Vizrt Live Production Automation, Integration & Control User Guide

Version 8-4

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Created on

06/23/2025

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Chapter 1 ABOUT THIS GUIDE

Vizrt live production systems deliver impressive production power 'right out of the box'. Their ability to simplify and automate custom operations and workflows, and to leverage the features and content of other platforms in the ecosystem, is the icing on the cake. This guide introduces all of these capabilities.

Even if you are the hands-on, never-ask-directions type, please peruse this page. If any questions arise later, you may find the information here allows you to jump directly to the details you need with a minimum of reading.

For the purpose of clarity within this document the term "Vizrt live production system" refers to any of our systems, including not only TriCaster but also many other products.

- *PART I – OVERVIEW:* The introduction to the Vizrt ecosystem also explains the organization of this guide.

- *PART II – AUTOMATION:* Introduction to the Vizrt product macro system, including the Vizrt live video mixer and Viz 3Play macro implementations, all about macro editing and management, and discussion of the numerous ways you can trigger macros.

- *CONTROL PANELS III* - Your Live production system can be taken to new levels of convenience and functionality with the addition of a supported external hardware control panel.

- *PART IV – INTEGRATION:* This section covers cross-product and cross-platform integration and communication.

- *PART V – APPENDICES:* Third Party solutions, a master Macro Command list, and a time-saving comprehensive keyword index.

PART I (OVERVIEW)

This section provides a high level overview of the different components of the Vizrt live production ecosystem, and serves a guide to your locating andutilizing those tools that will help you accomplish your production needs and creative goals.

Chapter 2 THE ECOSYSTEM

Vizrt live video production systems are everywhere. 'If only they could talk, the stories they would tell'; but wait, they do communicate! And not only with their siblings. Increasingly, third-party developers have prepared software and systems that can also talk to them, with manifold benefits.

Section 2.1 NO MAN IS AN ISLAND

Appealing as insularity may seem at times, John Donne had it right – "No man is an island". We are inextricably connected. This is truer now than ever. In the twenty-first century, technology multiplies, extends, and amplifies our connections enormously.

Perhaps that's why, four centuries later, we have the temerity to extend Donne's aphorism as follows: "No *system* is an island". To elaborate just a bit, the more efficient, flexible, and deep the connections between systems are, the greater the rewards in creativity and productivity.

Fluid data transfer between systems is obviously fundamental to modern video production and broadcast. Beyond that, systems with deeply integrated and open communication and control capabilities offer collaborative, efficient workflows and outcomes simply impossible by other means.

2.1.1 FAMILY AND FRIENDS

At Vizrt, we deeply respect these principles. Our systems are engineered with extensive, open and innovative integration in mind. They 'talk' to each other to make your work more efficient *and* rewarding. In particular, the TriCaster and Viz 3Play product families, along with supporting Vizrt software and hardware products, enjoy a high-level integration.

We also appreciate the importance of 'family friends.' Our customers have diverse needs, and equally unique pipelines. Simple connectivity is important, but much larger workflow benefits can accrue from more advanced interaction. The better we 'play well with others', the more we all gain.

No doubt our obsession with integration accounts for the rapidly expanding collection of collaborative systems and software we refer to as 'the Vizrt ecosystem'.

Section 2.2 SYMBIOSIS AND COMMUNICATION

Communication in one or another form lies at the core of symbiotic relationships. Many Vizrt systems can 'listen' for input from external hardware control devices and systems in several forms. You'll find these discussed in Section 5.1.

Vizrt live production systems can also exchange a/v streams and metadata, system status details (including 'tally', audio VU levels, etc.), and control instructions with suitably prepared external systems and software.

For example, audio, video, media files, and system control commands can easily be transmitted bi-directionally between systems across a shared network. Third-party solutions can even 'cross-pollinate' with Vizrt systems, endowing the latter with dedicated custom macro commands specially designed to work with their product.

Chapter 3 AUTOMATION AND INTEGRATION

This chapter briefly explains various aspects of automation and integration as an aid to understanding the terms and technology discussed in this guide, and provides an overview of how the different elements in these areas work together to offer flexible solutions to satisfy your needs.

Let's briefly consider distinctions between automation and integration as the terms are used in this guide. This is a bit trickier than it might seem, but we want to make the effort as it will enable you to quickly locate the type of information you want without too much tedious searching.

Section 3.1 INTRODUCTION TO AUTOMATION

To begin, let's pay automation its due by spending a few moments on its virtually endless benefits. Even in its simplest forms, automation can render repetitive operations effortless and error-free at the same time.

The principle *native* engine of automation for Vizrt live production systems is the Macro system. The very same commands exposed for your convenience in this system account for virtually every operation executed by the system.

And, of course, macros can be combined endlessly, with full control over timing. Without much effort at all, you will be able to customize your Vizrt system to streamline your workflow and accommodate your personal preferences.

Hint: Chapter 4 provides a thorough introduction to the Macro system.

Without belaboring the point, obviously automation can be extremely simple, or more complex. For example, a simple macro might select a transition and perform an *Auto* to display a specific video source. For convenience, you might assign this macro to a keyboard shortcut.

A slightly more complex macro might load a designated *M/E preset*, select it on the main Switcher's *Preview* row, load a custom transition, perform an *Auto*, and reconfigure the *Audio Mixer* to match the changes. Again, a single keystroke, click, or button press can trigger all of this.

Hint: Vizrt live production products support numerous and diverse input methods for triggering macros – see Chapter 5 for details.

Let's raise the automation bar even more. Rather than relying on manual input to trigger a sequence of automated tasks, the entire process can be driven by external systems.

For example, an external software application serving as a master control process can execute all manner of complex production operations according to predefined scheduling or other stimuli.

A typical example of this type of automation would include newsroom MOS protocol implementations, which are used to create, edit, manage, schedule and execute virtually every audio, video and graphic element of on air segments in many news centers worldwide.

By mentioning this level of automation, we have wandered into the fuzzy boundary between 'automation' and 'integration'. Before moving on to discuss the latter, let's touch briefly on one special automation task.

In high end, mission critical production settings, failsafe systems are de rigueur. One of the more important redundant systems in such settings is the primary video mixer. Vizrt live video mixers have unique features that permit them to serve in these environments.

Section 3.2 Introduction to Integration

In this guide, we use the term "integration" when referring to broader topics, including cross-platform communication, data transfer and also multi-system control. This may all sound daunting, but some wonderful things are actually readily accessible thanks to 'smart' connectivity inherent in Vizrt live production systems.

Let's consider an example. You may already know that most Vizrt video systems provide native support for network sources. A/V signals supplied across standard TCP/IP network connections can be ingested live, just like any other source.

When one Vizrt system is linked to another, both are 'aware' of the live connection, and the two systems are able to 'converse' without any further configuration. This allows simple signal traffic, such as tally notification, to pass between systems automatically. More than this, however, the native *Macro* systems of both units allow operators to send instructions from one system to another.

Thus, a Vizrt live video mixer operator could easily create a macro that would i) jump the live video stream from a Viz 3Play networked source back 5 seconds, ii) select a custom "Instant Replay!" transition, iii) commence slow motion playback of the Viz 3Play recording, iv) *Auto* the network source onto *Program* output, v) select a "Back to Live!" transition, and vi) *Auto* back to the original source 15 seconds later – then execute the whole thing with a single click at any time.

A new and growing resource is NDI® which (among other things) allows you to access video streams among NDI enabled devices. Imagine your production switcher, capture system, media server—any NDI-enabled device on the network—can now see and access content from all other devices, allowing more sources than ever before to be used for live production.

Of course, integration with kindred Vizrt systems is just the beginning. The chapters in the Integration section of this guide (Part III) also discuss integration with third party systems and products too. This includes, as well, coverage of related topics such as file import and export, and drive formats.

Note: For your free NDI Tools bundle, visit https://ndi.video/tools/.

PART II (AUTOMATION)

Full details of the macro system native to the Vizrt live production family, along with an explanation of redundant control over Vizrt live video mixer systems.

Chapter 4 THE MACRO SYSTEM

Macros can smooth your workflow, reducing complex operations to a single button press, and making it easier to produce sophisticated programs. Macros can also eliminate embarrassing operator errors. Too, the fact that there are nearly endless ways to trigger macros provides many opportunities for both workflow streamlining and creative applications.

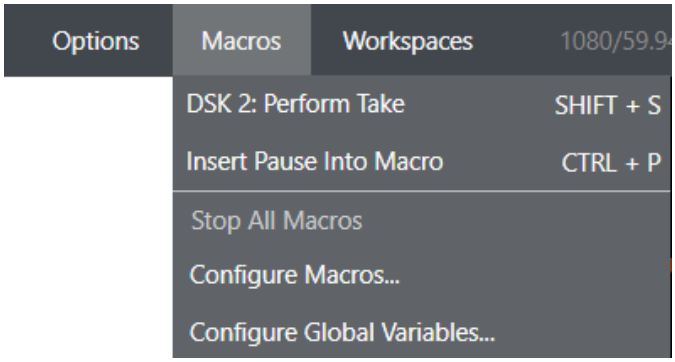
Keeping up with the action is one of the hardest things about live production. Fingers can only move so fast, and it can be hard to recall and perform important sequential steps without any slipups.

Macros are the answer to that dilemma. Record a sequence of events and play it back with one click. Or trigger it with a keystroke, control surface, MIDI panel or sequencer, your smart phone, automatically on a *HotSpot* action, on achieving a designated audio threshold, or many other alternatives.

Macros can do almost anything. Preload and play content, modify audio settings, automate multi-step sequences or perform synchronous operations. The amazing versatility of macros more than justifies the prominence the *Macros* button gets in the *Dashboard* area of most Vizrt live video mixer and Viz 3Play models.

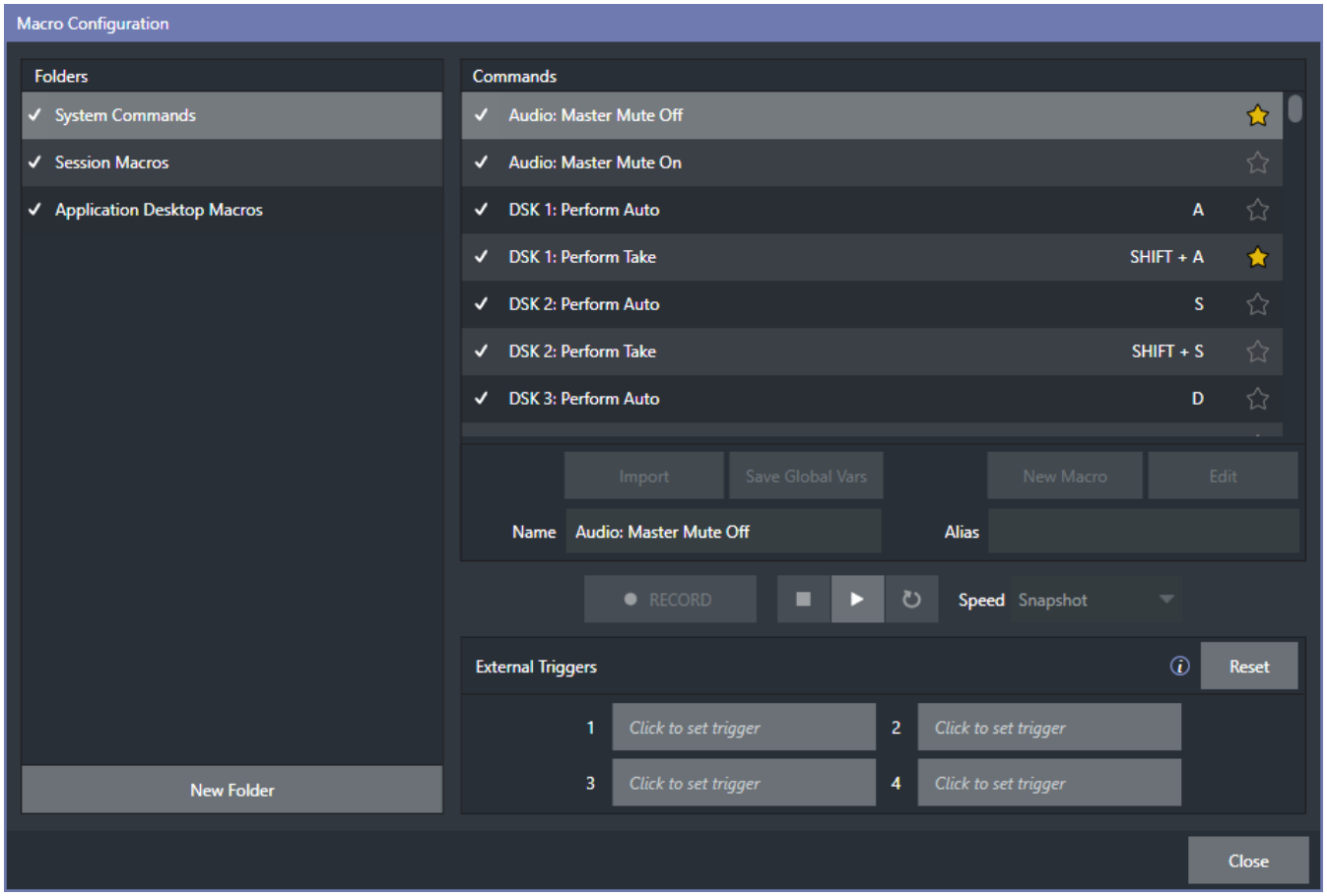
Section 4.1 MACRO CONFIGURATION

Click *Macros* to show a menu which lists a *Configure Macros* item at the bottom. Select this menu item to open the *Macro Configuration panel,* which in turn enables you to create, edit, and manage your macros.



Note: You may notice some differences in layout of this panel from one product and model to another, but basic functionality is generally as described in this guide.

4.1.1 SYSTEM MACROS



The largest part of the (resizable) *Macro Configuration* panel consists of the *Macro List*. By default, for any product, this list includes an uppermost entry labeled *System Commands*. Use the scroll bar at the far-right to see a lengthy list of these important macros. The macro entries in this group actually invoke the same shortcuts called by the user interface and *Control Panel* to operate your system.

Hint: Notice that keystroke shortcuts assigned to macro entries are visible at right.

It's worth noting a few unique aspects of *System Commands*. First, *System Commands* are specially safeguarded within the system. *Rename* and *Delete*, functions normally available from a right-click folder or entry context menu, are disabled.

Hint: If you copy of a System Macro outside that group, the copy becomes editable.

Individual entries in the list can be disabled by un-checking the switch at left; not surprisingly, removing the checkmark beside the *System Macros* folder itself will result in the failure of all 'system default' keystroke shortcuts. By design, this does not affect *Control Panel* operations, however.

4.1.2 SESSION MACROS

Session Macros is another macro folder that always appears in the list. Macros you create in or move into this special folder are available in the current session (only). This collection gives you a place to collect custom macros that are designed for use within a specific production without cluttering up the list.

Note: The Session Macros group itself cannot be deleted or renamed.

One advantage of the *Session Macros* implementation is that it lets you invoke session specific variants of a macro using the same keystroke shortcut (or MIDI surface button, etc.) without conflicts. For example, you might set up macros that behave similarly in every session, but which point to different content.

Hint: One effortless way to copy content from one Session Macros folder to a different session is to Clone the folder and rename it. Then launch the target session, and move the macros you want to transfer from the renamed clone into the current Session Folder.

4.1.3 APPLICATION DESKTOP MACROS

Application Desktop Macros have been specifically crafted to seamlessly integrate with the Live Call Connect Feature of TriCaster. This feature is supported in TriCaster 2 Elite, TriCaster Vectar, and TC1 Pro. These macros effortlessly incorporate your callers into your broadcast, supporting connectivity with various conferencing applications such as Zoom, Skype, Microsoft Teams, and more.

Section 4.2 RECORDING MACROS

Creating a new macro is simple. Selecting a folder in the list (other than the *System Macros* folder) enables the *New Macro* button. Click this button to add a new macro entry.

Continue to define the macro by clicking the *Record* button at the bottom of the panel, and perform the sequence of operations you wish to include in the macro.

You can use mouse, keyboard, and *Control Panel* operations when doing so. When finished, click the *Stop* button to complete recording.

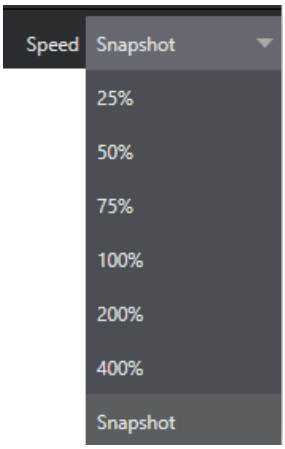
Hint: Double-click directly on the name field for a folder or macro to edit it, or select Rename from the context menu.

Test the new macro by clicking the *Play* button (or by double-clicking the macro entry in the list). You'll notice that an animated bar in the background of the macro's entry in the list tracks playback progress. You can set macros to loop using the button at right, or modify the playback rate using the nearby menu.

Hint: You can record a macro that includes other macros. Depending on your order of operations, you may need to re-highlight the newly recorded macro in the list to show its Stop control (to end macro recording).

4.2.1 SNAPSHOT MODE

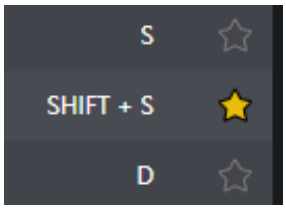
One option in the playback rate menu bears explanation: *Snapshot* is rather special. When you choose *Snapshot* as the macro's 'speed', you essentially tell it to jump to its end result. Any operation or delay that is irrelevant in achieving that end is simply omitted.

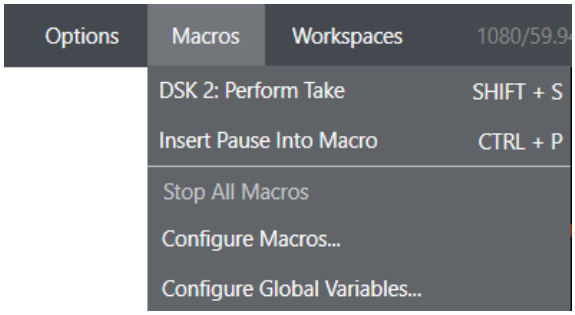


Snapshot mode is extremely useful for macros that configure Vizrt live video mixer to a particular state. For example, you might want to instantly reconfigure multiple *M/Es* with different angles of a single virtual set for an impending scene change; or perhaps you want to quickly disable *LiveMatte* for all *Media Players* at once. The possibilities are endless.

4.2.2 FAVORITES MENU

You'll see a 'star' gadget at right for each macro entry in the *Macro Configuration* panel. Click the star to include the macro in the quick access *Favorites* list, shown in the Dashboard *Macro* menu.





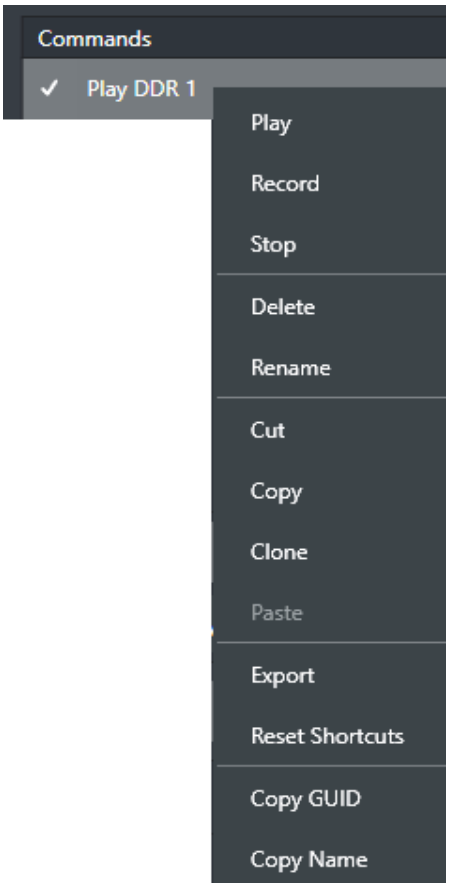
Section 4.3 MANAGING MACROS

The *Macro Configuration* panel has numerous features to help you organize and manage your macros, including not only folders, but also rename, clone, copy and paste, and hotkey assignment, as well as *Import* and *Export*.

4.3.1 THE CONTEXT MENU

Entries in the macro lister have a context menu, shown when you right-click an item. Menu items allow you to play or record a macro, delete or rename it. You can, of course, cut, copy, and paste macros, or clone them, combining the latter two operations in one step.

You can also export selections, including multi-selected macros, or even entire folders. When exporting a single macro or macro folder using *Copy GUID*, the exported file will retain its original GUID.

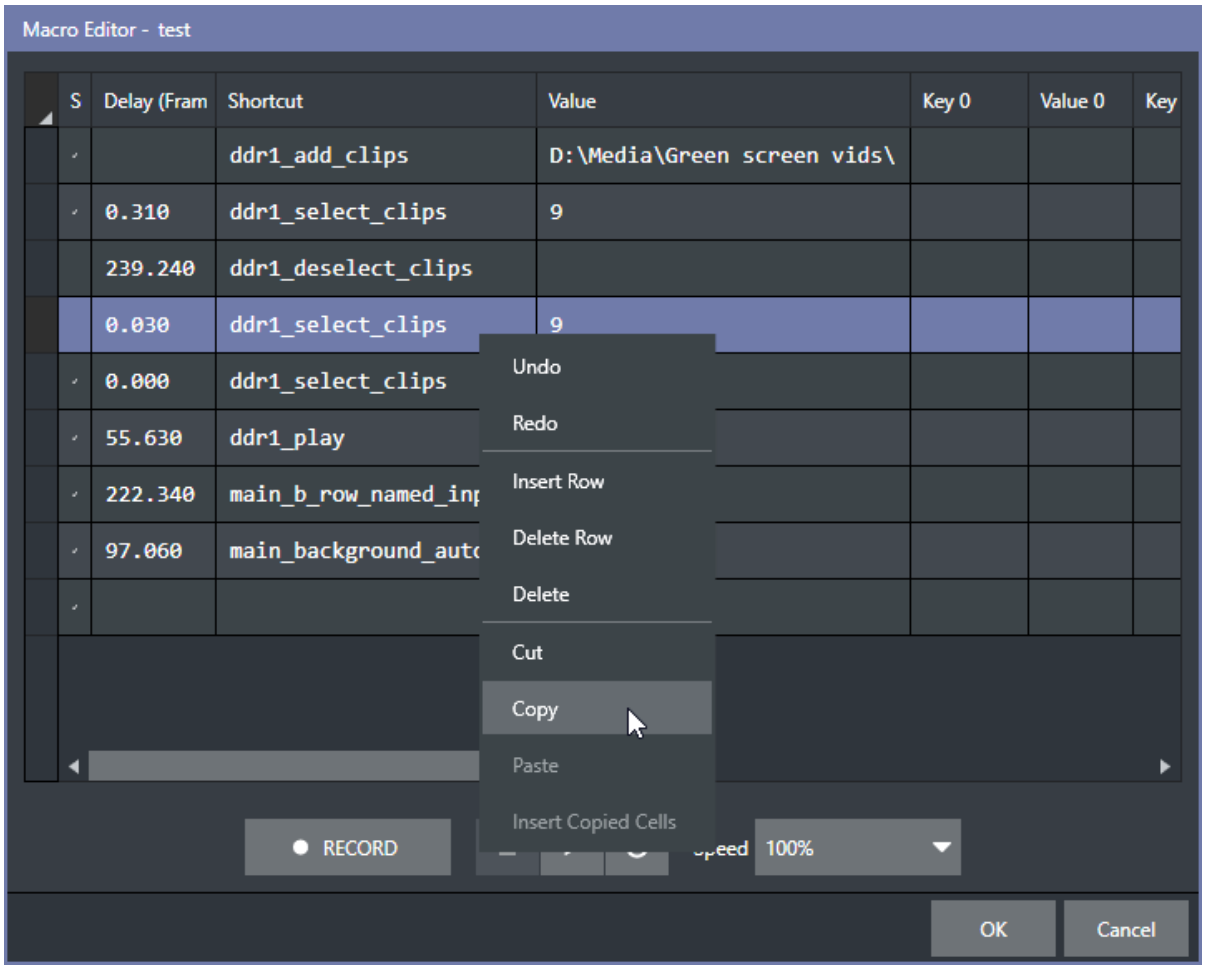


The corresponding import item is shown in the menu if you right-clicked either a folder or a blank area in the macro list pane. Import and export can be used to share macros with multiple users and systems, but provide another important service, too.

A good deal of time can be spent preparing complex macros designed to support your production. It would be a shame for these to be lost unintentionally through some mishap, as by some overly-tidy assistant deleting a folder on your day off (or by performing a *System Restore*). For this reason, we encourage you to use the *Export* feature to prepare a backup archive of your painstakingly designed macros.

Section 4.4 EDITING MACROS

Often you will wish to modify values assigned to the various steps in an existing macro, rather than re-recording it; or you may want to experiment with other possibilities. Click the *Edit* button to open the *Macro Editor* for the currently selected macro.



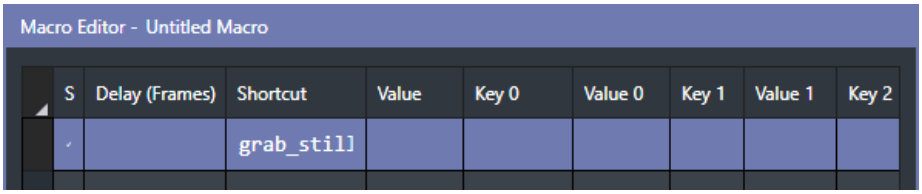
This deceptively simple editor presents the shortcut sequence your macro contains, along with all of its values, including timing information for each line, in a simple to comprehend 'spreadsheet-style' interface. Simply click a cell to edit the current entry, or use the arrow keys to navigate.

- Click any cell in the table to select it for editing or other operations. Or click the left-most cell to select a row. Select multiple rows using Shift or Ctrl modifier keys in the usual manner.
- Right-clicking opens the editor's context menu, which allows you to *Undo*, *Redo*, *Insert* a row (the keyboard shortcut Ctrl + i also inserts a row), *Delete*, or *Cut*, *Copy* and *Paste* selections.
- Standard copy and paste keyboard shortcuts are supported as well. When done editing a macro, click *OK* (or *Cancel*, to close the editor without saving your changes).

Hint: Use the Record button in the footer of the Editor to directly record new entries to be inserted into the current macro at the selected line.

Section 4.5 More About Macros

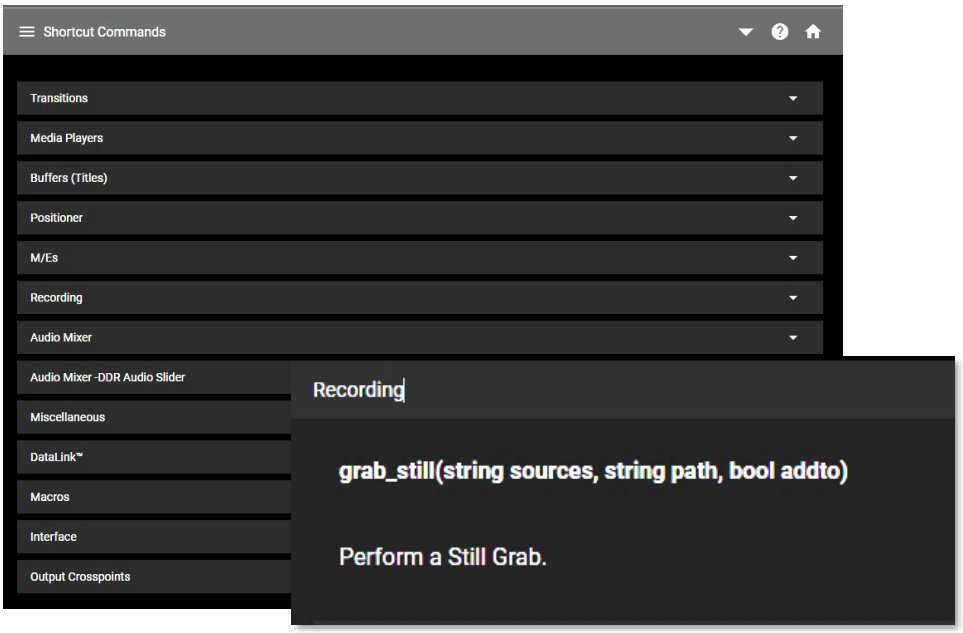
Macros consist of a *shortcut*, or command, and (at times) one or more *values*. Let's consider an example. The shortcut *grab_still* is easy to use. You can simply enter it as shown in and run the macro.



In this case, the result will be identical to what would happen if you clicked the GRAB button in the interface of a TriCaster. The grab operation will use the current settings from the *Grab Still Configuration* dialog. Macros can do much more, however. Let's see what the *grab_still* shortcut is really capable of.

4.5.1 UNDERSTANDING SHORTCUTS

TriCaster and Viz 3Play deliver an integrated LivePanel webpage that includes a handy Shortcut Commands reference page.



Shortcut commands are listed under expandable group headings, with supported arguments (keys and datatypes) shown. As the webpage is served by the system, this list is always up to date.

Those who want *more* detail about a shortcut can exit to Windows®, and locate the file named shortcuts_cfg.xml. Depending on your product, you will be able to find this file in the (hidden) directory C:\ProgramData\Vizrt*system-name (e.g., TriCaster)* \Configuration\. You can view the content of this file in most web browsers, or you might prefer to view it in a text editor.

Hint: You may wish to save this file to another system for reference purposes, but note that the content of the file changes from time to time as new features are added.

Either way, if you search the file for "grab", you will be able to locate the lines below, which include a *dictionary* that defines the properties of the *grab_still* shortcut.

```
<shortcut name="grab_still">
  <shortcut_dictionary>
    <entry key="sources" type="string" />
    <!-- ',' separated sources to capture, the pattern is [output/input]+[index], like
     "output1,input1", if this is not set selected sources in the combobox will be used-->
    <entry key="path" type="string" />
    <!-- the root path to store the files, if this is not set then the default session's still path would
     be used-->
    <entry key="addto" type="bool" />
    <!--whether or not add images to the selected destinations-->
  </shortcut_dictionary>
```

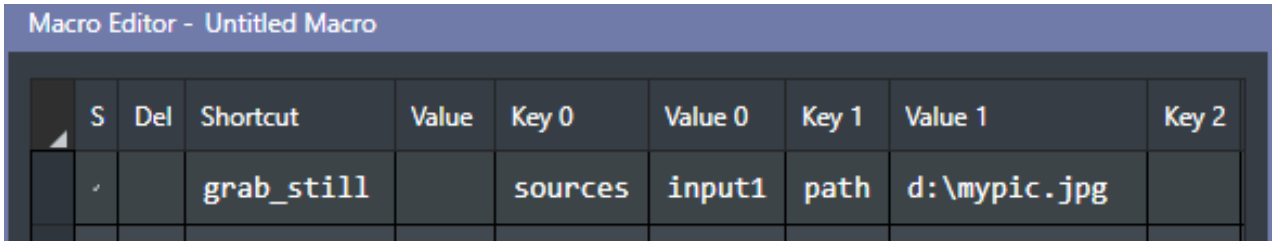
Hint: See also Exporting Macros in Section 8.2.1.

KEYS AND VALUES

Notice that the *dictionary* (in our example above) defines three *entry keys*, and explains their use:

- A key labeled *sources* allows us to specify which sources to grab. If we supply values for the *sources* key, we can tell *grab_still* which specific sources to grab from.
- Another key, labeled *path*, allows us to tell the system where to store the grabbed files.
- Finally, the key *addto* tells the system whether or not to automatically add the grabbed files to the current playlist of one or more *Media Player* modules.

As you can see, values can take different forms. The sources and path keys take text values (*string*), while the dictionary tells us that *addto* takes a *boolean* (0 or 1, true or false) value. Let's try these out.



In the screenshot above we added *sources* and *path* keys to our example, and gave them values. Executing our macro grabs an image from the source of switcher Input 1, storing it on the D:\ drive with the base name "mypic".

Hint: Note that the sources key supports values that are not available in the Grab Configuration panel. It is not unusual for a shortcut to provide extended capabilities in this manner, which is another advantage of macros.

Prefixes, Suffixes, and Targets

Grab_still is quite a simple *shortcut*, really just a single command. Many other *shortcuts* consist of two parts, a *prefix*, which is prepended to the shortcut string to identify its target, and the *suffix*, (typically the *shortcut* or command itself). Syntax for a slightly more complex shortcut is thus as follows: Prefix_shortcut (value).

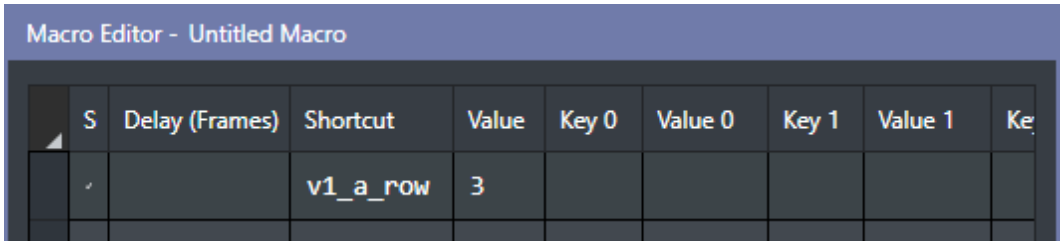
For example, the "_auto" shortcut requires a *prefix*, but does not require a *value*. A prefix tells the shortcut what the target of the instruction is. Recording a macro will often capture the prefix you need, but in any case you can search for "prefix" in shortcuts_cfg.xml to find a lengthy list of applicable prefixes.

This list includes the examples below (among many others):

- "main"
- "main_background"
- "main_dsk1"
- "v1_dsk1"

If we add the prefix *main* to the shortcut *_auto*, we get *main_auto*, which will perform an auto (transition) on Vizrt video mixer's main *Switcher*. In this case, the auto will be applied to all delegated video layers, just as if you clicked the *Auto* button below the *T-Bar* in the interface. However, other prefixes let you apply the shortcut to individual layers.

For example, a macro containing the compound shortcut *main_background_auto* exclusively applies the auto to the Program/Preview layers, ignoring other delegated video layers. Similarly, *main_dsk1_auto* affects only the first DSK video layer, while *v1_dsk1_auto* is limited to the first key layer for M/E 1 (a.k.a., v1).



In some cases, a *value* further refines a shortcut. For example, "v1" is the prefix that targets M/E 1. The index value "0" identifies the first video input. Thus, supplying the shortcut *v1_a_row* with a value of *3* selects Input 4 on the A row of M/E 1.

As we have seen in this section, it is simple matter to record a macro (4.1.3), and tweak it using the Macro Editor (Section 4.4). This is usually the quickest approach to finding a macro shortcut (command), any prefixes it requires, and the sort of values that it requires. The shortcuts_cfg.xml file provides deeper detail that can be helpful at times.

4.5.2 MULTI-STEP MACROS

The *Macro Editor* permits you to create and execute multi-step macros. Adding the line "#waitforcontinue" (or simply, "#pause") to a macro using the *Macro Editor* causes the macro to wait for user input at that step in its execution.

The *Continue Paused Macro* shortcut, assigned by default to the *backtick* key (`) serves to resume playback. This feature can be used in endless ways, for example to allow a user to step dynamically through a series of animated CG overlays on demand.

4.5.3 USING VARIABLES

At times it can be extremely powerful to be able to employ variables in macros. For example, consider a complex macro which defines the target for a shortcut with a variable. This would allow a large number of instructions in the macro to be retargeted by simply revising that one variable's value.

Variables are evaluated to determine their current value each time they are invoked. Thus, even if you update the value for a variable during the execution of a macro, the new value is used each time the variable is encountered as the macro proceeds.

GLOBAL AND LOCAL VARIABLES

There are two similar but distinct types of variables:

- **Global variables** can be invoked in any macro you execute.
    - They can be created and their values can be set or modified in two ways:

        - You might use the convenient Configure Global Variables dialog (which you can open from the Macros menu in the Dashboard of supporting live production systems).
        - Alternatively, create them using the shortcut "set_global_var" with a value like "myvar=4" (both without quotation marks)
    - Global variable names and values persist within a session - even after you shut down the system.
    - A "Save Global Variables to Macro" option appears in the context menu of the Macro Configuration window's right-hand pane. Either method copies the current global variables into a macro for export, editing or later recall.

- **Local variables** are 'transient', only existing during the execution of a macro. Hence they are exclusively created and populated using the shortcut command "set_local_var" (without quotation marks) within a macro.
    - NOTE: Although we recommend unique names, if a local variable and a global variable have the same name, the local one is used.
    - While you might think a local variable is only useful in the macro it is defined in, there is an important exception: Local variables extend to macros run by the same parent macro.
        - This lets you write 'generic' macros with targets or values to be provided later. For example, a macro might include a shortcut like ddr{DdrNum}_play, with no value supplied DdrNum. However, if you run this macro from one which does provide the value, the child macro derives the necessary value for DdrNum from the parent.
    - Outside the defining macro and those it spawns, though, local macros 'have no life.'
    - You could even use a single local variable name in simultaneous macros with different values.

Hint: At times it can be useful to convert a global variable to a local one. For example, you might want to increment a value as a macro runs without affecting the global variable's value. You can do this by copying the global value to a local variable, and referring to the local variable on subsequent lines. (Conversely, a similar approach would allow you to modify a global value once a macro begins, without affecting the local variable.)

Common Features and Use

- Variable names may not start with a number, contain spaces, or non-alphanumeric characters (with the exception of the underscore character, _)
- Variables values can be strings or integers (similar to DataLink).
    - Note that string or math operations will fail when applied to values having the wrong data type.
- Variables within curly brackets are evaluated and replaced by their current value when parsed in a macro.
- Variables can be used anywhere in a macro – even in the middle of a word or shortcut.

  - For example: if the variable DdrNumber holds a suitable value, ddr{DdrNumber}_play will cause the DDR identified to begin playback.
- The value of a variable is newly evaluated by the macro processor each time it is accessed
  - For example: If the current value of variable named myvar is 5, when the macro processor encounters {myvar} during execution, it treats it as a 5.

DataLink and Variables

The shortcut set_global_var can also set Datalink variables.

Hint: The % symbols are required to identify DataLink variables.

Examples:

- %AwayTeamScore% = {away_score}
- %MyDlText% = {somevar} {somevalue} {thirdthing}

You can also copy values from Datalink keys to variables.

  - For example:
    - {%Time%} expands to the current time value.
    - myvar = {%Time%} assigns the current time to myvar
    - Since variables are re-evaluated whenever they are used, assigning {%Time%} as the value of a variable 'locks' it to the time you set the value. It will not change thereafter without deliberate manipulation.
      - By contrast, entering {%Time%} directly at different points in a macro (rather than using a variable) produces a different value each time it is processed.

Hint: Variables enclosed in 'curly brackets', such as {myvar}, are evaluated whenever the shortcut executes. This means that even something like {%my_datalink_key%} will work, allowing you to use a DataLink value in places where the code normally would not have access to it.

Operations and Expressions

Simple string manipulations are supported. For example, If the variable myvar contains the string "Bob", then myvar = {myvar} Smith assigns the value Bob Smith to myvar (characters outside the curly brackets are treated as literals).

To perform more advanced string or math functions, you can use EXP( ) to indicate you're employing an expression. For example:

- %HomeTeamScore% = EXP({%HomeTeamScore%} + 1)

Hint: You can (and often must) force values to be treated as strings by wrapping them in apostrophes. (This can also be used to pad entries with spaces, which might otherwise be automatically stripped.)

For example, if %HomeTeamScore% holds the value 1, the entry %HomeTeamScore% = exp({%HomeTeamScore%} + 10) would assign the numerical value 11 to HomeTeamScore. By contrast, %HomeTeamScore% = EXP(%HomeTeamScore% + ' 10') would give it a string value as follows: 1 10.

A number of familiar math and string operators are supported in expressions. These include:

- + (addition)
  - For example, if myvar holds the value 2, invoking set_global_var with the value %dlvar%=EXP({myvar} + 2) assigns the value 4 to %dlvar%.
- - (subtraction)
- * (multiplication)
- / (division)
- % (modulus)
- TRIM: Used to remove all leading or trailing white space characters or escape sequences such as \r, \n, \t,
- SUBSTRING: Yields a string of the length specified, starting from the point specified in the string.
  - For example, EXP(SUBSTRING('{myvar}',2,3)) yields a value comprised of three characters starting from the second position in the string contained by myvar (using apostrophes to ensure a string value).
- LEN: Provides the number of characters comprising the string supplied in the form LEN(string)
  - For example, if the value of myvar is abc, EXP(LEN('{myvar}')) yields 3, the number of characters in myvar's value.

Comparing Values

IIF is a powerful function that allows you to determine whether another expression is true or false, and return different values for each case. For example, EXPR(IIF ('{myvar}'='Bob Wins', 'Bob is Happy!', 'Bob is Sad!')) returns Bob is Happy if myvar contains Bob Wins.

IIF supports the following comparison operators:

- < (less than)
  - For example: EXP(IIF({myvar} < 3, 'True', 'False')) will supply "True" when the variable myvar holds the value 2 (etc.)
- > (greater than)
- <= (less than or equal to)
- >= (greater than or equal to)
- <> (does not equal)
- = (equal to)

- LIKE (compare strings)
    - Note that LIKE can use the asterisk (*) as a wildcard when it leads or trails the exemplar string. For example:
        - EXP(IIF('{myvar}' LIKE 'DD*', 'This is a DDR', 'This is not a DDR')) will supply “This is a DDR” when the variable myvar holds any value that begins with “DD”.

Hint: While EXP(IIF(‘{myvar}’ < 3, 'True’, 'False')) Math operators may fail or provide unexpected results when applied to string values, even when you wrap the value in apostrophes.

Chapter 5 TRIGGERING MACROS

Macros can reduce or eliminate embarrassing errors. Too, the fact that there are nearly endless ways to trigger macros provides many opportunities for workflow streamlining and creative applications.

As discussed in the previous chapter, one way to execute a macro is directly from the *Macro Configuration* panel, by double-clicking a macro entry, or by clicking the *Play* button.

This is just the beginning, however. Macros can be triggered in so many ways that we've devoted a whole chapter to the topic.

For example, macros can be triggered by the following means:

- Keystroke shortcuts
- Control panel buttons
- MIDI pads and sequencers
- GPI signals
- Software events such as:
    - A Vizrt live video mixer *HotSpot* 'hit'
    - An audio event
    - Or input state change.
- Third-party software applications communicating with your Vizrt live production system over a network
- HTTP commands sent by a webpage designed for the purpose

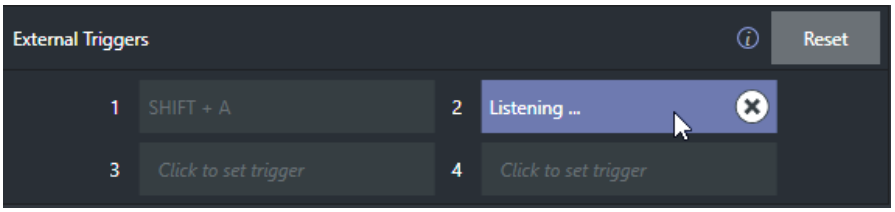
Section 5.1 HARDWARE

As mentioned earlier, macros can be triggered by any of a wide array of supported external hardware devices. Obviously, this includes your keyboard; and the majority of Vizrt control panels compatible with your live production system have a *Macro* button for this purpose.

As the simplest example, let's briefly consider keyboard shortcuts before looking into some of the other options.

