NewTek™

VMC1 OUT™

Operating Instructions

NDI™ Network Device Interface

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Chapter 1 INTRODUCTION AND SETUP

This chapter explains how to connect power, monitors and audio visual devices to your NewTek VMC1 OUT system. It also reviews the registration process. After completing this short section, you'll be all set to begin using VMC1 OUT.

SECTION 1.1 OVERVIEW

Thank you for purchasing this NewTek™ product. As a company, NewTek is extremely proud of its record of innovation and commitments to excellence in design, manufacture, and superb product support. NewTek IP Series products are our most advanced live production systems, and you will find them exceptionally powerful and versatile.

NewTek's innovative live production systems have repeatedly redefined broadcast workflows, providing new possibilities and economy. In particular, NewTek has been a leader in introducing integrated devices providing a complete set of tools related to program creation and broadcast, along with web streaming and social media publishing. This tradition continues with the NewTek VMC1 OUT. Its implementation of NewTek's innovative NDI (Network Device Interface) protocol places your new system squarely in the forefront of IP technology solutions for the video broadcast and production industries.

SECTION 1.2 SETTING UP

1.2.1 COMMAND AND CONTROL

Hint: VMC1 OUT's interface requires a monitor resolution setting of at least 1280x1024.

1. Connect an external computer monitor to either the DVI or HDMI port on the backplate (see Input Connections).
2. Connect the *mouse* and *keyboard* to USB ports also on the backplate.
3. Connect the *power cord* to VMC1 OUT's backplate
4. Turn on the computer monitor.
5. Press the *Power* switch on VMC1 OUT's faceplate (located behind the drop-down door).

At this point, the blue *Power LED* will illuminate, as the device boots up. (If this does not happen, check your connections and retry). Though not a requirement, we do strongly recommend that you connect VMC1 OUT using an uninterruptable power supply (UPS), as for any 'mission critical' system.

A word about UPS devices:

'Modified sine wave' UPS devices are popular due to low manufacturing costs. However, such units should generally be viewed as being of low quality and possibly inadequate to fully protect the system from abnormal power events.

For a modest added cost, consider a "pure sine wave" UPS. These units can be relied on to supply very clean power, eliminating potential problems, and are recommended for applications demanding high reliability.

Likewise, consider A/C "power conditioning", especially in situations where local power is unreliable or 'noisy'. Surge protection is especially important in some locales. Power conditioners can reduce wear on VMC1 OUT's power supplies and other electronics, and provide a further measure of protection from surges, spikes, lightning and high voltage.

SECTION 1.3 INPUT CONNECTIONS

External audio and video devices can be connected to the appropriate connectors on VMC1 OUT's backplate.

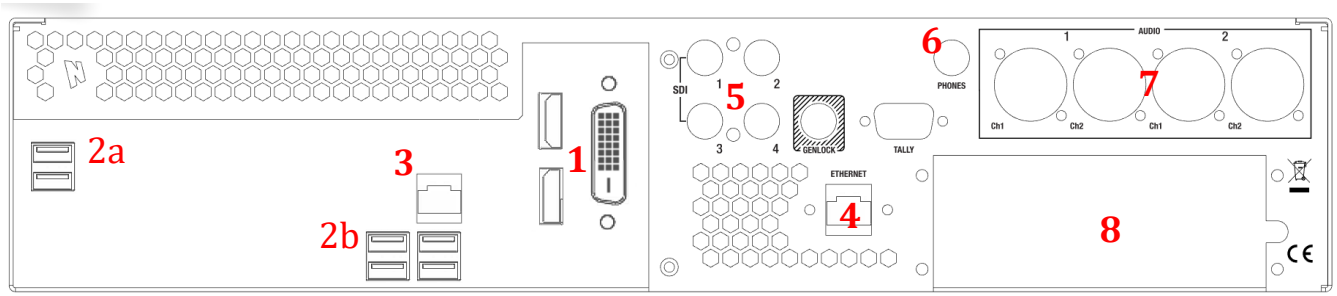


FIGURE 1-1

1. DVI and HDMI monitor connections.

2 a, b. USB Ports – keyboard, mouse and other peripheral devices.

3. Ethernet 1 – motherboard network connection

4. Ethernet 2 – backplane network connection

5. SDI Outputs 1 – 4

6. Phone jack – ¼" stereo connector

7. Analog Audio Out – 2 XLR stereo pairs carry sound from the MIX 1 and MIX 2 outputs

8. A/C Power connectors

SECTION 1.4 NETWORKING

Generally, simply connecting a suitable cable from one or *both of the Ethernet ports on VMC1 OUT's backplate to your local network is all that is required to add it to a *local area network* (LAN). In some settings, additional steps may be required. You can access the system *Network and Sharing* control panel to accomplish more extensive configuration tasks. If further help connecting is required, please consult your system administrator.

Note: Dual network connections can be helpful to ease bandwidth limitations when using numerous NDI inputs from your network.

Chapter 2 USER INTERFACE

This chapter explains the layout and options of the user interface, and how to configure VMC1 OUT audio and video input and output. It also introduces the various supplemental video production features VMC1 provides, including Proc Amps, Scopes and capture.

