System Notes

Dear Valued Customer:

Thank you for your purchase of the Abekas DVEOUS Digital Video Effects device.

In our effort to provide you with complete documentation, this manual describes a few features that are not currently functional. Please note the following items will be implemented in future software releases:

- SuperMatte Generator
- Target Framestore Recursive Effects
- Solid Builder Menu
- Motion Paths Preview Display
- Menu Undo Button
- GPIs
- Shot Box
- On-Air Mode & Menu
- Composite Input Module
- Composite Output Module

Abekas

DVEOUS™ Digital Video Effects

Operations Manual

Abekas

DVEOUS™ Digital Video Effects

Operations Manual

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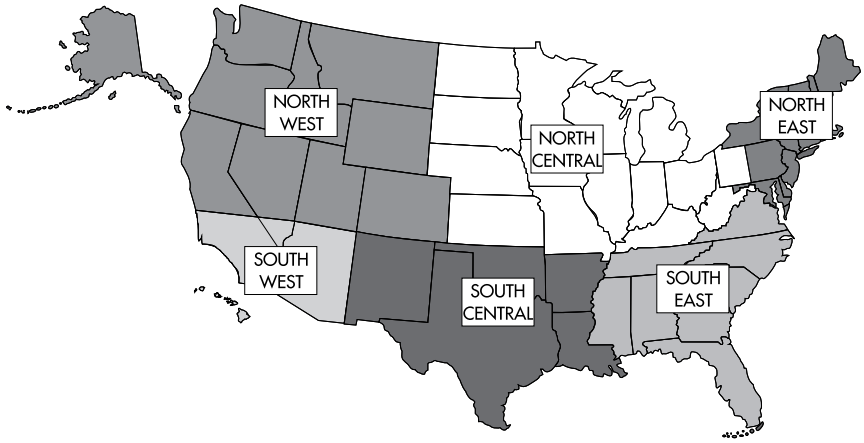
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Section 1

Introduction

System Description

Standard Features

DVEOUS™ is a 10-bit, frame-based, digital video effects system that is switchable between the 525 and 625 line standards. It offers the most advanced feature set ever seen in a real-time effects device. DVEOUS' unique standard features include the following:

- Internal 16 X 11 crosspoint matrix for source routing.
- SuperShadow™ – a full bandwidth drop shadow with independent manipulation controls.
- An internal Combiner that keys up to two DVE channel pairs and the optional Target Framestore over a background.
- A Background Framestore that can feed live or frozen images to the internal Combiner as a background.
- SurfaceFX™, which combines the powerful texture and light sourcing tools with the advanced UltraWarp™ capabilities. There is an internal Pattern Framestore for generating video test patterns and textures. You can use any input to the routing matrix, including video and key inputs and the SuperMatte generator, as the source for a texture.
- SuperMatte color generator for creating two color washes and patterns.
- Four independent input freeze buffers (two for video, two for textures) per DVE channel pair.

- UltraWarp™ advanced warp capabilities.
- 3D light sourcing.

One of the features that makes DVEOUS unique is its flexible channel configuration. The standard unit has two channels: one main channel dedicated for video, and a twin channel. The main video transformation path is a full bandwidth video channel. The twin channel can process key signals (luminance only), but is also a full bandwidth video channel. This lets DVEOUS operate in three modes:

- Video / Video – you can control the main and twin channels independently.
- Video / Key – you can control the key channel independently.
- Video-Key / Shadow – The key follows the main video channel, with independent control of the shadow.

Two dual serial digital input modules (providing four input sources) are standard. Each module can provide two independent video signals, or one video plus associated key. Additional input modules, in any supported format, are optional. DVEOUS supports a maximum of 12 inputs (six dual input modules).

DVEOUS supports two output modules, and there are two formats you can choose from: analog composite video and key outputs, and analog component video and key outputs. Both also have serial component digital video and key outputs. This means there are a total of four outputs (one serial digital video, one analog video, one serial digital key, and one analog key). You can select either 8 or 10-bit resolution for the serial digital outputs on both modules.

The DVEOUS Control Panel has a high resolution graphics display and a 3.5" high density (1.44MB) MS-DOS format floppy disk drive. You can use the floppy drive to store and recall effects and engineering setup files.

DVEOUS can control external switcher aux buses with frame accurate on-edge switching. Serial interfaces let external devices, such as a switcher or edit controller, control DVEOUS. DVEOUS supports the Abekas LINC™ timeline control, SMPTE, and Sony VTR protocols. There are also 12 GPI (General Purpose Interface) inputs and eight GPI outputs.

Battery backed up memory lets you store 100 effects on-line, using a pool of over 900 keyframes with the standard 1 MB memory, or about 2200 keyframes with the optional 2 MB memory. In either case, the maximum number of keyframes per effect is 300.

Each channel has its own timeline, and there is a separate global timeline. This lets you build different effects on different channels, then offset their start times, and the global timeline, independently.

Picture transform controls include 2D and 3D positioning and rotation, size, aspect, skew, and perspective in source, target, and global space. There are six different motion path types that you can assign to parameters on a keyframe basis.

Corner pinning, SuperMatte backgrounds, and many other advanced features are standard. For example, UltraWarp offers many non-linear shapes that are new to Abekas effects systems. The light source feature is a true 3D model that lets you add a light effect to either or both channels. Textures work with the light source feature: DVEOUS can modify the light source based on the texture signal, making true shading and highlights possible throughout a transformation. Textures also work with warps to let you create, for example, textured spheres. You can use a live video source for the texture, a video still from the Pattern Framestore, or the output of the optional Defocus module.

Options

An optional DVE board adds a second pair of channels to expand DVEOUS to a full two channel (video plus key) or a four channel (video only) system.

DVEOUS supports up to 12 inputs (six dual input modules). You can add input modules in any combination to suit your application:

- Dual Serial Digital – two identical 10-bit inputs; either can be video or key.
- Dual Parallel Digital – two identical 10-bit inputs; either can be video or key.
- Dual Component Analog – two identical 8-bit resolution inputs. Both are software selectable for SMPTE, Betacam® (525 or 625, setup or no setup), MII®, RGB (setup or no setup), or key (setup or no setup). Sync must be present on Y or G on the first input; the second input can lock to the first if sync is not available.
- Video Plus Key Component Analog – one each video and key input at 10-bit resolution. The video input is software selectable for SMPTE, Betacam (525 or 625, setup or no setup), MII, or RGB (setup or no setup). The key input is selectable for setup or no setup. This input has an external sync input, or can take sync on Y or G on the video input; the key input can use sync from the video input if sync is not available.
- Composite Analog – one each video and key input, at 10-bit resolution. This is selectable for 525 or 625 operation, and has loop-through inputs with switchable termination. It also provides advanced adaptive comb filtering for maintaining the quality of moving images and high resolution graphics.

There are two types of Output module available. Both provide dual serial component digital video and key outputs and conform

to both the 525 and 625 line standards. One type provides a duplicate component analog video and key output. The other type provides two duplicate composite analog video outputs and a single analog key output.

A separate Channel Output module is available as an option. This module provides the output from each DVE channel upstream of the Combiner, which feeds the main output module. The Channel Output module has a video and a key output, with the video unshaped and not keyed over a background. You can use one or two of these, and they fit in the input module slots, so you can not use those slots for inputs. The output format is serial component digital only.

The Shot Box option is a small Control Panel used on-air for recalling and running effects. Its buttons duplicate those in the On-Air and Timeline Control sections on the main Control Panel. It lets you directly access any effect and any keyframe in an effect. You can also freeze each channel and run effects forward or backward from the Shot Box.

Other options include Color Correction, Defocus, and a Target Framestore. The reTouch™ Color Corrector option lets you manipulate video in either RGB or YUV space on each channel independently. The Defocus option allows wide band defocusing of the luminance or chrominance in an image, or both. It is dual channel: you can use it on one or two video channels, or on one video and one key channel. Defocus controls include independent horizontal and vertical defocus settings. Target Framestore effects include trails with variable decay (with either video or a matte fill), sparkles with variable size and intensity, motion blur, and montage (drop-ins) with selectable priority for live video over or under existing drop-ins. This option is based on Z, or depth, information, letting you build solids easily and move live images in front of or behind the stored images automatically.

About This Manual

Scope of Manual

This manual has tabbed sections to help you find the information you need quickly. Each section includes a diagram of the menu(s) covered, a list of all the related controls with a brief description of their functions, and wherever possible, tutorials with examples that illustrate concepts or functions. The tabbed sections cover functional topics, as described below.

Section 1 – Introduction
This section is an overview of the system. It also discusses the information in this manual, and methods for getting the most out of it. The Control Panel button groups, and the menu layout and controls, are briefly discussed. At the end of this section, there is a description of the video and key signal paths.

Section 2 – Getting Started
The Getting Started section covers, step-by-step, powering up DVEOUS. It also contains an overview of the screen numbering system, the menu display, and keypad operations. There are also step-by-step instructions for selecting sources, configuring channels, and building, saving, and recalling a simple effect in this section.

Section 3 – Transforms
This section describes how DVEOUS handles image manipulation, including how parameters interact with each other. It also includes a discussion of target, source, and global spaces, and their interaction.

Section 4 – Channel Menus
This section covers the menus that affect the channels individually. The menus appear in alphabetical order to make finding the information you need easier.

Section 5 – Global Menus
The menus covered in this section have buttons in the Global Menus area of the Control Panel, including the Target Framestore and Defocus options. The menus in this section appear in alphabetical order.

Section 6 – Building and Running Effects
Section 6 explains creating, editing, and running effects. It covers timelines, their control buttons and menu, and using the TimeFrame™ Effects Editor and Quick Keyframe buttons.

Section 7 – Motion Control
There are six motion path types you can assign to parameters, and they define how DVEOUS interpolates between different settings in different keyframes. This section discusses the different path types, and how to assign them to parameters.

Section 8 – Saving and Recalling Effects
DVEOUS can store 100 effects in on-line, battery backed up memory, for a total of approximately 1200 keyframes (2200 with the optional 2 MB memory.) This section covers naming effects, and storing and recalling effects to and from the on-line memory and floppy disk.

Appendices
The glossary is an alphabetized list of terms commonly used with DVEs in general, and DVEOUS specifically.

How to Use This Manual

This manual is designed for easy reference. Everything you need for any function appears in its own tabbed section: button and control descriptions, plus tutorials that take you step-by-step through the function. Because each section focuses on a specific area, you may need to use more than one section for more complex operations.

This manual assumes that you have a properly installed and configured system, and some basic knowledge of the purpose of a digital effects system in a production environment. See the DVEOUS Technical Guide, P/N 9100-0239, for a detailed description of setup procedures.

If you are not familiar with the terminology used, see the glossary of terms in Appendix A.

Manual Conventions

In this manual, all Control Panel keys are called buttons to avoid confusion with the video keying process.

Keycap labels appear in bold capital letters: the **3D ROTATE** button, the **RUN**→ button. Menu names are capitalized: the Warp menu, the Input menu. Softkey labels are in bold upper and lower case italicized letters: the ***Locate*** softkey. Softknob labels appear in bold upper and lower case letters: the **H Loc** softknob. Otherwise, softknobs appear as softknob A, softknob B, softknob C, and softknob D, starting on the left with softknob A.

A sequence of button presses appears with long dashes (—) separating the buttons: **MODIFY** — **ALL** — **ENTER**. Holding one button down and pressing another appears with a plus (+). For example, holding **CLEAR** and pressing the **3D TRANS** button appears as **CLEAR + 3D TRANS**.

Depending on your input and channel configurations, a channel can process a video signal, a key signal, or a drop shadow. This manual uses the word *image* generically to indicate the channel's source (video, key, or shadow).

Overview of Terms Used

DVEOUS' unique features call for a new way of thinking about DVEs. To avoid confusion about the terms used when discussing DVEOUS, please see the discussion below, and the glossary at the end of this manual, for a definition of terms used with DVEOUS, and DVEs in general.

- Channel

  The term "channel" has historically been used to describe either the video or key processing path, inputs, or outputs (e.g., the video channel, or the key channel output). Most DVE systems process luminance and chrominance in the video path and only luminance in the key path. Usually, a two channel system or effect refers to the number of video images involved. The key channel processing is taken for granted.

  DVEOUS has the unique ability to process either a key signal or a video signal on the second channel. So the standard DVEOUS system can have one video and one key path, or two video paths.

  In this manual, "channel" can refer to a video path, a key path, or a shadow path, and, unless specifically noted, they are interchangeable. Each twin channel DVE board has a main video channel (1A) and a second channel (1B) that can process a video or key signal. The second (optional) DVE board adds an additional channel pair: one for video (2A), and the second (2B) for video or key processing.

- Multichannel

  Multichannel systems in the past always referred to the video channels. Thus, a four channel system had four video paths and four key paths. DVEOUS is a multichannel system in its standard configuration, because both channels can process video.

Each DVEOUS DVE board (two maximum) has twin processor channels: the video channel (A) and the twin channel (B). You can use these channels in three different modes:

A = Video, B = Video

The DVE board independently processes two video sources. All transform, warp, and lighting effects are adjustable separately on each video channel. The DVE processor internally generates the key signals associated with these signals. The key signals are full screen "white" with adjustable opacity and edge softness.

A = Video, B = Key

The DVE board independently processes one video and one key source. All transforms are available to the key signal independently from the video. The key signal also has clip, gain, and phase controls.

A= Video & Key, B = Shadow

In this mode, the DVE board derives a full bandwidth drop shadow from the key input. It processes the video and key (which are tied together) in one path, with independent control of the shadow in the other path.

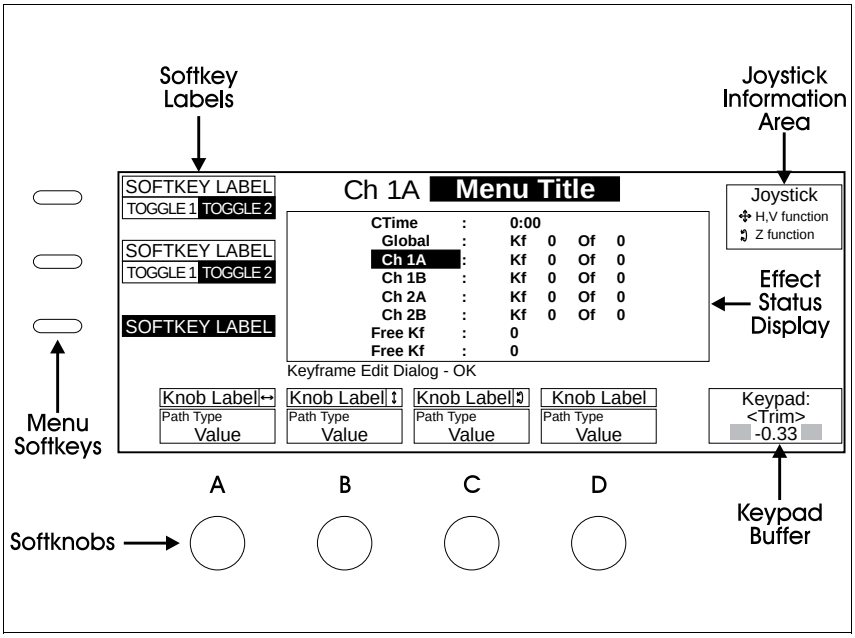
The Control Panel

A brief description of the Control Panel and its button groups follows.

The Menu Display

The menu display is in the upper left corner of the Control Panel. You can adjust its brightness and contrast in an Engineering Setup menu.

Some of the information displayed in the menu screen changes depending on DVEOUS' current status and the current menu. The figure below shows a typical display.



The Menu Screen & Controls

The top line shows the current menu title, and indicates the master channel (the one the menu settings reflect): 1A, 1B, 2A, or 2B. The master channel display does not appear in global menus.

The center of the display shows information about the current timeline and effect. The top line (***CTime***) indicates the current point on the effects timeline as seconds:frames. The next five lines indicate the current keyframe and total keyframes for each channel's effect. For example, if channel 1A is on keyframe two of a five keyframe effect, the display reads ***Ch 1A : Kf 2 of 5***. There are two ***Free Kf*** lines. The first one shows the number of keyframes available for addition in the current effect (there is a maximum of 300 keyframes per effect). The bottom line shows the number of keyframes available in the system keyframe pool (a total of over 900 with the standard 1 MB memory, 2200 with the optional 2 MB memory).

Below the effect information display area, there is a single line edit buffer that shows your keyframe editing command strings. If DVEOUS recognizes the command string, it confirms by displaying ***OK*** at the end of the string when you press **ENTER**. If it does not, an error message appears after the unrecognized command string.

A menu can have up to three different softkey labels. The softkey labels appear on the left side of the menu screen. Select a softkey by pressing the button next to its label. When you press a softkey, a black highlight appears to indicate that it is active. If there is more than one function for the softkey, pressing it toggles the function, and the highlight indicates the active mode. Also, up to four settings for the softkey function can appear above the softknobs at the bottom of the menu display. You can adjust these settings with the softknobs, the keypad, or the joystick. The motion path type assigned to the parameter appears above the softknob values.

You can change softknob settings several ways:

- Turn the softknob below its label.
- Enter a value in the numeric keypad, then press the corresponding **A**, **B**, **C**, or **D** button in the top row of the numeric keypad. For example, to enter the value 17 in softknob A, enter **17** on the keypad, then press **A**. This applies to softknobs that use numeric values.
- Use the joystick to change softknob settings. Adjust softknob settings with left / right arrows by moving the joystick left and right. Adjust settings with up / down arrows by moving the joystick up and down. Adjust softknob settings with circular arrows by twisting the joystick handle. You can also temporarily lock the joystick to a parameter by holding down its keypad softkey. In this mode any joystick up, right, and clockwise movement increases the parameter value; any down, left, and counterclockwise movement decreases the value.
- You can copy a value from one softknob to another. With the keypad buffer empty, press the keypad softkey (**A**,**B**, **C**, or **D**) for the softknob you want to copy. This copies the value to the keypad buffer. Pressing another keypad softkey (**A**, **B**, **C**, or **D**) enters the value in that softknob. Note that this also copies the motion path type.
- You can invert a value by pressing the **+/-** button, then the keypad softkey (**A**, **B**, **C**, or **D**) for the softknob. Use this for values that accept negative numbers.
- You can also use **TRIM** to trim a value: press **1** — **TRIM** — **A** to add 1 to the value in softknob A.

You can reset values and entire menus to their default settings:

- Press **CLEAR**, then **A**, **B**, **C**, or **D** to reset the softknob value and motion path type to default. Hold **CLEAR** and press more than one keypad softkey (**A**, **B**, **C**, or **D**) to reset multiple values.

- Hold **CLEAR** and press a softkey to clear all the values for that softkey to default. This resets the softkey setting (if it is a toggle or flag) and the softknob values and motion path types.
- Hold the **CLEAR** button and press a menu button to reset all the values for that menu to default. This resets all softkeys, softknob values, and motion path types.

A keypad buffer appears in the lower right corner of each menu. The buffer can display one of the following:

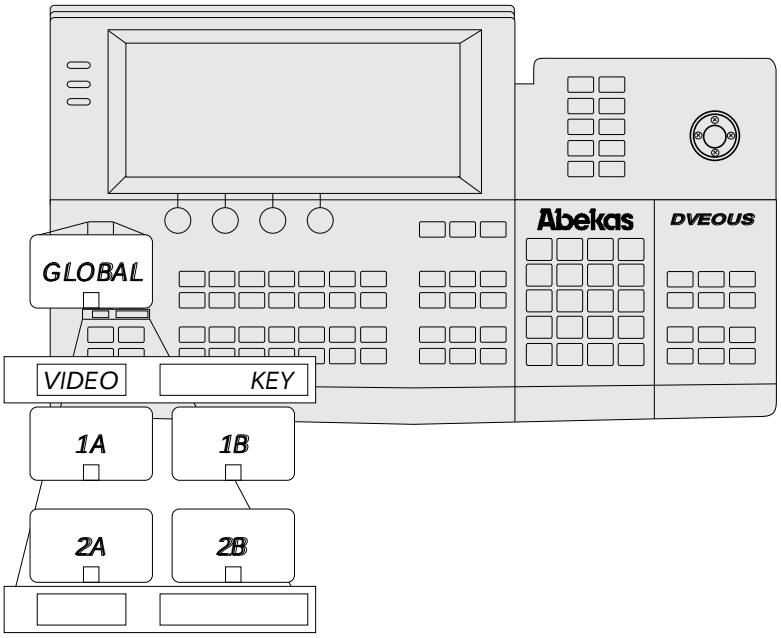
- Empty (default).
- A number waiting to be assigned to a softknob.
- A number and the word **Trim**.
- The word **Align**.
- The word **Clear**.
- The **+/-** symbol.
- The message **<Set Path>** and a list of the path types: **JP** (jump), **LN** (linear), **SL** (smooth linear), **T1** (TCB1), **T2** (TCB2), and **SM** (smooth). A cursor indicates the currently selected path type.

In some menus, the joystick has special functions, as listed in the joystick information area. Also, you can "lock" the joystick control to the current menu settings, then change to a different menu and use the softknobs to control the settings there. The joystick still affects only the settings it is locked to.

Channel Select Buttons

The Channel Select buttons include **GLOBAL**, **1A**, **1B**, **2A,** and **2B**. They are on the left side of the Control Panel, below the menu display. **1A** is the main video channel, and **1B** is its twin channel. **2A** is the second (optional) main video channel, and **2B** is the second (optional) twin channel. The global channel affects every channel equally. Press a Channel Select button to light its LED and make it the active channel. The menus reflect the status of the active channel, and any changes you make in the menus affect the active channel. Note that **2A** and **2B** are available only if you have the second (optional) DVE board.

The LED displays above and below the A Channel Select buttons read ***VIDEO*** to indicate that these channels are video channels. The displays above and below the B Channel Select buttons can



The Channel Select Buttons

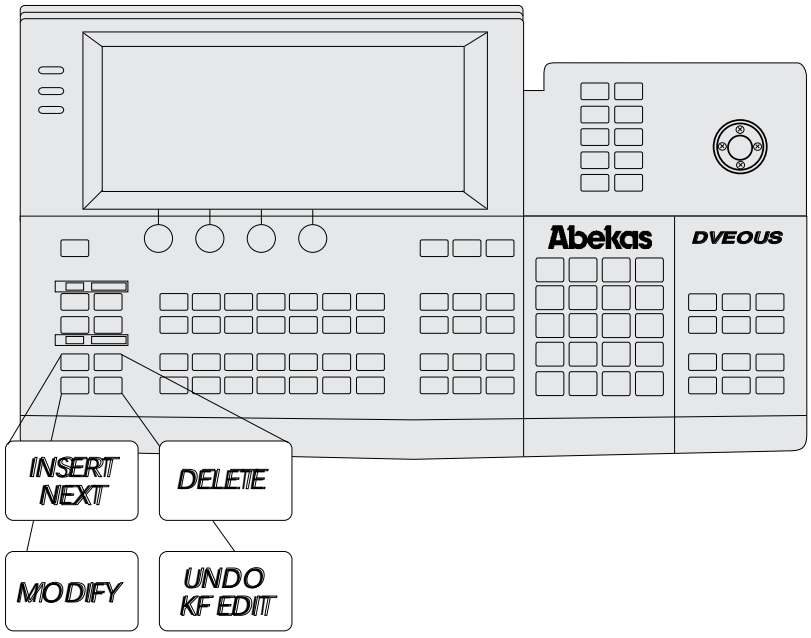
be either ***VIDEO*** or ***KEY***, depending on how you have configured your channels. See the discussion at the end of this section for more details on configuring channels.

You can have more than one channel active at a time. In this case, one channel is the "master" channel. The menus reflect the master channel, but changes you make in the menus affect all active (selected) channels. Hold a Channel Select button for half a second to designate it as the master. Double pressing a Channel Select button selects it as the master channel, and deselects the other channels. You can toggle any other channel on and off after designating a master channel.

Quick Keyframe Buttons

The Quick Keyframe buttons include the **INSERT NEXT**, **DELETE**, **MODIFY**, and **UNDO KF EDIT** buttons. All are located on the left side of the Control Panel. They only affect the current keyframe (the one that the effect is currently on).

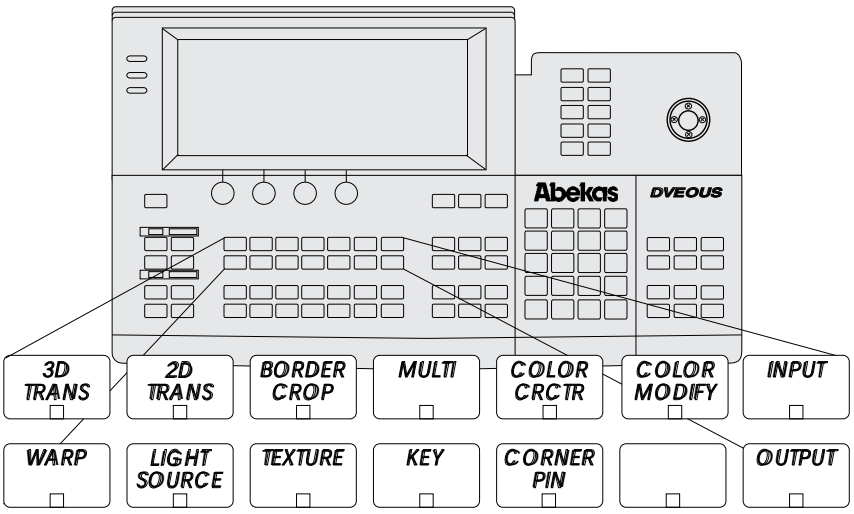
These buttons are single press functions. Pressing **INSERT NEXT** inserts a keyframe after the current keyframe. Pressing **DELETE** removes the current keyframe, including its duration, from the timeline. Pressing **MODIFY** changes the current keyframe to reflect any parameter changes. Pressing **UNDO KF EDIT** "undoes" the last keyframe edit you made.



The Quick Keyframe Buttons

Channel Menu Buttons

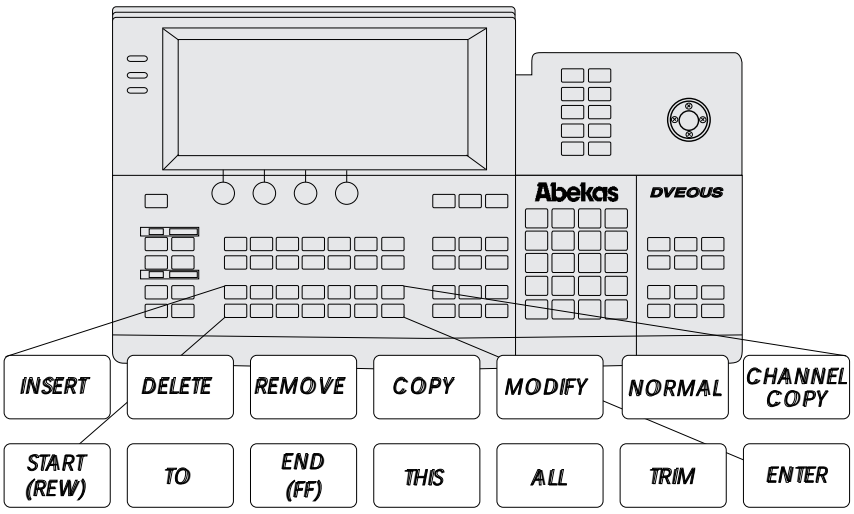
The Channel Menu buttons include the **3D TRANS**, **2D TRANS**, **BORDER/CROP**, **MULTI**, **COLOR CRCTR**, **COLOR MODIFY**, **INPUT**, **WARP**, **LIGHT SOURCE**, **TEXTURE**, **KEY**, **CORNER PIN**, and **OUTPUT** menu buttons. These buttons are located below the softknobs. Use these buttons to access menus and parameters for the active channel(s).



The Channel Menu Buttons

TimeFrame Effects Editor Buttons

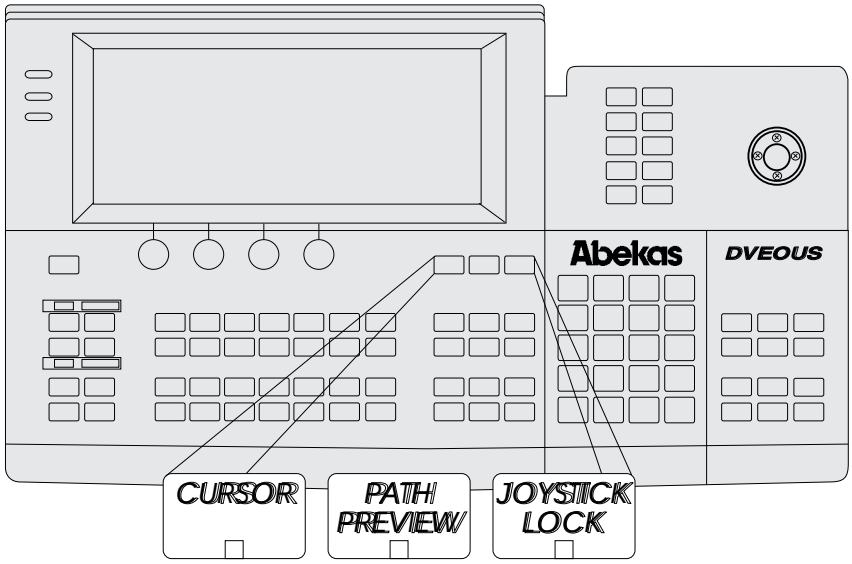
The TimeFrame Effects Editor buttons, located below the Channel Menu buttons, include **INSERT**, **DELETE**, **REMOVE**, **COPY**, **MODIFY**, **NORMAL**, **CHANNEL COPY**, **START (REW)**, **TO**, **END (FF)**, **THIS**, **ALL**, **TRIM**, and **ENTER**. Use these buttons to insert, delete, edit, and copy keyframes in effects.



The TimeFrame™ Effects Editor Buttons

Graphics Buttons

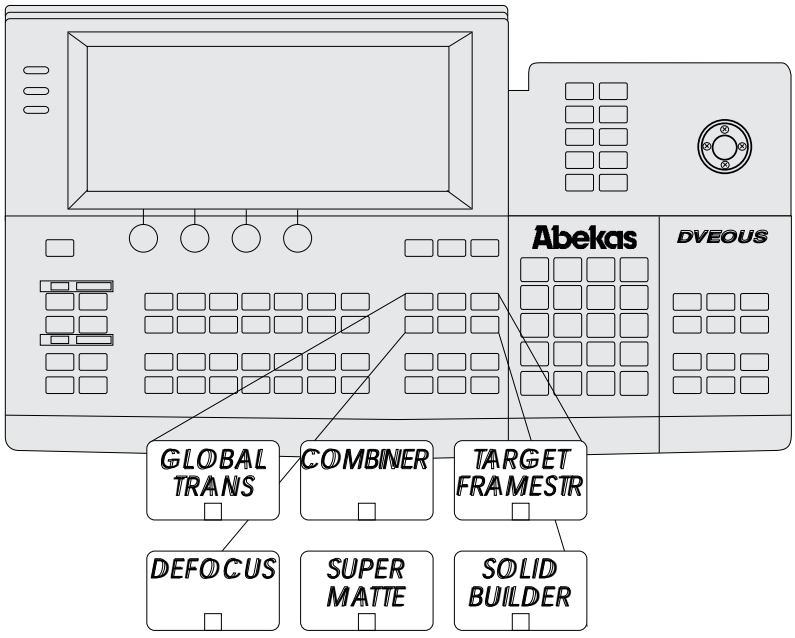
The Graphics buttons let you enable graphic overlays, and lock the joystick to the current menu controls. Press the **CURSOR** button to enable cursors and channel identifications on the DVEOUS output. The cursor shows the center of rotation for the image, and there are separate cursors for source and target space. Each channel's cursors are a unique color for easy identification. Use **JOYSTICK LOCK** to dedicate the joystick to the current menu control. This is handy if you want to continue using the joystick for positioning, for example, while using the softknobs in the Warp menu. **PATH PREVIEW** is not currently implemented.



