WATCHOUT is a 2D display/3D mapping projector or a set of 2D displays/3D mapping projectors containing properties obtained outside WATCHOUT, for example by using a camera-based calibration system. These properties can be positioning, warping and/or blending.

WATCHOUT supports the [domeprojection.com](#)® generic format and MPCDI version 1.0 (Profiles 2D Media/3D Simulation, level 1 or 3) which can be imported by going to “Import Display Setup” in the

File menu and choosing the format of your choice. This will open a dialog that is specific to the selected format.

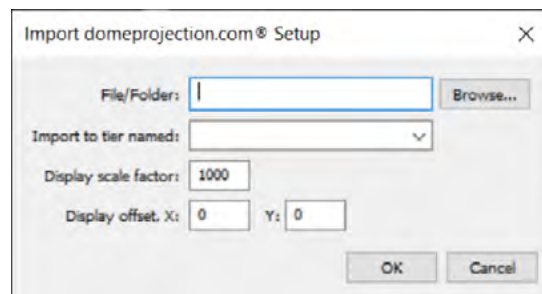
Both formats require specification of a file or folder, a target tier, and an offset.

File/Folder. Specifies a file or folder that contains the Display Setup data.

Import to tier named. Controls where the imported display setup will be placed.

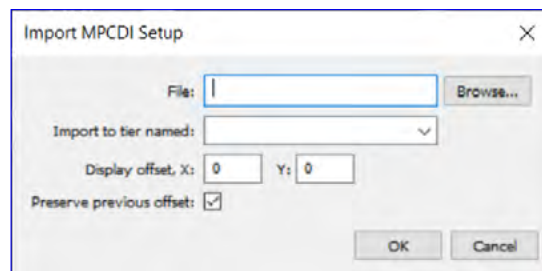
Display offset. Applies an offset to the positions of imported displays.

In addition to the three common fields of the two import dialogs, each of them has a unique setting.



Import dialog for domeprojection.com

As domeprojection.com® setups are often exported with normalized values, there is a “Display Scale factor” option available in the import. The normalized dimensions of the displays will be multiplied with this value before appearing in the Stage window.



Import dialog for MPCDI

The MPCDI setup import has a “Preserve previous offset” setting which lets you decide whether to keep the offset of a previously imported display setup when it is re-imported. When this is selected, whatever is entered in the Display Offset fields will be ignored in favour of the value specified during the last import of the MPCDI setup.

IMPORTANT: When importing an MPCDI file that has multiple buffers, the selected tier will not contain any imported display data. Instead, this tier is used as a basis for sequential creation of new tiers onto which the imported display data will be placed.

NOTE: Be careful when moving imported displays around as their relative positions have been calculated precisely. If you alter them by accident, the setup can easily be recovered by using Ctrl-Z or by simply re-importing the setup. Importing a setup again, using the same files, will update the existing setup so that no duplicate setups exist.

SDI LINK TYPE

There are four different SDI link types available in WATCHOUT: Single-Link, Dual-Link, Quad-Link Interleaved and Quad-Link Quadrant.

Single, Dual and Quad refer to the number of cables used to carry the signal, and subsequently how many output channels that will be occupied by a given output resolution and link type combination.

For Quad-Link there are two sub-categories; Quadrant and Interleaved. Quadrant splits a frame into four sections and each section is then sent through a separate cable (output channel). In Interleaved mode each channel sends interleaved pairs of pixels. The link type to use is determined by your needs, resolution required and framerate.

More information on the Quad-Link subcategories can be found on the Deltacast website:

<https://www.deltacast.tv/technologies/4k-video>.

SDI CHANNEL ASSIGNMENT

Typically an SDI board has connectors for input and output with varying bandwidth capabilities which are usually expressed as 3G or 12G. An SDI board also has a maximum bandwidth capability. A 3G connector may be used for Single-Link resolutions up to DCI 2K at 60 Hz, for Dual-Link up to DCI 4K at 30 Hz or for Quad-Link up to DCI 4k at 60 Hz.

A 12G-capable connector may be used for Single-Link resolutions up to DCI 4K at 60 Hz. Its usage will typically disable subsequent connectors.

As an example, Dataton's WATCHPAX 60 model C media server has an SDI board with 8 connectors and a maximum bandwidth of 24G. Two of the connectors (one and five) have 12G capabilities whereas the other six are 3G only. Since the board has a maximum bandwidth of 24G it is not possible to use the 12G capabilities of connectors one and five and at the same time use any of the six 3G connectors. In fact, using 12G or 6G (Single-Link) capabilities of connector one or five will cause the subsequent three connectors to become occupied.

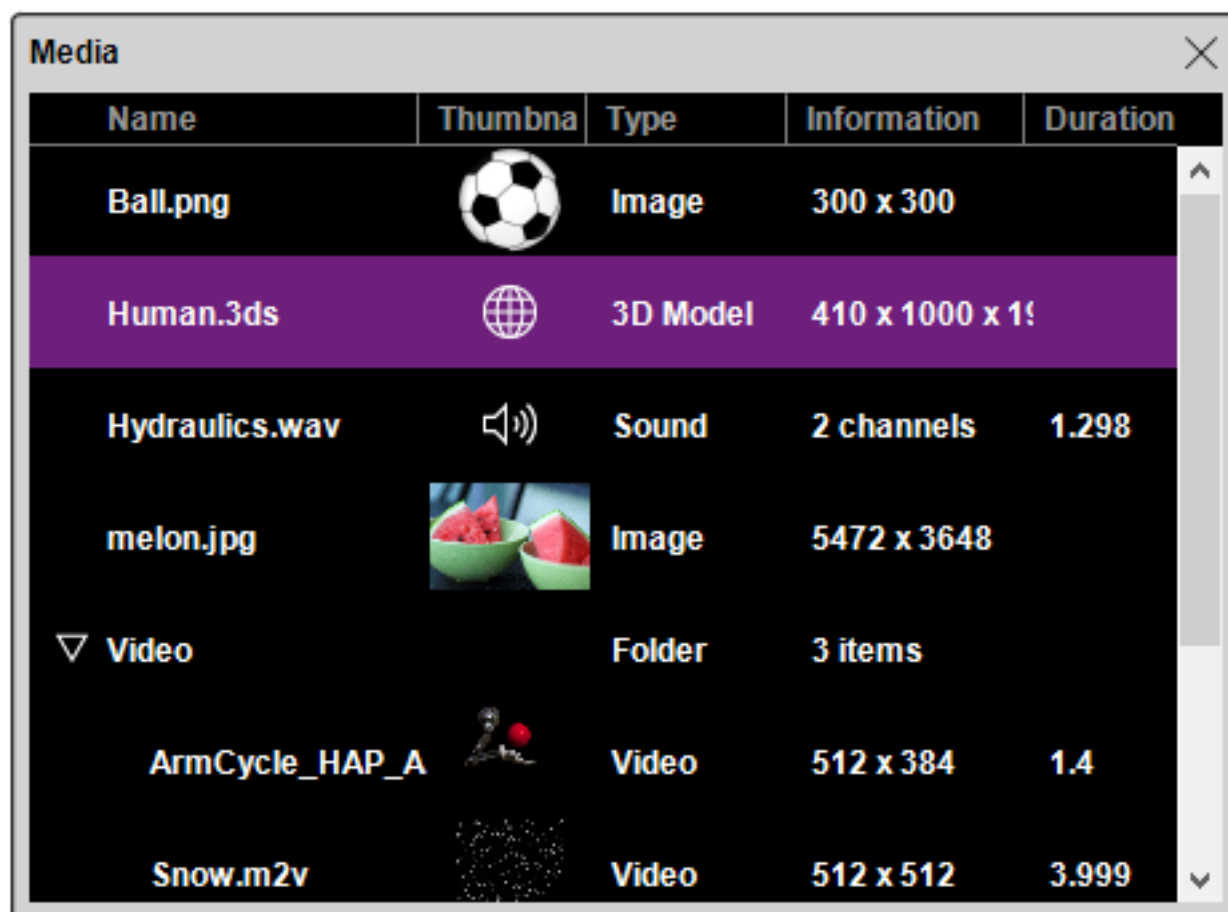
6. MEDIA

WATCHOUT is a compositing application; it does not include any media creation or editing functions. Most media to be used in your presentation must be supplied and edited using other means.

This chapter provides an overview of the media and file formats supported by WATCHOUT, as well as examples of popular applications used to create or edit such media files. A brief overview is also available online:

<https://www.dataton.com/watchout-overview-supported-media-images-sound-and-video>

IMPORTANT: Whenever possible, keep a show's media files in a folder that is located in the same folder as the WATCHOUT show file, or in a sub-folder. This allows the software to use relative file access paths, making it easier to move the show to another disk or computer. You can use the Consolidate To command to organize all files in this way.



Various kinds of media in the WATCHOUT Media window.

STILL IMAGES

Still images can be used as backgrounds or superimposed on other images. You can control the degree of transparency, scaling, rotation and other effects for all images (stills as well as moving images).

SUPPORTED FORMATS

WATCHOUT reads most popular image formats, including JPEG, Photoshop, PNG, Targa and TIFF.

Preferably, use an image format native to the application used to create/edit the images. For example, if you use Photoshop to edit images, save the images as Photoshop files. Although most image editing applications support saving or exporting to other file formats, doing so may cause a loss of information. This can make it difficult to edit the image later.

IMPORTANT: To use Photoshop images with WATCHOUT, files must be saved with “Maximize PSD File Compatibility” enabled. In Photoshop, this is under Preferences, File Handling, File Compatibility.

For photographic images (for example, scanned or shot using a digital camera), JPEG at a high quality setting often provides the best compromise between image quality and file size. Keep in mind that JPEG is a lossy compression format. This means that minor, normally unnoticeable, details in the original image may be lost in the compression process.

For computer-generated images with large, smooth areas (for example, screenshots), PNG is a suitable cross-platform format.

TRANSPARENCY

Some image formats include transparency information in addition to the image itself. This transparency information is sometimes referred to as an “alpha channel”, although some image editing applications use this term for other functions. Transparency can be used to create non-square images, holes inside images or semi-transparent areas, such as drop shadows. Photoshop, PNG, TIFF and Targa file are examples of file formats that support transparency.



Background image.

+



=

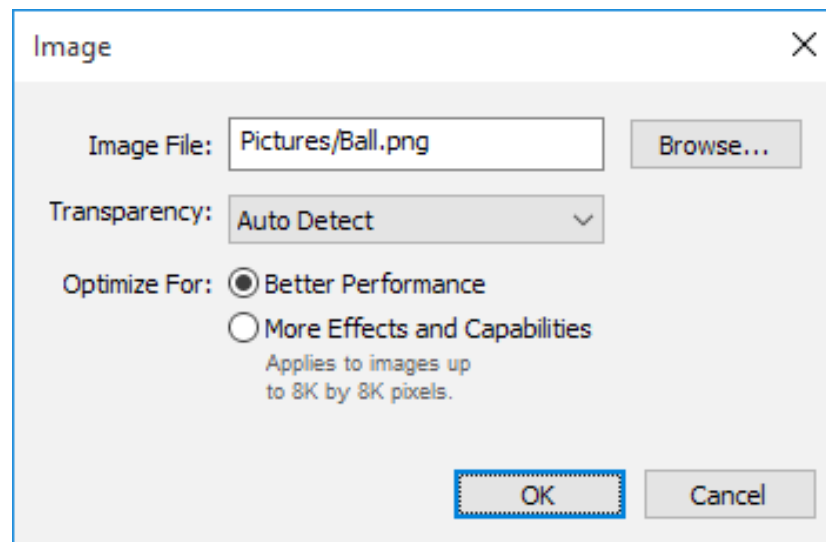


Result when composited in WATCHOUT.

WATCHOUT supports all common methods used for encoding transparency into images. Which method to use is usually determined automatically. If not, you can specify this manually by opening the Specifications dialog box for the image and choosing the desired type.

IMAGE SPECIFICATIONS

Double-click the name of an image in the Media window to change its specifications. Click the Browse button to link the media item to another file. This updates all cues to show the newly selected image.



Transparency

In most cases, WATCHOUT can determine the kind of alpha channel (transparency) being used in the image, if any. If the automatic detection fails, choose the correct type of alpha channel here.

Optimize For

WATCHOUT normally optimizes all images for best possible playback performance. However, this may occasionally limit your options when attempting to apply advanced features to an image, such as external control of its position or size (see [“External Control of Tween Tracks”](#)). To allow the use of such advanced features, choose “More Effects and Capabilities” instead.

IMPORTANT: Do not choose “More Effects and Capabilities” unless you need to, as doing so increases the load on your computer. This option is not available for images larger than 8192 by 8192 pixels.

VIDEO

WATCHOUT can play back videos saved in a Windows Media (DirectShow) or QuickTime-compatible format, such as MOV, WMV, AVI, DV and MPEG-1/2/4 (including H.264/AVC, see note below). A progressive – that is, non-interlaced – format is preferable (for example, “30p” or “60p”).

NOTE: H.264/AVC is limited to level 5.2. Videos encoded using a higher level will not be rendered.

NOTE: WATCHOUT can utilize QuickTime, including all its codecs, if available. However, QuickTime is not required by WATCHOUT. Some popular video formats often stored in MOV files will use native codecs built into WATCHOUT regardless of whether QuickTime is available or not. This includes the H.264 (MPEG-4), Animation, Prores and HAP codecs.

HIGH RESOLUTION VIDEO

WATCHOUT supports high resolution video using MPEG-2, H.264, Windows Media 9, Prores and HAP, as well as other codecs capable of high-resolution encoding and playback. Many MPEG-2 encoders have difficulty encoding higher resolution than 1920x1080, while other formats tend to be more flexible, and can support 4k and beyond, depending on hardware resources.

NOTE: High-resolution content using H.264, Windows Media and Prores codecs requires a comparatively fast CPU. Likewise, HAP and Prores requires a very fast disk/SSD subsystem. In general MPEG-2 content will play on less powerful computers.

COMPUTER-GENERATED ANIMATIONS

When using computer-generated moving images, you must specify the frame-rate and resolution of the resulting video during rendering. Generally, when combining computer generated and pre-recorded video material, the frame-rate is dictated by the live material. Alternatively, if your playback computer is fast enough, match the rendered frame-rate to the WATCHOUT display frame-rate (see “Display Framerate”); for example, 60 fps progressive.

As computer generated videos are by nature resolution independent, it is also possible to make videos that are much larger than a single display area. Very large videos may need to be pre-split in order to be used in WATCHOUT (see “Pre-splitting a Large Video”), depending on the performance of the display computers.

USING TRANSPARENCY

Some applications support inclusion of transparency information in the generated video file. Such transparency can either come from the source material (for example, a computer generated animation), or be added afterwards (for example a mask or color key applied to a video clip).

Being able to create arbitrarily shaped videos, or videos with holes in them, means you can combine videos and still images in many creative ways.

In order to include transparency information in the video file, you must choose a codec that supports this, such as the Animation or HAP codecs. If exporting the video, set to use “Millions+” of colors. The “+” at the end stands for the transparency information. This is sometimes called “Millions+Alpha”. You must also use an application that’s capable of reproducing and/or generating transparency information, such as Adobe After Effects.

HINT: In many cases, a clean green or blue background can be used instead of true transparency. Simply apply WATCHOUT’s Key tween track to the video.

VIDEO COMPRESSION

Due to the large amount of raw data in a video stream, storing and playing back uncompressed video is usually not feasible. Video compression is based on the concept of codecs. A codec (which stands for compressor/decompressor) is the part of the editing and display technology responsible for storing and playing back compressed digitized video.

There’s a wide variety of codecs available, each optimized for a particular kind of source material and playback requirements. WATCHOUT supports both Apple QuickTime and Microsoft DirectShow codec technologies for playback. Here’s a rundown of some of the more commonly used codecs:

MPEG-2. High quality. Used on DVD video discs. Optimized for camera video at normal frame sizes. Also supports high definition formats with some encoders (see “High Resolution Video” on page 111). The WATCHOUT MPEG-2 decoder performs de-interlacing automatically when required.

Quicktime Animation. Very low compression. Optimized for computer-generated material. Supports transparency when set to “Millions+” of colors.

Windows Media 9. High quality. Flexible in terms of frame size (useful for making tall or narrow videos), frame-rate and interlacing/progressive options. Demanding on processor speed when using high resolutions.

H.264/AVC. High quality. Flexible in terms of frame size (varies with encoder). Demanding on processor speed when using high resolutions. H.264/AVC is limited to level 5.2 in WATCHOUT. Videos encoded using a higher level will not be rendered.

Prores. Very high quality and low compression. Due to the high data rate, a fast disk/SSD is required. This codec is mainly designed for use in editing workflows, but given sufficiently powerful hardware it can also be used for playback.

HAP. Medium-to-high quality. Good playback performance. Due to the high data rate, a fast disk/SSD is required. The HAP-Alpha variant supports transparency when set to “Millions+” of colors during encoding. While HAP is built into WATCHOUT, it’s not available natively in most video encoders. Get the HAP codec here:

<https://github.com/vidvox/hap-qt-codec/releases/>

Choosing the right codec and codec settings for your source material and playback hardware may require some experimentation.

RECOMMENDED COMPRESSION FORMATS

Although WATCHOUT supports most video file formats, some formats tend to give better results. As a general guideline, use MPEG-2, H.264 or Windows Media 9. H.264/AVC is limited to level 5.2; videos encoded using a higher level will not be rendered. HAP is often a good choice too – particularly if you need to play numerous videos simultaneously. If you need transparency encoded into the video, choose either the HAP-Alpha or Animation QuickTime codec. WM9 as well as H.264 requires more processor power, but provides greater flexibility than MPEG-2 in terms of supported frame sizes.

PRE-SPLITTING A LARGE VIDEO

High-end computers are often capable of playing numerous high-definition video files at the same time. As long as what you need to play fits within the realm of your computer’s capabilities, you should generally choose among the recommended formats listed above.

However, for extremely large videos, spanning numerous displays, even modern computers may not be fast enough to handle the required resolution as one large video. This applies in particular to computer generated videos, which can be made at any resolution and frame-rate your animation software is capable of producing. Such very large videos can be played by splitting them into individual pieces, where each piece includes only the portion of the frame that will play on each display.

While this splitter function is built into WATCHOUT for still images, it is not handled automatically for moving images. The primary reason for this difference is that the original, large videos would most likely have to be compressed in order to be stored and distributed to the display computers. To split the video, the display computers would have to decompress each frame, split it and then re-compress the result again for final playback. This would mean that each video frame will be compressed twice. The end result would be a loss of image quality.

In addition to this quality aspect, there are also storage and bandwidth considerations related to distributing and storing the original (large) video in order to split it, as well as the processing time involved in compressing it twice. The latter would be significant for such a large video, particularly to achieve the best quality.



A 1200 x 480 movie to be pre-split across two overlapping 800 by 600 display areas.

This can all be avoided by splitting the image using the originating application, prior to compression. Most applications allow you to crop the output to any desired rectangle. In some cases, you can even set up batches to generate all the individual videos files in one go.

As an example, assume that you have two 800 by 600 pixel displays with a 30% overlap, and want to display a video of 1200 by 480 pixels, the split would appear as in the illustration to the right.

NOTE: These figures are only chosen as an example. All modern computers would be able to play such a video as is, without pre-splitting it.

Include the overlap in the split, since the portion of the image in the overlap will have to play on both displays. Likewise, if the displays aren't overlapping you will have to factor in any gap between the edges of the display areas by specifying a corresponding gap when making the split.

Most applications specify cropping relative to the initial image size. This means that the bottom and right edges need to be calculated based on the height and width of the original (large) image.

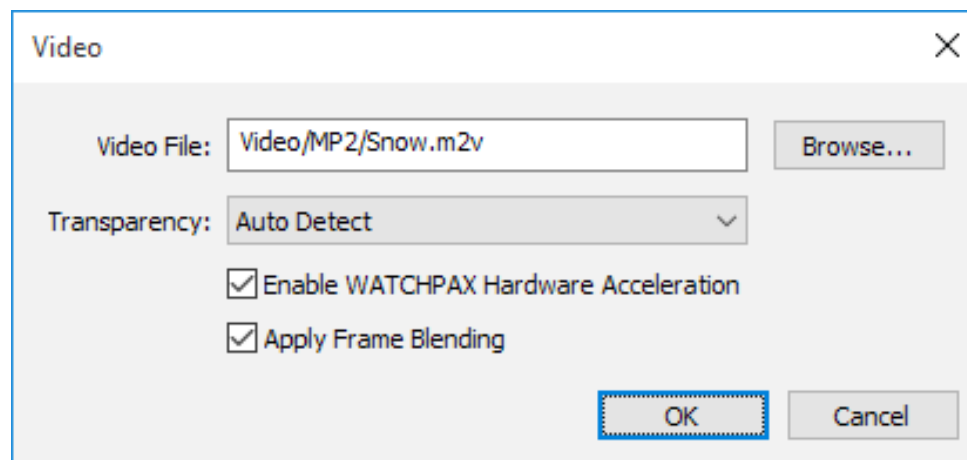


IMPORTANT: When splitting a large video into smaller pieces like this, avoid using a compressed video as the source. Doing so would introduce an additional de-compression/re-compression step, resulting in lower quality. Thus, whenever possible, start out with the original material, such as individual, computer-generated, image files.

Save the resulting files into a separate folder. Give each file the name of the WATCHOUT display on which it will appear. Select "Pre-split for Multiple Displays" and link the Video Proxy to the folder (see "Pre-split").

VIDEO SETTINGS

Double-click the name of a video in the Media window to change its specifications. Click the Browse button to link the media item to another file. This updates all cues to show the newly selected image instead.



Transparency

Most video formats do not support transparency. For the few that do (for example, QuickTime Animation and HAP-Alpha), the "Auto Detect" setting is usually sufficient. If you see a light or dark halo around the video content, you may try one of the "Premultiplied" settings instead.

Enable WATCHPAX Hardware Acceleration

Applies only when playing certain video formats, such as H.264, on WATCHPAX. May improve video playback performance when playing high resolution video. This checkbox has no effect when using other display computers.

Apply Frame Blending

This setting often results in smoother video playback, at the possible expense of some loss in image sharpness. This is especially true when the frame-rate of the video is not an even multiple of the display computer's frame-rate (for instance, when playing 25 fps video on a display computer set to 60 fps). This is accomplished by blending adjacent frames together, weighted by their temporal position.

IMAGE SEQUENCES

As an alternative to video file playback, WATCHOUT is also capable of playing image sequences. This is conceptually similar to video file playback, but instead of storing the entire video in single file, each frame of the video is stored as a separate, numbered file. All the frames making up the video are then stored together in a folder.

For image sequences, WATCHOUT supports:

Uncompressed 8-bit RGB/RGBA Tiff

Uncompressed 8-bit BGR/BGRA TGA

The TGA (without run-length encoding compression) files yields best playback performance.

Since a sequence of TIFF images is essentially a large number of uncompressed video frames, a very fast storage subsystem is required. This can be accomplished either using a number of SSDs in a RAID configuration, or using the increasingly popular PCIe-based SSD storage solutions.

For more details on using image sequences, see ["Add Proxy"](#).

AUDIO

In WATCHOUT, audio is used in a way that's very similar to moving images. Simply bring the sound file into WATCHOUT and place its icon on the display in the Stage window where you want the sound file to play.



Audio waveform displayed inside cue on timeline.

Audio will normally always play through the production computer, unless explicitly disabled (see ["Play Audio Media"](#)). Audio can also play through a display computer (see ["Sound"](#)). To decide which display computer to use for audio playback use either of the following methods:

- Place the audio icon (corresponding to the cue) inside the frame of a display connected to the relevant computer.
- Select the display or projector associated with the desired computer explicitly inside the audio cue.

Which method to use is specified in the cue used to play the audio file (see ["Sound Cue Specifications"](#)).

AUDIO FILE FORMATS

WATCHOUT can generally play any sound file compatible with Windows Media Player. However, the recommended sound file format is WAV. There's usually no reason to use a compressed sound file format, such as MP3, and the additional decompression step adds unnecessary load. The size of uncompressed sound files is usually not an issue with the kind of computers used to play back WATCHOUT presentations.

MULTI-CHANNEL AUDIO

WATCHOUT can play back multi-channel audio using a suitable sound interface (see ["Using Multiple Sound Channels"](#)). Multi-channel sound files are saved as WAV files using the "Wave Format Extensible" file format. Some applications capable of saving multi-channel WAV files include Steinberg Nuendo, Digidesign ProTools and Adobe Audition.

Settings inside the cue allow you to route individual sound channels to their desired outputs (see ["Sound Cue Specifications"](#)).

EMBEDDED AUDIO

Some video files also contain an audio track which means the sound would play from the same display computer(s) as the video.

NOTE: Using embedded audio is not recommended in WATCHOUT.

If you have a video file with embedded audio, cut the sound track out of the video and place it in a file of its own. This gives you two media files: one for video and one for audio. The video and the sound can then be added as separate cues in WATCHOUT. You can position them independently in the Stage window, allowing the sound track to play through any display computer.

LIVE VIDEO

Live video can be integrated into your presentation. This is particularly useful in speaker support applications, since it allows you to bring an image of the speaker onto the screen. It can also be used to play video from DVD or other external video playback devices, or to use video originating from satellite links or video conference feeds.

Video is brought into WATCHOUT by connecting the video source directly to each display computer that will show the live video. This minimizes the delay in the video signal – important for speaker support applications – while maximizing the quality by avoiding compression of the video signal.

From a production viewpoint, you can use the live video image like any other still image or video played from disk. Simply add the live video object to the Media window and drag it onto the Stage or timeline from there (see ["Add Live Video"](#)).

COMPUTER SCREEN

In the same way as you can display a live video feed in your presentation, you can also incorporate a live image of what appears on a computer's screen. This can be used to show Excel graphics, Powerpoint slides, a Web browser, or similar software applications, as part of your presentation.

The image displayed on the screen of the source computer is sent continuously via the network to the WATCHOUT display computers, where WATCHOUT composites it with other media. For example, you can put a plain Powerpoint presentation on top of a large, high-resolution background, thereby enhancing it with all the high-quality presentation capabilities of WATCHOUT.

The computer to supply the image must have VNC server software installed and configured (see “VNC Server Software”).

From a production point of view, you use the live computer image just like any other image. Simply add a Computer Screen object to the Media window and drag it onto the Stage or Timeline from there (see “Add Computer Screen”).

USING A COMPUTER VIDEO CAPTURE CARD

Although the VNC-based solution discussed above provides excellent image quality at virtually no additional cost, it does require a fast computer for running the VNC server software. Even so, it may not provide full frame-rate, and may hamper the performance of the computer somewhat, since it has to handle both the VNC server and the application being displayed (for example, Powerpoint).

As an alternative, you could use a hardware capture card to bring the computer’s screen into WATCHOUT. This solution is essentially identical to the “Live Video” input, described above. However, it may require a different capture card that can be connected to the source computer instead of a video camera.

Datapath has an excellent series of capture cards covering most computer signals, as well as traditional video formats.

<http://www.datapath.co.uk/products/video-capture-cards>

NETWORK VIDEO

This media type is similar to Live Video, except that video is received via the network rather than using a capture card. It can be used with network-enabled video cameras and other devices, applications and services capable of sending video over the network. WATCHOUT supports standard streaming protocols such as RTP and RTSP and video encoding formats such as H.264 or MPEG-2.

The advantage of this media type is that it requires no additional hardware installed in the computer and that it adds new kinds of video sources. A possible disadvantage is the noticeable delay incurred by the network stream processing, making it unsuitable for on-camera speaker display (IMAG), or other applications calling for low latency.

Assuming that you have such a network streaming source available, it can be incorporated into your presentation by choosing “Add Network Video” on the Media menu. Specify a name for the source, such as the name of a network-attached camera.

The media type has basic support for audio in the network streams, note however that the audio may start playing before the video appears.

Stream

Choose whether the data is sent as a multicast or unicast stream. In general, unicast is preferred. Use multicast only if the video stream will be shown by multiple display computers simultaneously. Most cameras unicast over UDP. Alternatively, choose TCP if required by the camera.

URI

Enter the Uniform Resource Identifier of the stream's source. The details here vary with the camera or application sending the stream, so you need to consult the device's documentation. As an example, an AXIS network camera used the following URI (where the group of digits is the IP address assigned to the camera):

`rtsp://192.168.0.178/axis-media/media.amp`

Preview

Select "Live" to see the network video in the Stage window. Generally, use this setting only for initial testing purposes, or when using a multicast stream (see above). For final playback, you're advised to use the "Thumbnail" preview mode.

Enable WATCHPAX Hardware Acceleration

Applies only when displaying certain formats, such as H.264, on WATCHPAX. May improve video playback performance when playing high resolution video. This checkbox has no effect when using other display computers.

Apply Frame Blending

This setting often results in smoother video playback, at the possible expense of some loss in image sharpness. This is especially true when the frame-rate of the video is not an even multiple of the display computer's frame-rate (for instance, when playing 25 fps video on a display computer set to 60 fps). This is accomplished by blending adjacent frames together, weighted by their temporal position in the sequence.

Dimensions

Enter the width and height of the video stream's image, as dictated by the originating device. In the example above, this is the native resolution of the video camera.

