NewTek TimeWarp™

INSTALLATION AND INSTRUCTIONS

Revised - June 30, 2008

TABLE OF CONTENTS

1 PRODUCT WARRANTY

NewTek Inc. Limited Hardware Warranty

This warranty covers only the hardware portion of the TimeWarp product delivered ("Product") and extends to the original purchaser only.

The "Product" for purposes of this Limited Hardware Warranty consists of TimeWarp only, and does not include any other third party hardware, device, or computer which a dealer, distributor, or other third party may have the Product installed or sold with, and no such third party hardware, device or computer is covered in any way by this warranty.

NewTek warrants that for a period of 1 year from the date or your original purchase of our Product it shall be free from defects in material and workmanship. If a defect is determined to be covered by this warranty as determined by NewTek, NewTek will correct it, and may do so using new or remanufactured components.

NewTek's Liability and Limitations. NewTek's obligations are only as expressly stated herein. NewTek is not liable for loss or damage for inconvenience or interruption of service, loss of business, data or anticipatory profits, or consequential, incidental or punitive damages resulting from the use (or operation) of any of the products purchase by you. NewTek's liability is limited solely to the repair or replacement of the defective product. NewTek is under no obligation or responsibility to enhance or update the product. This warranty does not cover damage or malfunctions resulting from improper handling, accident, misuse, abuse, neglect, electrical surges, failure of electrical power, use with other products not manufactured or approved by NewTek, installation or removal charges or damages, damage while in transit for repair, repair attempted by any unauthorized person, or any other reason not due to defects in materials and workmanship. This warranty is also void if any applicable serial number has been altered, defaced, or removed.

Trademarks. TimeWarp, LiveControl, TriCaster, TriCaster PRO, TriCaster PRO FX, TriCaster STUDIO, TriCaster BROADCAST, SpeedEDIT, LiveText, 3Play, VT, VT[3], VT[4], VT[5], Video Toaster, Toaster, Inspire 3D, 3D Arsenal and Aura are trademarks of NEWTEK. LightWave and LightWave 3D are registered trademarks of NEWTEK. All other brand names, product names, or trademarks belong to their respective holders.

To Obtain Warranty Service. To obtain free repair under this warranty, contact NewTek Technical Support for confirmation, receive a Returned Materials Authorization (RMA), and deliver the product along with proof of ownership (such as the original invoice, or a photocopy)

to NewTek. You will be responsible for any costs associated with the delivery to and from our service center.

Other Legal Disclosures. THE ABOVE WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED AND IN NO EVENT SHALL ANY WARRANTY EXTEND BEYOND ONE (1) YEAR FROM DATE OF PURCHASE.

Because so many states have different laws that are ever-changing, and because we have no desire to conflict with these laws, then any term of this warranty that is prohibited by applicable law shall not apply. Some states do not allow limitations on how long an implied warranty lasts or the exclusion of warranties or of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

2 INTRODUCTION

TW TimeWarp™ adds to the growing line of high-quality control surfaces available for NewTek's TriCaster™ live production systems. It permits convenient recording and immediate replay of live events during your live production – even in slow motion.

This chapter reviews system requirements, explains how to connect TimeWarp to your live producton suite, and provides a prelimary lesson in its use.

Figure 1

The person operating the TimeWarp control surface marks in and out points for events of interest, even as the event is ongoing. The marked video clips (a.k.a., 'replays') are recorded and stored in a DDR playlist, ready to be recalled on a moment's notice.

Playback speed can be set using either the TimeWarp buttons or the TriCaster/VT controls. Likewise, DDR clip selection and playback can both be controlled in either manner. TimeWarp's visual and tactile feedback is a boon for 'one-man-band' live producer, but a second operator can assume responsibility for instant replays when personnel is available.

> *Note: Though designed primarily to bring a high level of sophistication to live sports and fast-paced event coverage, TimeWarp can also serve as an outboard controller for TriCaster or VT[5] DDRs in many other environments (such as managing clips during a newscast).*

2.1 SYSTEM REQUIREMENTS

TimeWarp requires (as a minimum):

1. A NewTek TriCaster system running TriCaster 2.0 or higher software,

   or …

2. A NewTek VT[5] system (version 5.2 or higher)

2.1.1 PERFORMANCE CONSIDERATIONS

Let's briefly discuss the diverse range of systems that TimeWarp can support, with a view to performance.