SECTION 2.1 THE DESKTOP

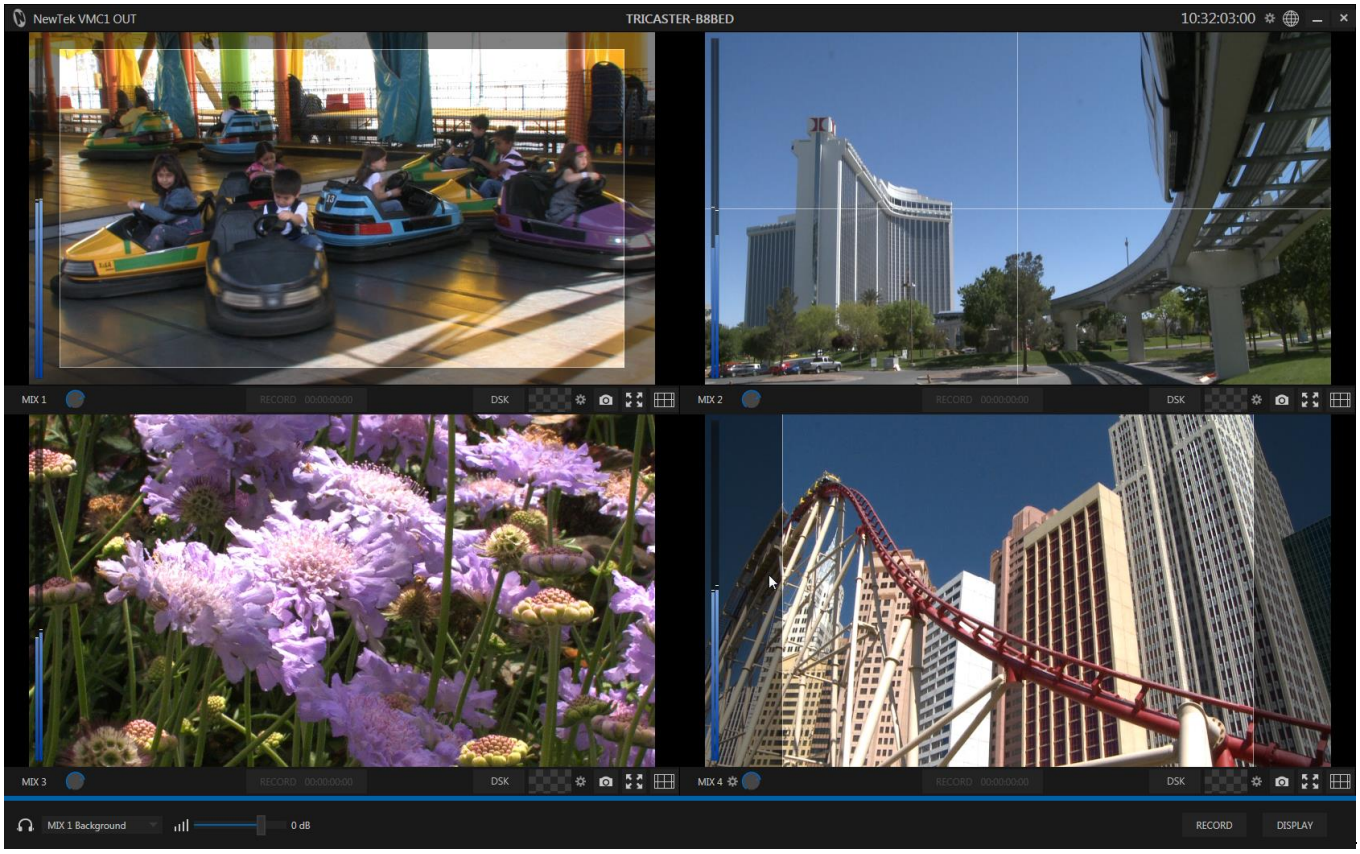


FIGURE 2-1

The *Desktop* interface includes *dashboards* running across the top and the bottom of the screen. By default, the large middle section of the *Desktop* is divided into quadrants, each displaying one video 'channel'. Beneath and each channel's viewport is a toolbar (see Figure 2-1).

Continue reading to get an overview on the features of the VMC1 OUT *Desktop*.

2.1.1 CONFIGURE CHANNEL

FIGURE 2-2

VMC1 OUT allows you to select a different audio and video source for each channel, via the *Configure* panel (Figure 2-3). The *Configure* panel can be found by clicking on the gear next to the label for each channel (Figure 2-2).

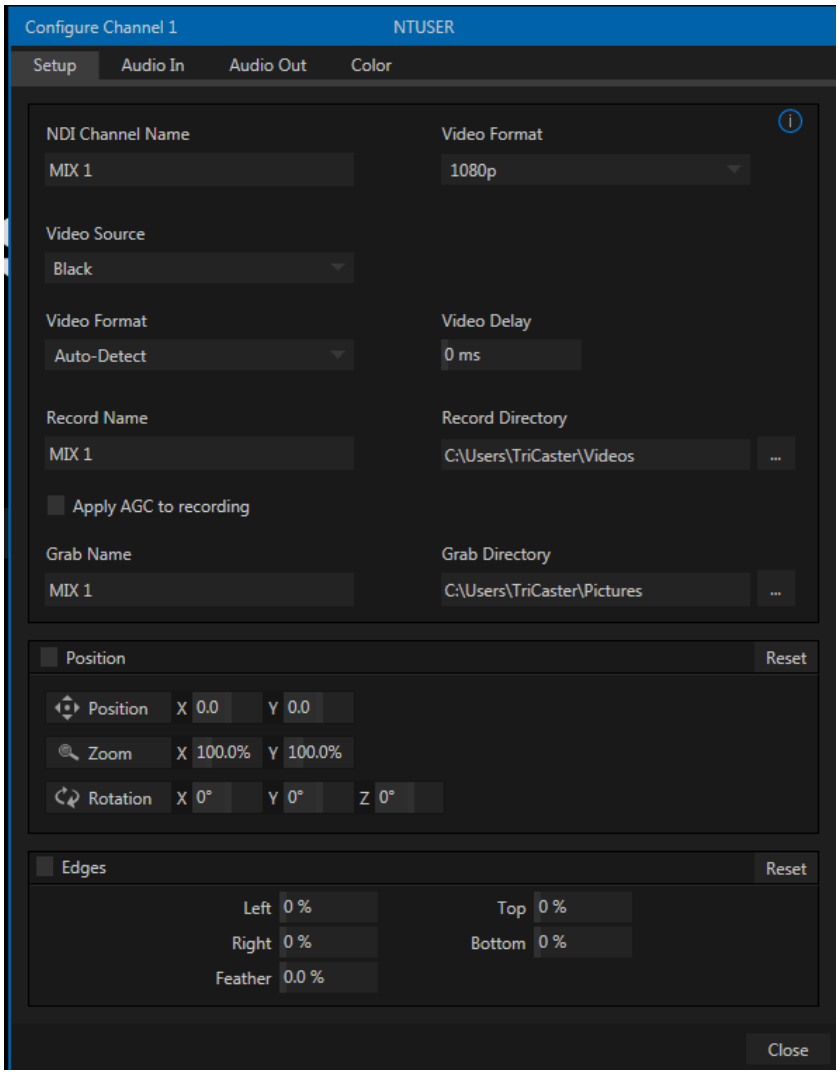


FIGURE 2-3

The *Setup* pane allows you to select the video source for this channel, and set the format. You can choose an NDI or SDI source, webcam, a camera (such as a PTZ unit) with compatible network output, an input from a suitable external A/V capture device, or even a still image (click the *Add Media* icon in the *Video Source* menu to select a suitable image file).

A *Delay* setting is provided for both audio (under the *Audio In* tab) and video sources, allowing precise A/V synchronization where source timing differs.

This tab is also where you assign the path and base filename for captured video clips and stills.

Initially the *Record* and *Grab Directories* settings are pointed at the default *Videos* and *Pictures* folders on the system, but we strongly encourage you to use fast network storage volumes or an external drive connected to one of the (blue) USB3 ports on VMC1's rear panel for video capture especially.

Position

The *Position* control group include *Position*, *Zoom, and Rotation*. *Position* settings can be toggled on and off together using the switch provided. Click and drag on the *Position* button to relocate the associated *channel* vertically or horizontally within the frame. Dragging left or right directly on either of the nearby numeric controls adjusts the position on a single axis (you can also handle negative and positive values here, otherwise not possible).

Hint: You can constrain mouse actions to one axis by holding down the Ctrl key before dragging.

Dragging the cursor on the *Zoom* button (magnifying glass) affects the apparent size of the video in the channel. Again, if you drag just one of the associated numeric gadgets you can adjust just one dimension of the corresponding *video* layer – width or height.

In similar fashion, drag the pointer over the *Rotation* button with the left mouse button depressed to turn the video source on three axes as follows:

- Drag left/right to rotate the source about the Y (vertical) axis.
- Drag up/down to rotate the source about the X (horizontal) axis.
- Drag while holding *Ctrl* down to rotate about the Z axis.
- Drag on a single numeric slider, or hold down *Ctrl* to constrain rotation to one axis.

Edges

It is very common for a source to be supplied with unintentional inclusions; these are often items that remain after chromakeying is applied, but which need to be removed along with the background. (Common examples include microphones or lighting fixtures dangling from above, or perhaps a harsh crease, blemish or tear in the background screen.) Or, as is frequently the case, the source video itself may have a few pixels of black or video 'noise' along one or more of its edges.

Cropping settings in the *Edges* control group can be used to remove such unwanted 'garbage' from the scene, or used independently for other purposes – such as to isolate some portion of the screen for use as a 'Picture in Picture' overlay source.

Essentially, the numeric controls in this group allow you to define independent margins for the frame. Drag left or right on the number fields to adjust the values interactively, or double-click a field to type a value using the keyboard. The region defined by these controls will be completely cropped.

NDI Output

In addition to SDI output, the a/v signal from each channel is also added to your network as an NDI source.

Note: NDI Group Manager, included in NDI Tools (available without charge from NDI.newtek.com), can be used to control access to NDI source and output streams.