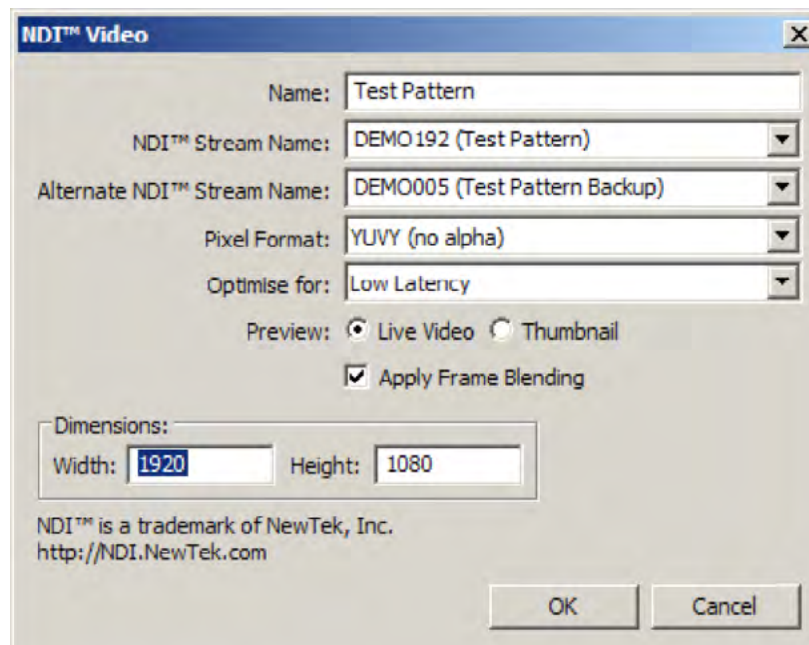
NDI VIDEO

Although NDI® (NewTek's Network Device Interface technology) is similar to Network Video in that the video stream is received over the network, there are enough differences to make it its own media type in WATCHOUT.

NDI video streams are identified by a name, which usually consists of a stream name and the name of the sending device, for example "Studio10 (BackupComputer)". To preserve network bandwidth, the video streams are compressed using compression techniques which are part of NDI, and not generally compatible with any other types of video compression.

The compression used is lossy, like H.264 and HAP, which means that there is some quality loss when using NDI. However, in almost all cases the loss is so small that it is not noticeable. One very important feature of the compression used in NDI is that it has no generation loss, meaning that you may compress and uncompress a video stream an infinite number of times, without any further loss of quality.

Assuming that there is an NDI source on the local network that you wish to incorporate into a WATCHOUT show, choose "Add NDI Video" from the Media menu. The dialog that appears lets you configure WATCHOUT for receipt, as shown below.



Name

The name of the source as it will appear in WATCHOUT's user interface.

NDI® stream name

The name of the NDI stream you want to incorporate into the show. Select one from the list of all NDI sources that are visible on the local network. Alternatively, type in the name of the source.

Alternate NDI stream name

This is meant for specifying a backup NDI source. If the primary source fails, WATCHOUT will automatically switch to the alternate source. As soon as the primary source is back online, WATCHOUT will switch back. Using an alternate stream is optional.

Pixel format

This option gives the sender a hint of which pixel format is preferred by the receiver. The NDI sender is free to ignore this request. The default is YUVY, which gives the best compression and uses less bandwidth than BGRA. There is no support for an alpha channel in YUVY. If you need alpha, please use

BGRA instead, but remember that the sender is free to ignore this request. BGRA uses more bandwidth, so YUVY is preferred at all times when there is no need for an alpha-channel.

Optimise for

There are three options here: Low Latency, Balanced and Smooth Playback. For Low latency, WATCHOUT keeps no queue of received frames. The frame displayed is always the latest frame received. This mode is sensitive to network hiccups, since if the continuous stream of frames is disrupted, WATCHOUT will have no new frame to display, resulting in the video freezing for a short amount of time. The Balanced mode keeps a short queue of frames for display. This increases the latency somewhat, but also makes the system less sensitive to network issues. Lastly, the Smooth Playback option keeps a larger queue of frames, which makes WATCHOUT even less sensitive to network issues, while increasing the latency further.

Preview

If Live Video is chosen, the video stream will be visible in the Stage window, for preview purposes. For the preview, a low-bandwidth (lower quality and lower resolution) stream is used, to preserve bandwidth.

Apply Frame Blending

If the display rate does not match the NDI stream rate, this option can be checked for smoother playback. As with any video media, frame blending will make the playback smoother, at the possible expense of a slightly blurrier appearance.

Dimensions

This is the size of the stream as it will be displayed by WATCHOUT. This resolution is also sent as a hint to the sender, which is free to ignore the request. If the resolution received is different, the frames will automatically be scaled to fit.

AUDIO

There is currently no support for NDI audio streams.

NDI-HX

Some NDI senders use a modified compression algorithm for enabling NDI to be used over Wifi and low-bandwidth connections. To use NDI-HX, the NDI-HX driver needs to be installed on all computers that will display the stream. This is available as an option in the WATCHOUT installer, or it may be downloaded from <http://ndi.newtek.com>. In most cases there is no need to install this driver, as most streams are not HX-streams. NDI-HX uses less bandwidth, at the expense of more complex compression. Please bear in mind that many of the hardware boxes sending out NDI-HX are quite limited in processing power, and may not be able to deliver the stream to more than a few display servers simultaneously. This is not a limitation in WATCHOUT, but rather a limitation of the sender.

For Dataton media servers, the NDI HX driver will be installed when upgrading the WATCHOUT version by going online in the production software if – and only if – the NDI HX driver is installed on the production computer.

MULTICAST

To reduce the bandwidth requirements, many senders can be configured to use multicast, which means that only a single copy of the stream will exist on the network, and this stream will be received by all media servers that display the stream. For multicast to function properly, it is absolutely essential to use high quality network infrastructure. Use smart switches, and configure them to enable IGMP snooping for best results. Always try to keep the number of servers and devices connected to the network as low as possible and, preferably, use one switch with many ports instead of several smaller switches.

If not using multicast, one unique copy of the stream will be sent to each display server showing the stream. This can increase the network load dramatically.

DYNAMIC IMAGES

The WATCHOUT Dynamic Image Server allows you to incorporate dynamic data into your presentation, such as:

- Still images that can be updated live by simply dropping a new image into a folder.
- Graphs obtained from databases or other sources.
- Up-to-the-minute news, available from online providers such as CNN.
- Live stock quotes.
- Desktop capture.

To use dynamic content in your presentation:

- Make sure the WATCHOUT Dynamic Image Server is running on a computer accessible from your display computers via the network.
- Provide content for the image server in the form of still images, HTML web pages or Flash (SWF) files, or by allowing the Dynamic Image Server to obtain such content from the Internet (may require additional network setup and configuration)
- Choose “Add Dynamic Image” on the Media menu to add the corresponding media item to your presentation (see “Add Dynamic Image”).
- Drag the media item onto the Stage or Timeline to make it appear on screen.

Please refer to the chapter titled “Dynamic Images” for more details on how to use this feature.

3D MODELS

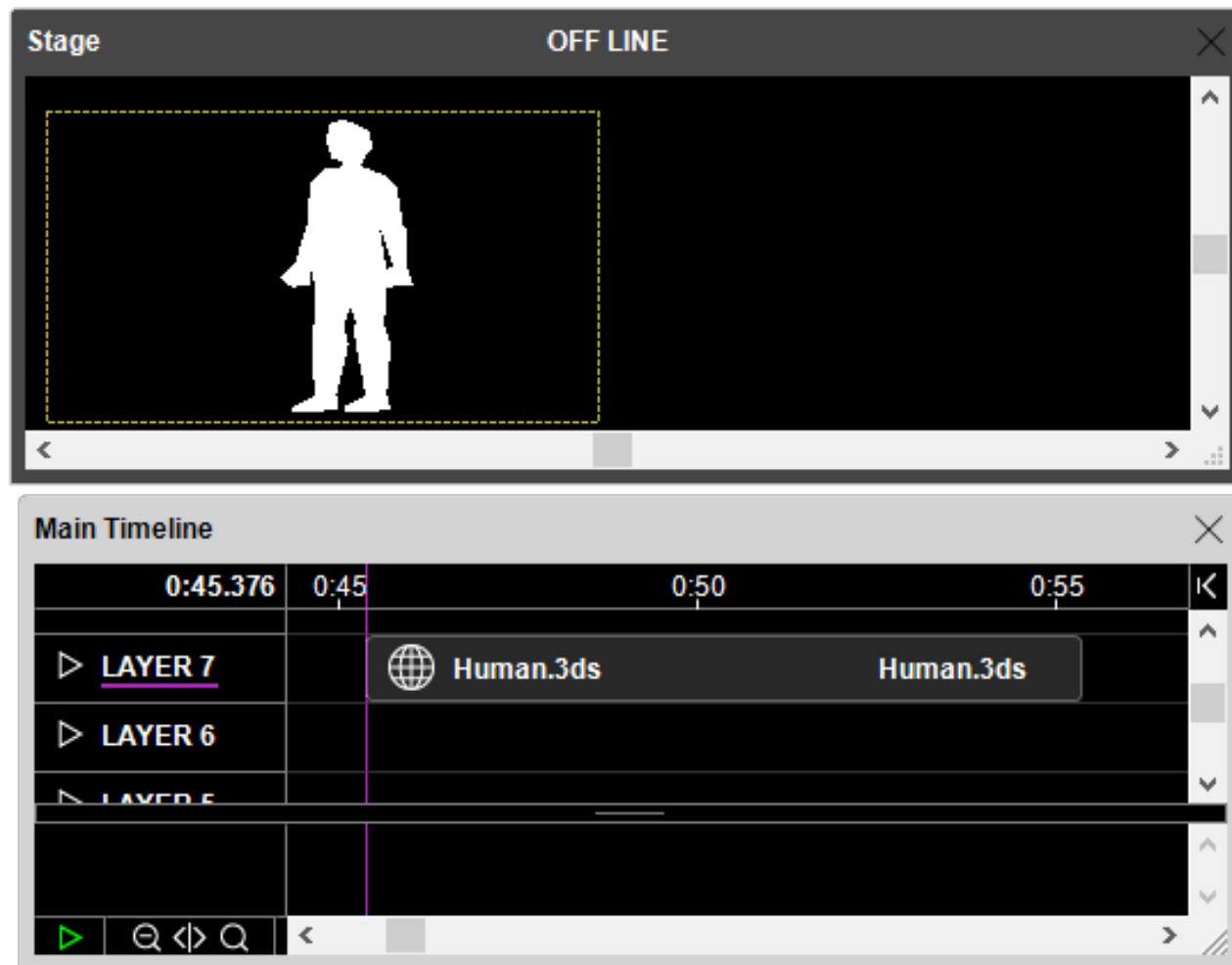
3D models can be incorporated into your presentation in much the same way as images and video. However, as many 3D file formats only contain the geometric shape of the object, and not its other attributes, a two-step process is involved:

- Drag the 3D model into WATCHOUT. It appears as a white, or multi-colored, object without any clearly distinguishable features.
- Apply images or video to the texturable areas of the 3D object to make it come alive.

The first step is accomplished by dragging a 3D model file into WATCHOUT. WATCHOUT accepts the following common 3D file formats:

- 3DS (3D Studio Max)
- OBJ (Wavefront).
- DAE/Collada.
- BLEND (Blender).
- FBX (Autodesk Filmbox).

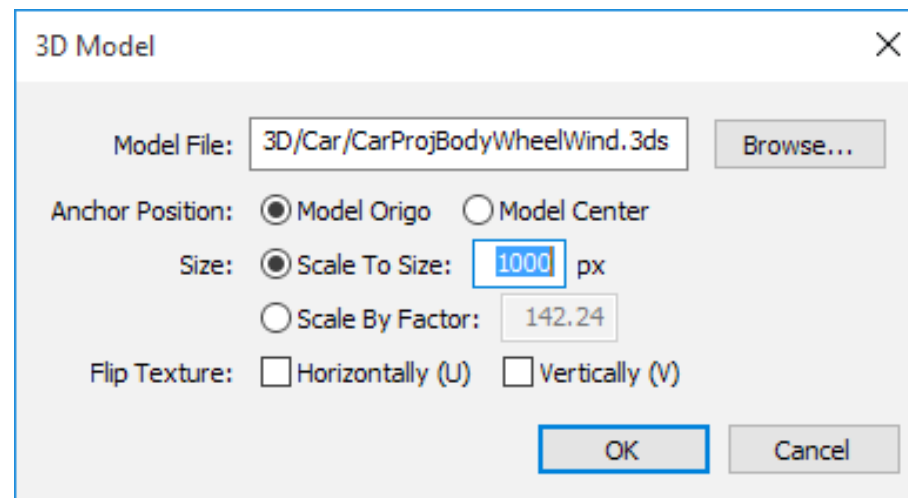
NOTE: Due to the wide variety of dialects used in 3D files, some files may not import properly or at all. If so, try exporting your 3D model in a compatible format from your 3D application. Formats that are likely to work consistently are 3DS and OBJ.



A 3D model of a human figure just brought into WATCHOUT, but not yet textured.

IMPORTANT: Models brought into WATCHOUT must have texture coordinates (also known as UV coordinates) assigned in the 3D application beforehand. This is necessary in order to subsequently apply the texture images correctly.

Many 3D file formats don't use real world dimensions. Instead they use their own, internal "units" to define size and distance. Hence, when bringing 3D models into WATCHOUT, the model's units must be interpreted into Stage pixels. You can control how this interpretation is handled in the Specifications dialog box associated with the 3D Model in the Media window. This also allows you to control where the anchor position used for scaling and rotation is located within the model.



Specifications dialog box of a 3D model.

Anchor Position

Controls where WATCHOUT's anchor point appears within the model. By default, it will be positioned at the X/Y/Z zero point (origo) of the imported model. However, in some cases, the model may not have been positioned properly before it was exported, and the anchor position may be way off. Then you can choose "Model Center" to position the anchor point in the center of the model instead. Alternatively, re-open the model in a 3D program and move it to its desired location.

Scale to Size

Scales the 3D model ensuring it will have the specified number of pixels along its longest axis. This is good default behavior since it avoids models being interpreted either as extremely small (often smaller than a single pixel) or extremely large. Simply type in the desired size, in pixels.

Scale by Factor

When bringing in multiple models, all originating from the same 3D application, you may instead want them to maintain their relative size from the 3D application. This is hard to do when scaling them all individually, each to its own pixel size. In this case, it is better to apply a fixed and known scale factor to all objects. You can do this by importing the main object first, and scaling it as desired using the "Scale to Size" option. Then read out the scale factor, and subsequently apply the same factor to all objects, selecting "Scale by Factor" instead.

HINT: By setting all 3D objects in a scene to "Scale by Factor" and "Model Origo", you can combine multiple models while maintaining their position and size from the source 3D application. Simply place all objects at the same stage position, as specified inside the cue. Since they all will have the same origo and scale factor, everything will end up in its proper place.

Flip Texture

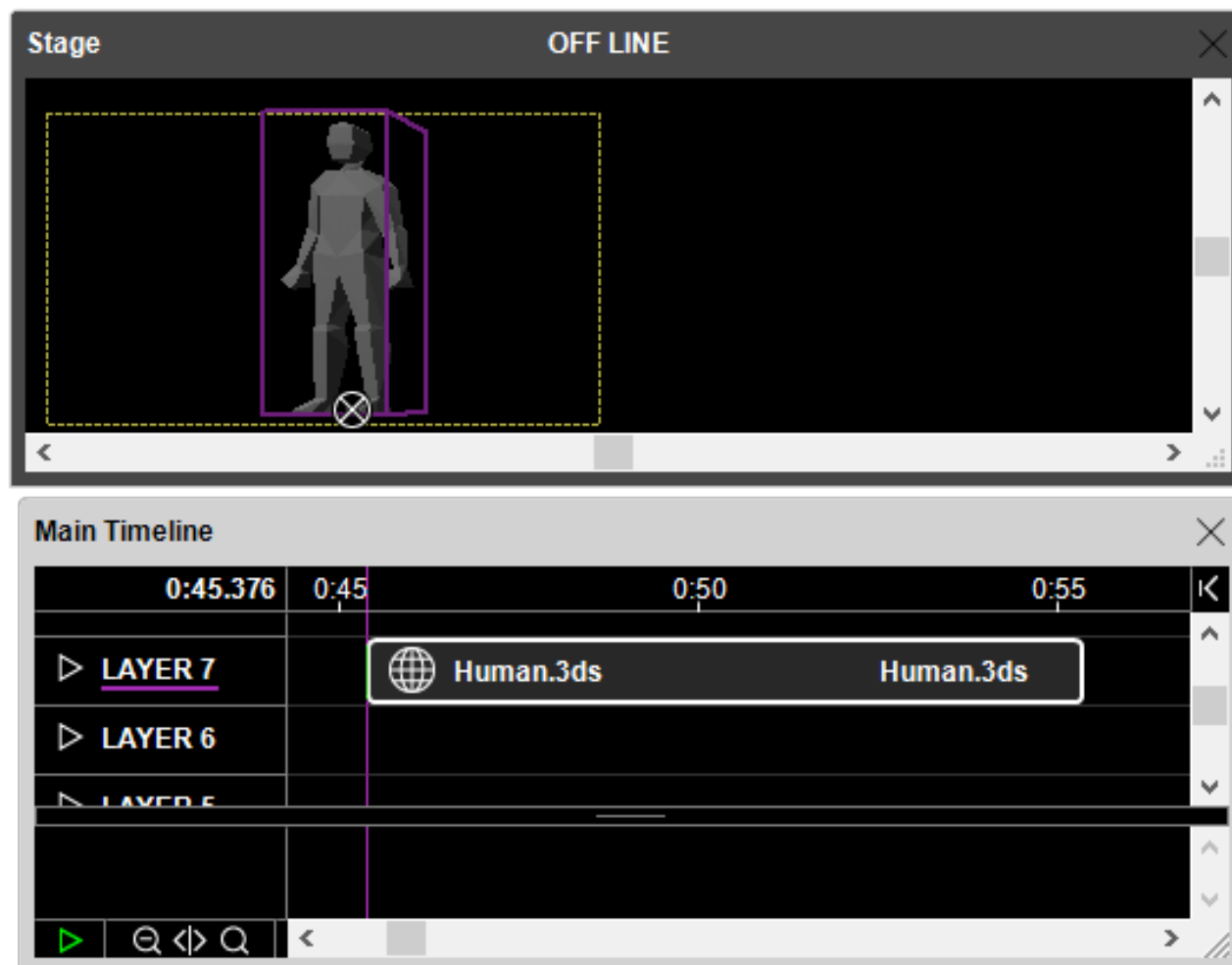
When you apply textures to a 3D object (see "Texturing" below), the placement of the image on the 3D object is controlled by texture coordinates embedded in the 3D model file. Different 3D applications use different standards for the direction of these texture coordinates. If the texture, when applied to the object, appears reversed or scrambled, try the "Flip Texture Horizontally" or "Vertically" checkboxes to see whether doing so corrects the problem. If not, you may need to go back into the 3D application and try out the image to be used as a texture there, to make sure it really matches the model and its texture coordinates.

TEXTURING

To give the model its texture and make it visible on displays, you must apply an image to it. This can be done in a variety of ways, with each method offering an increasing amount of flexibility.

- Using a still image. This applies the same texture throughout the entire cue. Useful for static 3D content.
- Using a video. The video starts playing at the beginning of the cue, but gives you no control over how it plays (for instance, looping or free-running).
- Using a **Virtual Display**. This provides the full compositing capabilities of WATCHOUT, allowing you to build the texture from multiple layers of still images, video, etc.

To apply a texture to a 3D object, first select its cue on the timeline, then drag the image, video or virtual display onto the 3D object's preview image in the Stage window.



A still image applied as a texture to the human figure.

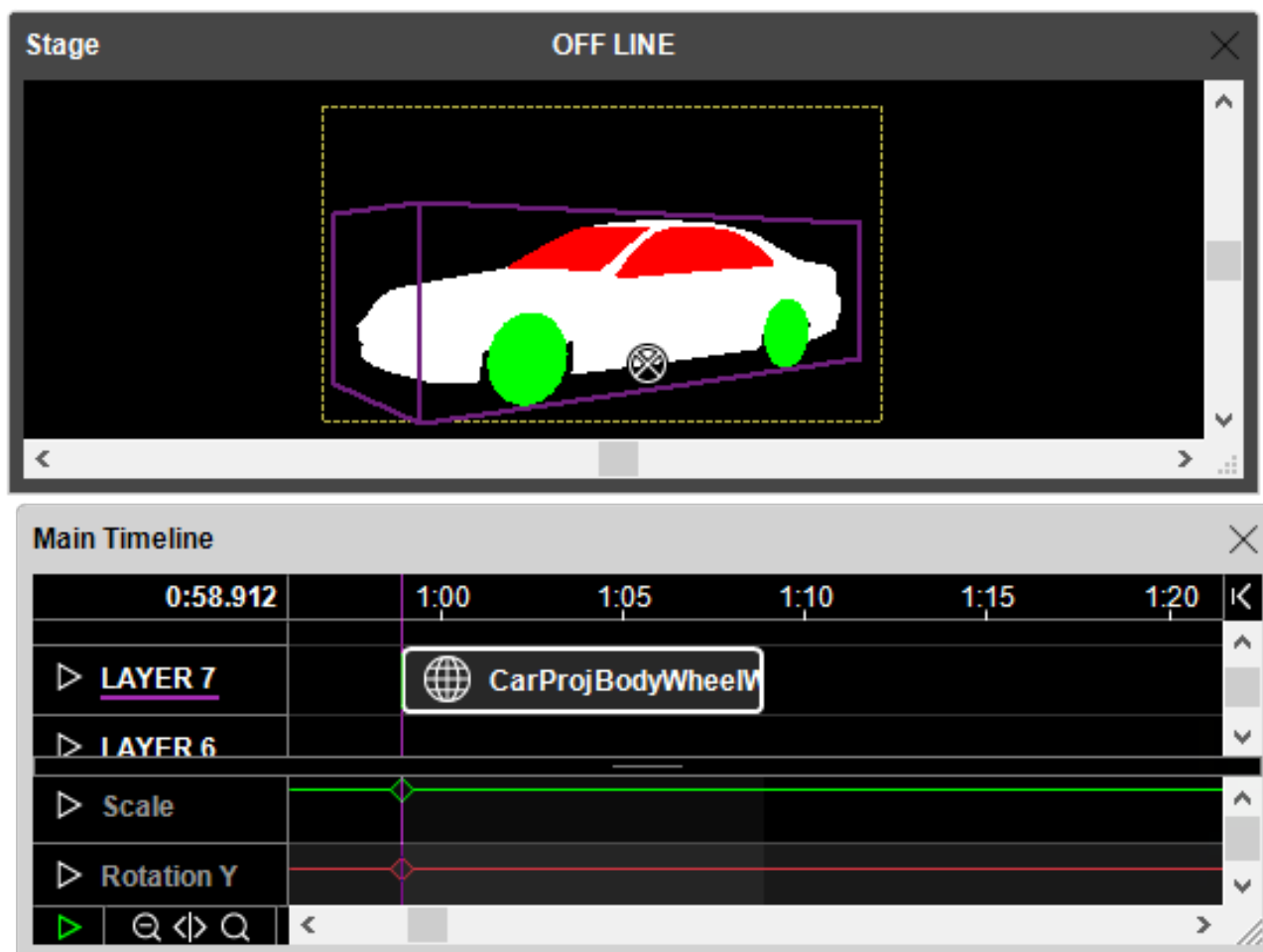
IMPORTANT: The cue associated with the 3D object must be selected in order to drop a texture onto the object in the Stage window. This is also indicated by a purple selection box around the 3D object, as shown in the Stage window above. When dragging from the Media window, reveal the image to be used as a texture in the Media window first, before selecting the cue. Then drag the image from the Media window onto the 3D preview in the Stage window with a single drag-and-drop operation.

See this video for more details on how to bringing in 3D models and applying basic textures:

<https://www.dataton.com/academy-video-watchout-6-3d-basics>

Using Multiple Textures

Some 3D objects have multiple texturable areas. If so, those are indicated by different colors in the Stage window.



Parts of a 3D model that can be textured separately are indicated by different colors in the Stage window.

To texture such an object, drop a separate texture onto each texturable area, replacing the solid color shown initially. See this video for more details on texturing multiple areas.

<https://www.dataton.com/academy-video-watchout-6-3d-texturing>

To see the list of textures applied to a model, open the cue's dialog box and select the "Textures" tab. Here you can also select and delete individual textures. You don't have to delete a texture in order to replace it. Just select the cue and drop a new texture onto the desired area to replace the previous one. However, explicitly deleting textures often makes it easier to see where any separately texturable areas are, due to the distinctive coloring of such areas.

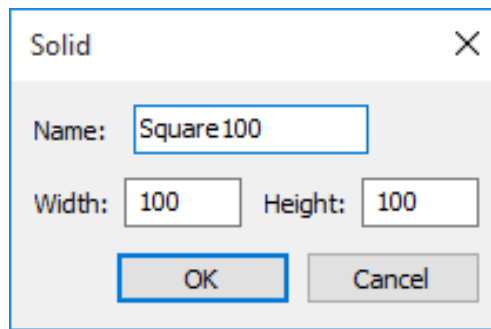
Texturing with Virtual Displays

For maximum flexibility, use a Virtual Display to texture a 3D object. This indirect method gives you access to all the rendering, tweening and compositing capabilities of WATCHOUT in order to create textures. You can even incorporate dynamic content, such as live video or interactivity into the texture before applying it to the 3D object. See "[Virtual Display](#)" for more details on how to use this method. This video shows you this advanced technique in action:

<https://www.dataton.com/academy-video-watchout-6-3d-texturing-using-virtual-displays>

SOLID

When all you need is a flat, colored background, create a Solid using the “Add Solid” command, rather than creating a rectangle in Photoshop.

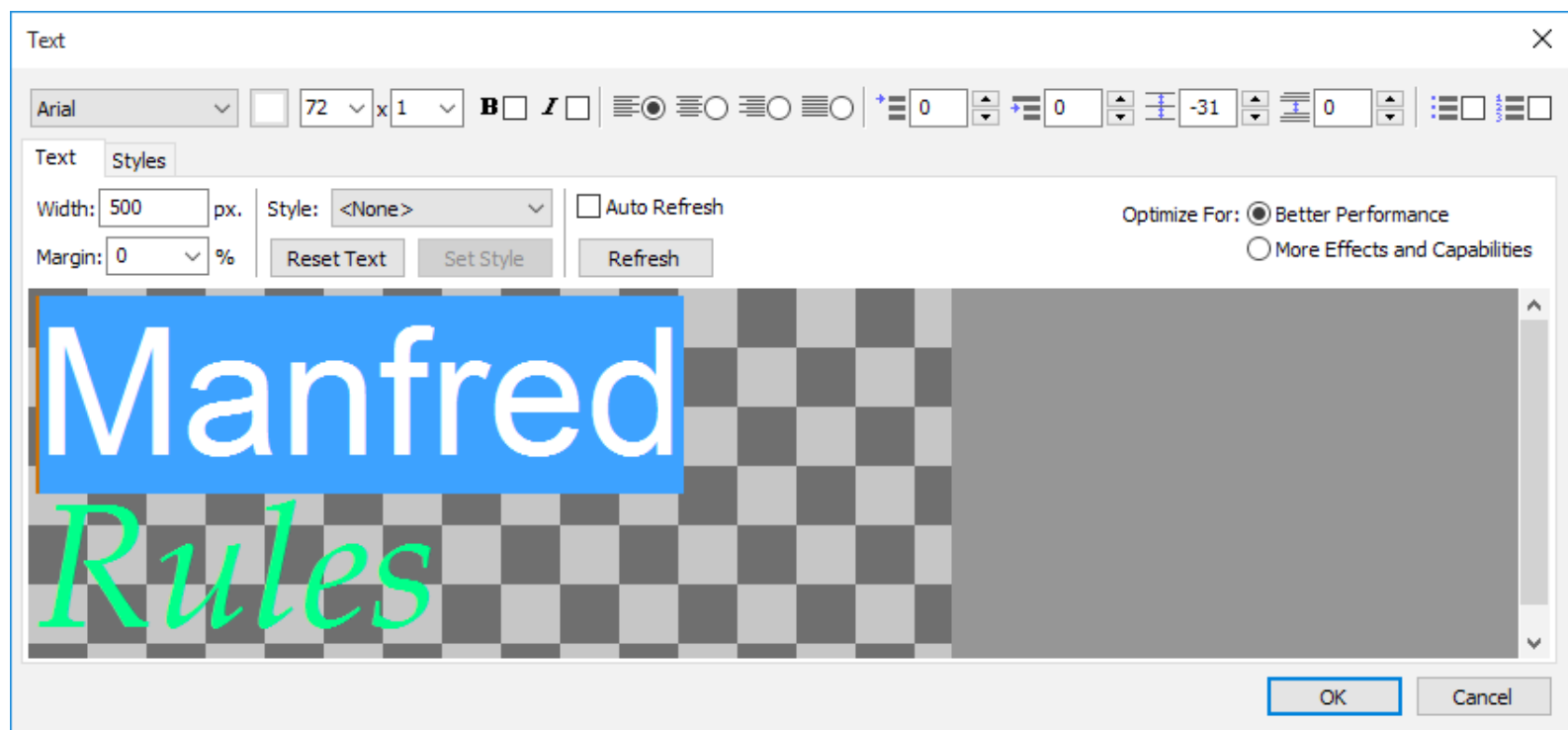


A 100 by 100 pixel solid white rectangle.

HINT: While the basic color of a Solid is always white, you can use a Color tween track to colorize it.

TEXT

This media type makes it easy to add headings and other texts to your WATCHOUT show without having to use an external program, such as Adobe Photoshop. To add a text to your presentation, choose “Add Text” on the Media menu, enter your text in the checkerboard area and click OK.



To display the resulting text, drag it onto a timeline and position it on stage. The text is shown on a transparent background and is used like a still image. As the text is rendered on the production computer, you don’t need to have the fonts installed on your display computers. To change the text, double-click it in the Media window or Alt-double-click the cue.

Width

Specifies the width of the resulting text image, in pixels. The height will be determined automatically by the amount and format of the text.

Font menu

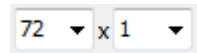
Choose any font installed on your production computer and apply it to the selected text. Note that you must select some text before you can apply a new font. The same goes for most other settings, as they apply on a per-character basis.

Text Color

The color swatch next to the Font menu specifies the color of the text. Again, first select some text then click the button to choose a color.

Font Size and Scale Factor

This menu, in conjunction with the scale factor, determines the size of the text as displayed in your presentation. For small to medium-sized text, keep the scale factor set to 1 and adjust the font size. For very large text, use the scale factor to scale the rendered text while keeping the edited text at a manageable size. The scale factor also governs other dimensions, such as the size of any drop shadow, but does not apply to the Width setting.