Of course, many of the *System Commands* entries have default keystroke shortcuts pre-assigned. The first shortcut assigned to a macro (some systems support multiple shortcuts) is displayed at right on the row, near the *Favorites* star mentioned earlier.

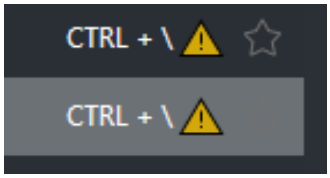
5.1.1 KEYBOARD SHORTCUTS



To set a new shortcut or replace an existing one, click a 'gesture field' in the *Shortcuts* group at the bottom of the *Macro Configuration* panel. It will display a "Listening …" tag. Then press the desired keystroke.

Hint: For clarity, lower-case characters are uniformly shown as upper-case. True upper-case letters are displayed in the form [Shift + (character)].

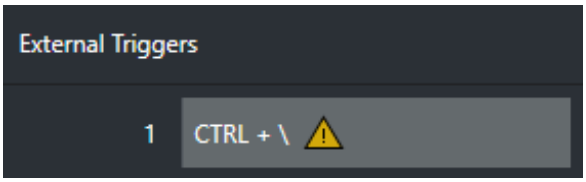
FEELING CONFLICTED?



By the way, assigning identical shortcut combinations to multiple macros *is* supported, and deliberately so. Still, as you may wish to avoid conflicts, a yellow triangular gadget referred to as a 'bang' (or, if you are a 'foodie', a 'nacho') is shown in this case.

Bangs appear at right for all macro entries in the *Macro Configuration* panel lister with shortcut conflicts.

Of course, when multiple shortcuts are assigned, the first shortcut for a macro – i.e., the one displayed at right in the *Macro Configuration* panel lister – may not actually be the one that is conflicted; or there can be several conflicts for a single macro.



In such a case, select the macro in the list to show the corresponding *Shortcuts group* entries at the bottom of the panel. Conflicted 'Listen' controls will *all* show bangs. Clicking a bang automatically jumps to the next conflicted entry, so you can advance quickly through the list resolving conflicts as you go.

Obviously, you can resolve a conflict by assigning different keystrokes to conflicted macros. Or you can disable conflicted macros if you prefer, using the checkmark switch.

Hint: Folder level checkmark switches offer a method for managing 'deliberate' shortcut conflicts. For example, the shortcuts assigned to entire folders of macros designed for various purposes can conflict with shortcuts in another folder, but keystrokes for any inactive folders will be ignored.

DELIBERATE 'CONFLICTS'

On the other hand, your 'conflicts' may be deliberate; running multiple macros with just one button press or gesture may be just what you had in mind. Pressing the conflicted shortcut key will perform *all* macros sharing that keystroke assignment.

5.1.2 VIZRT CONTROL PANELS

Several Vizrt manufactured control panels feature a dedicated *Macro* button (for a deep dive, see Chapter 6 Control Panels). When this is true, a macro can be assigned to buttons on the control panel in much the same manner as it would be assigned to a keyboard button. You would simply do as follows:

1. On Vizrt live video mixer's Live Desktop, open the *Macro Configuration* panel.
2. In the macro list, select the macro you wish to assign to a button.
3. Click the mouse in a *Listen* control at the bottom of the panel.
4. Hold down the MACRO button (on the control panel) and press the button you want to assign the macro to.

That's it – close the *Macro Configuration* panel, and test the result.

Hint: When you press the MACRO button, all buttons that currently have assignments light up. This makes it easy to see which buttons are available for your use.

5.1.3 MIDI CONTROLLERS

The MIDI (Musical Instrument Digital Interface) protocol and devices and systems supporting it offers another extremely useful (and often very affordable) macro trigger option. MIDI devices are often used in the audio and events industries, but can be found in other realms as well. Thousands of devices and systems of this sort are available.

The *Macro Configuration* panel system can 'listen' for button presses from most MIDI devices, just as it recognizes input from the keyboard or native control panel.

Note: Many MIDI devices provide 'plug-and-play' convenience. Some, though, require non-standard device drivers. Generally, adding device drivers to Vizrt products is discouraged, since these may not have been prepared with the rigorous demands of live production in mind.

If you install a driver and encounter unintended consequences, you can resolve the problem by restoring factory defaults and, if necessary, updating to the current software version appropriate for your Vizrt system.

Too, a wide variety of MIDI software and extensions are available for various platforms, including mobile devices such as tablets and smart phones. These can be used to create unique custom Vizrt live video mixer control alternatives. See Chapter 6 Control Panels for more on this topic.

5.1.4 GPI CONTROLLERS

GPI, or General Purpose Interface, is a long-serving analog control signal system based on simple contact closure. GPI inputs and outputs are quite common on professional production equipment. The macro system in Vizrt live production devices can take advantage of intermediary devices, such as the eBOX™ network/GPI hardware interface from JLCooper Electronics, to support both GPI signal input and output.

CONFIGURATION

For an external GPI device to communicate with a Vizrt live production system, it must be manually defined by text entries in the file named gpi_setup.xml. This file can be located in the directory shown below as appropriate for your platform:

- C:\ProgramData\Vizrt\SystemName\Configuration\

The entry for a given GPI control device must contain an IP address and port, password, and custom name, entered as follows:

< *device* name="*name* " ip="*###.###.###.###*" port="*##*" password=" "/>

At the time of writing, the xml 'element name' signified above by the placeholder *device* should be "jlcooper", without the quotation marks. The value for the "name" attribute that follows is a custom name of your choosing.

Hint: Normally, connected GPI devices are identified by unique names in this file; otherwise (if GPI devices share a single name) GPI commands are issued to them simultaneously.

The remaining configuration attributes ("ip", "port" and "password") are set at the external hardware device (refer to the vendor's documentation for details); the corresponding values need only be transferred into the XML configuration file. A typical entry might look like this:

<jlcooper name="JLCooper1" ip="192.168.128.102" port="23" password=""/>

LISTENING FOR GPI TRIGGERS

Just like keyboard shortcuts, control panel and MIDI button operations described earlier, properly configured and connected GPI devices can trigger macros. To assign a GPI trigger to a macro, simply click a 'gesture field' in the *Shortcuts* group at the bottom of the *Macro Configuration* panel, then send the desired external GPI trigger to the system. The 'listening' control will record the GPI signal, and a suitable shortcut entry will be displayed.

SENDING GPI COMMANDS

A special macro command allows you to send GPI signals to external devices and systems via network-connected GPI interface devices (such as the eBOX from JLCooper Electronics). GPI macro entries are formatted as shown below:

Delay (ms)	Shortcut	Value	Key 1	Value 1	etc.
####	gpi	*name*	*GPI_pin#*	*boolean*	

- **Delay** – the interval, in milliseconds, between the time when the command on the prior line (if any) was issued to the system, and execution of this line.
- **Shortcut** – Use the entry "gpi" in this field to send a GPI signal.
- **Value** – The shortcut value is the name of the GPI device (defined earlier in gpi_setup.xml) that you want the signal defined on this line to address.
- **Key # (0 – *n*)** – The value you enter in this field identifies a target pin on the external DVI device to receive a signal defined in the following field.
  The entry should be formatted as "pin#" (e.g., "pin12", without quotation marks).
- **Value # (0 – *n*)** – This value controls the contact closure state (on or off) for the GPI device pin identified by the preceding key. The value can be entered variously as "1" or "0" **,** "on" or "off", "true" or "false" (without quotations).

A typical entry might look like the following:

Delay (ms)	Shortcut	Value	Key 1	Value 1	etc.
500	gpi	jlcooper	pin12	1	

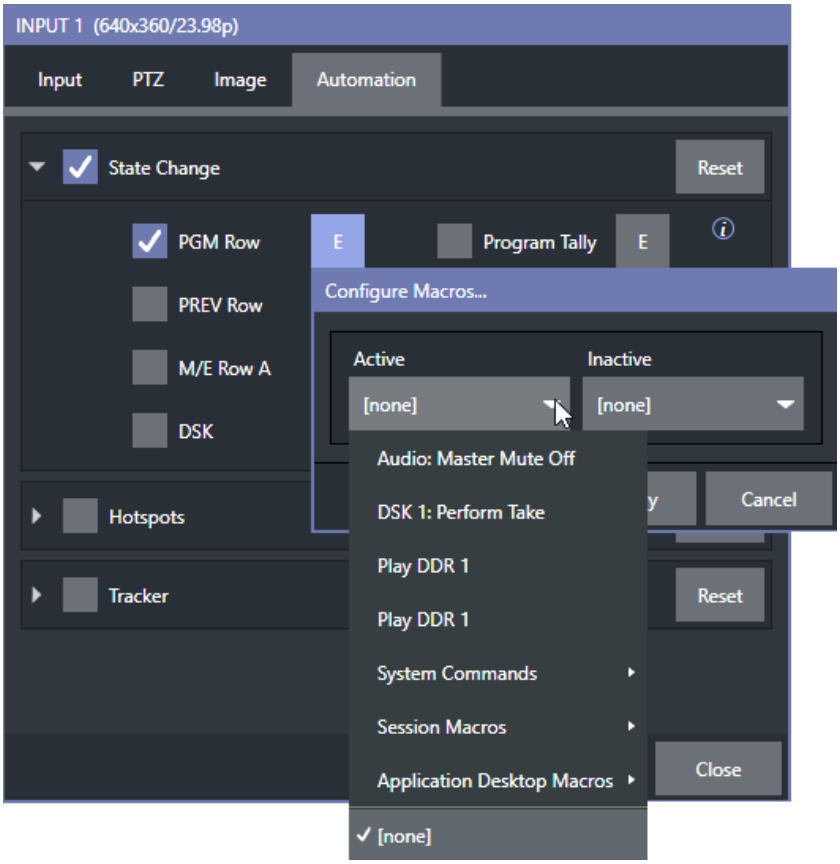
Hint: Multiple GPI pins can be targeted simultaneously by key/value pairs entered on a single line.

Alternatively, some GPI devices require a GPI 'pulse' of a specified duration. In such a case, you might send an "on" command on one line, followed – after a suitable delay – by an "off" command sent to the same pin.oftware

As mentioned earlier, macros can also be triggered by software events of various types, including internal or interactive events such as a Vizrt live video mixer HotSpot 'hit', audio event or input state change, or externally, in response to commands from software applications or even a webpage designed for the purpose.

5.1.5 SWITCHER STATE

*T*he *State Change* controls located in the *Automation* tab of Vizrt live video mixer's *Input Configuration* panel allow you to flexibly trigger macros based on the utilization of video sources used in your production.



Macros can now be assigned to run on specific *Switcher* operations, such as:

- *Program* or *Preview* row selection
- Displaying/ hiding the source in a *DSK* or *KEY* channel
- Selecting/de-selecting it on an M/E's A row
- Or any M/E row, or …
- Showing or hiding a source on the *Program* or *Preview* output.

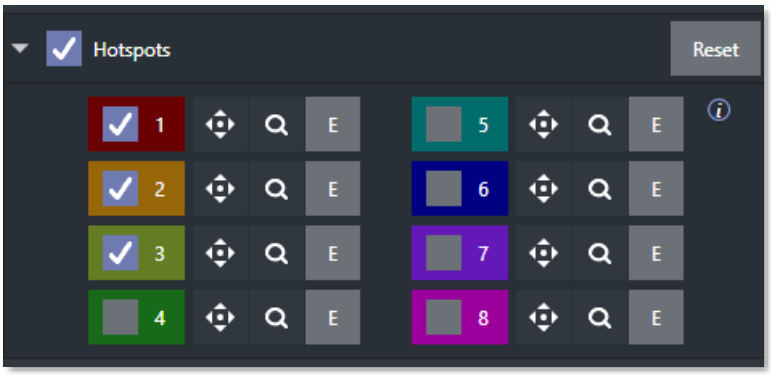
This feature is immensely powerful, and lends itself to all manner of applications, such as the following, to name just a few:

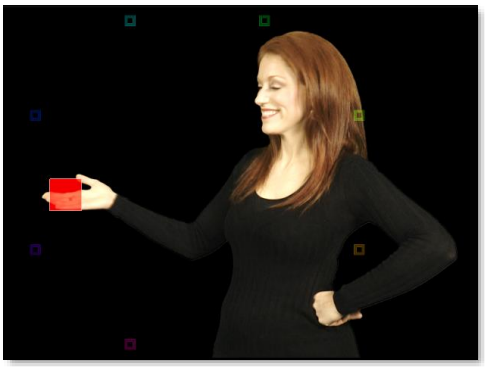
- Automatically fly in a title whenever you switch to a specified remote source.
- Then remove it again automatically after it is displayed for a specified time.
- Or automatically select a different *Audio Mixer* preset when you switch from viewing a source in the B monitor of a virtual set on *Program* to displaying it full-screen.
- And then change back to the original audio setup when you switch back to the anchor desk.

The possibilities are truly endless.

Simply click the E (Event) button next to a 'state' option for the input and select macros that will run when the source assumes or exits the specified state.

5.1.6 HOTSPOTS





On-screen *HotSpots,* also configured in *Automation* tabs, provide yet another way to trigger macros – based this time on activity detected in specially defined regions of the video frame.

Hotspots can serve many purposes. For example, onscreen talent can trigger one macro by moving their hand (for example) into a *Hotspot*, another by moving it out.

- Use live action to play sounds, make *Overlays* and *DSKs* appear auto-magically, or switch the video in a virtual monitor by tapping it with a fingertip.
- Switch from a seated desk shot to a standup virtual set simply set by walking into it; then auto-switch to the next shot when you walk back out of the frame.
- Load up a different *DDR MEM slot*, audio configuration and camera assignments when talent moves from the desk shot to standup in a virtual set.

Hotspots are configured in the configuration panels for individual inputs. Double-click the viewport for a camera input to open this dialog, and click the *LiveMatte* tab. The lower portion of this tab contains the *Hotspots* control group.

Note: All Hotspots for an individual source can be enabled or disabled using the switch in the group header, or globally for all sources in a given session using the Options menu.

Hotspots are color-coded, and their respective colors are used to draw the *Hotspot* overlay boxes on your viewports when the *Hotspot Markers* overlay is enabled for a corresponding monitor viewport.

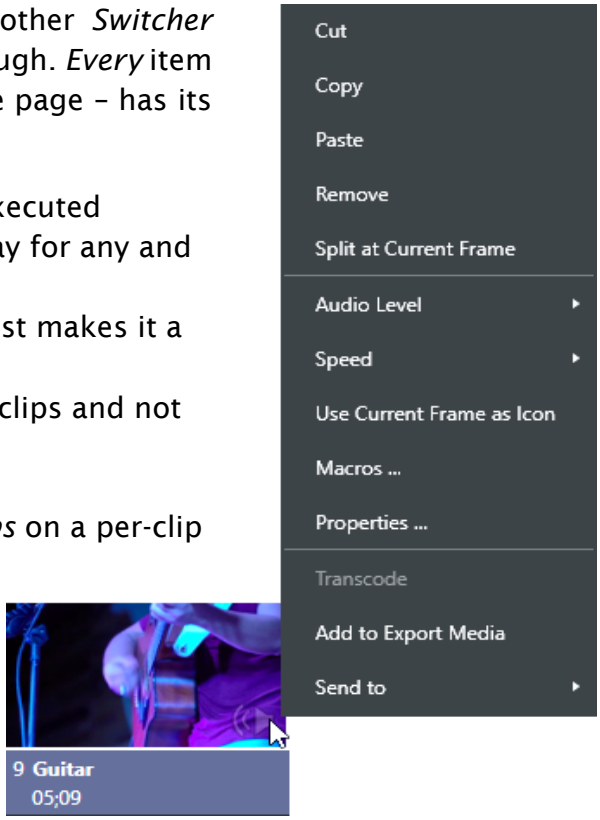
Scale and *Position* buttons allow you to re-size and place the 'trigger zone' for each *Hotspot* accurately.

The *Event* button for each *Hotspot*, marked by a capital "E", opens the *Event Triggers* dialog. This is where you will assign macros that are triggered when something moves into (On Screen) or out of (Off Screen) the otherwise transparent area defined by that *Hotspot*.

Hint: Use the Overlay option Flip View Horizontal to let talent see exactly where their marks are on a Multiview screen.

5.1.7 MEDIA PLAYER MACROS

Naturally, *Media Players* get *Macros* support like other *Switcher* inputs, as described above. We didn't stop there, though. *Every* item in a playlist – each clip, still image, audio file or title page – has its very own *Macros* features.



- Any macro you can record or create can be executed automatically on either playback or end of play for any and every individual playlist item.
- Improved multi-selection support in the playlist makes it a breeze to assign macros to multiple items.
- Automatically show titles for certain types of clips and not others.
  - Give them different title page types
  - Use macros to selectively adjust *Proc Amps* on a per-clip basis.
  - Or enable *LiveMatte* keying automatically when needed for certain items.

5.1.8 AUDIO AUTOMATION

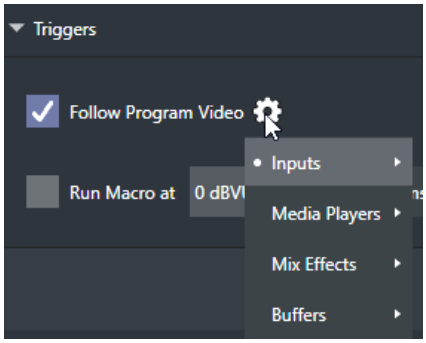
Vizrt live video mixer's Audio Mixer provides similar automation functionality. The related controls are located in the *Triggers* group in the *Input Settings* tab of the advanced *Audio Configuration* panel.

Hint: To open this panel, roll the mouse over the control group for any input in Vizrt live video mixer's Audio Mixer, and click the gear gadget that appears at the top in the label for that input.

The *Triggers* control group contains *Follow Program Video* (also known as 'AFV', for Audio Follows Video) and *Macro* options.

Follow Program Video

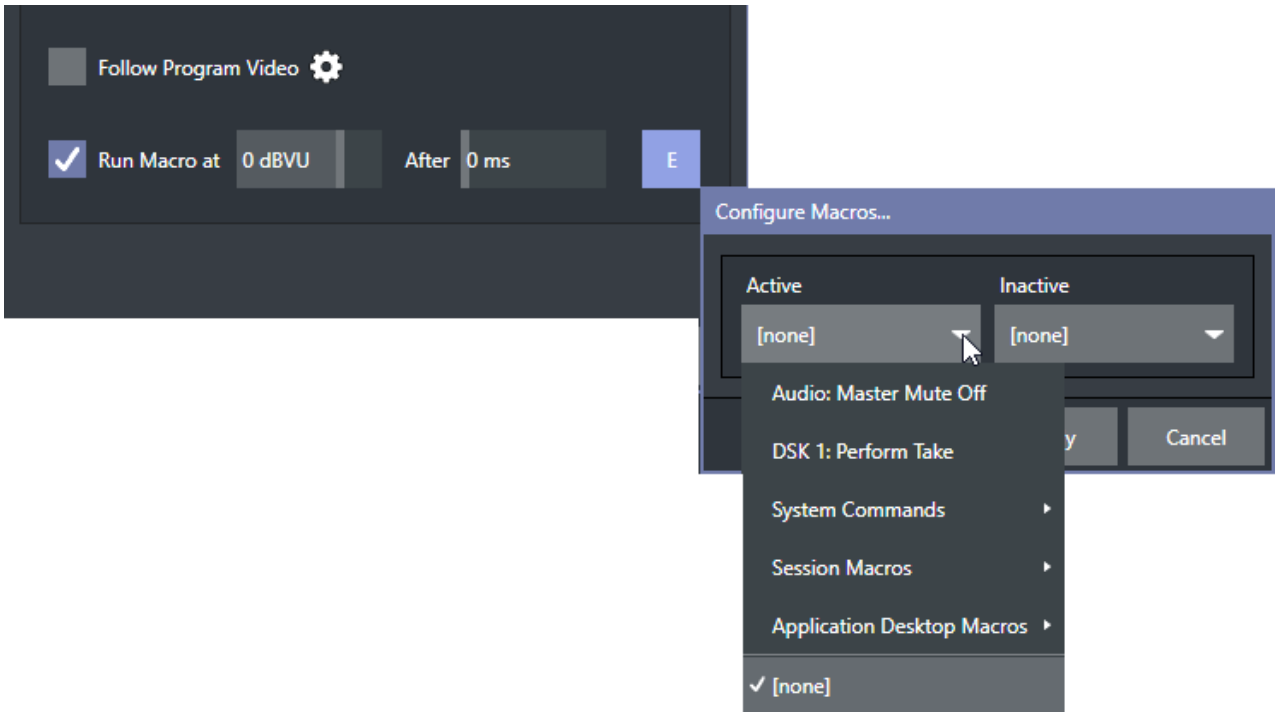
Enabling *Follow Program Video* options for an audio source directs the Vizrt live video mixer to track switcher operations affecting the related video source.



Audio for sources with *Follow Program Video* enabled in the *Audio Configuration* panel is automatically removed from mixed outputs until one or more specified video sources are actually displayed on *Program* output.

Run Macro

Audio threshold triggers allows you to specify a value in decibels to serve as a macro trigger. Whenever the sound level on that input rises above the threshold (or falls below it), designated macros will run. In this manner you could, for example, automatically perform a 'hands-free' camera switch to show someone who begins speaking, and then switch back again when he stops.

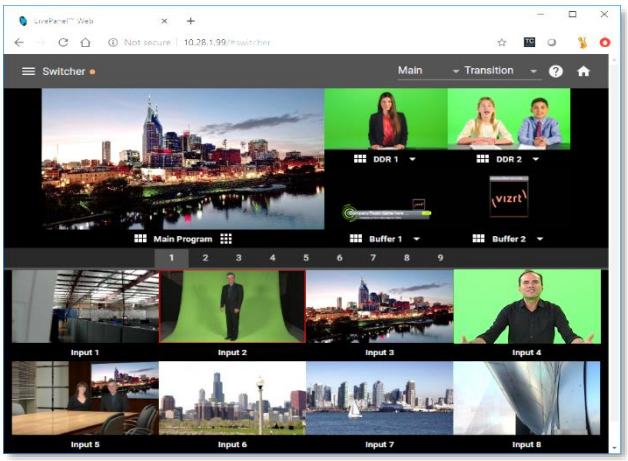


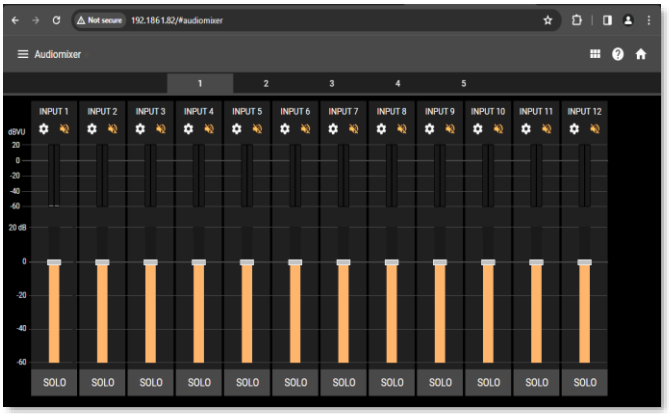
Hint: Transient sounds such as a brief cough are automatically filtered out.

Section 5.2 NETWORK

5.2.1 LIVEPANEL

Viz's LivePanel application (available for selected systems as a standalone purchase or included with Premium Access membership) provides a wide variety of prepared web applets.





You can use these to switch a show, adjust audio levels, update DataLink values in your title pages, trigger macros, and much more. Configuration is as simple as entering the appropriate URL into your web browser, and you can even create custom webpage applets of your own using the included LivePanel Builder.

5.2.2 NDI CONTROL AND MORE

Additional means for communicating and controlling Vizrt live production systems over a network, including macros that use HTTP, NDI communication, and other methods relevant to developing custom applications that use TCP/IP or HTTP protocols, are discussed in Section 8.2 of PART III (Integration).

PART III (CONTROL PANELS)

Your live production system can be taken to new levels of convenience and functionality with the addition of a supported external hardware control panel, describe in these Chapters.

Chapter 6 CONTROL PANELS

This chapter introduces the control surfaces offered by Vizrt for your TriCaster, helping you to see how they complement your system and add ability to your production setup. We will also discuss connecting to the control panels from your live production system.

Section 6.1 TRICASTER CONTROL PANEL COMPATIBILITY

Before we dive into all the incredible features of your control panel, the table below provides a comparison chart for Viz Control Panels and you Vizrt live production system.

TriCaster® Control Panel Compatibility Matrix

	Flex	Flex Dual	Mini CS	4-Stripe	2-Stripe
TriCaster® Now	✓	×	✓	×	×
TriCaster® Mini Go	✓	×	✓	×	×
TriCaster® Mini X	✓	×	✓	×	×
TriCaster® Mini 4K	✓	×	✓	×	×
TriCaster® Mini S	✓	×	✓	×	×
TriCaster® TC410 Plus	✓	×	✓	×	×
TriCaster® TC1 & 1 Pro	✓	✓	✓	✓	✓
TriCaster® 2 Elite	✓	✓	×	✓	✓
TriCaster® Vizion	✓	✓	×	✓	✓
TriCaster® Vectar	✓	✓	×	✓	✓

Section 6.2 2 & 4 Stripe Control Panels

These two similar control surfaces have been prepared for varied requirements. In large measure the functionality provided, and workflow is identical, regardless of which you use. The 4-Stripe control surface is a large and powerful 'four-stripe' unit, delivering precise control over your program, allowing you to produce your show quickly and confidently. 2-Stripe is its more compact sibling.

6.2.1 CONNECTION AND CONFIGURATION

Simply connect the control surface unit to the same *network your TriCaster is on. Both control surfaces require a standard, 3-prong AC power connection.

* The control surface and your TriCaster should be connected to the same subnet.

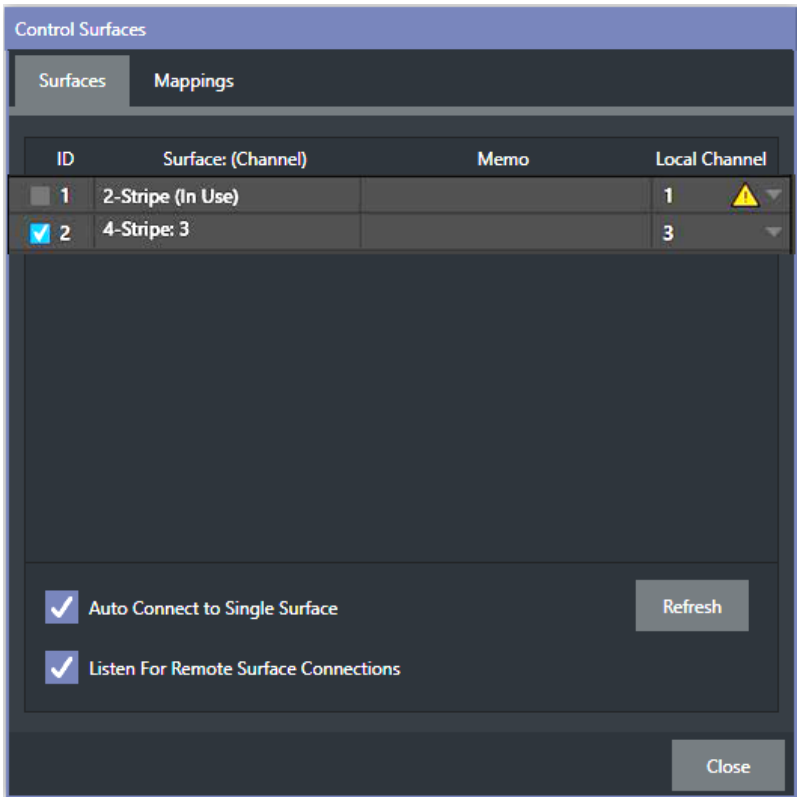
Pairing Systems and Surfaces

TriCaster automatically detects compatible control surfaces on the same network. Often there will only be one such surface, which makes setup easy. At other times, though, you may be in an environment with more than one surface, more than one live production system, or both conditions.

To allow you to manage these control connections, a *Control Surfaces* configuration utility has been included in the list of *Add-Ons* (located on the *Home Page*).

1. Click the *Add-Ons* button on the main menu on the *Home page* in the *Launch* pane to show the list of installed add-on applications.
2. The utility will automatically identify, and list qualified control surfaces it finds on the network.

3. Each surface discovered is listed in a numbered row. The ID number for the row is not permanently associated with a particular surface and may change as surfaces are added to or removed from the network. The ID number does serve a very useful purpose, however.



4. Once you identify the surface you want to use, simply checkmark it in the list to claim it for the local system (the steps in the next sub-heading, Setting the Channel, will complete the communication connection to the surface).

5. You can also enter a brief description ("BillyBob's 4-Stripe") into the *Memo* field, for later reference.

6. Finally, notice that a *Local Channel* menu is provided for each surface – or more accurately, for each *echelon, or* two stripe pair on the surface. Let's discuss this detail a bit further.

Setting the Channel

The *Channel* menu controls just one of two related channel settings – this one (on the local host), and another channel used by the control surface itself. These combine to let you connect to and control alternate live production systems.

Hint: You might think of the control and system channels as being like the channel settings of two 'walkie talkies' (2-way radios). For two-way radios to connect, both units must be on the same channel. Similarly, the channel selection displayed in this software pane tells the local unit to communicate with the selected (check-marked) control surface on the channel you choose. Of course, the control surface must also be set to the same channel for successful communication.

The *Control Surface* utility identifies the channel each control surface is on by a number from 1-8 after the colon in the *Surface: (Channel)* column. Normally, you can simply set the *Local Channel* to match this value (a 'bang' is shown if the channel the surface is set to does not match the *Local Channel*).

If you find it necessary to modify the channel the *control surface* is set to, proceed as follows:

7. Hold down the **SHIFT*, *CTRL* and *ALT* buttons on the control surface at the same time for a couple of seconds to enable channel select mode.

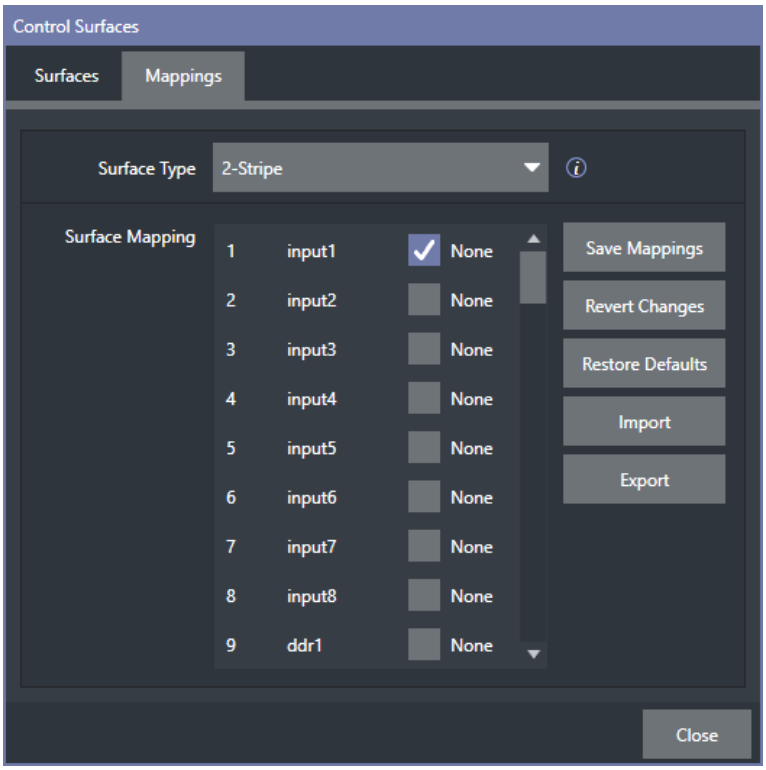
8. The left-most LCD display in the first stripe in the echelon updates to show channel selections, and a button in the PGM/A row lights to show the current channel. Tap another button in the row to change the selection.

*For the 4-Stripe Panel, you must repeat this operation in order to match the second echelon's channel setting to that of the first. Press and hold the *number pad* buttons labeled 1, 2 and 3 in the third stripe (rather than *SHIFT*, *CTRL* and *ALT*) in this case; then make your channel selection using the A button in the PGM/A row of the third stripe.

With these settings you can, for example, set one system to listen a certain control surface on channel 1, and set a different unit to listen to the same control surface on channel 2 – then easily go from controlling one system to controlling the other by updating the surface channel setting.

MAPPINGS

The *Mappings* tab in the *Control Panels* configuration utility lets you modify the default Switcher row button mapping.



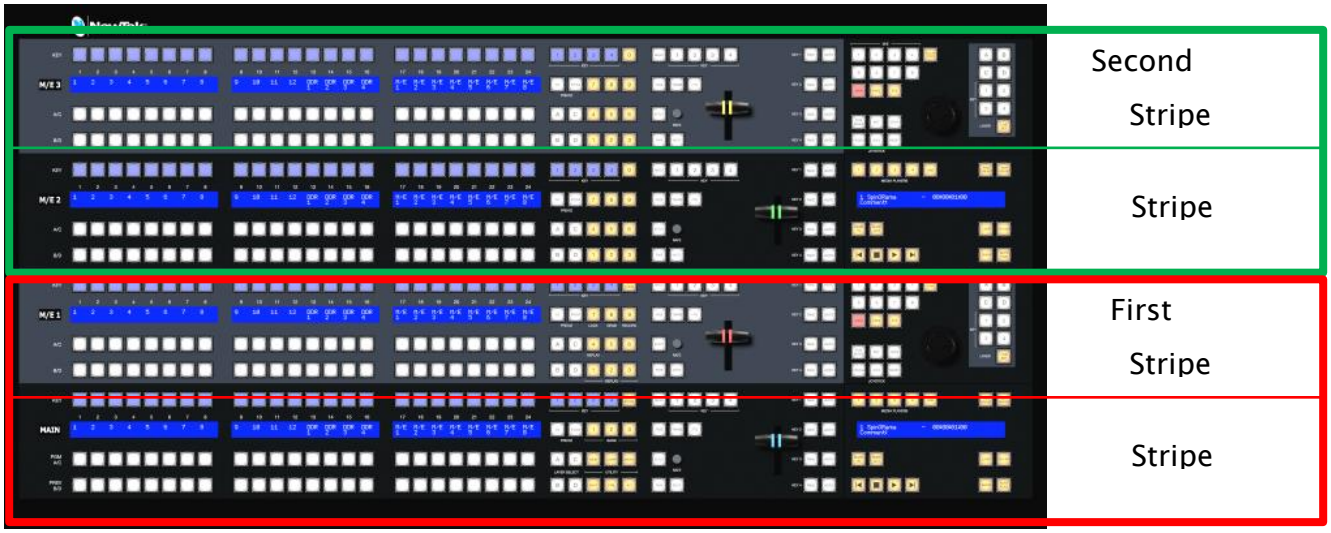
The *Surface Type* drop-down menu provides a list of available *Control Surfaces*. The *Surface Mapping* section offers the ability to remap *Switcher* row buttons individually. Check '*None'* if you want to disable a button from triggering a crosspoint change. Disabled buttons can serve as 'spacers' to divide source groups, this can be useful for those of us with 'fat fingers'. To the right are options to save, revert, restore, import and export your surface mapping.

BUTTON BACKLIGHTING

It is possible to modify the illumination level for the control surface buttons as follows:

- Press the LAYER SELECT B and D buttons together and keep them pressed down.
- Press one of the buttons number 1-3 in the PGM row of the first stripe to select low, medium, or high button illumination levels, and release the B and D buttons.

6.2.2 CONTROL SCHEMA



Generally, you can think of the various control groups provided as being organized into horizontal 'stripes'. In turn, two stripes are paired together in upper and lower echelons, as shown above.

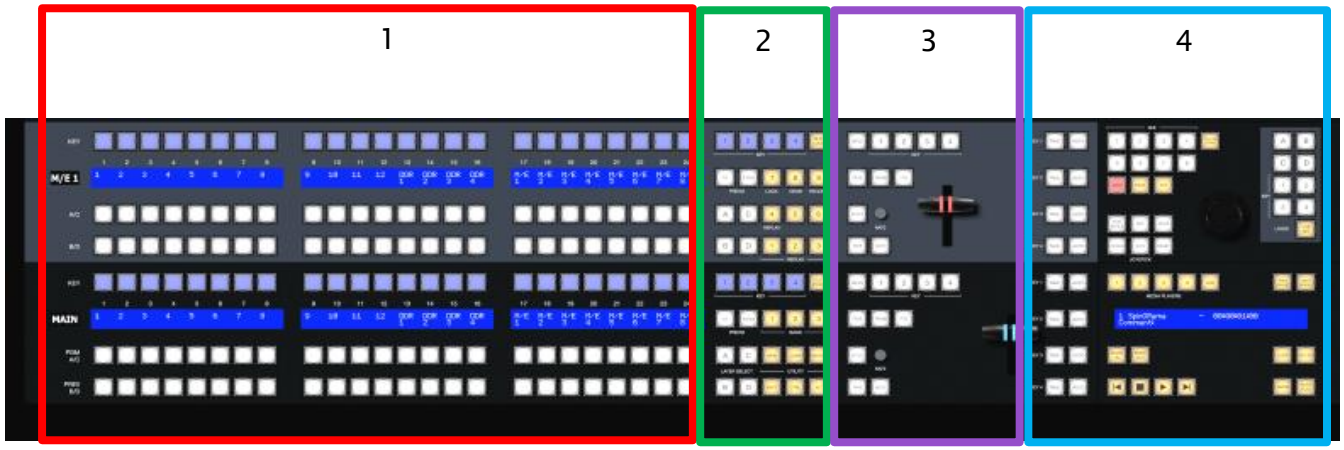
STRIPES AND ECHELONS

Broadly speaking, the control layout of all stripes is quite similar, and the second echelon is nearly identical to the first. However, the first echelon is unique in providing several common controls (e.g., SHIFT, ALT, BANK, etc.), conveniently locating these under your hands at rest.

This being so, it's not hard to see that the first echelon – that is, the one nearest the operator – can be considered dominant, even vital, while the second echelon plays a supporting role.

We'll cover the functions assigned to these controls in due course but, for now, let's continue our exploration of the control surface topography by looking at stripe organization, and the distinctions between odd and even stripes.

Control Columns



Controls in each horizontal stripe can be grouped into the following four columns:

1 – **Selection**: choose video sources

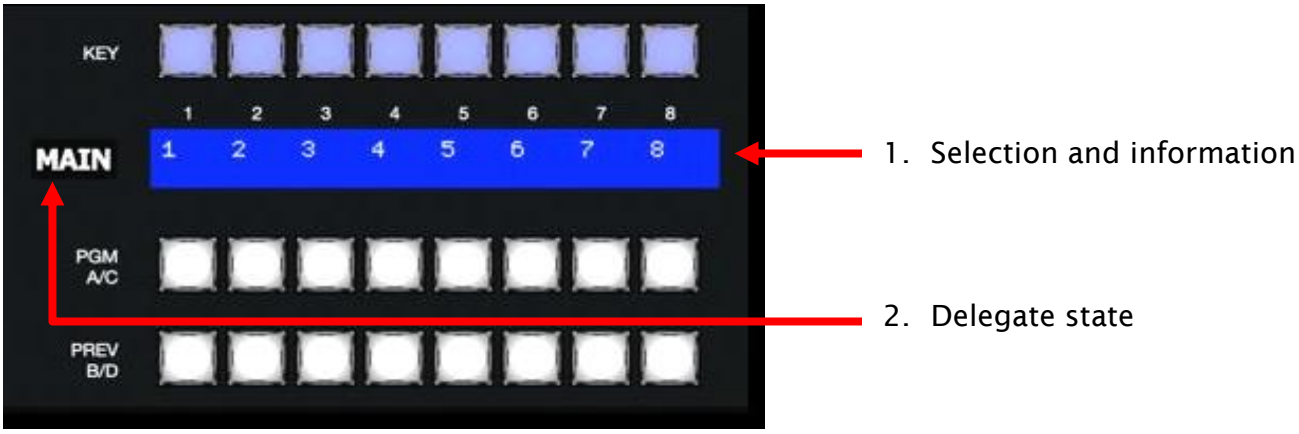
2 – **Command**: control operations and options

3 - **Layers & Effects**: transitions and layer visibility

4 - **Joystick & Media**: layer position and *PTZ* control, plus *Media Player* control

In the sections that follow, we'll look at each of the functions of controls in each of these columns more closely, but first, let's sidestep briefly to talk about displays.

Displays



Both control surfaces feature helpful indicators and system feedback by means of illuminated displays.

1. An OLED display positioned just left of each stripe normally shows the delegate state for the associated stripe. For example, it may show that the stripe has been delegated (or 'assigned') to control the Main switcher, one or more M/Es, or for TriCaster, one of its supplementary routed output.

2. The blue LCD surfaces spanning each stripe just below the *KEY* row show labels identifying the selection that would result from pressing a button in the same column.

Hint: The numbers 1-24 are silkscreened above the LCD surfaces as a further aid when making selections.

3. Another LCD strip appears in the *Media Players* group at right in the first stripe (and third, for 4-Stripe).

Item 1 above raises the question, "How do I delegate a stripe to control the desired module?" Let's go on to talk about this, beginning by discussing what "delegating" means in the context of a control surface.

6.2.3 PRIMARY COMMAND GROUP

We saw earlier that the second column of buttons in each stripe provides access to important control operations and options.

The *Command* group in the *first stripe* (nearest the operator) has some unique features that actually govern other sections of the overall control surface. We'll refer to this as the *primary Command group*. Among these special controls are several that we can describe as 'delegate' buttons.

For example, consider the four buttons labeled *KEY* in the top row of this group.

KEY

Pressing one of these buttons, labeled 1-4, 'delegates' or assigns the buttons in the 24-button *KEY* selection row at left in the same stripe to govern the active source assigned to one or more KEY (or DSK) layers.

Hint: Delegate buttons usually, though not always, support multi-selection.

Delegating KEY to UTILITY (Macro triggers)

Support for single-button macro execution (i.e., triggering a macro without holding the MACRO button down) is provided by allowing you to repurpose KEY rows for one or more stripes as UTILITY rows. In this state, connected TriCaster instances detect button presses from that row in the External Triggers feature of the Live Desktop's Macro Configuration pane.

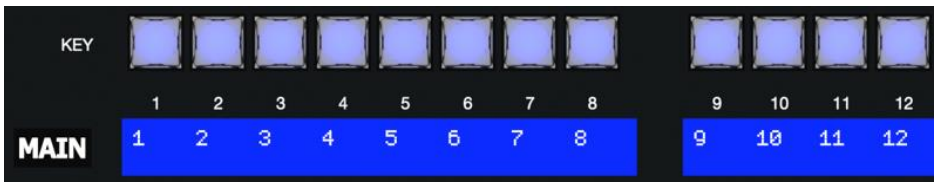
Each switcher bus supports four banks of UTILITY row buttons. To convert a KEY row to UTILITY row mode, double-punch an already lit DSK/KEY button (1-4), or triple-punch a different KEY delegate. This assigns the corresponding UTILITY bank (1-4) to the KEY row. While in UTILITY row mode, the KEY delegate button for the active UTILITY bank will blink.

To revert from UTILITY mode to normal KEY row usage, delegate one or more KEYS again (by punching a KEY delegate.

It's helpful to remember that each primary Switcher bus (MAIN, M/E 1, M/E 2, etc.) has its own independent UTILITY banks. This means that if you assign a set of macros to UTILITY row Bank 2 in M/E 3, these macro assignments are retained should you later delegate M/E 3 to a different Stripe.