All TriCaster version 2.0 models can encode and stream audio and video to the Internet in realtime, record the compressed and encoded stream as a file to the hard drive, and record the full-size program output to the same or a different hard drive. As well, that output may be concurrently sent at very high resolution to projection devices, and also to standard television displays. Further, the program itself (or some portion of it) may be playing from previously recorded files – on the same hard drive!

The case for VT[5] users is similar, but with an even wider selection of hardware needing support. In practice, this can mean that while all of this may be *possible* for a given system, 'biting off too much' may overtax another. Your system can indeed do many wonderful things – but attempting all *of them at once* may not result in peak performance. (For example, you might see frames being dropped from the program stream if the system is struggling to keep up.)

The key to a successful live production experience is "Test first!" A trial run is a great confidence booster, and will expose any limitations your need to keep in mind.

2.2 INSTALLING TIMEWARP

You're going to love this – all set? Connect the supplied cable between your TimeWarp controller and a free USB port on your TriCaster of VT system. That's it, you're completely done!

There's no need to install drivers, slog through a long complex set of steps, or sacrifice the traditional chicken!

2.2.1 UPDATES

As time goes along, software updates may be issued for your NewTek system to provide various enhancements and improvements. To get the most out of your system, make it a practice to periodically check for updates.

Figure 2 – TriCaster Update

TriCaster users can check for updates by clicking the **Close** [x] button in the upper-right corner of the TriCaster desktop and selecting **Admin**, then (after a few moments) clicking the large **Check for Software Updates** button (Figure 2). (The system must be online, of course.)

VT system owners can visit the "**my downloads**" page in the **Customer Care> Registration** area of the **NewTek website** (www.newtek.com) for updates when performing an installation from the original media, and from time to time thereafter.

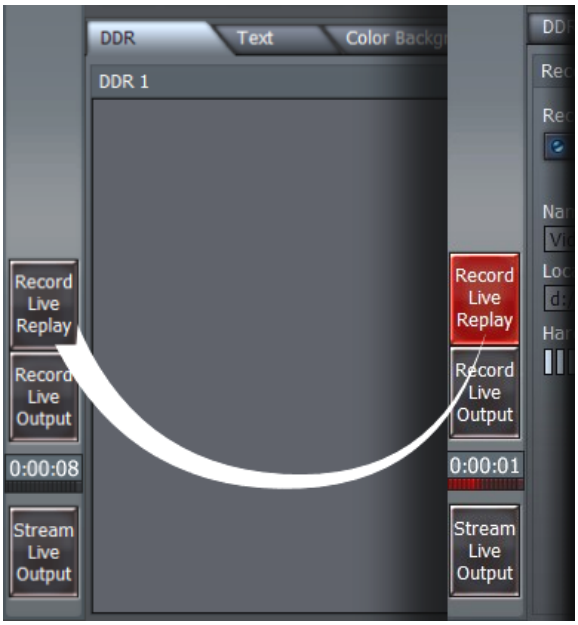
2.3 ONSCREEN INTERFACE

When a TimeWarp control surface is detected by TriCaster or VT[5], several special features are added to their respective user interfaces.

2.3.1 TRICASTER

With TimeWarp connected (as described above), launch the TriCaster and glance at the lower-left area of the **Live Output** screen. You'll see that a new button has been added (Figure 3) -- just above the **Record Live Output** button that was already there.

*Note: The **Record Live Replay** button is only shown when your TriCaster detects a connected TimeWarp control surface.*



The **Record Live Replay** button works in conjunction with the controls on the external TimeWarp control surface. Clicking it toggles replay recording.

When this button is enabled replay recording is continuous. The TimeWarp operator marks specific segments for addition to the DDR playlist, or can 'drop' them and mark other replay clips as the event progresses.

(Keep in mind you cannot enable replay recording when **Record Live Output** is capturing your program output. You must deliberately stop the latter first, before clicking **Record Live Replay** will have any effect.)

Figure 3 – Record Live Replay (TriCaster)

It is also worth noting that certain features of the **Record/Stream tab** (Figure 4) affect TimeWarp's replay recording.