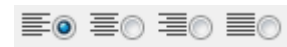


Bold and Italics

These checkboxes apply the corresponding styles to the selected text.

Text Alignment

The alignment radio buttons align paragraphs to the left, center, right or justified on both sides. Although adjusted text isn't shown as such in the dialog box, the rendered text will be adjusted.



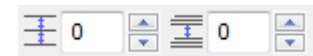
Text Indentation

The Indent and Hanging Indent settings indent the selected text by the specified amount. Note that these settings apply to entire paragraphs.



Leading and Paragraph Spacing

These fields control the spacing of lines and paragraphs in the selected text. Use negative numbers to tighten the spacing.



Bullets and Numbering

These checkboxes display a bullet or a paragraph count in front of each selected paragraph. Use the Hanging Indent setting to control the distance between this embellishment and the text itself.



Margin

Adds additional spacing on both sides of the text, as a percentage of the font size. This may be required to account for certain italicized fonts.

Style

Chooses a common text style, as defined under the Style tab (see "Style").

Reset Text

Resets the text, removing any local overrides, so it matches the style selected on the Style menu.

Set Style

Updates the style selected on the Style menu to match the currently selected text. Doing so affects all texts using this style.

Update and Auto Update

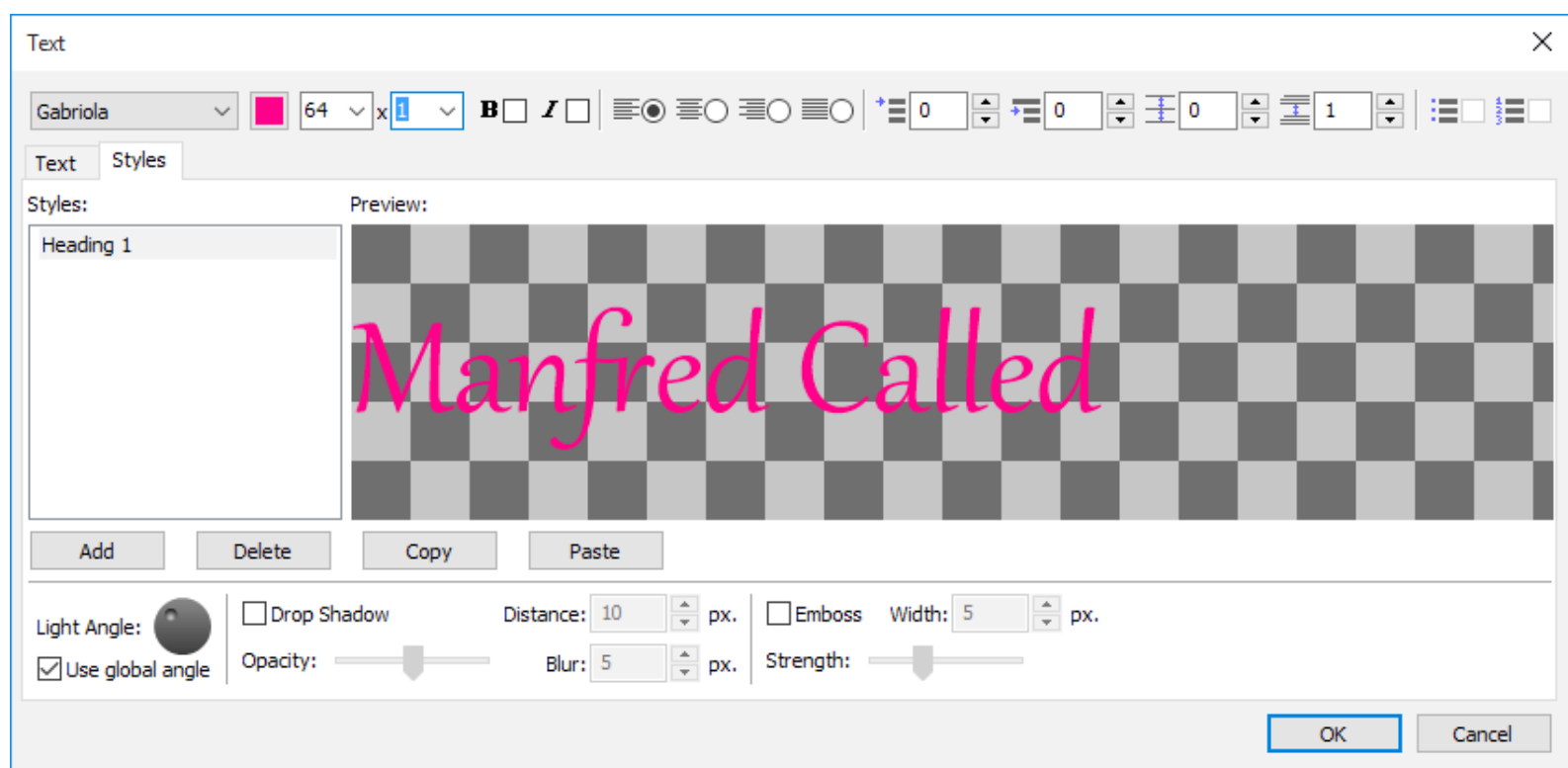
Click “Update” to see the result of your changes in the Stage window (assuming the text being edited is currently displayed). If you select the “Auto Update” checkbox, the stage will automatically update whenever you make changes. This may be time-consuming when rendering large texts – especially when also applying effects.

Optimize For...

This setting serves the same purpose as for still images, and has the same restrictions (see “Optimize For”).

STYLE

You may define text settings that can subsequently be applied across several Text media items, thus maintaining a consistent style throughout your presentation. To define a style, click the Styles tab in any Text media item.



A non-editable preview text is displayed in the checkerboard area of the window. If you have typed anything into the Text media item, that text will be used for the preview. Otherwise, a default text sample is shown.

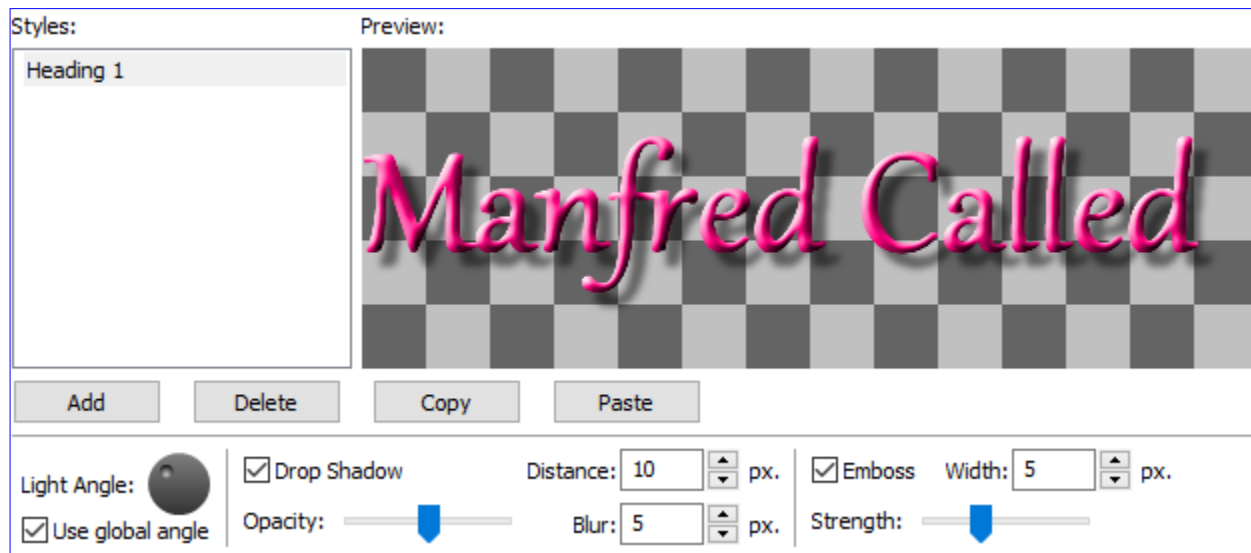
Change any of the settings (Font, Size, Color, etc) using the controls along the top of the window. The preview area shows the result. Style settings apply to the entire text, so you don’t need to select anything before changing settings.

Add/Delete Style

Click Add to create a new, named style based on the current settings, then enter a style name. To delete a style, first select it in the list, then click Delete.

Text Effects

Use the controls along the bottom of the window to add a drop shadow and emboss effect to the rendered text. Your settings here are reflected in the preview area of the Styles tab, but do not appear in the main editing area of the Text tab.



A text style with Emboss and Drop Shadow effects applied.

NOTE: Applying a drop shadow effect renders the image slightly wider than the specified Width setting. This is in order to accommodate the shadow without causing the text to re-flow.

Light Angle

Controls the perceived angle of light expressed by the emboss and drop shadow effects. Setting the light angle to be from the top left causes the drop shadow to appear below and to the right of the text. Select “Use global angle” to use a common angle across all styles with this option selected, or uncheck this checkbox to set the angle independently for the current style.

Applying a Style

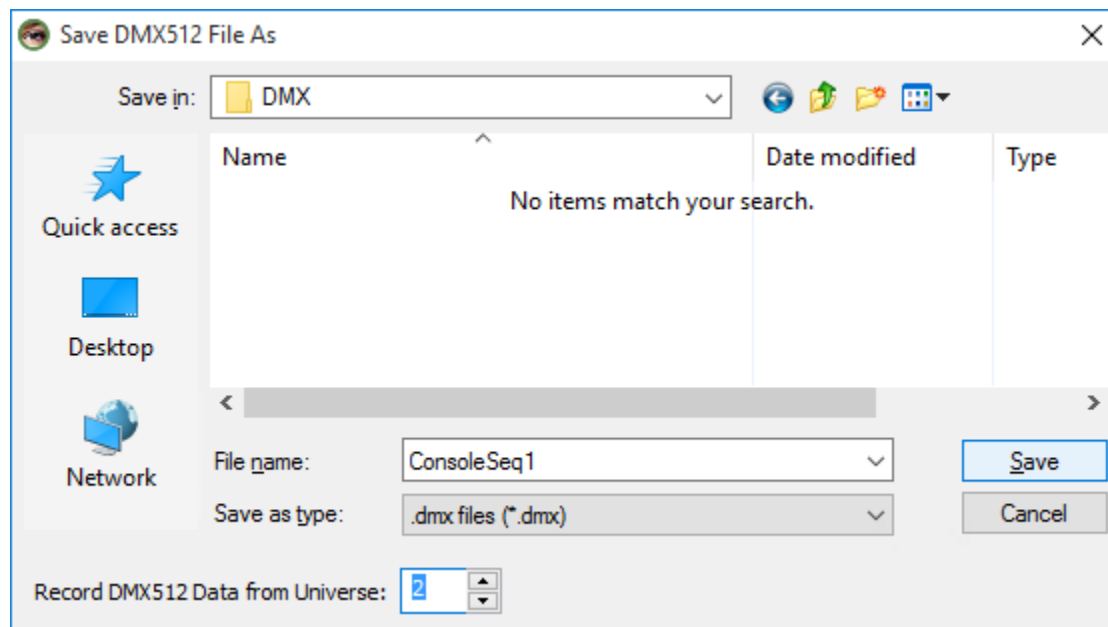
Once a style has been defined in this way, you can apply it using the Style menu on the Text tab. Note that local overrides applied to the text take precedence over style settings. Click the “Reset Text” button to remove all local overrides, setting all the text according to its style.

Transferring Styles Between Shows

Use the Copy button to copy selected styles to the clipboard. You can then paste those styles into another show.

DMX-512 RECORDING

WATCHOUT can control individual lighting channels directly (see “DMX Output”). However, when using numerous lighting channels, or moving lights, a dedicated lighting console is generally required. To simplify your playback system, you can record the data from the console into WATCHOUT, then remove the console and use WATCHOUT to play back the lighting control. Assuming that you have a lighting console connected to your network using the Artnet protocol, you can record its programming by choosing “Add DMX512 Recording” on the Media menu.



Enter a file name for storing the recorded DMX512 data. Save this file in/under the folder containing the current show file. Specify the Artnet Universe number used by the lighting console. Only data sent on this universe will be recorded.

NOTE: If your lighting console doesn't support Artnet directly, this requires a DMX512-to-Artnet adapter. See ["DMX-512 Input"](#) for more details.

Once you've added the "DMX512 Recording" to the Media window, proceed as follows:

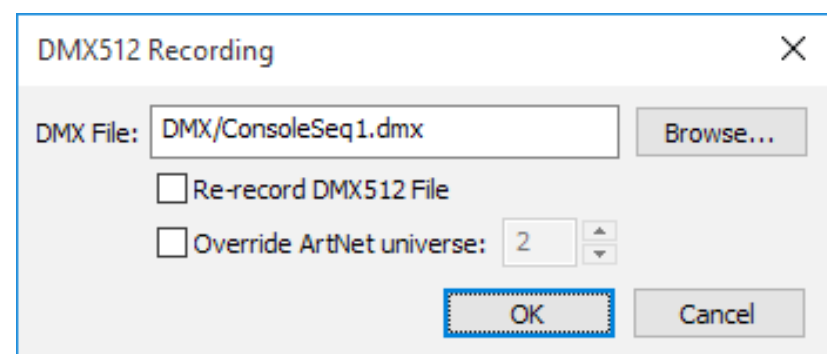
- Drag this new item from the Media window onto a timeline. Note that the cue says "To be recorded", indicating that data will be recorded when the cue is run. Place this cue where you want the recording to start, and extend it to cover the duration of the recording.
- Run the timeline along with the lighting console. You may simply start WATCHOUT and cue the console manually. Alternatively, use timecode to synchronize them.
- As the timeline reaches the cue, recording commences, as indicated by the RECORDING text in the cue. Allow the timeline to run for the entire duration of the cue.
- Once recording is complete, the RECORDING text in the cue disappears.
- Disconnect the lighting console from the network, or switch it off.

Play the WATCHOUT timeline again. The recorded DMX512 data will now be played back by the cue. An Artnet-to-DMX512 adapter is required unless your fixtures/dimmers accept Artnet directly.

You can use the Fade tween track of the cue to modulate the intensity of the recorded channels, if desired.

NOTE: Do not use the Fade tween track if any recorded channels use 16-bit precision – often used by moving lights and similar devices.

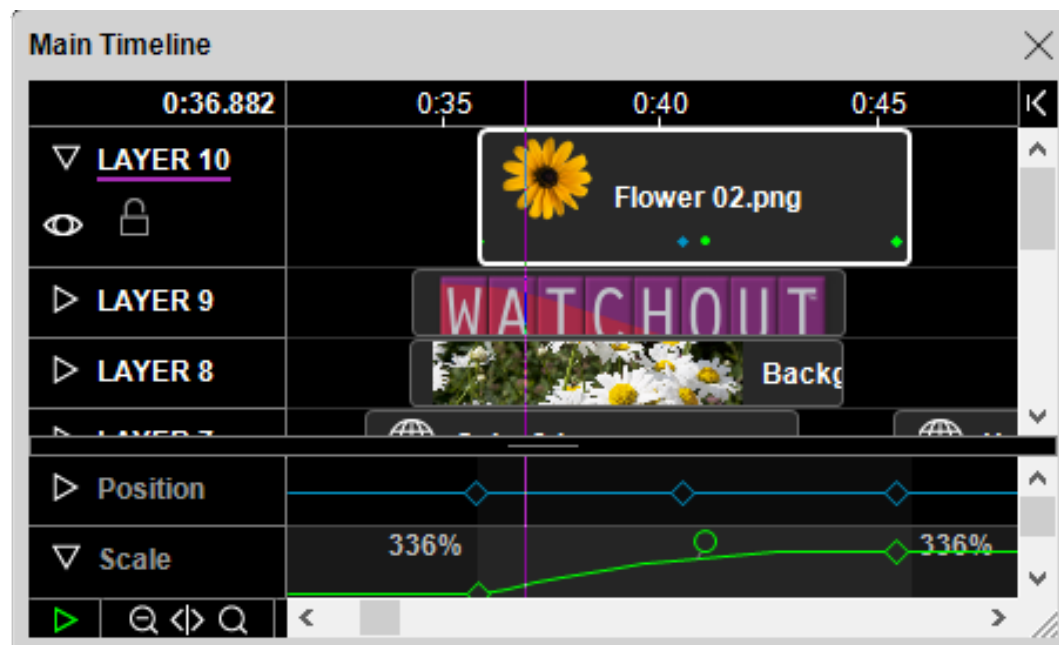
If you make a mistake during the recording, or simply want to do another take, you can reset the recording to its initial state by double-clicking it in the Media window and selecting the "Re-record DMX512 File" checkbox. This dialog box also lets you play the recording back using a different Artnet universe than the one recorded.



7. CUES

Cues are the primary active objects in WATCHOUT. They control when media appear on stage, as well as more dynamic behavior such as positioning and opacity. Cues exist on layers in timeline windows. The layers determine the stacking order of media on stage.

A cue also contains any associated animations. Those are managed by “tween tracks”, appearing in the lower part of the timeline window when the cue is selected (see “[Tween Tracks](#)” later in this chapter).



Cues in the timeline window (top), with tween tracks of the selected cue below.

ADDING CUES

To add a cue to a layer in a timeline window, drag a Media window item, or a media file, to the layer or the Stage window. Media files can be dragged directly from your hard disk.

IMPORTANT: Whenever possible, keep all media used in a presentation in a sub-folder of the folder containing the show file. Doing so allows WATCHOUT to refer to the file using a relative path specification, making it easier to move the presentation with all its media references intact.

When you drag media into the Stage window, the cue will appear on the currently selected layer (as indicated by a purple line under the layer’s name) and at the current time position. When dragging into the timeline, the cue appears at the layer and time you drag it to.

SELECTING AND POSITIONING CUES

Click a cue to select it. Shift-click to select multiple cues. Alternatively, drag from a point outside all cues to use the selection rectangle. Use “Select All” on the Edit menu to select all cues on all layers. To de-select all cues, click in the white space of any layer in the Timeline window.

You can also select a cue by clicking its preview image in the Stage window. This allows you to determine which cue corresponds to a particular image on stage.

To position selected cues, drag them using the mouse. To drag cues to another layer without altering their time positions, press the Shift key while dragging.

If you want to position a cue numerically, cut it, go to the desired time position using the Timeline Settings dialog box (see “Timeline Settings”), then paste it. Alternatively, use the cue’s dialog box (see “Cue Specifications”).

SELECTING CUES USING THE ARROW KEYS

Press the right or left arrow keys on the keyboard to select the next or previous cue on the layer that is currently selected. Pressing the Shift key as well selects the next or previous cue on any layer. Pressing the up and down arrow keys changes the currently selected layer.

CUTTING, PASTING AND DELETING CUES

Use Cut, Copy and Paste on the Edit menu to move or copy cues within a presentation or to other presentations via the clipboard. When transferring cues to other presentations in this way, any media associated with those cues will automatically be added to the target presentation.

To delete cues without altering the content of the clipboard, select the cues then choose “Clear” on the Edit menu.

CHANGING A CUE’S MEDIA POSITION ON STAGE

Cues contain information on where the media will appear on stage. To change the stage position, do one of the following:

- Drag the preview image in the Stage window. You can change the stage position of multiple cues at the same time by first selecting those cues.
- For precise adjustments press Control-arrow. Add the Shift key for greater increments.
- Double-click a cue and change its “Initial Stage Position”. If the cue has a Position tween track, this will relocate the entire motion path.
- Double-click one of the cue’s Position tween points.

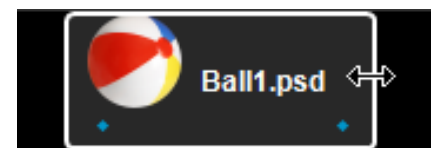
IMPORTANT: If a cue has a Position tween track, click the desired tween point to go to its time before moving the image using the mouse or the arrow keys. If the timeline isn’t positioned exactly at the tween point, a new point will be added. This assumes “Click Jumps to Time” is selected on the Timeline menu.

HINT: You can move the stage position of multiple cues using the Move command (see “Move”). This is particularly useful when merging cues from shows having different display positions.

The stage position of the anchor point is shown numerically in its Position tween track, if any (see “Position”).

CHANGING A CUE’S DURATION

To change the duration of selected cues, drag the bar at either end of a cue. If the cue has tween points, they will remain stationary in relation to the timeline. To stretch the tween points with the cue, press the Alt key while dragging the end of the cue.



HINT: Either end of the cue will snap to the current time position if “Snap” is selected. For this to work, you must first deselect “Click Jumps to Time” on the Timeline menu.

To set the duration precisely, type the desired duration into the cue’s dialog box (see “Cue Specifications”). To change the duration of multiple cues by a specific amount of time, use the “Insert/Delete Time” command.

NOTE: If you extend the duration of a movie beyond its actual length, it will stop by default at the last frame. Alternatively, you can make the movie run repeatedly in a loop by choosing the “Loop” behavior in the cue (see “Looping”).

REPLACING A CUE’S MEDIA

To change the media associated with a cue, drag new media onto the cue. You can either drag an item from the Media window, or a new media file from your hard disk.

HINT: If you want to replace *all* instances of a certain media file, you can change the file association of the item in the Media window instead (see “Image Specifications”). Doing so will affect all cues associated with that media item.

CUE SPECIFICATIONS

Specifies the settings of the current cue. The options available vary with the kind of media that is controlled by the cue. To open a cue’s specifications dialog box, select the cue and choose “Specifications” on the Edit menu, or simply double-click the cue.

The time when the media will appear on stage.

Starting offset into sound or video.

Stage position of anchor point at the start of the cue.

Position of anchor point within image, relative to image’s top left corner.

Video Cue

Basic

Advanced

Time: 5.6

Duration: 1:09.467

Pre-Roll: 0.0

In-Time: 0.0

Cue Color:  Reset

Media: Locate Media

Initial Stage Position: X: 2280 Y: 1256 Z: 0

Anchor Position within Image: X: 1920 Y: 1080 Z: 0

Set To: Top Left Center

WaterVideoSmall.mp4

OK Cancel

Shows how long the media remains visible on stage.

Media will be pre-rolled automatically (uncheck to specify pre-roll time manually).

Locates associated item in the Media window.

Sets the top-left or center position for anchor point.

IN-TIME

Specifies a starting offset for a sound or movie. For example, a certain movie may have ten seconds of black at the beginning. To skip those ten seconds, set the in-time to 10.

ANCHOR POSITION

Determines the position of the image anchor, relative to the upper left corner of the image. The anchor of a selected cue is displayed as a crossed circle in the Stage window. When scaling or rotating an image, the anchor specifies the point that remains stationary.

HINT: A checkbox in the Preferences dialog box determines the initial position of the anchor point for new cues (see “Center Anchor Position”).

INITIAL STAGE POSITION

If the cue does not have a Position tween track, this Initial Stage Position controls its media position on stage. Otherwise, this is the position of the first tween point. Changing this position moves the entire motion path, if any.

HINT: To move the position and motion paths of a set of cues, first select the cues, then choose **Move** on the Edit menu.

LOCATE MEDIA

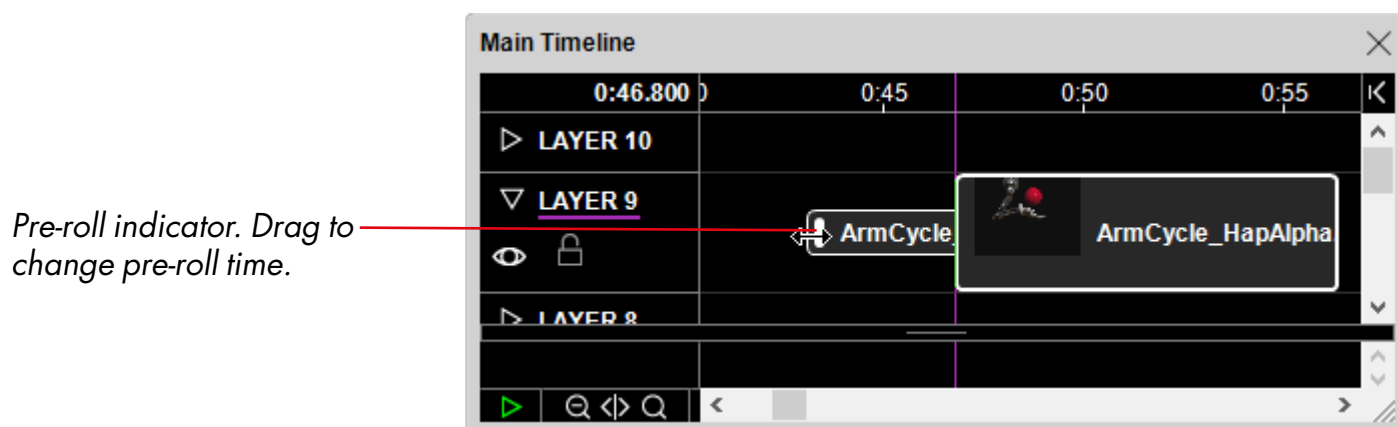
Locates the associated item in the Media window, automatically opening any enclosing folder.

HINT: Double-clicking a cue on a timeline while pressing the Alt key opens its associated media item. This shortcut is particularly handy when you want to open a Composition associated with a cue, as it allows you to go straight from the cue into the Composition.

PRE-ROLL

Some cues need to be pre-loaded and prepared a few seconds ahead of their appearance. When set to “Automatic”, this time is calculated automatically. This is the preferred setting in most cases. However, certain media files may require extensive computer resources when prepared. This may have an adverse effect on already visible, moving media. Although this is unavoidable, you may be able to reduce the impact by moving the moment when the preparation occurs backwards to a more appropriate time.

When specifying the pre-roll time manually, a pre-roll indicator appears in the timeline window. Adjust the pre-roll time by dragging the start of this indicator.

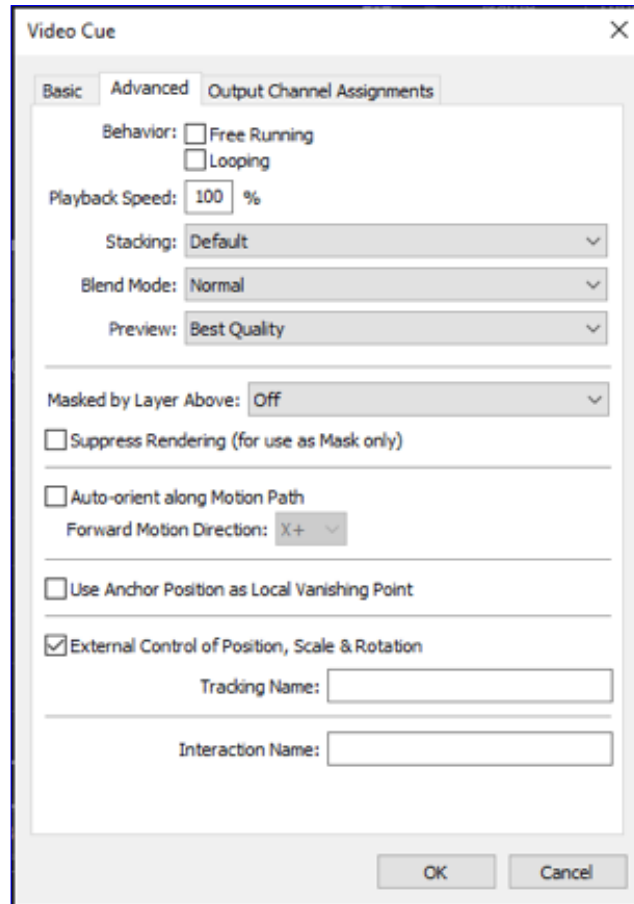


CUE COLOR

Displays the current color of the cue. Clicking the color indicator brings up a color selection dialog in which a new color for the cue can be chosen. To reset a cue to the default color of the cue type, click the Reset button. For more information about default colors of cue types, see the “Cue Colors” tab in the preferences window.

ADVANCED CUE SPECIFICATIONS

To adjust additional settings of the cue, open its dialog box then select the “Advanced” tab. Some options apply only to specific media types.



FREE RUNNING

Causes sound, movie or composition media to continue playing even if the timeline is paused. This is particularly useful in speaker support or conference situations, where you may be cueing the timeline manually. While waiting at a pause cue, you may still want to have something moving on stage.

HINT: Free Running and Looping behavior can be combined to create continuous playback of undetermined duration.

LOOPING

Causes sound or movie media to loop (re-start repeatedly) when played past its duration. This is particularly useful for short, cyclical animations, where the movie then contains only a single cycle.

NOTE: To see the effect of this behavior, the duration of the cue must be extended past the media's natural duration, or made free-running.

PLAYBACK SPEED

When set to 100%, video plays at its normal frame-rate. Set to a smaller value to slow down the video. Enable “Frame Blending” inside the video media object to make video that has been slowed down play smoother (see “Apply Frame Blending”).

NOTE: Audio embedded in the video will not play properly unless set to 100%.

STACKING

When using WATCHOUT in its traditional 2D mode, images originating from higher timeline layers cover images from lower layers. This is the behavior obtained when choosing “By Layer”. However, when positioning and moving images along the Z axis (towards or away from the viewer), you may want images closer to the viewer to always appear in front of more distant objects. In many cases, this can be accomplished by placing the cues onto layers in a matching order, which is the preferable solution. When this is not possible, choose “By Z-Depth” instead, to make images with lower Z position appear in front of images with higher Z position.

NOTE: Images with transparent or semi-transparent areas may not blend with other objects as expected when using “By Z-Depth”. If so, re-arrange the cues onto layers in the desired front-to-back order.

The “Default” option is identical to “By Layers” for cues on the Main Timeline or Auxiliary timelines. For cues in compositions, this setting makes images inherit the corresponding setting of the cue that plays the composition.

PREVIEW

Controls the maximum Stage window preview quality. Set to “Reduced” to preview the image using its thumbnail. Set to “None” to suppress preview altogether. When set to anything besides “Best Quality”, the name of the cue is shown in *italics* to indicate this. Reduce this setting if previewing this cue adversely affects the performance of your production computer.

NOTE: The preview quality is ultimately constrained by the setting on the Preview menu (see “[Preview Quality](#)”). The cue setting specifies the *maximum* quality by which the cue will be previewed.