DLGT STRIPE

The remaining button on the topmost row of the *primary Command group* is labeled *DLGT STRIPE*, which is an abbreviation of 'delegate stripe'.



When you press and hold *DLGT STRIPE*, the LCD displays in *each* stripe update to show the names of the available switcher busses (*MAIN, M/E 1, 2, etc.)* and MIX 1-4. In this state, press one or more buttons in the PGM/A row beneath and release the *DLGT STRIPE* button to assign the stripe to the designated bus or busses.

Hint: The QuickSelect button (marked with an 'eye' icon to associate it with visibility) is located in between BKGD and FTB. Clicking it updates the Switcher's T-Bar delegate and transition states so that the next TAKE or AUTO operation will remove all visible DSK or KEY layers from output. (On supporting control surfaces, press ALT & BKGD to trigger the QuickSelect feature.)

BANK

Another set of delegate buttons sits in the second row (counting from the top) of the *primary Command group*. This group is labeled *BANK*. As you know by now, the *Switcher* crosspoints are organized in banks comprising 24 columns.

Similarly, *Switcher* sources are presented in banks on Stripe model control surfaces. (The constituent sources of Switcher banks on the surface may deviate from the interface because the button count is different.)

Press the desired *BANK* button – 1, 2 or 3 – to determine which group of sources is currently delegated to the *Switcher* rows in all stripes. The displays above the selection rows will update accordingly.

Note: For reasons that should be obvious, Bank buttons do not support multi-selection.

Split Banks

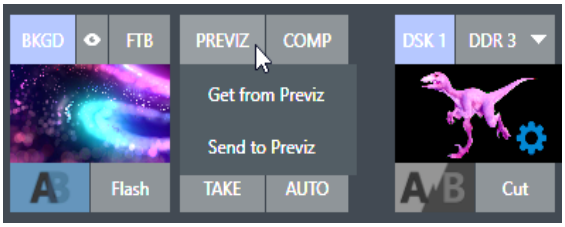
Ordinarily, the *Switcher* and *M/E* row bank assignments for all stripes on the surface match. So, for example, if the *Main Switcher* is showing *Bank 1*, all other stripes likewise display *Bank 1*. It is possible, however, to lock individual stripes to specified *Banks (*support for this feature varies by model*)*.

To do so, hold down the *ALT* and *CTRL* buttons on the surface together, which will cause the LCD displays to list *Banks 1, 2,* and *3* in the first three *Switcher* columns. Press the *KEY* row button above the display for the desired stripe to select the Bank it will present thereafter.

Stripes delegated to a particular *Bank* in this manner do not update when you press the *Bank (1-3)* buttons in the *Primary Command Group*. To restore normal behavior, hold down *ALT* and *CTRL* again, and notice that the *KEY* row button for the currently assigned bank lights. Press this button again to extinguish it, and the stripe will once again follow the primary *Bank* button assignment.

PREVIZ

There are more delegate buttons, but before moving on to consider them, let's complete our consideration of the second row of the *primary Command group*. This brings us to the *PREVIZ* group.



TO and FROM

Two buttons labeled *TO* and *FROM* in the *PREVIZ* group on the 2 or 4-Stripe control surfaces complete the support for this feature by providing access to the "Send to Previz" and "Copy from Previz" functions (presented in the *Live Desktop* interface by the *PREVIZ* and associated 'clipboard' buttons located just above *T-Bars*.

Note: To and From (Previz) buttons are found in the Command groups for all stripes.

- **TO** – Copies the selections and settings of the bus delegated to the corresponding stripe to *Previz* (for a stripe delegated to multiple switcher busses, *TO* uses the settings of the first delegate only).

- **FROM** – Copies the current *Previz* settings to back to the delegated busses for the corresponding stripe. Note that *FROM* does support multi-delegation, allowing you to copy the current *Previz* setup back to multiple busses). Finally, as a reminder, note that *FROM* will update the sources for *DSK/KEY* layers, but will not affect the main row source selections of the target busses.

UTILITY

MEM

When the *MEM* button is held down, the first 9 columns in the displays of all stripes update to list the names of *MEM*s for the busses delegated to the individual stripes. Punching a button in the selection row below a *MEM* name recalls the corresponding preset for the bus assigned to the stripe.

Note: For multi-delegated stripes, only the first delegate is affected

Holding *CTRL+MEM* then pressing and releasing a button in the *PGM/A* row beneath will store it into the corresponding MEM for the bus assigned to the stripe.

COMP

When the *COMP* button is held down, the first 16 columns in the displays of all stripes update to list the names of *COMPs* for the busses delegated to the individual stripes. Punching a button in the selection row below a *COMP* name applies the corresponding preset to the bus assigned to the stripe.

NOTE: In the case of multi-delegated stripes, the COMP names displayed represent the first delegate only.

To store or update a *COMP*, hold down *CTRL* + *COMP*, then press a button in the selection row below the display for the desired stripe. To clear a *COMP*, hold down *ALT* + *COMP*, then press a button in the same selection row.

MACRO

To assign a macro to *any* button, first select the desired macro in the *Macro Configuration* pane in the user interface. Click a box in the *Triggers* control group at the bottom of the surface, to enable "Listen" mode, then hold down the *MACRO* button, punch the control surface button you want to use for the macro, and release the *MACRO* button. (See also Section 6.2.4, Numberpad)

When the *MACRO* button is held down, the names for any macros assigned to buttons in the (PGM/A/C) row immediately beneath the selection area displays are shown. Punching the button below a macro name triggers the corresponding macro.

Hint: To clear an assigned macro from a button, hold down Ctrl with the Macro button, then press the (lit) button you wish to clear.

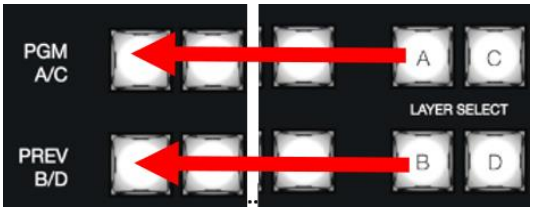
SHIFT, CTRL, ALT

These buttons provide support for extended features and future expansion.

Note: Among other things, CTRL and SHIFT are used in connection with instant replays (see the Replay heading in Section 6.2.4) and Buffers (see Section 6.2.7).

LAYER SELECT (A/C, B/D)

TriCaster lets you configure M/Es with effects supporting up to four primary sources (along with KEY layers). The control surfaces, however, offers just *two* primary source selection rows, *PGM A/C and PREV B/D.*



In cases where more than two selection rows are required for a given *M/E*, use the *LAYER SELECT* buttons to delegate the upper or lower selection rows to the layers you wish to control.

Hint: If you reduce the number of layers required by an M/E (by loading a different effect) the control surface will automatically revise the LAYER SELECT delegate state to match.

6.2.4 SECONDARY COMMAND GROUP

The *Command* control group in the second stripe (counting from the stripe nearest the operator) also has unique functions, which is why we will refer to it as the s*econdary Command group*.

While discussing the *Primary Command Group* in section 6.2.3, we reviewed the functions of the *KEY* delegates, *PREVIZ* buttons, and the *LAYER SELECT* (A/C, B/D) buttons. Let's now consider the remaining items in this section.

NUMBERPAD

Unlike the *primary Command group*, the *secondary Command* group includes a numberpad. We'll discuss basic number input functions soon but, first, observe that certain buttons in the numberpads have labels below them identifying alternate functions.

NUM LOCK

This is why (in contrast to additional numberpads provided on the 4-Stripe surface in particular), the 0 button in this numberpad is replaced by *NUM LOCK*. Not surprisingly, when *NUM LOCK* is lit all numberpad buttons perform simple numeric input.

When *NUM LOCK* is off, however (as it is by default) number buttons with alternate labels perform their secondary operation. Let's discuss these now.

LOCK (7)

With *NUM LOCK* off, this button lets you lock or unlock other control surface buttons. Pressing *LOCK* lights all currently locked buttons. While the *LOCK* button is lit, pressing any other control surface button toggles its locked/unlocked state, preventing unintentional changes.

GRAB (8)

Pressing this button (with *NUM LOCK* off) triggers the software's main Dashboard *GRAB* button.

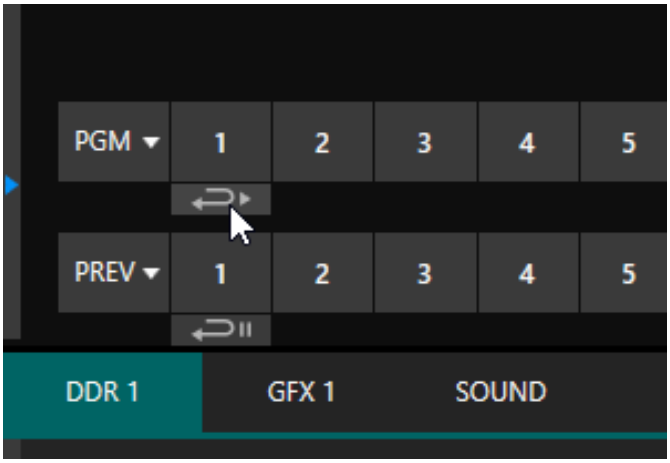
Hint: The main GRAB feature grabs stills from selected primary (MIX) outputs, as configured in the interface. To grab other Switcher sources (excluding M/Es), hold down the CTRL button on the control surface while punching any KEY row button for the desired source.

RECORD (9)

Pressing this button (with *NUM LOCK* off) triggers the main Dashboard *RECORD* function. You should be aware that, to prevent unintended interruptions in recordings, you must hold *SHIFT* while punching *RECORD* on the control surface to stop recording.

Hint: To alert you to this safety measure, SHIFT flashes if you press RECORD alone during capture.

REPLAY (1, 2, 3, 4)



Recent editions of TriCaster software provide powerful instant replay workflow for any source with a recorder assigned to it.

When a Recorder is assigned to a source in its Input Configuration surface, and you also enable the associated Instant Replay switch, special replay buttons appear below the corresponding *Program* and *Preview* row buttons in the Live Desktop *Switcher.*

Stripe control surfaces provide the same functionality as follows:

- To perform an instant replay from a *Switcher* source, hold down the *CTRL* button while punching the *PGM* A/C row button for the source. Double the length of the replay by holding down *SHIFT* along with *CTRL*.

- Or defer playback of the instant replay as follows:

    - Simply add the replay clip to the *DDR* playlist by clicking the source's *PREV B/D* row button (rather than the *PGM* row button) with *CTRL* (or *CTRL + SHIFT*) held down.

    - Then, when you're ready to trigger the instant replay, press *CTRL + AUTO* to initiate the DDR's *Show On* operation.

This powerful workflow is ideal for replays from individual *Switcher* inputs. However, the four *MIX* outputs (which typically includes Program output as MIX 1) do not appear on the *Switcher* button rows – so another method is required in this case:

- Press a button numbered *1-4* in the *Secondary Command Group* (with *NUM LOCK* off) to trigger a replay from the corresponding (*MIX 1-4*) recorder.
- Hold down *CTRL* when doing the above to defer playback of the replay clip.
- Add *SHIFT* to either of the above to double the length of the replay clip.

Hint: If you execute an instant replay operation while another replay is incomplete, the newer replay angle will replace the former one on output and the duration of the replay will be extended.

NUMBERPAD (NUM LOCK ON)

Having covered the alternate (NUM LOCK off) numberpad button functions, let's consider the value of the *Numberpad* in connection with running macros.

Any macro can be triggered by pressing a three-digit number sequence on any of the *Numberpads* on the control surface. Simply open the *Macro Configuration* surface in TriCaster's *Live Desktop* and select a macro from the list; click a *Listen* box at the bottom of the surface, then type a three-digit number, such as 123.

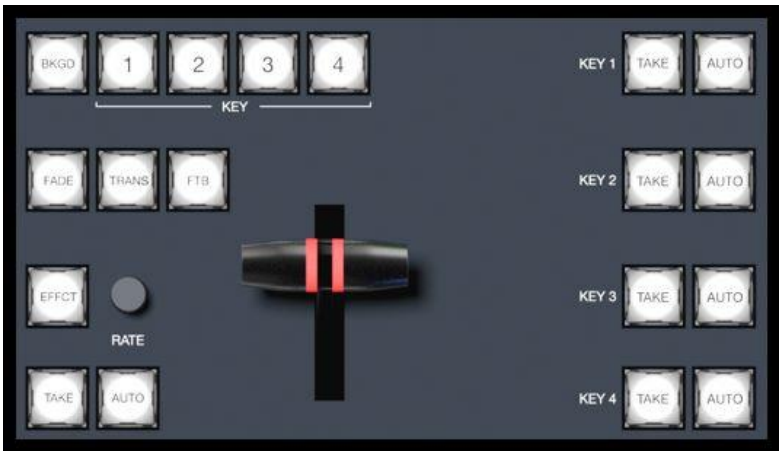
Each *Numberpad* on the control surface is treated independently. Thus, the very same numeric entry can trigger different macros from the *Numberpads* in different stripes.

For 4-Stipe, which has three *Numberpads*, this means you have direct access to nearly 3000 different macros.

Hint: If you start to enter a number, then change your mind, simply press any button outside the number pad to cancel the entry.

6.2.5 LAYERS & EFFECTS

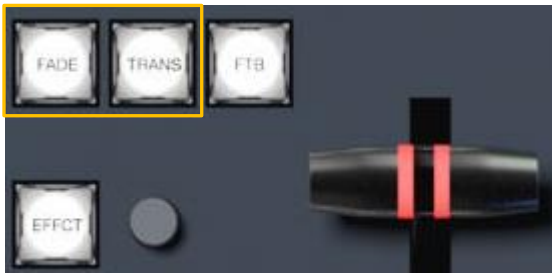
The controls in third column (all stripes) govern transitions and layer visibility for the various video busses.



BKGD AND KEY 1-4

These delegate buttons determine what video layers the main controls directly below (*TAKE*, *AUTO*, *T-Bar*, etc.) will affect. Multi-selection is supported, so, for example, if you select both *BKGD* (Background) and *KEY 1,* then press *AUTO* for a stripe delegated to the *Main Switcher*, a transition is applied to both the *Background* layer and *DSK 1*.

FADE & TRANS



These two buttons provide a quick way to control the *Transition Bin* selection for the delegated switcher layer(s).

- Pushing *FADE* offers a quick and convenient way to select the standard *Crossfade* transition.

- Push the *TRANS* button to activate the last-used transition for a video layer (or layers).

Hint: For new sessions, TRANS jumps to the transition following Fade in the effect preset bin.

The *FADE* and *TRANS* (Transition) buttons are mutually exclusive; selecting either cancels the other, and only the currently active button remains lit.

FTB

To perform a *Fade to Black* operation, press *SHIFT* + the *FTB* button (the SHIFT button is required as a safety measure, since FTB is a somewhat dangerous operation). Revert to normal output by pressing *FTB* alone.

Hint: The duration of the transition to and from black is derived from the BKGD transition duration setting.

EFFCT (Effect)

Hold down the *EFFCT* button to cause LED display columns at left to show the names of effects currently assigned to presets in effect bin for the currently delegated layer of the *Switcher* bus assigned to the stripe.

In the case of multi-delegated busses or layers, the display lists the content of the first effect preset bin only, and selection will only affect that delegated layer.

Rate

Rotate the nearby *RATE* knob to modify the transition timing for delegated layers. Or press the knob to cycle through the standard *Slow*, *Medium* and *Fast* presets.

TAKE & AUTO

The *TAKE* and *AUTO* buttons perform a cut or transition respectively, affecting only the currently delegated video layers.

T-BAR

The T-Bar is perhaps the most recognizable component of a professional video control surface, and arguably one of the most important. Stripe surfaces provide standard functionality by this means, along with exceptional system feedback. Obviously, you can pull the *T-Bar* to manually modify the progress of a transition between delegated video layers. The T-Bar can also be used to zoom M/Es configured with LiveSet virtual sets.

Illumination

The *T-Bar* employs colorful illumination to provide feedback and status updates based on your control surface selections and operations. The lighting schemes applied to *T-Bars* controlling both *M/Es* and *MAIN* video layers reinforce traditional button illumination in a way that soon becomes instinctive, and which provides unparalleled confidence in use. The following tables provide a color code for your convenience.

M/E TRANSITIONS

1. For an *M/E* with a transition assigned as the *Background* effect, control surface T-Bar illumination conforms to the color scheme of the *M/E tabs* on the *Live Desktop*.

M/E 1	M/E 2	M/E 3	M/E 4	M/E 5	M/E 6	M/E 7	M/E 8
Turquoise	Teal	Blush	Apricot	Sky Blue	Pink	Chartreuse	Hot Pink

2. If *BKGD* is delegated alone, the *T-Bar* color is as shown in the table above, identifying which *M/E* is delegated to the stripe. (When multiple *M/Es* are delegated, the first selected delegate determines the color.)

3. This color is at its brightest when the *PGM/A* source (effectively the *Program* row for a transition type effect) is fully displayed. As the *T-Bar* is moved (or *AUTO* is pressed) to begin a transition, the color gradually dims until the effect is complete. At that point, it pops back to full brightness, just as the onscreen *T-Bar* returns to the top of its stroke.

4. In a mixed delegate situation (*BKGD* along with one or more *KEY* layers) the *T-Bar* is lit medium blue and conforms to the *BKGD* behavior described above.

5. If one or more *KEY* layers are delegated without *BKGD*, the *T-Bar* color is purple. When the *KEY* layer (or, for multi-*KEY* selections, the first *KEY* layer) is fully displayed, *T-Bar* lighting is at its brightest. Removing the layer dims the illumination.

MAIN TRANSITIONS

1. Just as you would expect, the *T-Bar* uses industry-standard red/green color coding for *Program* and *Preview* rows.

2. *DSK*-only operations result in the *T-Bar* being lit in purple, similar to *M/Es*.

3. Mixed mode (*BKGD* plus *DSK* delegates) result in blue illumination, after the fashion of *T-Bar* behavior previously described for *M/Es*.

This brings us to the fourth and final column of the Stripe control surface – Joystick & Media control (see Section 6.2.2).

6.2.6 MEDIA PLAYERS

Let's explore the details of the *MEDIA PLAYER* control group (depending on your control surface model, there may be one or two such control groups).

DELEGATES

The *MEDIA PLAYERS* buttons determine which players are governed by operations in this group. Multi-selection is supported.

PREV PRESET/NEXT PRESET

These two buttons let you cycle backwards or forwards respectively through existing presets for the delegated *Media Player.*

DISPLAY

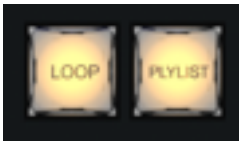
The top line of the *Media Player* display shows the filename, countdown timer and if available, timecode for the current playlist selection. The lower line contains any comments you have attached to the file (using the clip context menu item, *Properties*).

MARK IN/OUT

Click these buttons to set the *In point* or *Out point* for the current playlist item in delegated players to the current frame.

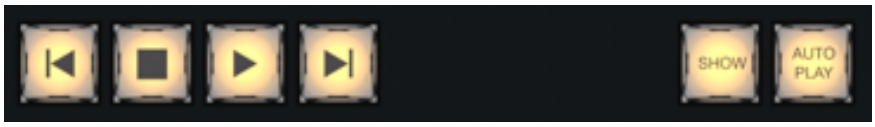
Hint: Press SHIFT with the button to reset the specified end point to its full limit.

LOOP AND PLYLIST



Click these buttons to toggle the *Loop* and *Playlist* modes for the delegated players.

TRANSPORT CONTROL



- |◀ (Previous Item) – Press this button to go to the previous playlist entry in delegated *Media Players*. (The selection cycles to the last playlist entry when necessary.)
- ■ (Stop) – Push once to end playback for delegated *Media Players*; push a second time to return to the start position (this operation respects the *Single* setting for individual *Media Players*
- ▶ (Play) – Push to initiate playback for delegated *Media Players*.
- ▶| (Next Item) – Push this button to go to the next playlist entry in delegated *Media Players*. (The selection cycles to the first playlist entry when necessary.)

SHOW AND AUTOPLAY

The *SHOW* button triggers the matching *SHOW ON* feature in the footer of TriCaster's *Media Players*. Likewise, the *AUTOPLAY* button toggles the eponymous *Media Player* option.

6.2.7 BUFFERS AND TITLES

TriCaster supports both static title templates (.CGXML file format) and animated LiveGraphics (.livegfx file format) title pages in its *Buffers* module. In turn, these title pages respectively support one or both of two different types of presets – Data Presets and Layer Presets.

Data Presets store text strings, image file links, and allow you to quickly update those aspects of a title page on demand. *Layer Presets* are still more powerful and allow you to hide or display layered various graphic elements comprising your LiveGraphics™ title page using predetermined per-layer animation (for more about LiveGraphics, including how to author your own dynamic title pages, please refer to your TriCaster guide).

To access these features from your 4-Stripe control surface, you must first delegate a specific *Buffer* slot containing the target graphic you wish to control. To do so, hold down *SHIFT + MEM* and punch the button on the *PGM A/C* row at left corresponding to the desired *Buffer*.

Having delegated a *Buffer* as just described, hold down *SHIFT + MACRO* and punch the button on the *PGM A/C* row at left that corresponds to the *Data Preset* you wish to recall. Or hold down *SHIFT + COMP* instead, to invoke a *Layer Preset* using the same selection method.

6.2.8 JOYSTICK

The Stripe control surface joystick provides a very versatile input mechanism.

In considering its applications it is important to realize that, unlike the *Layers and Effects* control groups at left, the *Joystick(s)* located in the surface's right-most column can optionally operate completely independently from the stripes at left.

Thus, while *T-Bar* operations (for example) are always directed to the video busses delegated to the stripe they are in, *Joystick* manipulations can affect any *M/E*, a *PTZ* (Pan, Tilt & Zoom) camera, or even a *Media Player*.

The specific target of *Joystick* operations at any moment is determined by a set of *Joystick delegate* buttons, outlined in red above.

- As appropriate, this selection is further refined by buttons in the *Layer* group at right, outlined in blue above.
- Finally, the nature of the operation performed on the target is determined by a set of *Control Mode* buttons at lower left, outlined in green above.

Let's consider the primary *delegates* first.

DELEGATES

Follow Preview

Probably the most useful joystick delegate mode is *Follow Preview*. You will probably not be surprised to learn that, when enabled (as is the default in new sessions) the joystick assignment tracks your Main > Preview (*PREV*) row selection.

Since the *Live Desktop* normally displays a large *Preview monitor*, this makes setting up exactly the shot you want for the upcoming source queued on *Preview* the proverbial 'no-brainer'. Or, to quickly modify the framing of a bunch of PTZ cameras, or a series of M/Es, just select them one after another on the *PREV* row and adjust to taste.

Hint: To open the Input Configuration surface for the source currently selected on the Preview row to adjust its settings, simply tap the * (asterisk) key in the keyboard numberpad.

Of course, the joystick has several other delegate modes, discussed next, but the default *Follow Preview* mode is very useful, and can be easily restored from any other mode by pressing the *PTZ* and *RESET* buttons together.

FOLLOW STRIPE

Pressing this *Joystick delegate* button restricts the behavior of the *Joystick* in a manner many are used to from using 'traditional' control surfaces. That is to say, *Joystick* operations will always be directed to the video bus(ses) assigned to the same stripe. It's possible to quickly redirect control to any suitable target without interrupting *Switcher* operations on neighboring stripes.

M/E 1 – M/E 8

These buttons provide a quick and convenient way to delegate *Joystick* operations to one or more selected *M/Es*

MAIN

Punch *MAIN* to direct delegate *Joystick* operations to the *Main Switcher*.

PRVZ

This button delegates *Joystick* operations to TriCaster's convenient *PREVIZ* video bus.

PTZ

SOURCE SELECT

PTZ (pan-tilt-zoom) style joystick operations are not limited to 'real' PTZ cameras. Static cameras, *Media Players*, and *Buffers* are among the different source types that may benefit from 'virtual PTZ' functionality. And of course, M/Es have similar capabilities courtesy of *COMP* and *Positioner* features.

For this reason, you can delegate <u>any</u> source that is qualified for *Joystick* control on your system as follows: Hold down the *PTZ* button and press the desired *KEY* row button at left in the same stripe as the *Joystick.*

Note: Press an M/E button (1-8), MAIN, or FOLLOW STRIPE to reset the Joystick to the corresponding operating mode.

PRESETS

In addition to manually controlling the PTZ camera with the *Joystick*, of course, you will often want to store and recall *PTZ presets*.

- To store a new preset for the currently delegated camera, or to update an existing preset, hold down the *PTZ* button and press a button numbered from 1-16 in the *A/C* row at left in the same stripe.

- To recall a preset, hold down the *PTZ* button and press a button numbered from 1-16 in the *B/D* row at left in the same stripe.

LAYER DELEGATES

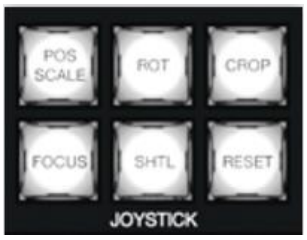
As mentioned above, some *Joystick* delegate modes let you further refine the target for your manipulations. For example, when your primary delegate is *MAIN*, joystick operations can be applied to the *DSK 1, DSK 2, DSK 3* or *DSK 4* video layers. The *LAYER* delegate group determines which one will be affected.

Specifically, the *KEY* buttons labeled *1-4* direct joystick control to *DSK 1-4* when *MAIN* is selected as the primary delegate, or *KEY 1-4* for an *M/E*. Similarly, when an *M/E* with a *LiveSet* selected as the *Background effect* is delegated, the *A, B, C* and *D* buttons allow you to target the individual *Positioners* for the main *M/E* layers (*A-D*).

Finally, the *LIVE SET* button targets the position and zoom settings for a virtual set.

CONTROL MODE

Let's turn now to buttons that govern the *Joystick* operating mode.



POS/SCALE

- Move the *joystick* horizontally, vertically or diagonally (as viewed from above) to move delegated video source(s) on its X and Y axes.
- Twist the *joystick* clockwise to scale delegated source(s) up, or counter-clockwise to scale down.

Hint: When multi-delegate selections are active for the Positioner, adjustments are generally relative to the current state for individual delegates, as opposed to absolute.

ROT (Rotate)

- Move the joystick horizontally (as viewed from above) to rotate delegated sources on the Y axis.
- Move the joystick vertically to rotate delegated sources on the X axis.
- Twist the joystick clockwise/counter-clockwise to rotate delegated sources on the Z axis.

CROP

- Twist the *joystick* clockwise (as viewed from above) to crop delegated sources inward on all four edges, maintaining the original aspect ratio.
- Twist the *joystick* counter-clockwise to reduce cropping of delegated sources on all 4 edges.
- Move the *joystick* horizontally to crop only the left edge of delegated sources.
- Move the *joystick* horizontally with the *joystick button* pressed to crop only the right edge of delegated sources.
- Move the *joystick* vertically to crop only the top edge of delegated sources.
- Move the *joystick* vertically with the *joystick button* pressed to crop only the bottom edge of delegated sources.

FOCUS

When the primary *Joystick Delegate* is *PTZ*, enable *FOCUS* to modify *Joystick* operations as follows:

- Pressing the *Joystick button* enables *Autofocus*.
- Rotate the joystick to adjust the camera's focus setting (which will naturally disable Autofocus).

SHTL (Shuttle)

Push *SHTL* (Shuttle) to delegate the *joystick* to shuttle the *Media Player(s)* currently selected in the *MEDIA PLAYERS > DELEGATE* group. (Again, the other joystick mode buttons cannot be multi-selected with SHTL.)

- To *shuttle* delegated *Media Players*, move the joystick horizontally (as viewed from above).

Note: You can zoom multiple LiveSets simultaneously when these are delegated together, just as you can also shuttle several delegated Media Players.

RESET

Despite its location, *RESET* is really an action button (not a *Joystick* mode). Press it to restore all position settings for currently delegated source(s) to their defaults. (This is also why *RESET* does not stay selected when pressed, nor does it change the current *Joystick mode*.

Hint: When SHUTTLE is delegated, delegated Media Players are reset to the starting point of the current item (or playlist). And when delegated to an M/E with LIVE SET enabled in the LAYERS group, the LiveSet is reset to its default positioning.

When the *MEM* button is held down, pressing a button between 1 and 9 in the selection rows at left causes corresponding operation in the *MEM* bin for the delegated M/E as follows:

- Pressing a button in the DSK/KEY row recalls the corresponding *MEM*.
- Pressing a button in the PGM/A row stores or updates the corresponding *MEM*.
- Pressing a button in the PREV/B row clears the corresponding *MEM*.

Section 6.3 TriCaster Flex Control Panel

The TriCaster Flex control panel is the ideal complement to supporting live production systems. It delivers new levels of control and usability while maintaining a convenient, compact footprint. In addition to Media Player and overlay controls, innovative PTZ and live switching features, TriCaster Flex also provides extensive audio control, including integrated audio connectors. And it supports more extensive and user-friendly customization than any of our prior control panels.

In this chapter, we'll first explain how to connect and configure your new control panel, then continue to dig into its powerful controls and features.

6.3.1 CONNECTION AND CONFIGURATION

Here at the basic steps needed to get you up and running with your new control panel.

- Connect the TriCaster Flex control panel to your local network.
- Connect AC power to the control panel.
- Find the TriCaster Flex control panel's IP address.
- Enter the TriCaster Flex unit's IP address into the URL field of a web browser of another a device on your network to access the configuration webpage.
- Check that the most recent firmware is installed.

- Confirm that your live production system software version includes TriCaster Flex support.
- Choose a target system to control and connect to it.

For some people, the bullet points above below will suffice. For the rest of us, though, this section will now continue with more elaborate details about each step.

Note: This equipment must be powered using a 3-prong connection.

Safety

Warning: Risk of Electrical shock. Disconnect all power sources before servicing.

This Protective Earth (ground) symbol identifies terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or terminal of protective earth (ground) electrode.

This indicates that the equipment must be powered using 100 to 240 Volt Alternating Current.

Replacement fuse: 3A 250 V AC DC Fuse Cartridge, Glass Holder 5mm x 20mm, Slow Blow

Your TriCaster Flex comes with an additional fuse in the instance the primary fuse is blown. The fuse box is located on the backplane next to the power input. Simply use a small flathead screwdriver in the slot to the right of the fuse box to pop the cover off. The extra fuse is within the compartment box.

Cable Connections

To begin, please connect your TriCaster Flex control panel unit to your local network. In normal operation, this would be the network your live production system is connected to, but this isn't a requirement for initial setup (such as updating firmware or similar administrative tasks).

Hint: In normal use, the control panel and target live production system should be on the same subnet. Otherwise, for more sophisticated network environments, note that TriCaster Flex also supports NDI Discovery Server.

Afterward, supply power to the TriCaster Flex unit using the AC cord provided. After a few moments, TriCaster Flex will complete its boot process, and briefly display the currently installed firmware version number.

Note: DHCP is enabled on TriCaster Flex by default, so (assuming your network has a DHCP server) the unit will automatically connect to your LAN. If your installation requires static IP addresses, you can set this up later using the TriCaster Flex configuration webpage.

TRICASTER FLEX CONFIGURATION WEBPAGE

Your TriCaster Flex panel has a built-in webserver, which it uses to provide additional configuration settings and tools you can access in the web browser of another device (such as a laptop or tablet) on the same network.

Note: Together, the webpage described here, and the panel's integrated control features host all necessary TriCaster Flex configuration. (The control panel utility provided in the Add-Ons menu described in other sections of the User Guide does not support TriCaster Flex.)

To access this webpage, first press the SHIFT, ALT and BANK buttons on the control panel simultaneously. This will display the unit's local IP address above the program (PGM) buttons. Enter the IP address into the URL field of a web browser on your LAN to open the local TriCaster Flex configuration webpage.

The first time you visit this webpage you'll be guided to create User and Password credentials to continue. Having done that, it's a good idea to check whether newer firmware has been released before continuing. On the TriCaster Flex webpage's Administration tab, expand the Firmware control group to locate the Current Firmware Version number.

LATEST VERSIONS

Then, visit Vizrt's Support>Downloads page to see whether a newer TriCaster Flex firmware version is available. If so, download the update and then click Update Firmware on the TriCaster Flex webpage to install it. (The webpage provides instructions and status messages to guide you during the process, which can take several minutes.)

With current firmware installed, the TriCaster Flex panel is ready to connect – but there's one more consideration: Obviously, your live production system must be compatible with TriCaster Flex and needs to have a software version that includes TriCaster Flex support installed (TriCaster version 8-0, or newer). As required, update your system in the usual manner.

CHOOSING A TARGET

At this point, you're almost ready to connect your TriCaster Flex unit to your live production system.

With one or more supporting live production systems connected to the same network, open a live session; this notifies the TriCaster Flex control panel that a suitable target is available.

Open TriCaster Flex's *Utility* menu (SHIFT + ALT + SET) and observe the four options that appear in the LCD display on the left. Press the first lit button above the word *Connect* to choose an available target system to connect to. (Other options are *Restore* software, *Reboot* the control surface or *Done* to exit).

Notice that the Play (▶), Previous, and Next buttons (|◀ and ▶|) in the Media player controls light up. This is to indicate that you can use these buttons to navigate through a list of qualified systems when several are detected.

To further help identify these systems, their individual IP addresses are also shown in the blue LCD panel to the right, above the firmware version.

Press the flashing green Play button (▶) to select a target from the list, telling TriCaster Flex which live production system you wish to control. This will also close the Utility menu.

Note: TriCaster Flex cannot connect to more than one live production system at a time.

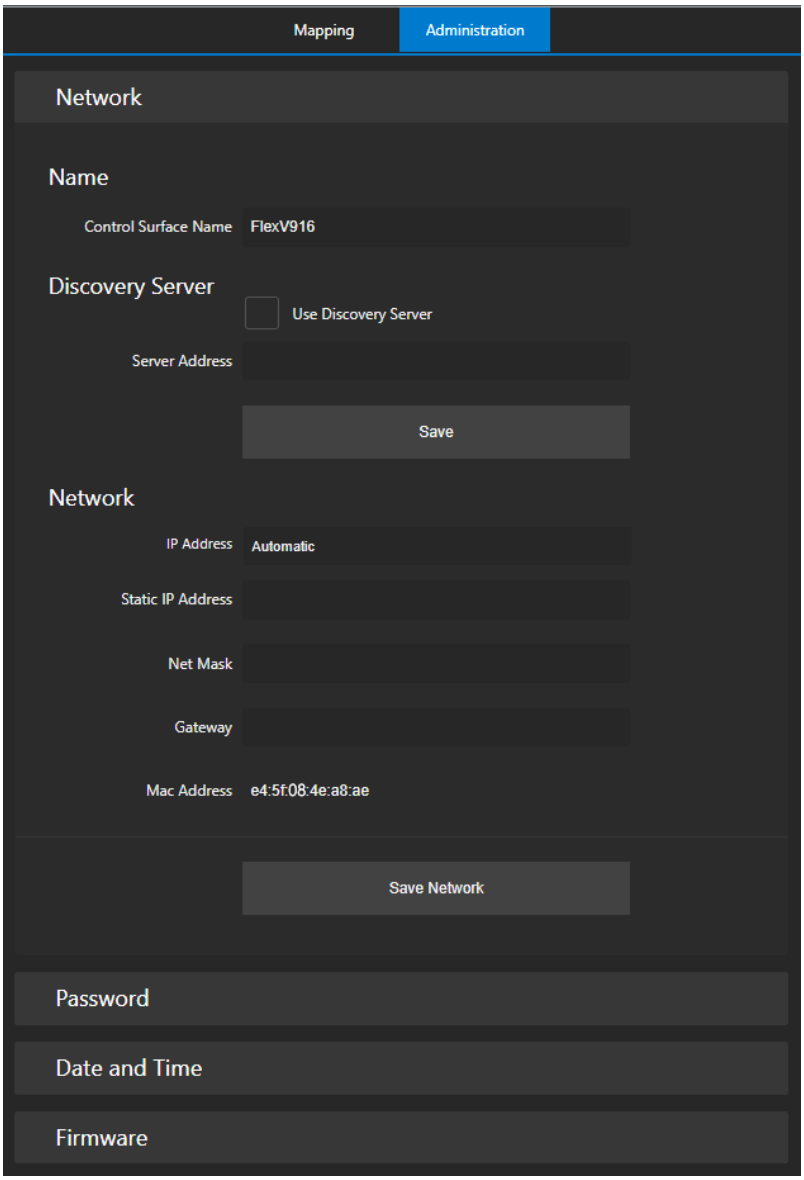
You're all set: The TriCaster Flex display will update to show the button names of any switcher inputs you have configured in your live production session.

If you wish, though, you can continue use the tools provided on the Mapping tab of the TriCaster Flex webpage to customize the order of source buttons in different banks on the TriCaster Flex panel (see the heading labeled Mapping Tab in Section 6.3.4)

6.3.2 TRICASTER FLEX WEBPAGE

We briefly touched on the TriCaster Flex configuration webpage when discussing initial setup and configuration. In this section, we'll take a more in-depth look at its features.

6.3.3 ADMINISTRATION TAB



The *Administration* tab contains all necessary network settings, divided into groups nested under collapsible 'accordion' widgets. The *Control Panel Name* field initially shows your unit's Serial Number, but you can replace this a name of your choosing (the serial number remains visible at the top of the TriCaster Flex webpage).

To connect via an NDI Discovery server, checkmark the *Use Discover Server* simply box, and add your server's IP address in the provided field. Additional *Network* settings, such as *IP Address*, *Static IP Address*, *Net Mask*, *Gateway*, and *Mac Address* are provided in this control group, too.

NOTE: If no DHCP server is detected when TRICASTER FLEX is connected, it automatically fails over to a default static IP address. After a restart, TriCaster Flex will attempt to search for DHCP again.

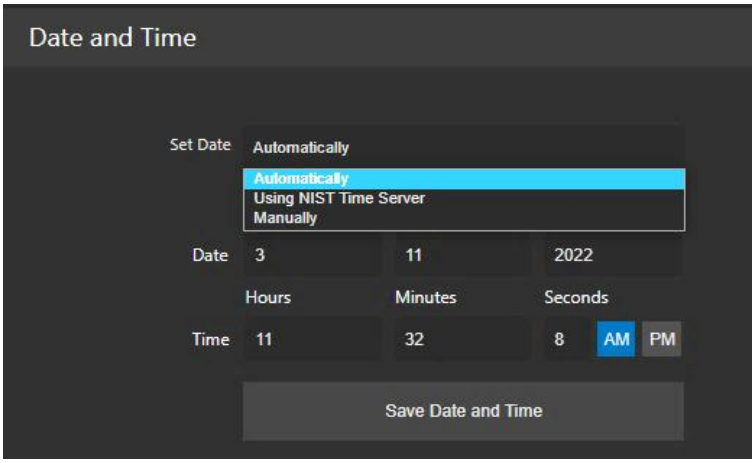
Change the IP Address Mode in the Network setting group to supply a 'permanent' static IP address if this is needed. Click the button below to *Save Network*. A pop-up message will appear to confirm network changes.

PASSWORD

Expand the *Password* control group to enter the password of your choice (twice). Click *Update Password* to confirm your choice.

DATE AND TIME

The *Date and Time* controls allow you to chose from several different methods for setting the date and time, using the combo box widget. Click on the *Set Date* drop-down menu to choose between *Automatically*, *Using NIST Time Server,* or *Manually*:



The default option is ***Automatically,*** will allow the system to set the time. Be sure to click *Save Date and Time*.

Using ***NIST Time Server*** uses the complex suite of algorithms that is defined in the NTP (Network Time Protocol) specifications to ensure that clocks on computers throughout a network are as accurate as possible. Once complete, click Save Date and Time.

A **Manual** option is offered for those who need it. Once completing your entry, click Save Date and Time.

FIRMWARE

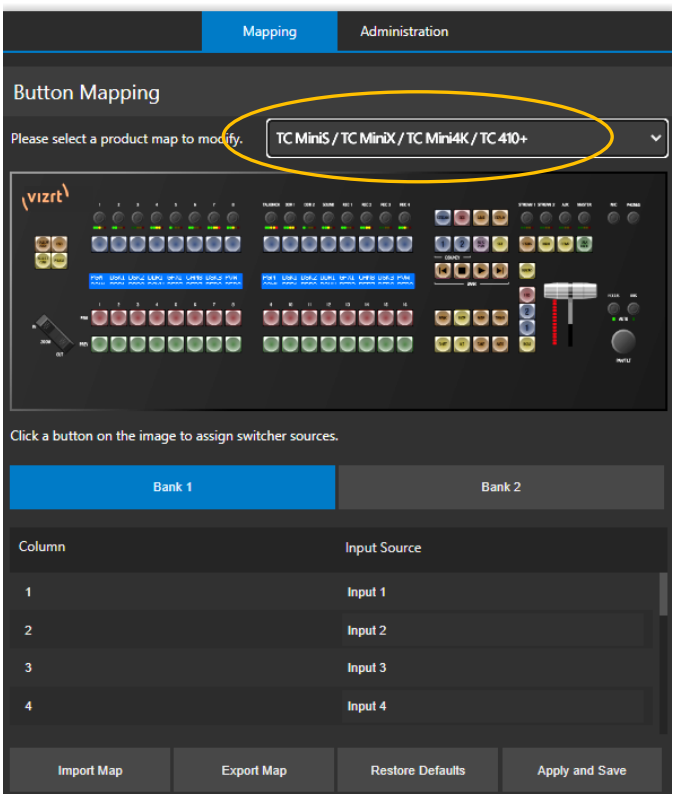
In the Firmware panel, the Current Firmware Version is displayed with options to Choose Firmware File and Update Firmware as discussed under Latest Versions.

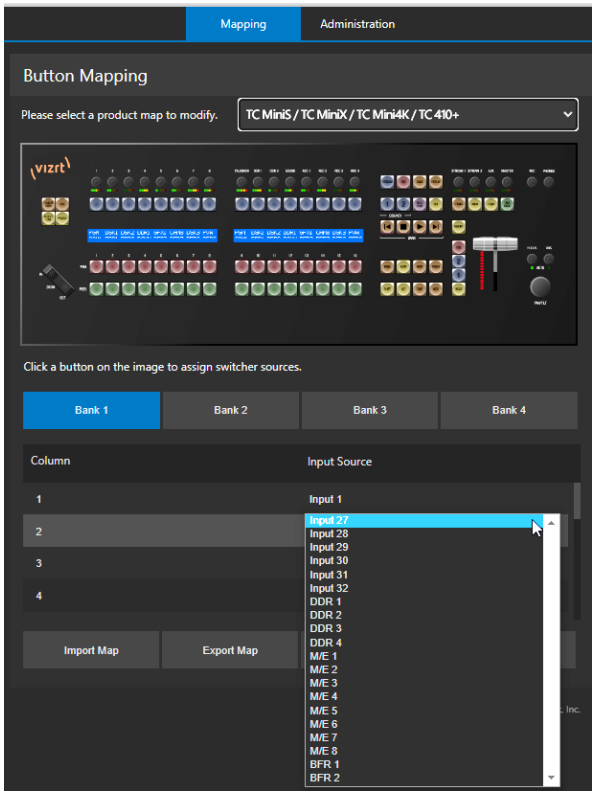
6.3.4 MAPPING TAB

The *Button Mapping* configuration panel displays a graphic of the Control Panel you are editing. The *Bank* buttons let you to determine which sources are in which button bank. Choose the button map appropriate for the Product you wish to control using the menu at the top of the page.