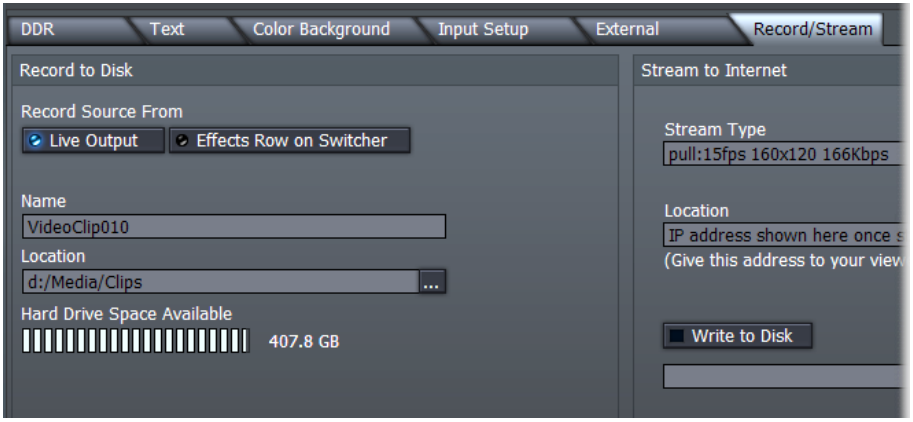


Figure 4- Record/Stream tab (TriCaster)

Notably, the **Record Source From*** section permits you to choose whether replays are recorded from the regular **Live Output** program stream or exclusively from the source selected on the Switcher's **Effects** row.

**TriCaster PRO, STUDIO and BROADCAST models only*

The **Name** and **Location** fields just beneath affect files recorded by TimeWarp in the same manner they would if you were using the standard Record Live Output function. As well, you'll want to keep an eye on the **Hard Drive Space Available**, to ensure you have sufficient capacity for recording the replay files.

2.3.2 VT[5]

In similar fashion, when VT[5] detects a TimeWarp control surface, an additional button (a small [R] for **Record Live Replay**) is added to the upper-right corner of the (VT Desktop's) title bar (Figure 5). The button is illuminated in red when replay recording is active.

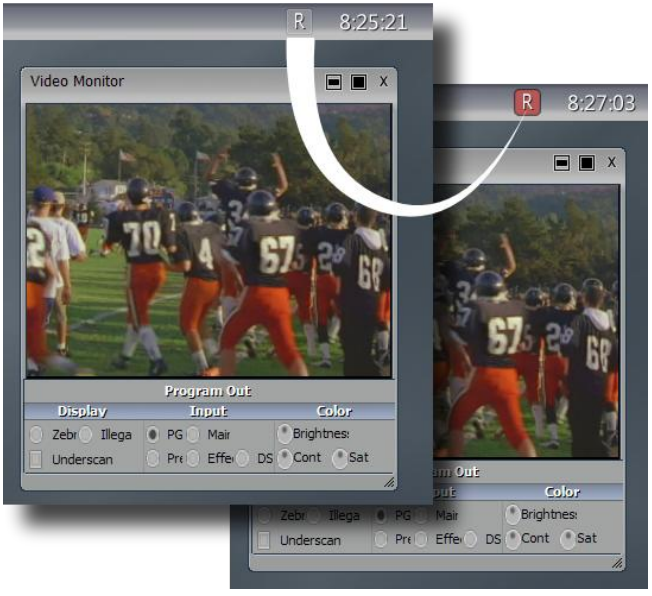


Figure 5 - VT Record Live Replay button

A second update related to TimeWarp appears in the VT[5] **Preferences** panel.

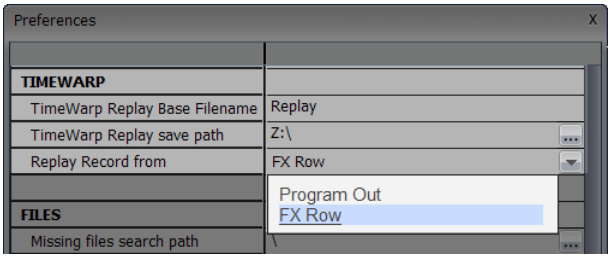


Figure 6 - VT[5] Preferences

The new TimeWarp settings group in **Preferences** is where you go to set the **Base Filename** for replay clips, choose their **save path**, and establish which source will be recorded – either **Program Out** or the **FX Row** selection.

2.4 QUICKSTART

Having connected your TimeWarp external surface, let's take it for a quick trial run, shall we? (We'll go into greater depth on its many features and the powerful new capabilities you now have in subsequent chapters.)

2.4.1 SETTING UP

1) Connect a suitable video source to a camera input on your NewTek live production system.

2) Select that source on the Switcher's **Live** (TriCaster) or **Main** (VT[5]) row, designating it as the primary live program output.

3) If you have previously changed the default recording source in the **Record/Stream** tab (TriCaster) or **Preferences** panel (VT[5]) to the Effects source option, change it back to the default now.