BLEND MODE

These options control how the image interacts with other images that it overlaps on stage. They perform similar to those with the same name in applications such as Adobe Photoshop.

- **Normal** makes the top image completely cover the bottom image (unless it has transparent areas or opacity applied).
- **Add** results in a very bright image, suitable for adding highlights to other images. Black areas in the overlapping image have no effect. [See video.](#)
- **Multiply** results in a darkened image. White areas in the overlapping image have no effect. [See video.](#)
- **Screen** is similar to Add, but softer and often produces a more pleasant effect. [See video.](#)
- **Lighten** keeps the lightest parts of the images.
- **Darken** keeps the darkest parts of the images
- **Linear Burn** is similar to the Multiple mode, but produces a more intense result.

MASKED BY LAYER ABOVE

Allows you to use one image or video as a mask for another one. The image to be used as a mask must be placed on the layer immediately above the one to be masked. If the mask image has an alpha channel, choose the “Alpha Mask” mode. Otherwise chose “Luma Mask” to use the brightness of the

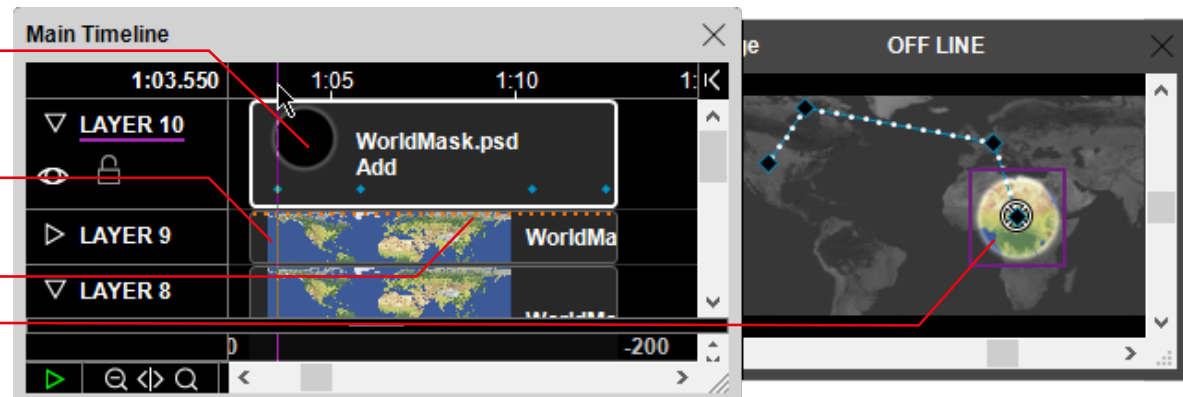
image to create the mask. Choose the “Inverted” version of each mask mode to reverse the mask. Masking is indicated by red dots running along the top of the masked cue.

Mask image, with “Suppress Rendering” selected.

Image being masked, with “Alpha Mask” selected.

Red dots indicate mask.

Resulting image.



See these videos for more examples on how to use masks:

Masking: <https://vimeo.com/134593900>

Masking & custom wipes: <https://vimeo.com/134594128>

Masking with a video clip: <https://vimeo.com/134594127>

Combining masking with other effects: <https://vimeo.com/134593901>

SUPPRESS RENDERING

When using an image as a mask, you often don't want the image itself to be rendered – only its masking effect. To accomplish that, select this checkbox in the cue that controls the image used as a mask.

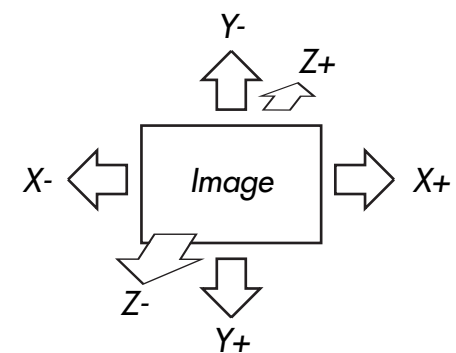
NOTE: Select “Masked by Layer Above” in the cue of the image being masked, and select “Suppress Rendering” in the cue of the image being used as a mask.

When this option is selected, the cue's name is shown in italics.

AUTO-ORIENT ALONG MOTION PATH

Causes an image or 3D model to rotate according to its motion direction at any given time. This is useful when animating an object that should always point along the path of motion, such as an airplane.

The “Forward Motion Direction” options control the orientation of the image as it moves along the motion path. Choose the direction you want to be considered forward, with the default value being the right edge of the image (X+).



NOTE: In some cases you may also need to apply Rotation to the image to make it point in the desired direction.

See these videos for more on animations:

Using animations, part 1: <https://vimeo.com/134593525>

Using animations, part 2: <https://vimeo.com/134593526>

USE ANCHOR POSITION AS VANISHING POINT

When positioning 3D models or rotating images in 3D space, a perspective must be applied to achieve the proper result on a flat screen. This perspective must assume a particular vantage point.

The far side of this point is called the **vanishing point**. The default vanishing point used in your WATCHOUT scene is set in the Preferences dialog box (see “3D Perspective and Stereoscopy”).

However, in some cases you may want to handle multiple, more or less independent, displays as a single WATCHOUT show. Those displays may not make up a single image canvas, but several image areas, where each should appear on its own. In this case, applying a single vanishing point to all these displays doesn’t make sense, and will make X/Y axis rotations and 3D objects on those displays appear incorrect and distorted.

To manage such cases, you can do either of the following:

- Select “Use Anchor Position as Vanishing point” in each cue related to that display. This method is suitable if there’s a small number of cues.
- Put all cues for that display in a Composition, and select “Use Anchor Position as Vanishing point” in the cue that displays this composition.
- Use a **3D Mapping Projector** instead of a 2D Display to produce the image for the display. In this case, no special setting is required, since each 3D Projector manages its own perspective, independent of the global vanishing point setting.

In the first two cases, you must also locate the anchor point in the cue as desired, since it will control the vanishing point.

NOTE: This checkbox applies only for 2D and Virtual displays. It doesn’t apply for 3D Projectors, which manage their own perspective based on their position and target point.

EXTERNAL CONTROL OF POSITION, ROTATION AND SCALE

Usually, you control media cue position, rotation and scaling using the corresponding tween tracks alone. However, you may occasionally want to control these parameters from an external source, such as a MIDI, tracking, DMX input, or via the network (see “setInput”). Select this checkbox to allow for such external control. Add the desired tween track and use its formula button to assign the control source to the desired parameters (see “External Control of Tween Tracks”). Alternatively, a “Tracking Name” may be specified to allow a Tracking Input to control the position and rotation of a media cue, see “Tracking Input” in the chapter titled “10. Inputs and Outputs”.

NOTE: The positional data received via a Tracking Input will be relative to a media cue’s anchor position.

NOTE: For still images, this option is only available when the image is set to be optimized for “More Effects and Capabilities” (see “Optimize For”).

IMPORTANT: Selecting this option increases the load on all your display computers. Do not choose this option unless necessary.

INTERACTION NAME

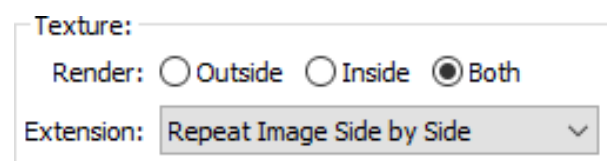
This value is only used by the hitTest command (see “hitTest”).

TEXTURE

These settings apply only to 3D model cues.

Render

Surfaces on a 3D model have two sides: an outside and an inside. For a closed 3D model, such as a sphere, you normally



Texture:
Render: ☐ Outside ☐ Inside ☒ Both
Extension: Repeat Image Side by Side

see just the outside. For other more complex models, you may see both the outside and inside. What's considered "outside" is controlled by the 3D model itself, and can be edited in a 3D application by altering the "normals" of the model.

When applying a texture to a 3D model in WATCHOUT, it may appear on the outside, the inside or both sides (default). If you prefer not to see the texture on the inside of the model, select "Outside", or vice versa.

Extension

Usually, a 3D model is designed to have a texture spanning its surface exactly. This is defined inside the 3D model by keeping its texture space (UV coordinates) within a 0-to-1 range. Some 3D models, however, may have one or many areas where the texture space extends outside this range. If so, the settings on the "Extension" menu determine what's to happen outside this range.

Repeat Image Side by Side. The texture you apply will be shown repeatedly, side by side, for as large a range as required. For instance, if the texture range in the 3D model is five wide by five tall, 25 copies of the texture will be shown in a 5-by-5 arrangement.

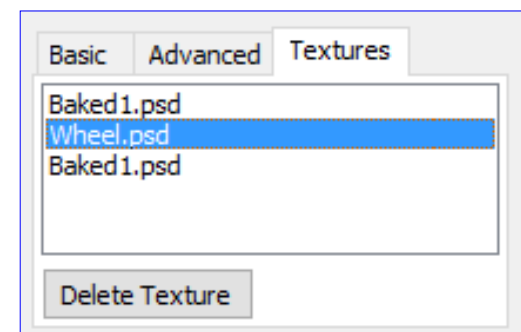
Repeat by Mirroring Even Copies. This option is similar to the previous one, but will cause copies at even positions in the grid to be mirrored or flipped. This works better with some textures to create a more seamless look.

Extend image edge pixels. In this mode, texture coordinates that fall outside the 0...1 range will be filled with whatever color is at the closest edge in the texture you provide.

Texture Tab

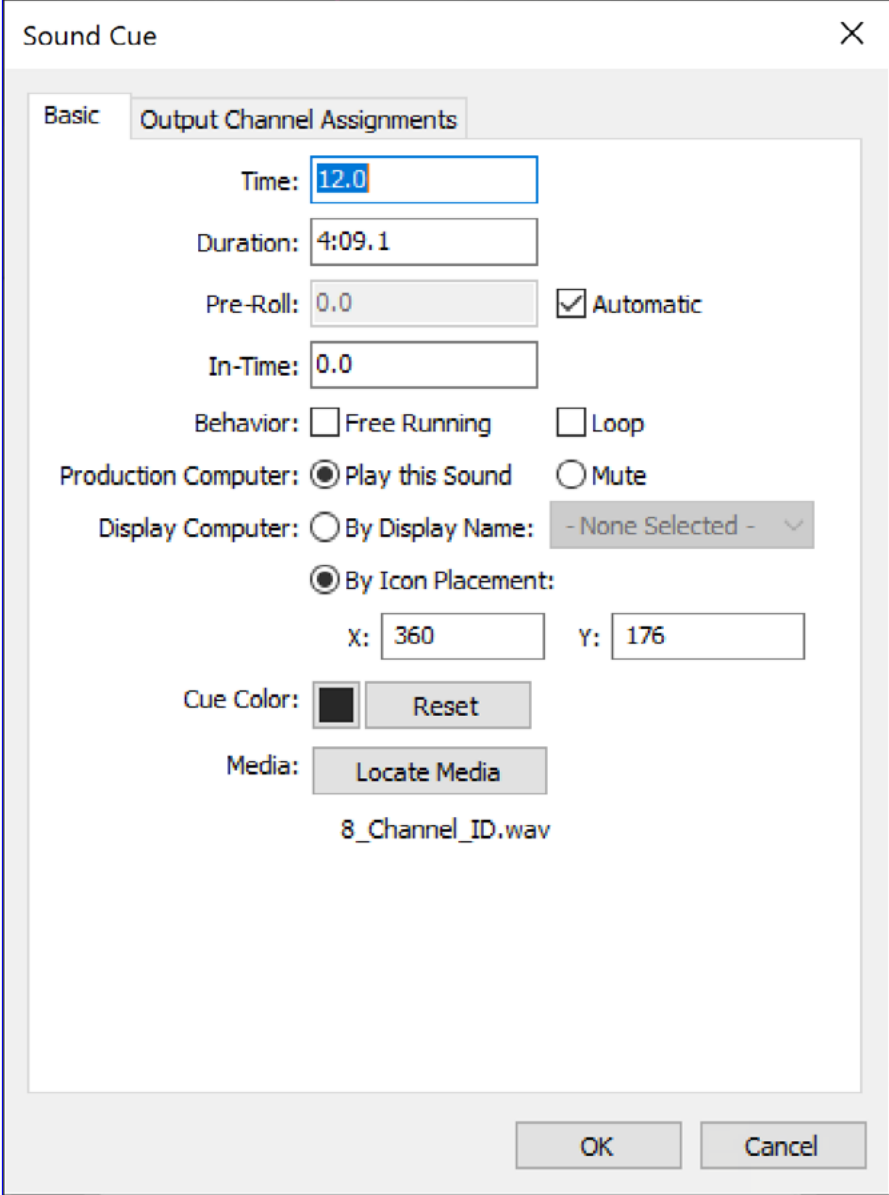
This tab lists the names of all textures currently applied to the model. Select a texture in the list and press the "Delete Texture" button to remove it from the model. Doing so replaces the texture with a solid color, allowing you to see the extent of a separately texturable area inside a model. Select multiple textures in the list by Shift- or Control-clicking.

NOTE: You don't need to delete a texture in order to replace it. Simply drop a new image in its place while the cue is selected.



SOUND CUE SPECIFICATIONS

Cues specific to sound media share many of the basic settings with images and video, as under “[Cue Specifications](#)”. They also have some settings that are unique to sound playback.



The screenshot shows the "Sound Cue" dialog box with the "Basic" tab selected. The "Output Channel Assignments" sub-tab is also visible. The settings are as follows:

- Time: 12.0
- Duration: 4:09.1
- Pre-Roll: 0.0
- In-Time: 0.0
- Behavior: ☐ Free Running, ☐ Loop
- Production Computer: ☒ Play this Sound, ☐ Mute
- Display Computer: ☐ By Display Name: - None Selected -
- ☒ By Icon Placement:
 - X: 360
 - Y: 176
- Cue Color: [Black swatch] [Reset]
- Media: [Locate Media]
- 8_Channel_ID.wav

At the bottom are "OK" and "Cancel" buttons.

PRODUCTION COMPUTER

Specifies whether the production computer should play this sound. This setting gives you control over this property on a per-cue basis, while the corresponding setting on the Preview menu provides a global setting for your production computer (see “[Play Audio Media](#)”).

DISPLAY COMPUTER

Specifies which display computer to use for playback:

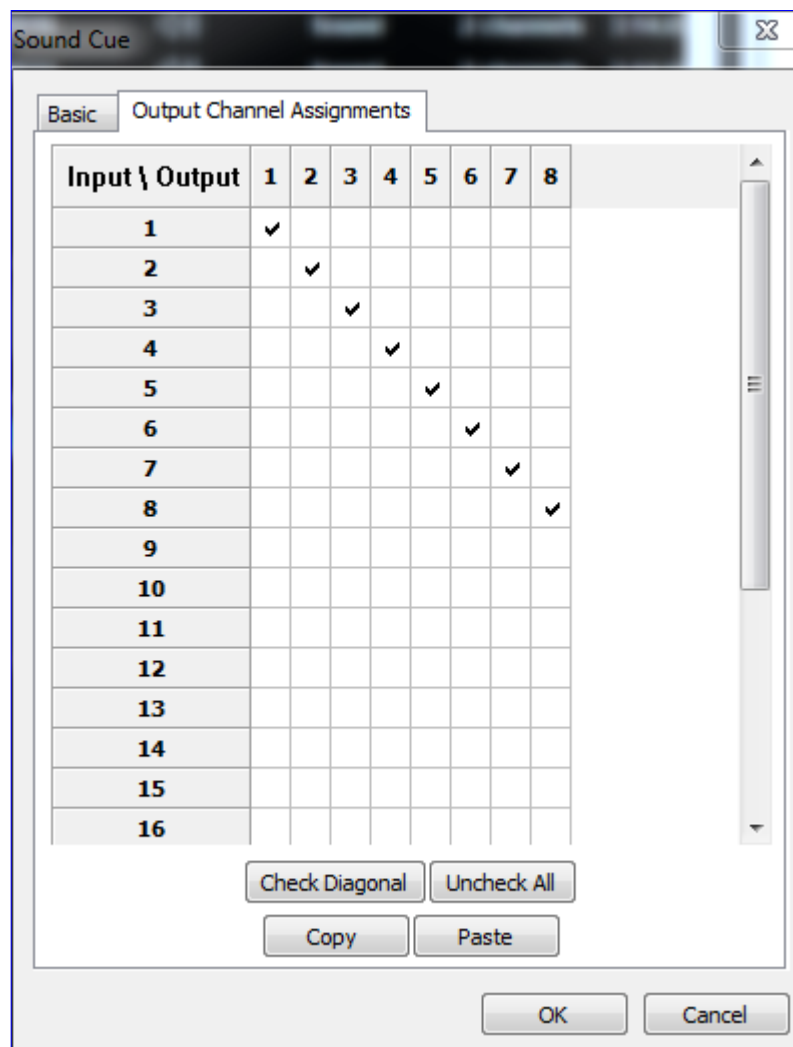
By Icon Placement. In this mode, place the speaker icon corresponding to this cue inside the desired display rectangle in the Stage window (also indicated by the X and Y position values in the cue). This legacy method applies only to 2D displays.

By Display Name. In this mode, choose the name of a display or projector associated with the desired computer on the menu next to this option.

OUTPUT CHANNEL ASSIGNMENT

In the “Output Channel Assignments” tab in the Sound Cue dialog box, you can modify the audio channel matrix by clicking corresponding cells. Any input channel can be routed into any output.

Note: WATCHOUT supports a maximum of 24 channels.



HINT: Use a “Channel Volumes” tween track to control playback volumes individually for each channel.

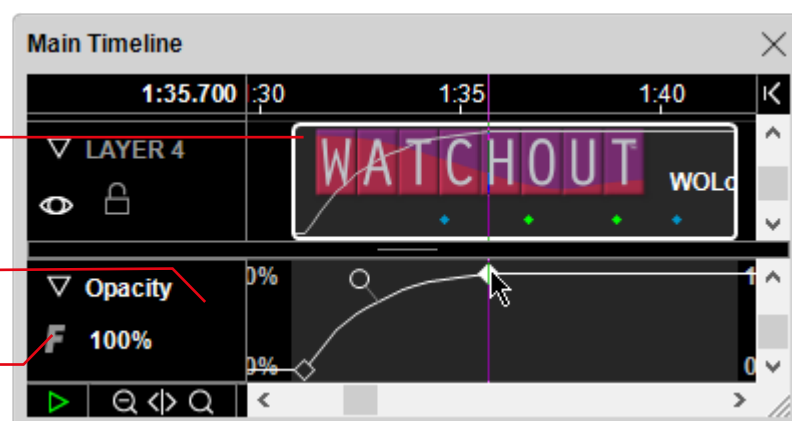
TWEEN TRACKS

Tween tracks control the appearance of media on stage over time. Depending on the type of media associated with the cue, you can add one or more tween tracks.

To add or remove a tween track, first select the cue then choose the desired type on the Tween menu.

Tween tracks of the selected cue appear in the tween pane.

Formula button linking the tween track to an external control input.



HINT: Click the disclosure triangle in the layer header to expand the layer. This reveals where tween points are located using colored dots along the bottom of cues, as shown above. These dots show you where tween points are used without having to select each individual cue.

Most tween track types apply to images, compositions and video. Volume and Balance apply to movies and audio media. 3D models support only Position, Scale and Rotation. However, you can apply any tween track for images used to create textures for 3D models by using a [Virtual Display](#) to manage the texture.

These videos provide an introduction to some of the tween tracks:

Using animations, part 1: <https://vimeo.com/134593525>

Using animations, part 2: <https://vimeo.com/134593526>

Using animations, part 3: <https://vimeo.com/134593530>

The following pages describe each kind of tween track, as well as the dialog boxes accessed by double-clicking a point along a tween track.

COPYING AND PASTING TWEENS

Entire tween tracks, or individual tween points, can be copied in one cue and pasted into one or more other cues. Select entire tracks by clicking their name to the left in the tween pane.

EXTERNAL CONTROL OF TWEEN TRACKS

Most parameters can be controlled by external inputs, or by a combination of tween track and external input. Those are indicated by a formula button, as shown in the illustration above. See also [“External Control of Position, Rotation and Scale”](#) as well as [“Controlling Tween Tracks”](#).

POSITION

Positions an image on stage. To change the position, drag the image or one of the motion path handles shown in the Stage window when the cue is selected. To set the position numerically, double-click the Position tween point and type the desired position of the anchor point into the "Location" field.

HINT: To move the entire motion path, first select all the Position tween points, then drag the image. Or use the Move command on the Edit menu.

The "Speed" fields control the speed of motion into or out from the point. A value of 1 results in the normal speed required to move linearly to the next point.

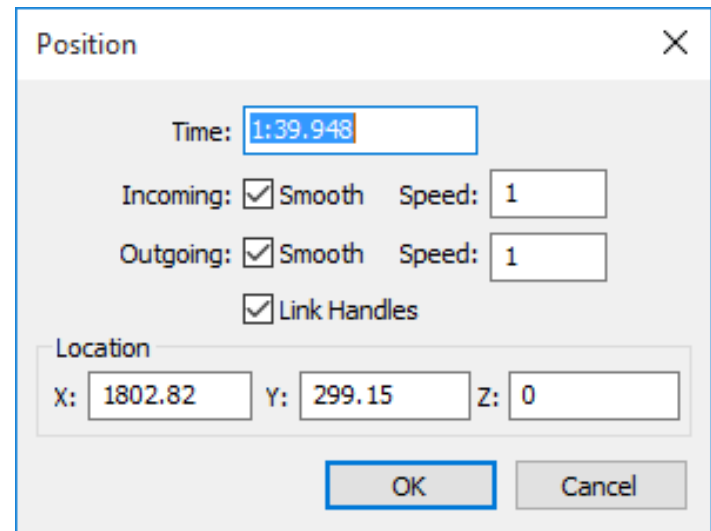
Smaller values make the image go slower and greater values go faster. The speed is indicated by white dots along the motion path (see below), and can also be controlled using the speed handles (visible only for smooth points).

Using the Z position field, you can move the image along the Z axis, away from or towards the viewer. The Z position can also be controlled by dragging the Position tween point vertically, with the position indicated numerically next to the tween track. Moving the image along the Z axis changes its perceived size according to the amount of perspective selected in the Preferences dialog box. When images move away from the viewer, they move toward the vanishing point, which is also set in the Preferences dialog box (see "3D Perspective and Stereoscopy").

Normally, images overlap and obscure each other according to their layer order. When using Z position, you may want images closer to the viewer to obscure images farther away. If so, select "By Z-Depth" in the cue's specifications (see "Stacking").

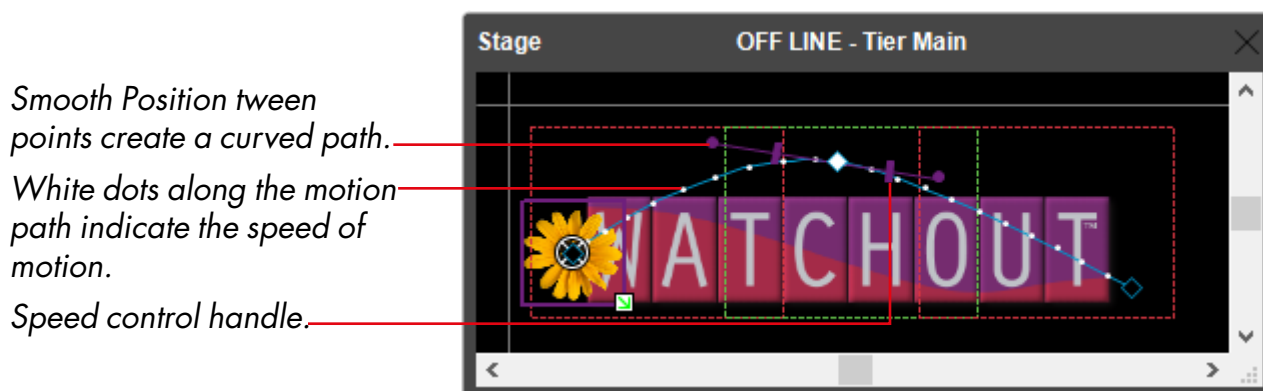
When positioning images along the Z axis, it may be hard to see where the image is when viewed from the front. If so, choose "View, Left" or "View, Top" on the Stage menu to rotate the stage preview. These views also allow you to edit the Z position by dragging the image or its position tween points in the Stage window.

HINT: In some cases, it may be easier to edit the position of an image in the Stage window by first deselecting **Perspective** on the preview menu.



MOVING ALONG A PATH

The "Smooth" checkboxes allow you to create curved motion paths, as shown below. When selected, a direction handle appears attached to the point, controlling the direction of motion into or out from the point.



Link Handles

Select “Link Handles” to make sure that the motion through a tween point is perfectly smooth. When selected, the directional handles on either side of the point are linked so they always point in opposite directions. This option is not available for the beginning and end points.

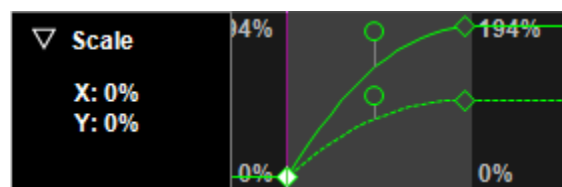
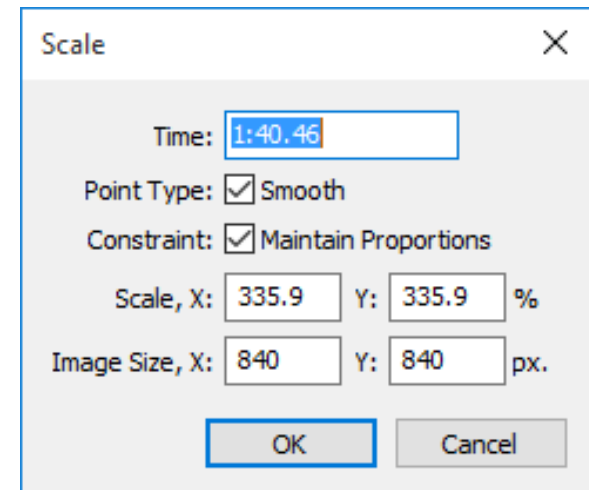
SCALE

Scales an image in relation to its anchor position (see “Anchor Position”). You can specify either the scale factor (relative to the image’s natural size), or the desired size of the image on stage. Negative values flip the image.

The “Smooth” checkbox allows you to change a corner point into a smooth point, and vice versa. A smooth point changes the rate of scaling over time, for example making it start or stop in a more gradual and less abrupt way.

As an alternative to using the Scale tween track handle or its dialog box, simply drag the scaling handle appearing in the Stage window. Press Shift to maintain the image’s proportions as you drag.

To scale the width and height by different values, first uncheck the “Maintain Proportions” checkbox. This results in a split scale curve, allowing you to adjust horizontal and vertical scaling independently.



Independent X and Y scaling factors, combined with a smooth retardation.

CROP

Use a Crop tween track to move the edges of an image inwards. You can use this to remove unwanted parts of an image, or as a creative effect to make text or other elements appear gradually.

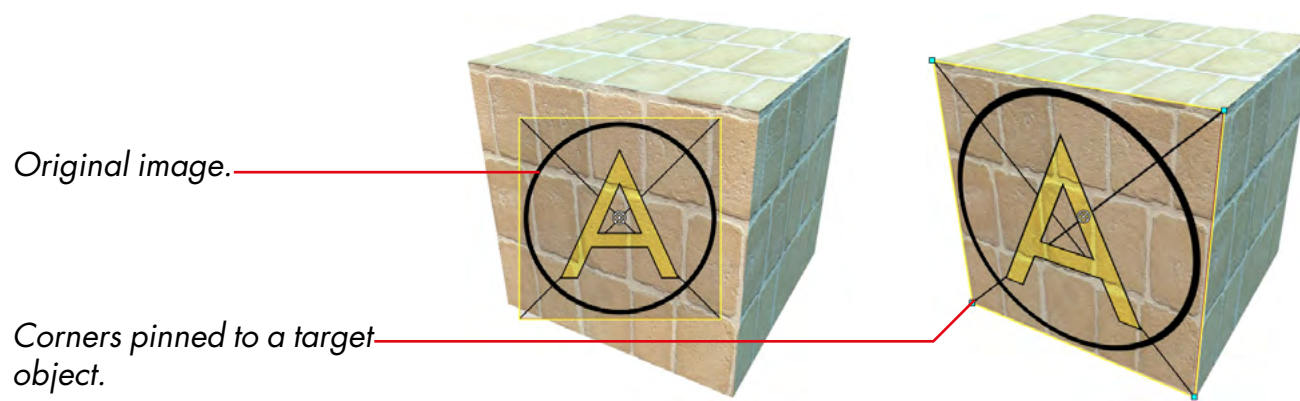
HINT: To specify a precise amount, double-click a tween point and enter the value as a percentage or in pixels.

As an alternative, use a **Wipe** tween track to reveal an image using a feathered edge.

CORNERS

Offsets the four corners of an image individually, allowing it to be mapped onto another image or real-world object. As the corners are moved, the image changes accordingly to obtain a matching perspective (see below). While this alters the perceived perspective of the image, the image remains flat (2D). The corners can be moved either by dragging with the mouse, or by using the arrow keys while holding down the Control key. Add the Shift key for greater increments.

For more advanced mapping applications, such as mapping onto arbitrarily shaped 3D surfaces, use a 3D Model object instead (see “3D Models”).



An image being mapped onto an object using a Corners tween track to position each of its four corners.

HINT: This tween track can also be used to skew the image by moving either the top or right-hand side control points.

OPACITY

Controls the opacity (transparency) of an image. To change the opacity, either drag the tween point vertically in the tween track, or double-click it to change its value numerically.

The “Time Position” field specifies the position of the tween point along the timeline. This must be a time within the time span occupied by the cue.

The “Smooth” checkbox allows you to change a corner point into a smooth point, and vice versa. Use smooth points in combination with corner points to accelerate or slow down transitions, as shown in the illustration under [Scale](#).