IP SOURCES

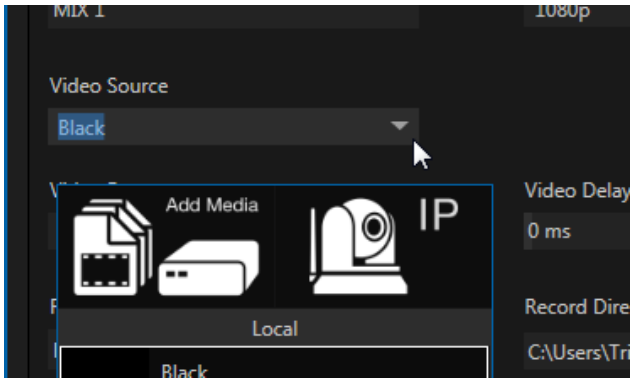


FIGURE 2-4

As mentioned in the previous section an IP (network) source such as a PTZ camera with compatible network video output can be selected. The *Video Source* drop down menu contains an IP icon (Figure 2-4).

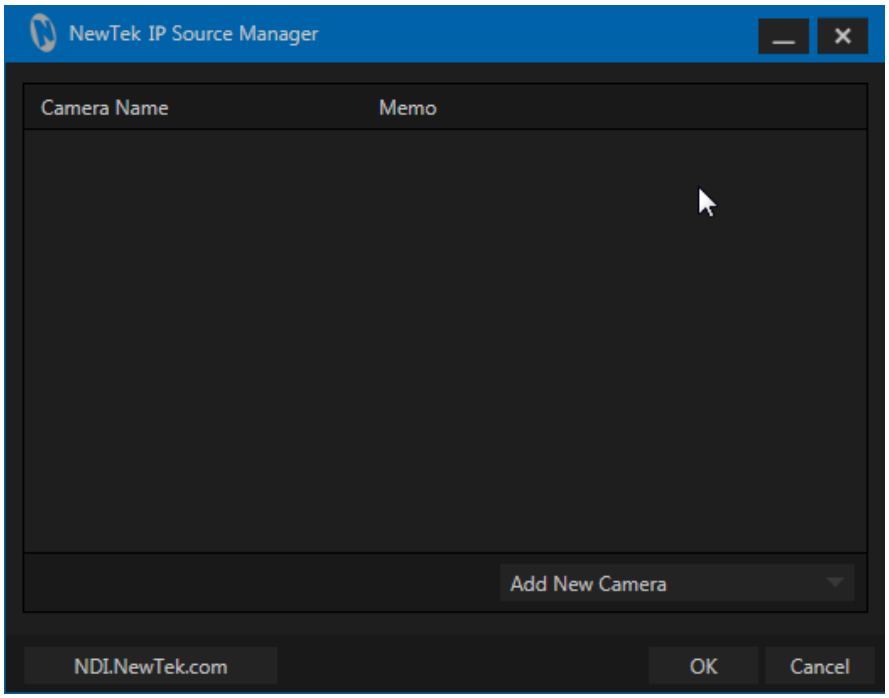


FIGURE 2-5

Clicking the *IP icon* opens the *IP Source Manager*. Adding entries to the list of sources shown in this panel causes corresponding icons for new sources to appear in the *Local* group shown in the *Video Source* menu of the *Configure Channel* panel (Figure 2-3).

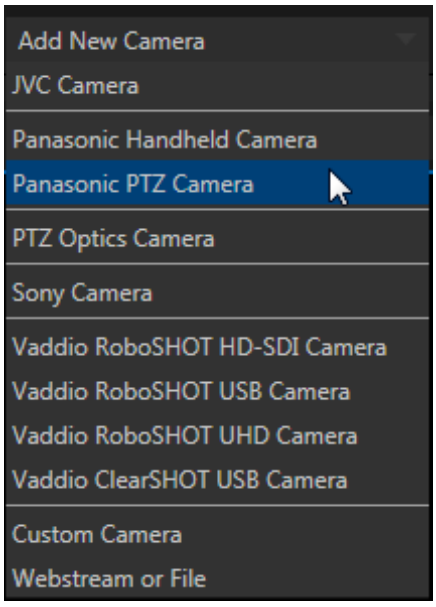


FIGURE 2-6

To begin. Click the *Add New Camera* menu, and select a source type from the dropdown list provided.

Doing so opens a dialog suited to the particular source device you wish to add, such as one of the numerous supported PTZ camera brands and models.

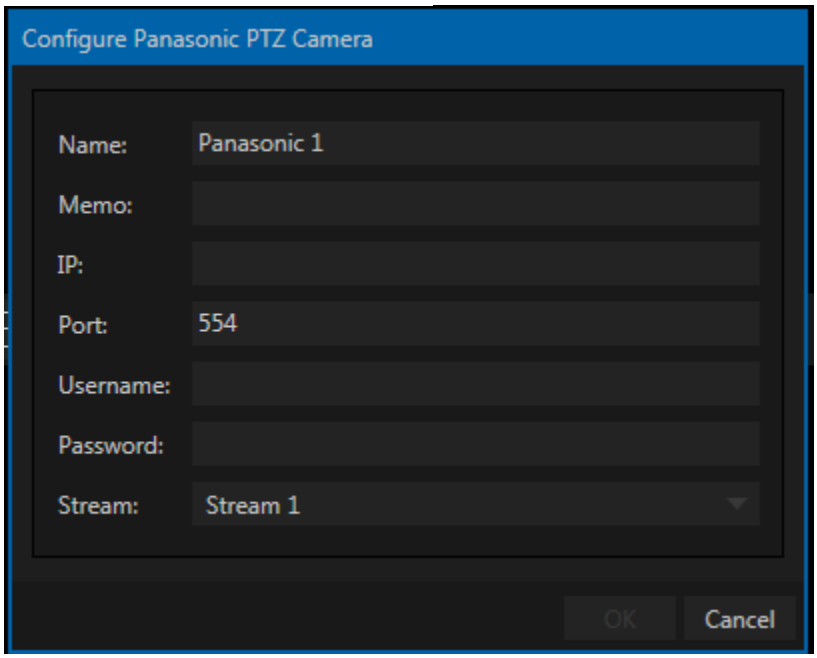


FIGURE 2-7

Note: After adding an IP source, you must exit and restart the software for the settings to be applied.

AUDIO IN TAB

The second tab in the *Configure Channel* pane hosts settings related to audio input for the current channel. The Audio Source will default to "Follow Video Source" but can be changed from the drop down menu. A delay can be set to the audio from this panel as well.