4) Press the **DDR1** button on the TimeWarp unit.

5) Press the **Selection** button on the TimeWarp unit.

6) Hold down TimeWarp's **ALT** button, and press the **Pause** button (to turn **Cue** mode on)

7) Press TimeWarp's **50%** button (presetting playback to a suitable slow-motion rate.)

8) Click the onscreen **Record Live Replay** button to commence live replay recording.

2.4.2 RECORDING AND PLAYING REPLAYS

9) Watch your live feed for a suitable event, and press TimeWarp's **Replay In** button

10) Wait 10-15 seconds, and press **Replay Out**.

11) Select **DDR1** (DDR on the base TriCaster model) on the Switcher's **Preview** row

12) Press the keyboard **Spacebar**.

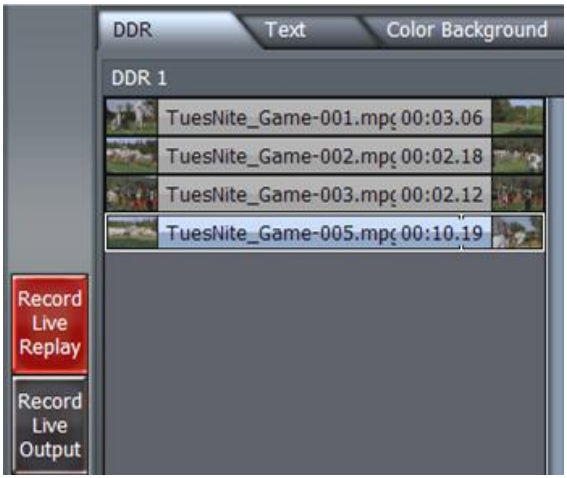


Figure 7 – TriCaster DDR with replay clips

Your instant replay will automatically transition in (replacing the live video feed) using the current Transition, play through once at half-speed, and then the live source will return on output – all without interrupting ongoing replay recording!

Really, these last few steps are 'The Big Ones' – say them with me: "Replay In, Replay Out, DDR and Spacebar". Repeat this mantra over and over for the next four hours (or less, if you're really confident you've committed them to memory!)

3 THE TIMEWARP CONTROLLER

TW The TimeWarp™ external control surface hosts a bevy of convenient and important buttons and controls.

This chapter explains each button and control in turn. It discloses their functions and their relationship to various features of your NewTek live production suite. It also offers hints for getting the most out of TimeWarp.

TimeWarp provides a large jog-shuttle wheel and 5 rows of buttons. The diagram below (Figure 8) illustrates the layout of these controls. Starting at upper left and proceeding in a clockwise direction, the TimeWarp unit hosts the following control groups:

1. DDR Number
2. DDR Mode
3. Transport (VCR) Controls
4. Jog Shuttle Wheel
5. Playback Speed
6. Clip Management

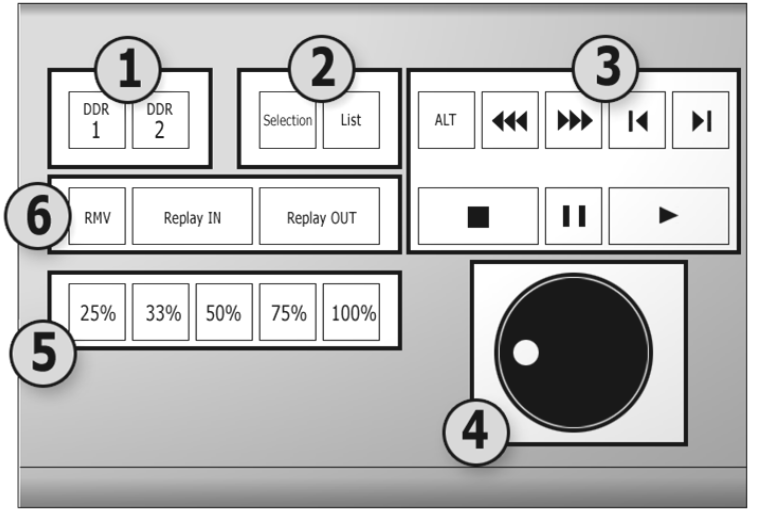


Figure 8 – TimeWarp controls

3.1 DDR 1 AND DDR2

Two buttons at upper-left – labeled DDR1 and DDR2 -- control which DDR TimeWarp is currently controlling (the LED on the currently selected button is illuminated).