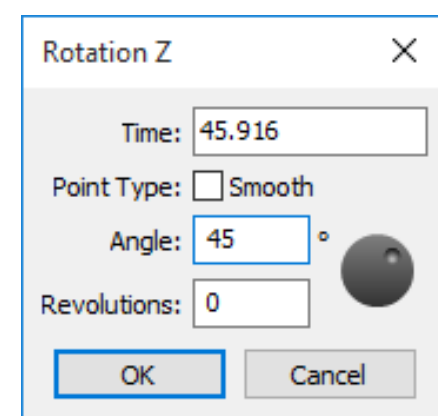
HINT: The opacity curve is also displayed in the cue’s body, allowing you to see it even when the cue isn’t selected.

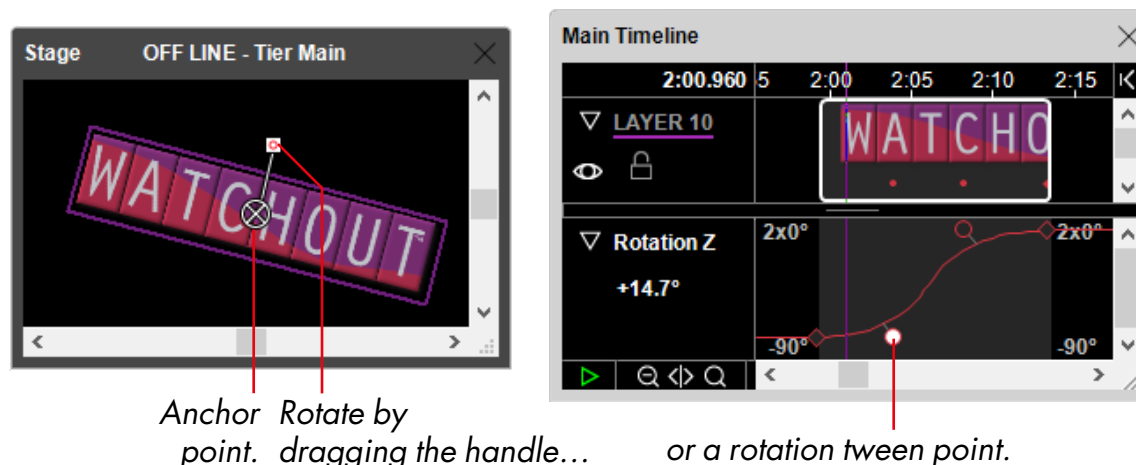
ROTATION Z

Rotates an image around its anchor point ([see “Anchor Position”](#)). You can rotate the image by a specified number of revolutions or degrees, or a combination of the two. (For example, to rotate 2.5 times, set Revolutions to 2 and Degrees to 180.)

Alternatively, drag the rotation handle in the Stage window or the Rotation tween point in the tween pane.

HINT: You can also make an image rotate automatically to orient itself along a motion path ([see “Auto-orient along Motion Path”](#)).





ROTATION X AND Y

Similar to the Rotation Z tween track described on the previous page, but rotates the image around its X (horizontal) or Y (vertical) axes instead, making it appear in perspective. The amount of perspective applied is specified in the Preferences dialog box (see “3D Perspective and Stereoscopy”).

HINT: To edit the amount of X or Y Rotation interactively in the Stage window, first change the view-point using the **View** command on the Stage menu.

VOLUME

Controls the volume of audio media and video containing audio. The volume curve is also displayed in the body of a sound cue, allowing you to see the curve even when the cue isn’t selected. When combined with the Channel Volumes tween track described below, the Volume tween track controls the overall volume of the sound file, allowing you to fade all channels together.

NOTE: When a Volume tween track isn’t used, the volume is controlled by a setting in the Preferences dialog box (see “Default Audio Volume”). Setting this to a value of less than 100% allows you to use a Volume tween track to boost the volume of individual sounds above this default level.

BALANCE

Controls the left/right audio channel balance. Applies to audio media and video media containing audio.

CHANNEL VOLUMES

Provides individual volume control for up to eight channels in the sound file. This is particularly useful when playing multi-channel sound files (that is, files with more than a single stereo pair). This tween track type applies to audio media only.

IMPORTANT: Use WAVE files to play multi-channel audio. Other file formats are not supported.

KEY (GREEN/BLUE)

Makes a green or blue background transparent. This is sometimes referred to as a “green screen” or “chromakey” effect, and is typically used with live video, although it can be used with any kind of image. Adjust the Threshold and Contrast parameters for best effect. See this video:

Blue green keyer: <https://vimeo.com/134594129>

HINT: For non-rectangular video playback, you can often use a pure green or blue background, combined with this tween track, as an alternative to a true alpha channel. This allows you to use more efficient video codecs than QuickTime Animation, such as MPEG-2 or H.264.

KEY (SELECTIVE)

Makes any specific, pure color transparent. This can, for example, be used to make a black background transparent (sometimes referred to as a “luma keyer”). Select the color using the color swatch, then adjust the Threshold and Softness parameters for the desired effect.

HINT: Use this feature to display Powerpoint slides, fed through a capture card Live Video or a Computer Screen media item, on top of a background produced in WATCHOUT. Specify a suitable background color in the Powerpoint presentation, which is then made transparent using this effect. See this video:

Luminance keyer: <https://vimeo.com/134594130>

KEEP COLOR

Makes the image mostly monochrome, while retaining a certain color range. First select the color to keep by clicking the color swatch or by adjusting the Hue, Saturation and Brightness tween tracks. Then adjust the Tolerance and Softness until you achieve the desired effect.

RGB MIXER

Re-mixes any amount of the original Red, Green and Blue color components to the Red, Green and Blue color components of the resulting image.

HUE & SATURATION

Allows you to re-map the color spectrum of an image, as well as adjusting its color saturation contrast and brightness. See this video for a few examples:

Hue & saturation effect: <https://vimeo.com/134593724>

Hue

Rotates the color spectrum of the image so that the chosen hue corresponds red in the original image. This can be used for minor color balance adjustments all the way up to color inversion.

Saturation

Adjusts the color saturation.

Gain

Changes the contrast of the image by multiplying all its pixels by the specified amount.

NOTE: This may result in clipping in bright areas. If you only want to change the contrast, use the “Contrast & Brightness” effect instead.

Offset

Changes the brightness of the image by adding the chosen amount to its pixels.

HINT: You can invert the image by setting the Gain to -100% and Offset to 100%.

CONTRAST & BRIGHTNESS

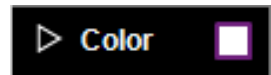
Adjusts the contrast and brightness of the image. This effect uses a spline curve to adjust these values, similar to how you may use the “Curves” command in Photoshop, thereby avoiding clipping in bright or dark areas.

COLOR

Use a Color tween track to specify the overall color of an image. The colors in the image will be multiplied by the color you choose. You can think of the Color tween track as the color of a light source

illuminating the image. Normally, the color of this light source is white. By changing the brightness or color of this light source, you can influence the overall brightness or color of the image.

Start by selecting an image cue on the timeline and choosing “Color” on the Tween menu to add the tween track. The default color is white, as indicated by the small color swatch next to the tween track name. Click this swatch to change the color.

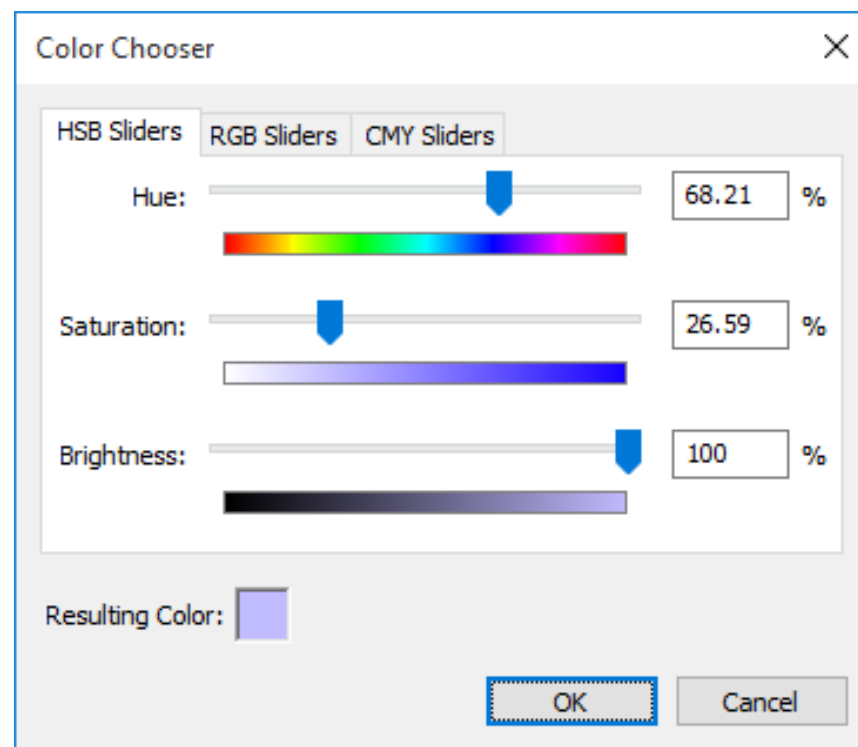


This brings up a dialog box allowing you to specify the color. Choose among the following color models:

HSB. Specifies the color by first picking a hue (a specific color) and then the saturation (the amount of that color) and brightness of the color. This intuitive color model is familiar to many artists and painters.

RGB. Specifies the color using an additive method based on the amount of the three primary colors Red, Green and Blue. This color model is often familiar to users with a web or computer background.

CMY. Specifies the color using a subtractive method, where you specify the filter density of an imaginative set of Cyan, Magenta and Yellow filters. This model may be familiar to you if you come from a lighting background, where filters are often used to control the color of a light.



Choose a color model by clicking one of the tabs, then specify the color with the sliders.

NOTE: It doesn’t matter which of the three methods you use to specify the color. Use the method that feels most familiar to you.

When using the HSB model, note that merely changing the Hue has no effect unless you also specify a saturation and brightness greater than zero. Watch the “Resulting Color” swatch as you drag the sliders to see the resulting color. The preview in the Status window shows the color as applied to the image.

An alternative way of specifying the color is to open the Color tween track to reveal its sub-tracks.

HINT: Double-click a tween point to set its value numerically. As the hue is specified by its color wheel angle, you can use this method to create rainbow cycles by making the hue go through several revolutions.

TINT

Use a Tint tween track to add color to an image. You can think of the Tint tween track as specifying the color of translucent spray paint added to the image. While the Color tween track primarily affects the bright areas of the image, the Tint tween track mainly affects the dark areas. Normally, the Tint color is black, meaning that no color is added.

HINT: You can combine both Color and Tint on the same image.

Specify the color to be added using the same methods as described above for the Color tween track.

BLACK & WHITE

Makes the image monochrome based on the color chosen in the Hue and Saturation parameters. Adjust the Mix parameter to restore some amount of the original color, if desired. See this video for an example:

Black & white effect: <https://vimeo.com/134593725>

HINT: The “Black & White” effect, with a carefully chosen source color, often gives a better result than using the “Hue & Saturation” effect to desaturate the image.

WIPE

The various Wipe effects make an image appear gradually, starting from one edge or corner and progressing towards the other. To see the effect, ramp up the Completion parameter from 0 to 100% over time. Change the Angle parameter to control the direction of the wipe. Adjust other parameters to your liking by changing the parameter while the Completion value is around 50%. See this video for some examples:

Wipe effect: <https://vimeo.com/134593531>

ROUNDED CORNERS

Applies a corner radius and/or feathered edge to an image. Note that for still images, this tween track is only available when “More Effects and Capabilities” is selected (see “Optimize For”).

HINT: Use this tween track on a **Solid**, in combination with a **Color** tween set to black and some **Opacity**, to create a rectangular shadow.

CONTROL CUE

The Control cue governs the behavior of timelines. The cue is performed when the timeline runs past it. The Control cue can be used to make a timeline pause, or jump to another position (by time or by name). To create a Control cue, choose “Add Play / Pause Control Cue” on the Timeline menu.

Cue name. Used to jump to a named position. Name cues F1 through F12 to use function keys.

Control the enclosing timeline or another, specified timeline.

Time position or Control cue name to jump to.

Makes the timeline stop, pause or run (possibly after jumping).

Control Cue

Name: F2 Time: 1:31.364

Tell: Enclosing Timeline

☒ Jump to:

☒ Time Position: 0.0

☐ Control Cue Named:

☐ Search Reverse Only

☐ Stop (applies to Auxiliary Timeline only)

☐ Pause ☒ Run

Jump-to-Run Delay: 0.0

OK Cancel

Name of auxiliary timeline to control.

Makes timeline jump to a time position or a named Control cue.

Jumps backwards only when jumping to a named cue.

Introduces a delay between the jump and the restart.

CREATING LOOPS

You can use the "Jump to" option to create loops – causing a section of the timeline to be repeated. When jumping, you have the option of automatically restarting the timeline after the jump. In this case, it is often a good idea to introduce a delay of a second or so to allow the display computers to catch up before starting. This is done using the "Jump-to-Run Delay" field.

To exit such a loop, use the QuickFind feature described below, possibly in conjunction with the Standby command .

Another option for creating loops is to use a free-running and looping composition. While slightly more complex, it gives better control over the loop exit. To use that method, proceed as follows:

- Put the entire loop into a composition (see "Compositions").
- Drag the composition onto a timeline to create a cue.
- Select Loop and Free Running in the cue to make the composition loop.
- Make the timeline pause during the loop.
- To continue after the pause, fade out the looping composition cue.

CONTROLLING OTHER TIMELINES

A Control cue can also be used to start, stop and position auxiliary timelines. To do so, select "Tell Timeline Named" in the cue, then enter the name of an auxiliary timeline into the field.

HINT: To name an auxiliary timeline, choose "Timeline Settings" while its timeline window is open. Do not change the name of an auxiliary timeline after creating control cues targeting it, or you will break the connection.

USING FIND AND QUICKFIND

Named Control cues can be used with the Find command to locate a position along the timeline by name. A QuickFind feature allows you to instantly jump to positions using the computer's function keys. To use this feature, simply name the Control cues "F1", "F2", etc, as shown above.

IMPORTANT: The Control cue's name field is case-sensitive. When using function key names, type an upper case F.

8. COMPOSITIONS

A composition allows you to group a set of cues together on their own sub-timeline. This can then be used from other timelines similar to how you can play a video. A composition makes it easy to re-use or re-arrange show sections or short snippets. It also makes it easier to apply the same effect to a group of media elements – for instance, to move and scale a set of images together.

A composition behaves like other media elements, such as still images and video clips. It lives in the Media window, from where you can drag it onto any timeline to use it. You can use a composition any number of times – you can even play multiple instances of a composition at the same time.

Similar to a video clip, a composition has a duration and may contain motion. However, as a composition is created within WATCHOUT, there's no rendering time or other delays involved in changing it. A composition can be looped and/or free running, making it easy to create motion of indefinite duration within WATCHOUT.

A BASIC EXAMPLE

For example, assume you want to add a frame to a video clip, and then make the video clip move across the screen while scaling it up at the same time. Although you could do this by applying the motion and the scaling to the video and the frame image individually, it's often hard to make the two move together in a cohesive way. Instead, you can add both elements to a composition without applying any motion and scaling to the individual elements. Then use the resulting composition from the main timeline, applying the motion and scaling to the composition as a whole.

CREATING A COMPOSITION

Start by choosing “Add Composition” on the Media menu. Give the composition a name, and type a suitable size into the “Reference Frame” field. In this case, it is a good idea to make the reference frame just slightly larger than the still image frame around the video. This reference frame will be used later when manipulating the composition as a whole from the main timeline.

Open the composition's timeline window by double-clicking the newly added composition item in the Media window. Notice that the content of the Stage window changes when the composition window appears. Instead of showing the display rectangles, it now shows the reference frame of the composition. While editing a composition, its preview appears in the Stage window, temporarily replacing the preview of the displays. To restore the Stage window to its usual state, select the main timeline window.

To change the size of the reference frame, or any other composition setting, choose “Timeline Settings” on the Timeline menu while the composition's window is active.

ADDING CUES

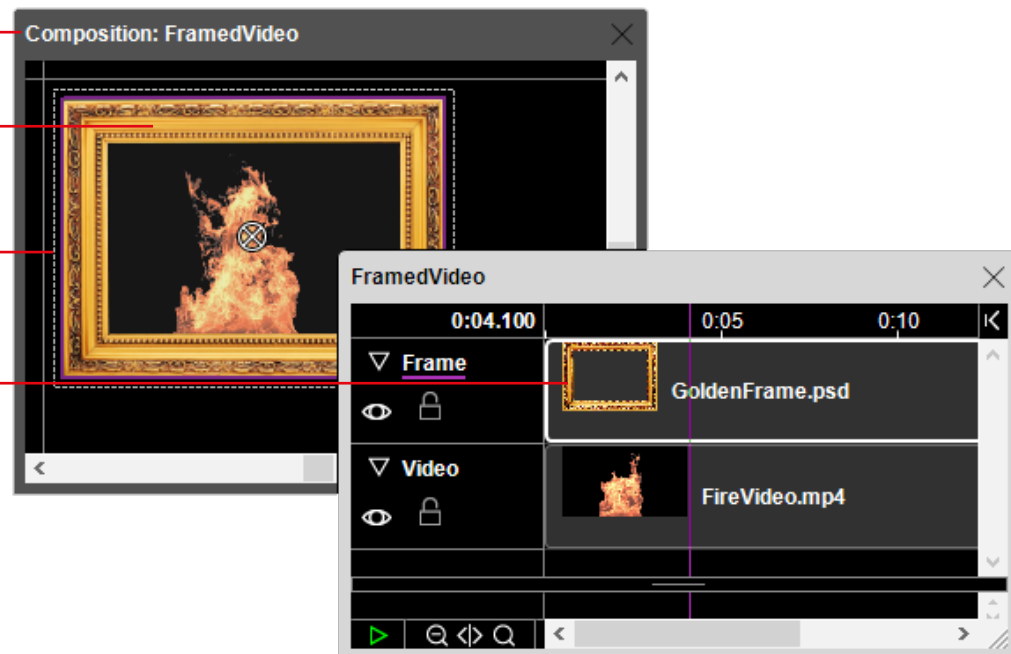
You add cues to a composition in the same way as you do to other timelines. In this example, we will add a video with a still image frame on top. Drag those images onto the composition's timeline. Their preview will appear in the Stage window.

Indicates composition preview mode.

Stage window content temporarily replaced to show a preview of the composition.

This rectangle represents the composition's reference frame.

Media added to the composition's timeline.



When you've added the media to the composition, close its timeline window. This restores the Stage window to its normal preview mode.

USING THE COMPOSITION

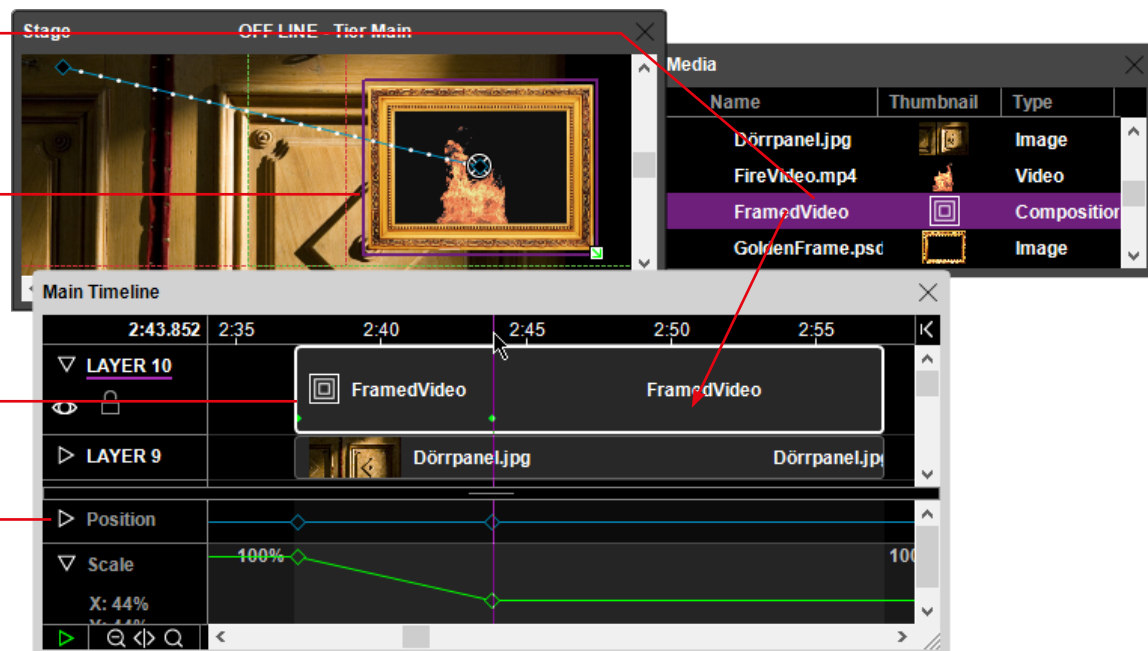
To use your newly created composition as a whole, simply drag it from the Media window onto the main timeline.

Drag a composition from the Media window onto a timeline.

The selection rectangle around the composition corresponds to its reference frame.

A composition cue appears on the timeline.

Add tween tracks to move and scale the entire composition.



HINT: To open a composition's timeline window from the Main Timeline, press Alt then double-click the composition cue.

NESTING COMPOSITIONS

A composition may be used inside other compositions. This can be applied in a hierarchical fashion to build complex animations one step at a time. This video shows how:

<https://vimeo.com/134594388>

9. DYNAMIC IMAGES

The WATCHOUT Dynamic Image Server is a separate program that allows you to incorporate up-to-date text, images and graphics into your presentation. It renders the requested images, and sends the result to your display computers via the network. This is somewhat similar to the way a VNC Server provides images for a “Computer Screen” media item, but provides greater flexibility and programmability.

Being a server application, the program doesn’t offer much in terms of user interface. It simply runs on a computer connected to the network and responds to image requests from WATCHOUT. Using the commands on the File menu, you can manually open local files and URLs to preview them on screen. Images are also displayed while they’re being served to WATCHOUT.

IMPORTANT: As the Image Server runs as a separate application, it requires its own WATCHOUT license key.

IMAGE TYPES

The Image Server can serve three types of content:

- A still image
- A web page, based on standard HTML5 components
- A SWF file (Adobe Flash)
- Desktop

For still images, the Image Server accepts JPEG and PNG and TIFF formats. It supports transparency information in PNG and TIFF images, as well as in HTML and Flash content. See “[Add Dynamic Image](#)” for more details on how to configure this media type.

ALTERNATE FILE LOCATION

By default, local image files are served from a folder relative to the location of the Image Server application. If you want to keep your dynamic images elsewhere, pass the -f command line parameter to the Image Server application to specify the location of the folder. Put this option into a shortcut used to start the image server, possibly located in the Startup folder of the computer, so that the shortcut’s Target field resembles the example below:

```
"C:\WATCHOUT\ImageServer\ImageServer.exe" -f D:\DynImages
```

If the image folder path contains spaces, enclose it within double-quotes too.

SERVING STILL IMAGES

A still image provided through the Image Server can be changed at any time. To update an image on the server, simply drop a new image file into the folder containing the old one, using the same name as the old image. When an image is replaced on the server, the new image will appear on all displays currently showing it. The default refresh interval is 3 seconds but you can customize the interval by using the parameter below.

```
"C:\WATCHOUT\ImageServer\ImageServer.exe" -fileRefreshInterval 1000
```

Values are expressed in milliseconds; the example thus shows a 1 second interval. :

You can provide the updated image in any way you like. For instance, you may run a web server on the same computer, configured to allow files to be uploaded. This web server can provide a web interface for manual uploading of images, or interact with camera phones via the Internet.

Alternatively, you may have a custom application that updates the image on a regular basis, based on some external data or other events. This application can run on the same computer as the WATCHOUT Dynamic Image Server, or another computer connected over the network. From the Image Server's point of view it doesn't matter where the image comes from. As soon as it is changed, it will be updated on screen accordingly.

SERVING HTML CONTENT

The Dynamic Image Server can render regular web pages, based on standard HTML, CSS and JavaScript. Such content can be served either from a local folder on the image server computer, by using a relative path, or from the Internet, by using a fully qualified URL.

Put the local path or the URL into the "Path" field in the Dynamic Image media item.

NOTE: When using a URL, the Dynamic Image Server must have Internet access in order to fetch the content.

If you want to display only a section of a web page, such as a weather map from a weather site, you can use a **Crop** tween track to extract the desired part. The dimensions you specify in the Dynamic Image media item must be large enough to include the desired part from the outset.

SERVING SWF FILES

You may also choose to serve Flash (SWF) files. Such a file can dynamically generate and update text, graphics and other image elements, and can interact with various data sources. SWF files are produced using Adobe Flash Professional. By combining high quality text and graphics rendering with a powerful, network-aware programming language, Flash allows you to create custom solutions with very little effort.

In order to serve SWF files, you must install the Adobe Flash Player on the Image Server computer. This is available as a free download:

<http://get.adobe.com/flashplayer/>

NOTE: When displaying SWF files that reside locally on the Image Server computer, you may need to grant additional rights to those files in order to access network resources. To do so, go to Control Panel, Flash Player. Click the Advanced tab, then Trusted Location Settings. Click the "Add..." button and add the folder(s) containing SWF files to be served by the Image Server.

SOURCING FLASH CONTENT

There are many websites dedicated to providing Flash examples and tutorials. This is a great source for simple flash content, such as live clocks, stock tickers, news readers, etc. In many cases, such content can simply be dropped into your Image Server folder and used as-is.

IMPORTANT: Since you're going to run the SWF files on your local computer, with a relaxed security sandbox based on the "trusted location settings" set above, only use SWF files from sources you trust.

NOTE: Keep in mind that such content may be copyrighted. Always check its license before including it in your presentations.

FLASH EXAMPLE: A NEWS READER

To develop custom solutions, you need to be familiar with Flash Professional and its ActionScript programming language, which is used to create live data. The example below shows a complete news reader for displaying the latest news from CNN:

```
var rssXML:XML;    // RSS feed data is loaded here
var rssLoader:URLLoader = new URLLoader();
var rssURL:URLRequest = new URLRequest("http://rss.cnn.com/rss/edition_
world.rss");
var timer : Timer = new Timer(10000); // Updating image regularly

rssLoader.addEventListener(Event.COMPLETE, rssLoaded);
rssLoader.load(rssURL);

function rssLoaded(evt:Event):void {
    var firstCall : Boolean = !rssXML;
    rssXML = XML(rssLoader.data);
    if (firstCall) {
        updateDisplay(null); // Draw first time right away
        timer.addEventListener(TimerEvent.TIMER, updateDisplay);
        timer.start(); // Display other news every 10 seconds
    }
}

function updateDisplay(evt : TimerEvent) : void {
    var itemCount : uint = rssXML.channel.item.length();
    if (itemCount) { // Has something to display
        var pick : uint = Math.random() * (itemCount-1);
        displayField.htmlText = rssXML.channel.item[pick].description;
    }
}
```

DISPLAYING LOCAL SERVER FILES

Put the local files that are to be served into a folder on the computer running the WATCHOUT Image Server application. By default, this folder is assumed to be found inside the WATCHOUT program folder. Add a command line parameter when starting the Image Server application to put the image folder elsewhere (see ["Alternate File Location"](#)).

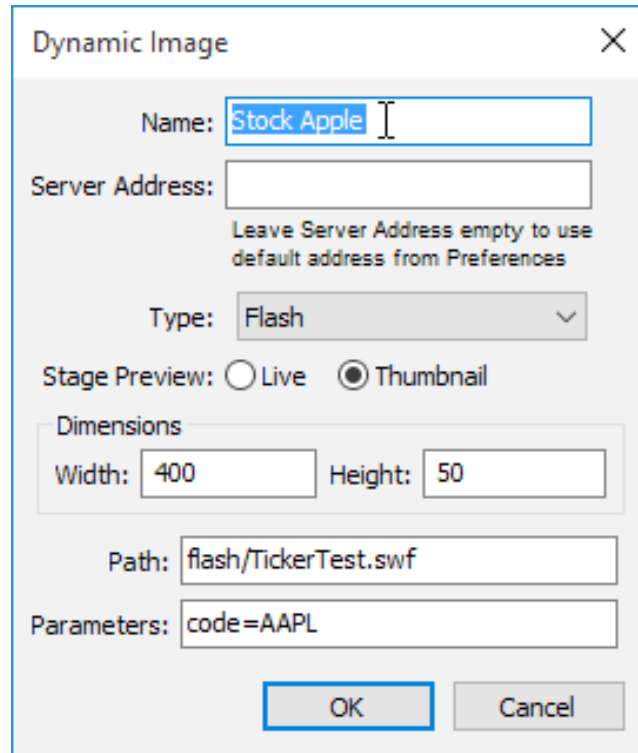
You can test a file manually using the Open command in the Image Server application. This will display the image on screen if it is compatible with the Image Server application.

To display an image in your WATCHOUT presentation, add it as a media item to the Media window of your WATCHOUT presentation (see ["Add Dynamic Image"](#)), then drag it onto stage. The image should now be requested from the Dynamic Image Server, and displayed on screen.

NOTE: You can also preview dynamic images in the production software, if specified in the dynamic media item.

DYNAMIC IMAGE PARAMETERS

In addition to the basic settings, such as the dimensions and path to the image being served, you can also provide additional parameters to the dynamic image. The parameters available vary with the type of image served.



FLASH PARAMETERS

For SWF images, any parameters specified in the Dynamic Image Specifications dialog box are passed to the SWF similar to how parameters are passed from a web page. This allows you to customize a single SWF file in various ways, without having to modify the SWF file itself.

For example, when creating a stock quote display SWF, you may not know what company to display. Instead of hard-coding the company identifier into the SWF file, pass it as a parameter by putting it into the “Parameters” field of the dynamic media item, as shown on the left.

You can then access this “code” parameter, as well as any other parameters you may want to pass, from the `loaderInfo` object in the SWF file like this:

```
loaderInfo.parameters.code
```

This parameter can be sent to a web service providing live stock quotes, such as the one available from Yahoo.