The Graphics Buttons

Global Menu Buttons

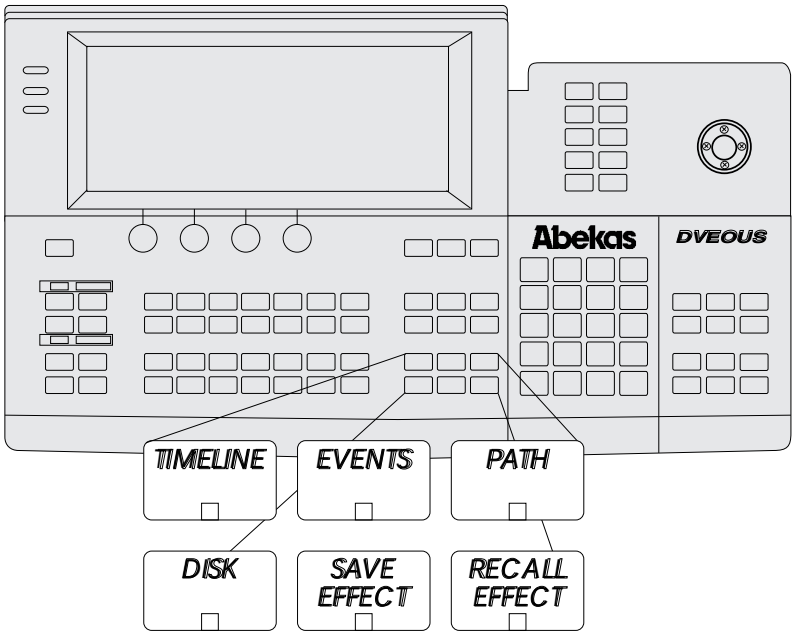
The Global Menu buttons are below the Graphics buttons, and include **GLOBAL TRANS**, **COMBINER**, **TARGET FRAMESTR**, **DEFOCUS**, **SUPER MATTE** and **SOLID BUILDER**. These buttons access menus that control DVEOUS functions that are not specific to the local (1A, 1B, 2A, 2B) channels. This includes menus for controlling optional features. If your DVEOUS does not have the Target Framestore or wide range Defocus options installed, you cannot access those menus.



The Global Menu Buttons

Effects Buttons

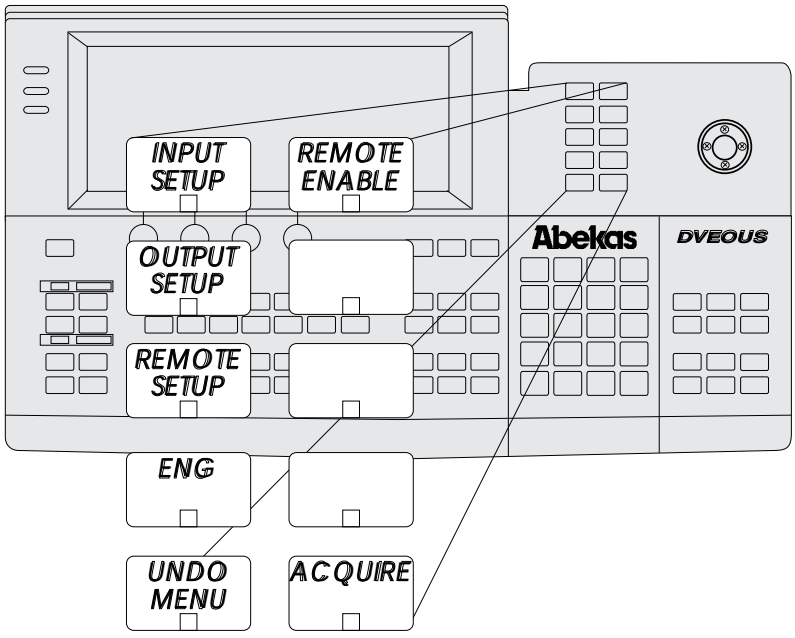
The buttons in this group, **TIMELINE**, **EVENTS, PATH**, **DISK**, **SAVE EFFECT**, and **RECALL EFFECT**, access menus that let you set controls for the effect as a whole. The Disk menu lets you save effects and setups to floppy disk. The save and recall effect buttons let you quickly save and recall effects by number. There are also menus you can use to save, name, protect, and recall effects. See Section 8 – Saving and Recalling Effects for more details.



The Effects Buttons

System Buttons

The System buttons include **INPUT SETUP**, **OUTPUT SETUP**, **REMOTE SETUP**, **ENG**, **UNDO MENU**, **REMOTE ENABLE**, and **AQUIRE**. These buttons access menus that let you setup the DVEOUS inputs, outputs, remote setups, and enables. See the DVEOUS Technical Guide, P/N 9100-0239, for a detailed description of the setup menus. The **UNDO MENU** button is not currently implemented.



The System Buttons

Joystick

You can use the joystick to change softknob settings. Adjust softknob settings with left / right arrows by moving the joystick left and right. Adjust settings with up / down arrows by moving the joystick up and down. Adjust softknob settings with circular arrows by twisting the joystick handle. Some menus use the joystick for special functions, as listed in the joystick information area in the menu.

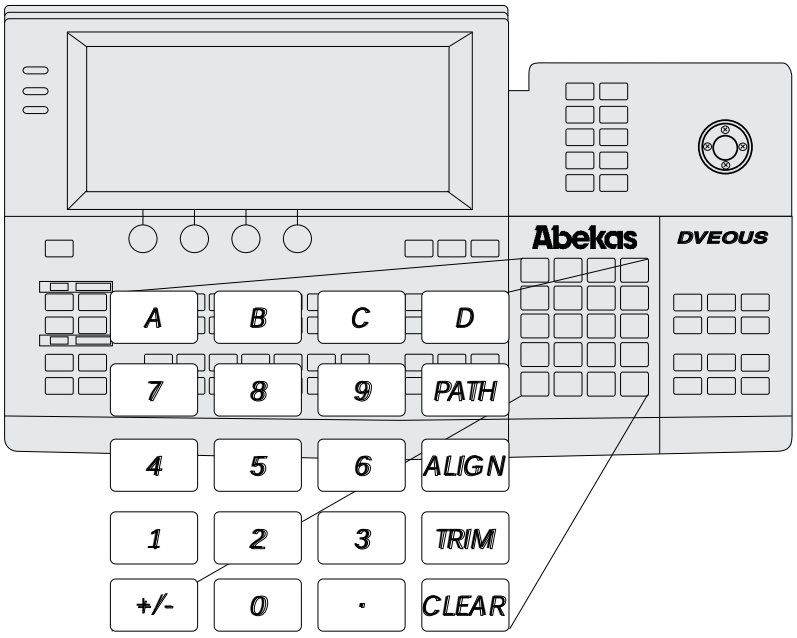
You can "lock" the joystick control to the current menu controls, then change to a different menu and use the softknobs to control the settings there. The joystick still affects only the settings it is locked to.

Numeric Keypad

The numeric keypad is located under the System buttons. Use the keypad to enter effect numbers, keyframe numbers, parameter values, etc. The **A**, **B**, **C**, and **D** buttons let you enter values into the softknob settings. For example, to enter the value 17 in softknob A, enter **17** on the keypad, then press **A**.

You can invert a value by pressing the **+/-** button, then the **A**, **B**, **C**, or **D** button for a softknob. Use this for values that accept negative numbers.

You can use **CLEAR** to erase the contents of the keypad buffer, the contents of the keyframe edit dialog, or reset entire softkeys or menus to default.



The Numeric Keypad

You can use **TRIM** to adjust values. For example, press **1** — **TRIM** — **A** to add 1 to the value in softknob A.

Press **ALIGN** to put the word ***Align*** into the keypad buffer. Now pressing a keypad softkey (**A**, **B**, **C**, or **D**) brings the corresponding softknob value to its nearest "logical" value. For example, aligning a rotational value of 43 degrees sets it to 45 degrees. This also aligns image locations to the nearest 1/8 of a screen unit, and so on. Pressing **ALIGN**, then a menu softkey (left side of the display) sets all the softknobs to their closest logical value.

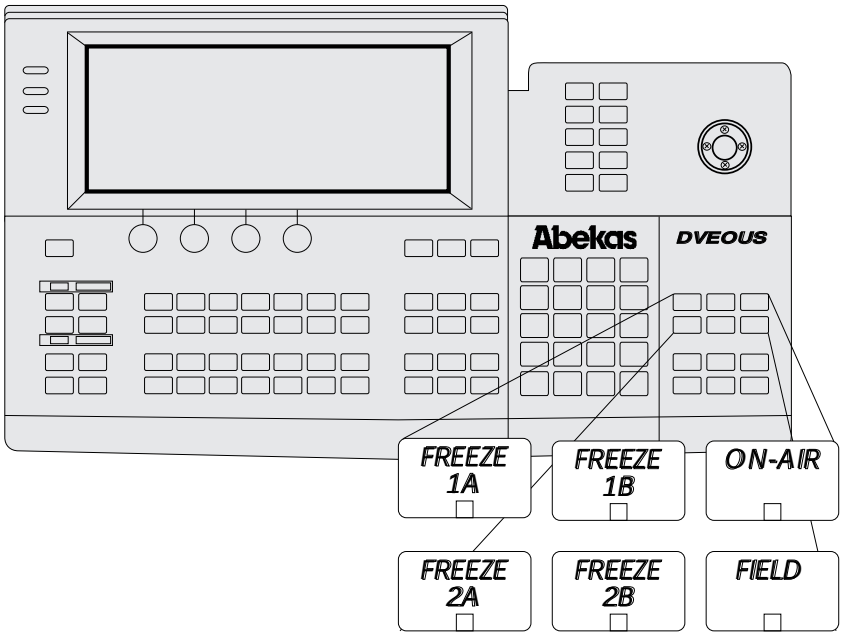
Pressing **PATH** toggles the available motion paths in the keypad buffer. You can assign a motion path to any softknob setting by pressing **PATH** to highlight the motion type in the keypad buffer, then pressing the keypad softkey (**A**, **B**, **C**, or **D**) for the softknob.

On-Air Buttons

Use these buttons when operating DVEOUS live. The four freeze buttons let you freeze the channels independently. Note that on-air freezes override any timeline effect: the channel stays frozen no matter what effects you recall or run. This is different from the freeze setting in the Input menu, which lets you apply a freeze on a keyframe-by-keyframe basis.

The **FIELD** button toggles the output to field 1, field 2 (LED in the button lit), or frame (LED off). Note that freezing a channel freezes field 1, field 2, or the frame, depending on the status of the **FIELD** button. You cannot change the field / frame mode of a frozen channel.

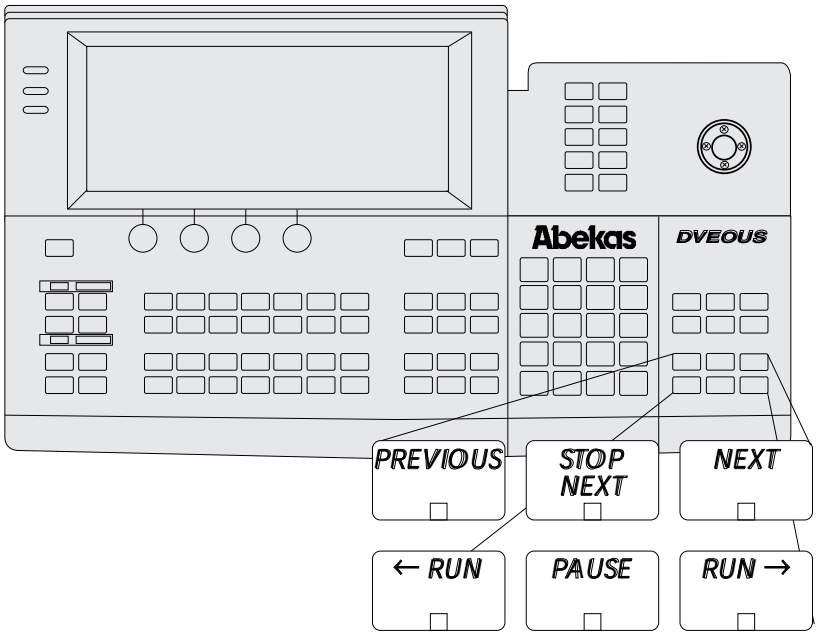
Press the **ON-AIR** button to bring up the On-Air menu and put the keypad in on-air mode.



The On-Air Buttons

Timeline Control Buttons

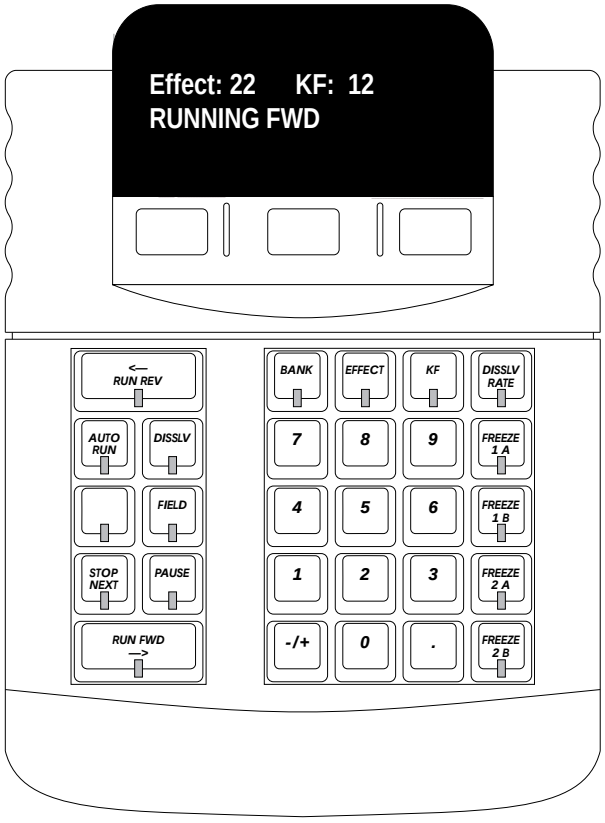
These buttons are in the lower right corner of the Control Panel and let you step through keyframes in an effect, run an effect either forward or reverse, and pause a running effect.



The Timeline Control Buttons

Shot Box

The Shot Box is an optional small Control Panel for on-air use. Its buttons duplicate the ones in the On-Air and Timeline Control sections on the main Control Panel. You can use the Shot Box to recall keyframes, recall, run, and pause effects, freeze channels, and select a field / frame output.



The Shot Box Option

Video and Key Signal Paths

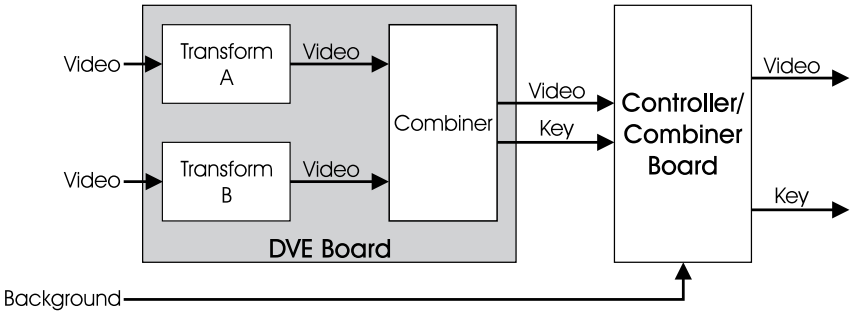
Understanding the video and key signal flow will help you better understand how DVEOUS works. This discussion outlines your options for channel configurations, and includes DVEOUS block diagrams that show the system video and key signal paths in more detail.

Channel Configurations

The standard DVEOUS system has one channel dedicated for video (A) and a twin channel (B). The main video transformation path is a full bandwidth video channel. The twin channel is a full bandwidth video channel, but it can also process key signals (luminance only). This gives DVEOUS three modes of operation.

Video/Video

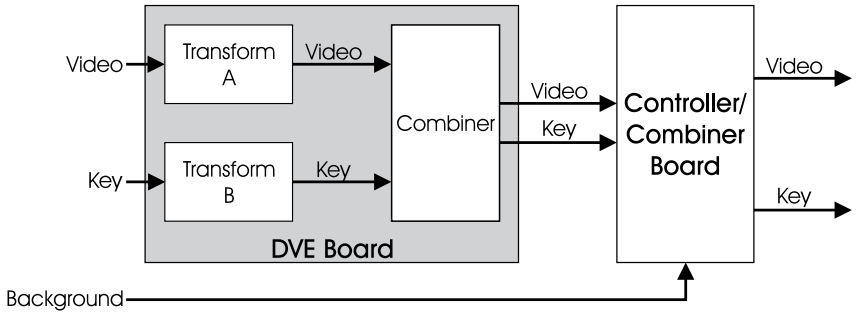
This mode lets you use the twin channel (channel B) as a video channel. The channel has independent control of all keyframe parameters including motion paths, warps, light sources, and textures. The DVE processor internally generates the key signals associated with these signals. The key signals are full screen "white" with adjustable opacity and edge softness.



The Video/Video Mode

Video/Key

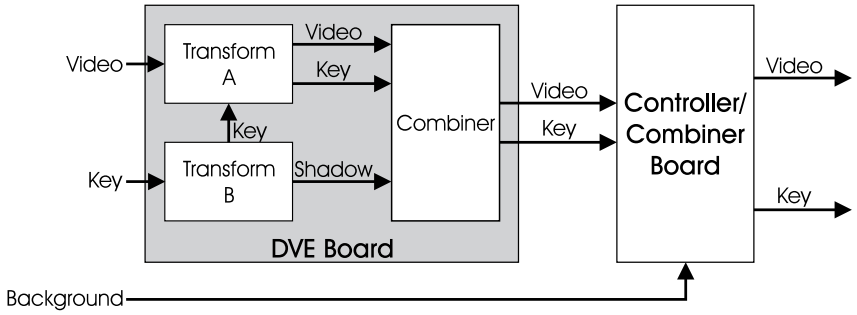
In this mode, you can manipulate the key signal with all keyframe parameters, including motion paths, warps, light sources, and textures, independently of the video. This is useful for compositing operations.



The Video/Key Mode

Video-Key/Shadow

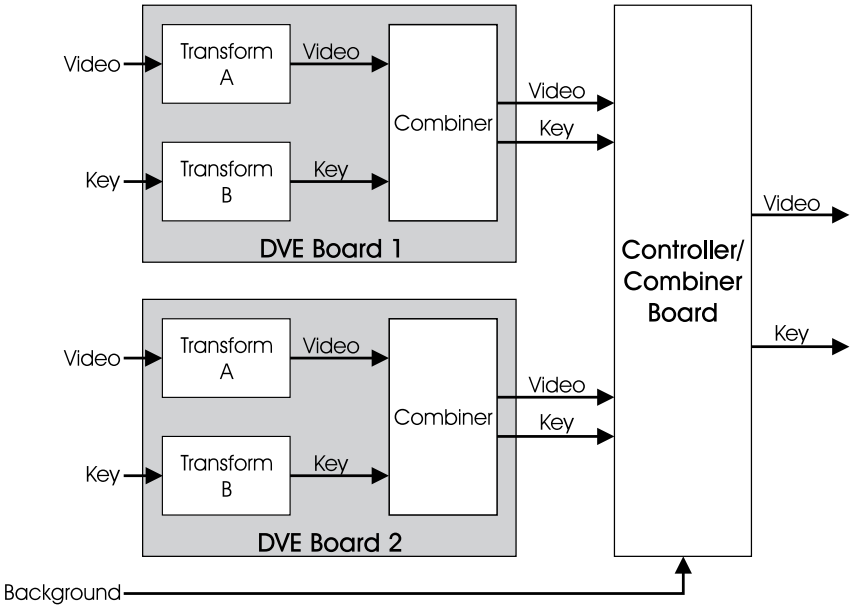
This mode splits the twin channel (B). The key portion is tied to the main video channel (A), and you can offset the key with subpixel timing. You can manipulate the shadow portion of the B channel independently of the video/key channel, with all keyframe parameters, including motion paths, warps, light sources, and textures. This is a full bandwidth drop shadow.



The Video-Key/Shadow Mode

Additional Channels

As an option, you can add a second DVE board to provide another set of A (main video) and B (twin) channels. The configuration possibilities are the same as for the standard DVE board. You can use the system as a two channel unit in conventional terms (two video and two key processing paths), as shown in the figure below.



The Video/Key Mode on Two DVE Boards

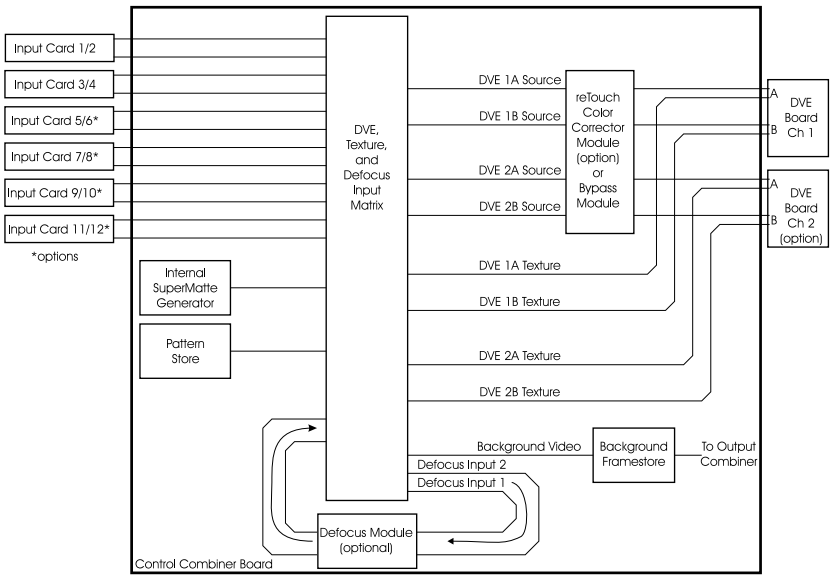
You also have the option of using one DVE board to process two video signals, and processing one video and one key signal on the other. Another configuration is four channels of video, each with independent control. This lets you use DVEOUS as a four channel, real-time video image processor.

Signal Paths

Inputs

DVEOUS accepts up to twelve inputs (six dual input modules); four (two dual input modules) come with a standard system. The type of input module installed determines the input signal's format (composite/component, digital/analog) and type (video/key). The twelve inputs, the internal SuperMatte generator, and the Pattern Framestore are all available as inputs to the Defocus option. The Defocus menu lets you select two input signals for defocusing.

The twelve video signals, the SuperMatte generator, the Pattern Framestore, and the defocus outputs are all available as DVE/texture matrix outputs. The nine matrix outputs include two video/key sources (A and B) and two texture sources (A and



DVEOUS Input Paths

B) for each DVE board, and the background source. Note that you can use any source anywhere, and in more than one place.

The DVE video/key sources feed the reTouch Color Corrector option (or a bypass board if the option is not installed). The Color Corrector output supplies the DVE boards' input.

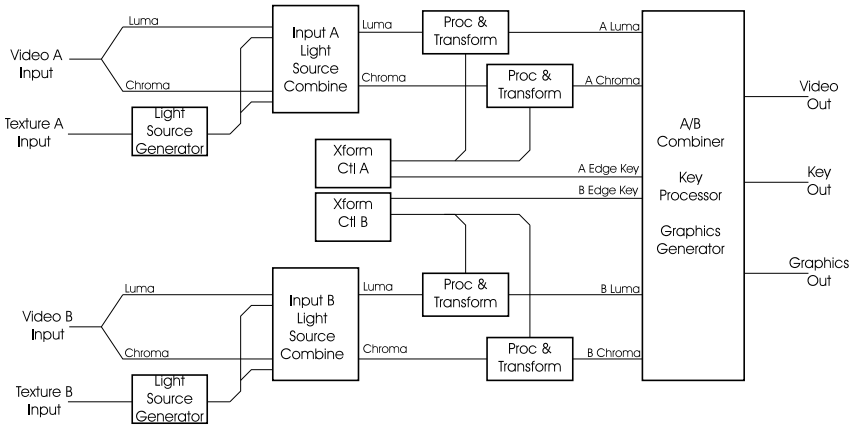
The DVE boards use the texture signals to modify the light source generator.

DVE Paths

As previously discussed, you can configure the DVE in three modes: Video/Video, Video/Key, and Video-Key/Shadow. This discussion includes a drawing for each mode.

Video/Video Mode

In the Video/Video mode, the DVE board has two identical sections. It applies the texture input to the light source generator, then combines that output with the video input.



DVE Board in Video/Video Mode

There are two transform controllers: one is dedicated to the A input, the other to the B input. Each transform controller generates an edge key signal that defines the transformed raster edges.

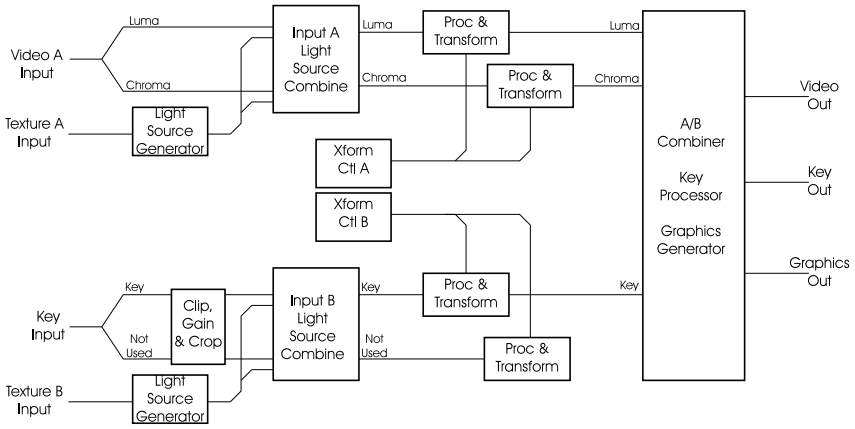
The transformed outputs are then combined into a single video and key output and sent to the Combiner Controller board for output processing. The combining process uses either a fixed priority (A over B or B over A) or a Z based priority, where each image's position in 3D space determines the priority.

The graphics output has axis grids for the A and B sources.

Video/Key Mode

The Video/Key mode differs from the Video/Video mode only in that the board processes the B input as the key signal, with additional clip and gain adjustments. Note that the "chroma" part of the B circuitry is not used since key signals are monochrome.

The A/B Combiner's key output is a transformed version of the input, and not the raster-based signal seen in the Video/Video



DVE Board in Video/Key Mode

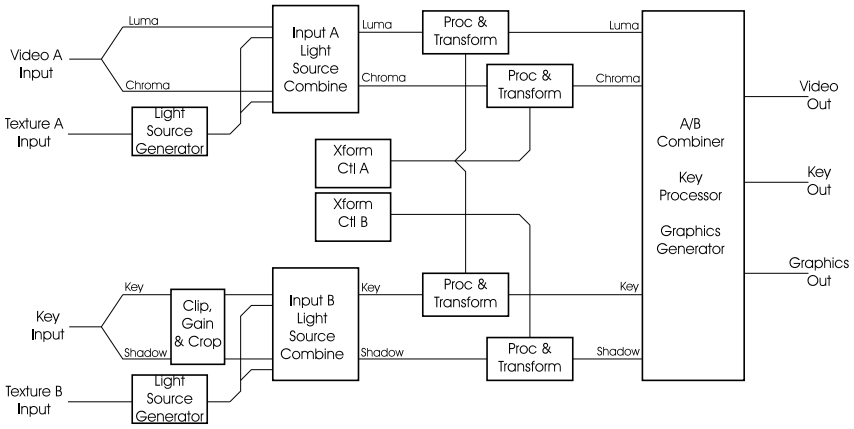
mode. The key transform is independent of the A video transform.

Video-Key/Shadow Mode

The Video-Key / Shadow mode is similar to the Video / Key mode, except the "chroma" part of the B circuitry is used to process a full bandwidth shadow signal.

The transforms for the A channel also control the key path. The B channel transforms control the shadow signal, allowing completely independent control of the shadow.

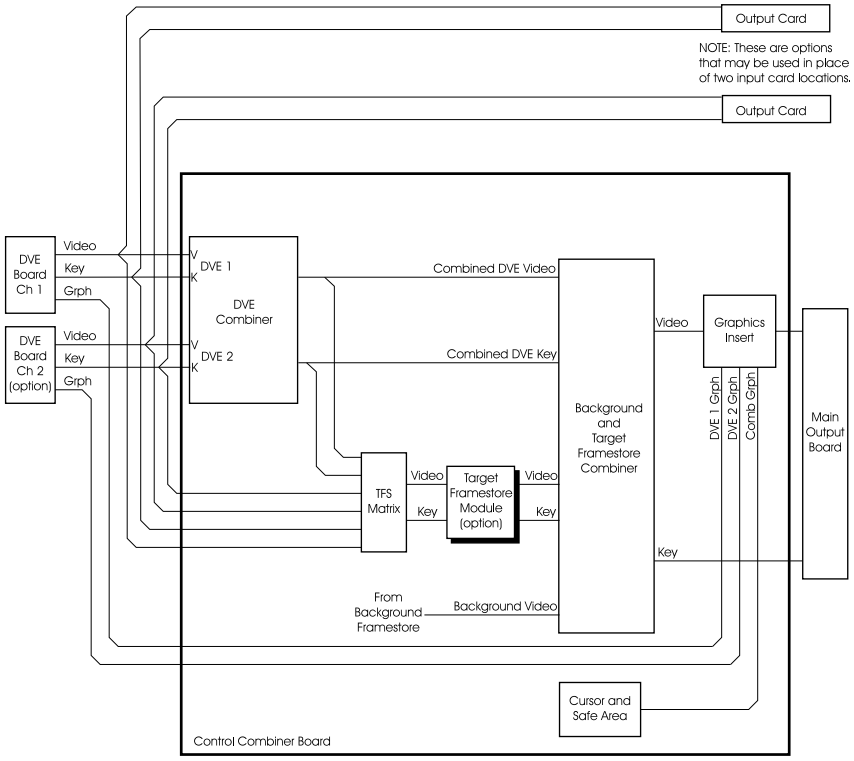
The A / B Combiner key output is a combined key / shadow signal.



DVE Board in Video-Key/Shadow Mode

Outputs

Each DVE board supplies three signals: video, key, and graphics. The video signal is either a transformed version of the A input (Video / Key or Video-Key / Shadow modes) or of the A and B inputs combined (Video / Video mode). The key signal is either a transformed version of the B input (Video / Key or Video-Key / Shadow modes) or an internally generated edge key (Video / Video mode). The graphics signal contains the cursors. The video and key signals connect to both the DVE Combiner and the TFS matrix. Their direct outputs are available as an option.



DVEOUS Output Paths

The DVE Combiner combines the two DVEs' video and key signals into a single set of video and key signals.

The TFS (Target FrameStore) matrix lets you select the source for the TFS option. Choose either DVE, or the DVE Combiner output.

The Output Combiner combines the DVE Combiner output, the Target Framestore, and the background.

Section 2

Getting Started

This section outlines the basic steps for powering up and checking out your DVEOUS system. You may also find it helpful to work through the examples in this section to quickly familiarize yourself with the Control Panel and some basic operations.

Powering Up DVEOUS

This section assumes that your DVEOUS system is properly installed and configured. For details on installation and engineering configuration, see the DVEOUS Technical Guide, P / N 9100-0239.

Power up DVEOUS as follows:

STEP 1: The main power switch is located under a small cover on the lower right side of the Signal Chassis front panel. Remove the front panel by grasping each side at the bottom edge and gently pulling forward. Push the switch toward the "1" to turn it on. The Signal Chassis takes about 15 seconds to load its operating software. Then it is ready for use.

When you power up DVEOUS, channel 1A appears full size at the video output, with input 1 as its source video. The key output is a full raster white field that duplicates the size of the transformed source video. You can change this by reconfiguring the channels, as described later in this section.

STEP 2: If the cable connecting the Signal Chassis to the Control Panel is less than 33 ft. (10 meters), the Control Panel can get its power from the Signal Chassis, and boots up at the same time as the Signal Chassis.

If the Control Panel cable is more than 33 ft. (10 meters) long, you need an external power supply for proper operation. The external supply (Abekas P/N 2800-0063) DIN connector plugs into the Control Panel connector labeled "POWER." The external supply AC cord then plugs into a standard AC Mains socket to power the Control Panel; there is no power switch. (The external power supply is autoranging, accommodating 90 to 264 VAC at 47 to 63 Hz.) The Control Panel takes about five seconds to load its operating software, then is ready for use.