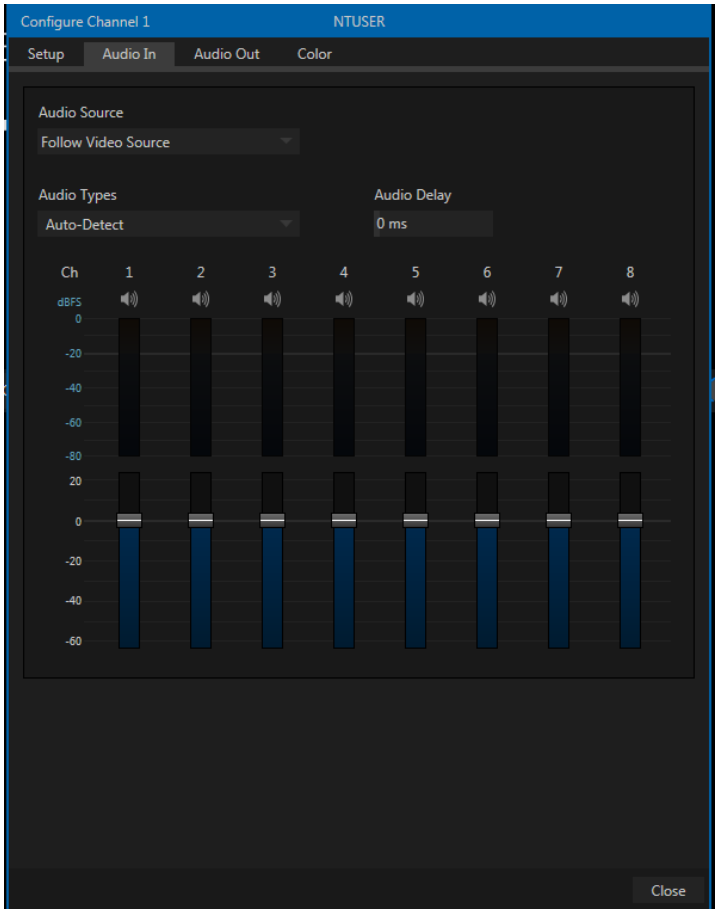
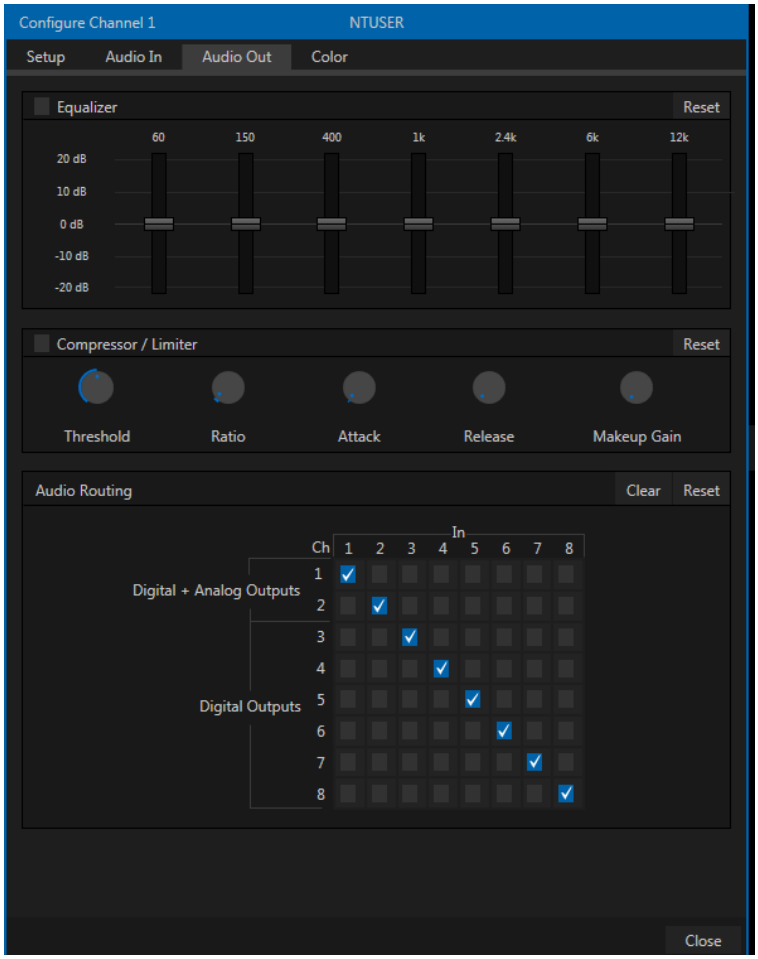


FIGURE 2-8

In addition you have the ability to adjust audio channel levels using the sliders and VU meters.

Double clicking the slider will reset it to 0.0db.



EQUALIZER

The seven-band equalizer allows you to 'shape' sound to taste, accommodate sources with different acoustic characteristics (say, mismatched mics), minimize feedback or roll off unwanted parts of the audio spectrum.

Enable or disable the *Equalizer* using the switch beside the label above its control group. The vertical sliders attenuate or boost the tonal range centered on the frequency shown at the top.

The effect applied falls off gradually as sound draws closer to neighboring frequencies on either side. Click *Reset* to return all sliders to 0dB.

COMPRESSOR LIMITER

The *Compressor/Limiter* is capable of preventing clipping (see Section **Error! Reference source not found.**) from unexpected peaks or transients, and making talent sound better than they do in real life, bringing voices, music and other audio sources into an optimal dynamic range. Being able to do this independently for each output too is icing on the cake, especially for Internet streaming, as it ensures correct levels at any time.

THRESHOLD

Sound above the set *Threshold* level will be compressed; the amount of compression and the manner in which it is applied are both dictated by the other settings.

Ratio

A *Ratio* of 4:1 means that if input level is 4 dB over the threshold, the output signal level after compression will be just 1 dB over the threshold. The gain (level) is reduced by 3dB. Very high ratio settings are the reason the word "limiter" is part of the title for this feature. The highest ratio setting will effectively reduce any signal that would rise above the threshold all the way down to the threshold level (with the exception of a brief period during a sudden increase in source loudness, as dictated by the *Attack* setting).

Attack

Attack (like Release) is labeled in milliseconds. The setting represents the amount of time it takes for the gain to change by a specified amount.

It would not be grossly incorrect to think of this setting as changing the slope of a graph depicting how aggressively the compressor pursues the target value (defined by applying the *Ratio* setting to the amount the signal surpasses the *Threshold*). Shorter values are more aggressive, while longer values are more subtle (and tend to be less noticeable to the audience).

Release

Release is similar to *Attack* in many ways, but refers instead to the speed with which the compression effect is removed as a source signal falls back on its own so that it no longer exceeds the *Threshold*.

Gain

Naturally, compression impacts the overall output level of the source or output. The *Gain* control allows you to compensate, bringing the post-compressor/limiter signal back to a comfortable nominal range.

Audio Routing

At times you may require specially configured audio mixes. For instance – some installations call for sending audio from one or more internal sources to a secondary distribution system.

Alternatively, you may want a 'clean' output from one or more sources for use apart from the main primary output mix. Specialized sub-mixes of this sort are often referred to as 'mix-minus,' since one or more sources are deliberately subtracted from the main program.

Then again, the designated audio source for a channel may carry narration in different languages on different audio channels. Since the routing matrix panel lets you remap inputs channel to the various output channels available, you can move Swahili to the first two channels on one output, while another otherwise identical output carries Dutch on the same channels.

The *Color* tab provides an extensive set of tools for adjusting the color characteristics of each video channel.