Note that the number of DDR's supported for TimeWarp purposes vary. Both TriCaster Studio™ and Broadcast™ feature two DDRs, and TimeWarp can control either according to the button you press.

Unique to TriCaster PRO is a Picture Player, supplied rather than a second DDR. TimeWarp's DDR2 button does provide control over the Picture Player, too. (Of course, recorded replay clips are always added to the DDR, not the Picture Player – regardless of the TimeWarp DDR button status.)

VT[5] users can have *multiple* DDRs open, or even none at all. To avoid confusion, TimeWarp supports just the first two (DDR1 and DDR2). If no DDR is open when the operator presses one of TimeWarp's DDR selection buttons, DDR1 or DDR2 respectively will open on the VT Desktop.

If you close the DDR module that is currently selected on the TimeWarp controller, its button is de-selected, and neither* DDR1 or DDR2 buttons is illuminated.

*Note: When no DDR button is selected on the TimeWarp control surface, its DDR control buttons (such as **Play**, **Pause**, etc.) have no effect. Pressing either of TimeWarp's DDR buttons opens the corresponding DDR and restores playback control. (Even so, if replay recording is in progress, **Replay IN** and **Replay OUT** function as usual; more on this when we discuss those buttons in a moment).*

3.2 SELECTION AND LIST

These two buttons (Figure 8) control the **Selection** and **List** playback modes for the DDR selected on the TimeWarp controller. The mode assigned is specific to each DDR, and the LEDs light up to show the current mode as you press the **DDR1** or **DDR2** buttons.

*Hint: **Selection** mode is the best choice for almost all replay applications. With **Cue** mode set in the **DDR**, the Switcher operator simply presses either the **Spacebar** to transition into and display the replay on the Live (video) output. When the replay clip ends, the switcher automatically re-selects the original live source on its **Live** row!*

3.3 DDR TRANSPORT CONTROLS

This group of buttons (Figure 8) provides a variety of convenient DDR transport controls.

3.3.1 ALT

When depressed the **ALT** button provides a second set of functions assigned to certain other buttons. (ALT operations are not assigned to *all* TimeWarp controls.)

3.3.2 FAST FORWARD & REWIND

In left to right order, these buttons are **Fast Forward**, **Rewind**, **Next Clip** and **Previous Clip** (the names each represent the default button action, unmodified by ALT).

The **Fast Forward** and **Rewind** buttons (labeled **>>** and **<<**) scan through the active clip (in the selected DDR) at 16x the normal rate. Pressing the button a second time during scanning moves the DDR playhead to either the beginning or end of the clip.

If **ALT** is depressed, clicking **Fast Forward** skips the first 5 seconds of a replay clip and *begins playback* from that point. **ALT +Rewind** plays the clip's last 5 seconds.

3.3.3 NEXT CLIP & PREVIOUS CLIP

Pressing **Next Clip** (labeled **>|**) highlights the next clip in the active DDR playlist, while **Previous Clip** (labeled **|<**) naturally selects the clip above in the playlist.

*__Important Note__: If the **DDR** is in **List** mode, the highlighted clip is not always the <u>active</u> one (i.e., the clip that is currently being sent to **Live Output)**.*

*If you press **Next** or **Previous Clip** while playback is playing or paused the active clip does not change, although the highlighted clip does. (This is standard behavior for a DDR, permitting management of playlist entries on the fly -- without interrupting playback.)*

When **ALT** is pressed, clicking **Next** or **Previous Clip** moves the DDR playhead either one second later or earlier.

3.3.4 STOP, PLAY, AND PAUSE

The VCR-style **Stop**, **Pause** and **Play** buttons correspond to the identical functions in a DDR panel. (As in a DDR, pressing Stop a second time moves the playhead to the first frame of the active clip.)

When **ALT** is depressed, the **Stop** and **Pause** buttons assume two important auxiliary functions. **ALT + Stop** turns the DDR's **Cue** mode off, whereas pressing **ALT + Pause** enables Cue mode.

ALT + Play moves the playhead to a point five seconds earlier in the active clip (if possible) and begins playback.

3.4 JOG/SHUTTLE WHEEL

TimeWarp's **Jog/Shuttle** control (Figure 8) behaves just like its namesake on a professional VCR. The control is comprised of an inner 'Jog Wheel' and an outer 'Shuttle Ring'.

Winding the **Jog Wheel** with a fingertip moves the current frame position forward and backward in the active clip with frame precise accuracy.