STEP 3: When both the Signal Chassis and Control Panel are powered up and running, the local 3D Trans menu appears in the Control Panel display.

NOTE: If the Signal Chassis and Control Panel are not communicating, the menu display remains blank. If this is the case, check the cable connection at both the Control Panel and the Signal Chassis.

STEP 4: If a single Control Panel is connected to the Signal Chassis, its **ACQUIRE** button LED lights automatically. If there is more than one Control Panel connected, the first Control Panel to communicate with the Signal Chassis has control of the system, and its **ACQUIRE** button LED lights. To use another Control Panel, double press the lit **ACQUIRE** button on the active Control Panel to release control and turn off its LED. Press the **ACQUIRE** button on the Control Panel that you want to use to light its LED and gain control of DVEOUS.

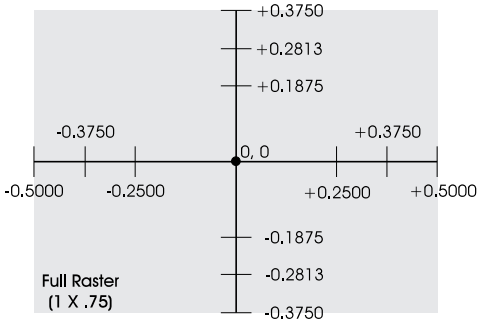
DVEOUS is now ready to use. See the discussions in this section for information on input and output setups, channel configurations, and creating simple effects.

The Numbering System

DVEOUS uses a numbering system derived from the normal television aspect ratio of 4:3 – four units horizontally by three units vertically. Dividing both sides of this ratio by four yields 1:3/4, or 1:0.75. DVEOUS uses this ratio as its numbering system. It indicates that the horizontal width of the screen, or the H axis, is one unit; the vertical height of the screen, or V axis, is three quarters of a unit, or 0.75 units. There is plenty of room for moving the image in both the source and target spaces (see Section 3 – Transforms for a discussion of source and target space); both planes have H and V dimensions of 200 units, or 200 times the height and width of the screen.

The third dimension, Z, is perpendicular to the H and V dimensions on each plane: it runs straight into and out of the plane at right angles to the horizontal and vertical directions. This value indicates depth, or distance from the plane.

The axis of each plane is defined as a point at which all three dimensions (H, V, and Z) have values of 0.0000. A point to the left of the axis on the plane has a negative H value; the left screen edge has an H value of -0.5000. A point to the right of the axis has a positive H value; the right screen edge has an H value of +0.5000. This gives a total width of 1.000.



Examples of Screen Positions

Similar coordinates apply to the vertical dimension. A point above the axis has a positive V value; the top screen edge has a V value of +0.3750. A point below the axis has a negative V value; the bottom screen edge has a V value of -0.3750. The vertical range from screen edge to screen edge gives a total screen height of 0.7500.

The H and V position numbers may represent locations on the source plane beyond the limits of the screen; the numbers always give you the exact location of the image on the plane, even if it is not visible in the video output.

In two dimensional transforms, the Z value represents picture size on the source plane; it does not move the image in the Z (distance) direction. A value of 1.0000 gives a full size image. 0.5000 indicates that the horizontal and vertical dimensions of the image are reduced to one half of full size, and the image area is one quarter of full size (1/2H x 1/2V = 1/4).

In three dimensional transforms, the Z value represents the position of the image relative to the plane: its distance from it. At a value of 0.0000, the image's Z position image coincides with the plane; it is "sitting" on the plane. At values above 0.0000, the image is "behind" the plane, i.e., further away from the viewer. At negative values, the image is "in front of" the plane, i.e., closer to the viewer. At Z values equal to or less than -1.6667, the image disappears; it has moved past the eye point and is actually "behind" the viewer.

Moving the axis (for either the source or target plane) moves the rotational center of the plane relative to the image. You can move the image, including the axis, on the plane (using the locate controls) or move the axis only, leaving the image alone (using the axis locate controls).

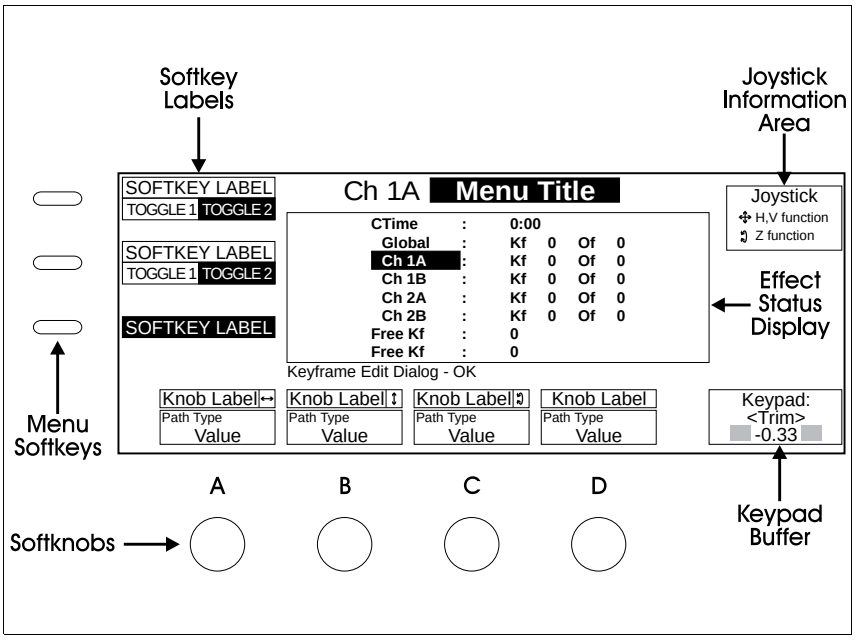
The Menu Display

The menu display is in the upper left corner of the Control Panel. You can adjust its brightness and contrast in an Engineering Setup menu.

Some of the information displayed in the menu screen changes depending on DVEOUS' current status and the current menu. The figure below shows a typical display.

The top line shows the current menu title, and indicates the master channel (the one the menu settings reflect): 1A, 1B, 2A, or 2B. The master channel display does not appear in global menus.

The center of the display shows information about the current timeline and effect. The top line (***CTime***) indicates the current point on the effects timeline as seconds:frames. The next five lines



The Menu Screen & Controls

indicate the current keyframe and total keyframes for each channel's effect. For example, if channel 1A is on keyframe two of a five keyframe effect, the display reads ***Ch 1A : Kf 2 of 5***. There are two ***Free Kf*** lines. The first one shows the number of keyframes available for addition in the current effect (there is a maximum of 300 keyframes per effect). The bottom line shows the number of keyframes available in the system keyframe pool (a total of over 900 with the standard 1 MB memory, 2200 with the optional 2 MB memory).

Below the effect information display area, there is a single line edit buffer that shows your keyframe editing command strings. If DVEOUS recognizes the command string, it confirms by displaying ***OK*** at the end of the string when you press **ENTER**. If it does not, an error message appears after the unrecognized command string.

A menu can have up to three different softkey labels. The softkeys are the three buttons on the left side of the menu screen. When you press a softkey, a black highlight appears in the label next to the button to indicate that it is active. If there is more than one function for the softkey, pressing it toggles the function, and the highlight indicates the active mode. Also, up to four controls for the softkey appear above the softknobs at the bottom of the menu display. You can adjust these settings with the softknobs, the numeric keypad, or the joystick (for softknob labels with arrow graphics). The motion path type assigned to the parameter appears above the softknob value.

You can change softknob settings several ways:

- Turn the softknob below its label.
- Enter a value in the numeric keypad, then press the corresponding **A**, **B**, **C**, or **D** button in the top row of the numeric keypad. For example, to enter the value 17 in softknob

A, enter **17** on the keypad, then press **A**. This applies to softknobs that use numeric values.

- Use the joystick to change softknob settings. Adjust softknob settings with left / right arrows by moving the joystick left and right. Adjust settings with up / down arrows by moving the joystick up and down. Adjust softknob settings with circular arrows by twisting the joystick handle. You can also temporarily lock the joystick to a parameter by holding down its keypad softkey. In this mode any joystick up, right, and clockwise movement increases the parameter value; any down, left, and counterclockwise movement decreases the value.

See the following discussion on using the numeric keypad for more details on entering and adjusting menu settings.

You can "lock" the joystick control to the current menu settings, then change to a different menu and use the softknobs to control the settings there. The joystick still affects only the settings that it is locked to.

The Numeric Keypad

The numeric keypad is the main interface for adjusting menu settings. This section describes entering, clearing, aligning, and trimming numeric values, copying values from one setting to another, and assigning motion path types to parameters.

The Keypad Buffer

The keypad buffer always appears in the lower right corner of the menu display. The buffer is a scratch pad that shows the value or function ready to be applied to a menu setting. Entering a value in the keypad puts the number in the keypad buffer. The other buttons in the numeric keypad let you apply functions to settings. The following buttons load these functions in the keypad buffer:

Button	Function	Buffer Message
PATH	Selects the parameter motion path type.	**<Set Path>** **JP LN SL T1 T2 SM**
ALIGN	Sets the parameter to the closest typical value.	**<Align>**
TRIM	Adds or subtracts the entered amount to / from the current value.	**<Trim>**
CLEAR	If a number or function is in the buffer, this erases it; If nothing is in the buffer, this resets the parameter to default. This also clears entries in the Keyframe Edit Dialog area.	**<Clear>**
+/-	Signs numeric values, and sets trims to subtract.	–

The following discussions cover these functions and how to use them to adjust menu settings.

The Keypad Softkeys

The top row of the numeric keypad has four buttons: **A**, **B**, **C**, and **D**. These are the keypad softkeys, and they correspond to the four softknobs beneath the menu display, from left to right.

With a value in the keypad buffer, pressing a keypad softkey enters it in the corresponding softknob. For example, in the 2D Trans menu, the **Size** setting is under the ***Position/Pre*** softkey. The right-most softknob, which corresponds to the **D** keypad softkey, controls this setting. To enter a **Size** value of 0.5 (which shrinks the image's horizontal and vertical dimensions to one half of full size), enter **. 5** in the numeric keypad, then press **D**.

To enter a negative value, use the **+/-** button to sign the number in the keypad buffer before pressing a keypad softkey. You can press the **+/-** button before or after entering the number. With no value in the keypad buffer, pressing the **+/-** button, then pressing a keypad softkey inverts the existing value's sign. For example, if softknob **A** has a value of 5, pressing **+/- — A** changes the softknob value to -5.

Entering a value that is outside the parameter's range sets it to its highest or lowest possible value. For example, entering 999 in the **Size** softknob sets it to 99.9999.

Pressing a keypad softkey (**A**, **B**, **C**, or **D**) when the keypad buffer is empty copies the current value and motion path type from the corresponding softknob into the keypad buffer. You can then press another keypad softkey to enter this value and motion path type in another softknob. This is an easy way to copy values from one setting to another. For example, the **Size** setting has a value

of 0.5000. Pressing the **D** button loads 0.5000 into the keypad buffer. Now pressing **B** sets the **H** softknob to 0.5000.

You can copy values this way to any softknob that takes a numeric value. Values outside the range of the "to" parameter set it to its highest or lowest value, just like entering invalid values with the numeric keypad. Also note that you can use this to copy values from a softknob in one menu to a softknob in another menu.

Setting Parameters to Default

You can use the **CLEAR** button in the numeric keypad to set a parameter to its default value. You can also use **CLEAR** to set all controls under a single softkey, or an entire menu, to default.

To set a single setting to its default, press **CLEAR** to bring the message **<Clear>** to the keypad buffer. Note that if there is an entry in the keypad buffer, pressing **CLEAR** once only erases it. Press **CLEAR** again to bring the message **<Clear>** to the buffer. With **<Clear>** in the keypad buffer, press the keypad softkey (**A**, **B**, **C**, or **D**) for the softknob to reset the parameter and motion path type to default. You can also press and hold **CLEAR** and press more than one keypad softkey to clear more than one parameter.

To set all softknobs under a single menu softkey to default, press and hold **CLEAR** and press the menu softkey. For example, in the 3D Trans menu, press and hold **CLEAR** and press the ***Rotate*** softkey to set all its softknobs (***Source* H Rot**, **V Rot**, and **Z Rot**, and ***Target* H Rot**, **V Rot**, and **Z Rot**) to default.

To set an entire menu to default, press and hold **CLEAR** and press the menu button. For example, to set all 3D Trans menu parameters to normal, press and hold **CLEAR** and press the **3D TRANS** button (**CLEAR + 3D TRANS**). This sets all 3D ***Locate***, ***Rotate***, and ***Axis Locate*** settings to default.

To reset all menus to the user default, press **NORMAL — ENTER** in the TimeFrame Effects Editor. This resets all menus to any personal-preference defaults that you entered.

To reset all menus to the system default (applies to all users), press **NORMAL — NORMAL — ENTER**. This resets all menus to an overall system default entered by your system engineer or senior operator.

To reset all menus to the factory default (as shipped from Abekas), press **NORMAL — NORMAL — NORMAL — ENTER**. This resets all parameters to the default defined by Abekas.

Trimming Values

You can change an existing value by adding or subtracting a given amount to or from it. To trim a softknob value, press the **TRIM** button to enter the message **<Trim>** in the keypad buffer. Enter the trim amount in the numeric keypad, then press a keypad softkey. For example, add 1.5 to the value in softknob A as follows: **TRIM — 1.5 — A**. To subtract 1.5 from the value in softknob A, enter **TRIM — +/- — 1.5 — A** or **+/- — 1.5 — TRIM — A**.

Note that there is always a trim amount in the keypad buffer. On bootup, the default trim amount is +1. After you trim a value, the keypad buffer "remembers" the trim amount. Now when you press **TRIM**, the keypad buffer recalls the last trim amount used. This makes it easy to trim multiple values by the same amount.

Aligning Values

You can use the **ALIGN** button to reset an existing softknob value to the nearest logical or typical value. This is handy if you have used the softknob or the joystick to roughly position the image, then want to position it more accurately. For some settings, the typical value is a one eighth increment. For rotations, for example, one eighth of a complete rotation is 45 degrees or 0.1250. Aligning a rotation value of 1.1111 resets it to 1.1250, the nearest multiple of 0.1250. Locate settings use one eighth of a screen unit as the logical value. For example, aligning an H locate value of 3.4739 sets it to 3.5, which is the nearest multiple of 0.1250, or one eighth of a screen unit.

For other functions, where there is no typical value, the align function sets the value to the closest one eighth of the parameter's entire range. For example, in the Multi menu, the full range for mosaic tile size is 0 - 100. Since the typical value is a multiple of 12.5000, or one eighth of the entire range, aligning a tile size of 28.3267 changes it to 25.0000, a multiple of 12.5000.

Assigning Motion Path Types to Parameters

The **PATH** button lets you assign a motion path type to parameters that you can change on a keyframe-by-keyframe basis. Motion paths define how DVEOUS interpolates from the settings in one keyframe to the settings in the next. See Section 7 – Motion Control for more details on each motion path type.

When you press the **PATH** button, this message appears in the keypad buffer:

<Set Path>
JP LN SL T1 T2 SM

The bottom line is a list of the available path types:

JP	Jump (Hold)
LN	Linear
SL	Smooth Linear
T1	TCB1 (Tension, Continuity, Bias preset 1)
T2	TCB2 (Tension, Continuity, Bias preset 2)
SM	Smooth

The highlight indicates the currently selected path type. Pressing the **PATH** button toggles the highlight through the list and selects a path type. After selecting the path type, press a keypad softkey (**A**, **B**, **C**, or **D**) to assign the currently selected path type to the setting.

Some parameters take only certain path types. If you try to assign an invalid path type to a parameter, it takes the highest "priority" path type available to it. The "priority" follows the list in the keypad buffer. For example, if you try to assign **SM** to a parameter that takes only the **JP**, **LN**, or **SL** path types, it assigns **SL** instead, because that is the highest priority path type allowed for that setting.

You can assign the same path type to all the softknob settings under a softkey: select a path type and hold the **PATH** button, then press the menu softkey. You can also assign a path type to all the parameters in a menu: select a path type and hold **PATH**, then press the menu button. When assigning a path type to multiple settings, remember that the path "priority" rule applies to any setting that does not accept the path type you want to assign.

Note that there is always a path type selected in the keypad buffer. On bootup, the default path type is **T1**. After you toggle the **PATH** button, the keypad buffer "remembers" the path type selected. Now when you press **PATH**, the keypad buffer recalls the last path type used. This makes it easy to assign the same path type to many parameters.

Selecting Sources

A fully configured DVEOUS has up to 12 input sources and up to four independent DVE channels. An internal 16 input by 11 output crosspoint matrix lets you route all internal video, key, and texture signals.

The external inputs are all available as DVE channel sources. The other channel sources are the SuperMatte (color background) generator, the output of the Pattern Framestore, and the outputs of the optional wide range Defocus module. Since the Defocus module is dual channel, you have a total of 16 available sources in a fully loaded DVEOUS system.

You can select any source as an input to any of these internal destinations: the four DVE channels (if two DVE boards are installed), the texture processors associated with each channel, the Background Framestore, and either input of the optional dual channel Defocus module.

The DVE channels each have a "front" and a "back" side, and you can select a different source for each side. DVEOUS automatically keeps track of the front and back sources and switches them as the image rotates horizontally or vertically.

Select an input for a DVE channel as follows:

STEP 1: Double press the Channel Select button for the channel (**1A**, **1B**, **2A**, or **2B**). This selects that channel and deselects any others.

STEP 2: Press the **INPUT** button to bring up the Input menu.

STEP 3: Toggle the ***Source*** softkey to ***Front*** to set a source for the front side of the channel. This brings up **Type**, **Source**, and **Invert** softknobs.

STEP 4: Use the **Type** softknob to select the source. Select **Video** to use an external input. **SuperMatte** selects the internal two color SuperMatte generator. **Pattern** selects the output of the Pattern Framestore. **Defocus A** and **Defocus B** select the corresponding output of the optional Defocus module. **Aux** only appears if DVEOUS is connected to a switcher Aux Bus.

STEP 5: With **Video** selected as the input type, you can use the **Source** softknob to select one of the 12 external inputs. Separate menus let you set up the SuperMatte generator, Pattern Framestore, and Defocus module.

STEP 6: You can invert the source image horizontally, vertically, or both. The **Invert** softknob is **Off** by default, giving the image normal orientation. **H** inverts the video horizontally, **V** inverts the video vertically, and **H+V** inverts the image in both directions.

STEP 7: To freeze or strobe a source in the channel, press the ***Freeze*** softkey to bring up the **Mode** and **Strobe** softknobs.

The **Mode** softknob selects the freeze mode: **Off** (no freeze, i.e., live video); **Fld 1** (freezes field one of the input video); **Fld 2** (freezes field two of the input video); or **Frm** (freezes the full frame of the input video).

The **Strobe** softknob lets you freeze the image indefinitely (**Infinity**), or create a strobe effect. To create a strobe effect, select the freeze duration with the **Strobe** softknob. The range is 0 - 254 frames. This is the length of time that DVEOUS holds the frozen image before grabbing the next freeze. For example, with a freeze set to strobe every 10 frames, DVEOUS

freezes and holds an image for 10 frames, grabs a new image and freezes it for 10 frames, and so on.

STEP 8: Even without the Defocus module, you can soften the source image to a certain extent. Press the ***Blur*** softkey to adjust the horizontal and vertical blur settings. The default is 0 (no blur); 100 gives the maximum blur.

STEP 9: Toggle the ***Source*** softkey to ***Back*** and repeat steps 4 through 8 for the back side of the channel.

NOTE: With a freeze enabled on a channel, you cannot see new sources as you select them. Also, with a freeze enabled, the same video appears on both the front and back sides of the channel.

Channel Configuration

As described in Section 1 – Introduction, each DVEOUS DVE board (one is standard) can operate in three modes:

- Video / Video – two independent video channels.
- Video / Key – one video channel and an independent key channel.
- Video-Key / Shadow – also called SuperShadow; one video channel with a "slaved" key, and an independent shadow channel.

Note that channel A is always video by definition. The default configuration is two independent video channels. If your system has the optional second DVE board (channels 2A and 2B), you can configure one pair of channels differently from the other.

To configure the 1A / 1B channel pair, double press the **1A** or **1B** Channel Select button and follow the steps below. To configure the 2A / 2B channel pair, double press the **2A** or **2B** Channel Select button and follow the steps below.

STEP 1: Press the **KEY** button to bring up the key menu.

STEP 2: Press the ***Setup*** softkey to highlight it.

STEP 3: The **Mode** softknob sets the DVE board configuration. **V+V** (Video / Video mode) sets the board to process two independent video channels. **V+K** (Video / Key mode) sets the board to process one video channel (A) with an independent key channel (B). **VK+S** (Video-Key / Shadow mode) sets the board to process a video channel plus a slaved key (A) and an independent shadow channel (B). In any configuration, you can select a "front" and "back" source for each channel, as described earlier in this section.

STEP 4: If you are using the Video/Key or Video-Key/Shadow mode, press the ***Mode*** softkey. In Video/Key mode, the **Key** softknob controls the key (B) channel only. In Video-Key/Shadow mode, the **Key** softknob is for the key portion of the A channel, and the **Shadow** softknob is for the shadow (B) channel. Both softknobs select the key mode for the channel:

White – a full raster key signal (i.e., a white field) that matches the size of the transformed video.

Video – generates a key signal based on the luminance in the source selected for the B channel.

Inv Video – same as **Video**, except that it inverts the polarity of the generated key signal (i.e., black changes to white and white changes to black).

Use **Video** or **Inv Video** when you want to replace the rectangular key with a shape (for example, the key signal from a character generator). Normally, use **White** in the Video-Key/Shadow mode when you want to derive a shadow from the normal rectangular raster.

NOTE: The softknobs under the *Mode* softkey do not appear in Video/Video mode, as both channels are forced to a full white key signal.

STEP 5: Press the ***Setup*** softkey to bring up the **Gain**, **Clip**, and **Phase** controls for the keyer. For a full linear key, use the default values (**Gain** = 100 and **Clip** = 50). As in a normal keyer, **Gain** adjusts the key edge sharpness; **Clip** is a threshold adjustment that sets the luminance level at which the key turns on or off.

NOTE: In 525, a Betacam, MII, or composite video input used as a key source may include 7.5 IRE setup. If this is the case, you must adjust the Gain and Clip softknobs to compensate for the increased black level of the original source.

The **Phase** softknob adjusts the horizontal position of the key signal relative to the original video. You can use this to compensate for key timing errors that originate outside DVEOUS. Normally, you can leave this at its default value (0.00).

NOTE: With White selected as the key source, the Gain, Clip, and Phase adjustments have no effect.

STEP 6: If you are using the Video-Key / Shadow mode, press the ***Shadow*** softkey to access the color and opacity controls for the shadow channel. The **Lum**, **Sat**, and **Hue** softknobs adjust the shadow brightness, color saturation, and hue, respectively. The **B Opac** softknob sets a transparency value for the shadow. The default values for **Lum**, **Sat**, and **Hue** (0) and a **B Opac** value of about 50 yield a realistic looking drop shadow. You can also use the Input menu ***Blur*** softkey settings to soften the drop shadow for an even more realistic look.

Creating a Simple Effect

After selecting sources and configuring the channels, you can try out DVEOUS' features by creating a simple effect. This procedure does not include every effect parameter. Its aim is to give you a basic understanding of the effect building process.

Create a simple effect that squeezes the picture down in size, moves it around the screen, and rotates it 360 degrees as follows:

STEP 1: Press **1A**, **1B**, **2A**, **2B**, and **GLOBAL** to light the LEDs in all five buttons. Press **DELETE — ALL — ENTER** in the TimeFrame Effects Editor to clear any existing keyframes on all channels.

STEP 2: Press **NORMAL — ENTER**. This clears all menu settings to default, selects the Video / Video mode, and gives channel 1A keying priority over channel 1B.

STEP 3: Double press the **1A** Channel Select button to select it and deactivate the other channels. Press the **3D TRANS** menu button.

STEP 4: Press the ***Locate*** softkey and toggle it to ***Source***.

STEP 5: Make the image smaller by twisting the joystick counterclockwise, or by turning the **Z Loc** softknob counterclockwise. The smaller channel 1A appears keyed over a full-size channel 1B. Move the reduced image to the upper left corner of the screen with the joystick or the **H Loc** and **V Loc** softknobs.

STEP 6: Press the Quick Keyframes **INSERT NEXT** button. This stores the current parameters as keyframe 1.

STEP 7: Move the image to the upper right corner of the screen with the joystick or softknobs. Press **INSERT NEXT** again to store the new parameters as keyframe 2.

STEP 8: Move the image to the lower right corner of the screen. Press the ***Rotate*** softkey and toggle it to ***Source***. Enter **1 — D** in the numeric keypad to rotate the image a full 360 degrees around its Z axis. (For rotations, "1" is a full rotation, ".5" is 180 degrees, or half a rotation). Press **INSERT NEXT** to store the current parameters as keyframe 3.

STEP 9: Press ***Locate*** and move the image to the lower left corner of the screen. Press ***Rotate*** and rotate the image horizontally by moving the joystick left or right. (You can also use the **H Rot** softknob.) To rotate the image exactly 180 degrees, enter .5 in the numeric keypad, then press the **B** keypad softkey. As the image rotates past "edge-on," the back source appears. Press **INSERT NEXT** to store the current parameters as keyframe 4.

STEP 10: There is now a four keyframe effect in the workspace. Press the **RUN–>** button to run the effect. The image starts at the upper left corner, moves to the upper right corner, rotates about its center while moving to the lower right corner, and rotates to reveal the back side while moving to the lower left corner of the screen. Press **<–RUN** to run the effect from the last keyframe to the first. Press **PAUSE** at any point to pause the effect, then press **RUN–>** or **<–RUN** to resume running the effect from that point.

To change the effect in the workspace, you can modify any parameter as follows:

STEP 1: Move to the keyframe you want to change by pressing **NEXT** (to step forward to the next keyframe) or **PREVIOUS** (to move back to the previous keyframe).

STEP 2: Change a parameter and press the Quick Keyframes **MODIFY** button. This modifies only the current keyframe. (For now, do not use the **MODIFY** button in the TimeFrame Effects Editor.)

STEP 3: Run the effect by pressing **RUN–>**. The effect now runs with the modified keyframe.

So far, you have created and modified an effect for channel 1A only. To create an effect for channel 1B, double press the **1B** button to select that channel and deselect channel 1A. Then, using the above procedure as a guide, create a different effect for channel 1B. When you run the effect, both channels simultaneously run their own effects.

You can also create an effect in which both channels move together. To use two channels, you must select which is the "master" channel and activate both channels. To build an effect with channel 1A as the master channel (the menus show its status), double press its Channel Select button. To activate channel 1B, press its Channel Select button. The lit LEDs in both Channel Select buttons indicate that both channels are active, and the changes you make in the menus affect both of them. The menu indicates the master channel next to the menu title, and the menus show its parameter settings. Using the joystick or the softknobs affects both channels as a unit.

On-Line Effects

After you create an effect, you can save it. DVEOUS' effects memory contains a pool of over 900 keyframes (2200 with the extended memory option) in battery backed RAM. When you create an effect, it sets aside a portion of these keyframes for that effect. You can save up to 100 effects in on-line effect registers, with a maximum of 300 keyframes per effect.

> **NOTE: Each keyframe in each channel uses a keyframe from the system pool. This means that when you create an effect by inserting four keyframes into five channels (1A, 1B, 2A, 2B, and Global), you actually use 20 keyframes from the pool.**

Saving and Recalling

Save the effect in the workspace to an on-line register as follows:

STEP 1: Enter an effect register number (0 - 99) in the numeric keypad.

STEP 2: Press the **SAVE EFFECT** button in the Effect area of the Control Panel.

If you enter an effect register number that already contains an effect, one of two things happens. If the existing effect does not have the protect flag enabled, the workspace effect overwrites the one in the register. If the existing effect does have the protect flag enabled, DVEOUS does not save the workspace effect, and does not overwrite the existing effect. A prompt tells you that the register is protected.

Recall an effect from an on-line register to the workspace as follows:

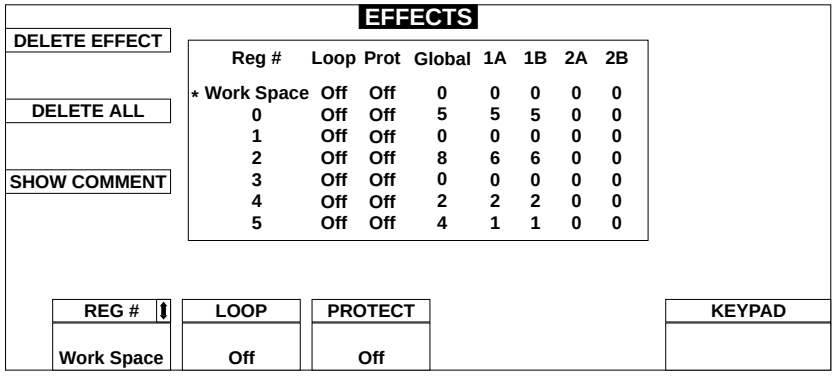
STEP 1: Enter an effect register number (0 - 99) in the numeric keypad.

STEP 2: Press the **RECALL EFFECT** button in the Effect area of the Control Panel.

See Section 8 – Saving and Recalling Effects for information on using the floppy disk to archive and recall effects.

The Effects Menu

You can use the Effects menu to browse the on-line effects registers, enable / disable the effect loop and protect flags, add comments to the effects, and delete effects. Bring up this menu by pressing the **SAVE EFFECT** or **RECALL EFFECT** button in the Effect area of the Control Panel. Note that if there is a number in the keypad buffer, DVEOUS saves or recalls that effect register number, and the menu does not appear. Be sure the keypad buffer is empty before trying to bring up this menu.



The Effects Menu

The display in the Effects menu shows information about the workspace effect, and the on-line register effects. The first column lists the register numbers, and the asterisk (*) pointer indicates the current effect register in the list. The softknobs also indicate the status of the current effect register.

The second column in the list indicates whether the loop flag is on or off for the effect. With it on, when you recall and run the effect, it runs from the first keyframe to the last, then returns to the first keyframe, runs again, and so on until you press the **PAUSE** button to stop it.

The third column indicates whether the protect flag is on or off for the effect. If on, DVEOUS does not overwrite the effect if you try to save the workspace effect to the register, and does not delete the effect if you use ***Delete Effect*** or ***Delete All***.

The other columns indicate how many keyframes there are in the effect on each channel.

The Loop and Protect Flags

You can enable / disable the loop and protect flags for an effect in an on-line register as follows. Note that you can set the workspace effect to loop, but you cannot enable the protect flag for it.

STEP 1: Move the pointer to an effect register. You can do this three ways:

Use the **Reg #** softknob to scroll the list and move the pointer.

Enter a register number in the numeric keypad and press the **A** keypad softkey (the workspace register number is -1).

Move the joystick up and down to scroll the list and move the pointer.

STEP 2: The **Loop** and **Protect** softknobs indicate the flag status for the currently select effect register. Use the softknobs to change the flag settings for the currently selected effects register.

Deleting Effects

You can delete the current (unprotected) effect, or all (unprotected) effects from the register(s) as follows. Note that you cannot delete the workspace effect.

STEP 1: To delete one effect, move the pointer to its register. You can do this three ways:
Use the **Reg #** softknob to scroll the list and move the pointer.
Enter a register number in the numeric keypad and press the **A** keypad softkey.
Move the joystick up and down to scroll the list and move the pointer.

STEP 2: Press ***Delete Effect*** to delete the effect in the currently selected register, or ***Delete All*** to delete all effects in unprotected registers.

STEP 3: DVEOUS prompts you to confirm the deletion by holding down the **CLEAR** button and pressing the softkey again. Press and hold **CLEAR**, then press the softkey used in step 2. DVEOUS deletes the unprotected register(s), and prompts that protected registers were not deleted. To delete an effect in a protected register, first use the **Protect** softknob to turn the register's flag **Off**.

Effect Comments

DVEOUS lets you add comments to on-line effects registers to make identifying them easier. You can add your own comment to an on-line effect, or let DVEOUS add the default comment. If the register has no keyframes, the default comment is "no keyframes." Otherwise, the comment is the register number and the date and time you first saved the effect. When you save a register to floppy disk, you can save it with the same comment, or change it before saving. You can use the Effect menu or the Disk menu to change an effect register's comment.