The number of banks shown on the webpage reflects the product you select. For example, the web interface when you chose "TC Mini Go (Default Map only) / TC Mini X/ Mini 4K/ TC 410+" this option provides controls for mapping *Bank 1* and *Bank 2*.

The drop-down menu offers more options such as TC1, TC1 Pro TC2 Elite and TriCaster Vectar Plus (see 6.3.6 Switcher for more information assigning *Banks*).





Clicking on the Input Source column will open all the available inputs to choose from to map your control surface as you wish. As you make your selections, the buttons light up on the graphic of the control panel in the UI. When done, click *Apply and Save;* a pop-up will appear to confirm success.

Note: If the Control panel is connected to a TriCaster when Apply and Save is clicked, the control panel must reconnect. Afterward, the control panel will automatically load the Bank profile corresponding to the model connected.

Import/Export Map and *Restore Defaults* buttons perform just as you would expect by importing/exporting map configurations and resetting to default. In this manner, you can easily switch between mapping configurations you have prepared in advance and stored for different productions or other purposes.

If you prefer to *Restore Defaults*, you will receive a confirmation message to confirm the restore was successful. After clicking *Apply and Save* your TriCaster Flex will restart with the new mappings applied.

Hint: Clicking the Mapping Tab's Restore Defaults button will restore the working configuration for the key map currently displayed on the Webpage - only.

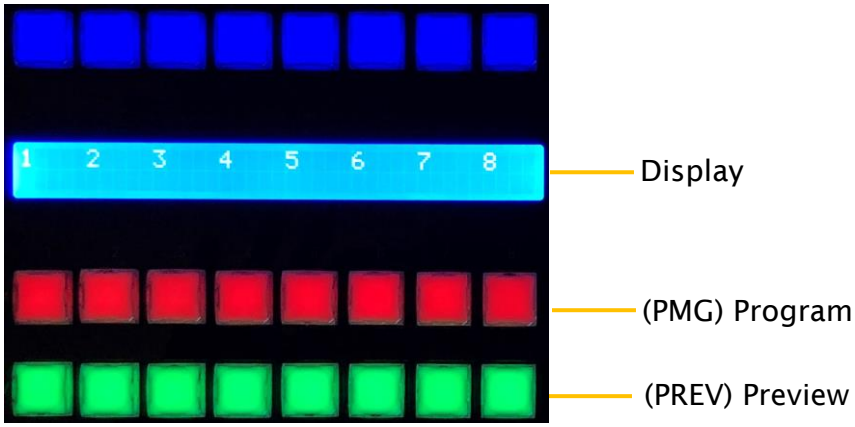
6.3.5 CONTROL LAYOUT

The various control groups are organized into groups as the following:

1 – Switcher
2 – Display
3 – DSK/KEY Row
4 – Audio Connections
5 – Qualifier & Action Group
6 – Media Group
7 – T-Bar
8 – Mini Joystick, Focus and Iris
9 – Zoom/Joystick Delegates Group
10 – Zoom rocker

- Yellow buttons typically work as qualifiers and require another selection to do anything.
- Amber buttons are action buttons, and immediately perform an operation, setting or selection.
- Button illumination brightens when the button is pressed (or are in an On/Selected state).

DISPLAY



TriCaster Flex control panel features helpful indicators and system feedback by means of illuminated displays.

- The blue LCD panel just below the *KEY* row shows labels identifying the source selection that would result from pressing a button in the same column.
- PGM/PREV – A/B row lighting color follows the UI colors for the delegated bus (Switcher or M/E).

6.3.6 SWITCHER

BANK

The *Switcher* crosspoints of TriCaster systems are organized in banks comprising between 8 and 32 columns (varies by model).

- Holding down BANK shows the opposite BANK in the LCD panel temporarily (on release, TriCaster Flex reverts to the original Bank).
- Add SHIFT to cycle backwards.
- Double punch BANK to latch to the new Bank.

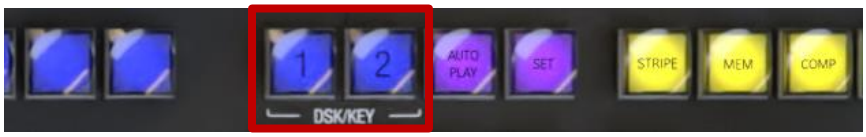
Hint: For models with 3 or 4 BANKS, double punching repeatedly to advance can be tedious. As an alternative, press ALT + BANK to pick a Bank directly using the Program row.

The default Switcher mapping by model is shown below:

TriCaster Model	Bank 1	Bank 2	Bank 3	Bank 4
TC Mini S TC Mini X TC Mini 4K TC 410 Plus	Input 1-8, DDR 1-2, GFX 1-2, M/E 1-4	Buffer 1-15 BLACK		
TC1/ TC1 Pro	Input 1-8, DDR 1-2, GFX 1-2, M/E 1-4	Input 9-16, DDR 1-2, GFX 1-2, M/E 1-4	Buffer 1-15, BLACK	
TC2 Elite	Input 1-12, DDR 1-4, M/E 1-8	Input 13-24, DDR 1-4, M/E 1-8	Input 25-32, Buffer 1-15, BLACK	
TriCaster Vectar TriCaster Vizion	Input 1-12, DDR 1-4, M/E 1-8	Input 13-36	Input 37-44, Buffer 1-15, BLACK	

DSK/KEY

Pressing the DSK/KEY buttons, labeled 1 and 2, delegates or assigns the buttons in the 16-button *KEY* selection row to the left to the corresponding DSK/KEY layer(s) for the current bus (MAIN or M/E (1-n).



Row delegates for DSK/KEY 3 & 4:

- Press SHIFT + 1 to toggle DSK3/Key3 (the DSK 1 button pulses slowly when DSK 3 is delegated. If *both* DSK/KEY 1 and DSK/KEY 3 are delegated, the button pulses faster).
- Press SHIFT + 2 to toggle DSK4/Key4 (the DSK 2 button pulses slowly when DSK 4 is delegated. If *both* DSK/KEY 2 and DSK/KEY 4 are delegated, the button pulses faster).

STRIPE

Holding down the STRIPE button allows the Switcher and Transition control groups to be delegated to MAIN, M/E 1-n, (varies by model) or *Pre-Viz* using the LCD display and PGM row buttons.

MEM AND COMP

When the *MEM* button is held down, the first 9 columns in the displays update to list the names of *MEM*s for the bus(ses) delegated to the stripe. Punching a button in the selection row below a *MEM* name recalls the corresponding preset for the bus assigned to the stripe.

When the *COMP* button is held down, the first 16 columns in the display update to the list the names of COMPs for the delegated buss(es).

- To clear a MEM/COMP, press a button (1-16) in the DSK/KEY row.
- To recall a MEM/COMP, press a button (1-16) in the PGM/A row.
- To store (or update) a MEM/COMP, press a button (1-16) in the PREV/B row.

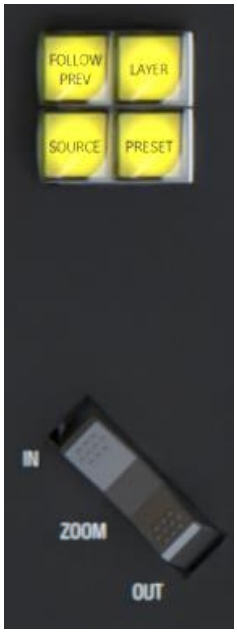
6.3.7 PTZ CONTROLS

Depending on the TriCaster model and feature set, PTZ (pan-tilt-zoom) style joystick operations are not limited to 'real' PTZ cameras. Static cameras, *Media Players*, and *Buffers* are among the different source types that may benefit from 'virtual PTZ' functionality.

The current Zoom/Joystick delegate state is fully independent of the Stripe Delegate (and is always based on either FOLLOW PREV or SOURCE).

CONTROL BUTTON GROUP

FOLLOW PREV



Follow Preview is probably the most useful joystick delegate mode. You will likely not be surprised to learn that, when enabled (as is the default in new sessions), the Zoom/Joystick delegate state tracks your current PREV row selection.

SOURCE

This button is an alternative to *Follow Preview*.

- While SOURCE is pressed, the PGM row button for the current selection is lit (only sources in the current Bank are shown; change banks if necessary to access other sources).
- Naturally, pressing a different button delegates the Zoom/Joystick controls to control the new source.

LAYER

The LAYER button delegate modes let you further refine the target for your Zoom/Joystick operations.

Depending on the controlled source type, the LAYER display shows a list of controllable layer options. The layer list shown at any time varies both by selected source type and by product, but will be comprised of appropriate entries from those listed below:

- BKGD
- DSK 1
- DSK 2
- DSK 3
- DSK 4
- LAYER A
- LAYER B
- LAYER C
- LAYER D
- KEY 1
- KEY 2
- KEY 3
- KEY 4

NOTE: The Main DSK layers are not available when the Zoom/Joystick controls are delegated to a specific Switcher source by either the FOLLOW PREV or SOURCE buttons. To reveal these layer options for selection, first double-punch the Source button, then press the LAYER button.

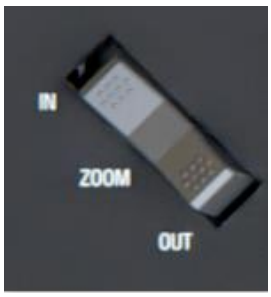
PRESET

In addition to manually controlling the PTZ camera with the *Joystick*, of course, you will often want to store and recall *PTZ presets*.

- Hold down to list presets on the LCD at right.

- To clear a preset, press (1-16) in the KEY row.
- To recall a preset for the delegated source, press a button (1-16) in the PGM row.
- To store (or update) a preset, press (1-16) in the PREV row.

ZOOM ROCKER



This control works as you'd expect: Zoom in and out by rocking forward and backward.

6.3.8 PAN/TILT

The Mini-joystick pans/tilts delegated PTZ Cameras.

FOCUS/IRIS KNOBS

These knobs sit to the right of the joystick, push to toggle auto-focus or auto-iris (exposure). The LED is lit when AUTO is enabled for FOCUS or IRIS.

6.3.9 TRANSITIONS

The Delegate buttons determine which players are governed by operations in this group. Multi-selection is supported.

- Delegate buttons (BKGD, (DSK/KEY) 1, (DSK/KEY) 2. Press SHIFT with button 1 or 2 to delegate DSK/KEY 3 and 4, when supported.

FTB

To perform a *Fade to Black* operation, press *SHIFT* + the *FTB* button (the SHIFT button is required as a safety measure, since FTB is a somewhat dangerous operation). Revert to normal output by pressing *FTB* alone.

- SHIFT flashes if FTB is pressed without it.
- FTB pulses slowly while on.

Hint: Double-punch any delegate button to remove perform an AUTO on the corresponding layer. (To perform a TAKE instead, assign CUT as the layer's transition effect.)

FADE & TRANS

These two buttons provide a quick way to control the *Transition Bin* selection for the delegated switcher layer(s).

- Pushing *FADE* assigns Crossfade as the effect for the currently delegated layers.
- Push the *TRANS* button to activate the last-used (non-Fade) Transition effect to the currently delegated layers.
- Long Press of the TRANS button will bring up a list of the nine available transitions.

RATE

Press the RATE button and the LCD display will show SLOW - MEDIUM – FAST options for the effect assigned to the selected delegate(s); use PGM row buttons to select.

6.3.10 T-BAR

The T-Bar is perhaps the most recognizable component of a professional video control panel, and arguably one of the most important. The T-Bar can manually be pulled to modify the progress of a transition between delegated video layers. An LED in the nearby vertical row displays the percent of completion of the current effect.

- LEDs light progressively from top-to-bottom or bottom-to-top depending on the direction the T-Bar must travel to complete the currently delegated effect.

TAKE & AUTO

The *TAKE* and *AUTO* buttons perform a cut or transition respectively, affecting only the currently delegated video layers.

Hint: To quickly TAKE/ AUTO any individual layer, double punch its Layer Delegate button.

- Double-punch BKGD-> auto Background
- Double-punch 1 -> auto DSK 1
- Double-punch 2 -> auto DSK 2
- Shift + double-punch 1 -> auto DSK 3
- Shift + double-punch 2 -> auto DSK 4
- For an individual Take, set the layer's effect to CUT (effect bin slot 1)

6.3.11 AUDIO FEATURES

BACKPLANE CONNECTIONS

From left to right you will find ports for DISPLAY, 2 USB, and the ETHERNET port. These are followed by line level inputs for TALKBACK, MIC, and PHONES (headphones). Lastly, two pairs of line level AUDIO IN and two pairs of AUDIO OUT connectors are provided.

VOLUME KNOBS

TriCaster Flex has taken audio features to the next level. In most control panels, operating the audio mixer requires you to access the UI in your live production system. A helpful new implementation of *Volume Knobs* on TriCaster Flex (at the very top of the control panel) give you fingertip access to control audio levels for *Audio Mixer* inputs and output busses as follows:

- IN 1-8
- TALKBACK
- DDR 1, 2
- SOUND
- REC 1-4

Hint: The LCD lists other Switcher sources with recording enabled when you hold down REPLAY.

- STREAM 1, 2
- AUX
- MASTER
- MIC and PHONES
- MUTE/UNMUTE
- VU Meters (LED colors follow the UI meters, with the last (RED) LED reserved to indicate clipping).
- SOLO (For sources supporting Solo, press ALT and the associated Volume knob to toggle Solo mode. To perform multi-selections, SHIFT + Alt + KNOB).

In addition to adjusting the volume levels, push a *Volume Knob* to toggle mute/ unmute the channel. Record options have enable/ disable AGC (audio gain control) without having to go into the Output Configuration panel to make those changes.

TALK BACK

The button input labeled TALK BACK serves a special purpose, providing a way to converse with remote callers off-air (i.e., without intruding into your live program).

- *TALK BACK* is a PTT button (Push-to-Talk)
  - Hold it down to activate the *TALKBACK* feature, sending the audio source designated in the UI to all Mixer connections with *TALKBACK* capability.
  - Double-punch *TALK BACK* to lock it ON (the button will pulse light in this state).

6.3.12 STREAM, CAPTURE AND REPLAY

STREAM & RECORD

- *STREAM* - Push to enable or disable TriCaster's live streaming feature.
- *RECORD* - Pressing this button enables TriCaster's *Record* feature.

Note: As a safety measure, pressing the REC button when recording is underway does not stop recording. Instead, the SHIFT button flashes to reminds you that you must hold it down at the same time as pushing REC to end recording.

GRAB

GRAB is a qualifier button:

- Hold down GRAB and punch a PGM row button to grab the associated source.
- To grab from Mix 1-(4 or 8, varies by model), punch the corresponding numbered button in the PREV row.

REPLAY

Hold down REPLAY to list Instant Replay enabled sources by name on the LCD display.

- The LCD(s) will list the enabled *Switcher* sources starting from the left, followed by any recorders enabled in the *Record* tab in Output Configuration panel.
- Punch the PGM row button for the desired recorder source you wish to show on as an instant replay.

Note: Instant Replay uses the Show On feature of the DDR designated in the Replay Configuration menu. As such, the replay clip can be shown on PGM or an M/E, or even an M/E on PGM.

Or defer playback of the instant replay as follows:

- Add the replay clip to the DDR playlist without playing it by clicking the source's PREV B/D row button (with REPLAY held down).
- When you're ready to trigger the instant replay, press SHIFT + AUTO to initiate the replay DDR's 'Show On' operation.
- In either case above (instant or deferred replay), double the length of the replay by double-punching the recorder's button.

6.3.13 MACRO

- On TriCaster's *Live Desktop*, open the *Macro Configuration Editor* (see Section 4.1 Macro Configuration)
- Select the macro you wish to assign in the onscreen lister.
- Click the mouse in the *Listen* field at bottom left.
- Hold down the *MACRO* button and press a suitable button on the control panel.

Hint: To clear an assigned macro from a button, while holding down MACRO, double-punch the button you wish to clear.

6.3.14 MEDIA PLAYER GROUP

This control group provides convenient control over TriCaster's most important Media Player functions and configuration options.

SET

Press to show (from right to left):

- MEM names for slots 1-12, LOOP, DDR 1-2, and Sound in the displays on the left. (PGM row buttons light to show the current selections when SET is pressed).
- Punch a button in the PGM row at left to:
  - Delegate the MEDIA group controls to the media player specified.
  - Or to apply a MEM (1-10) to the currently delegated media player
  - Or to Toggle Loop mode

AUTO PLAY

Click button to toggle *Autoplay* mode for the delegated players (button is lit when Autoplay mode is on).

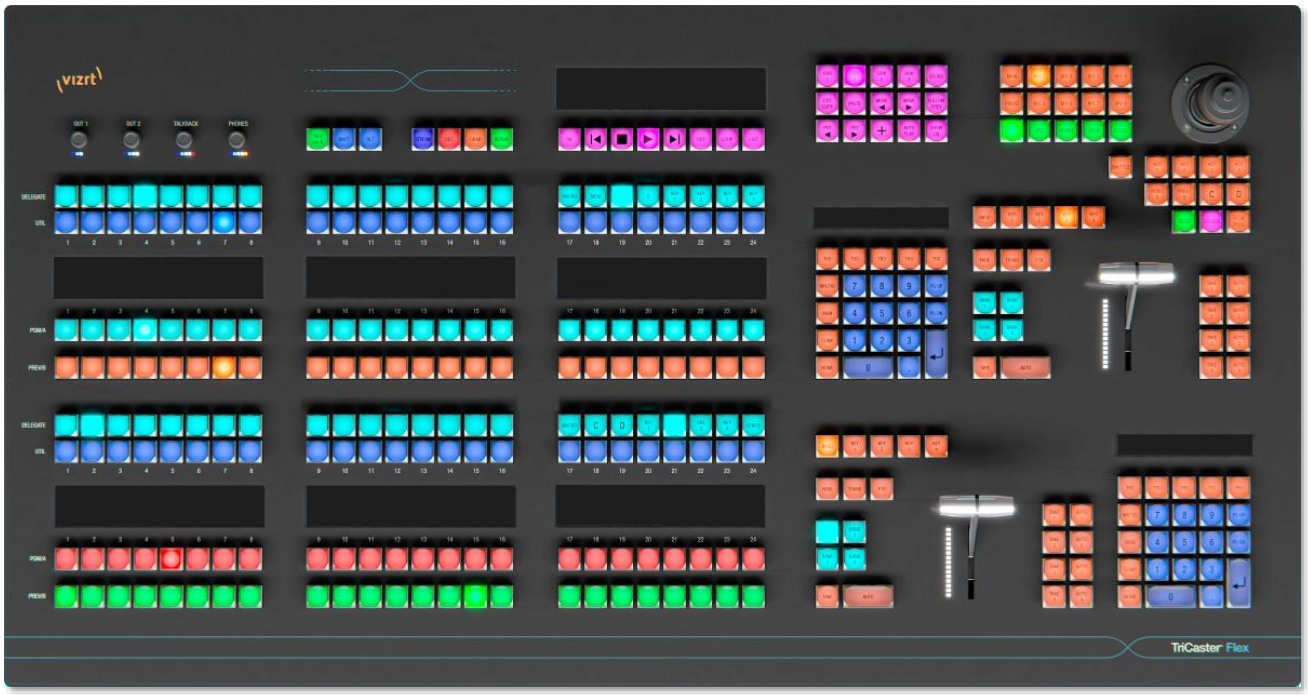
PLAY, STOP, PREV & NEXT

- PLAY - Push to initiate playback for delegated *Media Players*.

- STOP - Push once to end playback for delegated *Media Players*; push a second time to return to the start position. (This operation respects the *Single* setting for individual *Media Players)*
- PREV - Press this button to go to the previous playlist entry in delegated *Media Players*. (The selection cycles to the last playlist entry when necessary.)
- NEXT - Push this button to go to the next playlist entry in delegated *Media Players*. (The selection cycles to the first playlist entry when necessary.)

Section 6.4 TriCaster Flex Dual Control Panel

The TriCaster Flex Dual is everything its smaller sibling is but much more yet doing so with a relatively compact physical footprint suitable to many environments. More powerful and sophisticated shows call for the increased capacity provided by a somewhat less space-constrained two-stripe surface. The TriCaster Flex Dual offers that and more, including standard joystick control and extensive integrated configuration features.



6.4.1 CONNECTION AND CONFIGURATION

SAFETY

Warning: Risk of Electrical shock. Disconnect all power sources before servicing.

This Protective Earth (ground) symbol identifies terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or terminal of protective earth (ground) electrode.

This indicates that the equipment must be powered using 100 to 240 Volt Alternating Current.

Replacement fuse: 3A 250 V AC DC Fuse Cartridge, Glass Holder 5mm x 20mm, Slow Blow.

Your TriCaster Flex Dual comes with an additional fuse in the instance the primary fuse is blown. The fuse box is located on the backplane next to the power input. Simply use a small flathead screwdriver in the slot to the right of the fuse box to pop the cover off. The extra fuse is within the compartment box.

CABLE CONNECTIONS

To begin, connect your TriCaster Flex Dual control panel unit to your local network. In normal operation, this would be the network your live production system is connected to, but this isn't a requirement for initial setup (such as updating firmware or similar administrative tasks).

Hint: In normal use, the control panel and target live production system should be on the same subnet. Otherwise, for more sophisticated network environments, note that TriCaster Flex also supports NDI Discovery Server.

Afterward, supply power to the TriCaster Flex Dual unit using the AC cord provided. After a few moments, Flex will complete its boot process and briefly display the currently installed firmware version number.

Note: DHCP is enabled on TriCaster Flex by default, so (assuming your network has a DHCP server) the unit will automatically connect to your LAN. If your installation requires static IP addresses, you can set this up later using the Flex configuration webpage. (For details, see the Network control group in Section 6.3.3).

FLEX DUAL CONFIGURATION WEBPAGE

Your TriCaster Flex Dual panel has a built-in webserver, which it uses to provide additional configuration settings and tools you can access in the web browser of another device (such as a laptop or tablet) on the same network.

Note: Together, the webpage described here, and the panel's integrated control features host all necessary TriCaster Flex Dual configuration. (The control panel utility provided in the Add-Ons menu described in other sections of the User Guide does not support TriCaster Flex Dual.)

To access this webpage, press the INFO button *with* SHIFT, the INFO button is the top-left button on the multipad for Stripe 1 and the SHIFT button is the second-left button on the top row. In the same LCD display above the multipad, the IP address of the control panel will appear along with the latest firmware. Press the HOME button to clear this information.

INFO button

The first time you visit this webpage you'll be guided to create User and Password credentials to continue. Having done that, it's a good idea to check whether newer firmware has been released before continuing. On the Flex webpage's Administration tab, expand the Firmware control group to locate the Current Firmware Version number.

Latest Versions

Then, visit Vizrt's Support>Downloads page to see whether a newer Flex Dual firmware version is available. If so, download the update and then click Update Firmware on the Flex webpage to install it. (The webpage provides instructions and status messages to guide you during the process, which can take several minutes.) You will receive a pop-up confirmation message once firmware has been updated successfully.

With current firmware installed, the Flex Dual panel is ready to connect – but there's one more consideration: Obviously, your live production system must be compatible with Flex Dual and needs to have a software version that includes Flex Dual support installed (TriCaster version 8-2, or newer). As required, update your system in the usual manner.

CHOOSING A LIVE PRODUCTION SYSTEM

To connect TriCaster Flex Dual to a live production system, let's first discuss the UTIL (Utility) button features. The UTIL button is located on the top-left button in the multi-pad for Stripe 2. Press the UTIL button *with* SHIFT and the second line of the LCD updates to show UTIL menu options for the top-row buttons as follows:

- CONN (Connect) – The LCD lists detected systems or "Not Connect"
- RSTR (Restore) – To restore the local control panel unit to factory defaults
- REBT (Reboot) – To reboot the local control panel unit
- To navigate through a list of qualified and connected systems, press PgUP/Dn and to locate the unit you wish to control, and press ENTER to select it (and close the Utility menu).

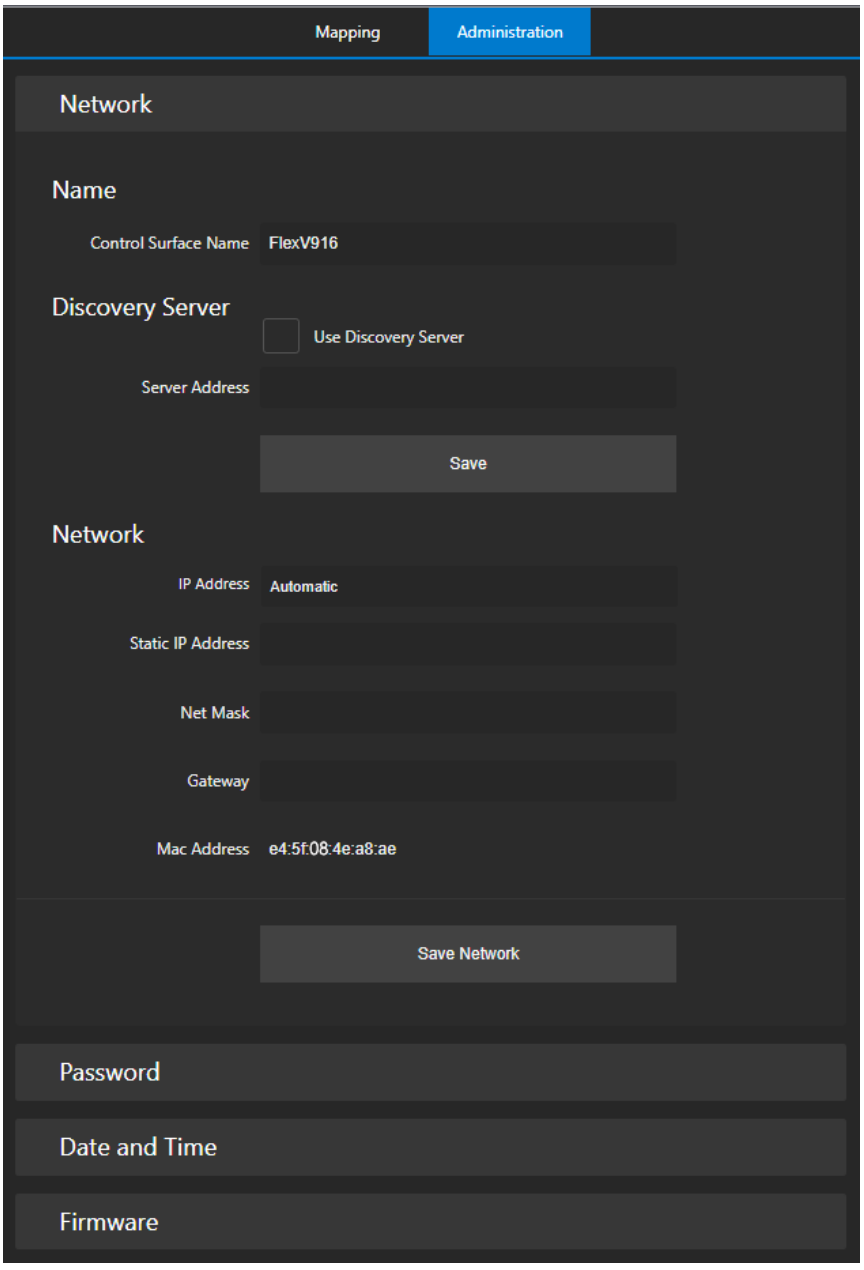
Note: Flex Dual cannot connect to more than one live production system at a time.

Once you have selected your live production system, Flex Dual updates to show the button names of any switcher inputs you have configured in your live production system. If you wish, you can continue to use the tools provided on the Mapping tab of the Flex Dual webpage to customize the order of source buttons in different banks on the Flex Dual panel.

6.4.2 TRICASTER FLEX DUAL WEBPAGE

We briefly touched on the Flex Dual configuration webpage when discussing initial setup and configuration. In this section, we'll take a more in-depth look at its features.

ADMINISTRATION TAB



The *Administration* tab contains all necessary network settings grouped and nested under collapsible 'accordion' widgets. Under the NDI menu, the *Control Surface Name* field initially shows your unit's Serial Number, but you can replace this a name of your choosing (the serial number remains visible at the top of the TriCaster Flex Dual webpage).

To connect via an NDI Discovery server, checkmark the *Use Discover Server* box, and add your server's IP address in the provided field. For additional measure, a *Send Group* (or groups) option has been added so you have more control of who can connect to the audio output from TriCaster Flex units.

Under *Network,* settings such as *IP Address*, *Static IP Address*, *Net Mask*, *Gateway*, and *Mac Address* are provided in this control group.

NOTE: If no DHCP server is detected when Flex Dual is connected, it automatically fails over to a default static IP address. After a restart, Flex Dual will attempt to search for DHCP again.

Change the IP Address Mode in the Network setting group to supply a 'permanent' static IP address if this is needed. Click the button below to *Save Network*. A pop-up message will appear to confirm network changes.

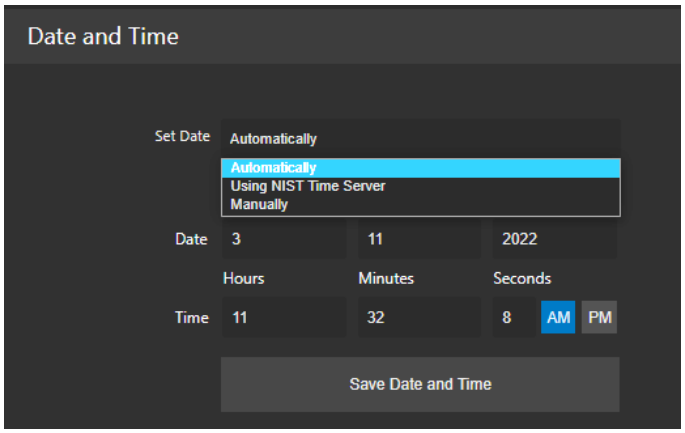
PASSWORD

Expand the *Password* control group to enter the password of your choice (twice). Click *Update Password* to confirm your choice.

DATE AND TIME

The *Date and Time* controls allow you to chose from several different methods for setting the date and time, using the combo box widget. Click on the *Set Date* drop-down menu to choose between *Automatically*, *Using NIST Time Server,* or *Manually*.

The default option is ***Automatically,*** will allow the system to set the time. Be sure to click *Save Date and Time*.



Using ***NIST Time Server*** uses the complex suite of algorithms that is defined in the NTP Network Time Protocol) specifications to ensure that clocks on computers throughout a network are as accurate as possible. Once complete, click *Save Date and Time.*

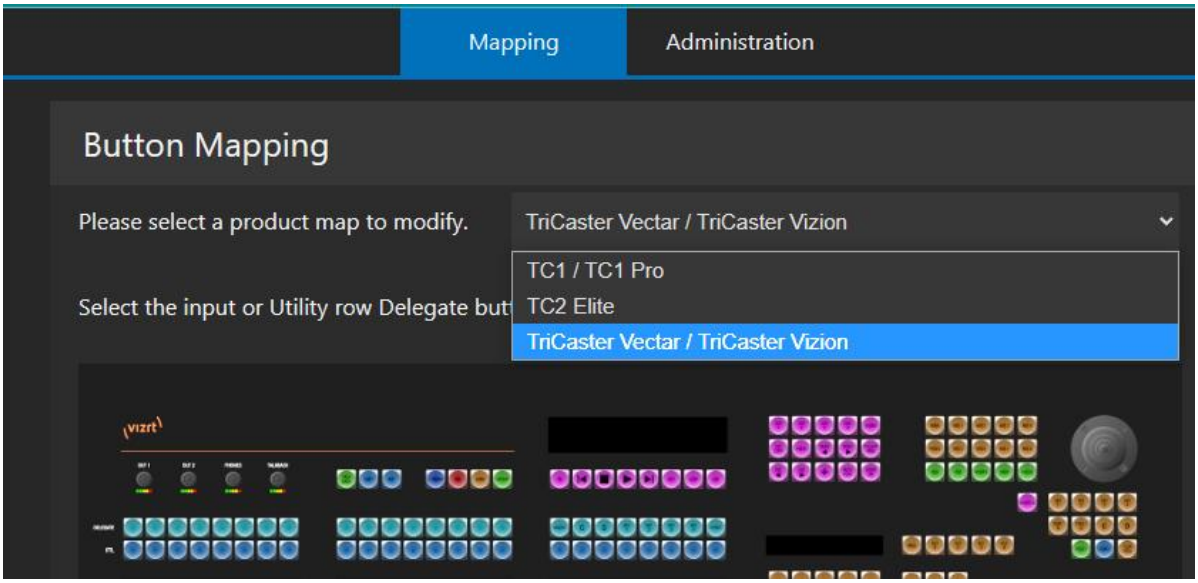
A ***Manual*** option is offered for those who need it. Once completing your entry, click Save Date and Time.

FIRMWARE

In the *Firmware* panel, the *Current Firmware Version* is displayed with options to *Choose Firmware File* and *Update Firmware* as discussed in 6.4.1, under Latest Versions.

TRICASTER PRODUCT SELECTION

The Mapping webpage tab is 'product agnostic,' allowing you to create and store mapping configurations for various TriCaster models.

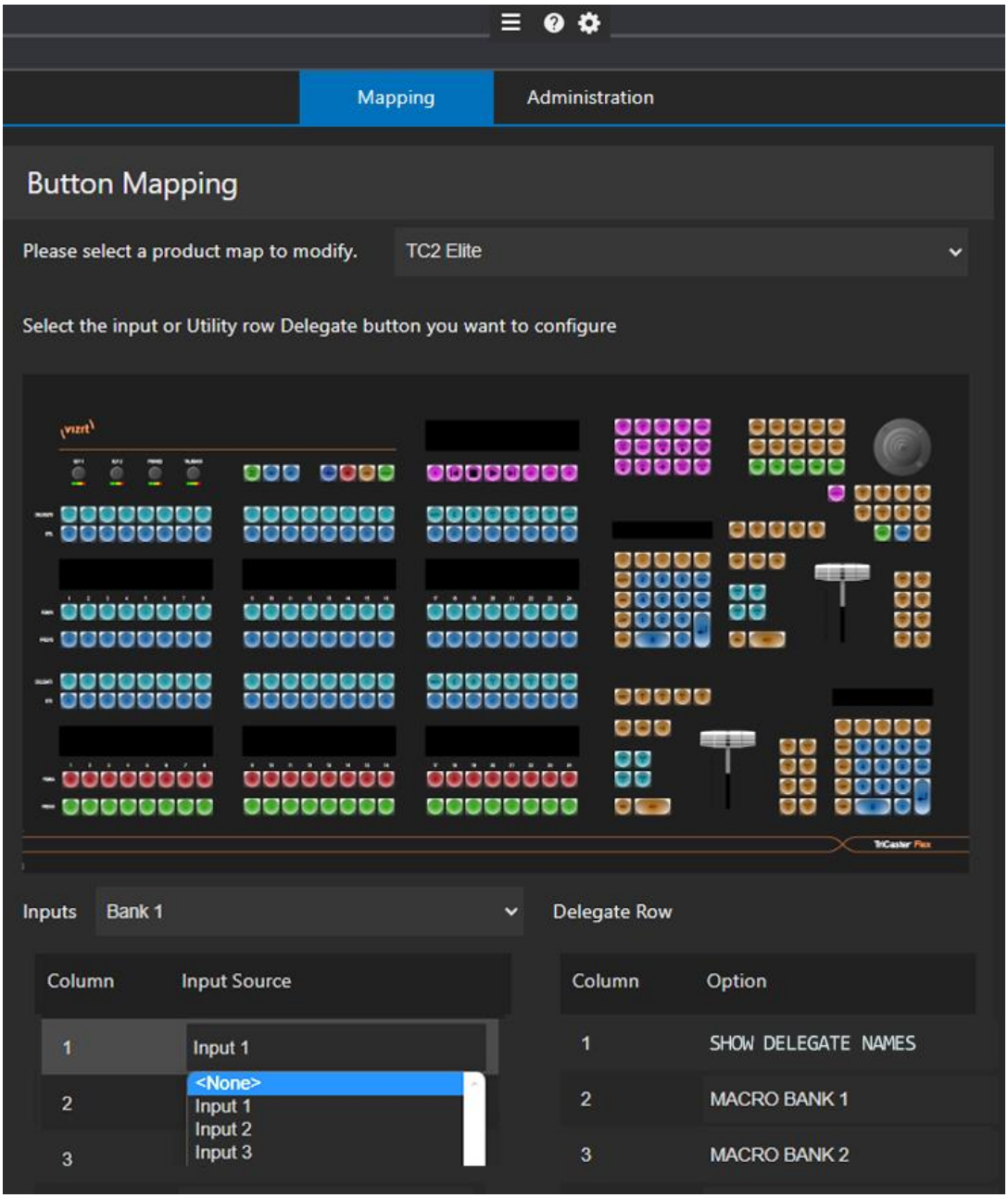


- Select a product type using a menu at the top of the mapping page. Use the tools provided to create a custom configuration, and store (or export) that configuration for use with the associated TriCaster type.
- The mapping options provided for each TriCaster model group listed in the Button Mapping menu vary according to the capabilities of that selection.
- *The target TriCaster need not actually be connected* to the surface to create and manage Flex Dual configurations.

MAPPING TAB

The *Button Mapping* configuration panel displays a graphic of the Control Panel you are editing. The mapping tab shows a graphic representation of both stripes on the control surface.

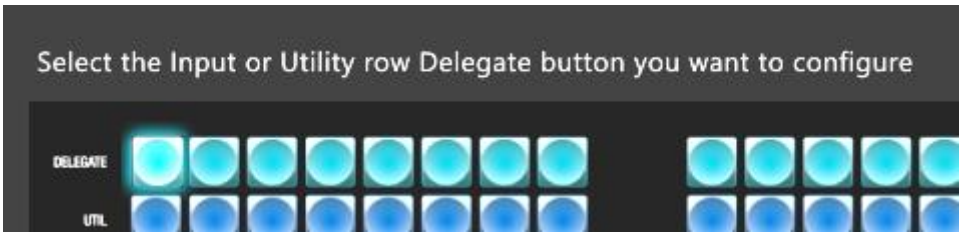
Below this, the webpage hosts two tabular configuration panes. The control panel image and settings tables are interactive, as described next.



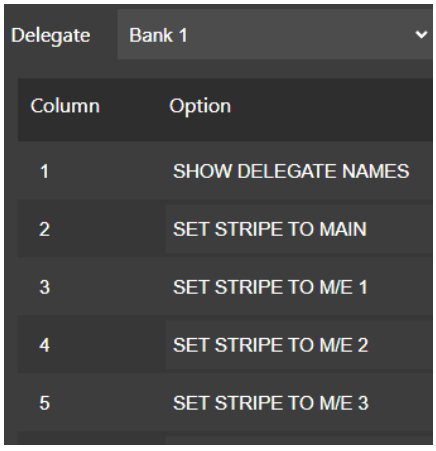
Editing Delegate Buttons

- Delegate row buttons govern the assignment of the UTIL(ity) row buttons beneath it.
    - Delegate row *mapping* for both control panel stripes is always identical.
    - But *selection state* of the Delegate row in each stripe is independent, allowing UTIL row assignments to differ.

- Buttons 17-24 of the Delegate rows are pre-assigned and cannot be edited. Simply enable 'Delegate button edit mode' to set the other Delegate row button assignments for the currently selected product type by:
    - Clicking a (Utility row) Delegate button in the CS image.
        - The selected Delegate button 'lights' to show its selection state.

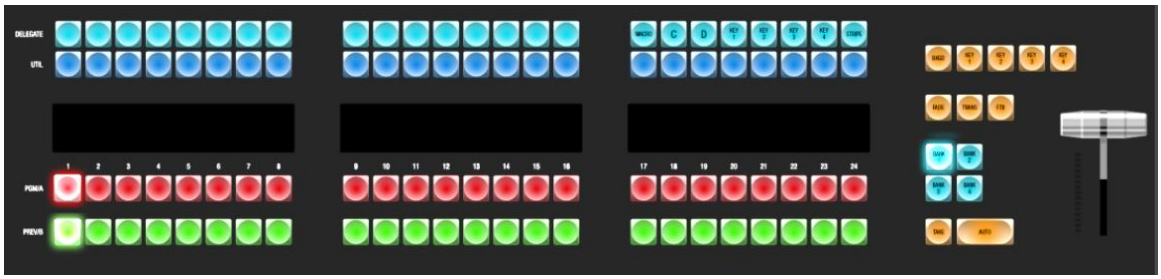


    - Or by clicking the Delegate Row control on the webpage.
    - In 'Delegate button edit mode', the Delegate Row (right-hand) table below is enabled, and the 'Inputs' table is disabled.
- The Delegate Row table entry corresponding to the selected Delegate button in the control panel image is highlighted, and its Option menu gadget is presented.
    - Conversely, clicking a different entry in the Delegate row lister updates the Delegate Row table selection as well as the button selection state shown in the image above.
- Making a selection in the Options column assigns that Utility > Delegate option to the selected button.



NOTE: The Options available for selection will vary according to the feature set of the TriCaster model group selected (please refer to the Features & Specifications table located in Appendix A in the TriCaster Guide).

Editing Inputs

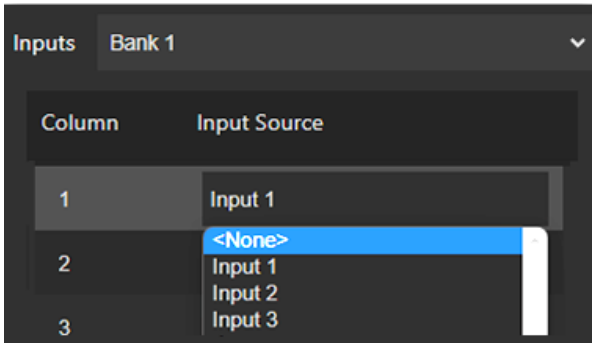


- To edit switcher Input assignments for the currently selected product type, the user enables 'Inputs edit mode' by one of the following means:
    - Clicking a Bank button in the control panel image to designate a switcher input Bank to edit,
    - Or, by clicking a button in either the PGM/A or PREV/B rows in the cs image,
    - Or, by clicking the Bank *menu,* located just above the Inputs table to activate it, then (if necessary) selecting a Bank to edit (the menu and control panel image sync, so either method can be used to select a Bank to edit).

Note: The number of Banks available in this menu varies by product group selection.

    - Or, by clicking the Inputs table itself
    - Clicking an entry in the Inputs menu likewise updates the control panel image selection state.