Twisting the **Shuttle Ring** engages **Fast Forward** or **Rewind** temporarily, and allows you to swiftly scan backwards or forwards in a clip. (The scan rate varies dynamically according to the degree of rotation you apply to the Shuttle ring.)

3.5 PLAYBACK SPEED

As you would expect, the buttons marked **25%**, **33%**, **50%**, **75%** and **100**% govern the playback rate of the active DDR when DDR Play is initiated using the TimeWarp **Play** button. The underlined portion in the previous sentence is an important caveat.

TimeWarp's speed controls should be thought of as *mode* buttons (as opposed to action buttons.) They do not initiate playback; rather – and again – the playback rate you set in this button group is exclusively respected when you press TimeWarp's **Play** button. (It's *entirely*

possible in some settings that the operator may initiate playback from the DDR controls on the TriCaster or VT interface, instead.)

Suppose, for example, that you click **33%** button, but then -- rather than pressing the TimeWarp **Play** button -- you click the **Play** (>) button on the DDR itself. Playback will begin, but not at 33% speed. Instead, the clip will run at its normal (100%) rate. Similarly, if you click one of the (forward/backward) LEDs beneath the DDR's own Jog wheel, the resulting forward or reverse play speed may not correspond to your currently selected TimeWarp button!

Regardless, TimeWarp and DDR states and activity are cleverly coordinated so as never to conflict. The operations are quite intuitive, but their respective displays and LED's interact to convey just what is happening as follows:

13) When you engage DDR playback from TimeWarp, the DDR 'speed LEDs' onscreen light up to show the correct playback rate.
14) When you engage DDR playback at **100%** (only) from TimeWarp, the onscreen **Play** button illuminates.
15) If a DDR is playing -- regardless of how you initiated play or its current rate -- clicking the onscreen **Play** button continues playback *while setting the rate to 100%*.
16) Clicking one of the (forward/backward) speed LEDs beneath the DDR's onscreen Jog wheel (TriCaster) pr thumbnail (VT) engages (or continues) play at the corresponding speed, whether in forward or reverse play mode.
17) Pressing one of TimeWarp's speed buttons *during* (TimeWarp initiated) DDR playback immediately changes the playback rate to the corresponding speed, updating the onscreen LED to match.
18) In any situation where direct use of onscreen DDR controls produces a mismatch between the TimeWarp rate setting and the actual playback rate, the LED on the TimeWarp button flashes.

3.6 RMV, REPLAY IN & REPLAY OUT

This final group of three buttons (Figure 8) is very important -- in fact they are critical to recording and managing your replay clips in easily accessible fashion.

3.6.1 REMOVE

The Remove button, labeled **RMV**, removes the currently highlighted clip (if any) from the active DDR's playlist. The clip is not deleted it from the hard drive, however.

3.6.2 REPLAY IN

Pressing **Replay In** actually performs several related functions. First, note that -- unless **Record Live Replay** is engaged -- TimeWarp is not actually recording anything! For this reason, when you press the Replay In button it does the following first:

- Checks whether <u>either</u> **Record Live Replay** or **Record Live Output** is engaged.

- <u>*TRICASTER ONLY**</u> -- If **Record Live Output** is running, it is given precedence (to avoid compromising the overall program recording. Nothing happens when you press **Record Live Output** (to safeguard the overall program recording).

- **Record Live Replay** is automatically begun (illuminating the interface button, just as if you had pressed it on the screen).

  Note: VT[5] provides a greater measure of flexibility than TriCaster -- thus (unlike the latter) its TimeWarp implementation does permit simultaneous replay and regular program stream recording. This kind of power places greater responsibility for balancing system demands and hardware resources on the operator, however.*

  Successfully accomplishing both tasks depends on the capabilities of your hardware and the resource demands of any concurrent tasks you ask of VT[5]. Please refer to Section 2.1.1 (Performance Considerations) for more on this topic.

When **Record Live Replay** is *already* operating, pressing **Replay In** marks the start of a new replay clip that will eventually be stored in the DDR (selected by TimeWarp's DDR1 or DDR2 buttons).