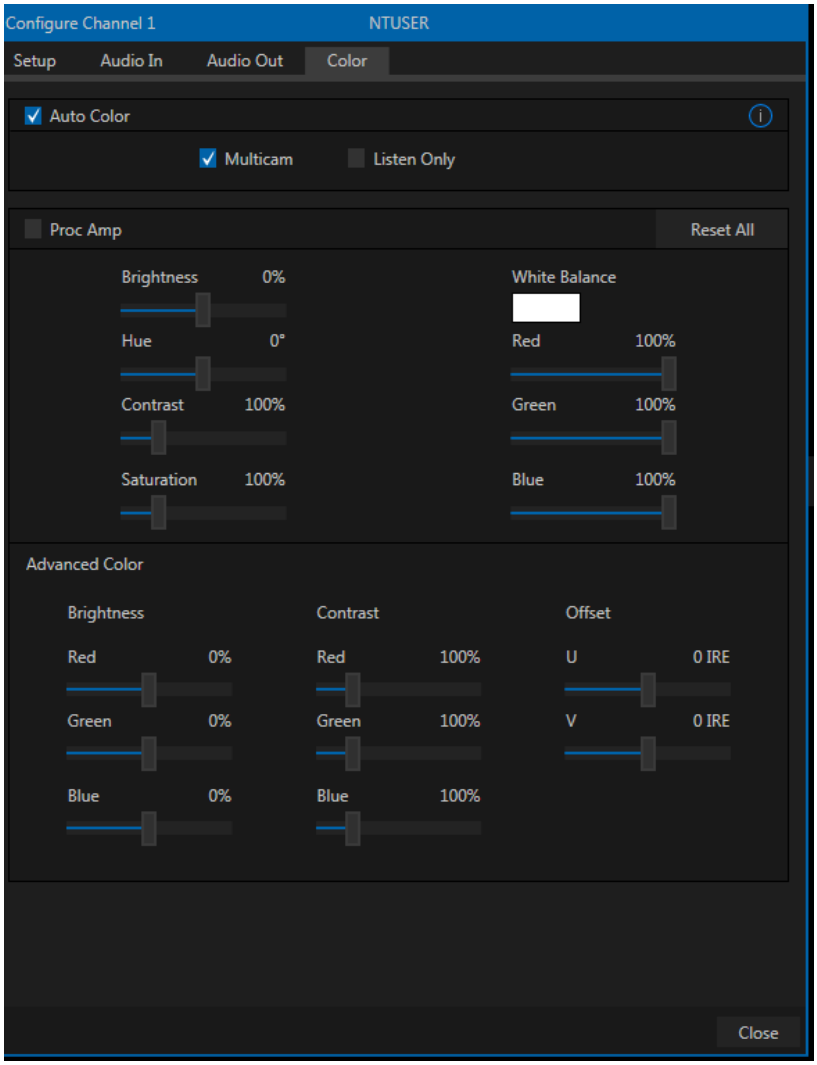


FIGURE 2-9

Choosing *Auto Color* automatically adapts color balance as lighting conditions change over time.

Note: Proc Amp adjustments follow Auto Color processing.

By default each camera with *Auto Color* enabled is processed by itself. Enable *Multicam* to process multiple cameras as a group.

To apply *Multicam* processing to a source without its own colors being evaluated, checkmark *Listen Only*. Or enable *Listen Only* for all *Multicam* group members except one to make that source the 'master' color reference.

Note: Custom settings in the Color tab trigger a COLOR notification message that appears in the footer below the viewport of the channel (Figure 2-10).

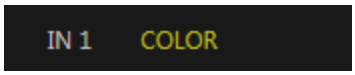


FIGURE 2-10

SECTION 2.2 TITLEBAR & DASHBOARD

VMC1 OUT's *Titlebar* and *Dashboard* are home to a number of important displays, tools and controls. Prominently located at the top and bottom of the *Desktop*, the *Dashboard* occupies the full width of the screen.

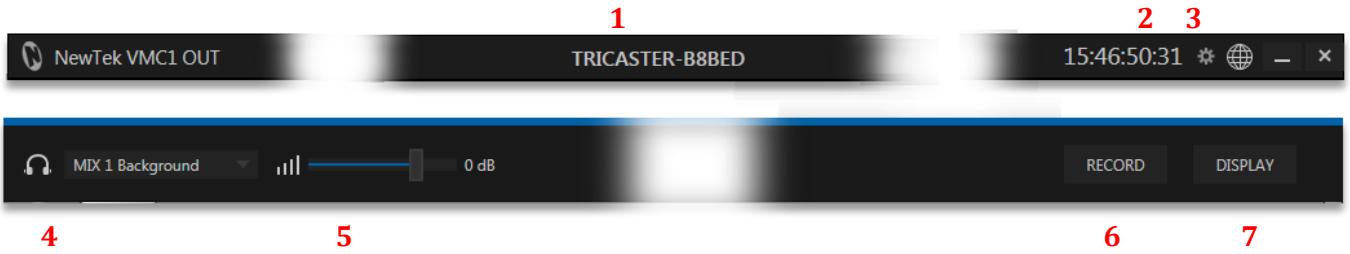


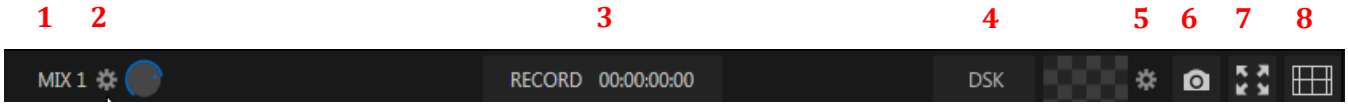
FIGURE 2-11

The various elements comprising the *Dashboard* are listed below (starting from the left):

1. *Machine name*
2. *Time Display* and *System Configuration* (see section 0)
3. *Information - Links to online resources and system information.*
4. *Headphones Audio source (see* Audio (Headphones)*)*
5. *Volume*
6. *Record (see* Record*)*
7. *Display (see* Monitoring*)*

Of these items, some are so important that they rate their own chapters. Others are detailed in various sections of this guide (cross references to the relevant sections of the manual are provided above).

2.2.1 VIEWPORT TOOLS



The VMC1 OUT's channels each have a toolbar, the various elements that make up the toolbar are listed below from left to right:

1. *Channel name* - can be changed by clicking on the label. This can also be changed in the *Configuration panel* (see **Error! Reference source not found.**).
2. *Configuration gear* (see section 2.1.1)

3. *Record button* and *Record Time Display* – the record button functions as a toggle for recording one particular channel (the RECORD button in the bottom dashboard which opens a widget for selecting single, group or all channels).
4. *DSK* – (downstream key) toggle
5. *DSK configuration (gear)*
6. *Grab stil*l – base name and save path can be set in the *Configuration* panel (see **Error! Reference source not found.**)
7. *Full screen* (see Fullscreen)
8. *Overlays* (see Overlays)

DSK

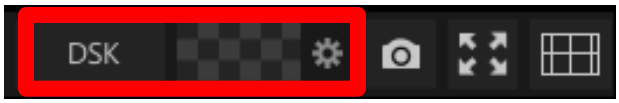


FIGURE 2-12

The *DSK* tool is found in the lower right corner of each channel. For key/fill source configurations, assign the Alpha Matte source to the neighboring even-numbered channel, and enable the *Alpha Matte* button in the lower right corner below the monitor for each channel (see Figure 2-12).

INPUT SETTINGS

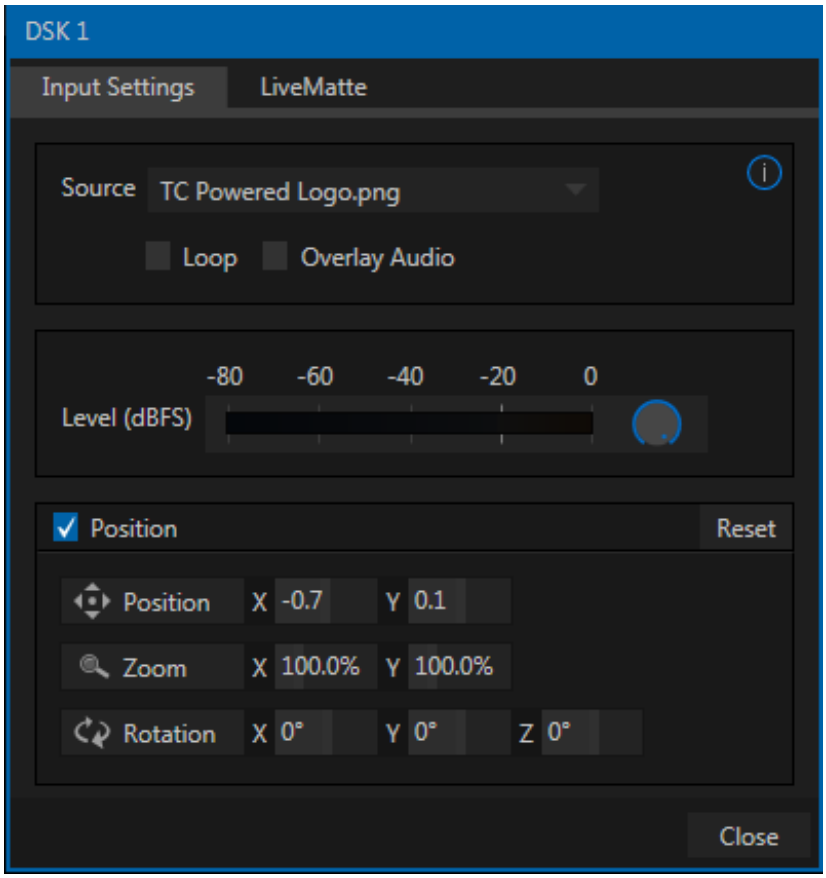


FIGURE 2-13

The *Source* control allows you to select a still image or animations to use as an overlay. Enabling *Loop* allows animations to repeat endlessly, this is ideal for station ID 'bugs'. *Overlay Audio* can be enabled or disabled from this panel, the default is off. The *Level* slider allows you to control sound volume from the overlay source, when present.