HTML PARAMETERS

Parameters entered for the HTML type will simply be appended to the URL as query string parameters, separated by a question mark. This can be used to pass such parameters to the web server serving the content.

STILL IMAGE PARAMETER

Still images support only the single, optional parameter:

```
missingImageIsOK
```

to indicate that a missing image should be displayed as entirely transparent, rather than giving an error message.

DESKTOP PARAMETER

The Path and Parameters fields are ignored when a desktop image is used. The Image Server simply transfers the desktop image to displays.

10. INPUTS AND OUTPUTS

Inputs and outputs act as gateways between WATCHOUT and external devices. Using industry-standard protocols, such as DMX-512, MIDI, TCP/IP, RTTrPM, and serial data communication, you can interact with the presentation environment in many creative ways.

INPUTS

Inputs receive signals from the outside world. Those signals can then be used to control and influence the behavior of WATCHOUT by starting and stopping timelines and by controlling various cue parameters.



Click the plus button in the top, right corner to add an input.

To create an input, first open the Input window using the Window menu, then choose “Add...” from the pop-up menu located in the upper right corner of the Input window. Depending on the type of input chosen, this displays a dialog box allowing you to enter its specifications. See the following sections for details on the various kinds of inputs.

NOTE: When you are using the production computer, inputs are managed there. When not using a production computer, inputs are managed by the primary display computer in the cluster.

GENERIC INPUT

Use a generic Input when you want to control its value using the WATCHOUT control protocol. The default range of a generic input is 0 through 1, although you may set the upper limit to any positive value using the Limit field in the Generic Input’s dialog box. To control a generic input, use the [setInput](#) command.

CONNECTING A MIDI DEVICE

Connect your MIDI device to a USB port (or other suitable MIDI interface) on your WATCHOUT computer. Many newer devices come with a direct USB connection. Older MIDI devices often use a standard 5-pin DIN connector, in which case you need a MIDI-to-USB adaptor, as shown on the right, or other Windows-compatible MIDI interface. If you have multiple devices with MIDI capabilities connected to your system, you can choose which one to use for MIDI input in the Control tab of the Preferences dialog.

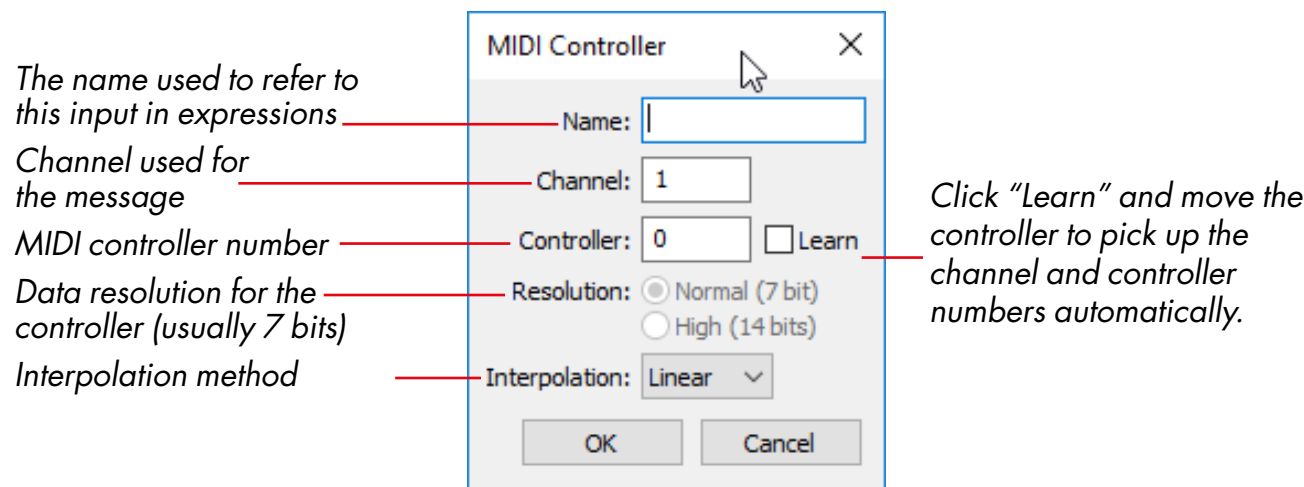


NOTE: Most MIDI devices that connect using USB occupy an entire MIDI bus on their own. Since WATCHOUT handles only a single MIDI bus, you won’t be able to combine such a device with other MIDI devices. When connecting multiple MIDI devices through the same bus, WATCHOUT can handle up to 16 devices simultaneously.

IMPORTANT: When using the production software, connect your MIDI interface to the production computer. Otherwise, connect it to the primary display computer. Turn on and connect your MIDI interface and devices to your computer before starting WATCHOUT.

MIDI CONTROLLER INPUT

A MIDI Controller Input brings in a knob or slider from a keyboard, or similar signal from a MIDI-compatible device or software. This type of MIDI data is sometimes referred to as a “Continuous Controller”, “Control Change” or “CC” message.



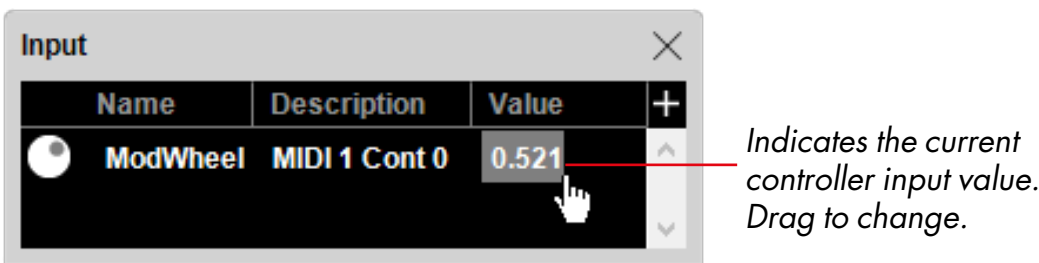
Enter the MIDI channel number and controller number to use, if you know them. If not, click “Learn” and move the controller.

NOTE: The controller number used in the MIDI protocol is often not the same as any number next to the knob on the device. Furthermore, many devices have programmable controllers, so the actual controller number may vary depending on the device’s configuration.

Do not select “Resolution: High” unless you know for a fact that the controller transmits high resolution data. Regardless of the resolution being used, WATCHOUT normalizes all controller inputs to a number in the range 0 through 1, as indicated in the Input window’s Value column.

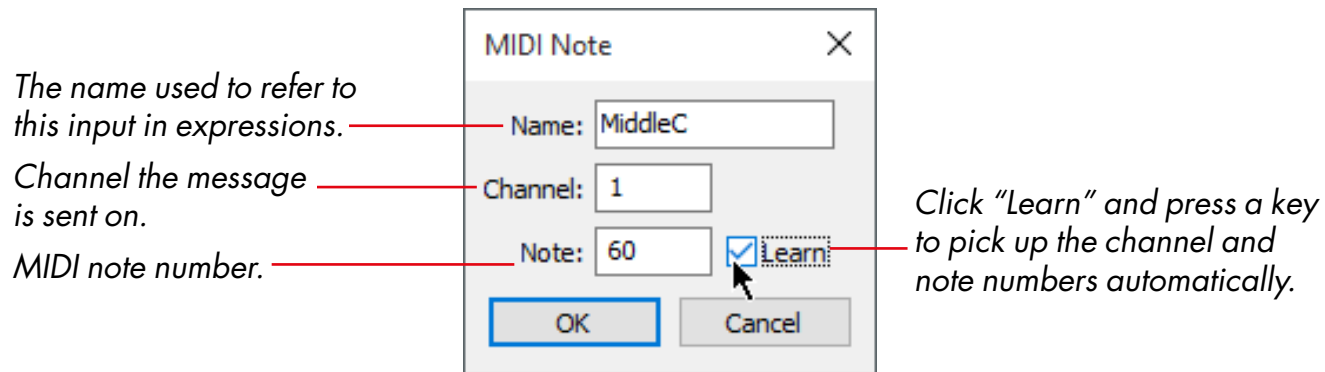
Circular interpolation should be set if using external controls able to rotate more than 360 degrees (e.g. an Endless Wheel Encoder, Jog-wheel or Jog-dial). This makes the input value interpolate the shortest distance between two points on a circular basis. This to avoid a jump backwards, if for example a rotational animation exceeding one revolution is applied on an object, which would be the case if using linear interpolation.

When done, click OK in the MIDI Controller dialog box. Verify proper operation of the input by moving the controller and observing the bar graph in the Input window.



MIDI NOTE INPUT

A MIDI Note Input brings in MIDI keyboard messages, often referred to as “Note On/Note Off” messages.



When you’ve entered all the information, click OK in the MIDI Note dialog box. Verify proper operation of the input by pressing the key and observing the bar graph in the Input window. If the keyboard has velocity sensitivity, the velocity is indicated by the magnitude of the value.

DMX-512 INPUT

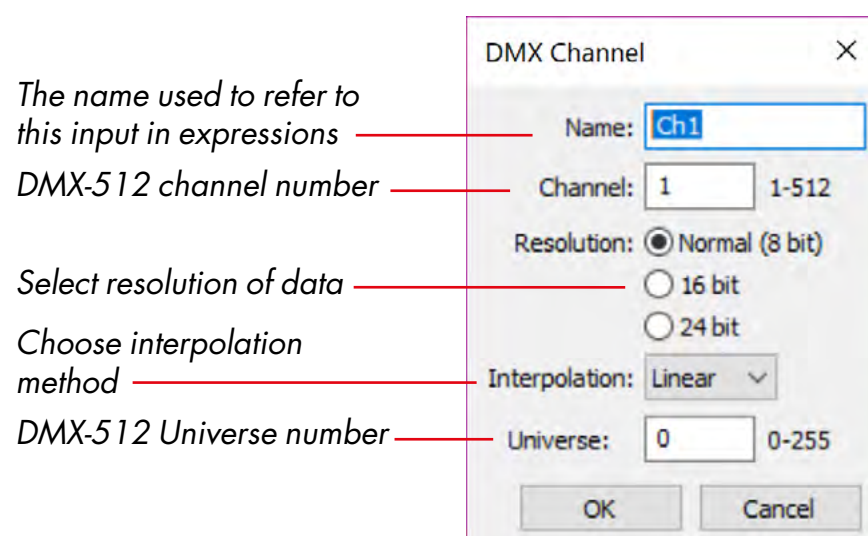
A DMX-512 Input brings in the value of a DMX channel. DMX-512 is a protocol used by most lighting consoles, dimmers, moving lights and other similar devices.



DMX-to-Ethernet adapters from Enttec and Kissbox.

WATCHOUT uses the computer network to receive DMX data with the Artnet protocol. Many lighting consoles can send Artnet over an Ethernet network. Otherwise, a DMX-to-Ethernet adapter must be used. In either case, you need to know the DMX channel number(s) to be used for WATCHOUT, as well as the Artnet Universe number used to send those channels. Set the default ArtNet Universe from which WATCHOUT will receive data under the Control tab in the Preferences dialog box. As the Universe can be set per output, the default setting can be ignored if multiple Universes are to be used.

Add a “DMX-512 Input” to the Input window using the plus button in its top, right corner. Specify the desired DMX channel number.



Choose the appropriate interpolation method (see explanation under the section on “[MIDI Controller Input](#)”, click OK in the DMX Channel dialog box and verify proper operation of the input by moving the fader for the specified channel and observing the bar graph in the Input window. WATCHOUT normalizes DMX values to a number in the range 0 through 1, as indicated in the Input window’s Value column.

Learn more about Artnet here:

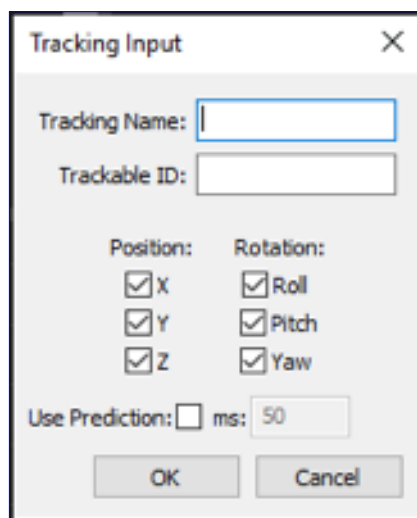
<https://en.wikipedia.org/wiki/Art-Net>

Resolution. Some lighting consoles support higher resolution values (16 or 24 bit). Such values are generally required to control, for example, the position of images in WATCHOUT, since the standard 8 bit DMX resolution (0...255) is too low for this purpose. If your console is capable of outputting 16-bit or 24-bit DMX values, choose the appropriate resolution in the DMX input settings and enter the base (coarse) channel number. WATCHOUT will derive the coarse 8 bits from this channel and the fine bits from the following one or two channels.

TRACKING INPUT

A Tracking Input is a multi-variable type of input that brings in positional and rotational data from a live motion tracking system into WATCHOUT.

Any tracking system that supports the RTTrPM protocol may be used, and the information sent by the system can either control the position and rotation of a media cue or act as a trigger for tasks.



Enter a name and a trackable ID to start using a Tracking Input.

The name is used inside of WATCHOUT to refer to this input in expressions and in media cues that should be controlled by the tracking input. The trackable ID is determined by the tracking system that is being used. For details on how to determine the trackable ID value, please refer to the manual of the tracking system being used.

The six checkboxes allow you to select which type of data will be applied to media cues controlled by the tracking input. If a type is deselected, and thus no longer processed, it will not be applied to media cues. For example, deselecting X under Position means media cues will no longer be affected by translation on the X-axis received from the tracking system.

To use the different components in a tracking input in expressions or triggers, specify them as: `<Tracking Name>.<component>` where component may be X, Y, Z, Roll, Pitch, or Yaw. To use the "Roll" component of a Tracking Input called "MyTrackable" in an expression you would write the following: `MyTrackable.Roll`

During periods of high network traffic or system load, the tracking of an object may seem to "fall behind". In these scenarios, tracking results may be improved by selecting "Use Prediction". This is especially useful when the tracked object(s) moves in a predictable way, e.g. at a constant speed.

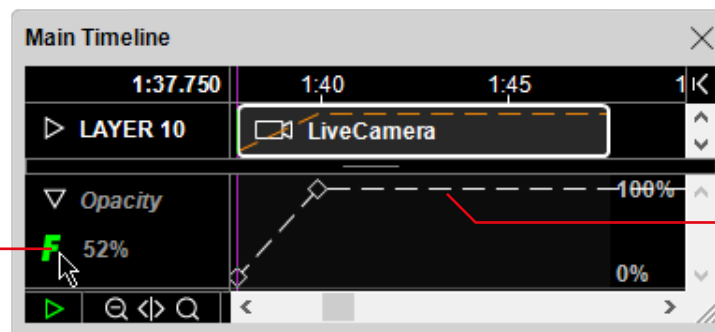
The "ms" (millisecond) setting controls the magnitude of prediction. It should be set according to the lag in the complete system.

NOTE: Using prediction when the tracked object may quickly change its direction or speed can cause an “overshoot” in its position or rotation.

CONTROLLING TWEEN TRACKS

Inputs can be used to control parameters of cues, similar to the way tween tracks are used. This provides external control over most parameters. To use this capability, add the desired type of tween track to the cue, then click the formula button located in the header area of the tween track. You may need to click the triangle in the tween track header to reveal the formula button. Some tween tracks have multiple controllable parameters.

The formula button allows you to control a parameter using an input. It turns green to indicate that such control is in effect.



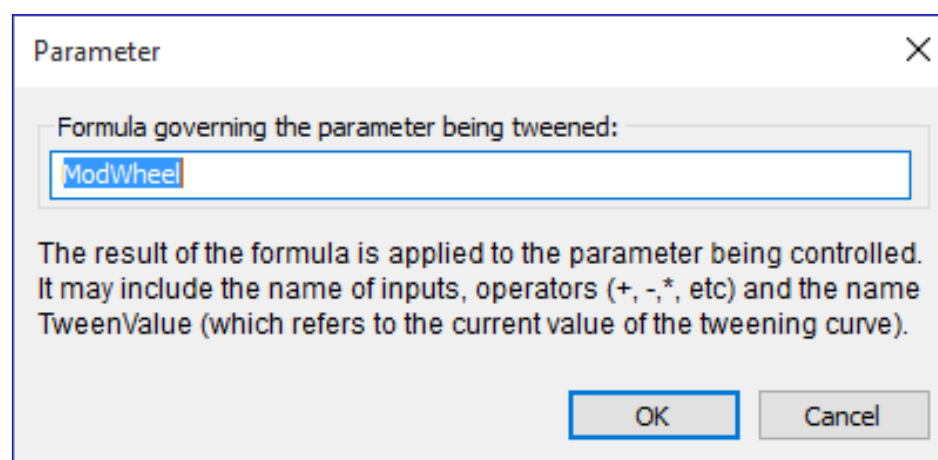
A dashed tween track curve indicates that the parameter is overridden by a formula.

Clicking the formula button brings up a dialog box allowing you to enter the control formula. By default, the formula consists only of the TweenValue item.

NOTE: In order to access the formula of some tween tracks, such as Position, Scale and Rotation, you must first enable this in the cue’s settings (see “External Control of Position, Rotation and Scale”). For still images, you must also select “More Effects and Capabilities” in the image’s specification (see “Optimize For”).

Some tween tracks, such as Position, contain multiple values, one for each dimension controlled by the tween track (such as X, Y and Z position).

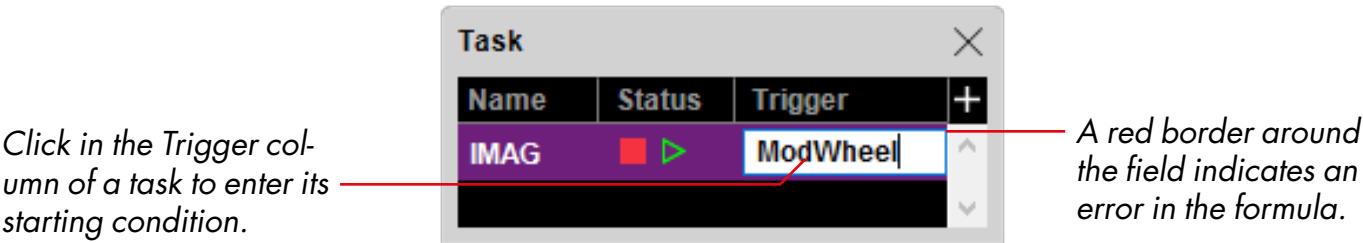
The TweenValue identifier represents the tween track itself. To control the parameter using an input, simply enter the name of the input instead, as shown in the illustration below, or enter a formula combining inputs, numerical constants, operators and the original TweenValue (see “Expression”).



Enter the name of an input, or a formula with inputs, constants and the original TweenValue.

TRIGGERING TASKS

You can use an input to start an auxiliary timeline by entering the name of the input in the Trigger column of the Task window.



Press Enter to complete the formula. The task will be started whenever the value of the formula entered in the Trigger column becomes non-zero. You can create more elaborate starting conditions by entering a more complex formula including multiple inputs, numeric constants and operators (see “Expression”).

IMPORTANT: Most media cues need some time to prepare before they will appear properly on stage. Therefore, it is generally not a good idea to put such cues at the very beginning of an auxiliary timeline. Leave about a second or so empty at the beginning of the timeline.

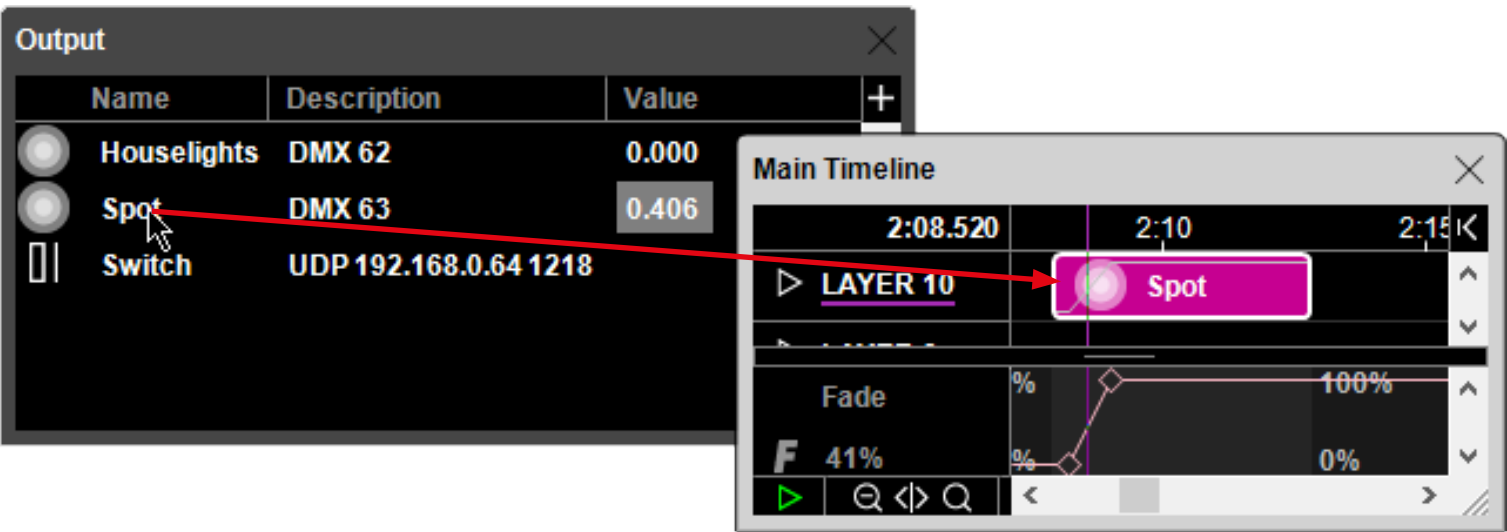
HINT: You can only use a trigger to start a task – not to stop it. To stop a task, use another task with a timeline containing a **Control Cue** that targets the timeline to be stopped. Trigger this second task using the desired condition.

OUTPUTS

Use Outputs to send data to other devices and systems from WATCHOUT. To create an output, click the plus button in the upper right corner of the Output window and choose “Add...” (see “Output Window”).

CREATING OUTPUT CUES

Outputs are controlled using cues. To create a cue for an output, drag the output from the Output window onto a timeline.

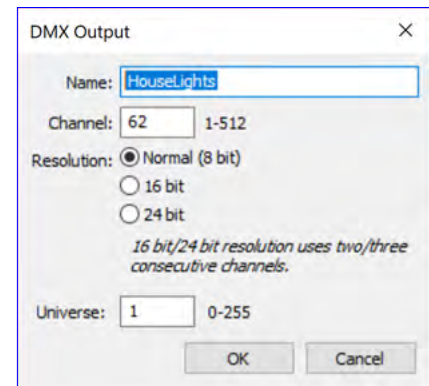


Drag from the Output window onto a timeline to create a Cue.

DMX OUTPUT

Use a DMX Output to control lighting and other devices which accept the DMX-512 protocol. Specify the DMX channel and Universe number to use in the dialog box, as shown to the left, and give the output a descriptive name.

You can configure the default Universe from which WATCHOUT will transmit data under the **Control** tab in the Preferences dialog box. However, as the Universe can be set per output, the default setting can be ignored if multiple Universes will be used.

A screenshot of the 'DMX Output' dialog box. It has a title bar with a close button. The 'Name' field contains 'HouseLights'. The 'Channel' field contains '62' and has a range of '1-512'. The 'Resolution' section has three radio buttons: 'Normal (8 bit)' (selected), '16 bit', and '24 bit'. Below this is a note: '16 bit/24 bit resolution uses two/three consecutive channels.' The 'Universe' field contains '1' and has a range of '0-255'. At the bottom are 'OK' and 'Cancel' buttons.

If the devices being controlled don't have an Ethernet connector accepting the Artnet protocol, you need an Ethernet-to-DMX interface, as shown under "DMX Output".

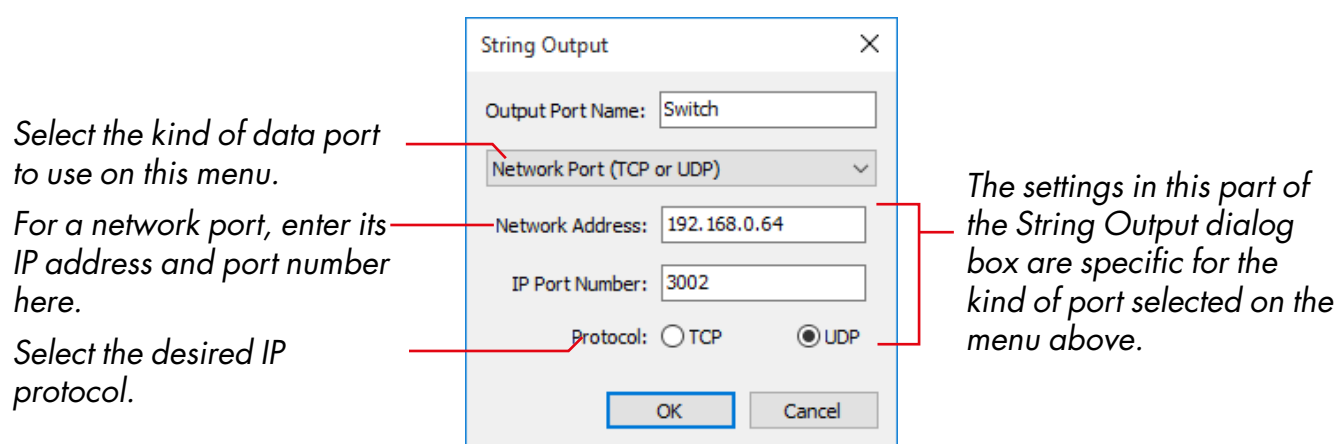
A DMX-512 Output is controlled using a Fade cue, created by dragging the output onto a timeline, as seen above. This cue contains a single tween track, allowing you to control the DMX output.

IMPORTANT: The DMX output is only controlled while the cue is active. Jumping to positions on the timeline between Fade cues will not change the output. To control an output over the entire duration of a timeline, the Fade cue must have the same duration as the timeline.

NOTE: If you have multiple cues controlling the same output at the same time (for example on separate timelines), the highest value will take precedence.

STRING OUTPUT

Use a String Output to control devices that accept text strings or other discrete data packets through a serial or Ethernet port. For example, you can tell a projector to power down by sending it a command through a serial port on its display computer.

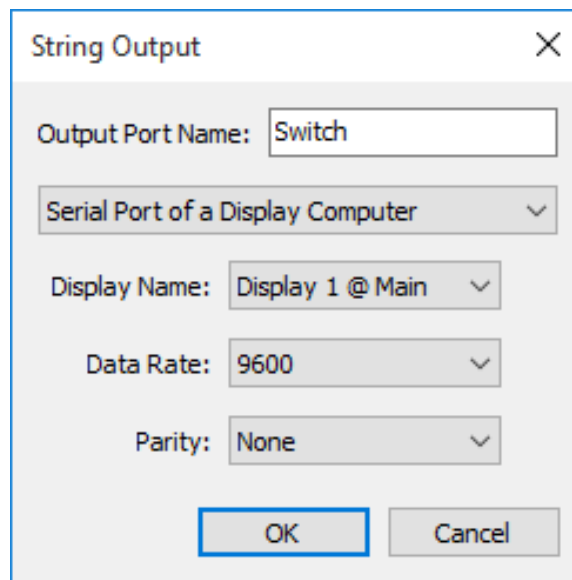
A screenshot of the 'String Output' dialog box with three red lines pointing to specific fields and explanatory text. The first line points to the 'Network Port (TCP or UDP)' dropdown menu, with the text: 'Select the kind of data port to use on this menu.' The second line points to the 'Network Address' field, with the text: 'For a network port, enter its IP address and port number here.' The third line points to the 'Protocol' radio buttons, with the text: 'Select the desired IP protocol.' The dialog box itself has a title bar, an 'Output Port Name' field containing 'Switch', a 'Network Address' field containing '192.168.0.64', an 'IP Port Number' field containing '3002', and 'Protocol' radio buttons for 'TCP' and 'UDP' (selected). At the bottom are 'OK' and 'Cancel' buttons. To the right of the dialog box, there is a note: 'The settings in this part of the String Output dialog box are specific for the kind of port selected on the menu above.'

Using a Network Port

When using a network port, you must know the IP number (or DNS name) and port number of the device to be controlled. You must also specify a protocol type. UDP is a rudimentary protocol used by many simple devices, while TCP is more common on computer-based systems. When using the TCP protocol, WATCHOUT will open the connection (if not already open), send the data packet, and close the connection after about a minute of inactivity.

Using a Serial Port

To use a serial port, connect the device to the COM1 port on any display computer, and select a display connected to that computer on the pop-up menu in the String Output dialog box. Select the data rate and parity mode according to the specifications of the device being controlled.



A dialog box titled "String Output" with a close button (X) in the top right corner. It contains several input fields: "Output Port Name:" with the text "Switch", "Serial Port of a Display Computer" (a dropdown menu), "Display Name:" with "Display 1 @ Main" (a dropdown menu), "Data Rate:" with "9600" (a dropdown menu), and "Parity:" with "None" (a dropdown menu). At the bottom are "OK" and "Cancel" buttons.

Send data on a serial port of the computer connected to "Display 1" at the Main tier.

For more details on serial data communication and wiring, see

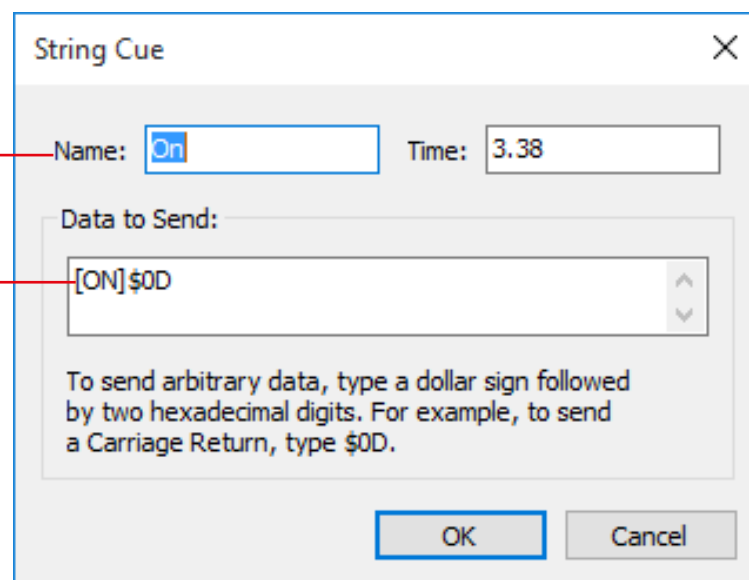
http://en.wikipedia.org/wiki/Serial_port

Sending a Data String

A String Output is controlled using a String Cue, created by dragging the output onto a timeline (see "Creating Output Cues").