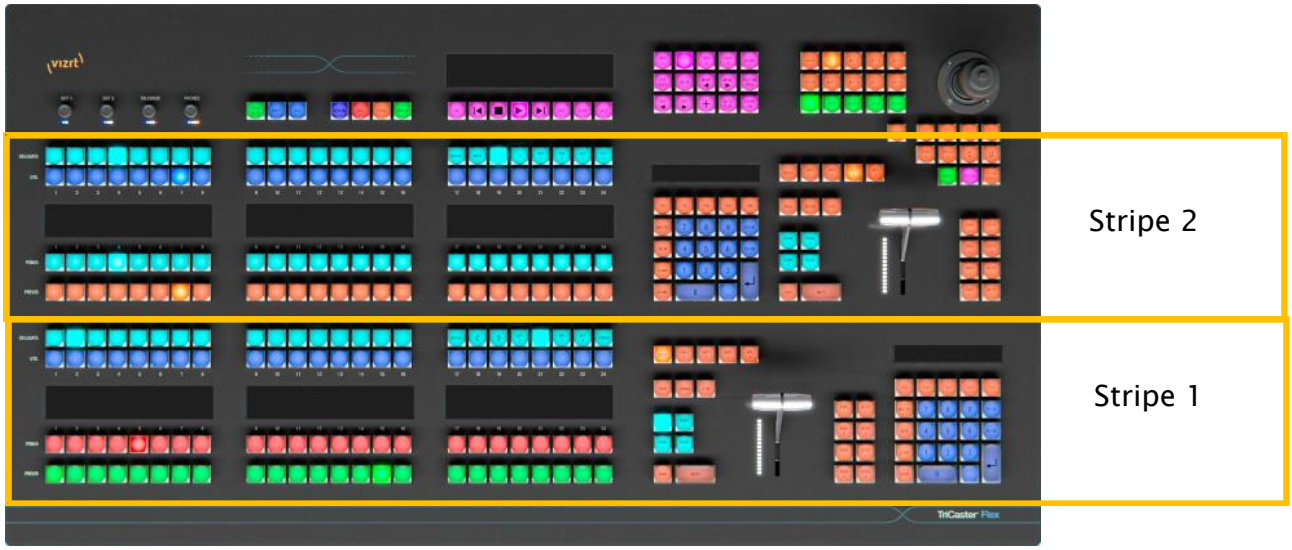
- Clicking the menu gadget in the 'Input Source' column opens a popup menu listing the inputs available for the selected TriCaster model group.
- Making a selection updates the corresponding Input row button mapping.
- The "<None>" option is to assign/map to the controls surface column. Once assigned, these columns will not trigger anything when hit. This feature can be helpful to create a safety area to allow more space in between buttons.



When your Mapping selections have been made, click *Apply and Save*; a pop-up will appear to confirm success.

Mapping tab footer buttons, *Import/Export Map,* and *Restore Defaults* perform just as you would expect by importing/exporting map configurations and resetting to default. In this manner, you can easily switch between mapping configurations you have prepared in advance and stored for different productions or other purposes.

6.4.3 CONTROL LAYOUT



Flex Dual features include:

- 24 assignable crosspoints in 4 Banks
- 2 fully independent stripes
- Assignable UTILITY rows
- 4-Line LCD displays
- 2x T-Bars
- 2x Multi-pads (with individual 2-line LCD displays)
- Full size joystick
- Extended Media Player controls with 4-line LCD display
- 4x rotary knobs for local audio level control

The various control groups are organized into groups as the following:

1 - A&B - Switcher
2 - Media Group
3 - A&B - Transition Groups
4 - A&B - Multi-Purpose Buttons
5 - Joystick
6 - Audio
7 - Talkback
8 – Qualifiers
9 – Stream, Record, Grab & Replay

DISPLAYS

TriCaster Flex Dual control panel features helpful indicators and system feedback by means of illuminated displays.

- The LCD panel (shown below) just below the UTIL row shows labels identifying the currently delegated UTIL row button labels above Switcher source selections that result from pressing a button in the same column.

- PGM/PREV – A/B row lighting color follows the UI colors for the delegated bus (Switcher or M/E).

Delegate Row

Utility Row

Display

Program Row

Preview Row

Another LCD strip appears in the *Media Player* group, displaying the following:

- Clip index and Filename
- Countdown timer and Timecode (when available) for the current playlist selection
- Preset and Audio level
- Comment – text from the clip context menu

6.4.4 SWITCHER

CROSSPOINT BANKS

A set of delegate buttons sit left of the T-Bar, this group is labeled *BANK*. The *Switcher* crosspoints are organized in banks comprising columns. These buttons determine which crosspoint bank is active.

Similarly, *Switcher* sources are presented in banks on Flex Dual's control panel. Press the desired *BANK* button – 1, 2, 3 or 4 – to determine which group of sources is currently delegated to the *Switcher* rows in both stripes. The displays above the selection rows will update accordingly.

Note: For reasons that should be obvious, Bank buttons do not support multi-selection.

- Bank buttons support both momentary (long press and release) and latching (punch) methods.
- When the current selection in any row is not in the active Bank, the corresponding crosspoint and Bank buttons pulse.
- BANK buttons are distinguishable by touch by virtue of 'extra-concave' button caps.

Hint: For models with 3 or 4 BANKS, double punching repeatedly to advance can be tedious. As an alternative, press ALT + BANK to pick a Bank directly using the Program row.

The default Switcher mapping by model is shown below:

TriCaster Model	Bank 1	Bank 2	Bank 3	Bank 4
TC1/ TC1 Pro	Input 1-8, DDR 1-2, GFX 1-2, M/E 1-4	Input 9-16, DDR 1-2, GFX 1-2, M/E 1-4	Buffer 1-15, BLACK	
TC2 Elite	Input 1-12, DDR 1-4, M/E 1-8	Input 13-24, DDR 1-4, M/E 1-8	Input 25-32, Buffer 1-15, BLACK	
TriCaster Vizion TriCaster Vectar	Input 1-12, DDR 1-4, M/E 1-8	Input 13-36	Input 37-44, Buffer 1-15, BLACK	

MACROS: OVERVIEW

It's helpful to have a good understanding of how Flex Dual organizes macro triggers.

- **Local (Switcher bus) triggers:** Each bus (MAIN, M/E 1, etc.) has a unique set of macro triggers that is assigned to the UTIL row buttons when the MACRO delegate is lit.
- **Global triggers:**

    - **Number Pad:** Numeric entries of one, two or three digits (confirmed by pressing ENTER) in either number pad can trigger a macro; and more than that, the two numberpads are independent – so if you assign a macro to one number pad, the same numeric entry can be re-used in the other to trigger a different macro.

    - **BANKS**: Flex Dual allows the 24 buttons in either UTIL row to serve as one-button macro triggers (as discussed in the next section). These triggers are arranged in 8 Banks.

      This allows you, for example, to delegate the UTIL row in one Stripe to one Macro Bank, and the other UTIL row to a different MACRO Bank (or, of course, something else entirely). And since you can assign different Macro Banks to DELEGATE row buttons, it's easy to recall the exact set of macros you need at any time.

UTILITY AND DELEGATE ROWS

The UTIL (Utility) row sits above the LCD display in each stripe. Using buttons in the DLGT (Delegate) row immediately above UTIL, you can assign this row to numerous duties.

Pressing Delegate buttons labeled KEY 1-4, 'delegates' or assigns the buttons in the 24-button *UTIL* button row below to select the source assigned to one or more KEY (or DSK) layers.

Delegate buttons may be either Static (fixed) or custom as follows:

- **Static DLGT buttons (17-24)** – assign the UTIL row to one of the following *modes*:

    - The MACRO button assigns UTIL row buttons to serve as a set of per-Switcher bus (Main, M/E 1, etc.) macro triggers corresponding to the current stripe assignment. For example, there is one set of 24 triggers 'attached' to Main, another to M/E 1, and so on. When MACRO is selected, the set matching the currently stripe delegate is assigned to the UTIL row.

    - Row C or D source selection for an M/E currently delegated to the Stripe.

- KEY 1, 2, 3 or 4 source selection (for the bus currently assigned to the associated Stripe).
- STRIPE delegate (Default) – UTIL buttons 15-24 list MAIN, M/E 1-8, and PREVIZ options; a selection delegates the Stripe to the designated bus.

- **Mappable UTIL>DLGT buttons (1-16)**
  - These buttons can be mapped to various purposes using the mapping webpage.
  - Buttons 9-16 default to: OUT 1, 2, 3, 4, 5, 6, 7 & 8 (NDI Output Routers, when supported by the connected TriCaster).
  - Assign delegate row buttons to directly set the Stripe to a designated Switcher bus such as: MAIN, M/E 1-8 and PREVIZ.

Note: This operation does NOT affect the current UTIL row assignments (with one exception, if the UTIL row delegate is MACRO); rather, it treats this Delegate button as an action button.

- DLGT row button operations can be 'momentary' or 'latched.'
  - Momentary: Hold down a DLGT button (e.g., "STRIPE") to make a quick selection in the UTIL row; the delegate selection reverts to the previous DLGT mode on release following a long press.
  - Or simply punch a DLGT row button (e.g., MACRO) to latch the UTIL row.

Mappable Delegate Options

As discussed above (and earlier in the context of the Mapping Tab of the TriCaster Flex Dual Webpage), the first 16 buttons in the Delegate row can be assigned to many different options – in turn controlling the functions controlled by the Utility row buttons beneath.

Here is a list of the optional assignments of Delegate buttons as provided in the Mapping tab of the webpage, the short name shown on the LCD for that button, and a description of the Utility row features that Delegate option invokes.

SHOW DELEGATE NAMES (DISPLAY: SHOW NAME)

- Show mapped delegate button function labels on the LCD below. This option, which is mapped to the first button in the Utility row by default, is for information purposes; utility row functions are unavailable in this state.

DELEGATE ROW BANKS (DISPLAY: BANK)

Assign Delegates options to any of 8 Delegate Row Banks. Independently assign any Delegate row Banks to each Stripe (for example, when the Delegate row in the first Stripe is on Bank 1, the second Stripe could be hosting Delegate row Bank 7).

DELEGATE ROW BANK 1 (DISPLAY: BANK 1)

- Assign Delegates options to any of 8 Delegate Row Banks.

DELEGATE BANK 2 (DISPLAY: BANK 2)

- Assign Delegates options to any of 8 Delegate Row Banks.

DELEGATE BANK 3 (DISPLAY: BANK#)

- Same as above …

MACRO BANK 1 (DISPLAY: MCRO BNK1)

- Assign the Utility row buttons to serve as triggers for the first of 8 global Macro banks.

Note: Global macro banks are not bound to a specific Switcher bus. For example, if a Delegate row button is assigned to MACRO BANK 7, macros configured in Bank 7 will be assigned to the Utility row in that Stripe when it is active - irrespective of which M/E is currently delegated to that Stripe.

In contrast, if either Stripe is assigned to M/E 2, when the permanent MACRO Delegate row button is lit, the 24 Utility row buttons in that Stripe trigger macros associated with M/E 2.

MACRO BANK 2 (DISPLAY: MCRO BNK2)

- Assign the Utility row buttons to serve as triggers for the second of 8 global Macro banks.

MACRO BANK 3-8, ETC. (DISPLAY: MCRO BNK#)

- As above …

MEDIA PRESET (DISPLAY: PLYR PST)

- Assigns Utility row buttons to call Media Player presets.
- When enabled, the first 5 buttons on the Utility row act as ‘sub-delegates’. Use these to determine which Media Player to address.
- Press another button at right in the same row to load the associated Media Player preset.

M/E MEM (DISPLAY: M/E MEM)

- Assigns Utility row buttons to call a Switcher or M/E MEM
- When enabled, the first 10 buttons on the Utility row act as ‘sub-delegates’. Use these to determine which Switcher bus (MAIN, M/E1-8, or PRE VIZ) to address.
- Press another button on the right in the same row to load a MEM for that bus.

M/E 1-4 COMP (DISPLAY: M/E COMP)

- Assigns Utility row buttons to apply a Switcher or M/E Comps
- When enabled, the first 4 buttons on the Utility row act as ‘sub-delegates’. Use these to determine which Switcher bus (M/E1-4) to address.
- Press another button on the right in the same row to apply a Comp to that bus.
- Press another button on the right in the same row to apply a Comp to that bus.

M/E 5-8 COMP (DISPLAY: M/E COMP)

- Assigns Utility row buttons to apply a Switcher or M/E Comps
- When enabled, the first 5 buttons on the Utility row act as 'sub-delegates'. Use these to determine which Switcher bus (M/E 5-8 plus PREVIZ) to address.
- Press another button on the right in the same row to apply a Comp to that bus.

MIX 1 (DISPLAY: MIX 1)

- Assigns Utility row buttons to select a source for the routed Switcher output labeled MIX 1 in TriCaster's user interface (Utility row button assignments follow the current Switcher BANK delegate, just as in the user interface).

MIX 2 (DISPLAY: MIX 2)

- As above …

MIX ALL (DISPLAY: MIX ALL)

- Assigns Utility row buttons to bring up each MIX output 1-8 (varies by model) and its available sources. Selecting a source from the Utility row changes the video source for the MIX. (Utility row button assignments follow the current Switcher BANK delegate, just as in the user interface).

OUT 1 (DISPLAY: OUT 1)

- Assigns Utility row buttons to select a source for the routed Switcher output labeled OUT 1 in TriCaster's user interface (Utility row button assignments follow the current Switcher BANK delegate, just as in the user interface).

OUT 2-8 (DISPLAY: OUT 2, ETC.)

- As above …

OUT ALL (DISPLAY: OUT ALL)

- Assigns Utility row buttons to all sources for the routed Switcher output labeled OUT 1-8 (varies by model) in TriCaster's user interface (Utility row button assignments follow the current Switcher BANK delegate, just as in the user interface).

BFR 1-5 LAYER PST (DISPLAY: BFR LAYR)

- Assigns Utility row buttons to call Layer presets for a specific Buffer.
- When enabled, the first 5 buttons on the Utility row act as 'sub-delegates'. Use these to determine which Buffer to address.
- Press another button at right in the same row to load the associated Buffer preset.

BFR 6-10 LAYER PST (DISPLAY: BFR LAYR)

- As above …

BFR 11-15 LAYER PST (DISPLAY: BFR LAYR)

- As above …

BFR 1-5 DATA PST (DISPLAY: BFR DATA)

- Assigns Utility row buttons to call Data presets for a specific Buffer.
- When enabled, the first 5 buttons on the Utility row act as 'sub-delegates'. Use these to determine which Buffer to address.
- Press another button at right in the same row to load the associated Buffer preset.

BFR 6-10 DATA PST (DISPLAY: BFR DATA)

- As above …

BFR 11-15 DATA PST (DISPLAY: BFR DATA)

- As above …

TELEPROMPTER (DISPLAY: TELEPROMPTER)

- Assigns Utility row buttons to function as Teleprompter controls such as PREV, STOP, PLAY, NEXT, SPD Dn (Speed Down) and SPD Up (Speed Up).

TOGGLE FEATURE

- Assigns DELEGATE row buttons to easily toggle features per crosspoint: Chroma Key, Proc Amp, and Crop.

TOGGLE RECORDER

- Assign DELEGATE row buttons to toggle RECORD ON/OFF.

NOTE: Selecting REC > ALL toggles recording of all qualified sources (local Record toggle for the source is ON), just like TriCaster's titlebar RECORD button.

TOGGLE MUTE

- Assigns DELEGATE row buttons to easily toggle MUTE feature to MSTR (Master), Aux 1-3 and TALKBACK.

6.4.5 MULTIPAD

A Multipad is provided in each stripe on your TriCaster Flex Dual.

Each Multipad features:

NUMBERPAD ENTRIES

- Are shown on the second line of the display as they are typed.
- *Most* numeric entries require the ENTER key to confirm/apply.
    - e.g., when COMP is pressed that button fully lights, and waits for a number pad entry. Typing "12" + ENTER executes the twelfth COMP stored for the bus currently assigned to the associated Stripe.
- Pressing any button *other than a number, the decimal, or ENTER* drops (clears) the current numeric entry.
- The 5-key is distinguishable by touch by virtue of 'extra-concave' button cap.

MODE BUTTONS

- MACRO, MEM, COMP are radio buttons (i.e., only one can be selected at any time).
    - The active Mode button is fully lit.
    - These buttons determine what subsequent number pad operations do.
    - MACRO, MEM, COMP each take number pad entries as arguments, and do not *require supplemental selections.

- The five buttons in the upper-most row:
    - Are multi-purpose buttons.
    - Are not *physically* labeled; their current function is identified by short labels on line 2 of the LCD.
    - All HOME options that can be assigned to multi-purpose buttons are treated as radio buttons in the Multipad Mode group – like MACRO, MEM, and COMP.
        - e.g., pressing MEM delegates the Multipad to MEM operation, deselecting any other active Multipad Mode button.

MACRO

Flex Dual's Macro features vastly surpass earlier control surfaces. Whereas the latter only supports using buttons as macro triggers with the MACRO button pressed simultaneously, Flex Dual supports both numberpad and one-button macro triggers using the two Utility rows.

> Hint: The Triggers display in the TriCaster's Macro Configuration pane shows which number pad was used to send the trigger as well as the numeric entry.

- Each Numberpad on the control surface is treated independently. Thus, the number pad in the second stripe issues a different trigger than the same digits in the first stripe's number pad.
- Flex Dual supports single, double, or triple-digit entries, the value being confirmed and applied using the ENTER key (this allows entries to be cued in advance).

> Hint: With a number pad in Macro mode, the top-right number pad menu button performs a 'continue_pausedmacro' operation.

MEM

Unlike entries for macro triggering or to call a Comp, any given stripe only supports 9 MEM slots. Thus, ENTER is not required to confirm a numeric entry to call a MEM.

COMP

The COMP workflow is like MEMs but because each Stripe supports 16 Comps, the ENTER key is required to confirm and apply entries of both 1 and 2 two digits.

HOME, Pg Up, Pg Dn

- Pressing HOME will return the top menu level, dropping any incomplete operations and/or numeric entries.
- "Pg Up" and "Pg Dn" buttons traverse menu tiers (one level at a time). This allows for:
    - Selections from options lists

- Allows the option to 'go back' using PgUp (drops any value from the original menu tier that has not yet been acted upon).

6.4.6 MULTI-PURPOSE BUTTONS

The top-level row of buttons in the Multipad are Multi-Purpose buttons that with the associated LCD, comprise a multi-level menu system.

LCD DISPLAY

- Before the surface is connected to a TriCaster, the display is blank.
- When connected to a TriCaster:
  - The top line of the LCD shows the current stripe delegate. As button selections are made, the top line also shows menu 'breadcrumbs'.
  - The second line shows the HOME menu for the multi-purpose buttons.

UTIL/INFO BUTTONS

As mentioned back in the Configuration Webpage section, when the INFO button (top-left button in the multipad for Stripe 1) is pressed with SHIFT, the LCD updates to show the surface's own IP address and firmware version. Press the HOME button (bottom-left button in multiped) to go back to the previous display.

OPTN (OPTION MENU)

Under the **OPTN** (Option) button there are four menu choices that appear in the LCD display MPAD (Mulitpad), DISP (Display), BTN (Button) and LOCK.

When **MPAD** (Multipad) is selected, the current Switcher bus label will show on the display. To allow the Mulitpad to be retargeted to a selected Switcher bus, push "PgUp /PgDn" to scroll through a list of options including; STRIPE (the default), Main, M/E 1, etc. Press ENTER to set.

Note: The top right of the LCD display are "Breadcrumbs that show where you are in the menu.

DISP (Display) or **BTN** (Button) provides three menu choices that appear in the LCD display. Here you can set the illumination to your desired effect.

The fourth option **LOCK** is to lock/unlock the buttons on the control panel. Selecting LOCK lights all currently locked buttons. While LOCK is lit, pressing any control surface button toggles its locked/unlocked state, preventing unintentional changes.

Another option under LOCK is to **LOCK ALL**. When selected in either multipad, the button label above changes to UNLK (Unlocked), with the message "Panel locked - press to UNLK". The button under UNLK will pulse. All other buttons are de-lit (similar to when disconnected, but the connection state remains unchanged). All control panel input other than pressing the pulsing UNLK button is ignored. Press the UNLK button to restore full functionality and returns the Mulitpad to HOME.

Note: The LOCK ALL state is not serialized. On booting/powering the control panel, the unlocked state is always applied.

When LOCK ALL is on, the entire second Multipad is included among the locked controls. Only the first Mulitpad hosts the UNLK button.

EFCT (Effect Menu)

The second option in the Home menu is the **EFCT** (Effect) button. In this menu you can configure the Transition or LiveSet effect for a layer of the bus assigned to the associated Stripe. After pressing the button below EFCT, press BKGD (Background) to select which layer to modify.

Press **SLCT** (Select) to choose an effect. Press PgUP/PgDOWN to scroll through the nine options listed as follows:

- Cut
- Twirl
- Circle (H)
- Noise
- Clouds
- Flash
- Non Additive Fade
- Additive Fade

Press ENTER to confirm selection; to escape, press HOME on the Mulitpad.

Press **RATE** (from EFCT menu) to set effect speed (not available for LiveSet effects). Once you have formatted the rate, press to enter a custom rate.

Press OPTN (from EFCT ->BKGD menu) to toggle **REV** (Reverse) and/or P**PNG** (PingPong) (not available for LiveSet effects).

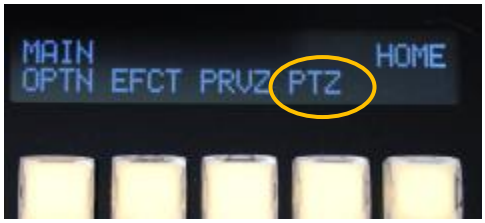
Press OPTN (from EFECT menu) to toggle with **wBKG** (Background Mode).

Press **ZPRI** (from EFECT ->BKGD menu) to bring up the Z-Priority menu. The range of the Priority settings runs from -10 to +10; the default is 0. Press the button below the plus or minus, enter the number on the keypad, followed by the enter button to confirm.

PRVZ (PREVIZ MENU)

Copy the current state of the associated Stripe to **PREVIZ** or PASTE the PREVIZ state to the bus assigned to the Stripe.

PTZ (PTZ/Pan & Scan Menu)



The last button option in the HOME menu is PTZ (PTZ/Pan & Scan). Press FPVW (Follow Preview row) or FJOY (Folly Joystick source).

Press LOAD to call a preset to apply, SAVE to store or overwrite a preset, or CLR (Clear) to clear a preset.

Whichever you've chosen LOAD, SAVE or CLR, you will enter number (1-16), and press ENTER.

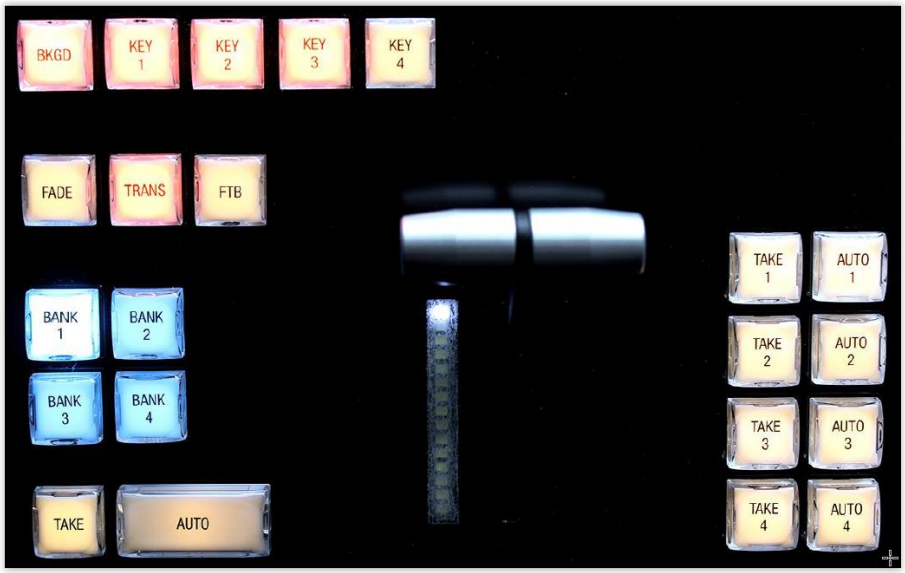
The last option in the PTZ menu is RATE to set speed (where supported), choose SLOW, MED, FAST, or SET (to set custom speed).

Press SET to format rate entries as percentage (1-100) and press ENTER.

6.4.7 TRANSITION GROUP

T-BAR

The T-Bar is perhaps the most recognizable component of a professional video control panel, and arguably one of the most important. The T-Bar can manually be pulled to modify the progress of a transition between delegated video layers. An LED in the nearby vertical row displays the percent of completion of the current effect.



These delegate buttons determine what video layers the main controls directly below (TAKE, AUTO, T-Bar, etc.) will effect. Multi-selection is supported, so, for example, if you select both *BKGD* (Background) and *KEY 1,* then press *AUTO* for a stripe delegated to the *Main Switcher*, a transition is applied to both the *Background* layer and *DSK 1*.

Hint: Double-punch any delegate button to remove perform an AUTO on the corresponding layer. (To perform a TAKE instead, assign CUT as the layer's transition effect.)

FADE & TRANS

These two buttons provide a quick way to control the *Transition Bin* selection for the delegated switcher layer(s).

- Pushing *FADE* assigns Crossfade as the effect for the currently delegated layers.
- Push the *TRANS* button to activate the last-used (non-Fade) Transition effect to the currently delegated layers.

Hint: For new sessions, TRANS jumps to the transition following Fade in the effect preset bin.

The *FADE* and *TRANS* (Transition) buttons are mutually exclusive; selecting either cancels the other, and only the currently active button remains lit.

FTB

To perform a *Fade to Black* operation, press *SHIFT* + the *FTB* button (the SHIFT button is required as a safety measure, since FTB is a somewhat dangerous operation). Revert to normal output by pressing *FTB* alone.

- SHIFT flashes if FTB is pressed without it.
- SHIFT is not required to remove FTB, but using it is supported anyway.
- FTB pulses slowly while on.

TAKE & AUTO

The *TAKE* and *AUTO* buttons perform a cut or transition respectively, affecting only the currently delegated video layers.

Hint: To quickly TAKE/ AUTO any individual layer, double punch its Layer Delegate button.

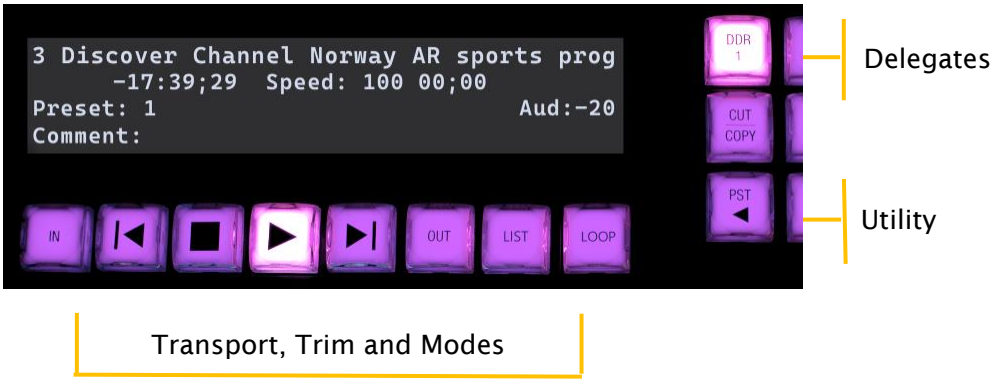
Double-punch BKGD-> auto Background

- Double-punch 1 -> auto DSK 1
- Double-punch 2 -> auto DSK 2
- Shift + double-punch 1 -> auto DSK 3
- Shift + double-punch 2 -> auto DSK 4
- For an individual Take, set the layer's effect to CUT (effect bin slot 1)

Hint: To trigger the QuickSelect feature, press ALT + BKGD to update the Switcher's T-Bar delegate and transition states so that the next TAKE or AUTO operation will remove all visible DSK or KEY layers from output.

6.4.8 MEDIA PLAYERS

This control group provides convenient control over TriCaster's most important Media Player functions and configuration options.



TRANSPORT, TRIM AND MODES

- IN, OUT – Set the In point or Out point for the current playlist item in delegated players to the current frame.
- |◀ (Previous Item) – Press this button to go to the previous playlist entry in delegated Media Players. (The selection cycles to the last playlist entry when necessary.)
- |▶ (Next Item) – Push this button to go to the next playlist entry in delegated *Media Players*. (The selection cycles to the first playlist entry when necessary.)
- ■ (Stop) – Push once to end playback for delegated *Media Players*; push a second time to return to the start position (this operation respects the *Single* setting for individual *Media Players.*
- ▶ (Play) - Push to initiate playback for delegated *Media Players*.
- LOOP, LIST – Click these buttons to toggle the Loop and List (Playlist) modes for the delegated players.

DELEGATES

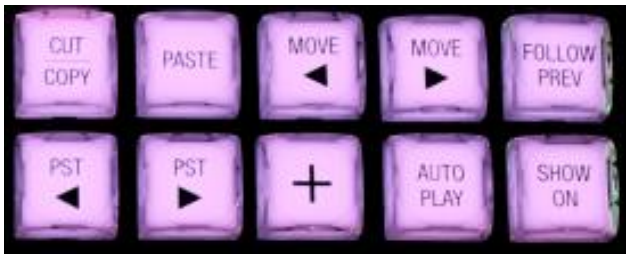
The Delegate buttons (labeled DDR 1-4 plus SOUND) determine the following:

- Which Media Player is being controlled and also
- Which Media Player is the Joystick controls when in SHUTTLE mode.
- Multi-selection of Delegates is supported.

FOLLW PREV

- This delegate follows the current (Main) Preview selection.
- If the current Preview row selection is NOT a Media Player, the last valid Media Player delegate state is used.
- When FOLLW PREV is ON, the button for the currently delegated Player is also lit.
- (FOLLW PREV can be toggled OFF, leaving the current delegate active.)

UTILITIES



- CUT|COPY – Push to copy currently selected playlist items into the Paste buffer (note that CUT requires SHIFT).

- PASTE – Push to insert Paste buffer content into the playlist of the delegated DDR.

- Move ▶ and Move ◀ – Move the currently selected Playlist entry on slot backward or forward in the list.

- **+** (Add mode)
    - Punch + to assign the Media Player group to file selection and upload operations (the + button is a toggle, fully lit when ON).

NOTE: The following CS buttons are repurposed in this mode, and have no effect on files already in the playlist of the currently delegated Media Player: MOVE <, MOVE >, FOLLOW PREV.

    - On first enabling Add mode:
        - The 2nd and 3rd lines of the LCD display the following hint for 3 seconds:
            - MOVE ◀ and MOVE ▶ TO NAVIGATE
            - PASTE TO GO BACK, FOLLW PREV TO ENTER
        - The LCD displays a list of storage volumes (including thumb-drives) connected to a USB port on the backplate of the control surface.

Note: File format limit is 10MB. To change the transfer rate, on the Multipad press 'OPT' then 'XFER'. Once selected the current transfer rate will be displayed, and to change the rate use PageUp/PageDown.

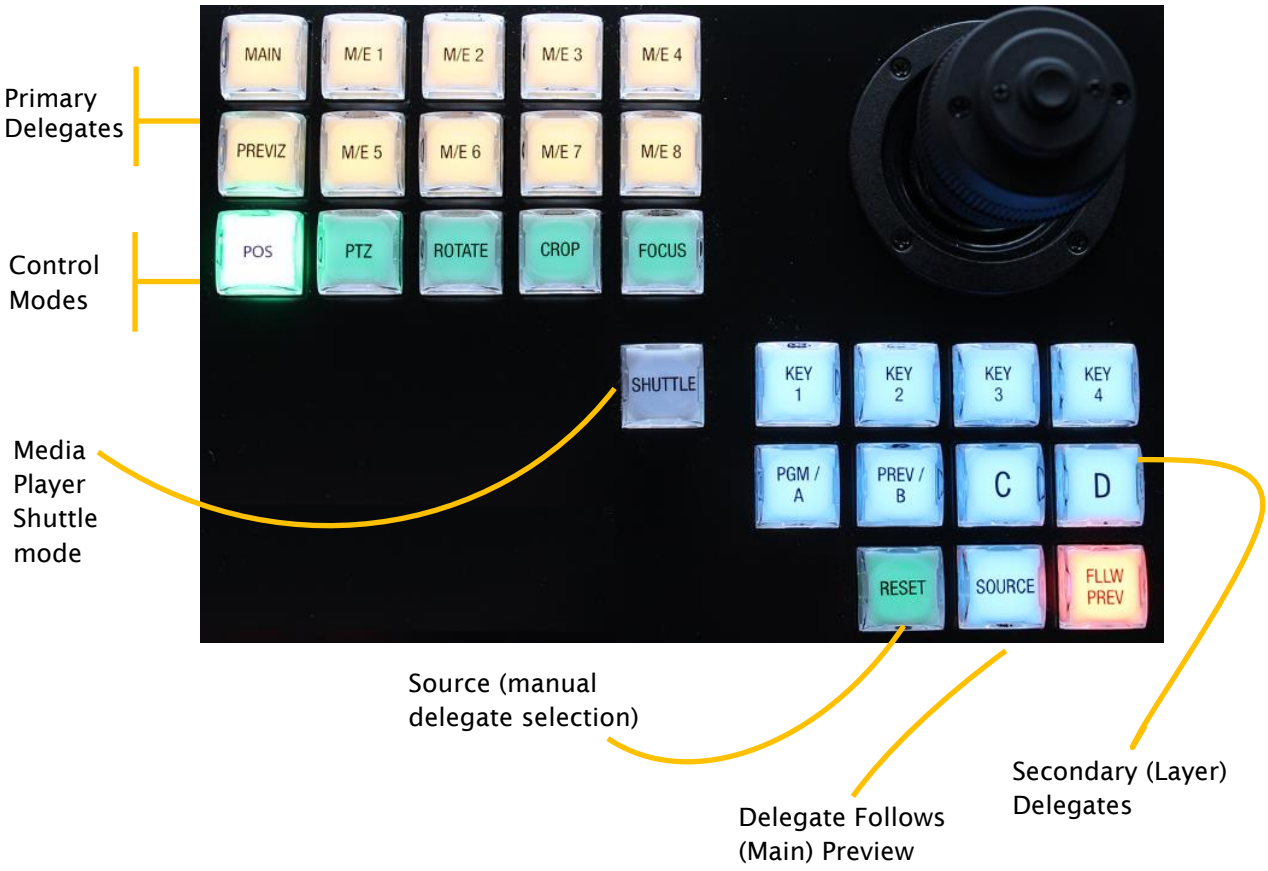
- You can traverse volumes/directories using the MOVE buttons, holding a MOVE button down will speed up this process.
- After a volume is chosen, the top line of the LCD lists the current directory path
  - Qualified files in the current directory are listed on the remaining 3 lines.
  - Selecting a file sends that file to TriCaster's "session-name>Received" (requires TC's "Share Media Folders" option to be on) as NDI metadata, adding it to the Playlist of the delegated DDR. Multi-selection is not supported.
  - File data is segmented for upload and sent only between any more important CS instructions in the queue.
- An upload can be stopped while in progress by double-tapping the + button.

- PST ▶ and PST ◀ - Previous and Next Preset.

- AUTO PLAY – Toggles Autopay mode for the currently delegated players.

- SHOW ON – Triggers Autoplay for the currently delegated players.

6.4.9 JOYSTICK



PTZ (pan-tilt-zoom) style joystick operations are not limited to 'real' PTZ cameras. Static cameras, *Media Players*, and *Buffers* are among the different source types that may benefit from 'virtual PTZ' functionality.

In considering its applications it is important to realize that, unlike the *Layers and Effects* control groups at left, the *Joystick(s)* located in the surface's right-most column can optionally operate completely independently from the stripes at left.

Thus, while *T-Bar* operations (for example) are always directed to the video busses delegated to the stripe they are in, *Joystick* manipulations can affect any *M/E*, a *PTZ* (Pan, Tilt & Zoom) camera, or even a *Media Player*.

- TriCaster treats almost all Switcher sources in similar fashion whether they are real PTZ cameras or not (the former offer "PTZ" controls, while the latter have "Pan and Scan" controls)
- The PTZ mode button delegates the Joystick to controls these parameters ("PTZ" and "Pan and Scan")
- The neighboring POS (Position) mode delegates the Joystick to control the separate layer position settings for individual layers in multi-layer LiveSet effects, or DSK/KEY layers.

DELEGATES

M/E1 – M/E8

These buttons provide a quick and convenient way to delegate *Joystick* operations to one or more selected *M/Es*.

MAIN

Punch *MAIN* to direct delegate *Joystick* operations to the *Main Switcher*.

PREVIZ

This button delegates *Joystick* operations to TriCaster's convenient *PREVIZ* video bus.

Follow Preview

FLLW PREV (*Follow Preview*) is probably the most useful joystick delegate mode. You will likely not be surprised to learn that, when enabled (as is the default in new sessions), the Zoom/Joystick delegate state tracks your current PREV row selection.

Of course, the joystick has several other delegate modes, discussed next, but the default *Follow Preview* mode is very useful, and can be easily restored from any other mode by pressing the *PTZ* and *RESET* buttons together.

SOURCE

This button is an alternative to *Follow Preview*. While SOURCE is pressed, the PGM row button for the current selection is lit (only sources in the current Bank are shown; change banks if necessary to access other sources). Naturally, pressing a different button delegates the Zoom/Joystick controls to control the new source.

RESET

Despite its location, *RESET* is really an action button (not a *Joystick* mode). Press it to restore all position settings for currently delegated source(s) to their defaults. (This is also why *RESET* does not stay selected when pressed, nor does it change the current *Joystick mode*.

Hint: When SHUTTLE is delegated, delegated Media Players are reset to the starting point of the current item (or playlist). And when delegated to an M/E with LIVE SET enabled in the LAYERS group, the LiveSet is reset to its default positioning.

When the *MEM* button is held down, pressing a button between 1 and 9 in the selection rows at left causes corresponding operation in the *MEM* bin for the delegated M/E as follows:

- Pressing a button in the DSK/KEY row recalls the corresponding MEM.
- Pressing a button in the PGM/A row stores or updates the corresponding *MEM*.
- Pressing a button in the PREV/B row clears the corresponding MEM.

LAYER DELEGATES

As mentioned above, some *Joystick* delegate modes let you further refine the target for your manipulations. For example, when your primary delegate is *MAIN*, joystick operations can be applied to the *DSK 1, DSK 2, DSK 3* or *DSK 4* video layers. The *LAYER* delegate group determines which one will be affected.

Specifically, the *KEY* buttons labeled *1-4* direct joystick control to *DSK 1-4* when *MAIN* is selected as the primary delegate, or *KEY 1-4* for an *M/E*. Similarly, when an *M/E* with a *LiveSet* selected as the *Background effect* is delegated, the *A, B, C* and *D* buttons allow you to target the individual *Positioners* for the main *M/E* layers (*A-D*).

NOTE: Joystick delegates – By default, the Joystick is in PTZ mode and delegated to BKDG/LIVESET for the current bus unless a layer (DSK/KEY 1-4, or A-D) is delegated. When a layer delegate is active its button is lit, but it can be toggled off; otherwise, the operator can reset to the default state (BKGD delegated) by pressing any button in the primary Delegate group (Main, M/E1-8,or PREVIZ). There is no BKGD or LIVESET delegate button.

CONTROL MODE

Let's turn now to buttons that govern the *Joystick* operating mode.

POS

- Move the *joystick* horizontally, vertically or diagonally (as viewed from above) to move delegated video source(s) on its X and Y axes.
- Twist the *joystick* clockwise to scale delegated source(s) up, or counter-clockwise to scale down.

PTZ

- TriCaster treats almost all Switcher sources in similar fashion whether they are real PTZ cameras or not (the former offer "PTZ" controls, while the latter have "Pan and Scan" controls).
- The PTZ mode button delegates the Joystick to controls these parameters ("PTZ" and "Pan and Scan")
- The neighboring POS (Position) mode delegates the Joystick to control the separate layer position settings for individual layers in multi-layer LiveSet effects, or DSK/KEY layers.

ROTATE

- Move the joystick horizontally (as viewed from above) to rotate delegated sources on the Y axis.
- Move the joystick vertically to rotate delegated sources on the X axis.
- Twist the joystick clockwise/counter-clockwise to rotate delegated sources on the Z axis.

CROP

- Twist the *joystick* clockwise (as viewed from above) to crop delegated sources inward on all four edges, maintaining the original aspect ratio.
- Twist the *joystick* counter-clockwise to reduce cropping of delegated sources on all 4 edges.
- Move the *joystick* horizontally to crop only the left edge of delegated sources.
- Move the *joystick* horizontally with the *joystick button* pressed to crop only the right edge of delegated sources.
- Move the *joystick* vertically to crop only the top edge of delegated sources.

- Move the *joystick* vertically with the *joystick button* pressed to crop only the bottom edge of delegated sources.

FOCUS

When the primary *Joystick Delegate* is *PTZ*, enable *FOCUS* to modify *Joystick* operations as follows:

- Pressing the *Joystick button* enables *Autofocus*.
- Rotate the joystick to adjust the camera's focus setting (which will naturally disable Autofocus).

SHUTTLE

Push *SHTL* (Shuttle) to delegate the *joystick* to shuttle the *Media Player(s)* currently selected in the *MEDIA PLAYERS > DELEGATE* group. (Again, the other joystick mode buttons cannot be multi-selected with SHTL.)

- To *shuttle* delegated *Media Players*, move the joystick horizontally (as viewed from above).

> Note: You can zoom multiple LiveSets simultaneously when these are delegated together, just as you can also shuttle several delegated Media Players.

Qualifiers

SHIFT & ALT are what are termed 'qualifiers buttons', in that (like their keyboard equivalents) they qualify or modify the outcome of operating some other control.

6.4.10 AUDIO

BACKPLANE CONNECTIONS

From left to right you will find ports for DISPLAY, 2 USB, and the ETHERNET port. These are followed by line level inputs for TALKBACK, MIC, and PHONES (headphones). Lastly, two pairs of line level AUDIO IN and two pairs of AUDIO OUT connectors are provided.

VOLUME KNOBS

In most control panels, operating the audio mixer requires you to access the UI in your live production system. *Volume Knobs* on TriCaster Flex (top left of the control panel) give you fingertip access to control audio levels for *Audio Mixer* output busses. In addition to adjusting the volume levels, push a *Volume Knob* to toggle mute/ unmute the channel.

- OUT 1 & 2
  - Govern *local* output levels from the two pairs of AUDIO OUT connectors (labeled 1 and 2) on the backplane.

- TALKBACK and PHONES– control faders in TriCaster's Audio Mixer UI.

TALKBACK BUTTON

The button input labeled TALKBACK (to the right of the volume knobs) serves a special purpose, providing a way to converse with remote callers off-air (i.e., without intruding into your live program).

- *TALKBACK* is a PTT button (Push-to-Talk)
  - Hold it down to activate the *TALKBACK* feature, sending the audio source designated in the UI to all Mixer connections with *TALKBACK* capability.
  - Double-punch *TALK BACK* to lock it ON (the button will pulse light in this state).

6.4.11 STREAM, REC, GRAB AND REPLAY

STREAM & RECORD

- STREAM - Push to enable or disable TriCaster's live streaming feature.
- *RECORD* - Pressing this button enables TriCaster's *Record* feature.

Note: As a safety measure, pressing the REC button when recording is underway does not stop recording. Instead, the SHIFT button flashes to reminds you that you must hold it down at the same time as pushing REC to end recording.

GRAB

GRAB is a qualifier button:

- Hold down GRAB and punch a PGM row button to grab the associated source.
- To grab from Mix 1-(4 or 8, varies by model), punch the corresponding numbered button in the PREV row.

REPLAY

Hold down REPLAY to list Instant Replay enabled sources by name on the LCD display.

- The LCD(s) will list the enabled *Switcher* sources starting from the left, followed by any recorders enabled in the *Record* tab in Output Configuration panel.
- Punch the PGM row button for the desired recorder source you wish to show on as an instant replay.