The *Position* control group include *Position*, *Zoom, and Rotation*. *Position* settings can be toggled on and off together using the switch provided. Click and drag on the *Position* button to relocate the associated *DSK* layer vertically or horizontally within the frame. Dragging left or right directly on either of the nearby numeric controls adjusts the position on a single axis (you can also handle negative and positive values here, otherwise not possible).

Hint: You can constrain mouse actions to one axis by holding down the Ctrl key before dragging.

Dragging the cursor on the *Zoom* button (magnifying glass) affects the apparent size of the overlay. Again, if you drag just one of the associated numeric gadgets you can adjust just one dimension of the corresponding *DSK* layer – width or height.

In similar fashion, drag the pointer over the *Rotation* button with the left mouse button depressed to turn the overlay source on three axes as follows:

- Drag left/right to rotate the source about the Y (vertical) axis.
- Drag up/down to rotate the source about the X (horizontal) axis.
- Drag while holding *Ctrl* down to rotate about the Z axis.

- Drag on a single numeric slider, or hold down *Ctrl* to constrain rotation to one axis.

LIVEMATTE

The LiveMatte tab is where the realtime keying system is configured. Keying is a popular and powerful method of compositing multiple images, whether photos, video clips or live camera streams.

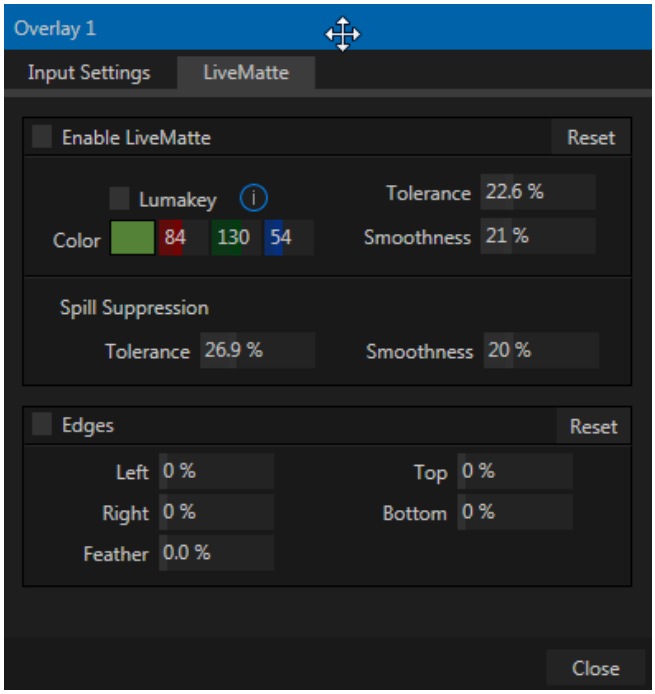


FIGURE 2-14

The process involves eliminating a portion of the image (effectively cutting a digital 'keyhole' in it) to reveal a user-defined background scene. *LiveMatte's* controls are deceptively simple, making a great deal of complex digital manipulations easy to use. Even so, much can be said about getting the best results.

EDGES

It is very common for a source to be supplied with unintentional inclusions; these are often items that remain after chromakeying is applied, but which need to be removed along with the background. (Common examples include microphones or lighting fixtures dangling from above, or perhaps a harsh crease, blemish or tear in the background screen.) Or, as is frequently the case, the source video itself may have a few pixels of black or video 'noise' along one or more of its edges.

Cropping settings in the *Edges* control group can be used to remove such unwanted 'garbage' from the scene, or used independently for other purposes – such as to isolate some portion of the screen for use as a 'Picture in Picture' overlay source.

Essentially, the numeric controls in this group allow you to define independent margins for the frame. Drag left or right on the number fields to adjust the values interactively, or double-click a field to type a value using the keyboard. The region defined by these controls will be completely cropped.

GRAB

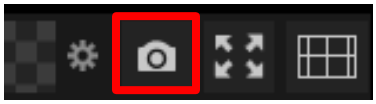


FIGURE 2-15

A *Grab Input* tool is located in the lower right corner below the monitor for each channel. By default, still image files are stored in the system "Pictures" folder. The path can be modified in the *Output* window for the channel (see **Error! Reference source not found.**).

FULLSCREEN

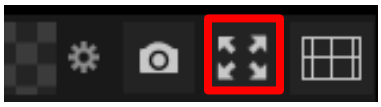


FIGURE 2-16

Clicking this button will expand the video in the selected channel to fill your monitor. Pressing ESC on your keyboard will return the display to normal.

OVERLAYS

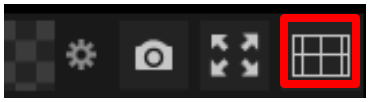


FIGURE 2-17

Found in the lower right corner of each channel, *Overlays* offer useful tools for visualizing safe zones, centering and more. To use an overlay, click on the icon in the list (Figure 2-19). More than one overlay can be active at the same time.

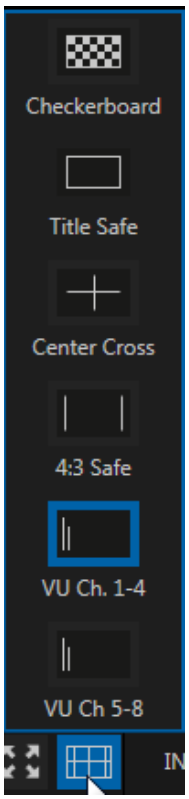


FIGURE 2-18

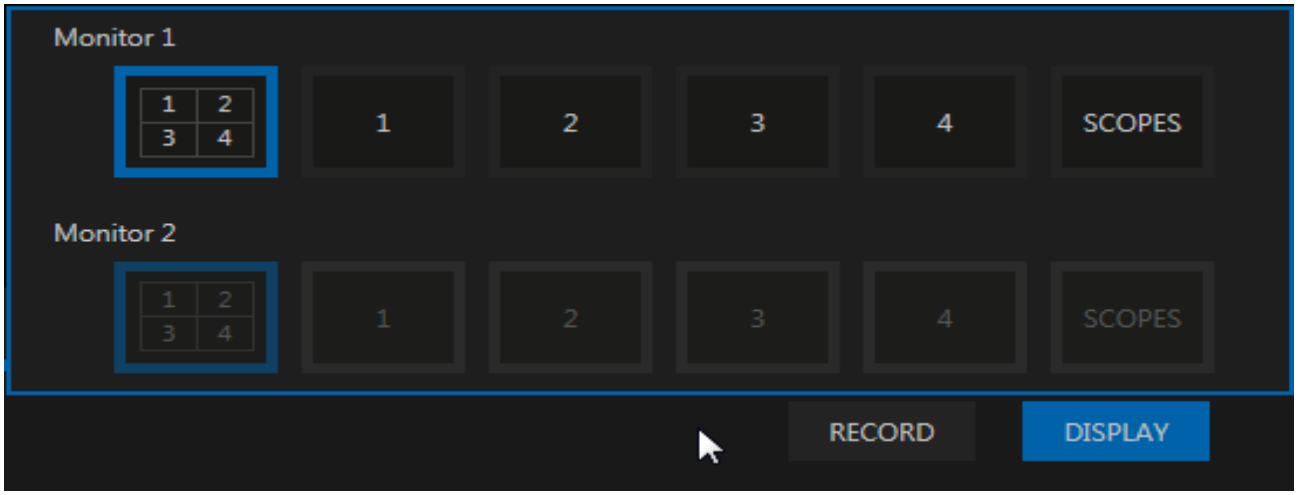


FIGURE 2-19

Located in the bottom right corner of the dashboard, the *Display* widget contains a variety of layout options for viewing channels individually or in groups, on one or two monitors (Figure 2-19).