Name the cue to state its purpose.

Enter the data to send to the device here. This can be plain text, hexadecimal data bytes, or a combination of both. Prefix each two-digit hexadecimal byte with a \$-sign.



A dialog box titled "String Cue" with a close button (X) in the top right corner. It contains: "Name:" with "On" (a text box), "Time:" with "3.38" (a text box), and "Data to Send:" with "[ON]\$0D" (a text box). Below the text box is a note: "To send arbitrary data, type a dollar sign followed by two hexadecimal digits. For example, to send a Carriage Return, type \$0D." At the bottom are "OK" and "Cancel" buttons. Red lines point from the explanatory text on the left to the "Name" and "Data to Send" fields.

IMPORTANT: The data is sent only when the timeline plays across the cue. It is not sent when jumping to or past the cue.

To output text, simply type the text into the "Data to Send" field. To output non-textual data, such as **control characters** or other arbitrary data bytes, enter the data in two-digit, hexadecimal form, prefixed with a dollar sign. The example above uses "\$0D" to output a Carriage Return control character.

NOTE: To output a single dollar character, enter two dollar characters into the field, like this: \$\$.

GENERIC VARIABLE

A Generic Variable can be controlled using cues on a timeline, just like a DMX-512 Output. However, its value isn't sent to any external device in your system. Instead, it can be used internally to govern the behavior of Task triggering expressions (see "Using Outputs in Triggering Expressions").

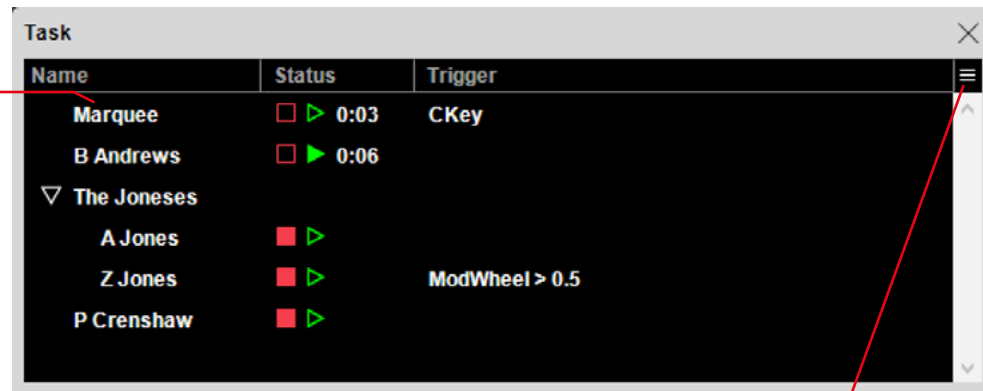
11. TASKS AND EXPRESSIONS

The Task window allows you to create multiple auxiliary timelines, and to specify their triggering conditions using expressions. Auxiliary timelines behave very much like the main timeline, but can be started and stopped independently.

If an auxiliary timeline displays images on stage, those images will appear on top of any images originating from the main timeline. You can control the order in which images from multiple, concurrent auxiliary timelines interact by dragging the tasks to the desired order in the Task window.

Drag a task towards the top of the Task list to make its images appear in front of other tasks' images.

See *"Task Window"* for more information.



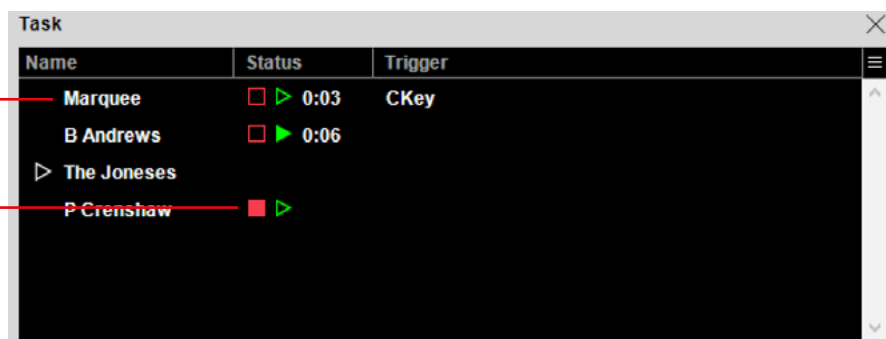
Click to lock the task list or to add more tasks or task folders

AUXILIARY TIMELINE

Double-clicking an item in the Task list opens its associated auxiliary timeline.

Double-click the task name to open its timeline.

Click here to start, stop or pause the auxiliary timeline...



...or click here after opening its timeline window.



HINT: Change the name shown in the Task list by first opening the auxiliary timeline and then choosing *"Timeline Settings"* on the Timeline menu.

STARTING AND STOPPING MANUALLY

An auxiliary timeline has three primary modes:

- Stopped (red button is lit). In this mode, the timeline doesn't contribute to the stage.
- Paused (neither button is lit). In this mode, the time isn't moving, but any cues at the current time position does contribute to the stage.
- Playing (green button is lit).

You can control these modes manually by clicking the buttons either in the Task window or in the lower left corner of an open auxiliary timeline window.

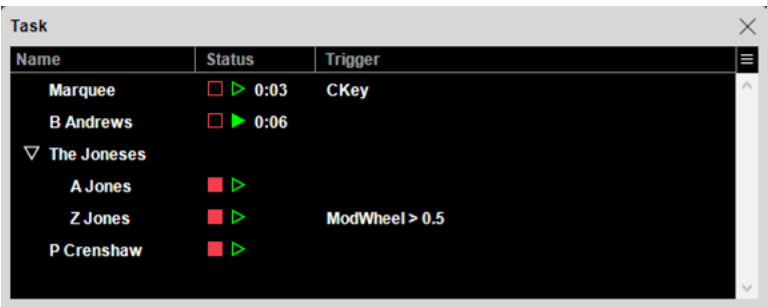
HINT: You don't need to open an auxiliary timeline to run it. Just click its play button in the Task window.

STARTING FROM AN INPUT

Alternatively, you can trigger an auxiliary timeline using an external signal, brought in as an input in the Input window. For details on how to configure inputs see "Inputs and Outputs". The section titled "Triggering Tasks" describes how you use an input to trigger a task. The task will be started when the value of the triggering expression becomes non-zero. This expression may combine multiple inputs and constants using operators (see "Expression"). For example, to trigger a task when the input goes above 50%, you would enter an expression like this:

ModWheel > 0.5

NOTE: The task will be triggered only when the value of the expression goes from being zero to being non-zero. In order to trigger the task again, the value must first return to zero.



Name	Status	Trigger
Marquee		0:03 CKey
B Andrews		0:06
▼ The Joneses		
A Jones		
Z Jones		ModWheel > 0.5
P Crenshaw		

To see the current value of an expression, point at the expression using the mouse.

Using Outputs in Triggering Expressions

Task expressions can use inputs, as described above, as well as numeric outputs. This can be used to build complex logic conditions, where the value of an output – such as a "Generic Variable" – governs the performance of a task.

STARTING FROM ANOTHER TIMELINE

You can use a "Control Cue" to position, start, stop or pause an auxiliary timeline from another timeline.

STOPPING AN AUXILIARY TIMELINE

An auxiliary timeline will stop automatically after playing to its end.

HINT: Set the length of an auxiliary timeline using the "Timeline Settings" command on the Timeline menu while the auxiliary timeline's window is active.

Alternatively, use a Control cue (either on the timeline itself, or on another timeline) to stop it. When stopped, its images will disappear from the stage.

EXPRESSION

An expression is a simple mathematical formula, combining values such as inputs, outputs (Task triggering expressions only) and numeric constants using operators in a way that yields a numeric result. Expressions are used to:

- Start tasks (see “Starting from an Input” and “Triggering Tasks”).
- Influence tween tracks (see “Controlling Tween Tracks”).

In its most basic form, an expression consists of a single value, such as an input (this example assumes that an input with the name “ModWheel” exists in the Input window):

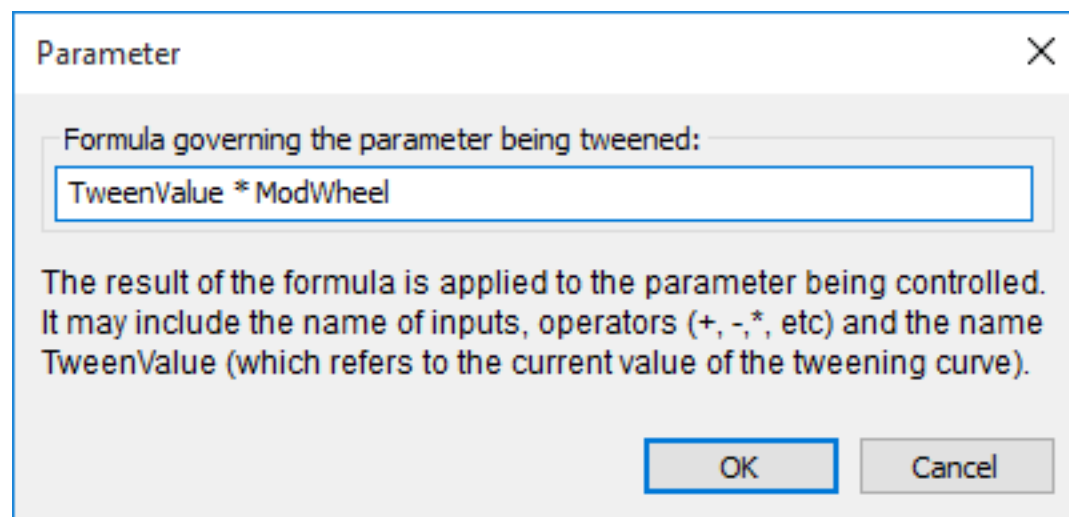
ModWheel

If this expression is used in the Trigger column of the Task window, that task will be started when the ModWheel’s value becomes non-zero (that is, when the modulation wheel on the attached MIDI device is moved from its zero position).

Likewise, if this expression is used as a formula for an Opacity tween track, the opacity will be controlled only by the modulation wheel (that is, the value of the tween track itself will have no effect).

USING NUMERIC OPERATORS

In some cases, you may want to combine multiple values. For instance, in the previous example, you may change the expression so that the modulation wheel modulates the value of the cue’s Opacity tween track by entering the following expression into its formula dialog box:



Enter an expression for a tween track by clicking its formula button (see “Controlling Tween Tracks”).

This expression combines the value of the ModWheel input with the value coming from the tween track itself by using the TweenValue identifier, which provides the enclosing tween track’s current value. Since both values are in the range 0 through 1, multiplying them in this way will work as desired.

Alternatively, you may want to combine the two values so that the opacity can be controlled by either the tween track or the modulation wheel. This can be accomplished by changing the formula to

TweenValue + ModWheel

Now the resulting image will appear on stage if the tween track or the external input says so. Note that if both the tween track and the input are at their maximum value, the result of the expression will be 2. However, the opacity value is effectively clipped to the range 0 through 1 (as the image can't be more than fully opaque or fully transparent). Most parameters work in this way, with the notable exception of the color hue, as it allows the color wheel to be rotated multiple revolutions.

USING RELATIONAL OPERATORS

When using expressions to trigger tasks, it is often useful to specify a threshold for the triggering value. If the input is used on its own, the task will be triggered as soon as the input leaves zero. If you prefer the input to exceed a certain value, you can use a "greater than" operator to test for this:

```
ModWheel > 0.5
```

This operator yields a value that is 1 if the value on the left hand side is greater than the value on the right hand side, otherwise its value is 0. Likewise, if you want to trigger the task when the value becomes zero (rather than when it leaves zero), you can write:

```
ModWheel = 0
```

This uses the "equals" operator, yielding 1 if the value on the left is the same as the value on the right, or else yielding 0.

USING LOGICAL OPERATORS

Occasionally you may want to create more complex triggering conditions, combining multiple inputs, so that the task will only be triggered when all conditions are met. That can be accomplished using the "and" operator:

```
ModWheel > 0.5 && MiddleC
```

This will trigger the task when the modulation wheel is above 50% and the MiddleC key is pressed (assuming here that MiddleC is a MIDI Note input).

HINT: Expressions in the Task window can use both numeric input and output values. This can be used to create complex logic conditions, governed by WATCHOUT itself, using logical operations together with the "Generic Variable".

LIST OF OPERATORS

This is a list of the operators supported by WATCHOUT, shown in their order of precedence.

Operator	Description
()	Parenthesis. Used to group sub-expressions.
-	Unary Minus.
* / %	Multiplication, Division and Modulo.
+ -	Addition and Subtraction.
< <= > >= = !=	Less Than, Less Than or Equal To, Greater Than, Greater Than or Equal To, Equal, Not Equal.
&&	Logical And.
	Logical Or.

Most operators work as expected. The Modulo operator yields the remainder of an integer division. All other numeric operators may yield results with fractional digits. All relational operators (<, >, etc)

yield 1 if the relation is true, 0 if it is false. Likewise, the logical operators yield 1 for true and 0 for false.

A. SYSTEM REQUIREMENTS

This appendix lists what you need in order to install WATCHOUT on a PC.

COMPUTER

A WATCHOUT computer has the following minimum system requirements:

- Intel or AMD dual core processor with four logical processors (4 threads).
- USB port.
- Gigabit Ethernet port.
- SATA hard disk (SSD recommended to drive multiple displays or for playing some video formats).
- 4 GB RAM. Under 64 bit Windows, 8GB is recommended (more RAM will generally not improve performance).
- DirectX 9.0 capable graphics card.
- Windows 10 (recommended, see [tweak list](#)), or Windows 7, 32 Bit “Home” (while WATCHOUT is a 32-bit application, it’s fully compatible with 64-bit Windows).

NOTE: It is generally not recommended to mix different kinds of display computers/media servers, or graphics cards in one display or projection surface. Nvidia or AMD synchronization cards are required to prevent tearing on LED displays when using multiple display servers.

IMPORTANT: These are minimum system requirements. Faster processor, faster memory, NVMe SSD, faster network, faster professional graphics card with more video memory, etc, will enhance performance.

LIVE VIDEO INPUT

To integrate live video into WATCHOUT, each display computer used to show live video must be equipped with a suitable video input, and its driver software must be installed.

Suitable video input solutions include:

- Datapath Vision cards:

<http://www.datapath.co.uk/products/video-capture-cards>

AUDIO

For sound playback a high-quality audio device is recommended. ASIO drivers are preferred for multi-channel. Audio input is required for slaving to SMPTE time code.

NETWORK

The production and display computers must be connected using an Ethernet network. A typical system has 100 MBit Ethernet network ports on all computers and a high-quality Ethernet switch with the required number of ports to connect the computers.

NOTE: A wireless network may work, but is generally not recommended for reliability reasons and affects synchronization accuracy among display computers.

B. MIDI SHOW CONTROL

MIDI Show Control (MSC) allows WATCHOUT to be controlled from a lighting console, or similar device capable of outputting MSC commands.

NOTE: During production, connect your MIDI device to the production computer. When not using the production software, connect it to the primary display computer in the cluster.

In addition to enabling MIDI Show Control, you also have to specify which input device to use for MIDI show control and the MSC Device ID (see “Control”). This acts as a channel number for MSC commands, and must be set to the device ID number output by the console. In addition, WATCHOUT also recognizes the global “all call” device ID.

Some MSC commands allow a cue/list/path to be specified. WATCHOUT doesn’t use the “path” number. The “list” number can be handled in either of three ways, as specified in the WATCHOUT Preferences:

- **Ignore Command.** In this setting, the entire command will be discarded (not acted upon) if a list number is specified.
- **Map all to Main Timeline.** This setting ignores the cue list number, sending all such commands to the main timeline.
- **Map to Auxiliary Timelines.** If a cue list number is specified, the command will be applied to an Auxiliary Timeline with the same name (where the name must be numeric, to match the list number).

The cue number, if specified, makes WATCHOUT locate a Control cue with that name (that is, the name of the cue must be a number). The GO and TIMED GO, LOAD and STOP commands interpret cue number 0 as specifying “no cue”, allowing you to specify the cue list part only. This allows you to use the STOP command to stop an Auxiliary Timeline without necessarily specifying a particular cue, by setting the cue number to zero.

The following is a description of each command, as it relates to WATCHOUT.

GO

If given without a cue/list specification, runs the main timeline.

If given with a cue but no list, locates the specified cue on the main timeline and runs from there. This does nothing if a cue with that name doesn’t exist.

If given with cue and list, locates the specified cue on the specified Auxiliary timeline, and runs it from there (assuming cue lists are mapped to Auxiliary timelines). This does nothing if specified cue or timeline can’t be found.

TIMED GO

Performs like GO, ignoring the time value specified.

STOP

Pauses the timeline, optionally locating the specified cue.

LOAD

Similar to GO, except that the timeline is not run.

RESET

Stops all Auxiliary timelines (returning them to their inactive state) and resets the main timeline to its beginning.

ALL OFF

Enters Stand-By mode.

RESTORE

Exits Stand-By mode.

C. CONTROL PROTOCOL

You can control the production computer or a cluster of WATCHOUT display computers from other programs or systems, including general purpose control systems such as AMX or Crestron. This is usually done through the network, but other options (such as serial port or a script file) are also available. The control protocol uses simple and readable command strings, making it easy to learn and implement from an external system.

To get started with controlling WATCHOUT, use a TELNET client to connect to WATCHOUT and give the commands from there. Both Windows and MacOS X come with a TELNET client (although under Windows it needs to be **enabled** before it can be used).

COMMAND FORMAT DETAILS

Each command is sent as a string, terminated by a carriage return, line feed or CR/LF pair. A command consists of a command name, sometimes followed by parameters. Commands are case-sensitive. Commands are encoded using the UTF-8 UNICODE character format, which is downward compatible with ASCII.

IMPORTANT: Commands containing non-ASCII characters – such as å, ä, ü, ç – must be encoded using the UTF-8 format in order to work properly.

String parameters are sent within double quotes. Backslash is used as an escape character (that is, to encode a double quote in a string, precede it with a backslash). To send a backslash character, use “\\” inside the string.

Commands are case-sensitive. Successfully performed commands are normally not acknowledged (although you can use the **Command ID Tagging** option to force explicit feedback for all commands).

While most commands are available in both the production and display programs, not all are. Furthermore, in a few cases, parameters to commands are slightly different in the two programs. Such differences are noted in the detailed descriptions of commands in this appendix.

WATCHOUT uses a simple text format for its commands. Some commands may return a reply, error message or other kind of response to the controller. Such responses are also sent as text.

Parameters

In commands that take parameters, the parameters are separated by white-space only. Optional parameters are shown in square brackets, like this: [<uint>]. Parameter types are described below.

<string>. String parameters are sent within straight double quotes:

"This is a string"

Backslash is used as an escape character (that is, to encode a double quote in a string, precede it with a backslash). To send a backslash character, use “\\” inside the string.

<uint> and <int>. An unsigned or possibly signed decimal integral number:

123

<float>. A possibly signed decimal number with an optional fractional part:

0.25

<bool>. The keyword true or false, with no quotes:

true

CONTROLLING THE PRODUCTION SOFTWARE

In cases where you must keep the production software in the system for some reason, you connect to and control the production computer, which in its turn controls the display computers. One advantage of this method is that you can clearly see your commands as they occur in the production computer's user interface, making it easier to try things out.

NOTE: Even when your goal is to control the display computers directly, it may help to start by controlling the production computer as it makes it easier to see what's happening. Once things work as desired, remove the production computer and target the display cluster directly.

Control Options

You can control the production software only through the network. It uses IP port number 3040. Commands can be sent over either TCP or UDP. In order to accept commands on either of those ports, you must enable those options in the Preferences dialog box' **Control** tab.

When using UDP, no feedback is available due to the connectionless nature of the UDP method. Hence, for most applications where reliability or feedback is important, always use the TCP method.

IMPORTANT: If you use the "load" command to load another show, make sure the desired control options are enabled in that show as well, or the connection will be closed.

CONTROLLING THE DISPLAY SOFTWARE

Before attempting to control a display cluster, ensure that the show has been successfully run from WATCHOUT production software (meaning that all media files have been transferred, etc). Then quit the WATCHOUT production software.

Authentication

Before you can give any command to the display software (with the exception of the "ping" command), you must specify the authentication level. To control WATCHOUT display software, you need authentication level 1:

```
authenticate 1
```

WATCHOUT responds with a Ready message. You can now send other commands.

CONTROL OPTIONS

You can control the display cluster either using a file stored on the primary display computer in the cluster, or using commands sent via the network or through a serial port.

File-based Control

You can use a script file stored on the primary display computer's hard disk to automatically perform most commands in this protocol when starting the display software. This can, for example, be used to set up a system that automatically loads and runs a show every time the computer is switched on. See "**Startup Script**" for more on how to set up a script on your display computer.

The example below shows the content of a command file that displays a message on the WATCHOUT screen, waits a few seconds, loads a show, waits for any other computers in the WATCHOUT display cluster to become ready, and then runs the show.

```
authenticate 1
setLogoString "The show will begin shortly"
delay 5000
```

```
load "MyShow"  
wait  
run
```

See each individual command later in this appendix for details.

IMPORTANT: If using non-ASCII characters in the show name (for example; å, ö, ü, ß), your text editor must be able to save the text using the UTF-8 encoding. If you're unsure about this, it's usually easiest to rename the show to avoid non-ASCII characters.

NOTE: Any errors occurring while executing commands from such a command file are displayed in a console window. However, to see this window, you have to close the main WATCHOUT display window by pressing Ctrl-W. Keep this in mind if your command file doesn't work as expected.

Network Control

To control a WATCHOUT display cluster via the network, connect to TCP/IP port number 3039 of one of the WATCHOUT display computers. The computer with which you initiate communication becomes the conductor of the cluster, and will automatically control the other cluster members, as specified by the presentation loaded using the "load" command.

Use a TELNET program to check the communication. Open the port specified above, then type "ping" and press Return. WATCHOUT will respond with a Ready message, stating its version number and some other details.

Serial Control

To control a WATCHOUT display cluster through a serial port, connect the controlling device to a serial port of one of the WATCHOUT display computers. This computer becomes the conductor of the cluster, and will automatically control the other cluster members, as specified by the presentation loaded using the "load" command.

No serial port is open by default. Use the serialPort command to open a serial port. Put this command into a text file, and use the file-based control feature to perform the serialPort command (see "File-based Control").

LIST OF COMMANDS

The table below shows the available commands. Some are explained in greater depth on the following pages.

Command	Description
ping	Do-nothing command, causing a Ready feedback message to be sent.
authenticate	Perform authentication. Required only for display software.
load	Load a show and get ready to run. Parameter syntax differs.
online	Go online or offline. Production software only.
run	Start running, optionally specifying an auxiliary timeline name.
halt	Stop running, optionally specifying an auxiliary timeline name.
kill	Stop and deactivate the named auxiliary timeline.
gotoTime	Jump to a time position.
gotoControlCue	Jump to the time position of a named Control cue.
enableLayerCond	Turn conditional layers on or off.
standBy	Enter/exit standby mode.
getStatus	Retrieves name and status of the currently show and its timelines.
reset	Reset and stop all timelines.
setInput	Set the value of a named Input, with optional fade-rate in mS.
setInputs	Sets the values of multiple inputs together.
setLogoString	Displays a message on the startup screen.
delay	Introduces a delay between commands (command file use only).
wait	Waits for the entire display cluster to become established (cluster only).
serialPort	Opens a serial port for control protocol use (cluster only).
timecodeMode	Activates LTC (SMPTE/EBU) timecode control (cluster only).
hitTest	Get information of interactive media cues

authenticate

This command is required for the display software prior to issuing any other commands except the ping command. While this command is accepted by the production software, it is not required. See "Authentication" above for details.

load (production software version)

Loads a show by name. The name is specified as a quoted string containing the full path to the file. The use of backslash characters in Windows path names conflicts with the use of the backslash as an escape character in this protocol. Either double the backslash characters, or use forward slashes instead (as shown in this example):

```
load "C:/Samples/ExampleShow.watch"
```

Parameter	Description
<string>	Path to the show to be loaded.
[<uint>]	Conditional layer enable flags, least significant bit is condition 1.

Parameter	Description
[<bool>]	Go online automatically. Defaults to true.

NOTE: When using this load command, the production software will automatically go online after loading the show.

If desired, you can add a numeric parameter to override the conditional layer settings of the show being loaded. For example, to enable condition 1 and 2 only:

```
load "C:/Samples/ExampleShow.watch" 3
```

The number is a sum of the decimal numbers corresponding to each desired condition, as shown in the table below.

Condition	Number
1	1
2	2
3	4
4	8
5	16
6	32
	...and so on.

The last optional parameter is a boolean controlling whether the production software will go online or not, after loading the show (default value is true):

```
load "C:/Samples/ExampleShow.watch" 3 false
```

loads the specified show and sets its layer conditions, but remains offline.

load (display software version)

Load a complete show specification from a local file associated with the show name specified by the first parameter. Busy feedback may be sent to the host while loading, informing the host about the progress. If errors occur, **Error** feedback is sent. Finally, a **Ready** feedback message is sent, regardless of whether any error occurred.

```
load "Phantom"
```

Parameter	Description
<string>	Name of the show to be loaded.
[<bool>]	Manage cluster loading and feedback. Defaults to true.
[<bool>]	Designate as the conductor display computer. Defaults to true.
[<uint>]	Conditional layer enable flags, least significant bit is condition 1.

NOTE: You can not specify a folder path to the show. The show must be present in the "Shows" folder, located in the same folder as the WATCHOUT display software.

online

This command applies to the production software only. It takes a single boolean parameter, specifying whether to go online (true) or offline (false). Note that the *load* command also goes online unless explicitly disabled by the optional parameter.

gotoTime

Jump to the specified time position along the timeline.

```
gotoTime 5000
```

Parameter	Description
<uint> or <string>	Time position to go to, in milliseconds, or as a string in this format: "HH:MM:SS.FFF", where FFF is milliseconds.
[<string>]	Name of auxiliary timeline to control (omit for main timeline).

gotoControlCue

Jump to the time of specified Control cue. If the optional "reverse only" boolean is set to true, it searches for the Control cue only back in time from the current time position. Otherwise it searches first forward then reverse.

The command does not change the run mode of the timeline. If the specified cue is not found, the timeline's state will not change, and a runtime error message to this effect will be returned.

```
gotoControlCue "William" true
```

Parameter	Description
<string>	Name of Control cue to look for.
[<bool>]	Search in reverse only if true. If false or not specified, then search both ways.
[<string>]	Name of auxiliary timeline to control (omit for main timeline).

enableLayerCond

Change the set of enabled layer conditions. While the layer conditions can be specified as part of the load command, this separate command allows the layer conditions to be changed without loading another show. The command takes a single, mandatory <uint> parameter with the same interpretation as the conditional layers parameter of the load command.

setLogoString

This command applies to the display software only. Display its single string parameter next to the WATCHOUT logo, when shown on screen.

standBy

Enter/exit standby mode. In standby, the display and sound is muted, or media on standby layers – if any – is performed . This mode can be entered/exited smoothly, by specifying a fade rate.

```
standBy true 1000
```

Fade out sound and image over one second and enter standby mode. If any standby layer is available, its media is performed instead.

Parameter	Description
<bool>	Enter standby if true, exit if false.
[<uint>]	Fade rate, in milliseconds. Defaults to zero if not specified.

getStatus

Get the current status of the WATCHOUT cluster conductor.

```
getStatus
Reply "WO2Launch" false 0 true true false 122 true
```

Responds with a Reply with the following parameters:

Reply Parameter	Description
<string>	Name of the show. Empty string if no show loaded.
<bool>	Busy. True if the conductor display computer or any of its performers are busy
<uint>	General health status of the cluster; 0: OK, 1: Suboptimal, 2: Problems, 3: Dead.
<bool>	Display is open (in its full screen mode).
<bool>	Show is active (ready to run).
<bool>	Programmer is on line.
[<uint>]	Current time position, in milliseconds (only included if show is active).
[<bool>]	Show is playing – false if paused (only included if show is active).
[<float>]	Timeline rate (nominally 1, only included if show is active).
[<bool>]	Standby mode (true if in standby, only included if show is active)

delay

Wait the number of milliseconds specified by the parameter before performing the next command in the file.

NOTE: Performed only when used in a command file. Applies to display software only.

wait

This command applies to the display software only. Wait for the display cluster to become fully established before proceeding with the next command in the file. Waits at most the number of milliseconds specified by the parameter.

NOTE: Performed only when used in a command file.

setInput

Sets the value of a named input (see "Inputs").

Parameter	Description
<string>	The name of the input to set.
<float>	The desired value, optionally prefixed by + or - for incremental change.
[<uint>]	Optional transition rate, in milliseconds.

```
setInput "uno" 0.5
```

The value is generally in the range 0 through 1, but may be extended to cover a wider range using the Limit setting of the Generic Input .

By prefixing the value with a plus or minus sign, you can adjust the value incrementally relative to its current setting. This example increases the value of the input by 0.1:

```
setInput "uno" +0.1
```

A third, optional parameter allows you to specify a transition rate, causing any property controlled by the input to change gradually to the specified target value. This parameter is specified in milliseconds.

NOTE: While you would typically use this command to set the value of a Generic Input, you may use it to set the value for *any* input. If data is also provided by a MIDI or DMX-512 source, the latest data will take precedence.

setInputs

This command is functionally equivalent to the setInput command above, but allows you to set multiple inputs with a single command. This is useful in the following cases:

- When it is important that several inputs are set simultaneously, because their values are used in an interdependent way. If you use two separate setInput commands, it is possible that the commands will not be executed on the same frame.
- When setting a large number of inputs, as it is more efficient to handle this with a single command than a number of separate commands, allowing you to set a larger number of values within a single frame.