STEP 1: Bring up either the Effect Menu or the Disk menu. If you are using the Disk menu, toggle the ***Disk*** softkey to ***Save*** (***Recall*** mode lets you view comments on disk files, but you cannot change them).

STEP 2: Use the **Reg#** softkey to select the register you want to change the comment for.

STEP 3: Press the ***Show Comment*** softkey. It changes to ***Set Comment***, and the **Letter** softknob appears. The register's existing comment also appears.

STEP 4: Use the **Letter** softknob or a PC/AT compatible keyboard connected to the Control Panel Keyboard port to change the comment. If you do not have a keyboard, select the character with the softknob, then press the **D** keypad softkey to enter the letter at the current cursor location. Move the cursor with the joystick to insert characters between existing ones. You do not have to use the **D** keypad softkey when entering numbers in a comment. The first time you press **D**, it erases the existing comment so that you can enter the new comment.

You can use any character for a comment, and comments can be up to 80 characters long.

STEP 4: Press **Set Comment** again to add the comment to the effects register.

> **NOTE: When you use the Disk menu, DVEOUS writes the existing register comment to the disk when it saves the disk file. Set the comment before saving the register to disk.**

You can view disk file comments on a DOS compatible PC by inserting the disk in the PC floppy disk drive and entering the command

```
type filename.ext
```

at the prompt. Be sure to use the actual file name and extension when entering this command, which displays the comment saved with the file.

Section 3

Transforms

Overview

DVEOUS is a three-dimensional digital effects system used to manipulate images to give the appearance of motion in three-dimensional (3D) space. To achieve this, DVEOUS can rotate the image, and as it rotates, maintain optically correct perspective. The processing preserves the geometric precision of 3D space on the two-dimensional (2D) plane of a television screen. The video being manipulated is called the source image.

> **NOTE: Depending on your input and channel configurations, a channel can process a video signal, a key signal, or a drop shadow. This section uses the word *image* generically to indicate the channel's source (video, key, or shadow).**

DVEOUS has four separate sets of 3D controls. It helps to visualize this by thinking of each set as applying to a 2D plane. The controls move the plane in 3D space. The four 3D control sets are as follows, in order of processing:

- The local source plane, which moves in local source space and contains the source image and any 2D pre-transform modifications.
- The local target plane, which moves in local target space and contains the entire local source plane.
- The global source plane, which moves in global source space and contains the entire local target plane.

- The global target plane, which moves in global target space and contains the entire global source plane.

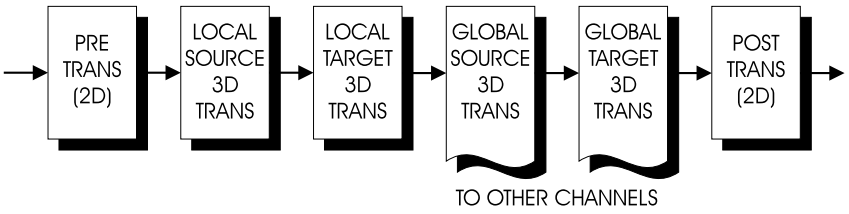
Manipulating a plane in its space affects the "upstream" planes that are contained in it, but has no effect on the "downstream" planes that come after it. For this reason, it is a good idea to manipulate the most upstream plane first (the local source plane), so you can use downstream planes (local target, global source, and global target) to create more complex movement later.

Each plane has a horizontal (or H) axis, a vertical (or V) axis, and a perpendicular (or Z) axis around which the plane can rotate. The intersection of these axes is a single point known as the axis point, or simply axis. You can view this axis point by pressing the **CURSOR** button in the Graphics area of the Control Panel. This enables cursors in the video output that indicate the current location of the axes for the active channels. See the discussion later in this section for more details on the axis cursors.

Using a plane's locate control to position it in its space also moves its axis settings to maintain their relationship to the plane. Rotating the plane does not appear to force rotations on its axis settings, but more on this later.

Each set of 3D controls are identical in operation and power; the only thing that differentiates them is the order in which they are allowed to transform the image. The names of the 3D transform sets could just as easily been "First," "Second," "Third," and "Fourth." However, the two global 3D transforms ("Third" and "Fourth") are special in that they apply to all DVEOUS channels.

There are also ***Pre*** transform and ***Post*** transform 2D controls. The ***Pre*** controls change the H and V position and the size of the source image on the local source plane, without moving the source plane in 3D space. The ***Post*** controls change the H and V position and the size of the entire transformed image (i.e., the global target plane) on the screen, without moving the global target plane in 3D space.

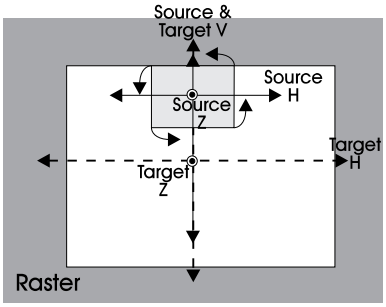


Transform Groups

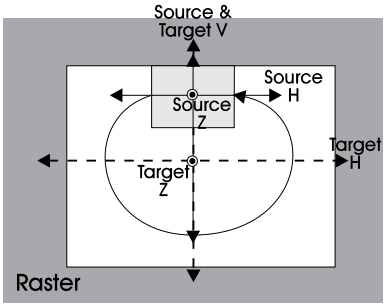
3D Transform Interaction Examples

For the following examples, it is helpful to use the 2D Trans Post **Zoom** control to reduce the image on the monitor and let you see more of the of 3D spaces. A **Zoom** value of 0.3000 works well.

Use local source V locate to move the image up a little. This moves the local source plane (and its axes) independent of the other three planes (and their axes). To prove this, use local source Z rotate to spin the image. It spins around the image's center. Now use local target Z rotate to spin the image. The local target plane spins on its center, which no longer matches the image's center because of the local source locate move.



A source Z rotate after a source H locate.



A target Z rotate after a source H locate.

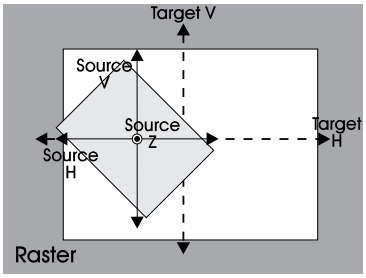
In the above example, it would make no difference whether we used local target Z rotate, global source Z rotate, or global target Z rotate; the results would appear the same, since they are all downstream of the local source space.

Here is a similar effect: use local target V locate to move the image toward the top of the screen (instead of the local source V locate used before). There is no apparent difference between local source Z rotate and local target Z rotate; they both spin about the

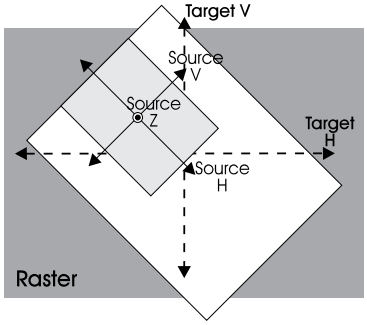
center of the image. Both global Z rotates spin about their (and the monitor's, in this case) center.

Here is another example of plane interaction: start with a centered image (all locate values set to 0.0000). Set local source Z rotate to 0.1250 (45 degrees). Now use local source H locate to move the image left and right. The image moves along a horizontal line straight across the screen. Using any other locate H controls gives the same results. As mentioned earlier, rotating a plane does not appear to affect its axes.

Now set the local source Z rotate back to 0.0000, and set the local target Z rotate to 0.1250. The local target and both global H locates still move the image straight across the screen. Using local source H locate, however, moves the image diagonally, as if the local source plane's axes have rotated. In effect, they have.



A source H locate on an image rotated in source space.



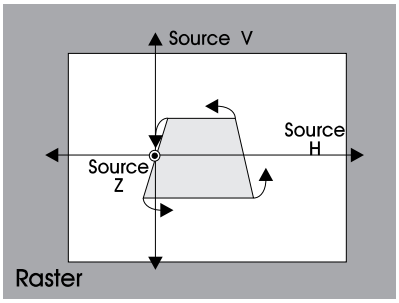
A source H locate on an image rotated in target space.

Rotating a plane does not affect its axes, but does affect the axes of all upstream planes. Rotating the local source plane affected nothing, since it is the first plane in the hierarchy. (This isn't entirely true; it does affect 2D ***Pre*** transform positions. More about the 2D functions later.) Rotating the local target plane affects the only plane above it: the local source plane (and the 2D ***Pre*** transform positions).

Rotate Hierarchy

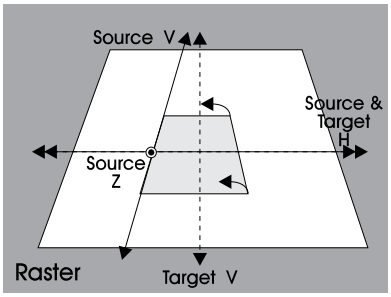
The previous examples showed that there is a hierarchy, or priority, of 3D controls. Using functions further down the list affects the controls above them. In the case of rotate, you must take this hierarchy into account even within a single set of 3D controls.

For this example, you must tilt the image back vertically, put the horizontal axis on the left image edge, and horizontally rotate the image as if opening the cover of a book. Using local source 3D controls, put the horizontal axis on the left edge of the image (-0.5000), lay the top of the image back with a vertical rotate, and now try to turn the page with a horizontal rotate. This fails because the vertical rotate, while affecting the local source plane, does not affect the still straight up and down vertical axis.



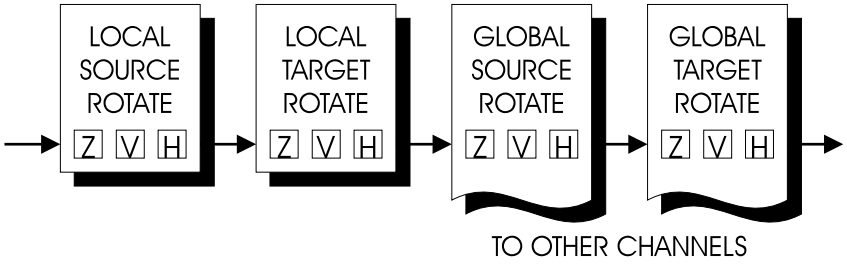
A source H rotate after a source V rotate.

To rotate a plane's axes, you must rotate the plane further down in the hierarchy. In this case, doing everything as above, except using local target V rotate to lay back the top of the image, results in the correct book cover effect. Note that using local target H rotate to open the cover would fail exactly as it did when using local source H and V rotates.



A source H rotate after a target V rotate.

The reason for this is that each 3D space's rotate has three individual transforms: first the Z rotate, then the V rotate, and lastly the H rotate.



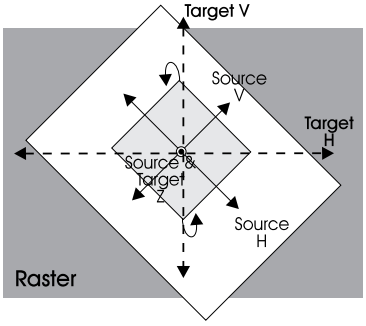
Rotate Hierarchy Within the 3D Transforms

In the above example, the problem was that image was first vertically, then horizontally, rotated (the order is Z - V - H). Instead of acting first on a flat image, the horizontal rotate acts on an image that is already vertically rotated. Performing the V

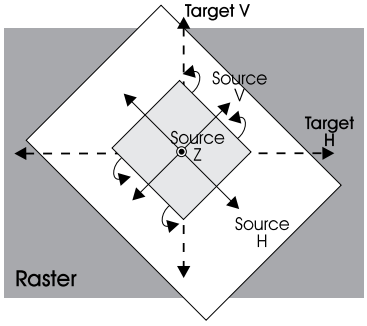
rotate in the local target space effectively lets the horizontal rotate act on a flat image. The now downstream vertical rotate simply lays back the horizontally rotated image.

You can use this with Z rotates to spin an image about opposing corners. This effect looks better with a square image, so instead of using Post 2D **Zoom** to reduce the image, enter 0.5000 in both the horizontal and vertical **Aspect** softknobs. Start with an image that has no rotates or locates, and set the local target Z rotate to 0.1250 (45 degrees).

The local target vertical rotate still rotates the image about axes that are straight across and straight up and down. Set the H and V rotates to 0.0000. Applying a local source vertical rotate shows that the local source plane's axes have also rotated: the image rotates on axes that are diagonal to the screen.

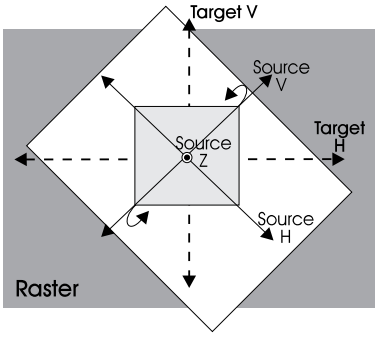


A target V rotate on an image Z rotated in target space.



A source V rotate on an image Z rotated in target space.

Now enter a local source Z rotate of -0.1250 (45 degrees in the opposite direction). This reorients the image to straight up and down, but local source horizontal and vertical rotates are still diagonal, causing the image to spin about opposing corners. This is because we allowed the horizontal or vertical rotates to act on a flat image. The Z rotate occurs downstream, effectively rotating the local source plane's axes.



A source V rotate on an image Z rotated in target space and -Z rotated in source space.

2D Parameter Overview

There are two sets of 2D position and size controls: ***Pre*** transform 2D, which is before the 3D transforms, and ***Post*** transform 2D, which is after the 3D transforms.

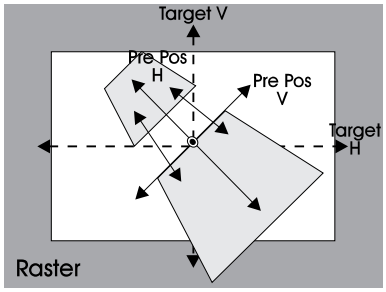
The ***Pre*** transform 2D controls include position and skew, as well as a true image size control. The size control also has aspect controls, letting you independently size the image horizontally and vertically.

2D Pre/Position and Aspect

The 2D ***Pre/Position*** controls actually move the image on the local source plane. It is important to note this for two reasons: ***Pre/Position*** moves the image off the axis of rotation for all four 3D transforms (since the image moves, but each plane's axes do not), and source plane rotations directly affect the path the image takes when moved with ***Pre/Position.***

For the following examples, it is helpful to use 2D ***Post*** **Zoom** to reduce the image on the monitor and let you see more of the 3D spaces. A **Zoom** value of 0.3000 works well.

With the H and V ***Pre/Position*** set to 0.0000, the local source rotates (and all other rotates) spin the image on axes that intersect in the middle of the image. Use the ***Pre/Position*** **H** control to move the image left so that it touches the edge of the screen. Now try the H and Z rotates. They all act on the axes' intersection, which has not moved. Think of the 3D transforms as acting on where the image use to be; their view of 3D space has not changed.



Using Pre Pos H on an image rotated in source space.

Now rotate the image H and Z about 45 degrees. Using the ***Pre/Position* H** control causes the image to slide along the rotated source plane.

Using the 2D ***Pre* Size** softknob actually changes the image size. Using Z locate does not actually resize the image; it appears larger or smaller because it moves closer or further away. If you set a rotate axis on the left edge of the image, then change its size with 2D ***Pre* Size** or **Aspect**, the axis is no longer on the image edge.

2D Post/Position

The 2D ***Post/Position*** controls let you position the output of the 3D transforms on the monitor. This does not affect the 3D look of a rotated image. These controls are very useful for offsetting or sizing a solid or other object that you created with the 3D controls. The **Zoom** control does not actually change the image's size; it acts more like a zoom lens on a camera. Zooming out (making the image smaller) widens the field of view; zooming in reduces it. The actual image you are looking at is unaffected. As opposed to the 2D ***Pre*** transform controls, the ***Post*** transform controls do not affect the 3D axis settings or rotate functions.

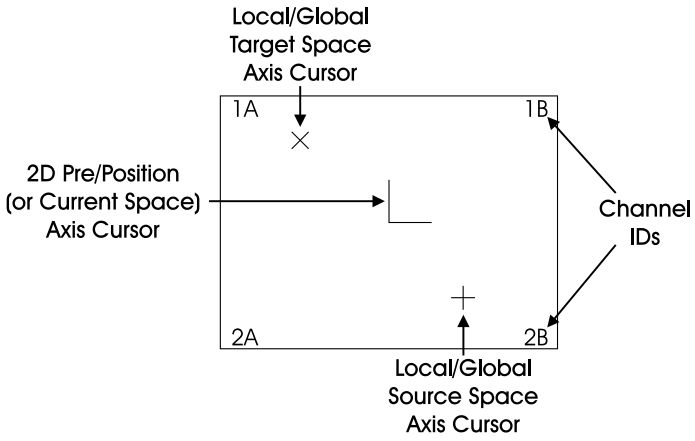
Axis Cursors

Pressing the **CURSOR** button to light its LED enables on-screen graphics to help you keep track of the channels and their axis locations. The channel IDs (1A, 1B, 2A, 2B) appear in the corners of the channel's image, as shown in the diagram below. There are three axis shapes:

L – indicates the axis for the space you are currently working in (local or global source or target); in the 2D Trans menu, indicates the center of the original source image, regardless of its location in 2D or 3D space.

X – indicates the axis for the local or global target space.

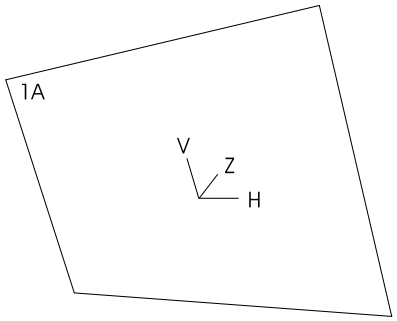
+ – indicates the axis for the local or global source space.



NOTE: This diagram shows all four channel IDs, but only one channel's axis cursors.

The only time you see all three axes on the same channel is in the 2D Trans menu. Otherwise, the L cursor overlaps the X or + cursor to indicate the space (source or target) currently selected in the 3D Trans menu.

The L cursor is actually 3D, to indicate the location of the Z axis. Rotating the image either horizontally or vertically brings the third cursor "leg" into view.



A rotated image that shows the third cursor axis. Axis labels are noted here for reference, and do not appear on the output.

The cursors and channel IDs only appear for the currently active channel(s). Since this can mean as many as 14 cursors on the screen at once, each channel has its own color for identification:

Channel 1A: white
Channel 1B: black
Channel 2A: yellow
Channel 2B: blue
Global Channel: red (no channel ID)

Note that the ID and cursor displays remain when you leave the 3D Trans menu. Also, running an effect automatically disables the **CURSOR** button so the displays do not appear on the output.

Parameter Hierarchy Detail

An effects system has many parameters (numeric values) and flags (switches) that alter the input video image. DVEOUS offers many advanced features to let you create unique effects. This means virtually limitless possibilities, but the array of controls can be daunting. It is important that you understand the image processing path and how the controls interact before you can expect to master DVEOUS.

This section describes the hierarchy of the system parameters. The key to building effects is to design them from the most downstream parameter up. Note that although you can alter parameters at any point in the hierarchy, changing a parameter in the middle of the hierarchy reorients all upstream parameters and interacts with parameters downstream from it. Although in most effects this is not important, you must consider it when building complex 3D tracking moves.

The following lists the parameters and flags, in upstream to downstream order. The menu for each parameter appears in parentheses.

Pre 2D Parameters

The Source Image

The source image is, by default, a full raster 4 by 3 image. It is placed in the center of the source plane unless you move it with the ***Pre/Position*** controls.

Defocus (Defocus)



You can select up to two video sources to be defocused or softened. There are independent controls for softening vertically and horizontally, and for the luma or chroma parts of the image. Defocus is an option.

Front/Back (Input)

These flags select the video input source for the front and back of the source image. Any image manipulations apply simultaneously to the front and back source images.

Color Corrector (Color Crctr and Color Modify)



The color corrector option lets you modify the video chroma and luma several ways. You can work in either RGB or YUV space. The reTouch Color Corrector is an option.

Freeze (Input)

You can freeze the input video by setting flags to freeze a field of video or a frame. Because ***Freeze*** is downstream of the front / back video switch, selecting a freeze causes the current video to appear on both sides of the plane.

Invert (Input)



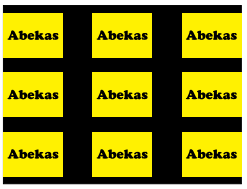
You can invert the input video for the front or back side horizontally, vertically, or both. You can also select different settings for the front and back sides. Use this to reorient a source after rotating it.

Mosaic (Multi)



The mosaic mode effectively reduces the input video's resolution, breaking it into blocks. You can control the horizontal and vertical size of the blocks.

Multipic (Multi)



In Multipic mode, DVEOUS copies the source image all over the source plane. You can adjust the distance between the copies. The current border color fills the gaps between the copies.

Crop (Border/Crop)



Although crops do not directly manipulate the source image, the effect is apparent on the source plane. Crops mask the key signal, so it reveals a selectable amount of the source plane. By default, the system provides a key crop that is coincident with the normal 4 by 3 raster. In DVEOUS' numbering system, the left edge of the raster is –0.5000, right is +0.5000, top is +0.3750, and bottom is –0.3750 screen units. Note that you can set the crops inside the image to mask part of it. In

Video/Video mode, you can set the crops outside the image to reveal the border color and multipics (if enabled).

Border (Border/Crop)



You can add a border inside the source image. You can set the border width and move the border "window" with the joystick. A separate softkey lets you set the border color. You can also adjust the width for each side independently, and set the border softness. You can see that borders are downstream of crops when you apply a border to a cropped image.

Skew (2D Trans)



This control distorts the image by letting you control the corner angles. A normal image has 90 degree corners. The default skew value is 0.0000. You can think of skew as a type of rotation: a value of 0.2500 brings two adjacent corners one quarter of the way around the rectangle, where they meet the other corners and form a single (invisible) line. You can skew the image horizontally, vertically, or both.

Pre/Position Size (2D Trans)



These controls let you adjust the image's size and position upstream of the 3D transforms.

Aspect (2D Trans)



This lets you individually control the source image's horizontal and vertical size, making it other than the standard 4:3. This resizes the image while keeping its center point at the center of the source plane.

Warp (Warp)



Warp shapes apply to the source plane. DVEOUS combines the warp settings with the image's position information to create an altered plane for motion. To slide an image through a warp, you must go upstream to ***Pre/Position***. Moving a warped image, such as moving a circular shape around the screen, involves using one of the locate or ***Post/Position*** controls.

Local Source

Source Rotate (3D Trans)



This rotates the source plane in this order: Z, V, then H. The rotate setting lets you rotate the source plane (2D output) about the Z, V, and H axes (in that order). As the image rotates, it has true perspective, with the angles and sizes needed to give the appearance of rotation in 3D space. When the plane rotates past an edge-on point, the back image on the source plane becomes visible. When you rotate the plane, you rotate the plane's numerical framework as well. For example, if you rotate the plane 180 degrees, then try to move the image with ***Pre/Position***, a left position entry apparently moves the image right. With a slight rotation applied to the plane, moving the

image with ***Pre/Position*** H or V (depending on the rotation) slides the image closer to or further from you.

Source Axis (3D Trans)



This lets you move the axes of rotation on the source plane. By default (normal), the three axes (H, V, and Z) intersect at the center of the source plane. You can change the horizontal and vertical values to move the pivot point for the image. The Z axis is normally on the plane, relative to the H and V axes, but you can move it in front of or behind the plane. If you move the Z axis, you can make the image rotate toward or away from you in a barrel roll, or orbit.

Source Locate (3D Trans)



This control moves the source plane in 3D space. You can locate the plane horizontally, vertically, and on the Z axis (toward or away from you, giving the impression of a size change). The effect of moving the image in space is that it maintains the viewing perspective as it moves. If you rotate the image horizontally, then change the **H Loc** value, the image's angles change to maintain the perspective while the image moves. That is, the image edge that is closer appears to move further and faster than the image edge that is further away.

Moving the image away in space always seems to move the image toward the center of screen. This is consistent with the rules of three dimensions: the further away you get, the more you see around the focal object.

Local Target

The target parameters are a second set of 3D controls. In the analogy of multiple effects systems, the processed output of the source 3D system feeds the target 3D system. The numbering system is identical to the source 3D parameters. You can use target controls as additional tools to create complete rotations and hierarchical motion paths.

Rotation is an obvious application for additional 3D controls. If you use just one set of rotational parameters, you must use the predetermined order of plane rotation (Z, V, then H).

An identical set of rotations in target lets you achieve a different order of plane rotation, such as Z, H, then V. This uses the target vertical rotation, which is downstream from the source vertical or horizontal rotation.

Target parameters also let you reposition a previously moved or rotated image, leaving source 3D controls available to manipulate the image at a different location in space while maintaining correct perspective.

Target Rotate (3D Trans)



This takes the three-dimensionally manipulated source plane and rotates it about the second set of Z, V, and H axes, in that order.

Target Axis (3D Trans)



This control lets you move the rotation axes. By default (normal position), the three axes (H, V, and Z) intersect at the same place as the source axes: the center of the source plane. You can change the horizontal and vertical values to move the pivot point for the image.

A simple application of target axes, used with source axes, is setting an axis of rotation on either side of the image. This lets you rotate the image off either edge without having to create an extra keyframe to move the axis.

Target Locate (Local 3D)



This parameter moves the plane in 3D space. You can move the plane horizontally, vertically, and on the Z axis (toward or away from you, giving the impression of a size change). The effect of moving the image in space is that it maintains the perspective as it moves. If you use target **H Rot**, then change the target **H Loc** value, the image's angles change to maintain perspective as the image moves. That is, the image edge that is closer appears to move further and faster than the image edge that is further away.

Moving the image away in space always seems to move the image toward the center of screen. This is consistent with the rules of three dimensions: the further away you get, the more you see around the focal object. If you combine target and source parameters, note that applying a target **H Rot**, then a source locate, as described previously, results in the same apparent "slide" seen when moving a rotated image with 2D ***Pre/ Position***.

Global Source and Target

The global source and target controls are a another set of 3D parameters that are downstream from, yet operate much like, their local counterparts.

In the analogy of multiple effects systems, the processed output of the local 3D system feeds the global source / target 3D system. The numbering system is identical to the local 3D parameters.

A primary function of globals is to move and rotate solids such as cubes and slabs, but you can also use these controls with single channel effects.

Light Source(Light Source)



You can add lighting effects such as spots, floods, and bars to effects for added realism. Light source controls include position, color, and rotation. When moving the image with ***Post/Position***, the light sources move with it.

Post 2D Parameters

Perspective (2D Trans)



You can exaggerate or reduce the amount of perspective on the processed image to adjust the look of rotated planes. The default value is 0.3000.

Post/Position Zoom (2D Trans)



In the multiple effects system analogy, you can consider ***Post/Position* Zoom** as a simple 2D image mover that gets its input from the global effects system.

Post/Position* Zoom** is the last level of controls in the system. Use it after building an effect to position the image on the screen. Because ***Post/Position is the final image manipulator, you can also use it to bring an image that is well off screen back into view.

Section 4

Channel Menus

Overview

The menus discussed in this section affect individual channels. A fully loaded DVEOUS has four channels: 1A, 1B, 2A, and 2B. The Channel Select buttons select the active channel(s). The menus reflect the status of the active channel, and any changes you make in the menus affect the active channel.

> **NOTE: If the global channel is the only active channel, making changes in the channel menus affects only channel 1A.**

If more than one channel is active, the menus reflect the "master" channel, but changes you make in the menus affect all active (selected) channels. For example, both channels 1A and 1B are active, with channel 1A designated as the master. Channel 1B has a .25 Z rotate value. Channel 1A has a .5 Z rotate value. Since 1A is the master channel, the menu shows a .5 Z rotate value. Increasing the rotation value maintains the relationship of the two channels, and rotates them as a single unit. As a result, channel 1A always has .25 more rotation on it than 1B. Note that entering an absolute value with the keypad gives both channels identical rotations.

Hold a Channel Select button for half a second to designate it as the master. Double pressing a Channel Select button selects it as the master channel, and deactivates the other channels. You can toggle any other channel on and off after designating the master. See the discussion on channel configurations in Section 2 –

Getting Started for information on configuring DVEOUS channels. Also see that section for discussions on keypad operations and screen units.

The following discussions deal with only one parameter at a time. See Section 3 – Transforms for more details on how parameters interact with each other.

2D Trans Menu

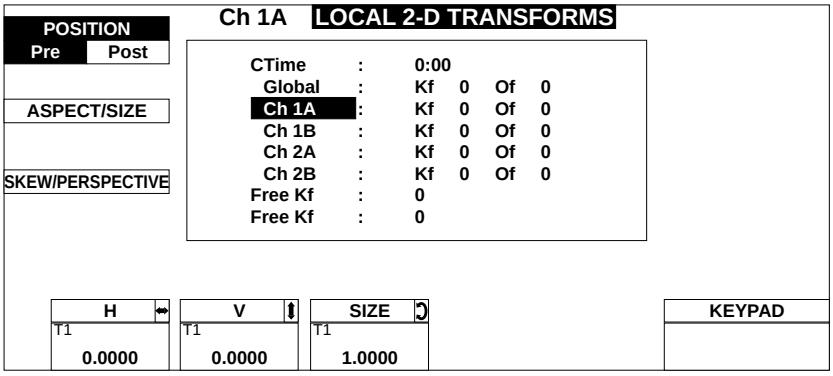
Press the **2D TRANS** menu button to bring up this menu. Here you can skew the image, change its aspect ratio, adjust the amount of perspective visible in a channel, and move the image and its perspective vanishing point. This is useful as an image "re-positioner" you can use after applying rotation and perspective.

Position

This control is similar to "target" and "source" in the Abekas A53-D, A51+, and A57. You can position the image in 2D space either upstream of all 3D transformations (***Pre***) or downstream of all 3D transformations (***Post***). The softknob labels change depending on the current mode (***Post*** or ***Pre***).

Pre

These controls position the image "upstream" of the 3D transformations, i.e., before any 3D movement of the source or target planes.

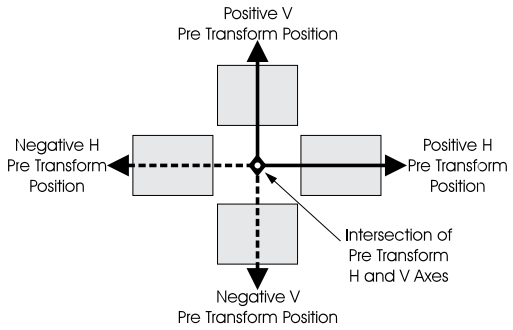


The 2D Trans Menu

H

Moves the image along the source plane's pre transform horizontal axis. Moving the image in this mode moves it away from the axes' intersection.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)



V

Moves the image along the source plane's pre transform vertical axis. Moving the image in this mode moves it away from the axes' intersection.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

Size

Changes the size of the image on the source plane. A value of 0.0000 causes the image to disappear; a value of 1 is default (full raster); a value larger than 1 makes the image larger than normal. You can think of these values as percentages: 0.5000 is 50% of full size in both the H and V directions, 1.2500 is 125% of full size in both the H and V directions, and so on. The same softknob, with the same values, appears under the ***Aspect/Size*** softkey.

Note that the 3D locate controls (source or target) move the entire plane with the image on it, so are not affected by the 2D size of the image.

Default: 1.0000
Range: 0 - 99.9999
Align: Nearest multiple of .1250

Post

These controls position the image "downstream" of all the 3D transformations. Using the **Zoom** setting to move the image alters its apparent perspective. See the discussion of the ***Skew/Perspective*** softkey for more information on perspective.

H

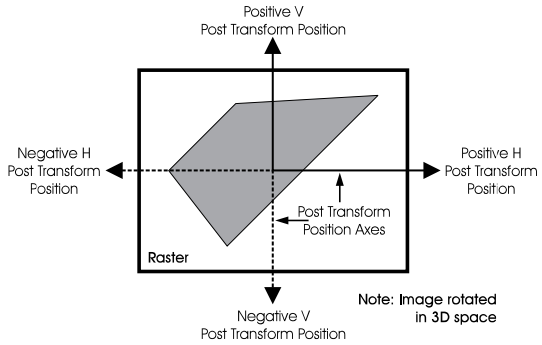
Moves the image horizontally, relative to the raster, no matter what local or global rotations have been applied.