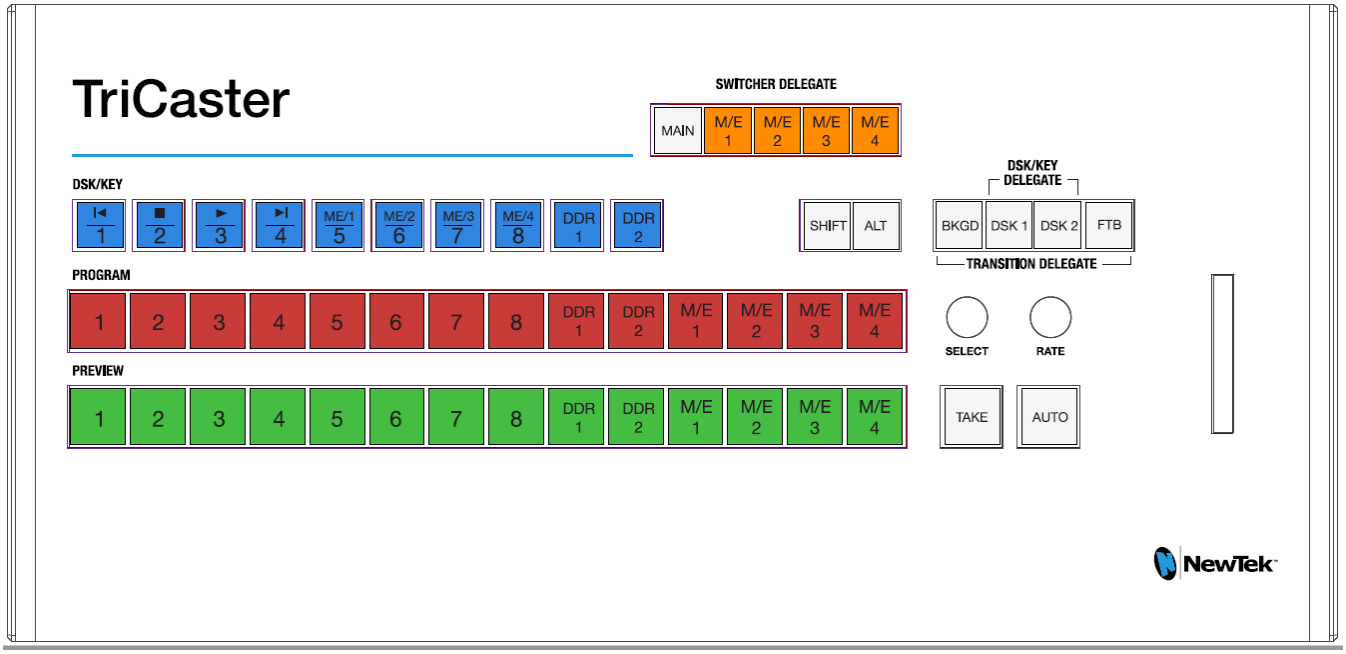
Note: Instant Replay uses the Show On feature of the DDR designated in the Replay Configuration menu. As such, the replay clip can be shown on PGM or an M/E, or even an M/E on PGM.

- Or defer playback of the instant replay as follows:
    - Add the replay clip to the DDR playlist without playing it by clicking the source's PREV B/D row button (with REPLAY held down).
    - When you are ready to trigger the instant replay, press SHIFT + AUTO to initiate the replay DDR's 'Show On' operation.
    - In either case above (instant or deferred replay), double the length of the replay by double-punching the recorder's button.

Section 6.5 TriCaster Mini S Control Panel

This chapter introduces the control surface for your TriCaster Mini helping you to see how it can complement your system and add ability to your production setup. We will also discuss connecting to the control panel from your live production system

The TriCaster Mini CS, the ideal traveling partner, provides studio-style control and a small footprint to deliver professional result from the office, an event, or almost anywhere you like, delivering portable, professional control for live productions of any size.



- When SHIFT is pressed, DSK/KEY row buttons execute their secondary function (shown above on the button label), as follows:
    - The first four DSK/KEY row buttons, when 'shifted', provide Media Player transport control.
    - To delegate these operations to a specific Media Player:
    - Hold SHIFT + ALT together, and punch DDR1 or DDR2 in the same row.
    - The next four DSK/KEY row buttons, when 'shifted', select M/Es 1-4.
- Holding down ALT while making a PROGRAM, PREVIEW or DSK/KEY row selection addresses sources from the second *bank* of Switcher sources, in the order listed below:

BFR 1	BFR 2	BFR 3	BFR 4	BFR 5	BFR 6	BFR 7	BFR 8	BFR 9	M/E 1	M/3 2	M/E 3	M/E 4	BLACK

Section 6.6 VIZ 3PLAY CONTROL PANEL

The 3Play Control Surface is purpose-designed to provide responsive and comfortable control over all commonly used production functions of the system, without unnecessary complexity. Its apparent simplicity is no accident, and makes using your 3Play straight forward, powerful, and trouble free.

In the sections that follow, we'll review the controls in each group on the *Control Surface*. First, we should familiarize ourselves with an important concept related to 3Play's primary *output channels*, designated *A* and *B*.

Hint: One of the LivePanel features in your 3Play system includes a virtual Control Surface along with macro-driven UI creation tools, all delivered via your network to a web browser.

6.6.1 DUAL CHANNEL REPLAY

In many ways, it would not be incorrect to think of your 3Play system as not just one, but two conjoined 'playout' devices. The system features two fully independent audio/video busses and outputs, referred to as *Channel A* and *Channel B*.

Each output channel can function completely independently of the other; either can be directed at any time to transmit any available audio/video source, whether live or recorded.

Physically, these two channels are individually supplied to connectors on the system's backplate for output to downstream devices. These comprise *Output 1* (3Play's *Channel A output*) and *2* (*Channel B*). During live production, both are represented on the *Replay Desktop* by individual output monitors.

Tip: A third, special output is called Aux (for "Auxiliary"), and is carried on Output 3 – more about Aux later.

The color in the Channel Info area indicates the source type sent to the channel: blue for the CLIP LIST, gold for PLAYLIST, and green for Live (or Delayed sources.)

It also shows which channel is delegated; normally, only the delegated channel displays a colored background.

A thin white border marks the delegated channel in Link mode (since both panes are colored).

CHANNEL DELEGATES

Transport (*PLAY*, *STOP*, etc.) and many other similar operations normally affect just one channel. That selection is determined by the active *Channel Delegate* button on the *Control Surface*.

As you would expect, pushing the *Control Surface* button labeled *A* directs operations to *Channel A*; Likewise, pushing *B* assigns control operations to *Channel B*.

Only one *Channel Delegate* can be selected at a time, and all operations and input are directed to that channel and its source (certain controls *can* affect both channels when *LINK* mode is on).

Tip: You can also choose the currently delegated channel by clicking the mouse in The Channel Info area beneath the output monitor for Channel A or B.

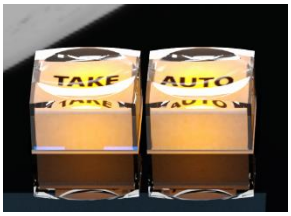
The active *Channel Delegate* determines the following matters:

- What is shown in the *CLIP* and *PLAYLIST* panes on the *Replay Desktop.*
- This includes the selections shown in the *CLIP* and *PLAYLIST tabs.*
- The state of various *Control Surface* and user interface buttons and settings.
- All of these attributes are stored independently for the two *Channel Delegates*. Switching from one *Channel Delegate* to the other updates the *Replay Desktop* display when appropriate.

- Note: Conveniently, supplementary a/v outputs referred to as AUX (Auxiliary) outputs automatically update to show the display for your current Channel Delegate – A or B.

6.6.2 TRANSITIONS (TAKE | AUTO)

3Play's powerful effects engine provides high end transitions (including powerful *Animation Store* effects, with embedded overlays and sound) in several ways to suit varied requirements. You can even create your own custom *Animation Store* transitions using the included *Animation Store Creator* add-on application.



The Control Surface's *Take* and *Auto* buttons work just like their familiar namesakes on a typical video switcher, permitting a 'direct to display' program/preview workflow in which *Channel B* supplies program output, with *Channel A* serving as the preview bus.

Let's consider 3Play's *Source Delegates next.*

6.6.3 SOURCE DELEGATES

We've seen how the active *Channel Delegate* determines which output channel is controlled, but we've yet to choose a specific audio/video source to send to the channel (and control). That's where the *Source Delegate* comes into play.

Your 3Play can deliver audio/video output from one of three possible sources:

- *CLIP LIST* – the currently selected clip (angle) in the *CLIP LIST*
- *PLAYLIST* – output from the *PLAYLIST*
- *Live* – the live (or *Delayed*) signal from one of the system inputs

As mentioned, 3Play's dual channel design means that, at a given time, a/v data from one of the three sources above is always assigned to *Channel A,* while *Channel B* could be carrying something else entirely. Changing the source for the current delegate channel simply requires pushing one of the *Source Delegate* buttons.

Naturally only one *Source Delegate* can be active for a given channel at any time. Note that your *Source Delegate* selection determines not only the source on the delegated channel, but also the source other controls affect – whether *LIVE* (video from an input), the *CLIPS LIST* or *PLAYLIST*.

Tip: Another way to change the Source Delegate is to click the mouse in the CLIP LIST, PLAYLIST. However, if you do this when video is playing on output, the Source Delegate does not update. (This is by design, and allows you to enter comments or perform other management tasks without interrupting play if you wish.)

CLIP LIST

While the *CLIP LIST* is delegated, *Control Surface* (along with corresponding keyboard and *Desktop* transport control) operations are directed to the *CLIP LIST*.

A gold outline around the *CLIP LIST* confirms selection, and the item currently selected in the *CLIP LIST* is automatically displayed on the delegated output (*A* or *B*).

PLAYLIST

While the *PLAYLIST* delegate button is active, *Control Surface* (along with corresponding keyboard and *Desktop* transport control) operations are directed to the *PLAYLIST*. A blue border around the *PLAYLIST* module signifies its delegated status and, again, the current selection is automatically displayed on the delegated channel.

LIVE

Finally, while *LIVE* is delegated, as you would expect, you control a live source from the system inputs, and it appears on the delegated channel (*A* or *B*).

In *LIVE* playback mode, transport operations (such as *STOP, Jog* or playback speed adjustments) can only be performed when *Record* is enabled. (In such cases, output is actually no longer *live*, but *Delayed.* In this case, no *Source Delegate* button is highlighted.)

Tip: When LIVE is delegated, select specific inputs by pressing number pad buttons on the Control Surface while holding down the ANGLE button, or by using ANGLE + ◂ and ▸ buttons.

6.6.4 INDEPENDENT STATES

3Play stores the *Control* and *Output Delegate* states for *Channel A* and *B* independently, along with other important parameters – including the current *CLIP LIST* or *PLAYLIST* selection state, playhead position, and so on.

Consider an example:

- *Channel A* may be delegated to *Clips*, and playing a certain clip from the *CLIP LIST*
- Meanwhile, *Channel B* might display the same clip in slow motion, or something else altogether – really any source, in any state of play.

When you newly select a *Channel Delegate* (*A* or *B*), the *Replay Desktop* display is refreshed to show the current state for that channel if it is appropriate to do so.

This brings us back to the *Link button*. You may wonder what effect different controls will have in this special 'tandem mode', and what will be displayed on the *Replay Desktop* when it's in use.

6.6.5 LINK

Enabling *LINK* does not alter the current *Channel Delegate.* Rather, the *LINK* button toggles a special 'lock-step' mode.

In broad terms, *Link* mode causes transport control operations (*Play*, *Stop*, etc.) to occur in tandem. Other operations – such as changing clip selections – are not linked.

For example, when *A* is lit along with *LINK* on the Control Surface or *Replay Desktop*:

- The *Replay Desktop* displays *Channel A's* operational state.
- Pressing *Stop* or *Play* affects playback for *CLIP LIST* or *PLAYLIST* sources on both channels simultaneously.
- Selecting a different clip (or *CLIP LIST /PLAYLIST* page*)* affects the delegated channel only (in this example, *A).*

- Tip: The LINK button behaves like the Caps Lock key on your keyboard, remaining active until you press it again.

Just to repeat it in this context, the *Channel Info* pane under the currently delegated channel output monitor is normally shaded to what source is assigned to it. When *LINK* is enabled, *both* panes are shaded, but a white border is added to denote the delegated channel.

6.6.6 RECORD

The *REC* (Record) button *activates* capture of a/v data to file(s) on assigned storage volumes on or off. (The specific sources that are recorded are configured in *Startup* when creating the session.)

Note that simply pushing *REC* again does not disable recording. To prevent accidental interruptions in capture of important events, you must hold down *SHIFT* before pressing *REC* when you wish to stop recording.

Tip: As a helpful reminder, a special 'record event' row is added to the CLIP LIST whenever you newly enable 3Play recording.

6.6.7 TRANSPORT

Let's circumvent the *Play Speed* control group momentarily in favor of more fundamental playback controls. The familiar VCR-style controls in the *Transport* group provide easy to use transport through your media.

PREVIOUS

|◀ Whenever the playhead is more than three seconds into a clip, pressing the first button in this row takes you to the In point.

Otherwise, it selects the previous (*CLIP LIST* or *PLAYLIST*) clip (if playback is underway, play resumes from this point).

Hint: When play is stopped, press SHIFT with PREVIOUS to jump to the first frame of a clip.

STOP

Press the *STOP* button to end playback (when it is underway). Press *STOP* again to jump to the first frame of the current clip (or double-press *Stop* during play to do this).

Tip: With the PLAYLIST delegated, pressing STOP a third time jumps the 'playhead' to the In Point of the first clip in the current playlist.

CUE

CUE is a very special 3Play feature meant for use when Output A or B is connected by NDI to a Switcher input on a TriCaster video mixer. This configuration takes advantage of the bi-directional NDI connection; if you enable CUE for the corresponding 3Play Output, taking the TriCaster Switcher source to Program out will automatically begin playback of the 3Play source.

PLAY

▶ Pushing *PLAY* initiates playback of the currently selected source – whether a clip in the *CLIP LIST* or *PLAYLIST*, or a *Delayed* video source. Pressing *PLAY* when a clip has stopped its last frame replays it from the beginning. When a *newly delegated* source is at 3-5% speed – whether due to pressing *STOP* or T-Bar use – the initial T-bar position is ignored when you push *PLAY*; *playback* is initiated at 100%.

Tip: For Live video sources, all transport control operations are invalid when REC (Record) is disabled and will have no effect.

Loop

Note that you can press SHIFT + ▶ (*Play*) to toggle the playback *Loop* setting (the loop control in the playback control group beneath the monitor for output *B lights to* shows when loop is enabled).

NEXT

▶| The *Next* button makes its appearance at the opposite end of the same row in the *Transport Control* group. Pressing *Next* takes you to the next clip in the *CLIP LIST* or *PLAYLIST*. If playback is underway, it will continue from this point.

Hint: When play is stopped, press SHIFT with NEXT to jump to the last frame of a clip.

FAST JOG

The *FAST JOG* button is a toggle. Press it to turn the feature on, and press it again to disable it. When enabled, the transport effect of the *Jog Wheel* (discussed next) is multiplied eight times so that you can traverse the frames in your media more quickly.

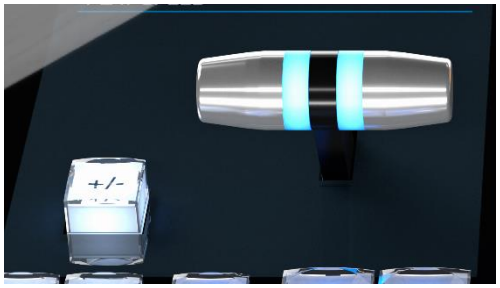
JOG WHEEL

Rotate the *Jog Wheel* to navigate back and forth through the frames of the current a/v selection.

Tip: Inside Media Browser, you can scroll through the File Pane using the Jog Wheel.

Normally, *Jog* will stop when you reach the *In* or *Out* point for the current clip. To continue to scan outside these boundaries, hold down *SHIFT* while jogging.

6.6.8 PLAY SPEED (T-BAR SECTION)



This group contains just two controls, an illuminated *T-Bar*, and a button labeled *+/-*. Adjustments to *T-Bar* position progressively modify playback speed, and can also automatically engage playback when not already in progress.

Since, at a given moment, *Channel A* and *B* may well be set to different playback speeds, the *T-Bar* position may not initially reflect the correct speed when you change which channel is delegated.

In this case, the speed applied updates as soon as you move the *T-Bar* to (or through) the current speed. (When a *newly delegated* source is at 0% speed – whether due to pressing *STOP* or T-Bar use – the initial T-bar position is ignored when you push *PLAY* and playback commences at 100% speed.)

In normal operating mode, the maximum *T-Bar* position corresponds to 100% playback speed, with 0% at the opposite extreme of the lever's travel. Pressing *+/-* engages a special *T-Bar* mode to extend the *T-Bar's* range. In this mode, the top and bottom of the lever stroke represent +200% and -200% respectively, with 0% (playback stopped) in the middle.

ILLUMINATION

The T-Bar lighting serves two purposes. The light color denotes the delegated source it is controlling at any moment – green for LIVE, blue for the *CLIP LIST*, and gold for the *PLAYLIST*. Normally, the light is brightest at the top of the T-Bar's stroke, representing 100% playback speed. At the opposite extreme of T-Bar travel, the light is noticeably dimmed. In +/- operating mode, the light is dimmed at the mid-point, representing 0% speed (playback stopped).

6.6.9 LIST SELECTION TOOLS

This group contains 6 navigation buttons that variously permit you to change the selection in the *CLIPS LIST* or *PLAYLIST* – whichever is delegated at the moment. If *LIVE* is delegated, the button action is directed to the last list accessed.

Note that changing *selection* during playback does *not* update what is shown on output. (This allows you to perform various clip management operations without interrupting your outgoing program streams.)

Tip: The ◂ and ▸ buttons are somewhat similar to the Previous and Next buttons but only affect selection. They never change what is output during playback. Also, they allow navigation into numeric fields (Previous and Next do not).

The two TAB buttons allow you to move forward or back between the different tabbed panes in your *CLIP LIST* or *PLAYLIST*.

6.6.10 SHIFT

SHIFT is a 'qualifier' button, and works much like its keyboard equivalent. When held down while performing another *Control Surface* operation, it modifies the outcome. Typically, *SHIFT* is used to support multi-selection, as when used with the ◂ and ▸ buttons.

6.6.11 SET | IN/OUT

Marking events is, of course, the core business of 3Play. These two simple buttons will be of use. Their roles are not complicated, but it would be good to review them anyway.

Note: Of course, marking events would be pointless without recording, so pressing either IN or OUT automatically enables Record when necessary.

SET | IN

Pressing the *IN* button adds a new event (row) to the *CLIP LIST*. The current timecode supplies the *In Point* for the event.

SHIFT + IN

Holding down *SHIFT* while pressing *IN* performs the 'shifted' button operation, which is *SET* – as the button label suggests. This updates the *In Point* for the selected event in the *CLIP LIST*, or, when the *PLAYLIST* is displayed, the current clip.

Tip: Use SHIFT + Jog to move into areas before or after the current clip boundaries.

SET | OUT

Naturally, if you have pressed the *IN* button to create a new event, setting an *In Point*, you realize that you can complete this operation by pressing the *OUT* button. In this case you set the event's *Out Point* to the current timecode value, and as a natural consequence, establish the *Duration* for the event.

Tip: If for some reason you choose to end recording when an event is incompletely marked – i.e., OUT was not pressed – an Out Point is supplied automatically.

One Button Marking

You can also add new events to the *CLIP LIST* without ever pressing *MARK IN*. If no *In Point* has been set (by pressing *IN*), pressing the *OUT* button will:

I. Create a new event.
II. Automatically assign both an *In Point* and an *Out Point* to it.

By default, the *In Point* for this event is set four seconds before the time when you pressed *OUT*. *One button marking* thus permits you to easily create a series of events just by pressing the *OUT* button only when you observe noteworthy occurrences.

Tip: The default duration for these events can be set to a custom value using One Button Marking menu options found in the Options menu.

SHIFT + OUT

Again, just as for the *IN* button, press *SHIFT* in conjunction with *OUT* to update the *Out Point* for the current *CLIP LIST* event or *PLAYLIST* clip, using the timecode from the currently displayed frame.

6.6.12 ANGLE

- In the *CLIP LIST*, you can use the ◂ and ▸ navigation buttons to change cameras.
- In *either* list, you can hold down the *ANGLE* button and press the camera number you want to switch to on the *Control Surface* number pad. (For the *PLAYLIST*, this actually updates the current item's source clip.

Tip: Changing angles this way does not normally move the playhead to the clip's In point. This allows for quick review of different viewpoints at a specific moment in time. If you do wish to jump to the In Point of the clip at the same time - hold down SHIFT along with ANGLE when pushing the number pad digit.

The ANGLE button thus also lets you revise the angle for a clip you have added to the *PLAYLIST*.

6.6.13 BOOK MARK

Bookmarks are timecode references that are independent of marked *In* or *Out* points you may set for events. This is a very useful feature, enabling you to quickly skip through your recorded video to specific points.

A bookmark is set at the current timecode every time you press the *BOOK MARK* button (as long as recording is underway).

The maximum number of bookmarks never exceeds ten, so once the limit is reached, pressing *BOOK MARK* again erases the 'oldest' bookmark and sets a new one.

Tip: Bookmarks reference the current (i.e., 'live') timecode when they are set. If recording is not underway, pressing the BOOK MARK button has no effect.

Press *SHIFT + BOOK MARK* to jump the playhead back to the most nearest prior bookmark. Doing so enough times will eventually 'wrap around' to the most recently set bookmark, and then work backwards through them again.

6.6.14 UTILITY BUTTONS

A four-button group located at upper right provides a number of important media management functions, as described next.

Tip: All of these functions operate on the current selection (clip or event) in the delegated list (i.e., the Clip or PLAYLIST). Generally, they have no effect in Live or Delayed play modes.

CUT/COPY AND PASTE

These familiar functions can be used to arrange and manage the entries in your *CLIP* and *PLAYLISTs* tabs. Use *SHIFT* with the *COPY/CUT* button to apply the *CUT* feature. *PASTE* insertions generally occur below the current selection, and the insertion will receive a new *Clip ID*.

Note: The Control Surface CUT/COPY/PASTE features operate on clips and events in the list panes. Similar operations in the dataview depend on standard keyboard shortcuts or context menu functions.

EXPORT MEDIA

This button sends selected items to *Export Media* from whence it can be further distributed to various destinations, including online streaming and social media sites, as well as local or ftp storage targets.

ADD TO PLAYLIST

Push *Add to PLAYLIST* to insert the currently selected clips from the *CLIP LIST* to the current *PLAYLIST* page. (The operation only proceeds if the *Source Delegate* is set to *Clips* when the button is pressed.)

6.6.15 TAG, GO TO AND SEARCH

Just as a brief introduction, then, when the *TAG* button is lit, CS number pad input is automatically converted to matching text entries in the cells (and tabs) of the TAGS pane located at the bottom of the *Replay Desktop*. Otherwise, literal numbers are entered.

The *GO TO* button has several functions. As follows:

- Entering an appropriate number and pressing *GO TO* takes you to the event row with the matching ID number in the *CLIP LIST*.
- Selecting a clip in the *Search Results* tab of the *CLIP LIST* and pushing *GO TO* jumps to the tab where that clip is actually located.
- The first digit for *GO TO* operations is treated as the tab number (superfluous leading zeros are ignored). This means that if you have 10 or less *CLIP LIST* tabs, entering a single digit and pressing GO TO jumps to the corresponding *CLIP LIST* tab.
- If *SHIFT* is pressed with *GO TO,* a 'go to timecode' operation is performed.

The *SEARCH* button performs a search of all *CLIP LIST* tabs for entries that match the criteria entered, and places the matching events in the *Search Results* tab.

6.6.16 THE NUMBER PAD

Not surprisingly, the number pad allows you to type literal numbers into the *dataview* window, which may be added to clip *Memo* fields, used for searching, etc. Less obvious, perhaps, the number pad is also a dream come true for working with 3Play's *TAGS* system.

For quickly populating *Memo* fields for your marked events using tags, or locating clips using tags, *ID* or timecode values, the number pad will almost certainly become your preferred input mechanism.

Also handy to know, in a Program-Preview workflow you can select a specific transition (from among the nine currently listed in the *Transition Palette*) by holding down *SHIFT* on the *Control Surface* and pressing a number between *1* and *9* on the number pad.

ESC & ENTER

Pressing the *Esc* (Escape) button cancels a popup dialog, or exits from text input without applying changes.

As you'd expect, pushing *ENTER* confirms or executes the current operation. When editing *Memo* cells, pushing *ENTER* updates the cell using the current content of the *dataview*.

Tip: Hold down SHIFT when pressing ENTER to cause all Memo cells for the current event row to take on the same value.

PART IV (INTEGRATION)

in·te·gra·te [in-ti-greyt] – verb:

1. to bring together or incorporate (parts) into a whole.
2. to make up, combine, or complete to produce a whole or a larger unit.
3. to unite or combine.

Chapter 7 DATALINK

Section 7.1 INTRODUCTION

Vizrt live video mixer's integrated title page system provides many opportunities for internal automation and broader pipeline integration.

Its unique DataLink implementation combines with native as well as third-party automation systems to supply text and image updates for CG purposes from a wide array of live and prepared data sources.

Vizrt live video mixers include internal *Media Players* and native title systems. These are coupled to a world-class effects engine so you can display colorful and informative titles and graphics into your productions with ease and flair. And, as discussed in earlier chapters, the macro and automation features add to the value of this implementation:

- The display of title pages can be automatically controlled and timed based on diverse trigger events and Switcher states.
- Using the integrated title editor, text and image content of title pages can also be manually updated while live.
- Third-party software solutions can also control and update title page text and image content.

In addition, DataLink technology extends these capabilities, by providing realtime updates from a wealth of data sources.

Section 7.2 VIDEO MIXERS AND DATALINK

7.2.1 TITLE TEMPLATES

Vizrt live video mixers include a *native* DataLink implementation to dynamically update the values of *key name* entries in titles. When the page is displayed on output, information drawn from external data sources is substituted for the key name. (The external data is formatted with the attributes you assigned to the key name entry when creating the title page).

Hint: You can force a minimum number of whole digits before and places after the decimal as in the following example. If the current value for "some numeric key" is 12.23456789, we can force the title page to display four places before the decimal and just two after by using the following DataLink entry: %some numeric key[4.2]%

The displayed result will be "0012.23" (without quotation marks). Negative signs appear when called for, but the + sign can be optionally displayed as appropriate using something like %some numeric key[+4.2]%. Similarly, express a number as a percentage (of 1) using % numeric key[percent]%, or as an ordinal (1st, 2nd, etc.) using %some numeric key[ordinal]%.

You can enter DataLink keys as the source for text or image fields in Vizrt live video mixer's *live* text editor. Text fields on title pages can contain either literal text or a DataLink key. Let's spend a few moments considering how you do the latter.

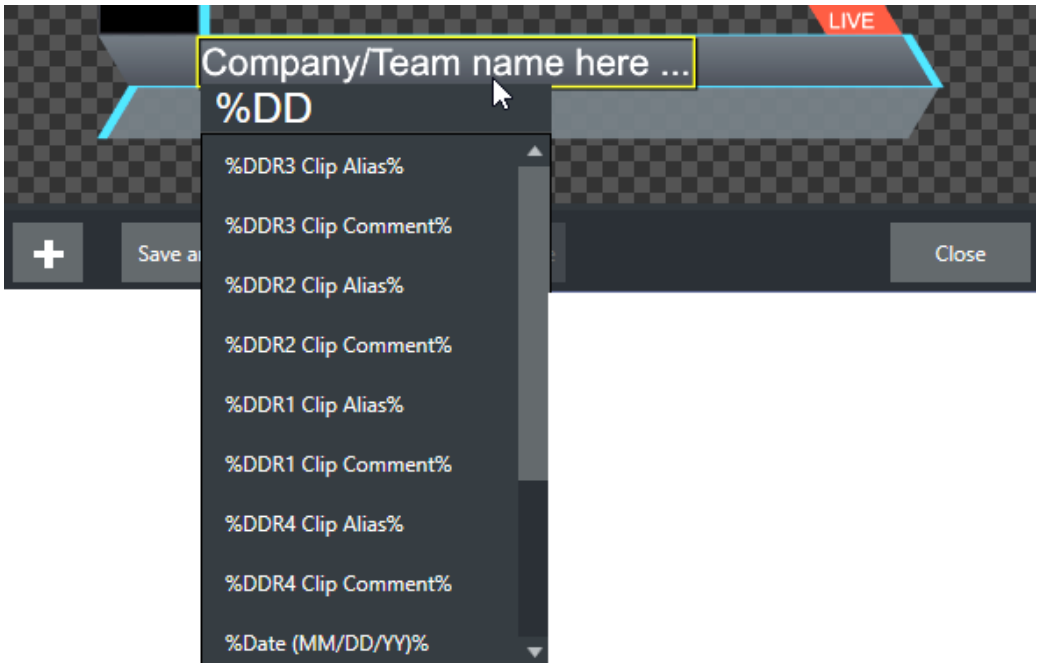
Note that the default entries for the name and description lines of the lower-third title page are bracketed by % (percentage) signs.

Hint: See the next section for a discussion of the special %Session xxxxx% keys.

Any text entry surrounded by % signs in this manner is automatically evaluated on display as a DataLink key, and the current value for that key is shown. You can manually enter keys by simply typing them into the field, but there's a method you might like better.

The *Title Editor* will show both *Layer* and *Data* presets, just like when you load a *LiveGraphic* title page, and store the result in a preset. Having done this, you can selectively hide or display different layers (or layer groups) of your Photoshop composition with a click or tap using the Buffer preset system.

In this manner (using *Layer presets*), a single title page can be used to display a whole theme pack of CG elements, and likewise (using *Data Presets*) a single title page can be updated to show individual player statistics for a whole team, and so on – all with a single click.



If you simply click a text field and type a % sign, DataLink keys are shown in a drop down menu. As you continue entering characters, the list updates to show relevant entries. You can use the arrow keys to highlight the key you want in the menu, and press Enter to select it. To enter a DataLink key for an image, right click the placeholder image in the live text editor, and select Properties.

Hint: Notice that many internal keys are provided, including keys based on time and day, Media Player metadata (such as %DDR1 Clip Alias% and %DDR1 Clip Comment%), and more. These allow you to easily, for example, use a single title page to automatically show the name and comment for the current DDR clip. If you then record a macro that displays that page in DSK1 (for example) briefly and then removes it, you can assign that macro to automatically display and hide the correct title for every clip you play from the DDR

Fallback Keys

Datalink also incorporates support for fallback keys, specifically within a Buffer or Media Player. This functionality allows you to specify one or more 'fallback' keys, serving as default values if the primary key is not present.

For instance, consider a scenario where a title text line is set to display %mydate%:

- If the Datalink key mydate holds the value "January 1, 2025," the title will reflect that value.
- However, if the mydate key is absent, the title line will remain empty when displayed.

To address this, an alternative approach involves using the following syntax in the text input line:

%{mydate, Date}%.

In this case, the key Date, which always has a value, serves as a fallback. If mydate is not present, the current system date will be displayed instead.

Another option is to employ a literal string as a fallback key. Building on the previous example:

%{mydate, “this literal string”}%

- If the mydate key contains the value "January 1, 2025," the title will display that value.
- In the absence of the mydate key, the literal string 'this literal string' (without quotes) will be shown.

Multiple fallback keys can be added in a sequence, as demonstrated below:

%{first_key, fallback_key, another_fallback, "this literal string"}%

Or, referring to the earlier example:

%{mydate, Date, Year (full), “this literal string”}%

This flexibility allows you to set up a hierarchy of fallbacks, ensuring that the system seamlessly resorts to alternative values when the primary key is unavailable.

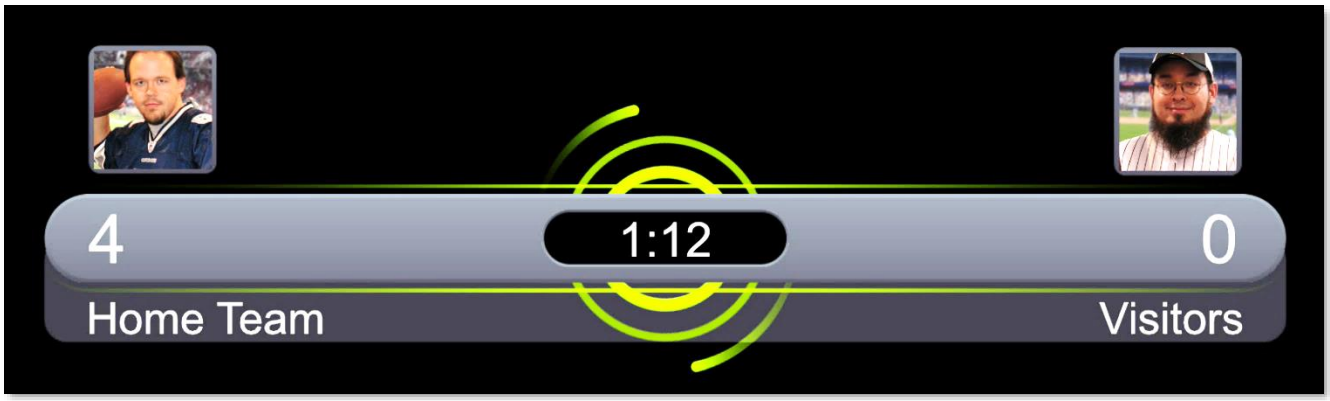
7.2.2 LIVEGRAPHICS

Vizrt LiveGraphics Creator for After Effects® (included with Vizrt Premium Access membership) makes creating animated titles and motion graphics for Vizrt live video production systems simple and fun.

You don’t need to be an After Effects expert to create beautiful, multi-layered, editable LiveGraphic titles for your Vizrt live production systems make displaying and controlling these graphic pages a breeze.

Naturally, editable text can be modified in realtime using TriCaster’s native Title Editor, which also lets you display or hide the individual graphic elements of your LiveGraphic title pages at will. In addition, the Title Editor lets you store different layouts as LiveGraphic presets. Recalling these presets triggers any number of dynamic layer animations to update the page.

DataLink keys can be inserted into Vizrt LiveGraphics at the time of their creation, but of course the integrated Title Editor for Vizrt live production systems supporting LiveGraphics also lets you enter for keys for text lines and replaceable imagery later if you need to.



A line of text or image set to a *DataLink* key is automatically replaced by the value currently assigned to that key when the LiveGraphic layer containing it is displayed.

Section 7.3 DataLink Sources

Vizrt live video mixers include *internal* DataLink sources to complement the integrated title and CG toolset, extending the original data sources available in several ways. In some cases, support for a given source type has been enhanced; for example, the former ASCII text file support now includes XML and CSV file support. Beyond this, a number of important internal keys and external sources have been added.

Here's a list of some important data sources:

- **LivePanel**
  - Scoreboard applets
  - DataLink applet
- **File Watcher**
  - ASCII text files
  - XML files
  - CSV (Comma Separated Value) files
- **Database**
  - MySQL database queries
- **RSS** (Really Simple Syndication) feeds
- **External hardware controllers**
  - *Daktronics™
    - Allsport
      - Baseball
      - Basketball
      - Football

                - Hockey
                - Soccer
                - Volleyball
            - Allsport CG
                - Baseball
                - Basketball
                - Football
                - Hockey
                - Soccer
                - Volleyball
        - DSI (Basketball)
        - OES
            - Basketball
            - Hockey
        - Translux Fairplay
            - Basketball
            - Football
        - WhiteWay (Basketball)
        - Whiteway Rainbow (Basketball)
- **Internal**
    - Time
        - Time
        - Time (filename)
        - Hours (short)
        - Hours (long)
        - Hours (short, 24h)
        - Hours (long, 24h)
        - Minutes (short)
        - Minutes (long)
        - Seconds (short)
        - Seconds (long)
        - AM/PM (short)
        - AM/PM (long)
        - Next Event
        - Time Until Next Event (or end)
    - Date
        - Date (MM/DD/YY)
        - Date (DD/MM/YY)
        - Date (DD/MM/YYYY)
        - Date (filename)
        - SystemDate
        - Day (short, numeric)
        - Day (long, numeric)

        - Day (short)
        - Day (long)
        - Month (short, numeric)
        - Month (long, numeric)
        - Month (short)
        - Month (long)
        - Year (short)
        - Year (full)
    - PGM Source Name
    - PGM Source Comment
    - Session
        - Title Name
        - Title Description
        - Title Image
        - Session Name
        - Session Type
        - Session Encoding
        - Session Aspect Ratio
    - Media Player
        - DDR1 Clip Alias
        - DDR1 Clip Comment
        - Etc.
- **Web Browser**
    - DataLink Web plugin
        - text, including paragraphs
        - images (files or URLs)
- ** **Network**
    - TCP/IP
    - HTTP
    - NDI

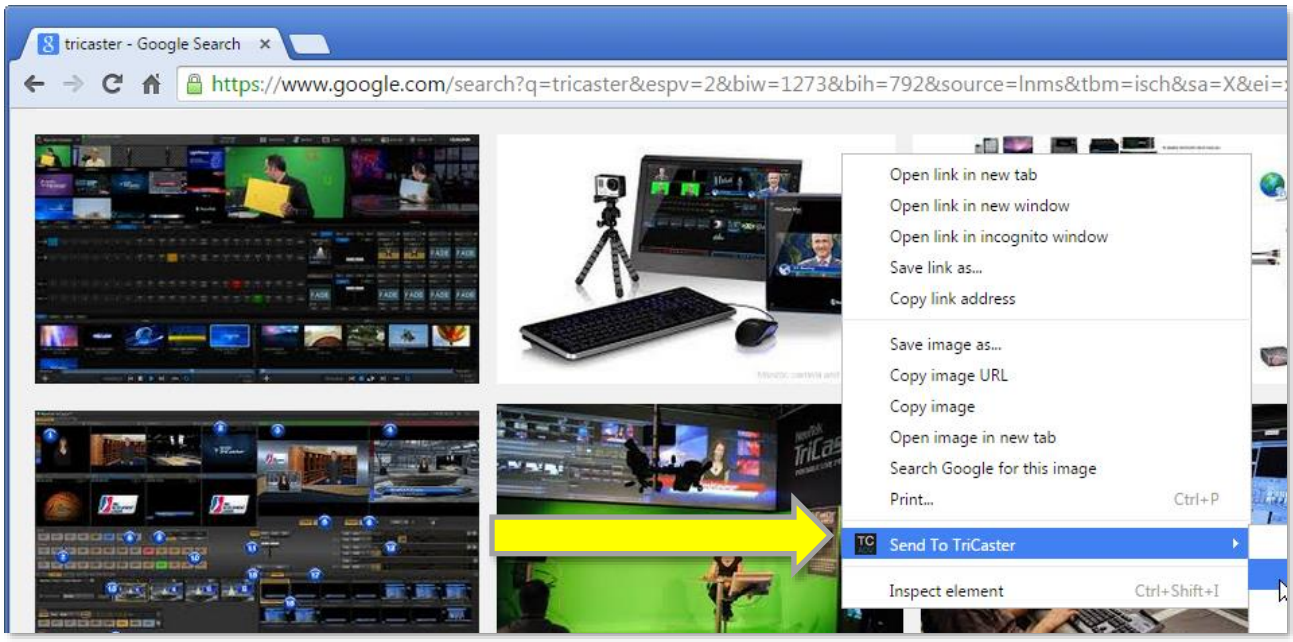
* Certain Daktronics controllers (including Allsport 3000 and 5000 models) require an AllSport CG unit to convert the propriety Daktronics feed to serial data to DataLink. Please contact your Daktronics representative for more information.

** These methods are discussed in Chapter 8, Network A/V & Control.

7.3.1 DATALINK BROWSER EXTENSION AND MORE

As long as the above list might be, it is not complete. In addition, third-party applications can create DataLink keys and supply their values, and you can create and populate DataLink keys using the “datalink_set” shortcut.

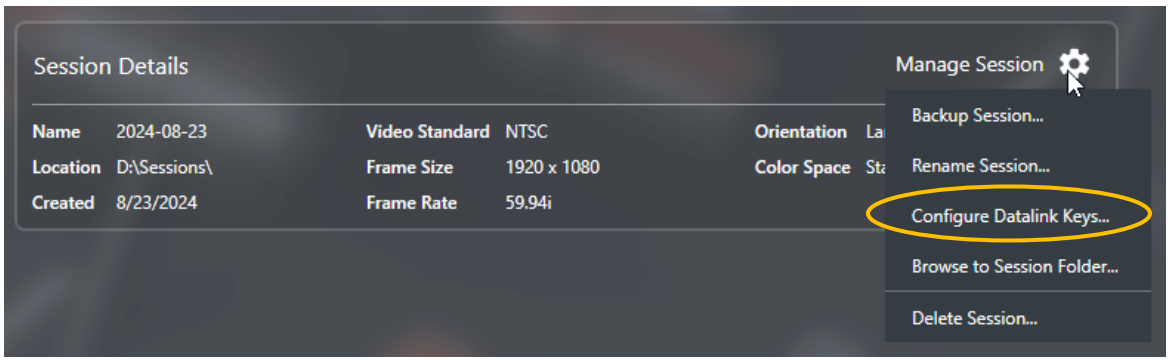
One of the most interesting sources of *DataLink* keys is DataLink for the Vizrt live video mixer, Vizrt's custom extension for the Chrome® web browser. Available without charge from the Chrome Web Store, DataLink Web allows you to easily populate both text and image DataLink keys from webpages.

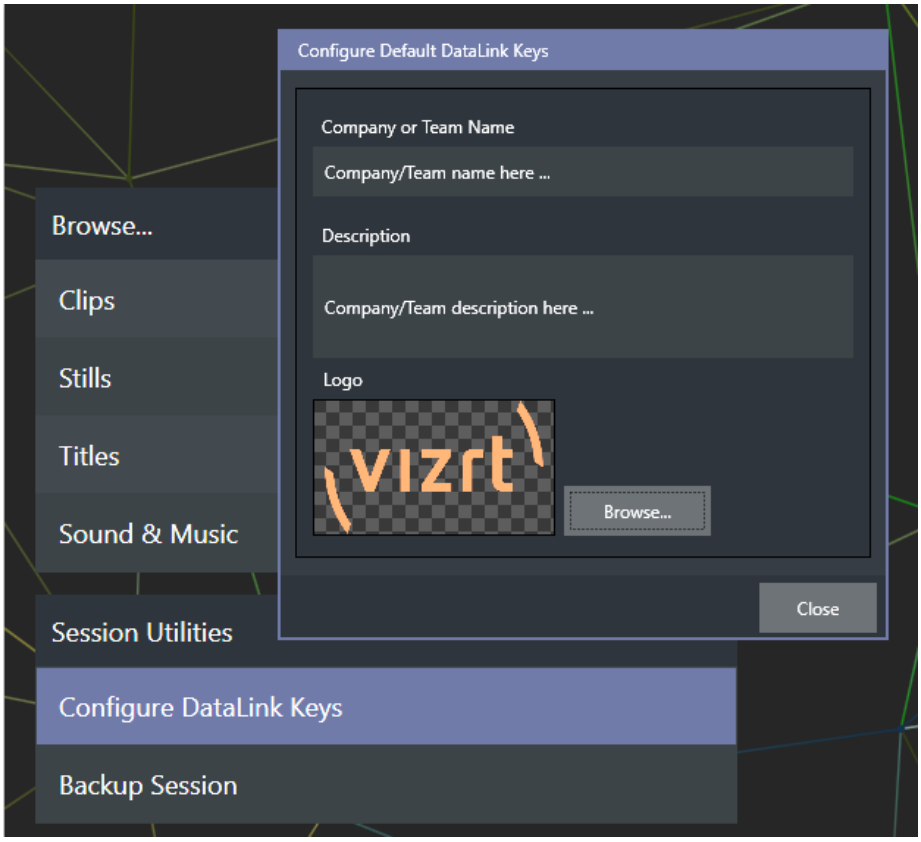


The *DataLink* keys and values are immediately available for use in Vizrt live video mixer title pages, and elsewhere in the live video mixer. Simply select some text, or an image, and use the right-click context menu (or a hotkey) to update a DataLink key you have defined. Any title page using that key will immediately update.