Among the layout options a *Waveform* and *Vectorscope (Scopes)* can also be found here in the *Display* widget (Figure 2-20).

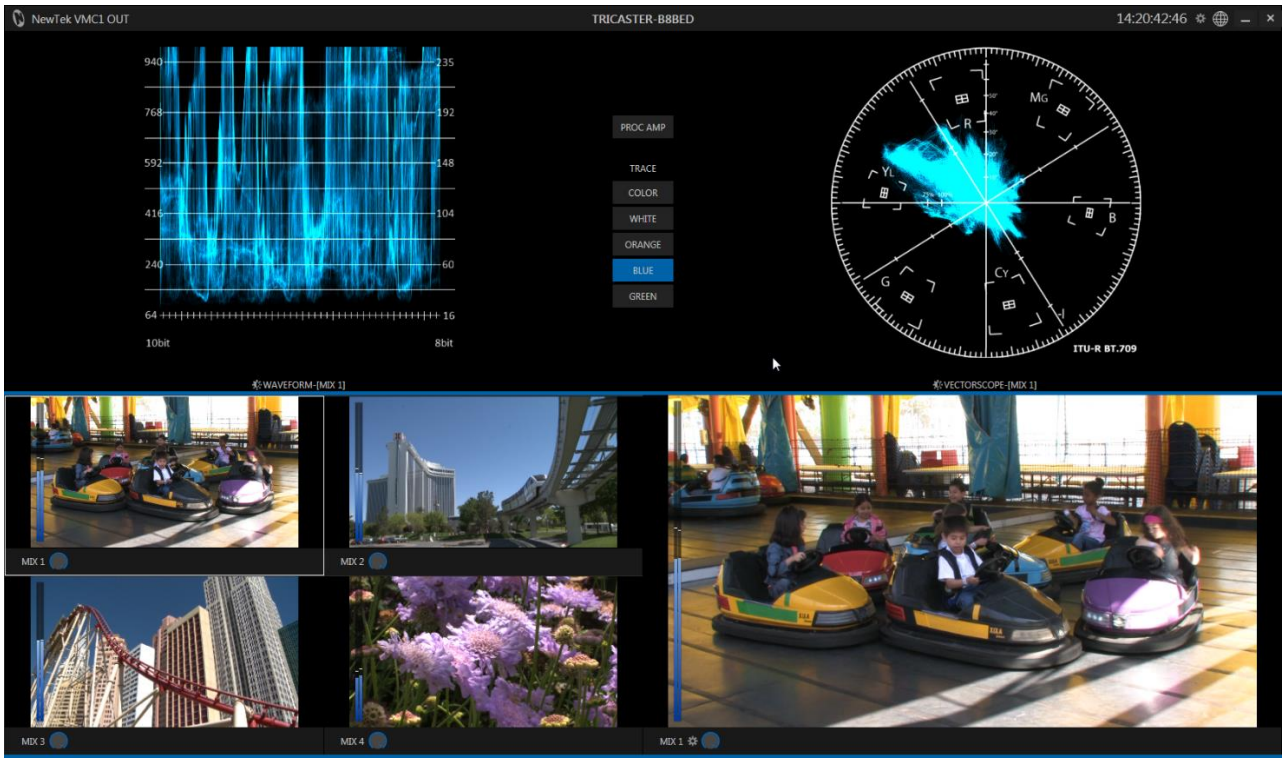


FIGURE 2-20

RECORD

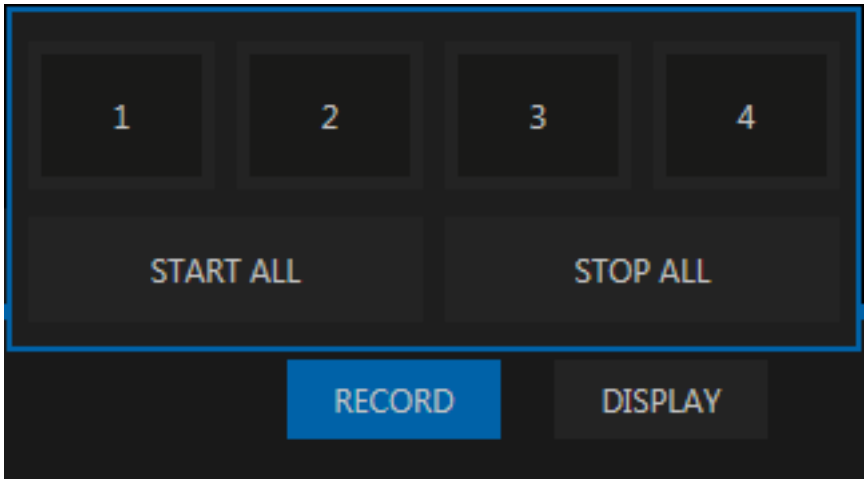


FIGURE 2-21

The *Record* button can be found in the lower right corner of the dashboard (see Figure 2-21). When pressed it will open a widget allowing you to select which specific channel(s) to begin or stop recording. You can even choose to start or stop all recordings.

Note: The destination of the recorded channels, labels, base file names and other settings are controlled from the Configuration panel (see Figure 2-3).

TIMECODE

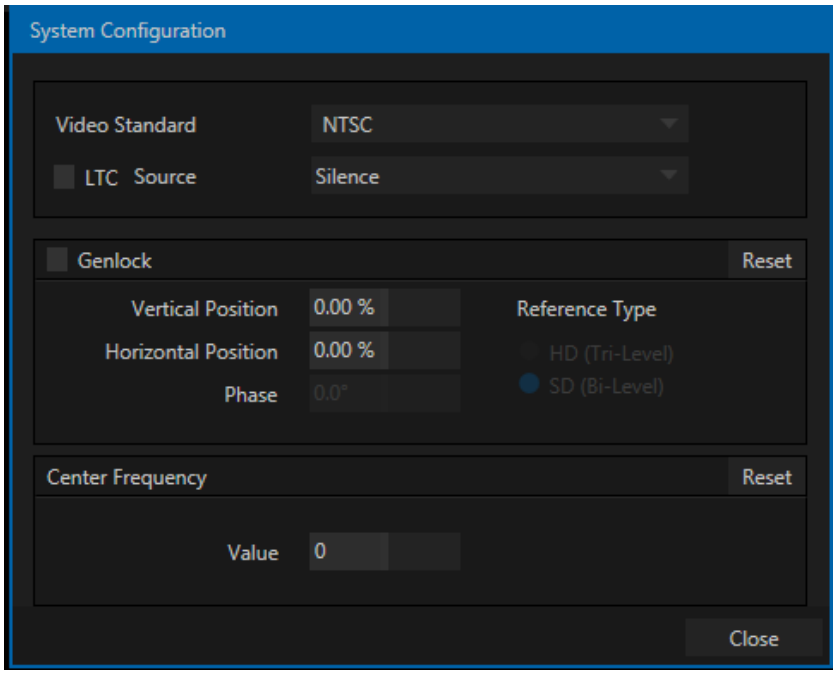


FIGURE 2-22

LTC timecode support can be activated in the *System Configuration* panel located in the gear found in the upper right corner of top dashboard.