Default: 0.0000
Range: +/-99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

V

Moves the image vertically, relative to the raster, no matter what local or global rotations have been applied.

Default: 0.0000
Range: +/-99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)



Zoom

Simulates the effect of a camera zoom lens. Changing the zoom value does not affect the image's true size, nor the distance between the eye (viewing) point and the image. Instead, the image only seems larger and closer with values greater than 1.0000. A 0.0000 value zooms the image out to infinity, where it is not visible at all.

Default: 1.0000
Range: 0 - 99.9999
Align: Nearest multiple of .1250

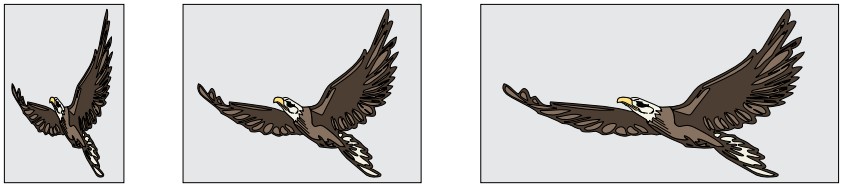
Aspect/Size

This softkey lets you alter the image's aspect ratio by providing independent H and V size controls. The normal aspect ratio of the television image is 4:3 or 1:0.75. Changing the aspect ratio distorts the input video.

H Aspect

Compresses or expands the image along its (pre transform) horizontal axis. The normal value is 1.0000. Smaller values compress the image, larger ones expand it.

Default: 1.0000
Range: 0.0500 - 99.9999
Align: Nearest multiple of .1250



H Aspect < 1 Normal H Aspect > 1

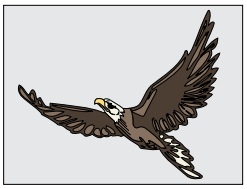
V Aspect

Compresses or expands the image along its (pre transform) vertical axis. The normal value is 0.7500. Smaller values compress the image, larger ones expand it.

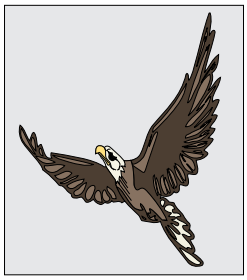
Default: 0.7500
Range: 0.0400 - 99.9999
Align: Nearest multiple of .1250



V Aspect < .75



Normal



V Aspect > .75

Size

Changes the size of the image on the plane. A value of 0.0000 causes the image to disappear; a value of 1.0000 is default (full raster). You can think of these values as percentages: 0.5000 is 50% of full size in both the H and V directions, 1.2500 is 125% of full size in both the H and V directions, and so on. This control is a duplicate of the ***Position/Pre*** **Size** control.

Default: 1.0000
Range: 0 - 99.9999
Align: Nearest multiple of .1250

Skew/Perspective

The normal image is a 4x3 rectangle: each corner is a 90 degree angle. Changing the corner angles by skewing them creates a parallelogram. You can think of skew as a type of rotation: a value of 0.2500 brings two adjacent corners one quarter of the way around the rectangle, where they meet the other corners and form a single (invisible) line. A value of .5000 effectively inverts the image, since the corners have moved halfway around from their original position.

H Skew

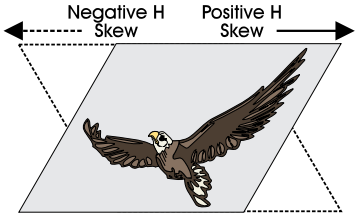
Skews the image along its (pre transform) horizontal axis. Positive values skew the top of the image to the right, negative values to the left.

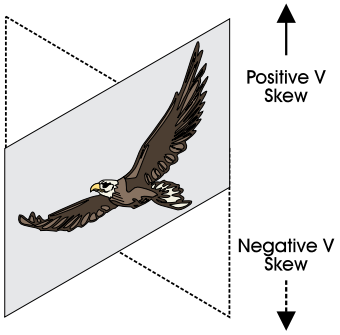
Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250

V Skew

Skews the image along its (pre transform) vertical axis. Positive values skew the right side of the image up, negative values down.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250



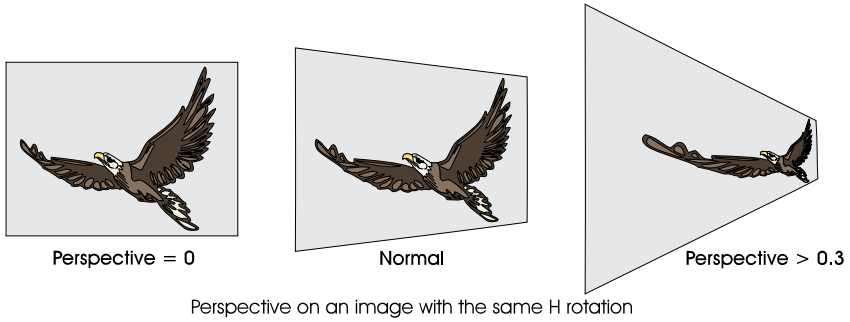


Perspcv

Perspective is the apparent depth given to a rotated two-dimensional image to make it appear as though it were in true three-dimensional space, and thus is not visible until you rotate the image. Perspective makes the closer edges of the image appear longer than the farther edges. The visible difference between the near and far edges depends on where the image is in 3D space, its rotation, and the perspective value. The optically correct default value is 0.3000. Smaller values make the perspective less pronounced; a value of 0 shows no visible difference between the near and far edges, no matter how much the image is rotated. Larger numbers exaggerate the perspective: the greater difference between the near and far edges makes the image look as though it stretches farther off into the distance.

Note that the post transform **Zoom** control affects the perspective of a rotated image, no matter which space you rotated it in. If you resize the transformed image with **Zoom**, you can multiply the default perspective value (0.3000) by the new **Zoom** value and enter the result in the **Perspcv** softknob to give the zoomed image normal perspective.

Default: 0.3000
Range: 0 - 6.5000
Align: Nearest multiple of .1250



Perspective on an image with the same H rotation

3D Transforms

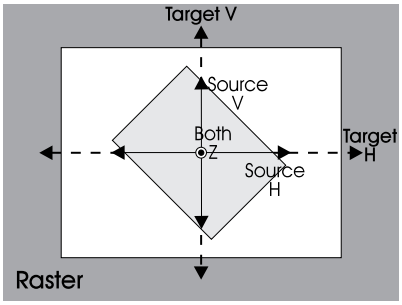
Source and Target Space

DVEOUS lets you transform images in 3D space. You can rotate, locate, and size images in both "source" and "target" space. All rotations use an axis point, which you can move in either space, and view by pressing the **CURSOR** button.

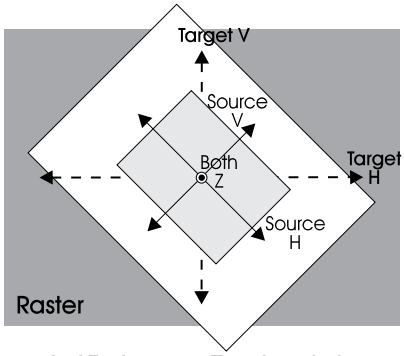
The transformations you can use can apply to either the source or target space. Before using these controls, it is important to understand how these spaces affect the image and each other.

- **Source Space**

  Manipulations in source space are relative to the axes of the source plane. Any H, V, or Z controls move the image plane, but not the axes, regardless of any rotations applied. You can think of the source axes as "locked" to the source plane, but not to the image. Also, you can think of source space as "nested" inside target space.



A 45 degree Z axis rotate in source space.



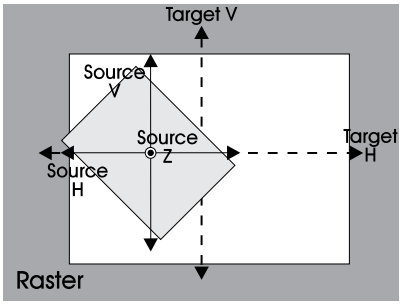
A 45 degree Z axis rotate in target space.

- **Target Space**

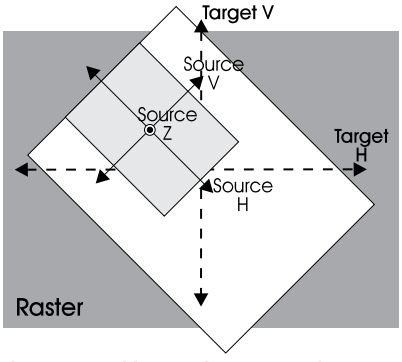
  Manipulations in target space are relative to the global source axes. Any H, V, or Z controls move the image relative to the global settings. If the global settings are at default, moves in target space are relative to the raster.

The figures show rotations in both spaces. Note that although these rotations look the same, they are different. Adding more transformations makes this difference more apparent. Rotating the image in source space does not affect either the source or target locates. However, rotating an image in target space effectively rotates the source space axes, and so directly affects source locates and rotates. Target locates are not affected in this case.

Section 3 – Transforms has more detailed discussions on the hierarchy of the transform spaces and how they interact.



A source H locate on an image rotated in source space.



A source H locate on an image rotated in target space.

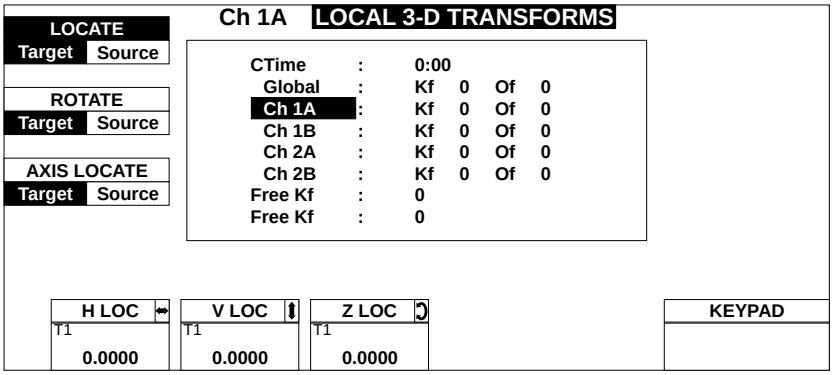
3D Trans Menu

Press the **3D TRANS** menu button to bring up the menu shown below. The menu's softkeys are ***Locate***, ***Rotate***, and ***Axis***. Each has H, V, and Z softknobs.

Locate

The ***Locate*** softkey lets you move the image along its axes in 3D space. Pressing the ***Locate*** softkey enables locations in either target or source space. Toggle the softkey to select ***Source*** or ***Target***. The dark highlight indicates the selected space. All source locates move the source plane. All target locates move the target plane.

All locates have true perspective, unless you alter the **Perspcv** setting in the 2D Trans menu (default = 0.3000).



The 3D Trans Menu

H Loc

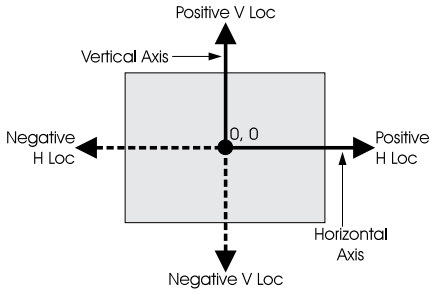
Moves the image along the horizontal axis. Positive values move the image to the right; negative values move the image to the left.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

V Loc

Moves the image along the vertical axis. Positive values move the image up; negative values move the image down.

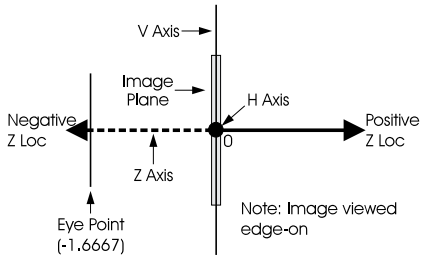
Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)



Z Loc

Moves the image relative to the eye (viewing) point. The default (full raster) value for Z is 0.0000. Positive values move the image away, making it appear smaller. Negative values move the image closer, making it appear larger. With a –1.6667 value, the image disappears because it reached the eye point, and is "behind you" in 3D space.

Default: 0.0000
Range: + / -99.9999
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)



Rotate

The ***Rotate*** softkey lets you spin the plane and the image on it about the three axes. These settings use fractions; for example, two and one quarter turns is 2.2500. You can find the numeric values for precise rotation by dividing the needed degree of rotation by 360. For example, a 33 degree rotation is 33/360=0.0917; 45 degrees is 45/360=0.1250, or one-eighth of a complete rotation.

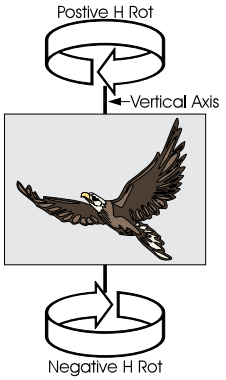
Pressing the ***Rotate*** softkey enables rotations in either target or source space. Toggle the softkey to select ***Source*** or ***Target***. The dark highlight indicates the selected space. All source rotates rotate the source plane. All target rotates rotate the target plane.

All rotates have true perspective, unless you alter the **Perspcv** setting in the 2D Trans menu (default = 0.3000).

H Rot

Rotates the image about the vertical axis. Positive values move the right edge away from you; negative values move the left edge away.

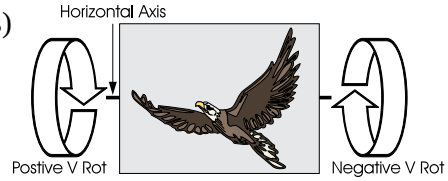
Default:	0.0000
Range:	+/- 99.9999
Align:	Nearest multiple of .1250 (45 degrees)



V Rot

Rotates the image about the horizontal axis. Positive values move the top edge away from you; negative values move the bottom edge away.

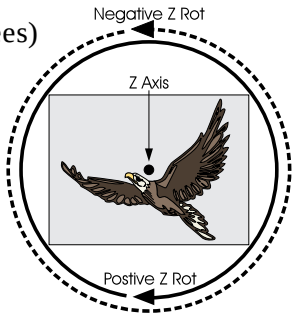
Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (45 degrees)



Z Rot

Rotates the image about the Z axis. Positive values rotate clockwise; negative values rotate counterclockwise.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (45 degrees)

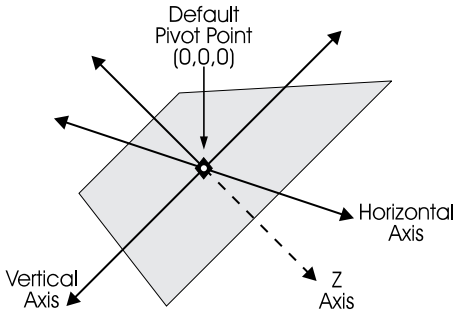


Axis Locate

Use this softkey to set the center of rotation for the image. The center of rotation is the single point at the intersection of the H, V, and Z axes. The H, V, and Z axes are perpendicular to each other, and you can use them to move their intersection (the "pivot point" for the image) in 3D space.

You can move the image's pivot point in either source or target space. The dark highlight indicates the selected space. Moving the source axis moves the pivot point on the source plane. Moving the target axis moves the pivot point on the target plane.

Moving the pivot point lets you rotate the image about its corner, or create swinging door effects, for example. Move the pivot point on the Z axis and use H and V rotates to make the image "orbit" the pivot point.

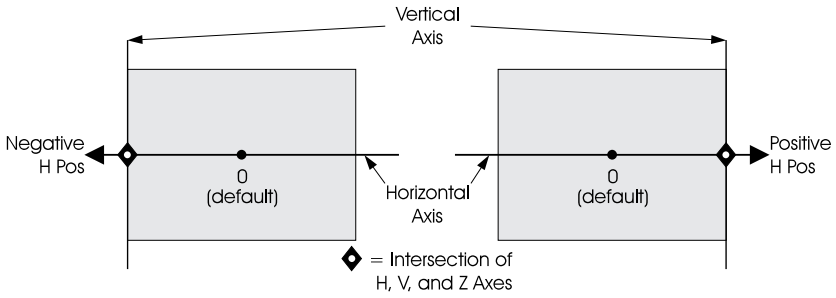


Enable the **CURSOR** button in the Graphics area of the Control Panel to bring up a cursor that indicates the pivot point's current location. Each channel's cursors and ID have a unique color for easy identification. See Section 3 – Transforms for more details on the cursor display.

H Pos

Moves the pivot point along the horizontal axis. Positive values move the pivot point right; negative values move it left.

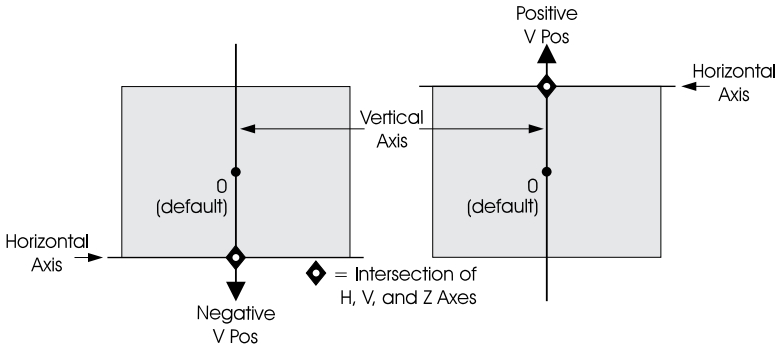
Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)



V Pos

Moves the pivot point along the vertical axis. Positive values move the pivot point up; negative values move it down.

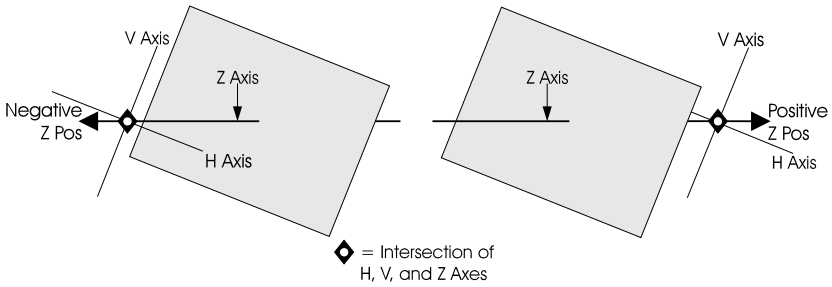
Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)



Z Pos

Moves the pivot point along the Z axis. Positive values move the pivot point behind the image; negative values move it in front of the image. Moving the pivot point along the Z axis causes horizontal and vertical rotations to move the image in an "orbit" about the pivot point.

Default: 0.0000
Range: + / - 99.9999
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)



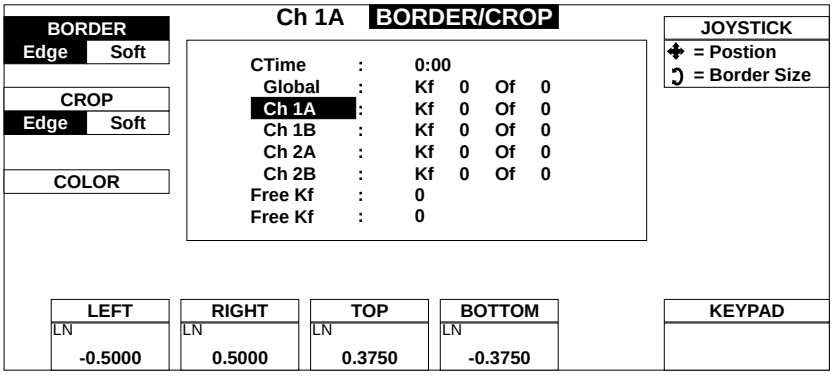
Border/Crop Menu

Press the **BORDER/CROP** menu button to bring up this menu. Here you can add an internal border to the image, and adjust the border's size and color. This menu also lets you crop all four sides of the picture independently or simultaneously. Border and cropped image edges also have variable softness.

Borders and crops are "upstream" of all other image manipulations. This means that, no matter what the image size, location, rotation, skew, etc., borders and crops always apply to the image edges. And, since crops are upstream of borders, borders always apply to cropped image edges.

Border

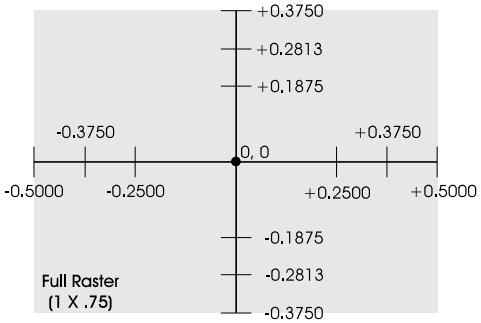
You can think of the border as having two edges. The outside one is fixed to the image edge. You can move the inside edge to size the border. The default border values place the inside border edge in the same place as the outside border edge. This means the border is always "on," but with no width, it is not visible.



The Border/Crop Menu

In Video/Video mode, you can set the crops outside the image edges. The border color appears in the gap between the image edges and the cropped edges. The result is an outside (of the image) border.

Note that the values for borders and crops are relative to a full raster image. 0,0 is at the center of the raster; a left or right value of -0.5000 is at the image's left edge; a .3750 top or bottom value is at the bottom of the image, etc.



Examples of Screen Positions

Because the border affects the video signal, you cannot independently add a border to, or use the **Soft** setting with, the key (B) channel in Video/Key mode.

Edge

To apply a border to one or more edges of the image, toggle the ***Border*** softkey to select ***Edge***. You can use the softknobs to adjust each side of the border independently, or apply the same border size equally to all four edges by twisting the joystick. Twist the joystick clockwise to increase the border width on all four sides. Twisting it counter-clockwise decreases the border width on all four sides. After adding width to the border, you can move it relative to the image by moving the joystick vertically (to move the top and bottom border edges at the same time) and horizontally (to move the right and left border edges at the same time). To adjust one border edge at a time,

hold its keypad softkey (**A**, **B**, **C**, or **D**) and use the joystick. Note that you can hold two softkeys at once and use the joystick to adjust a border corner.

Left
Moves the left border edge relative to the left edge of the image.

Default: -0.5000
Range: + / - 0.5000
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)

Right
Moves the right border edge relative to the right edge of the image.

Default: 0.5000
Range: + / - 0.5000
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)

Top
Moves the top border edge relative to the top edge of the image.

Default: 0.3750
Range: + / - 0.3750
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)

Bottom
Moves the bottom border edge relative to the bottom edge of the image.

Default: -0.3750
Range: + / - 0.3750
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)

Soft

Toggle the ***Border*** softkey to select ***Soft*** to adjust the border softness. This control affects only the inside border edge. Note that since the border is always "on," increasing softness makes it visible on the image, even if the border has no width.

Softness

Adjusts the softness of the border's inside edge. The default, 0, gives a hard edge.

Default: 0.00
Range: 0 - 100.00
Align: Nearest multiple of 12.50

Crop

Edge

To crop one or more edges of the image, toggle the ***Crop*** softkey to select ***Edge***. You can use the softknobs to crop each side of the image independently, or crop all four edges equally by turning the joystick. Twist the joystick clockwise to crop inward on all four sides. Twisting it counter-clockwise crops outward on all four sides. After cropping the image, you can move the crop relative to the image by moving the joystick vertically (to move the top and bottom crops at the same time) and horizontally (to move the right and left crops at the same time). To adjust one crop edge at a time, hold its keypad softkey (**A**, **B**, **C**, or **D**) and use the joystick. Note that you can hold two softkeys at once and use the joystick to adjust a crop corner.

The default crop values define the normal raster edges. The total range of cropping is from the opposite raster edge to the full raster. You can use crops to create any aspect ratio for the image. For example, you can create a 1:1 height to width ratio. Since twisting the joystick equally affects all the cropped edges, you can keep that aspect ratio while enlarging or decreasing the overall size of the hole cutter.

This control does not crop the image itself; it affects the key signal. In Video / Video mode, you can set the crops outside the image edges. The border color appears in the gap between the image edges and the cropped edges.

Because this control affects the key signal, you cannot independently crop or soften the edges of the video (A) channel in Video / Key mode.

Left
Crops the left edge of the image.

Default: -0.5000
Range: + / - 99.9999
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)

Right
Crops the right edge of the image.

Default: 0.5000
Range: + / - 99.9999
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)

Top
Crops the top edge of the image.

Default: 0.3750
Range: + / - 99.9999
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)

Bottom
Crops the bottom edge of the image.

Default: -0.3750
Range: + / - 99.9999
Align: Nearest multiple of .1250 (1 / 8 of a screen unit)

Soft

To soften one or more edges of the image, toggle the ***Crop*** softkey to select ***Soft***. You can use the softknobs to soften each side of the image independently, or soften all four edges equally by turning the joystick. Twist the joystick clockwise to increase the softness on all four sides. Twisting it counter-clockwise decreases the softness on all four sides. Move the joystick vertically to adjust the softness on the image's top and bottom edges. Move it horizontally to adjust the softness on the image's right and left edges. To adjust one edge at a time, hold its keypad softkey (**A**, **B**, **C**, or **D**) and use the joystick. Note that you can also hold more than one softkey at a time and use the joystick.

Note that this softens the image edges even if you have not cropped it.

Because this control affects the key signal, you cannot independently soften the edges of the video (A) channel in Video / Key mode. Also, you cannot independently control the softness on each edge when in Video / Key mode. In this mode, there is a single softness control.

Left

Softens the left edge of the image.

Default: 0.00
Range: + / - 1.00
Align: Nearest multiple of .25

Right

Softens the right edge of the image.

Default: 0.00
Range: + / - 1.00
Align: Nearest multiple of .25

Top
Softens the top edge of the image.

Default: 0.00
Range: +/- 1.00
Align: Nearest multiple of .25

Bottom
Softens the bottom edge of the image.

Default: 0.00
Range: +/- 1.00
Align: Nearest multiple of .25

Color
Press the ***Color*** softkey to adjust the border color.

Lum
Sets the luminance for the border color. 0 is no luminance (black), 100 is full luminance (white).

Default: 0
Range: 0 - 100
Align: Nearest multiple of 12

Sat
Sets the saturation for the border color. 0 is no saturation, 100 is fully saturated.

Default: 0
Range: 0 - 100
Align: Nearest multiple of 12

Hue

Sets the color for the border, in degrees around the color wheel. 0 is blue, 45 is magenta, 90 is red, and so on.

Default: 0.0
Range: + / - 720.0
Align: Nearest multiple of 45.0

Opacity

Sets the border color opacity. 100 is fully opaque, 0 is fully transparent.

Default: 0
Range: 0 - 100
Align: Nearest multiple of 12

Color Correction

Overview

The optional DVEOUS' reTouch™ Color Corrector gives you independent color correction for YUV or GBR (also known as RGB) components. There are two menus for controlling the Color Corrector option: the Color Corrector menu includes gain, offset, gamma, knee, and proc amp functions; the Color Modify menu controls include luminance and chrominance invert, luminance tinting, and solarizing.

Video in its simplest and purest form consists of three primary color components (red, green, and blue) that are combined to create a color image. Typically, video cameras, graphics and paint devices, and traditional analog color correctors have individual red, green, and blue adjustments. These controls are the most intuitive and easiest to understand.

However, DVEOUS is a component digital video device, and component digital video does not use red, green, and blue components directly. This format's components are noted as YUV, or Y, B-Y, R-Y, or Y, P_b, P_r, or Y, C_b, C_r. The first, Y, is a luminance component: it carries the video signal's brightness information. The two color difference components are noted as U and V, B-Y and R-Y, P_b and P_r, or C_b and C_r. Technically, some of these terms are more accurate than others. But that aside, the two color difference components, combined, carry the video signal's color (chrominance) information. This format appears as YUV in the Color Corrector and Color Modify menus.

There are four independent color correctors, one for each DVE channel. All color corrector adjustments are pre transform: they apply to the image before it enters a DVE channel for manipulation. Any input source to the DVE can be color corrected: any of the 12 video inputs, the SuperMatte generator, a texture pattern, or a defocused image. You can color correct the image in any channel using either GBR or YUV controls. You will probably find that the GBR mode is more intuitive to use than the YUV mode. However, since GBR color space is more restricted than YUV color space, there may be times when you need to work in the YUV mode.

DVEOUS' Color Corrector works in two stages. In the YUV mode, the first stage processes the video in this format without transcoding. In the GBR mode, the first stage upsamples normal 4:2:2 YUV to 4:4:4 YUV to double the chrominance resolution in preparation for GBR conversion. It then digitally transcodes this signal to 4:4:4 GBR, and uses this format for all processing including the gain, offset, gamma, knee, solarize, and invert gain functions.

The second color corrector stage transcodes the modified 4:4:4 GBR signal back to 4:4:4 YUV and downsamples to 4:2:2 YUV, then processes the luma tinting and proc amp functions. The color corrected and / or modified image then passes to its DVE channel for transformation.

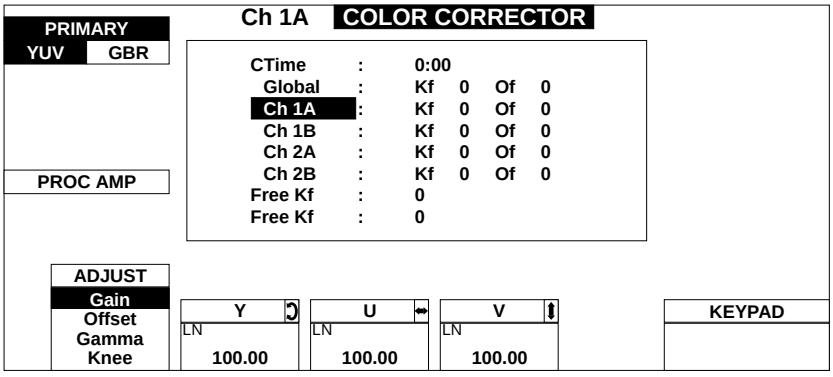
Color Corrector Menu

Press the **COLOR CRCTR** menu button to bring up the Color Corrector menu. If you do not have the reTouch Color Corrector option, you cannot access this menu.

> **NOTE: The Color Modify menu has an *Invert* softkey. When set to *On*, it disables all other color correction settings. If the video does not seem to be changing as you adjust the color correction settings, first check the Color Modify *Invert* softkey status.**

Primary

Toggle the ***Primary*** softkey to select a color space to work in: ***YUV*** or ***GBR***. Working in GBR (also known as RGB) color space may be more intuitive because you use the red, green, and blue components of video, much like camera white and black balance adjustments. Working in YUV color space mode is less straightforward. "Y" is the brightness or luminance component, "U" is the B-Y or blue/yellow chrominance component (with no luminance), and "V" is the R-Y or red/cyan chrominance component (with no luminance). What this means is that



The Color Corrector Menu

adjustments in GBR color space affect not only the color relationship, but also the luminance levels. YUV mode keeps the luminance separate from the color components, so you can adjust them independently.

Normally, you should use GBR mode; YUV mode is most useful when you want to apply color correction based on luminance levels, or to create black and white negatives with the ***Invert YUV*** controls in the Color Modify menu. Another advantage of the GBR mode is that the color corrector effectively limits the color-corrected video to legal GBR colors with a small outside margin.

Toggle the ***Primary*** softkey to ***GBR*** to adjust the individual green, blue, and red video components with the **White, Black**, **Gamma,** and **Knee** controls. With ***YUV*** selected, the controls are **Gain, Offset, Gamma,** and **Knee**.

Adjust
Use this softknob to select the **White/Gain**, **Black/Offset**, **Gamma**, or **Knee** control. Each control affects the individual components as follows:

White/Gain
The **White** or **Gain** control increases or decreases the component's overall level relative to the others.

Default: 100.00
Range: 0.10 - 199.86
Align: Nearest multiple of 25

Black/Offset

The **Black** or **Offset** control provides a black or null offset for each component. In GBR mode, it lets you control the dark portions of the image without affecting the bright portions; in YUV mode, it acts as a pedestal offset, which changes all brightness levels equally.

Default: 0.00
Range: + / - 50.00
Align: Nearest multiple of 12.50

Gamma

Gamma is a contrast adjustment that lets you bring out more detail in a component. A **Gamma** setting of less than 1 "stretches" the darker portions and "compresses" the lighter portions of an image; a **Gamma** setting of greater than 1 "stretches" the lighter portions and "compresses" the darker portions. Use the **Knee** control to set the dividing point that determines which portions are stretched and which compressed.