7.3.2 SESSION KEYS

Note that %Session Title Name% and %Session Title Description% are special DataLink keys. Along with %Session Title Image%, the values for these keys are defined in the Startup>Launch screen.





These special 'session keys' are pre-assigned by default to appropriate title entries in specific title pages supplied with your Vizrt live video mixer. When displayed live, these keys are replaced by the values you entered in the Startup screen. In certain cases, this means that simply taking a few moments to choose appropriate values for your company or client will automatically pre-populate stock titles in the session with those values. (Of course, you can modify the individual title page entries as you see fit, too).

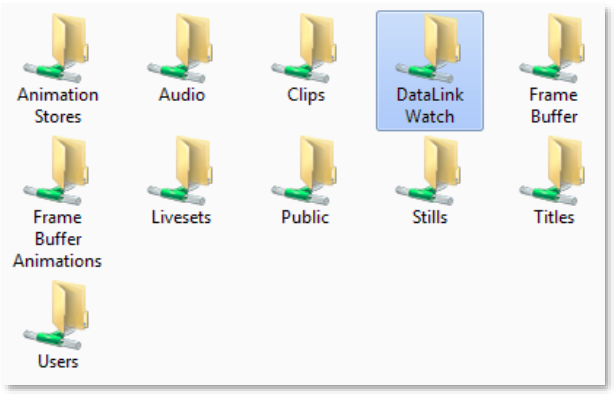
7.3.3 TIME AND DATE

A diverse set of useful time and date keys are always available in the key insertion drop-down menu. These keys allow you to prepare clock and calendar objects that update in realtime on your title pages.

When these keys are displayed, the corresponding values are derived from the Vizrt live video mixer's production clock. This provides many useful and creative possibilities, including counting down to upcoming events.

7.3.4 FILE WATCHER

Among other sources as described earlier, Vizrt live video mixer monitors files in designated *DataLink Watch* folders for changes to keys and their values.



The *DataLink Watch* folder system is implemented per-session, allowing you to automatically provide different video programs you produce with unique DataLink key setups. You will find the folder on your local Vizrt live video mixer host at (*Your session volume*):\Sessions*session-name*\DataLink Watch Folder.

Hint: If you enable the Share Media Folders and Buffers option in Vizrt live video mixer's File menu (Live Desktop), this folder will be accessible to other systems on the network.

Note that it is best to write data into a different folder on the same volume (such as a sub-folder in the Watch folder), then move the file to the Watch folder. This reduces resource demands, and can prevent display glitches that may sometimes occur when modifying and saving files in the Watch folder itself.

ASCII TEXT

DataLink pulls data from ASCII text files (.txt) residing in the (constantly monitored) *DataLink Watch* folder. As this is the simplest source available to DataLink, let's use it to demonstrate a few basics before continuing.

1. Create a new text file in the folder (the filename doesn't matter), and open it in a text editor (Notepad will do).

To supply usable values for DataLink, the text files should contain only *key-value pairs*, arranged in the following format: [key] = [value]

Key names from the file(s) will be available as DataLink entries in your title pages. The value you enter beside the key name in the text file will be shown when the page is displayed on output.

Two Key-Value pairs entry examples are shown below:

city = San Antonio
temperature = 98˚

Note: Keys and values may contain punctuation and spaces.

XML

Similarly, XML (eXtensible Markup Language) files can supply DataLink keys and values. Consider the example xml file content provided below:

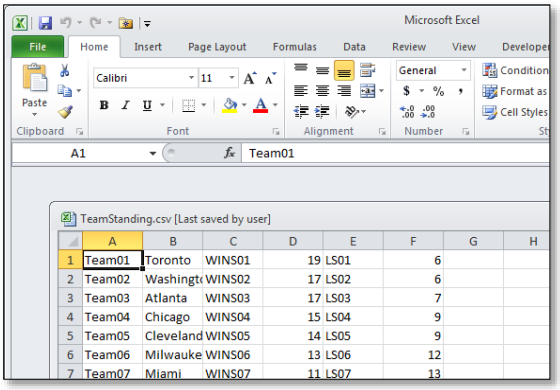
```
<Key>
  <word1>Hello</word1>
  <Child>
    <word2>World</word2>
  </Child>
</Key>
```

From the entries listed above, the DataLink drop-down will show the following keys with the values listed:

%Key word1% = Hello
%Key Child word2% = World

CSV Files

Imagine using common spreadsheet functions to manage complex sport statistics, then pushing the results to a title page with a single keystroke. That's all possible, thanks to *DataLink's* CSV (Comma Separated Value) file support.



For example, simply save changes in the CSV file to Vizrt live video mixer's network-shared *DataLink Watch Folder*, and *DataLink* parses the keys and values it contains, then immediately updates the title page, even if it is on display at the moment.

DataLink parses key-value pairs from neighboring cells on each row as shown in the table below.

Team01	Germany	Team01Wins	6	Team02Losses	2
Team02	Belgium	Team02Wins	4	Team02Losses	1
etc.					

In this case, the key %Team01% would have the value "Germany"; %Team01Wins% would hold "6", etc.

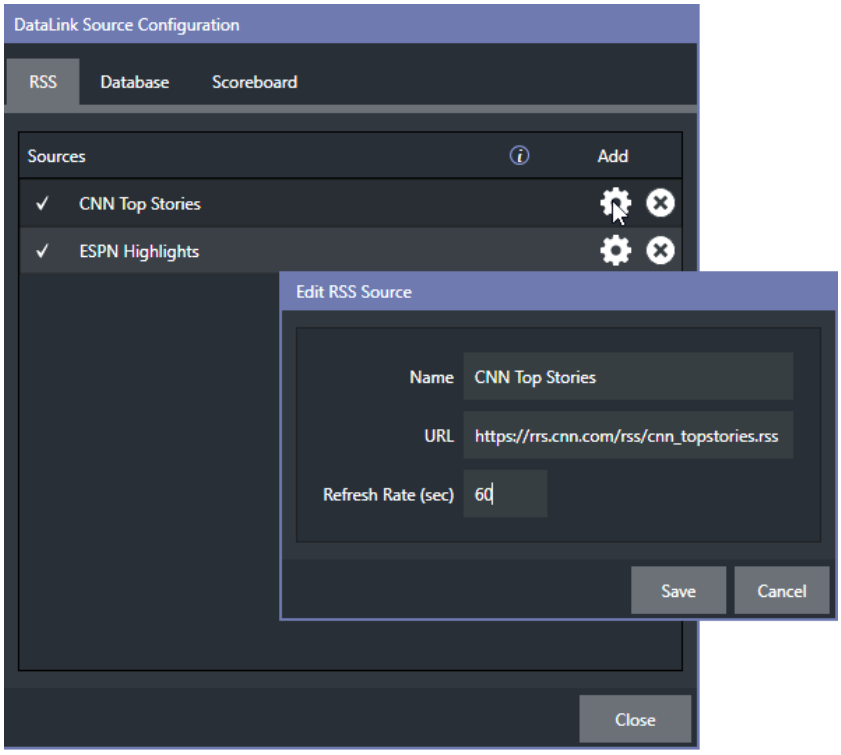
Let's go on to consider the external hardware sources (such as scoreboards) supported by DataLink. Vizrt live video mixer depends on an external hardware connection to supply values for these keys. In the next section, we'll explain how to connect these external devices.

Section 7.4 Source Configuration

Internal DataLink sources, such as clip comments or time and date keys, do not require any configuration beyond populating them. Some other source types require a little more setup, however. Data from RSS feeds, database queries, and external hardware sources (such as scoreboards) fall into this category.

The necessary settings for these latter sources are conveniently located in the *DataLink Source Configuration* application, launched from the *Home Page* in the *Configuration* tab, click on *Add-Ons*. The *DataLink Source Configuration* panel has three tabs, *RSS*, *Database*, and *Scoreboard*. The purpose and contents of each is discussed next.

7.4.1 RSS



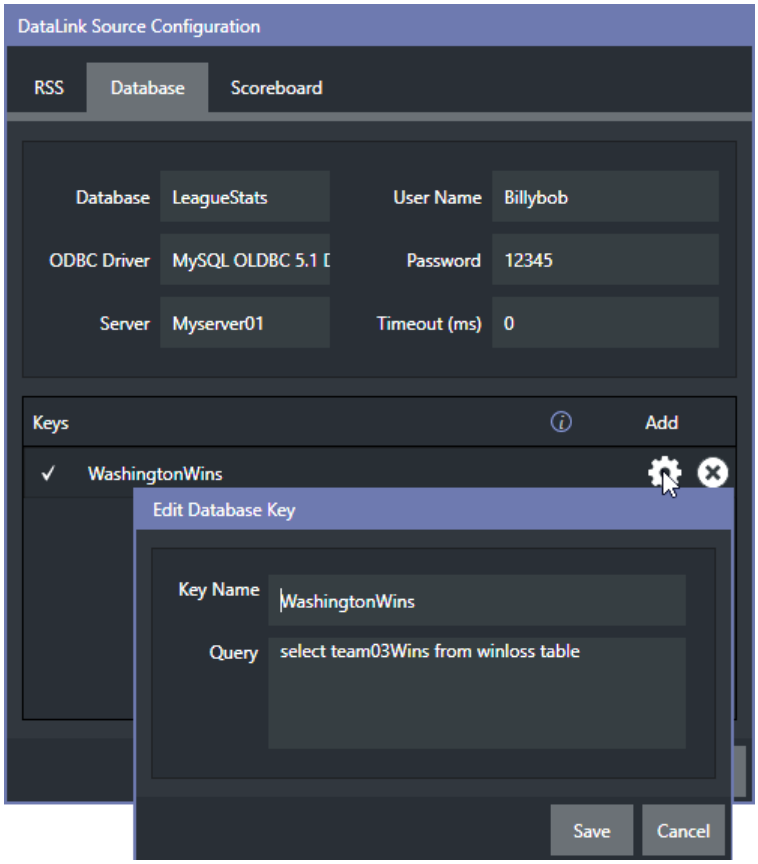
In the RSS tab, click the *Add* button at right to open a dialog that lets you define a new RSS source. Provide a *Name* to identify the new RSS source, and enter the URL to the feed below. The *Refresh Rate* entry below determines how often *DataLink* will poll the source for updates. Click *Save* to store the source (afterward, you can click the gear gadget that appears on rolling the mouse over the source entry to make changes, or the (x) to delete it).

Hint: Key names for RSS feed elements are automatically generated.

7.4.2 DATABASE

For database sources, *DataLink* monitors the value for keys you designate are produced by queries you define. The *Add a Database Key* dialog is shown when you click *Add* in the *Database* tab. Here you can enter a descriptive key *Name*, and the SQL query that will produce the desired value (or values).

Note: You (or someone helping you) will need a measure of familiarity with database addressing and queries.



Enter a representative name in the *Database* box (this is simply to help you identify the data source; it need not be an actual file name). Then enter a *User Name* and *Password* for the database in the boxes provided, and specify the driver used for SQL queries in the *ODBC Driver* box. Finally, enter the *Server* name into the corresponding entry box.

Click *Add* to create a new DataLink key. Give it a suitable *Key Name* in the popup panel, and enter the query string that will produce the value(s) you wish to associate with this key into the large box below.

When the SQL query provides more than one match, DataLink creates a key/value pair for each qualified result.

For example, a keyword “author” could produce an array of matches, which DataLink would arrange as follows:

%author% -> "Voltaire"

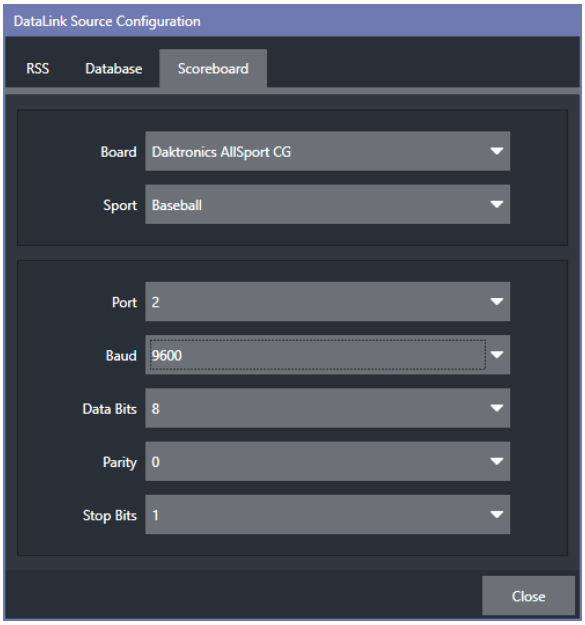
%author.1% -> "James Joyce"

%author.2% -> "Herman Melville"

Click Save to finish the addition of the new key.

7.4.3 SERIAL (SCOREBOARD) SETUP

This DataLink component receives data from compatible external scoreboard hardware controllers. For information on connecting these devices to a Vizrt live video mixer, see Section 7.4.4.



Once connected, use the *DataLink Source Configuration* utility to notify the Vizrt live video mixer that it is available as a source. Use the *Board* menu to choose the device brand/model you have connected from the list of supported devices. Choose a supported *Sport* in the same manner. The rest of the settings for serial devices auto-fill based on your Board and Sport selections, with one exception - select the Port using the information from the heading

Find the COM Port in Section 7.4.4.

KEY NAME LIST

Appendix A, DataLink Hardware Keys lists the keys available for use with DataLink and the varied brands of external equipment it supports.

7.4.4 HARDWARE CONNECTIONS

Note: The steps in this section are mandatory if you require data from an external hardware scoreboard controller.

Naturally, for DataLink to communicate with an external data source, such as a scoreboard, that equipment must be connected to a Vizrt live video mixer and powered up. Also, DataLink must be configured to find and use the connection. We'll discuss how to make and configure connections under this heading.

USB-Serial Adapters

The diversity of supported external systems, cable connectors, and available ports on the host system means this connection may require an adapter.

Newer external devices may use USB connections, but many use older RS-232 (25-pin) connectors (or occasionally, slightly more recent 9-pin) connectors.

Note: Unless the external system is supplied with a USB connection, a USB-Serial adapter is required to connect it to a Vizrt live video mixer.

To connect using a USB-Serial adapter, follow these steps:

- Connect the scoreboard controller's output cable connector to the USB-Serial adapter.
  - Connect the adapter to Vizrt live video mixer.
  - Install drivers for your USB-Serial adapter on the Vizrt live video mixer. Drivers are generally supplied on a Compact Disk (CD) packaged with the adapter by the manufacturer.

    Note that the Vizrt live video mixer may warn you about the dangers of foreign software if it does not recognize the driver for your adapter. (You may wish to ask Vizrt Customer Service about supported adapters or request that your favorite be qualified for exemption from these warnings.)

Note: Certain Daktronics controllers (including Allsport 3000 and 5000 models) require an AllSport CG unit to convert the propriety Daktronics feed to serial data for use in LiveText. Please contact your Daktronics representative for more information.

Find the COM Port

The next step involves determining *which* COM port has been assigned to the new connection by the operating system. This information is required to configure DataLink.

- Right-click the *My Computer* icon on the *Windows Desktop*, and select *Manage* from the menu (to open the Computer Management panel).
- Open the *Device Manager*, and click the + sign next to *Ports (COM and LPT)* in the right-hand pane to disclose available communication ports.

- Locate the entry for your scoreboard controller – take note which COM port number is assigned to it (such as COM 1 or COM2).

Note: You should see your new connection listed. If it doesn't appear at first, try removing and re-inserting the USB cable connector – or you can use the "Scan for hardware changes" item in the Device Manager's Action menu. (If it appears, but shows a **!** icon next to its entry, this may indicate a problem with either the USB connection or your driver installation – try re-installing the driver, following the directions supplied with it.)

- Close the *Device Manager*.

Again, the port number you noted above is required to enable DataLink to recognize the external device.

Important Note: In some environments, Windows may arbitrarily reassign the external device to a different COM port following a reboot. If this happens, you could simply update the COM port entry in the affected configuration profile. However, you may prefer instead to lock the connected device to a specific COM port, using the Windows Device Manager.

To do this, please locate the current port entry for your scoreboard controller. Right-click the entry name, and select Properties in the drop-down menu. Next, click the Port Settings tab at the top of the Properties panel, and click the button labeled "Advanced." Use the Com Port Number drop-down menu to choose an unused port number, and click the OK button. OK the Properties panel too, then close the Device Manager. The Port Number you assigned should now be retained on subsequent reboots.

Chapter 8 NETWORK A/V & CONTROL

Most Vizrt live production systems support both ingest and output of a/v feeds over standard network infrastructure via NDI. This provides a plethora of valuable creative and efficient alternatives. In addition, many Vizrt systems can send or receive control instructions from networked devices and systems, offering many powerful possibilities.

Given Vizrt's preeminent position of innovation in IP solutions for video production, it will surprise no one that it is entirely possible to operate and/or control various Vizrt products from other Vizrt or third-party systems or software using network control methods. We will discuss various approaches available in this chapter.

Section 8.1 NDI

NDI (Network Device Interface) is an immensely popular standard for live production video over IP workflows, even when limited to Gigabit Ethernet networks. NDI allows systems and devices to identify and communicate with each other, to encode, transmit, and receive high quality, low latency, frame-accurate video and audio over IP in real time. NDI enabled-devices and software can enhance video production pipelines, making video input and output available anywhere your network runs.

Most Vizrt live video products and an immense number of third-party systems provide direct support for NDI, both for ingest and output.

8.1.1 CONTROL CONNECTIONS

NDI supports more than just a/v data transfer. As just one example, it makes tally (on-air) notification available to all connected NDI sources and systems. Even better, NDI provides the ability to transmit instructions between Vizrt live production systems and other connected devices.

For TriCaster, applications can be developed to send commands to systems connected by NDI. Here is a code example to perform a take:

```
NDIlib_metadata_frame_t meta_data;
meta_data.p_data = "<ntk_shortcut><shortcut name=\"main_dsk1_take\"
      value=\"\"/></ntk_shortcut>";
NDIlib_send_send_metadata(pNDI_send, &meta_data);
```

Hint: Multiple shortcuts can be sent this way.

In similar fashion. Datalink updates can be sent along NDI connections (requires V2 software).

Here is example code to send a DataLink message:

```
NDIlib_metadata_frame_t meta_data;
    meta_data.p_data = "<ntk_shortcut><shortcut name=\"set_datalink\"
  datalink_key=\"second_line\" datalink_value=\"Vizrt \"/></ntk_shortcut>";
    NDIlib_send_send_metadata(pNDI_send, &meta_data);
```

Third-party developers can also implement custom commands to support their requirements. These can even be used in macros just like 'Vizrt native' commands. Documentation supplied with third-party products will provide information on custom commands that have been prepared for your use by their developers.

MACROS AND NDI

Vizrt live production systems with macro support can use this mechanism to transmit and receive supported instructions across an NDI connection.

This makes it a trivial matter to send control messages between a TriCaster and Viz 3Play, or from one TriCaster to another, for example. Such a macro might perform synchronized operations on both systems and, conveniently, can be executed by a keystroke shortcut or other macro trigger (see Chapter 5, Triggering Macros).

When both parties to the network 'conversation' support NDI, there is no need for complicated configuration. The Vizrt live video system 'knows' which NDI source is connected to its network inputs, and automatically opens a bi-directional communication channel to its host. Let's consider an example scenario.

Example

You identify the upstream NDI source connected to a specific system's inputs as targets for instructions (rather than the local host) using a special "net*n*" shortcut entry in a macro.

Hint: Commands to both the remote target and local host can be entered on different lines in a single macro.

When examined in Vizrt live video system's Macro Editor, a macro entry of this type might look as follows:

Delay (ms)	Shortcut	Value	Key 1	Value 1
0	net1		shortcut_name	main_auto

In this case, the shortcut "net1" defines the Switcher input (i.e., input 1) whose NDI source system is the target for an instruction at right on the same row in the macro.

The "shortcut_name" entry in the Key 1 field tells the target system to expect a valid shortcut to be supplied in the Value 1 field that follows. Additional key/value entries can be supplied as arguments of the instruction performed when the macro is executed.

Hint: One way to learn what shortcuts and values are relevant is to record operation on the target system to a local macro, to see what was captured. Similarly, to debug a macro that sends shortcuts to an external NDI-connected device, record a macro on the target system during operation to see what is received.

Viz 3Play Channel Shortcuts

Viz 3Play also supports a small handful of unique 'channel' commands, listed below. Unlike standard shortcuts, these target the relevant module supplying either output A or B, whichever is connected to the Switcher input identified by the "net" shortcut. (The target for most other shortcuts is defined by individual prefixes, as discussed in Section 4.5.1.)

Note: The syntax for 'channel' commands differs slightly from standard usage detailed previously, as shown below.

CLIP_STORE

Delay (ms)	Shortcut	Value	Key 1	Value 1
(ms)	*net1*	clip_store	index	*ID*

This command stores a local reference ID for the current clip (the one visible on the network input). The value *ID* can be a string. ID is global and shared across your system (i.e., not per system output).

For example:

Delay (ms)	Shortcut	Value	Key 1	Value 1
.0001	net1	clip_store	index	AAA1

The entry above will 'remember' the current clip with the name "AAA1". (The default for ID is an empty string, which is a valid storage target.)

CLIP_RESTORE

Delay (ms)	Shortcut	Value	Key 1	Value 1
(ms)	*net1 or net2*	clip_restore	index	*ID*

This command cues up content previously stored with a specified ID value on the upstream source channel assigned to the network input designated.

For example:

Delay (ms)	Shortcut	Value	Key 1	Value 1
.0001	net1	clip_restore	index	AAA1

The clip previously indexed as "AAA1" (using clip_store) is restored on the source system output channel connected to Net 1. The playhead is set to the beginning of the clip. (If the indexed clip is not located, nothing occurs.)

CLIP_ SELECT

Delay (ms)	Shortcut	Value	Key 1	Value 1
(ms)	*net1 or net2*	clip_select	index	#

Select a page (or clip) defined by the value assigned to index. This may be a number specifying a particular page or at times, another property.

For example, sending a "clip_select" command to Viz 3Play with a suitable numeric value assigned as the "index" key selects a specific Play List tab by index (assuming Play List mode is active. On the other hand, in Clip List mode, if the value for "index" was "0-023" the clip referred to would be selected.

For example:

Delay (ms)	Shortcut	Value	Key 1	Value 1
.0001	net1	clip_select	index	4

This would select the fourth Play List tab on the Viz 3Play output (A or B) connected to Net 1.

CLIP_ MOVE

Delay (ms)	Shortcut	Value	Key 1	Value 1
(ms)	*net1 or net2*	clip_ move	distance	#

Move the specified number of pages forwards or backwards from the current page.

For example:

Delay (ms)	Shortcut	Value	Key 1	Value 1
.0001	net1	clip_move	distance	-1

The entry above would select the previous clip on the source connected to Net 1.

CLIP_ PLAY

Delay (ms)	Shortcut	Value	Key 1	Value 1	Key 2	Value 2
(ms)	*net1 or net2*	clip_ play	speed	#	position	#

You can specify "speed," "position" or both keys (the order of keys is not important).

When "position" is not specified, play begins at the current frame. The value for position is specified in seconds, while speed is expressed as a playback rate value (1.0 = 100%).

For example:

Delay	Shortcut	Value	Key 1	Value 1	Key 2	Value 2
.0001	*net1*	clip_ play	speed	-.5	position	10

This entry would play a clip backwards at 50% speed from a position 10 seconds into the clip.

CLIP_ SCRUB

Delay (ms)	Shortcut	Value	Key 1	Value 1
(ms)	*net1 or net2*	clip_ scrub	distance	#

This command will move the playhead backward or forward by a distance of # seconds.

For example:

Delay (ms)	Shortcut	Value	Key 1	Value 1
.0001	net1	clip_scrub	distance	5

The entry above would advance the playhead five seconds further into a clip displayed on the source connected to Net 1.

NOTES: The software associates values with their key name, so keys can be entered in any order. The following are valid formats for numeric entries: "+0.1", "0.1", ".1", "-0.1".

Section 8.2 TCP/IP

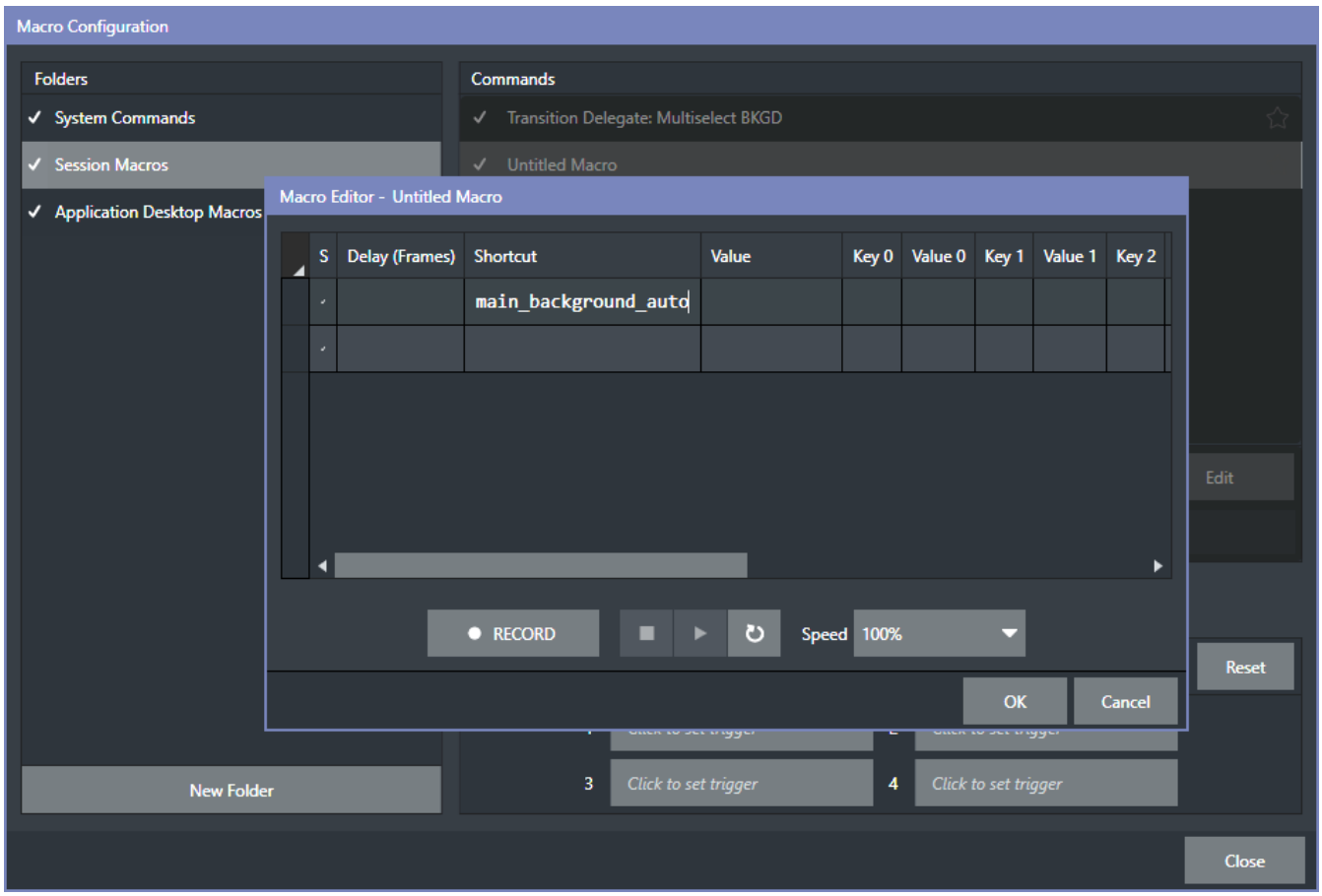
It is also possible to communicate with many Vizrt live video systems over a standard network TCP/IP connection. Custom applications running on a networked host system can directly control the functionality of most Vizrt live production systems by this means.

Here is some sample code that will open and send a message over TCP:

```
int _tmain( int argc, _TCHAR* argv[] )
{     // Initialize Winsock (only needed once for the entire program)
      WSAData wsaData_;
      ::WSAStartup( MAKEWORD(2, 2), &wsaData_ );

      // The machine name we are going to connect too.
      const wchar_t* p_machine_name = (argc>1) ? argv[1] : L"127.0.0.1";

      // We create a socket to use
      SOCKET hSock = ::socket( AF_INET, SOCK_STREAM, 0 );
      if ( hSock == INVALID_SOCKET ) { /* Handle error */ return 1; }

      // We are now going to get the address information
      struct addrinfoW *p_result = NULL, hints = { 0 };
      hints.ai_family   = AF_INET;
      hints.ai_socktype = SOCK_STREAM;
      hints.ai_protocol = IPPROTO_TCP;

      // Resolve the server address and port
      if ( ::GetAddrInfoW( p_machine_name, /* Port No.*/ L"5951", &hints, &p_result ) != 0 )
      { /* Handle error */ return 1; }

      // We now try to connect to the actual destination
      if ( ::connect( hSock, p_result->ai_addr, p_result->ai_addrlen ) == SOCKET_ERROR ) {
      /* Handle error */ return 1; }

      // We are going to register to receive state information
      const char cmd_2[] = "<shortcut name=\"main_dsk1_take\" value=\"\"/>";
      const int cmd_2_sz = ::strlen( cmd_2 )+1;
      if ( ::send( hSock, cmd_2, cmd_2_sz, 0 ) != cmd_2_sz ) { /* Handle error */ return 1; }

      // Close the socket
      ::closesocket( hSock );

      // Finished !
      return 0;
}
```

8.2.1 FINDING COMMANDS

An easy way to find a command (shortcut) is to record a macro on the Vizrt system you are working with. Then you can use the integrated *Macro Editor* to view the recorded shortcuts, and see their arguments. For example, the screenshot below shows the result of recording a main switcher Background Auto. The "shortcut" column lists the command applied, and the subsequent columns list any values or additional data associated with its execution.

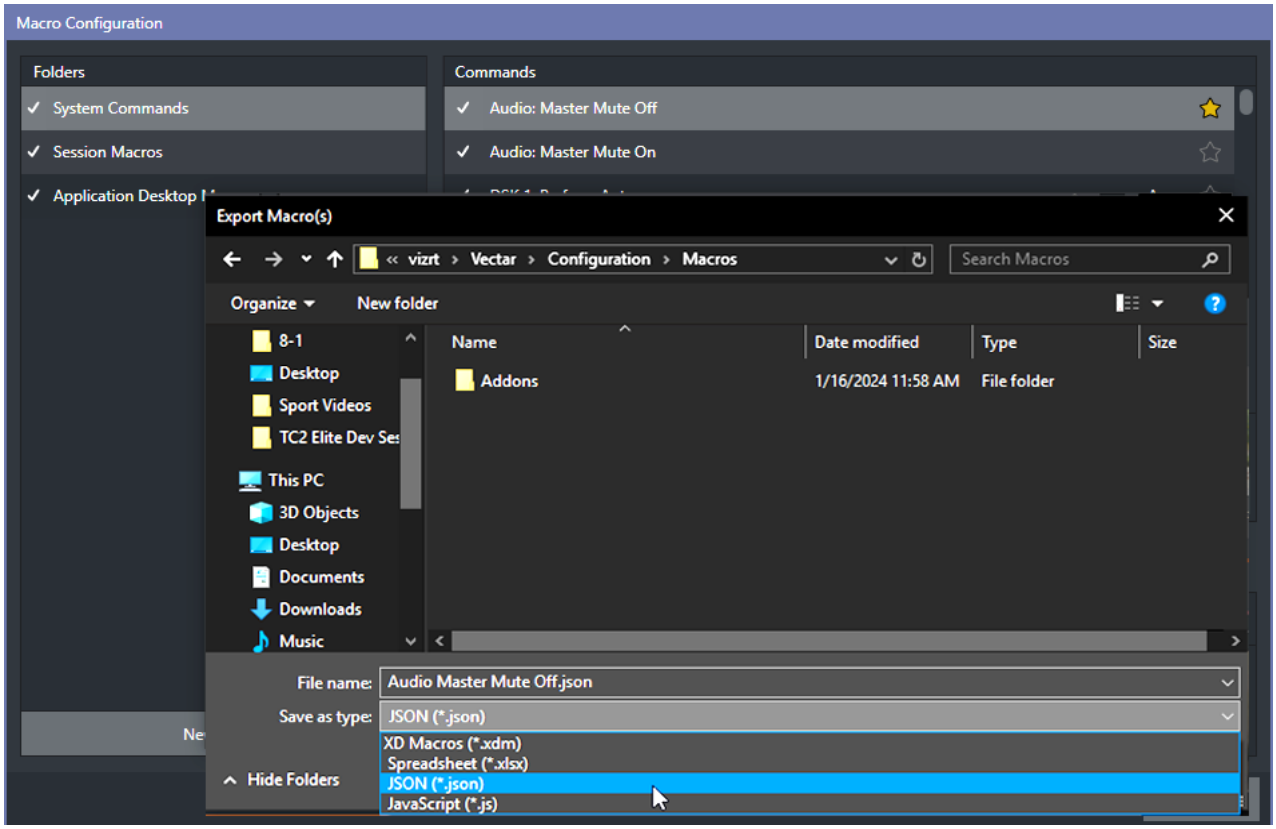


The next section explains how to use this data to produce the XML string needed to issue commands across the network, as illustrated in the code example above.

Hint: Section 4.5.1, Understanding Shortcuts, can help you to locate and use the shortcuts you need.

EXPORTING MACROS

Another way to obtain particularly useful information about macros and the shortcuts used in them is to use the Export feature provided in the Macro Editor provided on supporting Vizrt products.



Right-click a macro (or even a folder full of macros) to show a menu including the Export item. Use the Save as Type menu at the bottom of the file-save window that opens to choose which format the export operation will produce from the following options:

- XD Macros – Vizrt's internal macro format
- Spreadsheet – Microsoft Excel's common XLSX format
- JSON – JavaScript Object Notation format, a popular data-interchange language supported by modern programming languages.
- Javascript – This is a particularly interesting and useful alternative, as the exported code includes a functional websocket implementation.

MACRO UTILITY SHORTCUTS

We'll highlight one particular group of shortcuts here. These commands operate on macros, and thus can serve to reduce or eliminate the need to send a batch of shortcuts sequentially; this is equally true whether you are using TCP/IP, HTTP or NDI for communication.

These are:

- play_macro_byname – the value supplies the name of a macro that will be run.
- play_macro_byid – internally, macros are identified by an ID string (see hint below). Launching a macro by its ID can be useful when it is possible that the operator may rename a macro.
- record_macro_byname
- stop_record_macro

Other macro-related shortcuts worth mentioning follow below:

- stop_macro_byname
- stop_macro_byid
- macro_is_enabled_byname
- macro_is_enabled_byid
- get_macroid_byname – prints the first matching macro ID to the Notifications panel.

Hint: macros are defined in two files. The first is named system_macros.xdm, and is located in the directory at C:\ProgramData\Vizrt\system-name\Configuration\Macros\. The file lists (write-portected) system macros as well as any global (non-'session') macros you create. The second is located in the session folder, typically D:\Sessions\session_name\ and is named session.xdm. This file holds macros affecting just that one session.

Alternatively, names and IDs for all macros can be read in a web browser by entering the URL below:

http://[tricaster-ip]/v1/dictionary?key=macros_list

8.2.2 COMMAND FORMAT

Commands (shortcuts) you will send across the network are formatted as XML strings as follows:

```
<shortcut name="" value=""/>
```

Commands with multiple parameters are formatted as follows:

```
<shortcut name="" value="" key1="value1"/>
```

For instance, the following table illustrates several commands in XML format:

Command formatted as XML	Description
<shortcut name="main_background_take"/>	Perform a Take
<shortcut name=" main_a_row_named_input" value=”ddr1” />	Select DDR 1 on the program row

All XML strings are sent in UTF8 encoding, and should be terminated either with a carriage return, line feed, or NULL terminator. Many commands can be sent back to back without requiring the socket to be closed.

To send multiple commands at once, you may use the following method:

<shortcuts><shortcut name="" value=””/></shortcuts>

8.2.3 TALLY EXAMPLE

Here is an example in which we connect to a Vizrt system via TCP and get tally (On Air) notifications.

The sample code supplied below will connect to a TriCaster TC1 (or any Vizrt switcher) and start listening for the current states of the system.

```
// Remote Control.cpp : Defines the entry point for the console application.
//

#include "stdafx.h"

int _tmain( int argc, _TCHAR* argv[] )
{   // Initialize Winsock (only needed once for the entire program)
    WSAData wsaData_;
    ::WSAStartup( MAKEWORD(2, 2), &wsaData_ );

    // The machine name we are going to connect too.
    const wchar_t* p_machine_name = (argc>1) ? argv[1] : L"127.0.0.1";

    // We create a socket to use
    SOCKET hSock = ::socket( AF_INET, SOCK_STREAM, 0 );
    if ( hSock == INVALID_SOCKET ) { /* Handle error */ return 1; }

    // We are now going to get the address information
    struct addrinfoW *p_result = NULL, hints = { 0 };
    hints.ai_family   = AF_INET;
    hints.ai_socktype = SOCK_STREAM;
    hints.ai_protocol = IPPROTO_TCP;
```

```
    // Resolve the server address and port
    if ( ::GetAddrInfoW( p_machine_name, /* Port No.*/ L"5951", &hints, &p_result ) != 0 ) {
/* Handle error */ return 1; }
    // We now try to connect to the actual destination
    if ( ::connect( hSock, p_result->ai_addr, p_result->ai_addrlen ) == SOCKET_ERROR ) { /*
Handle error */ return 1; }

    // We are going to register to receive state information
    const char cmd_2[] = "<register name=\"NTK_states\"/>";
    const int cmd_2_sz = ::strlen( cmd_2 )+1;
    if ( ::send( hSock, cmd_2, cmd_2_sz, 0 ) != cmd_2_sz ) { /* Handle error */ return 1; }

    // For the next minute or so, we display whatever is happening on in terms of states
    for( DWORD start_time = ::GetTickCount(); ::GetTickCount() - start_time < 60000; )
    {   // Lets receive some data. We want to do something better than this in production
        // code, but this is meant to keep things short.
        char some_data[ 4096 ];
        if ( ::recv( hSock, some_data, sizeof(some_data), 0 ) < 0 ) { /* Handle error */ return
1; }

        // Display the data
        ::puts( some_data );
    }

    // Lets stop receiving state changes from now
    const char cmd_3[] = "<unregister name=\"NTK_states\"/>";
    const int cmd_3_sz = ::strlen( cmd_3 )+1;
    if ( ::send( hSock, cmd_3, cmd_3_sz, 0 ) != cmd_3_sz ) { /* Handle error */ return 1; }

    // Close the socket
    ::closesocket( hSock );

    // Finished !
    return 0;
}
```

You will receive messages like this one when the tally changes :

```
 <shortcut_states>
  <shortcut_state name="program_tally" value="INPUT1|BFR2|DDR3" type="" sender="" />
  <shortcut_state name="preview_tally" value="INPUT7" type="" sender="" />
 </shortcut_states>
```

In this example, INPUT1, BFR1, DDR3 are identified as being on Program output, while INPUT7 is on Preview.

Section 8.3 HTTP

Most current Vizrt products also function as HTTP servers, and are able to receive either GET or POST messages. HTTP methods that are easily accessed by advanced end users.

Using a simple text editor, anyone conversant with HTML can create useful web browser 'applets' that can interoperate with Vizrt systems.

Add programming knowledge (say, javascript or Python for example) and an entire world of possibilities open up. The internal web server can be addressed as in this example:

http://*SystemName*

Hint: In order to determine if the session is running, you can query "http:// SystemName /v1/live". Alternatively, us the IP address for the system, for example "http:// 192.168.1.24/v1/live".

This will return a text string of TRUE when in a session, and FALSE when in the control panel.

8.3.1 PASSWORD PROTECTION

Password protection for web access conforms to standard practices for a web server, using a standard Apache server password file. Users or developers can use standard command line tools to configure the password as follows:

https://httpd.apache.org/docs/current/programs/htpasswd.html

The password file is typically located in the folder below:

%PROGRAMDATA%\ Vizrt \ *SystemName* \Configuration\web_passwords

Deleting this file removes web password protection for the system. The TriCaster *Administrator panel* also provides a convenient "Change password" link. Upgrade installers may show option to "Disable web access password". By default, this option is disabled (i.e., the password is enabled by default). The default username and passwords are both "admin."

The web server employs standard HTTP authentication methods. While RFC3986 is supported, we would recommend digest access authentication which follows RFC2069.

For more information, please refer to shttps://en.wikipedia.org/wiki/Basic_access_authentication and https://en.wikipedia.org/wiki/Digest_access_authentication.

8.3.2 GET COMMANDS

You can send shortcut commands and (macro) trigger messages by using http GET commands.

For example, to send a shortcut that executes an "Auto" (transition) on the main Switcher's background video layer, you would simply get the address below:

http://*Insert_IP_Address*/v1/shortcut?name=main_background_auto

Hint: The URL you wish to 'get' should be formatted as follows:

/v1/shortcut?name=NAME&value=VALUE&value1=ANOTHER_VALUE

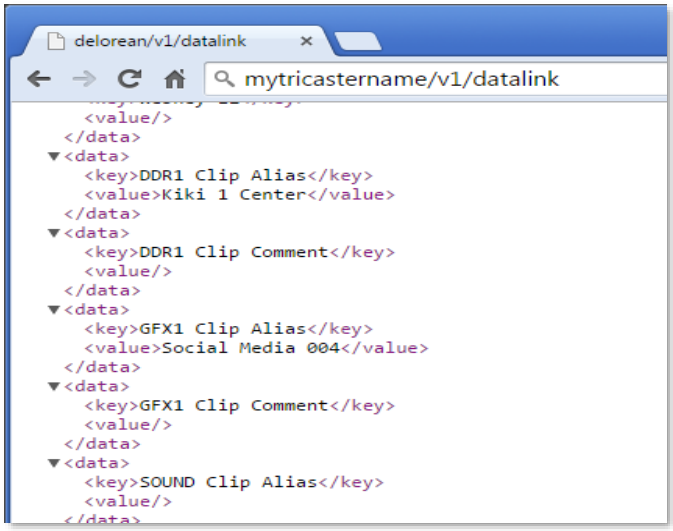
To issue a trigger you would GET the address "/v1/trigger?name=NAME"

To issue a DataLink update, you would GET the address "/v1/datalink?key=KEY&value=VALUE". You can easily obtain a full list of the current set of DataLink key/value pairs by querying the URL below:

http:// SystemName /v1/datalink

This returns the current DataLink keys and values in the format listed next:

```
<datalink_values>
<data>
<key>Time</key>
<value>5:08:50 PM</value>
</data>
<data>
<key>Hours (short)</key>
<value>5</value>
</data>
<data>
<key>Hours (long)</key>
<value>05</value>
</data>
<data>
<key>Hours (short, 24hr)</key>
  (etc…)
```



Note: The name and value pairs must be correctly escaped.

8.3.3 POST COMMANDS

You can POST a <shortcut …> or <trigger …> message directly. You should send these to any URL that is in the path /v1/shortcut, /v1/trigger or /v1/datalink. Since these are XML messages, the content-type should be text/xml.