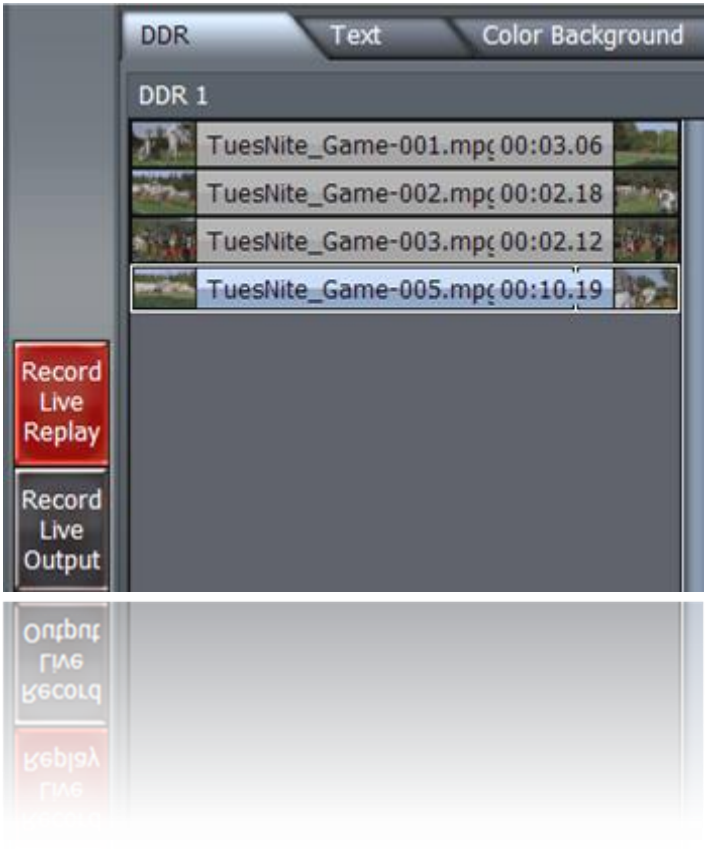
> *Hint: Actually, **Replay In** could be thought of as a 'reset in point' button (in this respect, it works much like the button by the same name in VT[5]'s Capture modules). Pressing it sets a new replay **In Point**, discarding the previous one. Any partially recorded replay up to that time is simply dropped (and is not added to the DDR playlist).*

3.6.3 REPLAY OUT

Replay Out likewise performs a little series of several actions on a single press:

- The replay clip currently being stored is ended.

- The stored clip is added to the end of the playlist (of the DDR selected by TimeWarp's DDR buttons).
- Replay clip recording recommences using the current time as its In Point.



Hint: ***Replay Out*** *thus functions in a similar manner to VT[5]'s* ***Chop*** *button. If you wish, with Record Live Replay running, you can simply keep pressing it at will -- without ever touching Replay In. This effectively sub-divides the entire program into a record comprised of discreet and consecutive replay clips already added to the DDR playlist (depending on system resources and overhead, be aware that a frame or two may be lost between neighboring clips).*

4 TIMEWARP LIVE

TW The principal application for TimeWarp is in connection with live sports productions. We'll review that application, adding a few notes and hints on other creative possibilities.

4.1.1 REVIEWING THE BASICS

As noted way back in Section 2.4.2 (Recording and Playing Replays), after a few easy steps to set up all you need to do as a minimum is:

1) Click the **Record Live Replay** button
2) Press TimeWarp's **Replay In** button
3) Wait until an interesting even ends and press **Replay Out**.
4) Select the (correct) **DDR** on the Switcher's **Preview** row
5) Press the keyboard **Spacebar**.

Systems with two (or more DDRs) permit you to vary which DDR you add replay clips to, which provides you an opportunity to organize clips from different types of events (or two teams) separately.

> *Hint: Remember, too, that you are free to manually trim the in/out points of replay clips in the DDR playlist, rename them, and so on.*

4.1.2 RECORD SOURCE FROM

Most of NewTek's live production systems permit you to decide whether TimeWarp replays are taken from the **Live (or Program) Output** or exclusively the source assigned on the Switcher's **Effects** row (see Section 2.3).

The default option will naturally include the combined results of switching operations, LiveSet™ selections, overlays, and so-on in the replay clips. In some environments, you may prefer to set **Effects** as the replay source, as when a specific camera can be dedicated to replay purposes.

Selecting Effects as the replay source provides another advantage to TriCaster Broadcast and VT[5] users (current edition 66mHz VT card required). Both of those systems allow a second output stream via analog connections.