Default: 1.00
Range: 0.10 - 2.50
Align: Nearest multiple of 0.30

Knee

Knee sets the dividing point that determines which portions the **Gamma** setting stretches and which it compresses. The best way to see **Gamma** and **Knee** adjustments is to input a ramp test signal and adjust each softknob. If you are not familiar with **Gamma** adjustments, checking the output on a waveform monitor can help you better understand how these controls affect the image.

Default: 25.00
Range: 10.00 - 50.00
Align: Nearest multiple of 5.00

Proc Amp

This softkey accesses controls that work much like a processing amplifier or VTR time-base corrector. All ***Proc Amp*** adjustments are downstream of the main color corrector settings.

Hue

This control adjusts the image's overall chroma phase or hue.

Default: 0.0
Range: + / - 720.0
Align: Nearest multiple of 45.0

Sat

This control adjusts the image's overall chrominance saturation.

Default: 100.00
Range: 0.00 - 200.00
Align: Nearest multiple of 25.00

Gain

This control increases or decreases the image's overall luminance level.

Default: 100.00
Range: 0.00 - 199.86
Align: Nearest multiple of 25.00

Offset

This control provides a pedestal level or black offset for the image.

Default: 0.00
Range: + / - 50.00
Align: Nearest multiple of 12.50

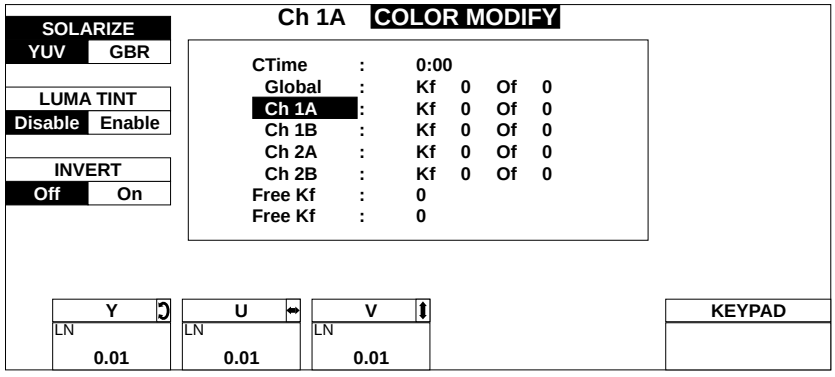
Color Modify Menu

Press the **COLOR MODIFY** menu button to bring up the Color Modify menu. This menu lets you add special-effect type color correction: solarizing, luma tinting, and chrominance and luminance inverting. If you do not have the reTouch Color Corrector option, you cannot access this menu.

Solarize

This softkey lets you adjust the number of quantizing levels in the individual video components. In the ***YUV*** mode, you can solarize the individual **Y**, **U**, or **V** components with their softknobs. In the ***GBR*** mode, you can solarize the individual green, red, and blue components with the **G**, **B**, and **R** softknobs. Solarizing the B-Y or U, and R-Y or V, components (which together make up the chrominance signal) is also known as "posterizing."

Default: 0.01
Range: 0.01 - 5.12
Align: Nearest multiple of 0.64



The Color Modify Menu

Luma Tint

Toggle this softkey to ***Enable*** to apply a color tint to the image based on its luminance value. You can apply tint to the black, gray, or white areas of the image, or any combination. Each has independent **Sat** and **Hue** softknobs. Like the proc amp adjustments, all luma tint settings are downstream of the main color corrector adjustments.

All/Black/Mid/White

The **All** setting applies the settings in the other softknobs to the entire image, regardless of different luminance levels. With the **Black** adjustments active, the controls apply to luminance levels below about 45 percent; the darker the level, the greater the effect. With the **Mid** adjustments active, the controls apply to luminance levels between about 20 percent and 85 percent, with the greatest effect at about 50 percent. With the **White** adjustments active, the controls apply to luminance levels above about 60 percent; the brighter the level, the greater the effect.

Sat

This control determines the saturation of the tint color added to the image.

Default: 0.00
Range: 0.00 - 200.00
Align: Nearest multiple of 25.00

Hue

This control determines the hue of the tint color added to the image.

Default: 0.0
Range: +/- 720.0
Align: Nearest multiple of 45.0

Proc Sat

This control adjusts the saturation level of the original image before tinting. It is the same as the ***Proc Amp*** **Sat** control in the Color Corrector menu.

Default: 100.00
Range: 0.00 - 200.00
Align: Nearest multiple of 25.00

Invert

Use this softkey to adjust the gain of the components, centered around the component's 50 percent level. This lets you create a negative of the original image by swapping dark areas for bright, and vice versa, for all three components. Positive values give a positive image, with reduced contrast below 100.00. Negative values give a negative image; -100.00 creates a full contrast negative. The softknobs let you invert the individual component's gain.

Default: 100.00
Range: + / - 100.00
Align: Nearest multiple of 25.00

Corner Pinning Menu

Corner pinning lets you "pick up" and "paste" any corner of an image without moving the other corners. This means you can "tack" a compressed image in a (four-cornered) position that does not conform to the standard 4x3 television image.

Consider a wide shot of a highway. On the side of the highway is a billboard. You want to put different video in the billboard. Because of the camera angle, the billboard is at an angle that is difficult for an effects system to match manually. You might use a paint system, filling the board with green, and do a chroma key. The new video's perspective probably does not match the billboard's perspective. Because it is a chroma key, the new video is cut in with a mask rather than compressed to fit, and some of the new video is cut away and lost.

With corner pinning, you can pick up each corner of the new video and place it on individual corners of the billboard. In just a few minutes, the new video is in place perfectly, the perspective is correct, and all the new video is in the shot.

Corner pinning changes the 2D Trans ***Aspect*** and ***Skew*** and 3D Trans ***Target Locate*** and ***Rotate*** settings as you manipulate the image. The advantage of using target to do corner pinning is that you can then use the 3D Trans menu's ***Source Locate*** and ***Rotate*** softkeys to manipulate the image without disturbing the shape as created. Because target is downstream of source, the source parameters work as you expect them to. When you enable the ***Corner Pin*** softkey, the values in the softknobs reflect the corners' positions relative to the raster, as set in the 3D Trans and 2D Trans menus.

> **NOTE: Using global transforms on a corner-pinned image is not supported, and may have unexpected results.**

Bring up this menu by pressing the **CORNER PIN** menu button. Here you can control the corner pinning and autocube functions.

Corner Pin

Select the ***Corner Pin*** softkey to enable the corner pinning controls.

Corners

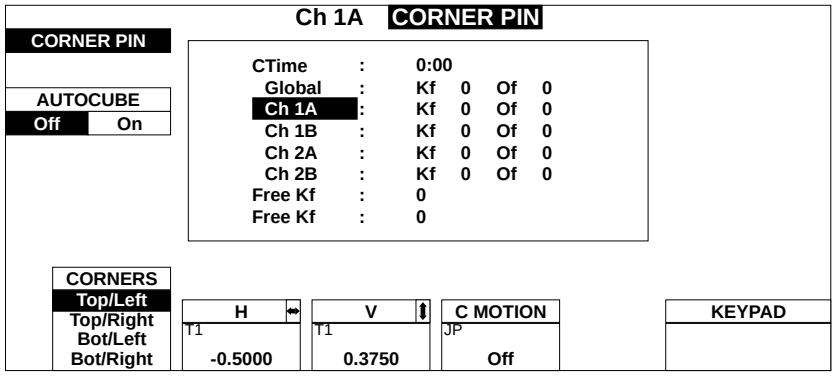
Use this softknob to select the corner you want to pin. Note that the H and V values reflect the corner's current position relative to the raster.

H

Moves the selected corner horizontally, relative to the center of the screen (0). Negative numbers move the corner left, positive numbers move it right.

V

Moves the selected corner vertically, relative to the center of the screen (0). Negative numbers move the corner down, positive numbers move it up.



The Corner Pin Menu

C Motion

Corner pinning uses the 2D Trans ***Aspect*** and ***Skew*** and 3D Trans ***Target Locate*** and ***Rotate*** parameters. Set the **C Motion** softknob to **On** to force these parameters to track together between keyframes. Setting it to **Off** may cause unexpected image movement between keyframes, because the parameters involved may not necessarily track together.

Corner pinning is most often used to create static shapes or effects that move without transformations. You can use frame-by-frame editing or transitions with the jump motion type selected for corner pinned material. For example, say you want to pin an image onto a moving background shape, such as a moving truck. In this example, you probably need to use frame-by-frame editing, unless someone did some clever work with truck / camera movement. The chances of an effects device exactly matching the motion of another image are very remote. Because the motions of the two moving images (the truck and the effect) are not identical, they look "disconnected" and the effect may not be realistic. The only way around this is frame-by-frame (or field-by-field) editing. Cue up the first frame of the truck, pin the image to it, record the frame, cue up the next frame, and so on. This way, each frame has the new video "locked" onto it, making the scene much more realistic.

Autocube

Toggle the ***Autocube*** softkey ***On*** to enable the autocube function. This lets you build certain solids (those with directly opposed faces, notably slabs and cubes), with only three edit passes on a single channel. When you create a solid, you need determine only one face of an opposing pair (e.g., the front / back pair). DVEOUS programs the opposite one automatically.

Input Menu

Press the **INPUT** button to bring up this menu. Here you can select the source for the active channel, and invert, freeze, and blur the source. Freezes have a variable strobe cycle.

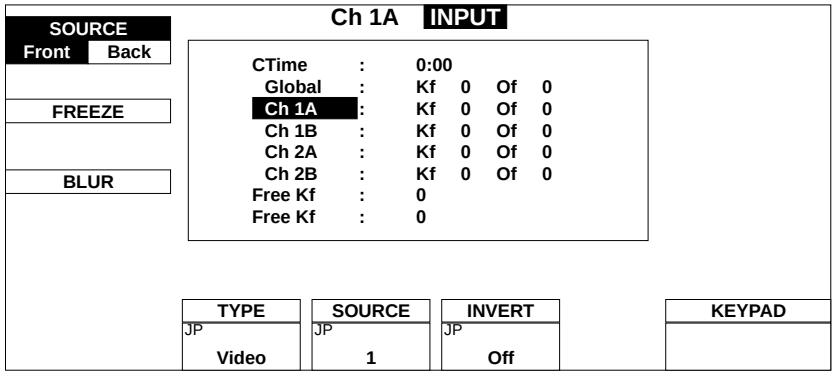
Source

Toggle this softkey to select the source for the ***Front*** or ***Back*** side of the active channel. You see the back side source whenever the image rotates past "edge-on" (0.2500) on the H or V axes. The softknobs for each side are identical.

Type

Use this softknob to select a source for the front or back of the active channel:

Video – this is an external video input. The **Source** softknob lets you select one of the twelve physical inputs. You may not have all these inputs available if your system does not have additional input modules installed; four inputs are standard.



The Input Menu

SuperMatte – this is the SuperMatte generator. A separate menu lets you select the colors and patterns for the SuperMatte output.
Pattern – this is the Pattern Framestore. You can load video test patterns and texture patterns in this framestore in the Texture menu.
Defocus A and **B** – these are the two outputs of the (optional) Defocus module. You can select the video to be defocused in the Defocus menu.
Aux – this only appears if DVEOUS is controlling a switcher Aux Bus. The **Source** softknob lets you select the Aux Bus source.

Source
Use this softknob to select the physical input for a **Video** source type. The softknob scrolls from 1 - 12, although you may not have all these inputs available if your system does not have additional input modules installed; four inputs are standard. With the **Aux** type selected, this softknob selects the Aux Bus source.

Invert
Use this softknob to reverse the source image left-to-right, top-to-bottom, or both. **Off** is the default: the source image is not inverted. **H** inverts the source image horizontally. **V** inverts the image vertically. **H+V** inverts the image both horizontally and vertically.

> **NOTE: DVEOUS automatically inverts the back source horizontally to simulate the effect of viewing the source from behind. To reorient the back source, select H invert for it.**

Freeze

Use the ***Freeze*** softkey to freeze or strobe the source image. The **Mode** softknob determines whether the image is frozen as a field or frame. You can set the freeze to create a stop motion (strobe) effect with the **Strobe** softknob.

Note that the freezes you program here are keyframe attributes, and you can use them as part of an effect. The **FREEZE** buttons in the Control Panel On-Air button group are not keyframe attributes, and their status is not saved as part of an effect.

Mode

Use this softknob to select whether the freeze mode is **Off** (the source is live video), or the frozen video is field 1 only, field 2 only, or a full frame. For input video with motion, select **Fld 1** or **Fld 2** to eliminate inter-field flicker. To capture a still image with full vertical resolution, use the **Frm** setting.

Strobe

The **Strobe** softknob lets you freeze the image indefinitely (**Infinity**), or create a strobe effect. For a strobe effect, select the freeze duration with the **Strobe** softknob. The range is 0 - 254 frames. This sets the number of frames DVEOUS holds the image before grabbing the next incoming frame (or field, depending on the **Mode** setting). For example, with a frame freeze set to strobe every 10 frames, DVEOUS grabs a freeze and holds it for 10 frames, then grabs a new freeze and holds it for another 10 frames, and so on.

Note that if you set the **Strobe** softknob to anything other than **Infinity**, any freeze you enable uses the **Strobe** setting. This applies whether you use the **FREEZE** buttons in the On-Air button group or the **Mode** softknob to freeze the image.

Blur

Use this softkey to slightly blur or soften the source video for the currently selected channel. This control uses the standard video bandwidth filtering to blur the image. It is a standard feature and is not a function of the wide range Defocus option.

H

This softknob blurs the image horizontally.

Default: 0
Range: 0 - 100

V

This softknob blurs the image vertically.

Default: 0
Range: 0 - 100

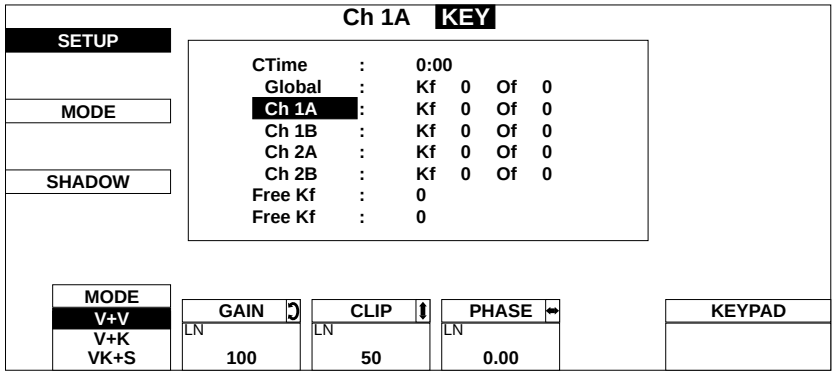
Key Menu

The Key menu lets you configure DVEOUS to process two independent video channels, one video channel with independent key channel processing, or one video/key channel with independent SuperShadow channel processing. You can also adjust the key channel and shadow settings in this menu. Press the **KEY** menu button to bring up this menu.

Setup

Mode

Each DVE board (maximum two per system) has two processing channels: the video channel (A) and the twin channel (B). The B channel can independently process a video signal, a key signal, or a drop shadow. This softknob selects the mode for the B channel, but the A channel actually retains this information, which you can use as a keyframe attribute. The channel configurations are as follows:



The Key Menu

V+V – Video / Video mode: the DVE board independently processes two video sources. You can separately adjust all transform, warp, and lighting effects on each video channel. The DVE processor internally generates the key signal associated with each channel, which is full screen "white" with adjustable opacity and edge softness.

V+K – Video / Key mode: the DVE board independently processes one video and one key source. All transforms are available to the key signal independently from the video. You also have clip, gain, and horizontal phase controls for the key (B) channel.

VK+S – Video-Key / Shadow mode: the DVE board derives a full bandwidth drop shadow from the key input. It processes the video and key together in the A channel, with independent control of the shadow in the B channel. You have clip, gain, and horizontal phase controls for the key portion of the A channel, and color and opacity adjustments for the shadow (B) channel.

Gain

This softknob adjusts the key edge sharpness. The setting is in percentages, where 100(%) is a linear key. This setting does not apply in Video / Video mode. Note that it does, however, affect the both the key and the shadow in Video-Key / Shadow mode.

Default: 100
Range: 0 - 799
Align: Nearest multiple of 100

Clip

This softknob adjusts the luminance level in the key signal above which the foreground or key fill video becomes visible over the background video. This setting does not apply in Video / Video mode. Note that it does, however, affect the both the key and the shadow in Video-Key / Shadow mode.

Default: 50
Range: 0 - 100
Align: Nearest multiple of 12

Phase

This softknob horizontally offsets the input key signal relative to the video, in 1 / 64 pixel increments. This setting does not apply in Video / Video mode. Note that it does, however, affect the both the key and the shadow in Video-Key / Shadow mode.

Default: 0.00
Range: + / - 8.00 pixels
Align: Nearest multiple of 1.33

Mode

The softknobs under the ***Mode*** softkey do not appear in Video / Video mode, as both channels are forced to a full white key signal.

Key

Shadow

These softknobs select the source for the key and shadow channels. In Video / Key mode, the **Key** softknob controls the key (B) channel only. In Video-Key / Shadow mode, the **Key** softknob is for the key portion of the A channel, and the **Shadow** softknob is for the shadow (B) channel. Note that the **Shadow** softknob does not apply in Video / Key mode.

White – a full raster key signal (i.e., a white field) that matches the size of the transformed video.

Video – generates a key signal based on the luminance in the source selected for the B channel.
Inv Video – same as **Video**, except that it inverts the polarity of the generated key signal (i.e., black changes to white and white changes to black).

Use **Video** or **Inv Video** when you want to replace the rectangular key with a shape (for example, the key signal from a character generator). Normally, use **White** in the Video-Key / Shadow mode when you want to derive a shadow from the normal rectangular raster.

Shadow

Select this softkey to create a color and opacity for the drop shadow. This softkey only applies to Video-Key / Shadow mode, where DVEOUS creates a drop shadow based on the input key signal shape. You must move the drop shadow (B) channel before you can see it, because its default position is directly beneath the A channel. DVEOUS uses a dedicated color generator for the drop shadow.

Lum

This softknob sets the luminance or brightness of the shadow color. 0 is no luminance (black), 100 is full luminance (white).

Default: 0
Range: 0 - 100
Align: Nearest multiple of 12

Sat

This softknob sets the chrominance saturation of the shadow color. 0 is no saturation (monochrome), 100 is fully saturated.

Default: 0
Range: 0 - 100
Align: Nearest multiple of 12

Hue

This softknob sets the hue (tint) of the shadow. The values represent the hue angles on a vectorscope: 0 is near blue, 90 is near magenta, 180 is near yellow, and 270 is near green.

Default: 0.0
Range: + / - 720.0 (two vector rotations)
Align: Nearest multiple of 45

B Opac

This softknob sets the shadow opacity or transparency. 100 is fully opaque, 0 is fully transparent.

Default: 100
Range: 0 - 100
Align: Nearest multiple of 12

Light Sources

Overview

DVEOUS' light source modeling is part of the standard SurfaceFX feature. It simulates the effect of a fixed light source shining on the image as it moves in 3D space. The light source itself is never visible, but it adds reflections and / or shadows to the transformed image to enhance the illusion of an object moving in 3D space.

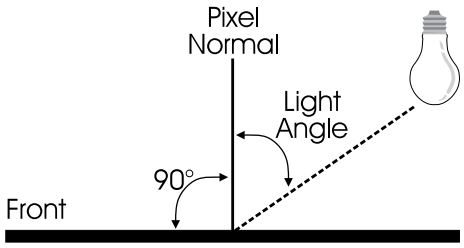
The light source has its own location in 3D space, and it does not move when you manipulate the image in local or global space. As the image moves, reflections and shadows move on it to imply the light source. However, the light source does have its own position controls, so you can move it independently of the image. This means you can fix the light source in one place as the image moves, fix the image in one place as the light source moves, or move both the image and the light source as part of an effect.

Positioning the Light Source

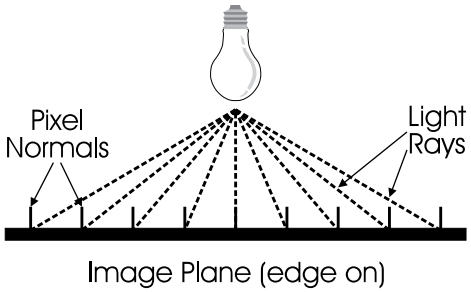
Like the image itself, you can locate the light source in three dimensions: H (horizontal), V (vertical), and Z (depth). The locate values are the same as the image transforms, including screen unit increments and Z depth values. The light source defaults to a location of 0(H), 0(V), 0(Z), which places it on the screen plane and in the center of the raster. Changing the H or V position values moves the light source horizontally or vertically; changing the Z position values moves the light source closer (negative values) or further (positive values) from the viewer.

Remember that the light source itself is never visible, it is only implied: only its effect on the image is visible. To produce the effect, DVEOUS looks at each point on the image and determines how much of the light source it would reflect if it were a real

object. These calculations involve measuring the angle at which a ray of light from the light source strikes the image and comparing it to the image "normal" at that point. The image "normal" is an imaginary line that intersects the image plane at right angles; "normal" is perpendicular to the image. Since each pixel in an image has its own normal, comparing each pixel's normal with the light source's location means the light source effect applies to the image on a pixel-by-pixel basis.



To visualize this, think of the light source as a single point of light, like a candle or light bulb. If the light source is close to the front of the image, its light rays match the normals of the pixels directly in front of it. However, the light rays that strike the areas of the image closer to the edges are slanted. This creates an angle between the light ray and the normals near the image's edges. DVEOUS uses this angle to calculate how much of the light source is visible for each pixel in the image.



Enable and view the light source for channel 1A as follows:

STEP 1: Press the **1A** button twice quickly to select channel 1A and deselect all other channels. Press **NORMAL — ENTER**, then **GLOBAL TRANS + CLEAR** to remove any transforms on channel 1A and the global channel.

STEP 2: Press the **3D TRANS** menu button and use the ***Locate*** softkey to highlight ***Source***. Turn the joystick handle, or use the **Z Loc** softknob, to move the image back.

STEP 3: Press the **LIGHT SOURCE** menu button. Use the ***Lights*** softkey to highlight ***High***. The light source's reflection appears at the center of the image, since the default light source position is at center screen.

STEP 4: Press the **3D TRANS** menu button again. Enable the ***Rotate*** softkey (with ***Source*** still highlighted) and rotate the image on all three axes to see the effect of light source on the image.

STEP 5: Press and hold **CLEAR** and press the ***Rotate*** softkey to set all source rotate values back to zero. This clears the rotations, but does not affect the image's location.

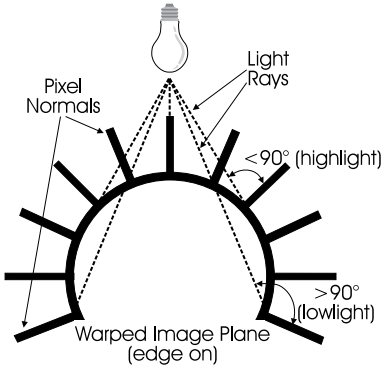
STEP 6: Press the **LIGHT SOURCE** menu button again. Press the ***Position*** softkey once, leaving ***Spot*** highlighted, to access the position controls.

STEP 7: Use the joystick to move the light source in all three dimensions and note how it interacts with the image. The reflection is visible in the image when the light source's Z position value is less than the image's Z locate value, because the light source is "in front of" the image. When the light source's Z position value is greater than the image's Z locate value, the light source is not visible, because it is "behind" the image.

Highlights and Lowlights

At an angle of zero degrees, the light source shines directly on the pixels in that area of the image, and the reflection from the image is the strongest. This light source reflection is the "highlight." As the angle increases, the reflection from the image becomes weaker, until, at an angle of 90 degrees, no light at all falls on the pixels in that area of the image, so there is no reflection.

With DVEOUS, it is possible to have the difference between the angle of the light source and the pixel normals greater than 90 degrees. In the real world, an angle of greater than 90 degrees creates a shadow, and this happens with the lighting model also. If the normal is more than 90 degrees from the light source for a pixel, DVEOUS creates a "lowlight," or shadow, and adds it to that pixel. The lowlight applies to areas of the image that are hidden from the light source, and adds a shadow to the image where the angle between the light source and the pixel normals is greater than 90 degrees.



A pixel with a difference of 180 degrees has the most intense lowlight applied to it.

By moving the light source in the Z dimension (toward or away from the viewer), you can place the light source "behind" the image. In this case, the image's pixel normals point "away" from

the light source, and are at an angle of more than 90 degrees from the light source. The result is that the lowlight appears in the image, since this area of the image is hidden from the light source and is in shadow.

Note that it is possible to place the light source directly "on" the image plane. In this case, because the pixel normals are all at exactly 90 degrees from the light source, the image shows neither highlight nor lowlight; the light source, in effect, does not exist.

You can use the highlight or the lowlight on the image, or both. You can also use any color for either light. The default colors are white for the highlight and black for the lowlight, to simulate natural reflections and shadows. In another mode, described in more detail later, you can increase or decrease the image's gain where the highlight or lowlight appears, instead of adding a color to the image, for a more subtle lighting effect.

This example shows the effect of a highlight and a lowlight on the image:

STEP 1: Use steps 1 and 2 in the previous example to position the image.

STEP 2: Press the **LIGHT SOURCE** menu button to access the Light Source menu. Toggle the ***Lights*** softkey to highlight ***Both***. The light source's reflection appears at the center of the image, since the default light source position is at center screen.

STEP 3: Press the ***Position*** softkey once, leaving ***Spot*** highlighted, to access the position controls. Use the joystick to change the light source's Z position and note how it interacts with the image. Again, the reflection is visible in the image when the light source's Z position value is less than the image's Z locate value, because the light source is "in front of" the image. This reflection is the highlight.

When the light source's Z position value is greater than the image's Z locate value, the light source is "behind" the image, and the highlight disappears and the lowlight appears. The lowlight indicates the shadow created by the light source, because the light source is more than 90 degrees away from the image "normal."

STEP 4: Move the light source in front of the image again, but place it at one corner, very close to the image. The highlight is very small when the light source is close to the image.

STEP 5: Press the **3D TRANS** menu button and use the ***Rotate*** softkey to highlight ***Source***. Rotate the image horizontally or vertically with the joystick. Note that, if the light source is close enough, the image actually passes through the light source, revealing the lowlight.

STEP 6: The highlight color defaults to white to simulate a reflection, and the lowlight color defaults to black to simulate a shadow. There are independent color settings for each light. Toggle the ***Color*** softkey to ***High*** to access the highlight's the color and opacity. Toggle ***Color*** to ***Low*** to adjust the lowlight's color and opacity.

Light Source Types

Each channel can use one of three light source types: spot, bar, or flood. Each type creates a reflection (the highlight) and a shadow (the lowlight, if used) on the image, based on its position in 3D space. As you move the image in space, the resulting highlights and lowlights simulate a realistic, fixed light source. The bar light type also has controls for horizontal, vertical, and Z rotation so you can orient the light source to match the image.

Spot

The spot light type simulates a single-point light source located near the image, as with a light bulb or flashlight. With a spot light source, the reflection is a single point of light that gradually falls off, or gets less bright, in areas of the image that are further away from the point of reflected light. You can position the spot source anywhere in 3D space.

Bar

The bar light type simulates a single-line light source located near the image, as with a fluorescent or neon tube. With a bar light source, the reflection is a single line of light that gradually falls off, or gets less bright, in areas of the image that are further away from the line of reflected light. Besides controlling the bar light position in 3D space, you can also rotate it about its center.

Flood

The flood light type simulates a large light source, much like the sun, where the rays are all parallel. With a flood light source, no single point on the image shows the reflected light source any more or less than any other point on the image; it is distributed equally across the entire image. Like the spot and bar light types, you can locate a flood light anywhere in 3D space. Its most effective use, however, involves moving it horizontally and

vertically, if needed, but leaving its Z position at default (0), or using a slightly negative value to move it closer to the viewer.

> **HINT: When first positioning a light source, it is helpful to select the spot light source type. It is easier to visualize the position of a single point in 3D space than the position of an entire line or plane of light. Also, since the spot light source shows the center of rotation for the bar light, you can move the source first using spot, then change to the bar light type; all three light source types share the position values.**

Focusing the Light Source

The **Focus** control lets you limit the range of the light source by "focusing" it on an area of the image. A truly natural-looking point light source, such as a candle or light bulb, has a focus value of 1.0000. In the lighting model, however, this value lets light from the source shine equally on nearly the entire image unless the light source is very close to the image.

By artificially focusing the light source, DVEOUS can simulate a spot light and a bar light more readily than would otherwise be possible. For this reason, the **Focus** setting has a 0.0500 default value. This lets you easily differentiate between a spot light, a bar light, and a flood light type. Values below 0.0500 tend to give unnaturally harsh edges. Values above 0.0500 give more natural lighting effects, though the location of the light source is less obvious.

You can also use **Focus** to give the image a glossy or shiny appearance. A low **Focus** value gives the reflection sharply defined edges, to simulate a very shiny, highly reflective surface. Higher **Focus** values spread out the highlight, simulating a less reflective surface.

Light Source Modes

Two light modes define how the light source affects the image: specular and diffuse. Both modes modify the image's brightness and saturation, much like a true light source. **Specular** mode simulates the reflection from a glossy (highly reflective) surface, and **Diffuse** mode simulates the reflection from a dull (non reflective) surface.

Specular

This mode adds a highlight by superimposing a matte color onto the image in areas that reflect the light source. The same is true for the lowlight, but it applies only to areas that are hidden from the light source. Much like a glossy photograph, the image has "glare" where the light source is reflected from it. If you use the lowlight, the image is also darker in areas where the image is hidden from the light source. You can independently control the brightness, saturation, and hue of the highlight (glare) color and the lowlight (shadow) color.

Diffuse

This mode is visually more subtle than Specular mode. It increases or decreases the image's brightness and/or color saturation (by changing the luminance and/or chrominance gain) where the light source is reflected from it, without adding "glare." This simulates a flat, non reflective surface, such as a piece of colored paper or cloth. You can independently control the levels in the image, in both the area of reflection and the ambient light level of the area surrounding the reflection.

Maximum and Minimum Gain

In diffuse mode, there are two modes that determine the gain (brightness and saturation) of the area of the image that is lit by the light source and how it relates to the unlit area. The normal setting is maximum gain, which lets you adjust the lit area of the

image to be either lighter or darker than the surrounding, or ambient, area. It also makes both the lit and ambient areas brighter or darker than their original values. As you adjust the image's ambient (unlit) area, the brightness of the lit area tracks the brightness of the ambient area to maintain their contrast.

The other setting is minimum gain, which limits the brightness of the lit and unlit areas. The brightness of the lit area can never exceed the brightness of the ambient area, and the brightness of the entire image cannot exceed its original brightness.

Multiple Light Sources

Each DVE channel has its own independent light source. However, if you do not need the light source for one channel (for example, when the B channel is a key or shadow channel), you can "borrow" that light source and apply it to the other channel of the pair. This lets two light sources fall on one channel.

To acquire another channel's light source, its "own" channel must first release it. For example, to use channel 1B's light source on channel 1A, you must release it on channel 1B. When you do this, channel 1B no longer shows the light source effect, because it now applies to channel 1A. Any light source can only be applied to one channel at a time. Also, you can apply the light source from channel A to channel B, and at the same time apply the channel B light source to channel A. These modes are outlined more completely in the discussion of the Light Source menus later in this section.

To apply the same light source parameters to multiple channels, each channel must use its own light source. When you enable multiple channels, all light source adjustments apply to the active channels. The result looks like a common light source for all the

channels, even though they each use their own individual light sources for the effect.

This example shows the effect of two light sources on one image:

STEP 1: Use steps 1 and 2 in the previous example to position the image and turn on a light source.

STEP 2: Press the ***Position*** softkey once, leaving ***Spot*** highlighted, to access the position controls. Move the light source position to one corner of the image.

STEP 3: Press the ***Lights*** softkey and select **Both** with the **Source** softknob. This acquires channel 1B's light source, but it is not visible until you release it from channel 1B. DVEOUS prompts that channel B is using its own light source to remind you of this.