For instance, if you wished to send a shortcut contained in the file “MyShortcut.xml,” you would use the following CURL command line:

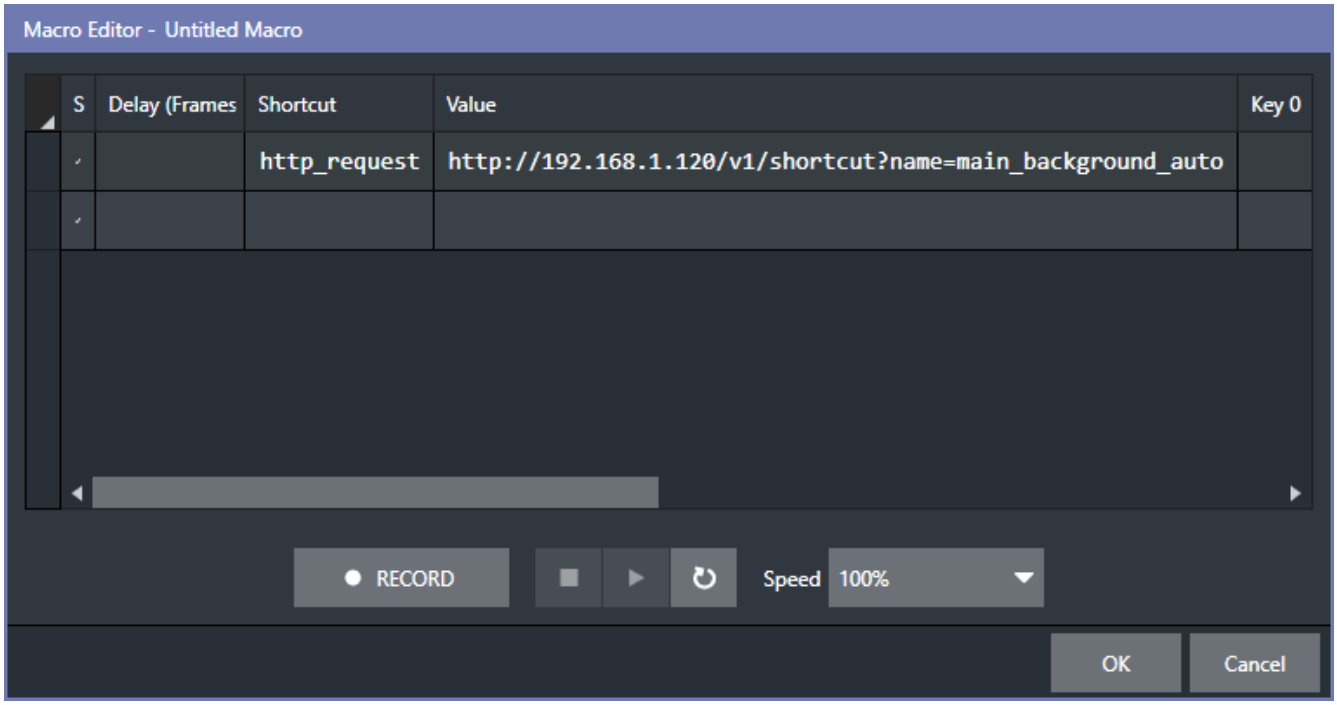
```
curl -X POST -d @MyShortcut.xml http:// SystemName/v1/shortcut --header "Content-
    Type:text/xml"
```

If you are using PHP, it is common to wish to post commands in a form “shortcut=<shortcut name=value…”. This is automatically detected for “shortcut=”, “trigger=”, “datalink=” where the value is the regular XML form of the shortcut (the value is fully escaped).

8.3.4 MACROS AND HTTP

It’s also possible to use the native Macro engine on Vizrt systems to send (HTTP) GET commands to external Vizrt systems or other supporting devices (such as a PTZ camera). To do this, use the shortcut “http_request” in your macro.

Doing so sends the GET request to the target identified in the value string you supply. For example, a macro prepared as shown below will trigger an Auto (transition) on the main Switcher of a TriCaster with the IP address 192.168.1.120. (Any response the request generates is ignored.)



8.3.5 FILE TRANSFER

It is possible to send media files directly to a Vizrt live video mixer via HTTP post commands. Post commands are sent to http:// SystemName/v1/file. As an example, the following curl command would post a PNG file to the system.

```
curl.exe -X POST –data-binary @YourCoolFile.png http:// SystemName/v1/file --header
    "Content-Type: image/png " --header "Filename:HelloWorld.png" --header
    "Overwrite:true"
```

The header “Filename:somefilename” is optional, but allows you to give the Vizrt live video mixer a hint as to what file-name to choose for this file. If one is not specified then a filename will be chosen for you automatically.

Specify “Overwrite:true” if you wish the filename to be used no matter whether it exists or not (by default, overwrite is false).

The response from the file transfer will either be a 400 error, with a text description of the error, or a 200 success with the filename of the file returned; allowing you to then use this in titles, DDRs, etc.

Supported content types are:

Type	Description
audio/mpeg	MP3 Audio file
audio/basic	AU Audio file
audio/x-wav	WAV file
audio/x-aiff	AIFF file
image/gif	GIF image file
image/jpeg	JPEG image file
image/png	PNG image file
image/tiff	TIFF image file
image/bmp	BMP image file
video/x-msvideo	AVI file
video/quicktime	QuickTime file (MOV)
video/mp4	MPEG-4 wrapper (H.264 normally)
video/mpeg	MPEG-2 video file.

8.3.6 VIDEO PREVIEWS

It is possible to receive JPG images back for any source within the Vizrt live video mixer or Viz 3Play system. These may be queried as described next.

Possible names of sources for use with this method are listed in the table below:

Source Name	Description
output1	The primary video output
output2	The secondary video output
output3	The third video output
output4	The fourth video output
input1- input(n)	Video inputs
net1, net(n)	NDI inputs
ddr1, ddr2	DDR media players
gfx, gfx2	Graphics players
bfr1 - bfr15	15 buffers

Additional parameters are available that perform the following:

Parameter	Description
xres	Force the resolution of the image to be this width. If this is omitted, this is computed from the source aspect ratio.
yres	Force the resolution of the image to be this width. If this is omitted, this is computed from the source aspect ratio.
q	JPEG image quality (range 50-100).

TABLE 1

In general, it is wise not to query frames at high image rates. Request them at a resolution that is close to what you need. For instance, to receive a 640x480 preview of the current output, you would get:

http:// SystemName/v1/image?name=output&xres=640&yres=480

Note: See also Section 8.3.9 for information on Vizrt live video mixer's WebSocket implementation.

8.3.7 GENERATING ICONS

It is possible to obtain an icon representation for any file that is on the system. This can be used, for instance, to generate icons for Vizrt LiveSet or Transition files that may be loaded into the switcher (with the names given to you by getting the Vizrt live video mixer state data). Similar to how inputs are read, you get an icon by specifying the path (required), the resolution of the longest side (optional), and the JPEG quality (optional).

For instance, to get the icon for the LiveSet effect file at the location below:

C:\ProgramData\Vizrt\Effects\LiveSets\Alignment\Center.LiveSet

You could get the URL:

http://“VideoMixer“/v1/icon?filename=C:%5CProgramData%5CVizrt%5CEffects%5CLiveSets%5CAlignment%5CCenter.LiveSet&res=320&Q=90

8.3.8 GETTING TALLY AND OTHER SETTINGS

Vizrt live video mixers can provide XML-formatted lists of parameters and values representing various states of the switcher, buffers and effects. Combining this information with scripted shortcut commands, sophisticated interactions can be made between the Vizrt live video mixer and a web application, controlled from either side of the client/server relationship.

Requesting the URL below returns a full description of all of the video inputs on the system, with information regarding whether they are currently being displayed on program or preview output (tally information):

http:// SystemName/v1/dictionary?key=tally

An example returned XML result would be as follows:

```
<tally>
<column name="input1" index="0" on_pgm="false" on_prev="false" ndi_id="0"/>
<column name="input2" index="1" on_pgm="false" on_prev="false" ndi_id="1"/>
<column name="input3" index="2" on_pgm="false" on_prev="false" ndi_id="2"/>
<column name="input4" index="3" on_pgm="false" on_prev="false" ndi_id="3"/>
<column name="input5" index="4" on_pgm="false" on_prev="false" ndi_id="4"/>
<column name="input6" index="5" on_pgm="false" on_prev="false" ndi_id="5"/>
<column name="input7" index="6" on_pgm="false" on_prev="false" ndi_id="6"/>
<column name="input8" index="7" on_pgm="false" on_prev="false" ndi_id="7"/>
<column name="input9" index="8" on_pgm="false" on_prev="false" ndi_id="8"/>
<column name="input10" index="9" on_pgm="false" on_prev="false" ndi_id="9"/>
<column name="input11" index="10" on_pgm="false" on_prev="false" ndi_id="10"/>
<column name="input12" index="11" on_pgm="false" on_prev="false" ndi_id="11"/>
<column name="input13" index="12" on_pgm="false" on_prev="false" ndi_id="12"/>
<column name="input14" index="13" on_pgm="false" on_prev="false" ndi_id="13"/>
<column name="input15" index="14" on_pgm="false" on_prev="false" ndi_id="14"/>
<column name="input16" index="15" on_pgm="false" on_prev="false" ndi_id="15"/>
<column name="bfr1" index="16" on_pgm="false" on_prev="false"/>
<column name="bfr2" index="17" on_pgm="false" on_prev="false"/>
<column name="bfr3" index="18" on_pgm="false" on_prev="false"/>
<column name="bfr4" index="19" on_pgm="false" on_prev="false"/>
<column name="bfr5" index="20" on_pgm="false" on_prev="false"/>
<column name="bfr6" index="21" on_pgm="false" on_prev="false"/>
<column name="bfr7" index="22" on_pgm="false" on_prev="false"/>
<column name="bfr8" index="23" on_pgm="false" on_prev="false"/>
```

```
<column name="bfr9" index="24" on_pgm="false" on_prev="false"/>
<column name="bfr10" index="25" on_pgm="false" on_prev="false"/>
<column name="bfr11" index="26" on_pgm="false" on_prev="false"/>
<column name="bfr12" index="27" on_pgm="false" on_prev="false"/>
<column name="bfr13" index="28" on_pgm="false" on_prev="false"/>
<column name="bfr14" index="29" on_pgm="false" on_prev="false"/>
<column name="bfr15" index="30" on_pgm="false" on_prev="false"/>
<column name="ddr1_a" index="31" on_pgm="false" on_prev="false"/>
<column name="ddr1_b" index="32" on_pgm="false" on_prev="false"/>
<column name="ddr2_a" index="33" on_pgm="false" on_prev="false"/>
<column name="ddr2_b" index="34" on_pgm="false" on_prev="false"/>
<column name="gfx1_a" index="35" on_pgm="false" on_prev="false"/>
<column name="gfx1_b" index="36" on_pgm="false" on_prev="false"/>
<column name="gfx2_a" index="37" on_pgm="false" on_prev="false"/>
<column name="gfx2_b" index="38" on_pgm="false" on_prev="false"/>
<column name="ddr1" index="39" on_pgm="false" on_prev="false"/>
<column name="ddr2" index="40" on_pgm="false" on_prev="false"/>
<column name="gfx1" index="41" on_pgm="true" on_prev="false"/>
<column name="gfx2" index="42" on_pgm="true" on_prev="false"/>
<column name="v1" index="43" on_pgm="false" on_prev="false"/>
<column name="v2" index="44" on_pgm="false" on_prev="false"/>
<column name="v3" index="45" on_pgm="false" on_prev="false"/>
<column name="v4" index="46" on_pgm="false" on_prev="false"/>
<column name="preview" index="47" on_pgm="false" on_prev="false"/>
<column name="me_preview" index="48" on_pgm="false" on_prev="false"/>
<column name="me_follow" index="49" on_pgm="false" on_prev="false"/>
<column name="previz" index="50" on_pgm="false" on_prev="false"/>
<column name="web_follow" index="51" on_pgm="false" on_prev="false"/>
<column name="sound" index="-2" on_pgm="false" on_prev="false"/>
<column name="black" index="-1" on_pgm="false" on_prev="false"/>
  </tally>
```

Other system information can also be obtained in this manner. For example, getting the following URL returns information about the system, software, and session:

http:// SystemName /version

An example response would look like the following:

```
<product_information>
  <product_model>TC1</product_model>
  <product_name>TriCaster TC1</product_name>
  <product_version>7-0</product_version>
  <product_id>NCWL-WFKNJ8YAA-200918</product_id>
  <product_serial_no/>
  <product_build_no>7-0-180920</product_build_no>
  <machine_name>TC1</machine_name>
  <session_x_resolution>1920</session_x_resolution>
  <session_y_resolution>1080</session_y_resolution>
```

```
    <session_fielded>true</session_fielded>
    <session_frame_rate>29.970030</session_frame_rate>
    <session_aspect_ratio>1.777778</session_aspect_ratio>
    <session_color_format>CCIR709</session_color_format>
    <session_color_coding>NTSC</session_color_coding>
    <session_name>TC1 Session</session_name>
</product_information>
```

To offer another example, requesting the (example) URL below returns a wealth of switcher parameters.

http:// SystemName/v1/dictionary?key=switcher

The result would include:

- All inputs, physical and virtual
- Switcher row sources for M/Es, including up to 4 rows if using a LiveSet
- Overlay information for main and M/E switchers
    - Overlay source
    - T-Bar position
- Currently loaded Effect (Transition or LiveSet)

An example response would look like the following:

```
<switcher_update main_source="BFR4" preview_source="gfx1" effect="Q:\Products\
      SystemName _Content\Animation Stores\Output\Broadcast\Door Slam.effect">
  <tbar position="0.000000" speed="0.000000"/>
  <switcher_overlays>
    <overlay z_order_position="0" source="V2">
      <tbar position="0.000000" speed="0.000000"/>
    </overlay>
    <overlay z_order_position="1" source="BFR1">
    <tbar position="0.000000" speed="0.000000"/>
```

Or, requesting the URL below will return a list of the currently-assigned buffers for the main switcher row and the M/E rows, similar to the following example:

```
http:// SystemName/v1/dictionary?key=buffer
:
<buffers>
  <main>
    <buffer selection="BFR4"/>
  </main>
  <me index="0">
  <row>
    <buffer selection="BFR1"/>
  </row>
</me>
...
```

The URL below returns a list of all the effects loaded into all the bins for each transition and overlay in the main Switcher and all M/Es.

http:// SystemName/v1/dictionary?key=switcher_ui_effects

An example result follows:

```
<switcher_ui_effects>
<switcher name="main">
<effect_bin>
<effect0 effect="Fade"/>
<effect1 effect="Q:\Products\ Vizrt live video mixer _Content\Animation
    Stores\Output\Broadcast\Door Slam.effect"/>
<effect2 effect="c:\Program Files\ Vizrt \...\Effects\Transitions\Fades\Non Additive
    Fade.trans"/>
<effect3 effect="c:\Program Files\ Vizrt \...\Effects\Transitions\Fades\Flash.trans"/>
<effect4 effect="c:\Program Files\ Vizrt \...\Effects\Transitions\Fades\Clouds.trans"
...
<effect7 effect="c:\Program Files\ Vizrt \...\Effects\Overlays\Iris\Hard\Rectangle
    (H).ofx"/>
<effect8 effect="c:\Program Files\ Vizrt \...\Effects\Overlays\Iris\Hard\Circle(H).ofx"/>
</effect_bin>
</key>
</switcher>
<switcher name="v3">
<effect_bin>
<effect0 effect="Fade"/>
<effect1 effect="c:\Program Files\ Vizrt \...\Effects\Transitions\Fades\Additive
    Fade.trans"/>
<effect2 effect="c:\Program Files\ Vizrt \...\Transitions\Fades\Non Additive
    Fade.trans"/>
<effect3 effect="c:\Program Files\ Vizrt \...\Transitions\Fades\Flash.trans"/>
<effect4 effect="c:\Program Files\ Vizrt \...\Transitions\Fades\Clouds.trans"/>
<effect5 effect="c:\Program Files\ Vizrt \...\Transitions\Fades\Noise.trans"/>
<effect6 effect="c:\Program Files\ Vizrt \...\Transitions\Iris\Hard\Circle(H).trans"/>
      ...
<switcher name="v8">
<effect_bin>
<effect0 effect="C:\Program Files\ Vizrt \...\Effects\LiveSets\User\Rock Stage Standing
    Flares 03 RAW\Rock Stage Standing Flares 03 RAW.LiveSet"/>
</effect_bin>
<key>
<effect_bin>
<effect0 effect="Fade"/>
<effect1 effect="c:\Program Files\ Vizrt \...\Effects\Overlays\Trajectories\Fly In\Fly In
    B.ofx"/>
```

The complete list of key values supported for dictionary use in the manner disclosed in the preceding examples follows below:

- shortcut_states
- tally
- ddr_playlist
- ddr_timecode
- buffer
- switcher
- buffer
- switcher_ui_effects
- audiomixer
- audio_bins
- audiomixer
- filebrowser
- macros_list
- ndi_sources

8.3.9 WEBSOCKETS

The WebSocket protocol is supported by most major web browsers and allows Vizrt systems to push data (inluding a great deal of system status information along with image previews and audio data) to the client. This allows improved responsiveness by notifying clients of state changes, removing the need for clients to peridically poll for changes.

CONNECTING

Vizrt systems support a number of different web socket connections. These can variously receive notifications of state changes or quickly execute shortcut commands. The process for establishing a web socket connection is the same regardless of the connection type. For example, to receive state change notifications, first open a connection to the Vizrt system with a web socket on port 5951 using the path "/v1/change_notifications" and the WebSocket protocol. Then listen for data coming in on that connection.

To keep the connection active for lengthy periods, you may send the web server ping frames periodically (every 15 seconds would be fine). Another common approach is to wrap the connection in a function that is called upon its closing.

The following is a list of available web socket addresses, which will vary depending on the system.

- v1/audio_notifications
- v1/change_notifications
- v1/shortcut_notifications
- v1/shortcut_state_notifications
- v1/timecode_notifications
- v1/vu_notifications

Opening a Connection in JavaScript

```
var url = 'ws://' + ipAddress + 'v1/change_notifications';
var ws = WebSocket( url );
```

Hint: See also Exporting Macros in Section 8.2.1.

State Change Notifications

The "v1/change_notifications" web socket connection notifies the client of state changes (for example a clip being added to or removed from a DDR, or a change to tally). The only data sent over this connection is the name of the served state page whose content has changed. A subsequent HTTP request is required in order to obtain the actual updated state data.

For example, if the text received is "tally", the web page located at "/v1/dictionary?key=tally" has changed. Notification messages will pertain to one of the following key values, depending on the action on the device.

- shortcut_states
- tally
- ddr_playlist
- buffer
- switcher
- switcher_ui_effects
- audiomixer
- audio_bins
- macros_list
- ndi_sources

State Change Message Processing

The example code below creates a WebSocket that renews itself upon closing, has handler functions for onopen, onclose, and onmessage, and gives three stubs for processing received messages.

```
function createWebsocket() {
        var url = 'ws://' + ipAddress + 'v1/change_notifications';
        var ws = new WebSocket( url );
}

// create the socket the first time
createWebsocket();

// Attach event handlers. Standard WebSocket handlers are supported.

ws.onopen = function() {
    console.log("TriCaster WebSocket Opened");
}
```

```
// The incoming message data will be one of the states listed above.
ws.onmessage = function( msg ) {
      if (msg.data == "tally") {
        // do tally things
          }
          else if (msg.data == "switcher") {
            // do switcher things
          }
          // …
}

ws.onclose = function() {
      createWebsocket();   // Upon closing, reopen the socket
}
```

Video Previews

Some Vizrt products (such as TriCaster) also support the serving of video preview streams over web-sockets. The web socket location takes the form shown below:

http://SystemNameOrIPAddress/v1/video_notifications?name=NAME&xres=RESX&yres=RESY&q=QUALITY

(Parameters in the above example are described in Section 3.4, and work the same way.)

A web socket will be opened and JPG images will be streamed to it as fast as the network can send them. Each frame is sent in a single send operation, so you know the size of the JPG data from the size of the received packet.

Receiving/Sending Audio

Vizrt systems may also allow you to observe audio over a web socket. To do so, use the following format to create a connection:

http://SystemNameOrIPAddress/v1/audio_notifications?name=NAME

Supported audio names are listed below:

- output
- aux
- phones

There following caveats are important:

- Audio is uncompressed stereo 44.1 kHz, in signed 16 bit format. This requires approximately 180 Kb/s over the network so make sure you have a good enough connection.
- The implementation does not do dynamic audio resampling. Thus, occasional audio glitches may be expected, since the client computer is not locked to TriCaster's audio clock.

TriCaster also supports serving VU data over web sockets. The web socket address takes the form shown below:

http://SystemNameOrIPAddress /v1/vu_notifications?name=NAME

Receiving/Sending Shortcuts

For some shortcuts, state change notifications that require a subsequent HTTP request could make an app feel slow or unresponsive. The "v1/shortcut_state_notifications" web socket connection not only notifies the client that a shortcut has changed, but includes its updated value as well, omitting the need for any HTTP request.

The "v1/shortcut_state" web socket can be used to quickly issue a shortcut command when performance is important (like updating a volume slider). No data is ever received by the client on this connection, it is only meant for sending data from the client to the system.

Issuing a Shortcut via WebSocket in Javascript

```
var url = 'ws://' + ipAddress + 'v1/shortcut_state';
var ws = WebSocket( url );
ws.send( 'name=<shortcut_name>&value=<shortcut_value>' );.
```

NOTES: A document named "AMP Video Server Setup", available from the Ross Video website, details how to configure a Carbonite system for AMP communication.

Chapter 9 FILES AND STORAGE

Some corollary of 'Murphy's Law' must state that "The more critical it is to a production, the greater the likelihood that important media will be delivered at the last possible moment and the wrong format, if it can be found at all." This section is devoted to reducing your stress level when this inevitably occurs.

Section 9.1 MEDIA FILE FORMATS

9.1.1 VIDEO CAPTURE

Current Vizrt live video mixer products support capture as Quicktime (.mov) files in Vizrt's own SpeedHQ (SHQ) format. In general, where other considerations permit, we recommend the use of these native Quicktime formats for high quality video capture. (Alternatively, the ENCODE feature on some products supports real time encoding as H.264 in an MPEG-4 (MP4) container, which may be helpful when smaller file size is important.)

The Quicktime format supports all Vizrt live video mixer features, including embedded timecode, and provides high quality capture suitable for almost any purpose. Most modern software applications can work with the Quicktime format (some applications may require installation of Vizrt Quicktime codecs).

Note: Vizrt live video mixer and Viz 3Play systems are able to play back Quicktime files that are still 'growing' (being actively captured). Some external software applications also enjoy the same benefits. (For example, Adobe's Premiere and After Effects applications support growing files courtesy of plugins included in the NDI Tools suite.)

9.1.2 VIZRT CODECS

Codecs are available for the Windows platform supporting both Vizrt's high quality AVI and Quicktime capture formats. The codecs can be found in the "Extras" folder of our live production systems or, alternatively, can be downloaded from the Vizrt website's Support pages.

Hint: Users of Vizrt live video systems need not separately install these codecs.

OS X PLATFORM

Reading Vizrt's Quicktime files on Apple platforms requires the installation of third-party tools (such as one of the Adobe® applications and plugins mentioned earlier, or VLC™ from VideoLAN™).

Section 9.2 IMPORT

Vizrt live video procucts are able to play back media files in many different popular file formats, but some of these require more system resources to play than others. With a view to making best use of precious resources, then, media files should ideally be prepared beforehand.

With the assistance of the Vizrt codec packs just mentioned, it is often true that media can be created in or converted to Vizrt-friendly formats that are easy to play back right in your favorite non-linear editor or compositing package. We can recommend Vizrt's own SpeedHQ Quicktime or AVI encoding as a good high quality format for use in any of our live production systems. (SpeedHQ options include support for files with embedded alpha channel, especially valuable for animations intended for use as overlays.)

Alternatively, Vizrt live production systems generally include dedicated *Import* modules. This module, typically provided in the *File* menu at upper left in the Live Desktop (see product manuals for details) provides a way to add multiple items to a queue for batch processing, including optional transcoding, as necessary.

Otherwise, most high quality Quicktime formats (other than ProRes) will work well. For HD files, you might consider trying the Quicktime PNG encoder (especially when an alpha channel is required).

Section 9.3 EXPORT

At times you may wish to export files recorded with a Vizrt live production in some other popular format. Of course, whether working with files captured to shared storage systems or copied to external media across a network, for example, you could perform transcoding entirely externally using your favorite conversion software. You may instead, though, wish to use your Vizrt system to do transcoding.

All current Vizrt live production platforms include an Export feature in the system's Startup pages. Most also provide a Publish Queue in the Live or Replay Desktop. Files can be added to the lists in these modules using a variety of method, even – in this latter case – during live production. The modules provide access to a deep set of transcoding tools and control over destinations for file output (including local and networked volumes, and ftp).

Section 9.4 ASSET MANAGEMENT

The integrated *Media Browser* native to Vizrt live production systems is a competent asset management system, enabling you to quickly locate and work with files related to your sessions, or external files.

Of course, more extensive media asset management systems provided by leading industry providers are also available within the Vizrt ecosystem, and may be directly supported by Vizrt products.

To utilize your favorite (supported) third-party asset management systems, you need only hold down the keyboard Ctrl key when invoking a file browser. For example, double-clicking a blank spot in a DDR playlist on a Vizrt live video mixer with Ctrl depressed will show your compatible custom asset management interface, rather than Vizrt live video mixer's native *Media Browser*.

Hint: Alternatively, you can open a standard system file explorer, by holding down the Shift key rather than Ctrl when adding files.

Asset management solutions can include outboard storage systems, so let's talk about this related matter.

Section 9.5 External Storage

Vizrt live productions systems provide substantial integrated storage for media used in your productions, by means of internal and removable drives. Of course, many broadcast environments have still larger requirements, making external storage solutions attractive. In addition, by virtue of their potential for massive capacity, fails-safe mechanisms, transfer speed, and shared access, external storage solutions can facilitate file ingest, shared access, media updates, and more.

Large storage solutions come in many varieties, including SAN (Storage Area Network), NAS (Networked Attached Storage) and others. Individual solutions may include dedicated MAM (Media Access Management) implementations, or not.

In general, we recommend the use of the NTFS file system, not least because it effectively manages files larger than four gigabytes (unlike FAT32, for example), but also because it fully supports the Vizrt video system features.

At times, though, you may prefer to employ another file system for media used for video capture or file sharing. If so, note that it's best if the actual "Session Volume" for a Vizrt live video mixer or Viz 3Play is still NTFS-formatted. Otherwise, links to media captured during the session that are automatically generated by the system may fail, forcing you to expend extra effort to locate them.

APPENDICES

APPENDIX A. DATALINK HARDWARE KEYS

This section lists the actual key names that are available for use with DataLink for the assorted brands of external equipment it supports. Mostly, the key names are self-explanatory, but we've added slightly more descriptive notes where appropriate. The list is grouped by manufacturer.

Note: the key names listed are shown inserted between percent (%) signs as a reminder, since this is how you will enter them onto your pages.

A.1 DAKTRONICS

A.1.1 BASEBALL

%DakClock% - Game Clock Time – "MM:SS.T"

%DakClockStatus% - Game Clock Status

%DakHomeHits% - Home Team Hits

%DakGuestScore% - Guest Team Score

%DakInning% - Current inning

%DakHhr% - Hour (from Clock Time)

%DakMin% - Minutes (from Clock Time)

%DakSec% - Seconds (from Clock Time)

%DakTen% - Tenths (secs/10 from Clock Time)

A.1.2 BASKETBALL

%DakClock% - Game Clock Time – "MM:SS.T"

%DakClockStatus% - Game Clock Status

%DakShotClock% - Shot Clock Time – "SS"

%DakHomeScore% - Home Team Score

%DakGuestScore% - Guest Team Score

%DakHomeFouls% - Home Team Fouls

%DakGuestFouls% - Guest Team Fouls

%DakHomeTOFull% - Home Time Outs Left – Full

%DakHomeTOPart% - Home Time Outs Left – Partial

%DakHomeTOTotal% - Home Time Outs Left – Total

%DakGuestTOFull% - Guest Time Outs Left – Full

%DakGuestTOPart% - Guest Time Outs Left – Partial

%DakGuestTOTotal% - Guest Time Outs Left – Total

%DakPeriod% - Current period

%DakHhr% - Hour (from Clock Time)

%DakMin% - Minutes (from Clock Time)

%DakSec%- Seconds (from Clock Time)

%DakTen% - Tenths (secs/10 from Clock Time)

A.1.3 FOOTBALL

%DakClock% - Game Clock Time – "MM:SS.T"

%DakClockStatus% - Game Clock Status

%DakPlayClock%% - Play Clock Time – "SS"

%DakHomeScore% - Home Team Score

%DakGuestScore% - Guest Team Score

%DakHomeTOFull% - Home Time Outs Left – Full

%DakHomeTOPart% - Home Time Outs Left – Partial

%DakHomeTOTotal% - Home Time Outs Left – Total

%DakGuestTOFull% - Guest Time Outs Left – Full

%DakGuestTOPart% - Guest Time Outs Left – Partial

%DakGuestTOTotal% - Guest Time Outs Left – Total

%DakQuarter% - Current quarter

%DakMin% - Minutes (from Clock Time)

%DakSec%- Seconds (from Clock Time)

%DakTen% - Tenths (secs/10 from Clock Time)

A.1.4 HOCKEY

%DakClock% - Game Clock Time – “MM:SS.T”

%DakClockStatus% - Game Clock Status

%DakShotClock%% - Shot Clock Time – “SS“

%DakHomeScore% - Home Team Score

%DakGuestScore% - Guest Team Score

%DakHomeTOFull% - Home Time Outs Left – Full

%DakHomeTOTotal% - Home Time Outs Left – Total

%DakGuestTOFull% - Guest Time Outs Left – Full

%DakGuestTOTotal% - Guest Time Outs Left – Total

%DakPeriod% - Current period

%DakMin% - Minutes (from Clock Time)

%DakSec%- Seconds (from Clock Time)

%DakTen% - Tenths (secs/10 from Clock Time)

A.1.5 SOCCER

%DakClock% - Game Clock Time – “MM:SS.T”

%DakClockStatus% - Game Clock Status

%DakShotClock%% - Shot Clock Time – “SS“

%DakHomeScore% - Home Team Score

%DakGuestScore% - Guest Team Score

%DakHomeTOFull% - Home Time Outs Left – Full

%DakGuestTOFull% - Guest Time Outs Left – Full

%DakGuestTOTotal% - Guest Time Outs Left – Total

%DakHalf% - Current half

%DakMin% - Minutes (from Clock Time)

%DakSec%- Seconds (from Clock Time)

%DakTen% - Tenths (secs/10 from Clock Time)

A.1.6 VOLLEYBALL

%DakClock% - Game Clock Time – "MM:SS.T"

%DakClockStatus% - Game Clock Status

%DakHomeServiceIndicator%

%DakHomeScore% - Home Team Score

%DakGuestScore% - Guest Team Score

%DakHomeTOFull% - Home Time Outs Left – Full

%DakHomeTOTotal% - Home Time Outs Left – Total

%DakGuestTOFull% - Guest Time Outs Left – Full

%DakGuestTOTotal% - Guest Time Outs Left – Total

%DakGameNumber% - Current game number

%DakMin% - Minutes (from Clock Time)

%DakSec%- Seconds (from Clock Time)

%DakTen% - Tenths (secs/10 from Clock Time)

A.2 DAKTRONICS CG

A.2.1 BASEBALL

%CGDakHomeScore% - Home Team Score

%CGDakGuestScore% - Guest Team Score

%CGDakInning% - Current inning

%CGDakInningText% - Current inning (text)

%CGDakInningDescription% - Inning Description (text)

%CGDakHomeAtBat% - Home At-bat indicator (0 or 1).

%CGDakGuestAtBat% - Guest At-bat indicator (0 or 1).

%CGDakHomeHits% - Home Team Hits

%CGDakHomeErrors% - Home Team Errors

%CGDakHomeLeftOnBase% - Home Team Left-on-base

%CGDakGuestHits% - Guest Team Hits

%CGDakGuestErrors% - Guest Team Errors

%CGDakGuestLeftOnBase% - Guest Team Left-on-base

%CGDakBatterNumber% - At-bat Player Number

%CGDakBatterAverage% - At-bat Player Average

%CGDakBall% - Ball count

%CGDakStrike% - Strike count

%CGDakOut% - Outs

%CGDakHit% - Hits

%CGDakError% - Errors

%CGDakHitErrorText% - Error (text)

%CGDakErrorPosition% - Error Position

%CGDakInningLabel1% - First Inning label

%CGDakInningLabel2% - etc.

%CGDakInningLabel3%

%CGDakInningLabel4%

%CGDakInningLabel5%

%CGDakInningLabel6%

%CGDakInningLabel7%

%CGDakInningLabel8%

%CGDakInningLabel9%

%CGDakInningLabel10%

%CGDakInningLabel11%

%CGDakInningLabel12%

%CGDakHomeInningScore1% - Home Score, First Inning

%CGDakHomeInningScore2% - etc.

%CGDakHomeInningScore3%

%CGDakHomeInningScore4%

%CGDakHomeInningScore5%

%CGDakHomeInningScore6%

%CGDakHomeInningScore7%

%CGDakHomeInningScore8%

%CGDakHomeInningScore9%

%CGDakHomeInningScore10%

%CGDakHomeInningScore11%

%CGDakHomeInningScore12%

%CGDakGuestInningScore1% - Guest Score, First Inning

%CGDakGuestInningScore2% - etc.

%CGDakGuestInningScore3%

%CGDakGuestInningScore4%

%CGDakGuestInningScore5%

%CGDakGuestInningScore6%

%CGDakGuestInningScore7%

%CGDakGuestInningScore8%

%CGDakGuestInningScore9%

%CGDakGuestInningScore10%

%CGDakGuestInningScore11%

%CGDakGuestInningScore12%

%CGDakHomePitcherNum%- Home Pitcher Player Number

%CGDakHomePitchesBalls% - Home Pitches, Balls

%CGDakHomePitchesStrikes% - Home Pitches, Strikes

%CGDakHomePitchesFoulBall%- Home Pitches, Foul Balls

%CGDakHomePitchesInPlay% - Home Pitches In Play

%CGDakHomePitchesTotal% - Total Home Pitches

%CGDakGuestPitcherNum%- Guest Pitcher Player Number

%CGDakGuestPitchesBalls%- Guest Pitches, Balls

%CGDakGuestPitchesStrikes% - Guest Pitches, Strikes

%CGDakGuestPitchesFoulBall%- Guest Pitches, Foul Balls

%CGDakGuestPitchesInPlay% - Guest Pitches In Play

%CGDakGuestPitchesTotal% - Total Guest Pitches

A.2.2 BASKETBALL

%CGDakClock% - Game Clock Time – "MM:SS.T"

%CGDakClockStatus% - Game Clock Status

%CGDakShotClock% - Shot Clock Time – "SS"

%CGDakHomeScore% - Home Team Score

%CGDakGuestScore% - Guest Team Score

%CGDakHomeFouls% - Home Team Fouls

%CGDakGuestFouls% - Guest Team Fouls

%CGDakHomeTOFull% - Home Time Outs Left – Full

%CGDakHomeTOPart%% - Home Time Outs Left – Partial

%CGDakHomeTOTotal%- Home Time Outs Total

%CGDakGuestTOFull% - Guest Time Outs Left – Full

%CGDakGuestTOPart% - Guest Time Outs Left – Partial

%CGDakGuestTOTotal%- Guest Time Outs Left – Total

%CGDakPeriod% - Current period

%CGDakMin%- Minutes (from Clock Time)

%CGDakSec% - Seconds (from Clock Time)

%CGDakTen%- Tenths (secs/10 from Clock Time)

A.2.3 FOOTBALL

%CGDakClock% - Game Clock Time – "MM:SS.T"

%CGDakHomeTeamName%- Home Team Name

%CGDakGuestTeamName%- Guest Team Name

%CGDakHomeScore% - Home Team Score

%CGDakGuestScore% - Guest Team Name

%CGDakQuarter% - Current quarter

%CGDakBallOn% - Current ball position

%CGDakDown% - Current down

%CGDakToGo% - Yards to go

%CGDakHomePossess%- Possession indicator (0 or 1).

%CGDakGuestPossess%- Possession indicator (0 or 1).

%CGDakPlayClock% - Play Clock Time – "SS"

%CGDakHomeTO% - Home Time Outs

%CGDakGuestTO% - Guest Time Outs

%CGDakMin%- Minutes (from Clock Time)

%CGDakSec% - Seconds (from Clock Time)

%CGDakTen%- Tenths (secs/10 from Clock Time)

A.2.4 HOCKEY

%CGDakClock% - Game Clock Time – "MM:SS.T"

%CGDakClockStatus% - Game Clock running status indicator

%CGDakHomeScore% - Home Team Score

%CGDakGuestScore% - Guest Team Score

%CGDakHomeTO% - Home Time Outs

%CGDakGuestTO%% - Guest Time Outs

%CGDakHomeShotsOnGoal% - Home Shots on Goal

%CGDakGuestShotsOnGoal% - Guest Shots on Goal

%CGDakPeriod% - Current period

%CGDakHomePenalty1_PlayerNum% - Home Penalty, player number

%CGDakHomePenalty1_PenaltyTime%- Home Penalty, time left

%CGDakGuestPenalty1_PlayerNum% - Guest Penalty, player number

%CGDakGuestPenalty1_PenaltyTime%- Guest Penalty, time left

%CGDakHomePenalty2_PlayerNum% - Home Penalty, player number

%CGDakHomePenalty2_PenaltyTime%- Home Penalty, time left

%CGDakGuestPenalty2_PlayerNum% - Guest Penalty, player number

%CGDakGuestPenalty2_PenaltyTime%- Guest Penalty, time left

%CGDakMin%- Minutes (from Clock Time)

%CGDakSec% - Seconds (from Clock Time)

%CGDakTen%- Tenths (secs/10 from Clock Time)

A.2.5 SOCCER

%CGDakClock% - Game Clock Time – “HH:MM:SS.T”

%CGDakHomeTeamName%- Home Team Name

%CGDakGuestTeamName%- Guest Team Name

%CGDakHomeScore% - Home Team Score

%CGDakGuestScore% - Guest Team Score

%CGDakHalf% - Current half

%CGDakHomeShotsOnGoal% - Home Shots on Goal

%CGDakHomeSaves% - Home Saves

%CGDakHomeCornerKicks% - Home Corner Kicks

%CGDakGuestShotsOnGoal% - Guest Shots on Goal

%CGDakGuestSaves% - Guest Saves

%CGDakGuestCornerKicks% - Guest Corner Kicks

%CGDakHomeFouls% - Home Fouls

%CGDakGuestFouls% - Guest Fouls

%CGDakHhr% - Hours (from Clock Time)

%CGDakMin% - Minutes (from Clock Time)

%CGDakSec% - Seconds (from Clock Time)

%CGDakTen% - Tenths (secs/10 from Clock Time)

A.2.6 VOLLEYBALL

%CGDakClock% - Game Clock Time – "MM:SS.T"

%CGDakClockStatus% Game clock running status indicator

%CGDakHomeGameScore% - Home Team Score

%CGDakGuestGameScore% - Guest Team Score

%CGDakHomeTO% - Home Time Out

%CGDakGuestTO% - Guest Time Out

%CGDakHomeServiceIndicator% - Home Service indicator (0 or 1)

%CGDakGuestServiceIndicator% - Guest Service indicator (0 or 1)

%CGDakHomeGamesWon% - Home Games Won

%CGDakGuestGamesWon% - Guest Games Won

%CGDakGameNumber% - Current Game Number

%CGDakHomeGameScore1% - Home Score, First Game

%CGDakHomeGameScore2% - Home Score, Second Game

%CGDakHomeGameScore3% - Home Score, Third Game

%CGDakHomeGameScore4% - Home Score, Fourth Game

%CGDakGuestGameScore1% - Guest Score, First Game

%CGDakGuestGameScore2% - Guest Score, Second Game

%CGDakGuestGameScore3% - Guest Score, Third Game

%CGDakGuestGameScore4% - Guest Score, Fourth Game

%CGDakMin% - Minutes (from Clock Time)

%CGDakSec% - Seconds (from Clock Time)

%CGDakTen% - Tenths (from Clock Time)

A.3 DSI KEYS:

A.3.1 BASKETBALL

%DSIClock% - Game Clock Time – "MM:SS.T"

%DSIShotClock% - Shot Clock Time – "SS"

%DSIMin% - Minutes (from Clock Time)

%DSISec% - Seconds (from Clock Time)

%DSITen% - Tenths (secs/10 from Clock Time)

A.4 OES

A.4.1 BASKETBALL

%OESClock% - Game Clock Time – "MM:SS.T"

%OESShotClock% - Shot Clock Time

%OESAwayScore% - Guest Team Score

%OESHomeScore% - Home Team Score

%OESHomeFouls% - Home Team Fouls

%OESAwayFouls% - Guest Team Fouls

%OESHomeTOFull% - Home Team Time Out - Full

%OESHomeTOPart% - Home Team Time Out - Partial

%OESAwayTOFull% - Guest Team Time Out - Full

%OESAwayTOPart% - Guest Team Time Out - Partial

%OESPeriod% - Current period

%OESMin% - Minutes (from Clock Time)

%OESSec% - Seconds (from Clock Time)

%OESTen% - Tenths (secs/10 from Clock Time)

A.5 TRANSLUX FAIRPLAY

A.5.1 FOOTBALL

%TLFPClock% - Game Clock Time – "MM:SS.T"

%TLFPQuarter% - Current quarter

%TLFPHomeScore% - Home Team Score

%TLFPVisitorScore% - Visiting Team Score

%TLFPDown% - Current down

%TLFPToGo% - To go (yards

%TLFPBallOn% - Ball on (yard line)

%TLFPFieldTimer% - Current field timer (SS)

%TLFPMin% - Minutes (from Clock Time)

%TLFPSec% - Seconds (from Clock Time)

%TLFPTen% - Tenths (secs/10 from Clock Time)

A.6 WHITEWAY

A.6.1 BASKETBALL

%WWPeriod% - Current period

%WWClock% - Game Clock Time – "MM:SS.T"

%WWAwayScore% - Guest Team Score

%WWHomeScore% - Home Team Score

%WWShotClock% - Shot Clock Time

%WWMin% - Minutes (from Clock Time)

%WWSec% - Seconds (from Clock Time)

%WWTen% - Tenths (secs/10 from Clock Time)

A.7 WHITEWAY RAINBOW

A.7.1 BASKETBALL

%WWRSportNum% - Sport Number

%WWRPeriod% - Current period

%WWRShotClock% - Shot Clock Time

%WWRAwayScore% - Guest Team Score

%WWRHomeScore% - Home Team Score

%WWRMinutes% - Minutes (from Clock Time)

%WWRSeconds% - Seconds (from Clock Time)

%WWRTenths% - Tenths (from Clock Time)

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CREDITS

Special thanks to each member of the hard-working R&D team who made this product possible.

Third Party Licenses:

This product uses a number of third-party software libraries under license. Related license requirements are defined in documentation installed on the product. To view these licenses, please click the Additional Licenses link provided in the Help menu on the Startup>Home page shown upon launching the product.