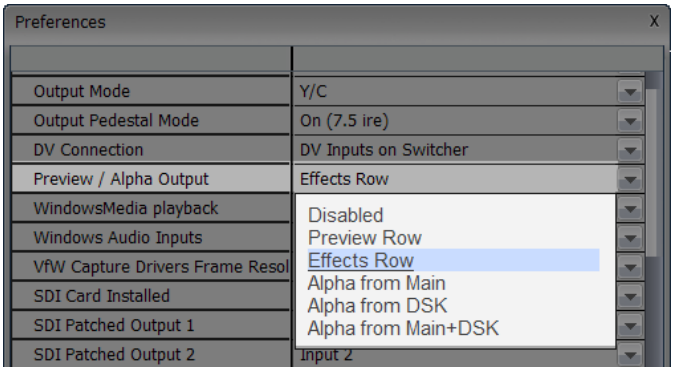


Figure 9 – VT[5] Preferences, Preview/Alpha Output setting

Setting that secondary output to show the video on Effects would allow an external monitor to be dedicated to full-size and full-time display of the replay source, facilitating Replay In/Out decisions (note that this configuration involves more hardware resources, a performance consideration).

4.1.3 FILE PATH

It may be useful in your setting to create a 'replay capture' folder named specifically for each event, and use the **Location** (Record/Stream tab -- TriCaster) or **TimeWarp Replay save path** (Preferences panel – VT) setting to store replays by event. Cataloging replay clips in this manner could be very useful for selecting highlights later for an evening sports recap broadcast!

4.1.4 CUE, TRANSITIONS AND SELECTION/LIST

The DDR **Cue** feature plays a vital role in seamlessly displaying TimeWarp replays. With it turned on, your system provides a nice transition in and out of the replay clip, rather than a hard cut.

The transition applied will be the currently selected one in the **Transitions** tab. This allows you to choose a transition in a suitable theme for the type of event (see Figure 10). Remember too, that you can vary the speed of the transitions, using the controls in the Switcher section (see you TriCaster or VT[5] manual for details).

Figure 10 – Transition to Replay

You have another option too – in **List** mode, you could easily display a complete playlist of hand-picked replay clips, or perhaps a slideshow of still images.

In other contexts, TimeWarp can serve as little more than a handy external hardware controller for the DDR, but at times that may be just want you need! (Remember that if you turn Cue off, you will need to manually switch back to the regular program stream when done viewing DDR clips or images).

4.1.5 CONTROLLING REPLAY AUDIO

Note too that you can right-click on clips in TriCaster DDRs, and disable the original audio captured with a replay – or **Mute** the audio in the **Audio** control tab (VT[5] DDRs boast a **Mute Audio** switch and separate **Volume** knob.)

4.1.6 PLAYBACK SPEED TRICKS

We discussed TimeWarp's basic **Playback Speed** buttons back in Section 3.5. An agile user can get a bit more creative with these, though. For example, try changing playback speed on the fly. That's right -- you can speed up or slow down playback, even while a replay is being displayed on Live Output!

What's more, using the onscreen DDR controls, you can even apply reverse playback, ping-ponging important sections of a replay clip back and forth while the commentator provides

analysis. Likewise, the Jog/Shuttle wheel permits interactive scanning of replay clips, even while they are appearing on the program out stream! (Remember to transition back though, as some of these tricks kick the DDR out of normal play mode, meaning that Cue will not do the job for you when the clip ends.)

4.1.7 LIVESET™ AND TIMEWARP

It is perfectly acceptable to use TimeWarp's replay clips (in a DDR playlist) as the source for an 'over-the-shoulder' (picture-in-picture) element, or perhaps a video monitor placed in a virtual set next to a commentator.

Figure 11 - Over the shoulder LiveSet™ replay, with greenscreen talent and title overlay

Keep in mind though, that if you use the Effects row as the replay record source, ideally you'll want to prepare your LiveSets so as not to require use of that row. Otherwise you may get unwanted results. (Of course, it's not really that different when you record replays from the live output stream, as these can also include undesirable elements such as overlays, LiveSets, etc.)

5 INDEX

T

V

6 CREDITS

Software Engineering: Andrew Cross, Mike Watkins, James Killian, Jeremy Wiseman, Kirk Morger, Masaaki Konno, Kevin Nations, John Perkins, Abheeshta Seethepalli, Nathan Kovner, Brian Brice, Kenneth Long, Steve Bowie, Michael Story

Hardware Engineering: Kevin Rouviere, Charles Steinkuehler, Dale Whitt, Menghua Wang

Marketing: Michael Kornet, Philip Nelson, Donetta Colboch, Paul Lara, Michael "Aussie" Holton, Andrew Yaple, Phil Cassell

Content: Rex Olson, Jarrod Davis, Graham Toms, Gil Triana

Additional Thanks: NewTek Technical Support, NewTek Customer Service, NewTek Sales