STEP 4: Press the **1B** button twice quickly to access the Light Source menu for channel 1B and deselect channel 1A.

STEP 5: Press the ***Lights*** softkey and toggle it to ***Both***. This turns on the light source highlight and lowlight for channel 1B.

STEP 6: Use the **Source** softknob to select **None**. This releases channel 1B's light source, and makes it visible on channel 1A.

> **NOTE: If you select Ch B Light or Both on channel 1B, the light source reverts to channel 1B, and it disappears from the image on channel 1A. When you want to use two light sources on one image, be sure that the Source setting for the channel that is releasing its light source is None.**

STEP 7: Press the ***Position*** softkey and move the 1B light source. Note that, though the 1B light source is visible on channel 1A, the menu controls for it are still accessed by channel 1B. This means that, to use another channel's light source for an effect, the channel's timeline must be included in the effect, even if the video from that channel is not otherwise used.

STEP 8: To simultaneously apply channel 1B's light source to channel 1A and apply 1A's light source to 1B, use the **Source** softknob to select **Ch B Light** on channel 1A and **Ch A Light** on channel 1B. This releases each channel's original light source and applies it to the other channel. Again, note that if either channel has its own light source or **Both** selected, the other channel cannot acquire the second light source.

Using a Light Source with Textures

As described in the section on the Texture menu, you must enable a light source to use textures. When you apply a texture to an image, it is not visible unless the image is lit by a light source.

The light model uses Z (depth) information derived from the image's position in 3D space. Modulating or changing the Z data slightly within the image gives the normally flat image surface depth and makes it appear three-dimensional. This is how textures work with light sources. Since a texture pattern is luminance (brightness) information used as Z (depth) data, DVEOUS uses the texture source's luminance information to modulate the depth data for the textured image. When you apply a light source to the image, any changes to the image's depth made by the texture information appear as exaggerated highlights or lowlights in the image. The result is the appearance of a surface texture. See the section on the Texture menu for more information on this feature.

Using a Light Source with UltraWarp

Many of DVEOUS' UltraWarp shapes let you add light sources (and / or textures) to give a realistic three-dimensional look. These shapes appear in the Warp menu with an asterisk (*), and include these categories:

- Page Turns (roll and flap, all views)
- Quad Page (roll and flap, all views)
- Spheres (transparent and opaque, both front and back views)
- Concentric shapes (swirl, 4-rings, and multi-rings)
- Ripples (circular and linear)
- Cylinders (vertical and horizontal)
- Fancy shapes (cylinders, page turns, and page rolls, both front and back views of each)
- Split shapes (mirrors and split)
- Miscellaneous shape (lens only)

Like textures, these warp shapes contain Z (depth) data that the lighting model uses to determine whether each pixel of the image is lit, in shadow, or unaffected. When you turn on a light source, DVEOUS calculates the warp shape's position relative to the light source and applies a highlight or lowlight to the image accordingly.

As described earlier in this section, the highlight applies when the light source strikes a pixel at less than 90 degrees to its "normal." The lowlight applies when a pixel's normal is more than 90 degrees from the light source. Since a warp shape can bend the image, each pixel's normal may be in a slightly different direction. With extreme bends, the normals in some areas of the image are less than 90 degrees, but normals in other areas may exceed 90 degrees from the light source angle. This creates highlights in some areas of the image and lowlights in others.

This is what gives the UltraWarp shapes a realistic three-dimensional appearance when used with a light source. By highlighting areas of the image that reflect the light source and shading areas that are hidden from the light source, the result is the illusion of a three-dimensionally warped image.

> **NOTE: The UltraWarp shapes (and most warp shapes) are created by two-dimensional processes, and the illusion of depth is destroyed if the image is rotated horizontally or vertically until the view is edge-on. For this reason, you should always use the warp rotate controls, where applicable, to rotate a warped image, not the 3D Trans menu source or target rotate controls.**

Apply a light source to an UltraWarp shape as follows:

STEP 1: Select a DVE channel by double pressing its Channel Select button (for example, **1A**). This also deselects any other channels.

STEP 2: Press the **WARP** menu button to access the Warp menu and press the ***Warp*** softkey. Do not toggle it ***On***.

STEP 3: Use the **Shape Category** softknob to select a category that has an asterisk (*) next to it.

STEP 4: Use the **[Category] Type** softknob to select a shape type from that category. If applicable, use the **[Type] View** softknob to select a view.

STEP 5: Turn the **Demo** softknob **On**, then immediately **Off** again. This applies preset warp parameters to the shape to make it visible, then returns the other transform parameters to their previous values. The selected warp shape appears on screen.

STEP 6: Press the **LIGHT SOURCE** menu button to access the Light Source menu. Press the ***Lights*** softkey and toggle it to ***Both***. The default light source position and type appear in the warped image.

STEP 7: To view the light source's effect on the warped image, you can either move the light source (press the ***Position*** softkey and move the joystick) or move the warped image (use the Warp menu to adjust the ***Modify*** and/or ***Position*** controls). Either way, the highlights and/or lowlights move on the image to simulate a light source shining on a three-dimensionally curved surface.

See the discussion on the Warp menu for more information on warps.

Light Source Menu

Press the **LIGHT SOURCE** menu button to bring up the Light Source menu. Here you can add light source effects to an image.

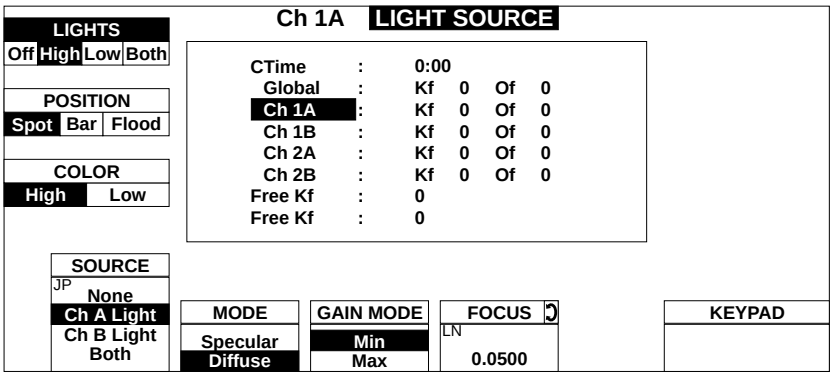
Lights

Toggle this softkey to enable a highlight (**High**), a lowlight (**Low**), or **Both** for the active channel(s). The **Off** setting disables the light source for the active channel(s).

Source

This softknob selects which light source(s) apply to which channel(s).

- Use **None** to release the light source for the active channel. This lets the other channel acquire this channel's light source.
- **Ch A Light** selects channel 1A's light source for the active channel. This is the default setting when channel 1A is active.
- **Ch B Light** selects channel 1B's light source for the active channel. This is the default setting when channel 1B is active.



The Light Source Menu

- **Both** applies both light sources to one channel. This is visible only if the other channel has released its light source by using **None** or the first channel's light source.

Mode

Use this softknob to select either **Specular** or **Diffuse** lighting. Specular lighting places a "glare" on the image, simulating a glossy or shiny image surface. The highlight and the lowlight each have their own color generator.

Diffuse lighting is a more subtle effect; instead of placing an extra "glare" on the image, it changes the image's luminance (brightness) and / or saturation (chrominance level) where the light source reflects from it. This simulates a flat, non reflective surface.

Gain Mode

This control only appears in **Diffuse** mode, and toggles between **Min** and **Max**. The default setting is **Max**, which lets you set the brightness and saturation of the areas of the image where the highlight and / or lowlight appear. There are separate gain controls for the highlight and the lowlight. You can also set the brightness and saturation of the ambient (unlit) areas of the image independently. As you adjust the ambient levels, the highlight and lowlight levels vary proportionally. There is only one set of ambient gain controls; they apply to both the highlight and the lowlight.

The **Min** setting limits the brightness and saturation of the highlight and / or lowlight in the image to be below the ambient (unlit) area of the image. It also limits the brightness and saturation of the ambient area of the image to below the original (unmodified) levels of the image.

Focus

This softknob controls the edge hardness for the reflection and/or shadow. The truly natural setting is a value of 1.0000. The default, however, is 0.0500, which lets you easily differentiate between a spot light, a bar light, and a flood light type. Values below 0.0500 tend to produce unnaturally harsh edges. Values above 0.0500 produce more natural lighting effects, though the location of the light source is less obvious. The higher the **Focus** value, the softer the edge of the reflected light on the image, and the greater the area of the image that is affected by the light source.

Default: 0.0500
Range: 0.0000 to 10.0000
Align: Nearest multiple of 1.2500

Position

This softkey selects the light source type and accesses the position controls. You can move the light source in 3D space with the softknobs or joystick. The bar light type also has controls for rotation. Light position parameters use the same screen unit values as other 3D transform parameters.

H Pos

This softknob moves the light source along the screen horizontal axis.

Default: 0.0000
Range: +/-99.9999
Align: Nearest multiple of .1250 (1/8 screen unit)

V Pos
This softknob moves the light source along the screen vertical axis.

Default: 0.0000
Range: +/-99.9999
Align: Nearest multiple of .1250 (1/8 screen unit)

Z Pos
This softknob moves the light source along the screen Z axis.

Default: 0.0000
Range: +/-99.9999
Align: Nearest multiple of .1250 (1/8 screen unit)

Adjust
This softknob only appears with the bar light type selected. It toggles the bar **Position** and **Rotation** controls. The **Position** controls are identical to those for the spot and flood light types. When you toggle this softknob to **Rotation**, the controls change to let you rotate the bar light source. Note that the spot light location is also the center of rotation for the bar light source.

H Rot
This softknob rotates the bar light horizontally around its center.

Default: 0.0000
Range: +/-99.9999
Align: Nearest multiple of .1250 (1/8 full rotation)

V Rot
This softknob rotates the bar light vertically around its center.

Default: 0.0000
Range: +/-99.9999
Align: Nearest multiple of .1250 (1/8 full rotation)

Z Rot

This softknob rotates the bar light around its center, about an axis that is perpendicular to the screen.

Default: 0.0000
Range: +/-99.9999
Align: Nearest multiple of .1250 (1/8 full rotation)

> **HINT: When positioning a light source, it is helpful to select the spot light source type. It is easier to visualize the position of a single point in 3D space than the position of a line or plane of light. Also, since the spot light source shows the center of rotation for the bar light, you can move the source first using spot, then change to the bar light type; all three light source types share the position values.**

Color

Toggle this softkey to access the controls for adjusting the highlight and lowlight colors or gains.

In specular light mode, these controls set the brightness, saturation, and hue of the highlight or lowlight color that is added to the image.

Lum

This softknob adjusts the luminance (brightness) level of the highlight or lowlight color.

Default: 100.00 (highlight) or 0.00 (lowlight)
Range: 0.00 to 100.00
Align: Nearest multiple of 12.50

Sat

This softknob adjusts the chrominance (saturation) level of the highlight or lowlight color.

Default: 0.00 (both highlight and lowlight)
Range: 0.00 to 100.00
Align: Nearest multiple of 12.50

Hue

This softknob adjusts the hue (tint) of the highlight or lowlight color.

Default: 0.00 (highlight) or 180.00 (lowlight)
Range: +/-720.00
Align: Nearest multiple of 45.00 (1/8 full vector rotation)

Opac

This softknob adjusts the opacity (transparency) of the highlight or lowlight. At a value of 100, the highlight or lowlight is completely opaque; at a value of 0, the highlight or lowlight is fully transparent.

Default: 100.00
Range: 0.00 to 100.00
Align: Nearest multiple of 12.50

In diffuse light mode, the following controls set the brightness and saturation of the areas of the image affected by the highlight or lowlight without actually adding a separate color. They also control the brightness and saturation of the unlit, or ambient, area of the image. There is one set of ambient controls that apply to both the highlight and the lowlight.

Y Gain

This softknob adjusts the brightness of the image where the highlight or lowlight appears. The number indicates the amount of additional gain added to the highlight or lowlight. For example, a 0.00 setting is no additional gain, a 50.00 setting increases the gain by 50 percent, and a -50.00 setting reduces the gain by 50 percent. In **Min Gain** mode, this level cannot exceed the **Amb Y Gain** setting.

Default: 50.00 (highlight) or -50.00 (lowlight)
Range: +/-100.00
Align: Nearest multiple of 25.00

C Gain

This softknob adjusts the saturation of the image where the highlight or lowlight appears. In **Min Gain** mode, this level cannot exceed the **Amb C Gain** setting.

Default: 50.00 (highlight) or -50.00 (lowlight)
Range: +/-100.00
Align: Nearest multiple of 25.00

Amb Y Gain

This softknob adjusts the image's brightness in areas not affected by the light source, i.e., the ambient brightness of the image. In **Min Gain** mode, this level cannot exceed the image's original luminance level.

Default: 0.00
Range: +/-100.00
Align: Nearest multiple of 25.00

Amb C Gain

This softknob adjusts the image's saturation in areas not affected by the light source, i.e., the ambient saturation of the image. In **Min Gain** mode, this level cannot exceed the image's original chrominance level.

Default: 0.00
Range: +/-100.00
Align: Nearest multiple of 25.00

Multi Menu

Press the **MULTI** menu button to bring up this menu. Here you can add mosaic and multiple picture effects, and adjust the motion detection for the image.

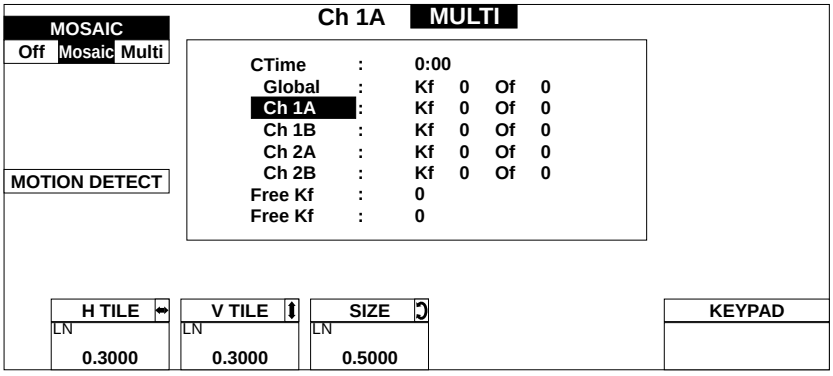
Function

Use this softkey to enable mosaics or the multiple picture mode. Note that you cannot use both modes at the same time.

Mosaic

Mosaic is a pixelization effect that modifies the image by repeating a pixel multiple times horizontally and / or vertically. The more a single pixel is repeated, the more input pixels are discarded, and the lower the image resolution. The result is a "tiled" image. The **H Tile** and **V Tile** softknobs set the tiles' aspect ratio.

> **NOTE: Increasing the mosaic tile size with crops set outside the image reveals the entire set of mosaic tiles, resulting in a changing image size. Normally, DVEOUS uses the crop window to mask this apparent size change.**



The Multi Menu

H Tile
This softknob sets the width of the mosaic tiles.

Default: 0.3000
Range: 0 - 99.9999
Align: Nearest multiple of 12.5000

V Tile
This softknob sets the height of the mosaic tiles.

Default: 0.3000
Range: 0 - 99.9999
Align: Nearest multiple of 12.5000

> **NOTE: The H Size and V Size settings are relative to a standard television image, so setting them to the same values results in tiles that have a 4:3 aspect ratio. To use square tiles, for example, set H Size to 0.7500, V Size to 1.0000.**

Size
This softknob sets the overall tile size while maintaining the aspect ratio set with the **H Size** and **V Size** softknobs. As you increase the **Size** setting, fewer tiles are visible in the image.

Default: 0.5000
Range: 0 - 99.9999
Align: Nearest multiple of 12.5000

Multi
This mode creates multiple, identical copies of the image on the source plane, letting you create filmstrip or video wall effects. In Video / Video mode, you can see parts of each copy inside the image edges with lower softknob values. With higher values, use the Border / Crop menu to set the crop values outside the image to see the copies. The current border color fills any gaps between the copies. In Video / Key or

Video-Key / Shadow mode, you must apply the multi mode to both the A and B channels to see copies. This lets you use the key as a "cookie cutter" to reveal parts of the video (A) channel. Note that if the A channel has the same transforms as the B channel, the multiple pictures are identical copies. If the transforms on the channels do not match, the video part of the multiple pictures do not either.

H Mult

This softknob copies the image along the horizontal axis. The copies begin on top of the original image, and move outward horizontally as you increase the **H Mult** value. The greater **H Mult** value, the farther apart the copies.

Default: 1.0000
Range: 0 - 3.5000
Align: Nearest multiple of 0.4375

V Mult

This softknob copies the image along the vertical axis. The copies begin on top of the original image, and move outward vertically as you increase the **V Mult** value. The greater **V Mult** value, the farther apart the copies.

Default: 1.0000
Range: 0 - 3.5000
Align: Nearest multiple of 0.4375

Motion Detect

Mot Dec

DVEOUS is a frame based digital effects system. This means that it can use a full frame of information when transforming the video to the size and position you define with the transform controls. Wherever the video has motion, for example, a car driving past in an otherwise stable shot, using the information from two consecutive fields results in visible banding artifacts. Because the actual video for the two fields is different, trying to make a single image out of them results in chaos. When DVEOUS uses field mode to transform moving video, it uses only a field of video information. This can result in some loss of image resolution.

Note that using DVEOUS to move the video, for example with 3D locate, is not considered motion in this sense; it is strictly the input video content (and moving border edges) that is of concern. Also note that motion in the image, and the motion detection setting, have no effect when the image is at unity size. Motion detection only applies when you reduce, expand, or move the image.

DVEOUS has a motion detector that examines the video pixel by pixel to determine how much motion it contains. It uses this information to switch between the optimal frame mode (used with static video) and the field mode (used when the video contains a lot of motion). It can also define settings between frame and field to deal with varying amounts of motion. In the moving car example, DVEOUS would use the frame mode on the static parts of the video, and field mode on the parts that contain motion, adapting the mode to the video.

The settings between frame and field represent a motion threshold. This sets how sensitive DVEOUS is to motion. Setting it to a low value (toward frame mode) causes DVEOUS to treat the video as though it has less motion than is really present, and can cause banding artifacts in the motion portions of the video. Setting to a high value (toward field mode) causes DVEOUS to treat the video as though it has more motion than is really present, and can cause the picture to lose some detail. The default setting is 9, which works well in almost all cases. Even with still video, this setting provides the best quality, because if the motion detector finds no motion, it enables frame mode automatically. An example of when forcing the frame mode would be useful is if the still input video has a lot of noise (if it is from an analog VTR, for example). DVEOUS can interpret noise as motion, which softens the picture more than necessary.

Default: 9
Range: Frame - 1 - 14 - Field
Align: None

Output Menu

Press the **OUTPUT** button to bring up this menu, where you can set the transparency and key priority of one channel relative to its twin. The A channel's keyframe memory retains these settings.

See the Combiner menu discussion in Section 5 – Global Menus for information on setting the priority and opacity of one DVE channel pair relative to the other pair (if installed), of the combined DVE channels relative to the Target Framestore (if installed), and of the combined DVE and TFS relative to the background.

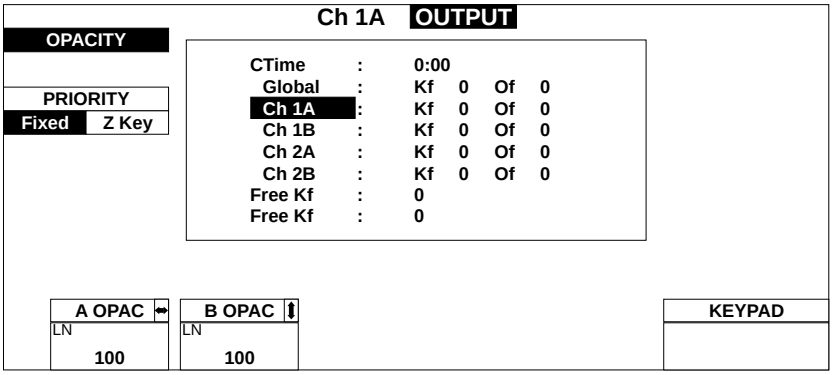
Opacity

These softknobs set the opacity for each channel. You can set one or both channels to be transparent, or fade them in or out during an effect.

A Opac

Sets the opacity for the A channel of the active pair.

Default: 100
Range: 0 (fully transparent) - 100 (fully opaque)



The Output Menu

B Opac

Sets the opacity for the B channel of the active pair.

Default: 100
Range: 0 (fully transparent) - 100 (fully opaque)

Priority

This softkey sets the priority type and related parameters.

Fixed

This priority type places one channel always "over" or "in front of" the other channel, no matter what its location in 3D space. The A channel is, by default, "over" the B channel. You can change this with the **XFade** (crossfade) softknob.

XFade

Use this softknob to exchange the priority of the A and B channels by crossfading. By default (0), the A channel is "over" or "in front of" the B channel. At a setting of 100, the B channel is completely "over" or "in front of" the A channel. Intermediate settings give a mix of the two channels where they overlap. This lets you dissolve or mix one channel through the other as part of an effect.

Z Key

In Z key mode, DVEOUS uses Z (depth) information to set the relative key priority of the two channels. The lower a channel's Z locate value, the closer it is to the viewer, and the higher its priority. The higher the channel's Z locate value, the further it is from the viewer, and the lower its priority. Also, if an image is rotated horizontally or vertically, part of the image is "closer" to the viewer, giving that part a higher priority. This means that if the two channels meet, overlap, or intersect at any point, their relative Z locate values determine which channel is "over" or "in front of" the other.

A Offset

Use this softknob to increase the Z priority of the A channel from its normal value without changing its position with Z locate, which also affects its size. An zero offset uses the normal Z locate priority. An increased offset value increases its priority, letting it appear "over" or "in front of" the B channel when it otherwise would not.

Default: 0.0000
Range: 0.0000 - 100.0000

B Offset

Use this softknob to increase the Z priority of the B channel from its normal value without changing its position with Z locate, which also affects its size. An zero offset uses the normal Z locate priority. An increased offset value increases its priority, letting it to appear "over" or "in front of" the A channel when it otherwise would not.

Default: 0.0000
Range: 0.0000 - 100.0000

Z Soft

This softknob controls the sharpness of the change in priority from one channel to the other: it lets you control the softness with which one channel intersects the other.

Default: 0
Range: 0 (soft edge) - 7 (hard edge)

Textures

Overview

Textures are a part of the SurfaceFX feature, and work with light sources to add the appearance of a textured surface to the image in any DVE channel. Textures work with both flat (planar) images and warped images. For example, you can create a textured sphere that moves with realistic lighting effects.

You can use any source available to DVEOUS to create a texture for an image. A source used to create a texture is a "texture source." Each DVE channel can have a different texture source. Also, since you can use live video for the texture source, the result can be a moving texture pattern. You can also use the Pattern Framestore as the texture source. There is one Pattern Framestore for the entire system, so each DVE channel has its own input freeze buffer for the texture and video inputs. This lets you load a pattern in the Pattern Framestore, freeze it on one DVE channel, then load another pattern and freeze it on another channel. You cannot route live video to the Pattern Framestore, only to each DVE channel's input freeze buffer.

How Textures Work

When you apply a texture to an image, DVEOUS derives the texture information from the luminance in the texture source and translates it into Z (depth) data. Where the luminance level in the texture source increases (gets brighter), the texture is "raised" above the image's average surface level. The light source sees this as a "peak" in the texture and applies a highlight to it, making it brighter relative to the surrounding image.

In the same way, where the luminance level in the texture source decreases (gets darker), the texture is "lower" than the image's average surface level. The light source sees this as a "dip" in the texture and applies a lowlight to it, darkening it relative to the surrounding image.

Note that the actual luminance level of the texture source is not as important as the contrast in the image. It is the change in luminance levels that gives the image its texture. Areas of the texture source that do not have contrasting luminance levels appear flat and two-dimensional when applied to the image, regardless of their absolute luminance level: completely black, completely white, or a shade of gray.

This is why surface textures are visible only when you apply a light source to the image. A light source uses pixel normals to generate highlights and lowlights in the image (see the Light Sources section for an explanation of "normals"). The texture information modifies the pixel normals in the image; it does not modify the image itself. This lets the light source feature give the impression of surface texture by applying light and shadow to the image in a way that realistically imitates the lighting and shading you would see if the surface of the image were truly textured.

Like a warp shape, you lose the illusion of a texture if you rotate the image and view it edge-on. Textures are strictly a visual impression made possible with a light source, although it is a powerful and realistic looking effect when used properly.

Applying a Texture

Add a texture to an image as follows:

STEP 1: Turn on the light source for a DVE channel. See the examples in the Light Sources section for more details on this.

STEP 2: Press the **TEXTURE** menu button and toggle the ***Main*** softkey to ***On***. This also brings up controls for selecting a texture source, input buffer freeze functions, and texture offset and gain settings. With a light source enabled and visible, the current texture source is visible in the image.

STEP 3: The texture source defaults to input 1. You can select any input installed in your system as the texture source, regardless of the main image source, with the **Source** softknob. Other available sources are the output of the Pattern Framestore (**Pattern**), the output of either Defocus module (**Defocus A** and **Defocus B**), and the **SuperMatte** generator.

STEP 4: To view a pattern from the Pattern Framestore, press the ***Load*** softkey. Use the **Pattern** softknob to select a texture pattern. (The first 14 patterns are video test signals that do not produce a recognizable texture pattern.) After selecting a pattern number, press ***Load*** again. It briefly highlights ***Confirm*** as it loads the selected pattern into the framestore.

STEP 5: Press the ***Main*** softkey again. To use different texture patterns in multiple channels, you must use the channel's input freeze buffer to store the texture source before selecting a new source for another channel. The **Freeze** softknob lets you select a live source (**Off**), or freeze a moving source as a single field (**Fld 1** or **Fld 2**), or freeze a still image as a full frame for maximum

vertical resolution (**Frm**). For best results, freeze a pattern from the Pattern Framestore as a full frame.

STEP 6: The **Offset** and **Gain** softknobs default to their best typical values. The **Offset** softknob controls the balance between the height and depth of the texture. Positive **Offset** values raise the average height of the texture relative to the image. Negative **Offset** values decrease the average height of the texture relative to the image. At the ends of the **Offset** range, the highest or lowest points of the texture are clipped off, or flattened out.

STEP 7: The **Gain** softknob controls the slope of the texture, much like the gain control in a keyer. The higher the **Gain** setting, the steeper, or sharper, the texture edges are, making the texture appear more exaggerated. Negative **Gain** settings invert the polarity of the texture, making former "high" spots in the texture "low," and vice versa. A **Gain** setting of zero "flattens out" the texture, effectively removing it from the image. Typically, a low **Gain** setting gives the most realistic-looking texture.
Also, you can toggle the ***Main*** softkey to ***Invert*** to change the polarity of the texture source.

STEP 8: Press the ***Crop*** softkey and toggle it to ***On*** to access the texture crop controls. Softknobs for the **Left**, **Right**, **Top**, and **Bottom** positions let you crop or mask the texture pattern inward from the outer edges of the image. You can use this to limit the texture to just part of the image. Toggling ***Crop*** to ***Invert*** lets the texture appear outside the cropped or masked area, instead of inside it.

Texture Menu

Press the **TEXTURE** menu button to bring up this menu.

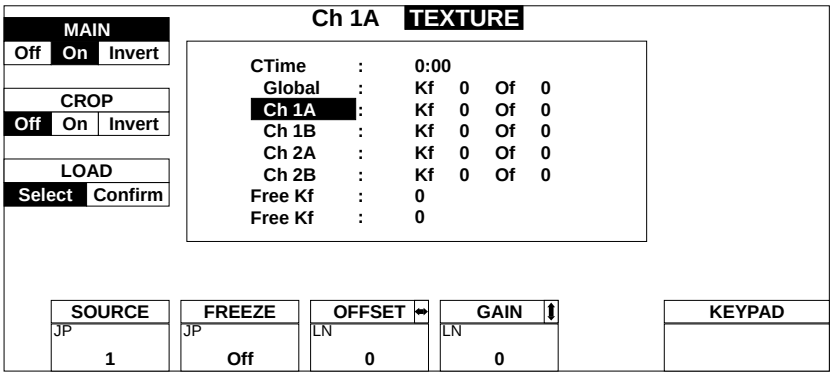
> **NOTE: You must enable a light source in the Light Source menu before you can see a texture applied to the image.**

Main

By default, textures are ***Off***. Toggle this softkey ***On*** to apply the selected texture to the active channel(s). Use ***Invert*** to invert the texture source's high/low polarity. Both modes have the same controls:

Source

Use this softknob to select the source for the texture pattern. **1 - 12** are the external inputs. You may have fewer inputs available if your system does not have additional, optional input modules (two modules, for a total of four inputs, are standard). **SuperMatte** selects the internal two color SuperMatte generator. **Pattern** selects the output of the Pattern Framestore. **Defocus A** and **Defocus B** select the outputs of the optional Defocus module. **Aux** only appears if DVEOUS is controlling a switcher Aux Bus output.



The Texture Menu

Freeze

Use this softknob to select whether the freeze buffer for that DVE channel's texture input is **Off** (for a live input), or frozen as field 1 only, field 2 only, or a full frame. To freeze a moving texture source, select **Fld 1** or **Fld 2** to eliminate interfield flicker. To capture a still texture source with full resolution, use the **Frm** setting.

Offset

This softknob changes the average surface height of the texture relative to the surface of the image. Positive numbers make the texture appear higher than the image surface; negative values make the texture appear lower than the image surface. At the extreme ends of the offset range, the highest or lowest points of the texture are flattened, or clipped.

Default: 0
Range: -128 to +127
Align: Nearest multiple of 32

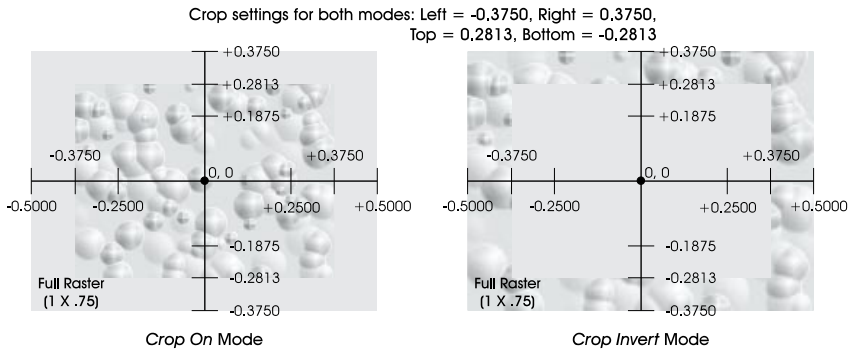
Gain

Use this softknob to increase or decrease the contrast between the highest and lowest points of the texture relief. Low positive values narrow the contrast range, and the result is a more subtle relief effect. Higher positive values increase the contrast range, and the result is a more exaggerated relief effect. A value of zero removes the texture by removing all relief; negative values invert the polarity of the texture source.

Default: 0
Range: -50 to +50
Align: Nearest multiple of 12.5 (1/8 full range)

Crop

You can crop, or mask, the input texture source to apply the texture in some areas of the image but not in others. Toggle this softkey to ***On*** to enable texture crops. In this mode, you can crop the texture from the outside in, with independent controls for each edge. You can also use the joystick to move the crop edges simultaneously. In ***Invert*** mode, you can unmask the texture from each side independently, or use the joystick to move the crop edges simultaneously. The softknobs for each mode are identical, and the default settings apply the texture across the full image in normal mode, or completely mask the texture in invert mode.



The Texture Crop Modes

Left
This softknob crops or masks the texture relative to the left edge of the image.

Default: -0.5000
Range: + / - 0.5000
Align: Nearest multiple of .1250 (1 / 8 screen unit)

Right
This softknob crops or masks the texture relative to the right edge of the image.

Default: 0.5000
Range: + / - 0.5000
Align: Nearest multiple of .1250 (1 / 8 screen unit)

Top
This softknob crops or masks the texture relative to the top edge of the image.

Default: 0.3750
Range: + / - 0.3750
Align: Nearest multiple of .1250 (1 / 8 screen unit)

Bottom
This softknob crops or masks the texture relative to the bottom edge of the image.