You can connect a headset to the (green) audio output jack on the rear of VMC1 OUT's motherboard.

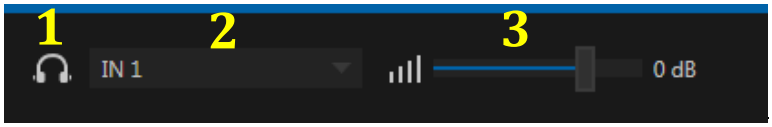


FIGURE 2-23

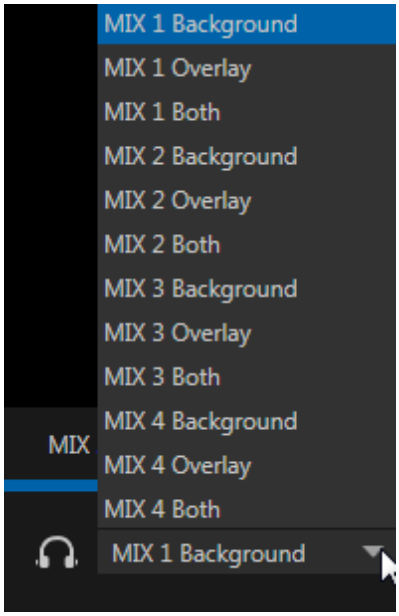


FIGURE 2-24

1. The *Headphone Audio* controls and icon can be found in the lower left of the bottom dashboard (Figure 2-23).
2. *Headphone Source* can be set by opening the menu next to the *headphone* icon (see Figure 2-11).
3. The *Headphone Volume* for the selected source can be adjusted moving the head of the slider, this can be set back to 0dB by double clicking on the headphone audio head.

APPENDIX A: NDI (NETWORK DEVICE INTERFACE)

For some, the first question may be "What is NDI?" In a nutshell, NewTek's Network Device Interface (NDI) technology is a new open standard for live production IP workflows over Ethernet networks. NDI allows systems and devices to identify and communicate with each other, and to encode, transmit, and receive high quality, low latency, frame-accurate video and audio over IP in real time.

NDI enabled-devices and software have the potential to greatly enhance your video production pipeline, by making video input and output available anywhere your network runs. NewTek's live video production systems and a growing number of third party systems provide direct support for NDI, both for ingest and output – but, at times, you may want to connect a source that is not natively NDI-enabled; or you may wish to supply an NDI output to a traditional downstream device or display. NDI Connect provides the means to handle i/o requirements of this type and more.

For more extensive details on NDI, please visit http://www.newtek.com/ndi.html.

APPENDIX B: DIMENSIONS AND MOUNTING

The NewTek VMC1 OUT comprises a 1 Rack Unit (RU) enclosure supplied with 'ears' designed to permit mounting in standard 19" rack architecture (Figure 2-25).

The units weigh nearly 14 pounds (6.35 KG). A shelf or rear support will distribute the load more evenly if rack-mounted. Good front and rear access is important for convenience in cabling should be considered. In view of the top panel vents on the chassis, at least one RU should be allowed above these systems for ventilation and cooling.

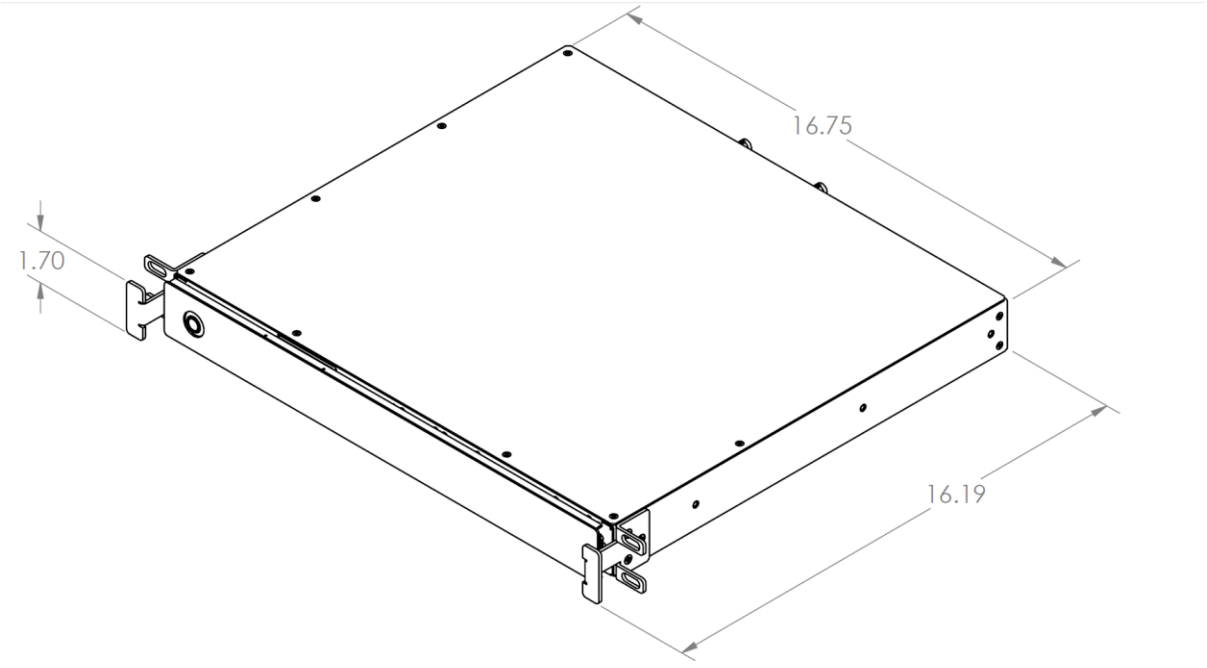


FIGURE 2-25

APPENDIX C:ENHANCED SUPPORT (PROTEK)

NewTek's optional ProTek℠ service programs offer renewable (and transferable) coverage and enhanced support service features extending well beyond the standard warranty period.

Please see http://www.newtek.com/protek.html or your local authorized NewTek reseller for more details regarding ProTek plan options.

APPENDIX D: RELIABILITY TESTING

We know our products play vital roles in the productions of our customers. Durability and consistent, robust performance are much more than just adjectives for your business and ours.

For this reason, all NewTek products undergo rigorous reliability testing to ensure they meet our exacting test standards. For VMC1 OUT, the following standards are applicable:

Test Parameter	Evaluation Standard
Temperature	Mil-Std-810F Part 2, Sections 501 & 502
Ambient Operating	0°C and +40°C
Ambient Non-Operating	-10°C and +55°C
Humidity	Mil-STD 810, IEC 60068-2-38
Ambient Operating	20% to 90%
Ambient Non-Operating	20% to 95%
Vibration	ASTM D3580-95; Mil-STD 810
Sinusoidal	Exceeds ASTM D3580-95 Paragraph 10.4: *3 Hz to 500 Hz*
Random	Mil-Std 810F Part 2.2.2, 60 minutes each axis, Section 514.5 C-VII
Electrostatic Discharge	IEC 61000-4-2
Air Discharge	12K Volts
Contact	8K Volts

CREDITS

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Additional thanks to: NewTek Marketing, Sales, Business Development, Customer Support,Training and Development, and Operations

With special recognition to: 3D Storm, DVS Direct, Lanlink Digital Broadcast

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- FreeImage library http://freeimage.sourceforge.net/
- LAME library http://lame.sourceforge.net/
- FFMPEG library http://ffmpeg.org/

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NDI™ Network Device Interface

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