The first parameter is the transition rate, in mS. Subsequent data must be provided in groups of two parameters:

Parameter	Description
<string>	The name of the input to set.
<float>	The desired value, optionally prefixed by + or - for incremental change.

```
setInputs 100 "Yo" 0.8 "Man" 0.5 "Stereo" 0 "Left" 0 "Top" 0.5
```

Ramps the named inputs to the specified values over 100 mS.

```
setInputs 0 "Yo" +0.1 "Man" -0.5
```

Instantly increase the Input named "Yo" by the value 0.1 and decrease "Man" by 0.5.

serialPort

Applies to display software only. Opens or closes a serial port for protocol commands, setting its parameters.

```
serialPort true "COM1"
```

Parameter	Description
<bool>	Open (true) or close (false) the serial port.
<string>	The name of the serial port.
[<uint>]	Protocol selector. Must be 0. Default is 0.
[<uint>]	Data rate, in bits per second. Default is 9600.
[<uint>]	Number of data bits, 7 or 8. Default is 8.
[<uint>]	Number of stop bits, 1 or 2. Default is 1.
[<uint>]	Parity: 0 = none, 1 = odd, 2 = even. Default is none.

HINT: For serial-only control, put the serialPort command into a text file, and use the file based control feature to perform the commands in this file (see "File-based Control").

timecodeMode

Applies to the display software only. (Use the Timecode options in the Preferences dialog box to use timecode with the production software.)

Controls the LTC timecode receiver of the display computer. The timecode receiver is initially off. When turned on, incoming timecode will control the presentation as if using the run, halt and goto-Time commands. Furthermore, while playing, the presentation will be synchronized to the timecode.

```
timecodeMode 2 "-1:00:00"
```

Parameter	Description
<uint>	0 = receiver off, 1 = auto-detect format, 2 = EBU 25 fps, 3 = SMPTE 29.97 NDF, 4 = SMPTE 29.97 DF, 5 = SMPTE 30 ("B&W"), 6 = 24.
[<int> or <string>]	Time offset expressed in milliseconds, or as a string in this format: "HH:MM:SS.FFF", where FFF is milliseconds. Default is 0.

Avoid using the auto-detect mode whenever possible. Instead, specify the expected timecode format explicitly. Specifically, the SMPTE 30 ("B&W") format can not be detected automatically.

Use the separate Timecode Tester application to verify proper timecode reception, and to choose the appropriate input connector to use for the timecode signal .

HINT: For stand-alone use of the timecode control feature, put this command into a text file, as described under "File-based Control".

NOTE: Timecode control of the display computer can't be used while the production software is online. In this case, use the corresponding feature of the production software instead.

hitTest

Get information of the frontmost, visible and interactive media cue that intersects the 2D point given by the two parameters (in stage pixels).

```
hitTest 1200 250
Reply true "Image01" 1154 212 0
```

Parameter	Description
<int>	X-coordinate of the 2D stage point
<int>	Y-coordinate of the 2D stage point

To make a media cue interactive it needs an interaction name specified, which can be done under the advanced tab of the media cue dialog see [\(see "Advanced Cue Specifications"\)](#). The reply message contains, among other things, this interaction name, if an interactive media cue was hit.

Reply Parameter	Description
<bool>	True if an interactive media cue was hit
[<string>]	Interaction name (if hit)
[<float>]	X-coordinate position of media cue (if hit)
[<float>]	Y-coordinate position of media cue (if hit)
[<float>]	Z-coordinate position of media cue (if hit)

FEEDBACK

The WATCHOUT cluster conductor sends feedback messages to the controller. Note that the controller must be prepared to receive such messages at any time – not only as a direct response to particular commands.

Most commands execute silently, unless an error occurs. Use the command ID tagging feature to force commands to be positively acknowledged, if desired [\(see "Command ID Tagging"\)](#). When using command ID tagging, any feedback message sent as a direct response to a command will be tagged by that command ID, and will be sent to the sender of that command.

Any spontaneous feedback message (that is, not directly associated with a particular command) will be sent to the most recently connected or authenticated controller.

Ready

Sent once when becomes ready after being busy (as indicated by one or more Busy messages). Also sent as response to the "ping" command.

```
Ready "2.0" "WATCHPOINT" "Windows" true
```

Feedback Parameter	Description
<string>	The version of the program.
<string>	The name of the program.
<string>	The name of the computer/OS.
<bool>	License key is up to date.
[<string>]	Address of originator (empty or omitted if the origin is the conductor).

Busy

Sent once or repeatedly while busy doing lengthy tasks, such as downloading or caching files.

```
Busy "Transferring" "Media/Wilfred.jpg" 76
```

Note that either or both string parameters may be empty, in which case the controller should retain the previous values for these parameters and just update the progress value.

Parameter	Description
<string>	What is being done (for instance, "Transferring"). May be empty string.
<string>	The subject of the above action (for instance, a file name). May be empty.
<uint>	Percentage done so far, 0...100
[<string>]	Address of originator (empty or omitted if originating from the conductor).

Error

Sent when any error occurs, either as a direct result of a command, or for any other reason.

Parameter	Description
<uint>	Error kind: 1 Operating system error (for instance, a Win32 HRESULT). 2 QuickTime error (Mac OSErr style). 3 Rendering API error (that is, DirectX). 4 Network errors (that is, WinSock). 5 File server error (for example, file not found during download). 6 Syntax/parser error (for instance, when loading a specification file). 7 General runtime error – described by string. 8 Authentication error.
<int> or <string>	Error number or description string. May be zero.
<string>	Excuse or explanation, may be empty string.
[<string>]	Address of originator (empty or omitted if the origin is the conductor computer).

Operating System Error. Indicates a generic operating system error from the host's OS. Under Windows, this is a HRESULT that indicates failure, with the error code included as the second parameter (possibly decoded into an error message string). The third parameter may provide additional information.

QuickTime Error. Similar to the Operating System Error, but originating from QuickTime. This is treated separately from the OS errors since the QT errors use MacOS style error codes even under Windows. This kind of error typically originates from still image files, or from video files as they are opened or played. The third parameter generally contains the name of the offending media file.

Rendering API Error. Error occurred specifically related to rendering. This is similar to other operating system errors, except that you also know that it occurred while rendering. Sometimes, rendering errors occur due to display card driver issues, video memory or other hardware resource limitations.

Network Error. Error occurred specifically related to network communication. This is similar to other operating system errors, except that you also know that it occurred specifically while using the network. Sometimes, network errors are caused by network interface hardware or driver issues, the computer's network configuration, or problems on the network itself (for instance, a bad cable/hub or incorrectly configured router).

File Server Error. Error occurred when attempting to get a file from the media file server. The error number is the same as those listed for the first Reply parameter in the File Transfer group. The Excuse string is typically the name of the required file.

Syntax/Parser Error. Indicates an error that occurred when reading structured data (such as a show specification file). Error code and excuse vary with the nature of the error.

General Runtime Error. Other errors, not covered by any of the above cases. Always described further by a string as the second parameter, as well as further information in the third parameter (optional).

Authentication Error. The second parameter gives further details:

Value	Description
1	You have no authority.
2	Your authority is insufficient for this command.
3	In use by another Programmer.
4	Authentication challenge/response sequence failed.
5	Invalid authentication level.
6	Authentication level not allowed for port.
7	Command not allowed in read-only mode.

The third parameter may provide additional context information. For instance, in the case of being in use by another controller, it may provide information to identify that controller – such as its address.

Warning

Sent when a non-critical error occurs.

Warning "Low Memory: Primary Video 1960 KB"

Feedback Parameter	Description
<string>	The warning message, as a quoted string.
[<string>]	Address of originator (empty or omitted if the origin is the conductor computer).

Information

Sent to convey some general information.

Feedback Parameter	Description
<string>	The information message, as a quoted string.
[<string>]	Address of originator (empty or omitted if the origin is the conductor computer).

Reply

A Reply feedback message is sent as a direct response to a query command ([getStatus](#), for instance). Use a command ID to positively associate the reply with the command.

The format of the reply parameter(s) depends on the command that caused the reply to be sent.

Quit

Sent when the application is about to quit (either due to a keyboard or other command). This message has no parameters.

COMMAND ID TAGGING

Commands may optionally be preceded by a command ID. This is any sequence of characters enclosed in square brackets. When used, at least one explicit reply is always sent for each command. The reply is then also tagged with the same ID:

```
[23]ping
```

```
[23]Ready "2.0" "WATCHPOINT" "Windows" true
```

Use this feature if you want positive confirmation of commands, or to explicitly associate a feedback message with a command.

D. COMMAND LINE OPTIONS

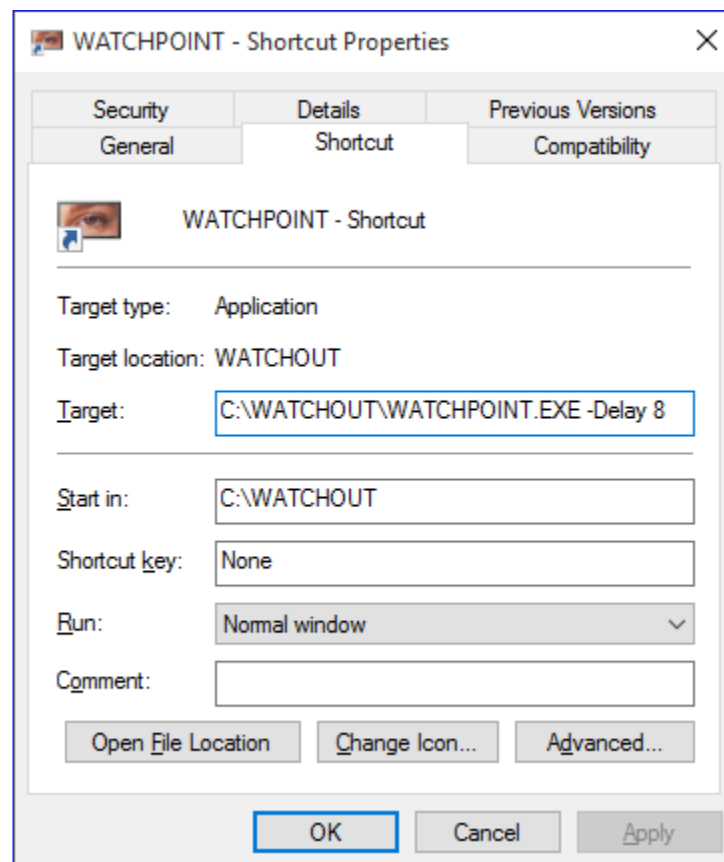
Some parts of WATCHOUT accept startup options that can be specified on the command line used to launch the program. This is typically done using a shortcut located in a convenient location, such as:

- The computer's desktop.
- The Startup folder, in case you want to launch the program automatically as your computer is started (see "Auto-Starting WATCHOUT").

A shortcut to the desired WATCHOUT application (such as the display software or the dynamic image server) is created by dragging the application using the right mouse button to the desired location – such as the desktop or the Startup folder – and then choosing "Create Shortcut here". There are three WATCHOUT applications you may want to create shortcuts to:

- The display software, named "WATCHPOINT.EXE", found inside the WATCHOUT installation folder (by default located at "C:\WATCHOUT 6").
- The production software, named "WATCHMAKER.EXE", also inside the WATCHOUT installation folder.
- The Dynamic Image Server, named "ImageServer.EXE", located inside a folder named Image-Server in the WATCHOUT installation folder.

Once a shortcut has been created, you can configure it by right-clicking the shortcut and choosing Properties. Enter any options at the end of the Target field, separated by a space, as shown below.



The -Delay option specified for the display software.

Note the following details:

- The first part of the Target field is the full path to the program being started by the shortcut. If this contains any spaces, it will be enclosed in double quotes.

- The items in the Target field are space separated. This also applies to command line option arguments.
- If a command line option argument or other parameter contains spaces, it must also be enclosed in double quotes.

IMPORTANT: Command-line options of the newer generation of Dataton media servers, such as the WATCHPAX 60, are set through the “Edit Command Line Options” entry under the File menu.

DISPLAY SOFTWARE

The WATCHOUT display software (WATCHPOINT.EXE) accepts the following options:

-Delay

Specifies any delay to introduce when starting the display software. This option must be followed by a number, specifying the delay in seconds (see illustration above). This is useful in cases where other programs or computer functions may need to be fully started before WATCHOUT can start reliably (see “Auto-Starting WATCHOUT”).

-NoLogo

Suppress the WATCHOUT logo normally shown together with a progress bar when updating shows or transferring media files. With this option, the display software will hold whatever is on screen during such operations, hence providing no on-screen feedback on the progress. Progress bars will still be shown in the Stage window of the production software, though.

-ShowsPath

Specifies the location of the “Shows” folder, which in its turn contains all the shows that have been transferred to the display computer. By default, this folder is named “Shows” and is located in the WATCHOUT installation folder. In some cases, you may want to locate this folder elsewhere, such as on a separate drive. If so, use this command line option to do so.

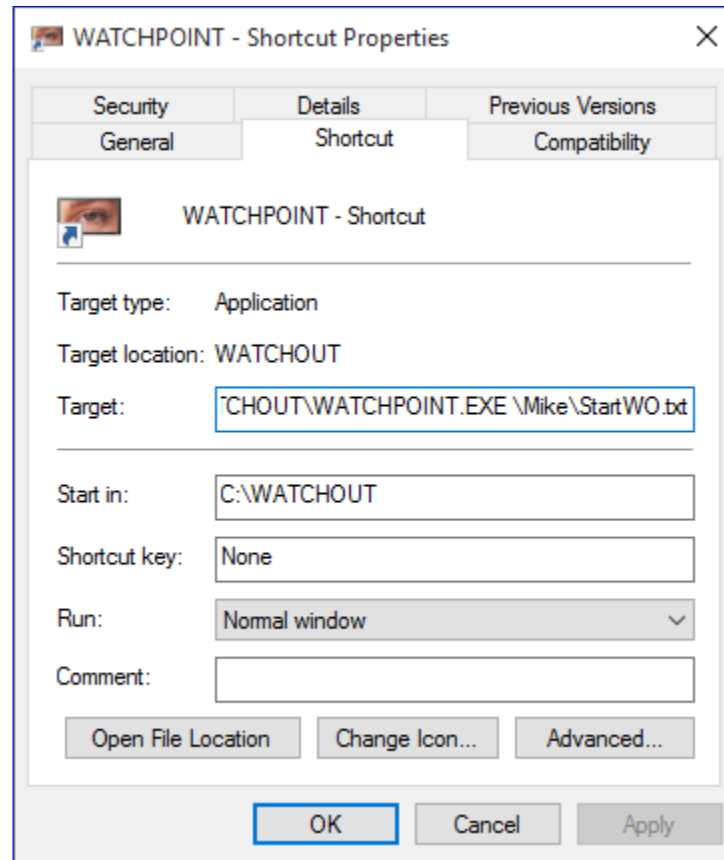
Specify the path to the desired location after the -ShowsFolder option, separated by a space. Remember to put the path inside double quotes if it contains any spaces.

STARTUP SCRIPT

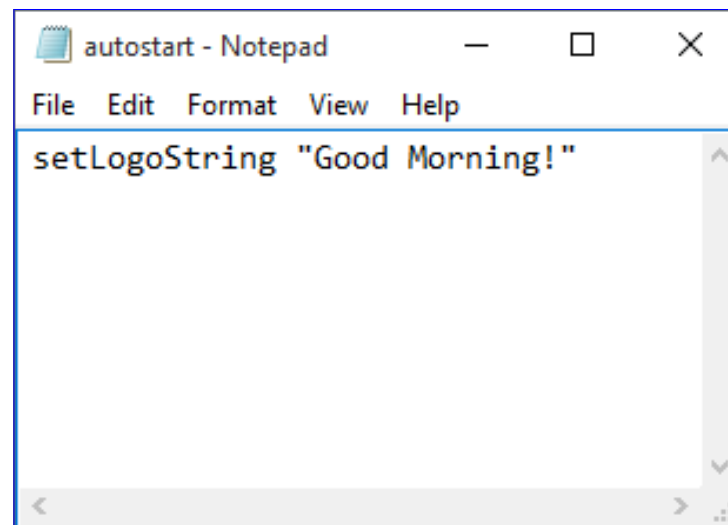
You can pass the name of a file as the last item on the command line. Note that such a command file name is *not* prefixed by any option name. Remember to enclose this path in double quotes if it contains spaces.

NOTE: By default Windows hides the file extension of most files. Hence, the name of a script may appear as “StartWO” rather than “StartWO.txt”. The same applies to most other files. Use the DIR command in a command line window to see the full file name.

If you specify just a file name, without an absolute path, WATCHOUT will look for this file in the WATCHOUT installation folder. The example below specifies a file named “StartWO.txt”, located in the folder named “Mike” at the root of the system drive.



The content of this script file follows the same syntax as described in the chapter titled “Control Protocol”. Here’s an example of a valid command file.



A command file that displays a message after starting WATCHOUT.

You can put comments inside the script file, if you want. Start each comment line with a semicolon. Comment lines are ignored by WATCHOUT.

Default Startup Script

By default, WATCHOUT always looks for a file named “autostart.txt” inside the WATCHOUT installation folder. If found, and no explicit file name was specified on the command line, any commands found in this “autostart.txt” file will be performed. The main purpose of this file is to perform some configurations on Dataton media servers, but it can be used on any display computer, if desired.

You can edit this script either by locating it inside the WATCHOUT installation folder using Windows Explorer, or by choosing “Edit Startup Script” on the File menu of the WATCHOUT display software, accessed by pressing Ctrl-W while the display software is active.

HINT: You can edit this file from the production computer, in case you don't have a keyboard connected to the display computer, by using the [Remote Access](#) command.

After editing the startup script, you need to re-launch the display software for it to take effect. You can do this by choosing "Relaunch" on the File menu of the display software.

PRODUCTION SOFTWARE

The WATCHOUT production software accepts the following command line options.

-Lang

Specify a localized version of the user interface. Normally, the language selection is performed automatically, according to the preferred language of the operating system. For instance, if you're running a Chinese version of Windows, WATCHOUT will be displayed in Chinese. In some cases, this is not desired. For instance, you may want to run the user interface in a localized language even if the computer is running in English. To force WATCHOUT to run in Chinese, for example, add this command line option when starting the production software

```
-Lang zh
```

Follow the option with a space and two letter language code, as shown above. The following language codes are recognized:

- **en** English.
- **es** Spanish.
- **it** Italian.
- **ja** Japanese.
- **ru** Russian.
- **tr** Turkish.
- **zh** Chinese.

NOTE: If a recent command or text is not available in the chosen language, it will be presented in English instead.

-SiteServer

It is possible to use a central license key rather than individual license keys for each computer in a WATCHOUT installation. In this case, the display computers will find the site license server on the network automatically. However, if you also want to use the site license for a production computer, you need to specify the IP number of the license server using this command line option, like this:

```
-SiteServer 192.168.0.101
```

In this example, "192.168.0.101" is the IP number of the site license server.

DYNAMIC IMAGE SERVER

The dynamic image server accepts the following command line options.

-FilePath

By default, the image server looks for any local files to serve relative to the WATCHOUT installation folder. Hence, to display a file named "TickerTest.swf" located in a folder named "flash" inside the WATCHOUT folder, configure the Dynamic Image media item as shown under "Dynamic Image Parameters".

You may prefer to keep your dynamic image content somewhere else than inside the WATCHOUT installation folder. If so, use the -FilePath option to the image server to specify the path to the folder containing your local dynamic content. Separate the option and the path with a space. Enclose the path in double-quotes if it contains spaces.

NOTE: This option is also recognized by its alias -f, as shown in the example under "Alternate File Location".

-PollInterval

When displaying images hosted locally on the dynamic image server, any changes made to those images will be recognized instantly. This can be used to update content by simply replacing a file with another one, with the same name and dimensions.

When displaying remote images, accessed by specifying a fully qualified URL as the path in the Dynamic Image media item, changes will not be recognized instantly, as a round trip to the server is required in order to detect them. While displaying a remote image, the image server will poll the server at regular intervals to see if the image has changed. If it has, it will be updated accordingly. By default, the interval by which the image server queries the remote server is 30 seconds. Hence, it may take up to 30 seconds for any change made to the image on the server to appear on the displays.

You can specify another poll interval using the -PollInterval command line option, followed by a space and then the desired interval, in seconds. The shortest interval you can specify is 1 second. Setting this value to 0 disables any updates, making the image server load the image only once, as the first client requests it, and then hold the same image indefinitely until the last client let go.

NOTE: Some servers may impose limits on how frequently you may request updates. In such cases, making the refresh interval too short may cause the server to stop responding altogether, thereby nullifying your intent to expedite updates.

PRODUCTION SOFTWARE

The WATCHOUT production software accepts only a single option; the full path to a show file to load. Hence, if you have a situation where you use the production software to run the show, and you always load the same show, you can make a shortcut to the production software (possibly putting it into the Startup folder), specifying the full path of the show to load.

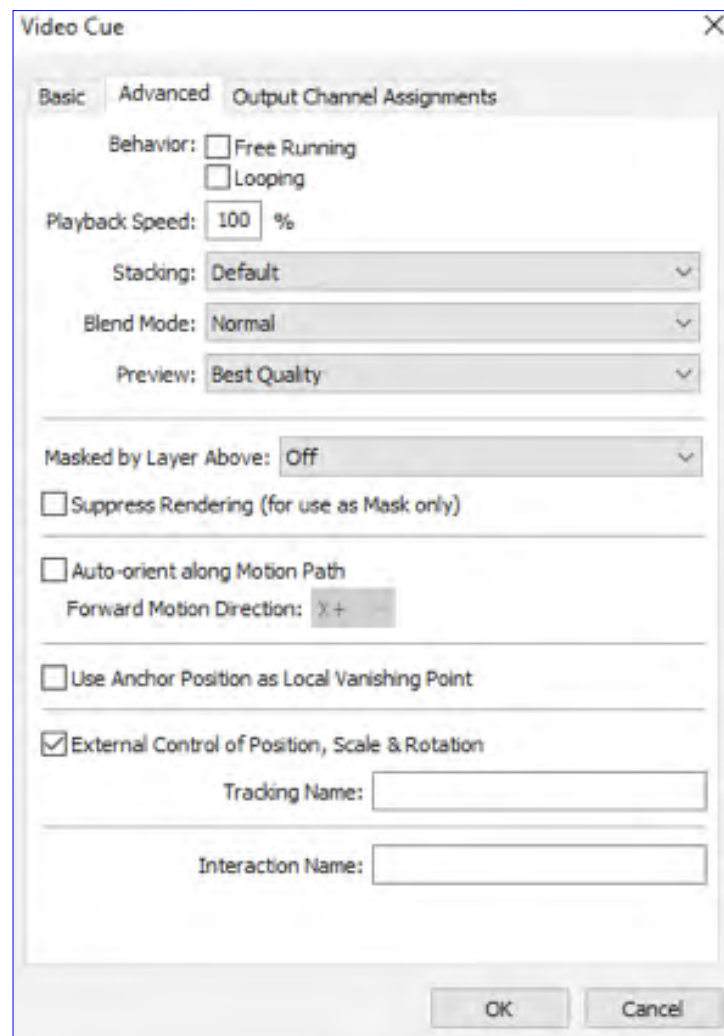
HINT: If the show was saved with "Go Online Automatically" selected in the **Control** tab of the Preferences dialog box, the production software will also connect to the display computers automatically.

E. TRACKING INPUT

CONTROL MEDIA

A tracking input can be connected to any type of visible media inside WATCHOUT. This includes images, videos and 3D objects.

To set media to receive tracking data, open the preference window of the media cue and go to the Advanced tab. In the Advanced tab, enable “External control of position, scale & rotation” and enter the name of your tracking input in the “Tracking name” field. The object is now receiving tracking data and can move freely inside the Stage window.



External control specified in the Advance tab.

CONTROL 3D MODELS

To ensure correct movement of a 3D object in WATCHOUT, you have to correlate the object scale to the system scale of WATCHOUT. The best way to achieve this is to open the 3D model's media preferences and select “Scale by factor.” Set this to the appropriate factor, depending on how the model was created (inches, mm, cm).

IMPORTANT: Make sure that the Anchor position within the model correctly reflects the origin as determined by your tracking system.

REALTIME TRACKING PREFERENCES

Multicast Address

The tracking system sends its RTTrPM data on this address.

Port

The port used for sending the data.

System Scale

WATCHOUT employs pixels as its units while RTTrPM uses meters. This value determines the conversion from meters to pixels.

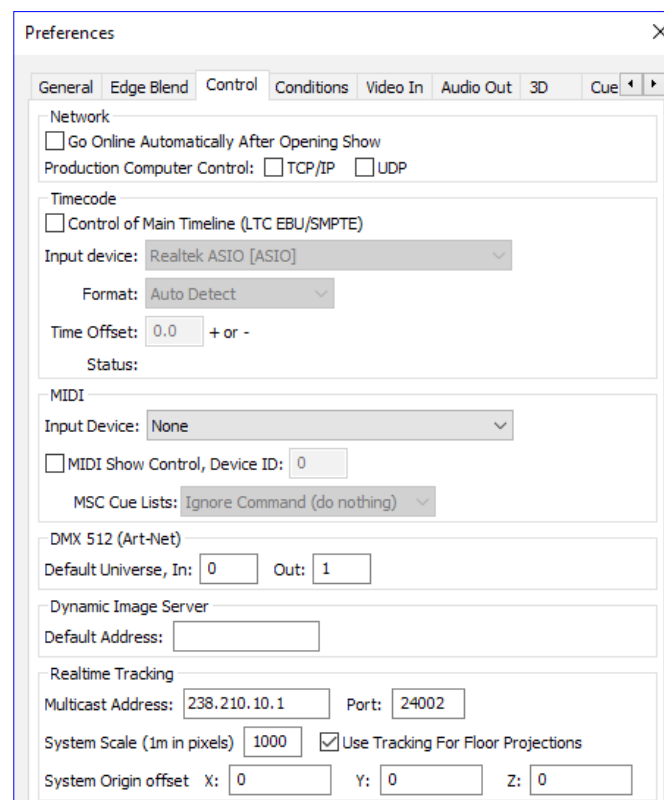
Use Tracking for Floor Projections

This option rotates the tracking data 90 degrees which makes it possible to use the WATCHOUT 2D display for tracked floor projections.

System Origin Offset

Set an offset to your tracking data to position your media in a more convenient place in the WATCHOUT Stage window.

Note: A tracked object cannot be moved using click and drag. In order to change the position of a tracked object, you can either change the position in the cue specifications, use the move command (Ctrl-M) or set an offset to the tracking.



Preferences dialog when using realtime tracking

F. KEYBOARD SHORTCUTS

GENERAL

Shortcut	Description
Ctrl-K	Preferences dialog
Ctrl-O	Open a show file
Ctrl-Q	Quit program
Ctrl-R	Refresh media (looks for changed files)
Ctrl-S	Saves show to disk

EDIT

Shortcut	Description
Ctrl-A	Select all
Ctrl-C	Copy
Ctrl-E	Select to end
Ctrl-F	Find/Replace
Ctrl-G	Find/Replace again
Ctrl-M	Move stage position of selected cues/displays
Ctrl-X	Cut
Ctrl-Z	Undo
Ctrl-Shift-Z	Redo
Enter	Open specifications dialog

STAGE & PREVIEW

Shortcut	Description
Ctrl-Shift-A	Remote manage display
Ctrl-B	Standby mode (toggle)
Ctrl-D	Update
Ctrl-L	Online (toggle)
Ctrl-N	Snap (toggle)
Ctrl-Shift-D	Frame displays
Ctrl-Shift-O	Scroll to origin
Ctrl-Shift-E	Perspective
Ctrl-Shift-F	View front
Ctrl-Shift-T	View top
Ctrl-Shift-L	View Left
Ctrl-Arrow	Nudge image of selected cue 1 pixel
Ctrl-Shift-Arrow	Nudge image of selected cue 10 pixels
Ctrl-1	Preview scale 1:16
Ctrl-2	Preview scale 1:8
Ctrl-3	Preview scale 1:4
Ctrl-4	Preview scale 1:2
Ctrl-5	Preview scale 1:1
Ctrl-6	Preview as wireframes
Ctrl-7	Preview as thumbnails
Ctrl-8	Preview video as thumbnail
Ctrl-9	Preview at best quality
Ctrl-0	Preview masked by displays
Ctrl-Drag	Zoom scale to rectangle
Ctrl-Click	Zoom in
Ctrl-Shift-Click	Zoom out
Ctrl-Alt Drag	To pan
Ctrl-Tab	Cycles window
Ctrl-Shift-(1,2,3,etc)	Select tier

TIMELINE

Shortcut	Description
Ctrl-I	Insert layer
Ctrl-DEL	Delete layer
Ctrl-J	Timeline settings
Ctrl-P	Add play control cue
Ctrl-Shift-P	Add pause control cue
Ctrl-T	Click jumps to time (toggle)
Spacebar	Start timeline (toggle)
Esc	Pause timeline (no toggle)
NUM 0	Start timeline (no toggle)
NUM *	Jump to last start position
NUM +	Magnify timeline scale
NUM -	Reduce timeline scale
Alt	While dragging tail of cue to stretch tween points
Up/Down	Select layer
Left/Right	Select next/previous cue in layer
ALT-Double-Click Composition	Opens a composition from the timeline

TWEEN

Shortcut	Description
Alt-P	Position
Alt-O	Opacity
Alt-S	Scale
Alt-R	Rotation Z-axis
Alt-C	Crop
Alt-L	Wipe (tiles)
Alt-T	Tint
Alt-E	Wipe (strips)
Alt-W	Wipe (gradient)
Alt-N	Corners
Alt-H	Hue & saturation
Alt-I	Wipe (bands)
Alt-Y	Rotation Y-axis

AUDIO TWEEN TRACK

Shortcut	Description
Alt-V	Volume
Alt-B	Balance