Default: -0.3750
Range: + / - 0.3750
Align: Nearest multiple of .1250 (1 / 8 screen unit)

Load

Use this softkey to load an internally generated pattern into the Pattern Framestore. It defaults to ***Select***. Use the **Pattern** softknob to select a video test pattern or texture pattern. When you press the ***Load*** softkey with ***Select*** highlighted, it briefly highlights ***Confirm*** as DVEOUS loads the pattern into the framestore.

As of this writing, the first pattern is black. The next 13 patterns are video test patterns (color bars, multiburst, etc.). The rest of the patterns are specifically for use as texture sources.

UltraWarp

Overview

The term "warp" describes the nonlinear transformation of an image. If we define a linear transformation as a two dimensional image attached to a flat plane that moves in three dimensional space, a nonlinear transformation bends or curves the plane that the image is on. It can also slice the plane into small segments and move those segments individually in different directions or at different rates. In either case, modifying the plane directly affects the image on the plane, and this modification is called a warp.

DVEOUS' UltraWarp package includes all the warp shapes from Abekas' previous generations of DVEs, plus several new ones, for a total of 62 shapes. (Individual shape numbers go up to 72; however, some intermediate numbers are not used due to redundancy.) Many of the new warp shapes work with the SurfaceFX package, which uses light sources to give these shapes a realistic three dimensional look. These shapes appear in the menu with an asterisk (*), and include page turns, spheres, ripples, cylinders, and concentric shapes such as swirls and rings.

The Warp menu has all the controls you need to select and create a warp shape. You can combine other DVEOUS parameters with warps when building effects.

The Warp Demo Mode

As with other transform parameters, the warp settings default to values that are the most linear. However, since a warp effect is by definition nonlinear, when you enable a warp shape with its default settings, it may not appear to affect the image.

Because of this, DVEOUS has a warp demo mode. When you enable this mode, it loads preset warp settings to let you see how the shape affects the image. Since each shape has its own values that result in the most visible effect, different preset values automatically apply to different shapes.

To view the warp shapes, press the **WARP** menu button to bring up the Warp menu. Set the **Demo** softknob to **On**. This turns warp mode on, and DVEOUS applies preset values to the warp controls to let you see the selected shape immediately. A tilde (~) appears next to the channel(s) in the center of the menu display to indicate that warp demo mode is active for the channel(s).

Demo mode is a special case, and there are some things you need to keep in mind when you use it:

- Turning demo mode on automatically turns on warps.
- In demo mode, DVEOUS temporarily ignores the channel transforms and displays an image reduced to 75 percent, centered on screen, with no rotations. However, if you insert or modify a keyframe in demo mode, the current parameter values in the transform menus apply to that keyframe, so that the keyframe does not save the way the image appears in the demo mode. It is a good idea to turn demo mode off before inserting or modifying keyframes.
- Turning demo mode off does not turn warp off. It applies the current (demo) warp settings to the normal, transformed image. This is an easy way to start when adding a warp shape

to an image. Leaving the Warp menu also turns demo mode off, with the same results.

- Selecting new shapes in demo mode loads new presets into all warp settings. You can adjust these settings (under the **Modify** and **Position** softkeys) to experiment with the shape. There are three ways to return to the shape's preset demo mode settings:
  - Turn demo mode off, then back on.
  - Select another shape, then the original one.
  - Press **Align — A** in the Warp menu.

To select a warp shape, first use the **Shape Category** softknob to highlight a category, or group, of warp shapes. You can then choose a particular shape with the **Type** softknob. Some shapes also let you select a front or back view, or both, with the **View** softknob. Note that the selected warp shape number always appears in the lower left corner of the Warp menu.

Applying a Warp Shape

Apply warp to an image as follows:

STEP 1: Select the channel you want to apply the warp to with the Channel Select buttons. Press the **WARP** menu button to bring up the Warp menu.

STEP 2: Toggle the ***Warp*** softkey ***On*** to enable the warp shape.

STEP 3: If you know the number of the warp shape, enter it in the numeric keypad and press the **A** keypad softkey. If you do not know the shape number, select a category with the **Shape Category** softknob, then select a shape name with the **Type** softknob.

STEP 4: If the **View** softknob appears, select the side of the warp shape you want to create: the **Front**, the **Back**, or **Both**.

STEP 5: Note the top of the Warp menu display. Whenever the Warp menu is current, the menu displays the word **WARP**, the shape category (**Basic**, **Twist**, **Linear**, etc.), and the selected type and view, if applicable. Also, the lower left corner of the menu display always shows the warp shape number.

> **NOTE: Selecting a shape does not necessarily impose that shape on the image if all warp parameters are at default. You must change the warp settings to something other than default before the warp shape is visible.**

STEP 6: Use the softknobs under the ***Modify*** and ***Position*** softkeys to manipulate the shape. You can use these controls alone or with other parameters to program the keyframes in your effect. Note that the ***Modify*** and ***Position*** parameters change depending on the currently selected shape.

STEP 7: After setting the warp controls, you can press the Quick Keyframes **INSERT NEXT** button to create a keyframe with these parameters.

STEP 8: Change a warp parameter, or a motion parameter, and press **INSERT NEXT** again to save another keyframe. When you press **RUN –>**, the warp shape appears as you created it for the first keyframe, then interpolates to the next keyframe. This way, you can experiment with different warp shapes and their controls to create nonlinear transform effects.

Warp Menu

The selected shape category and type always appear in the top line of the Warp menu, after the menu title. For example, with channel 1A as the master channel, and the **Fancy** category, **Cylinder** type, **Front** view selected, the top line of the display reads

Ch 1A WARP Fancy – Cylinder Front

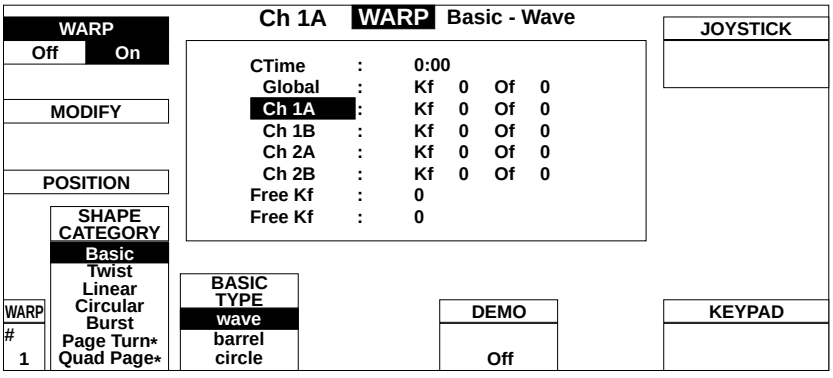
Also, the shape number always appears in the lower left corner of the menu; in the above example, the shape number is 60.

Warp

This softkey toggles the warp function ***Off*** and ***On***.

Shape Category

Use this softknob to select a shape category. There are 14 shape categories, and each has at least two warp shapes.



The Warp Menu

[Category] Type
This label shows the shape category selected (**Basic**, **Twist**, etc.). Use the softknob to select a particular shape. You can also select a shape by entering the shape number in the keypad and pressing the **A** keypad softkey.

[Type] View
This label shows the shape type selected (**Cylinder**, [Page] **Turn**, [Page] **Roll**, etc.). Use the softknob to select the view for two channel warp shapes. For most of these shapes, you can select the **Front** side, **Back** side, or **Both**.

Demo
Turn this softknob **On** to apply the selected shape to the image with preset warp settings. Turn it **Off** to create the shape manually. See the discussion on the warp demo mode earlier in this section.

Modify
Press this softkey to access the warp modification controls. You can use the softknobs, the numeric keypad, and, in most cases, the joystick, to adjust these settings. There are many controls, and only some apply to a given shape, so the softknob descriptions appear in alphabetical order. For the shape categories noted, the ***Modify*** softkey toggles between ***Normal*** and ***Waveform***.

Alignment
This softknob applies only to the **Fancy** category, which requires two DVE channels to complete the shape. Use **Alignment** to match up the edges of the shape halves to create a fully closed shape.

Amplitude
This softknob applies to the **Linear**, **Circular**, and **Ripple** categories. Use **Amplitude** to set the "gain" for the selected shape; it affects the amount of warp nonlinearity applied to the image.

Axis
This softknob applies to the **Basic**, **Burst**, **Linear**, **Circular**, **Page Turn**, **Quad Page**, and **Ripple** categories, and the **Misc** category **Meltdown** shape. Use **Axis** to Z rotate the warp shape without rotating the image itself.

Frequency
This softknob applies to the **Linear** and **Ripple** categories. Use **Frequency** to change the "wavelength" of the warp effect; it affects how many repetitions of the nonlinear waveform appear in the image.

Horizontal Frequency
This softknob appears when you toggle ***Modify*** to ***Normal***, and applies to the **Circular** category. Use **Horizontal Frequency** to change the "wavelength" of the warp effect across the width of the image; it affects how many repetitions of the nonlinear waveform appear horizontally in the image.

Mag
This softknob applies only to the **Misc** category **Lens** shape. Use **Mag** to set the image's apparent magnification through the lens.

Phase
This softknob appears when you toggle ***Modify*** to ***Waveform***, and applies to the **Circular** and **Ripple** categories. Use **Phase** to change the position of the ripples relative to the center point of the shape without changing the size of the affected area of the image.

Pulse Width
This softknob appears when you toggle ***Modify*** to ***Waveform***, and applies only to the **Circular** category **Square Pulse** and the **Concentric** category **Multi-Rings** shapes. Use **Pulse Width** to set the width of the square pulses or rings.

Radius
This softknob applies to the **Page Turn**, **Quad Page**, **Sphere**, **Ripple**, **Concentric**, **Cylinder**, and **Fancy** categories. Use **Radius** to set the radius (distance from the center to the outer edge) of the circular warp shapes.

Range
This softknob applies to the **Basic** and **Burst** categories, and the **Misc** category **Meltdown** shape. Use **Range** to set the "gain" of the selected shape; it affects the amount of warp nonlinearity applied to the image.

Rotation
This softknob applies to the **Concentric**, **Cylinder**, and **Fancy** categories. Use **Rotation** to Z rotate the warp shape without rotating the image itself.

Size
This softknob applies only to the **Misc** category **Lens** shape. Use **Size** to set the diameter of the lens without changing the size of the image itself.

Spread
This softknob applies to the **Basic** and **Burst** categories, and the **Misc** category **Meltdown** shape. Use **Spread** to set the width of the warp shape relative to the image. In general, the effect of the **Spread** setting on the image is not apparent unless you use a non-zero **Range** value.

Twist

This softknob applies only to the **Concentric** category **Multi-Rings** shape. Use **Twist** to Z rotate the rings without rotating the image itself. Unlike **4-Rings**, this shape does not have individual rotation controls for each ring; each successive ring rotates proportionally more than the ring inside it.

Vertical Frequency

This softkey appears when you toggle ***Modify*** to ***Normal***, and applies to the **Circular** shape category. Use **Vertical Frequency** to change the "wavelength" of the warp effect up and down the height of the image; it affects the number of repetitions of the nonlinear waveform that appear vertically in the image.

Position

Press this softkey to access the warp position controls. You can use the softknobs, the numeric keypad, and, in most cases, the joystick, to adjust these settings. There are many controls, and only some apply to a given shape, so the softknob descriptions appear in alphabetical order. For the shape categories noted, the ***Position*** softkey toggles between ***Normal*** and ***Offset***.

H Position

This softknob applies to the **Circular**, **Quad Page**, **Sphere**, **Ripple**, **Concentric**, and **Split** categories, and the **Misc** category **Lens** shape. (For the **Split** category **Split** shape, toggle the ***Position*** softkey to ***Offset*** to access this control.) Use **H Position** to change the horizontal position of the warp shape on the image.

H Split

This softknob applies only to the **Split** category **Split** shape. Toggle the ***Position*** softkey to ***Normal*** to access this control. Use **H Split** to set the width of the horizontal separation between the parts of the image.

Left / Right / Top / Bottom

These softknobs only apply to the **Split** category **Mirrors** shape. Toggle the ***Position*** softkey to ***Offset*** to access these controls. Use these softknobs to rotate each part of the image independently.

Position

This softknob applies to the **Basic**, **Burst**, **Linear**, **Page Turn**, and **Fancy** categories, the **Ripple** category **Linear** shape, and the **Misc** category **Meltdown** shape. Use **Position** to change the position of the warp shape on the image relative to its **Axis** and **Rotation** setting.

Quadrant

This softknob applies only to the **Split** category **Split** shape. Toggle the ***Position*** softkey to ***Offset*** to access this control. Toggle **Quadrant** to select the part of the image (**Upper Left, Upper Right, Lower Left, Lower Right**) you want to move or rotate.

Ring 1 / 2 / 3 / 4

These softknobs apply only to the **Concentric** category **4-Rings** shape. Toggle the ***Position*** softkey to ***Offset*** to access these controls. Use these softknobs to rotate each ring independently.

Rotate

This softknob applies only to the **Split** category **Split** shape. Toggle the ***Position*** softkey to ***Offset*** to access this control. Use **Rotate** to Z rotate the part of the image selected with the **Quadrant** softknob.

Top Left / Top Right / Bottom Left / Bottom Right
These softknobs apply only to the **Quad Page Turn** category. Toggle the ***Position*** softkey to ***Offset*** to access these controls. Use these softknobs to move the corners of the **Quad Page Turn** independently.

V Position
This softknob applies to the **Circular**, **Quad Page**, **Sphere**, **Ripple**, **Concentric**, and **Split** categories, and the **Misc** category **Lens** shape. (For the **Split** category **Split** shape, toggle the ***Position*** softkey to ***Offset*** to access this control.) Use **V Position** to change the vertical position of the warp shape on the image.

V Split
This softknob applies only to the **Split** category **Split** shape. Toggle the ***Position*** softkey to ***Normal*** to access this control. Use **V Split** to set the width of the vertical separation between the parts of the image.

Section 5

Global Menus

Overview

The buttons in the Global Menus section access menus that control DVEOUS functions that are not specific to the local (1A, 1B, 2A, 2B) channels. This includes menus for controlling optional features. There are six menu buttons in the Global area:

- **GLOBAL TRANS**

The Global Trans menu controls transformations applied in global space. Global space is downstream of all local channels, and applies to all channels as though they are a single unit. You can think of global space as another DVE that uses the combined output of the local channels for its source.

The global space has its own timeline, so you can build effects on the global timeline and offset its start time from the start times of effects on other channels' timelines. This lets you, for example, fly together pieces of an image (each on its own local channel), then rotate or fly the entire image as a unit with the global channel. For a detailed discussion of global space, see Section 3 – Transforms.

Global Trans movement and rotation controls are similar to the ones in the local 3D Trans menu, and use the same screen units and rotation values. There are also separate global source and target spaces. You can assign global parameters their own motion path types, keyframe durations, and pauses, just like the local channel timeline effects.

- **COMBINER**

Use the Combiner menu to select a background source and set the key priority between the DVE outputs, the Target Framestore option, and the background. The background source can be external video, the internal SuperMatte generator, the Pattern Framestore, or the optional Defocus module, either live or frozen. With fixed priority, you can manually crossfade and control the opacity of the channels, background, and Target Framestore. Z (depth) priority uses the Z locate value of each element to set its priority relative to the other elements in the combined output.

- **TARGET FRAMESTORE**

The Target Framestore (TFS) is an option that provides recursive effects. These include several trail types (decays, sparkles, and smears) and composite “montages” that drop frozen images into the Target Framestore, either "under" ("behind") or "over" ("in front of") the combined DVE output.

- **SUPERMATTE**

The SuperMatte menu lets you create a two color wash or background with dedicated color and pattern generators. The SuperMatte output is available as a source just like an input.

- **DEFOCUS**

The Defocus menu controls the optional dual channel wide range Defocus module. With this option, you can simultaneously or independently blur or soften any two DVEOUS sources.

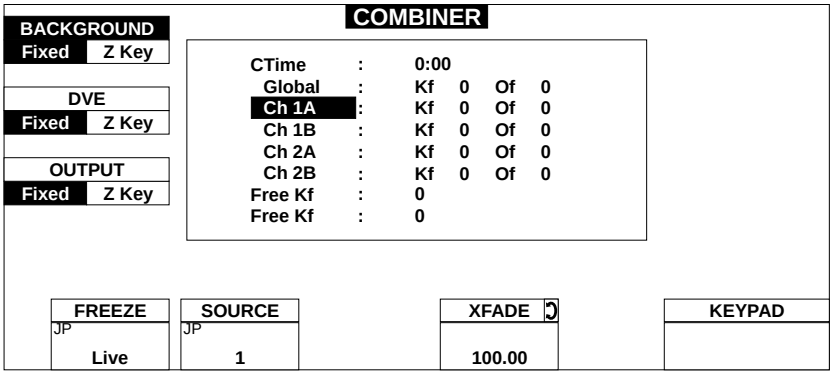
- **SOLID BUILDER**

The Solid Builder menu lets you build multisided geometric objects. It offers prisms, pyramids, regular polyhedrons, and rectangular skewed solids. After you define the number of sides, size, and shape of the object, DVEOUS performs the calculations needed to produce the spatially related effects. Some solids have too many sides to create simultaneously, and require an external multigeneration layering device, such as a digital disk recorder.

Combiner Menu

Press the **COMBINER** button to bring up this menu. Here you can select background sources and set the key priority either manually (fixed priority) or automatically (Z key priority). The automatic setting bases keying priority on the relative location of each channel, the Target Framestore, and the background in 3D space. This lets these elements intersect or otherwise interact with each other.

> **NOTE: The channel Output menu has controls for setting the priority between the A and B channels of each pair. See the information on the Output menu in Section 4 – Channel Menus for more details.**



The Combiner Menu

Background

Use this softkey to select a source for the background, its freeze mode, and its key priority. Two of the softknobs, **Freeze** and **Source**, appear in both ***Fixed*** and ***Z Key*** modes.

Freeze

This softknob selects the freeze mode for the background source: **Live** or **Freeze**. Note that a frozen background source is always a full frame of video.

Source

Use this softknob to select the source for the background. **1 - 12** are the external inputs. You may have fewer than 12 inputs available if your system does not have additional input modules installed; four inputs are standard. **SuperMatte** selects the internal two color SuperMatte generator. **Pattern** selects the output of the Pattern Framestore. **Defocus A** and **Defocus B** select the corresponding output of the optional Defocus module. **Aux** only appears if DVEOUS is controlling a switcher Aux Bus.

Fixed

This priority type, by default, places the background behind all other elements in the combined output (all DVE channels and the Target Framestore), no matter what their position in 3D space. You can change this with the **XFade** (crossfade) softknob.

XFade

In fixed priority mode, use this softknob to exchange the key priority of the background relative to the combined DVE and Target Framestore (if installed). The default value, 100.00, places the background "behind" or "under" all other elements. A value of 0 places it "in front of" or "over" all other elements. Intermediate settings give a mix of the background and other elements. This lets you dissolve or mix the background through the other elements as part of an effect.

Z Key

In this mode, the priority of the background depends on its location in 3D space, which, by default, is infinitely far from the viewer.

Z Pos

This softknob has the same effect on key priority as the Z locate value for the DVE channels: the lower the value, the "closer" the background is to the viewer. Note, though, that the background does not actually change size or position: this softknob affects only key priority. The default value, 100.0000, places the background behind all other elements. A value of 0.0000 places it in front of all other elements. Intermediate settings place the background in front of, behind, or intersecting the DVE channels and Target Framestore, depending on their individual Z locate (depth) values.

Z Soft

This softknob controls the sharpness of the priority transition between the background and the other elements. It sets the softness of the edge where the background and DVE channels (and / or Target Framestore) intersect.

Default: 0
Range: 0 (soft edge) - 7 (hard edge)

DVE

This softkey controls the key priority between the two combined DVE outputs. Channel 1 is the standard DVE output (1A and 1B combined). Note that if you do not have the second (optional) DVE board (channel 2), the only control that applies is the **CH1 Opac** softknob. These controls treat each combined channel pair (1A / 1B and 2A / 2B) as a single source.

This softkey toggles between ***Fixed*** and ***Z Key*** priority. The opacity softknobs appear for both modes.

CH1 Opac

Use this softknob to set the opacity of the combined channel 1A / 1B output.

Default: 100
Range: 0 (fully transparent) - 100 (fully opaque)

CH2 Opac

Use this softknob to set the opacity of the combined channel 2A / 2B output.

Default: 100
Range: 0 (fully transparent) - 100 (fully opaque)

Fixed

This mode, by default, places the combined 1A / 1B output over the combined 2A / 2B output, regardless of their relative locations in 3D space. You can change their relative priorities with the **XFade** (crossfade) softknob.

XFade

In fixed priority mode, use this softknob to exchange the relative priority of the combined 1A/1B output and the combined 2A/2B output. The default value, 0, places 1A/1B over 2A/2B. A value of 100 places 2A/2B over 1A/1B. Intermediate settings give a mix of the two pairs where they overlap. This lets you dissolve or mix one channel pair through the other as part of an effect.

Z Key

This priority mode uses Z (depth) information to set the key priority between the channel pairs. A lower Z locate value places the channel pair closer to the viewer in 3D space and gives it higher priority. A higher Z locate value places the channel pair farther from the viewer and gives it lower priority. Also, if a channel pair is rotated horizontally or vertically, part of the channel pair is closer, and so has higher priority. This means that, where the channel pairs meet, overlap, or intersect, their relative Z locate values determine which channel pair is over the other.

Z Soft

This softknob controls the sharpness of the priority transition between the channel pairs. It sets the softness of the edge where the channel pairs intersect.

Default: 0
Range: 0 (soft edge) - 7 (hard edge)

Output

This softkey treats the combined DVE channels (1A, 1B, 2A, and 2B) as a single source, and controls the DVE opacity and key priority relative to the Target Framestore. Note that if the Target Framestore option is not installed, the only control that applies is the **DVE Opac** softknob.

This softkey toggles ***Fixed*** and ***Z Key*** priority. The opacity softknobs appear in both priority modes.

DVE Opac

This softknob sets the opacity of all combined DVE channels as a single source.

Default: 100
Range: 0 (fully transparent) - 100 (fully opaque)

TFS Opac

This softknob sets the opacity of the Target Framestore option.

Default: 0
Range: 0 (fully transparent) - 100 (fully opaque)

> **NOTE: The opacity settings are cumulative, and have a hierarchy that affects the channel's final opacity. For example, channel 1A has a 50 percent opacity setting in its Output menu. If you set the Combiner menu *DVE* CH1 Opac softknob to 50, it halves channel 1A's visible opacity to 25 percent. If you then set the *Output* DVE Opac softknob to 50, it halves channel 1A's visible opacity again, to 12.5.**

Fixed

This priority mode, by default, places the DVE over the Target Framestore, regardless of the DVE's location in 3D space. You can change the relative priorities of the DVE and TFS with the **XFade** (crossfade) softknob.

XFade

In fixed priority mode, use this softknob to exchange the priorities of the DVE output and the Target Framestore. The default value, 0, places the DVE over the TFS. A value of 100 places the TFS over the DVE. Intermediate settings give a mix of the two where they overlap. This lets you dissolve or mix one element through the other as part of an effect.

Z Key

This priority mode uses Z (depth) information to set the relative key priority between the DVE and the Target Framestore. A lower Z locate value places the DVE closer to the viewer and gives it higher priority. A higher Z locate value places the DVE farther from the viewer and gives it lower priority. Also, if the DVE is rotated horizontally or vertically, part of it is closer to the viewer, and that part has higher priority. This means that, where the DVE and TFS meet, overlap, or intersect, their relative Z locate values determine which is over the other.

When you freeze one or both DVE channels in the TFS, the current channel Z locate information is stored with the video. This gives the TFS its own Z priority, letting it appear over or under the DVE, depending on its Z locate values.

Z Soft

This softknob controls the sharpness of the priority transition between the DVE and the Target Framestore. It sets the softness of the edge where the DVE intersects the TFS.

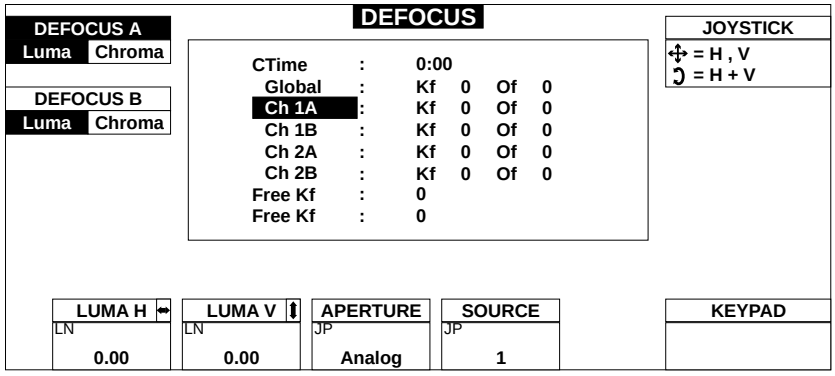
Default: 0
Range: 0 (soft edge) - 7 (hard edge)

Defocus Menu

The wide range Defocus option lets you blur or soft-focus two images simultaneously or independently. You can use either defocus channel's output as the source for the DVE channels (1A, 1B, 2A, and 2B), textures, and the background. Press the global **DEFOCUS** button to bring up the Defocus menu. If the Defocus option is not installed, you cannot access this menu.

Defocus A/B

These softkeys select the current defocus channel, A or B; the controls for both are identical three-way toggles. The first press selects luma defocus, the second press selects chroma defocus, and the third press selects both luma and chroma defocus. The softkey highlight indicates the current defocus channel and its mode. ***Luma*** defocus affects only the image's luminance (brightness). ***Chroma*** defocus only affects the image's chrominance (color). Toggle the softkey to select both to defocus the entire image.



The Defocus Menu

Luma H/Chroma H/Both H

Softknob A controls the defocus in the horizontal direction, and its label changes depending on the mode selected with the softkey. At 0.00, horizontal defocus is effectively off.

Default: 0.00
Range: 0.00 - 100.00

Luma V/Chroma V/Both V

Softknob B controls the defocus in the vertical direction, and its label changes depending on the mode selected with the softkey. At 0.00, vertical defocus is effectively off.

Default: 0.00
Range: 0.00 - 100.00

Note that you can use the joystick to control the defocus settings. Move the joystick right and left to adjust the horizontal defocus; move it up and down to adjust the vertical defocus. Twist the joystick handle to adjust defocus in both directions simultaneously.

Aperture

This softknob lets you select the type of video blanking needed for the input video source. The **601** setting is for digitally generated video, which typically has narrow blanking. Use **Analog** for analog video, which has wider blanking. If an image contains black (or blanking) at the edges, passing it through the defocus module averages the black into the active image, resulting in a darkening of its edges. Since defocus applies to the video upstream of the engineering setups and crops, you cannot use them to remove the black edges. The **Analog** setting replaces the black with gray to keep the softened edges from darkening.

Source

Use this softknob to select the source for the defocus channel. **1 - 12** are the external inputs. You do not have all inputs available if your system does not have additional input modules installed (four inputs are standard). **SuperMatte** selects the internal two color SuperMatte generator. **Pattern** selects the output of the Pattern Framestore. **Aux** only appears if DVEOUS is controlling a switcher Aux Bus.

Global Trans Menu

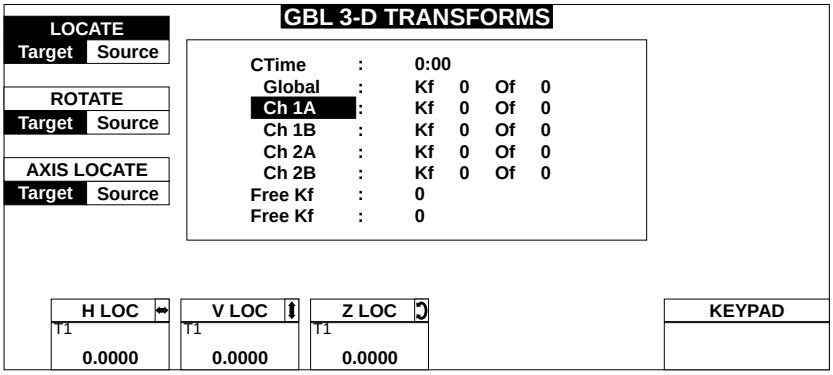
Press the **GLOBAL TRANS** menu button to bring up this menu. The menu's softkeys are ***Locate***, ***Rotate***, and ***Axis Locate***. Each has H, V, and Z softknobs.

Locate

The ***Locate*** softkey lets you move the channels along the global axes in 3D space. Pressing the ***Locate*** softkey enables locations in global target or global source space. Toggle the softkey to select ***Source*** or ***Target***. The dark highlight indicates the selected space. All source locates move the global source plane. All target locates move the channels relative to the screen.

All locates have true perspective, unless you alter the **Perspcv** setting in the 2D Trans menu (default = 0.3000). The perspective setting is downstream of the global space.

See Section 3 – Transforms for a detailed discussion of the global spaces and how they interact with the local spaces.



The Global Trans Menu

H Loc

Moves the channels along the global horizontal axis. Positive values move the channels to the right; negative values move the channels to the left.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

V Loc

Moves the channels along the global vertical axis. Positive values move the channels up; negative values move the channels down.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

Z Loc

Moves the channels relative to the eye (viewing) point. The default value is 0.0000. Positive values move the channels away, making them appear smaller. Negative values move the channels closer, making them appear larger. With a -1.6667 value, the channels disappear because they reached the eye point, and are "behind you" in 3D space.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

Rotate

The ***Rotate*** softkey lets you spin the channels about the three global axes. These settings use fractions; for example, two and one quarter turns is 2.2500. You can find the numeric values for precise rotation by dividing the needed degree of rotation by 360. For example, a 33 degree rotation is 33 / 360=0.0917; 45 degrees is 45 / 360=0.1250, or one-eighth of a complete rotation.

Pressing the ***Rotate*** softkey enables rotations in global target or global source space. Toggle the softkey to select ***Source*** or ***Target***. The dark highlight indicates the selected space. All source rotates rotate the global source plane. All target rotates are relative to the screen.

All rotates have true perspective, unless you alter the **Perspcv** setting in the 2D Trans menu (default = 0.3000). The perspective setting is downstream of the global space.

H Rot

Rotates the channels about the global vertical axis. Positive values move the right edge away from you; negative values move the left edge away.

Default: 0.0000
Range: + / - 99.9999
Align: Nearest multiple of .1250 (45 degrees)

V Rot

Rotates the channels about the global horizontal axis. Positive values move the top edge away from you; negative values move the bottom edge away.

Default: 0.0000
Range: + / - 99.9999
Align: Nearest multiple of .1250 (45 degrees)

Z Rot

Rotates the channels about the global Z axis. Positive values rotate clockwise; negative values rotate counterclockwise.

Default: 0.0000
Range: + / - 99.9999
Align: Nearest multiple of .1250 (45 degrees)

Axis Locate

Use this softkey to set the center of rotation for the channels. The center of rotation is the single point at the intersection of the global H, V, and Z axes. The H, V, and Z axes are perpendicular to each other, and you can use them to move their intersection (the "pivot point" for the channels) in 3D space.

You can move the channel's pivot point in global source or global target space. The dark highlight indicates the selected space. All source axis moves locate the pivot point in global source space. All target axis moves locate the pivot point relative to the screen.

You can move the pivot point on the Z axis and use the H and V rotates to make the channels "orbit" the pivot point.

Enable the **CURSOR** button in the Graphics area of the Control Panel to bring up a cursor that indicates the pivot point's current location. See Section 3 – Transforms for details on the cursor display.

H Pos

Moves the pivot point along the global horizontal axis. Positive values move the pivot point right; negative values move it left.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

V Pos

Moves the pivot point along the global vertical axis. Positive values move the pivot point up; negative values move it down.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

Z Pos

Moves the pivot point along the global Z axis. Positive values move the pivot point away from you; negative values move it closer. Moving the pivot point along the Z axis causes horizontal and vertical rotations to move the channels in an "orbit" about the pivot point.

Default: 0.0000
Range: +/- 99.9999
Align: Nearest multiple of .1250 (1/8 of a screen unit)

Section 6

Building and Running Effects

Overview

This section discusses the effect and timeline concepts. It details using the Timeline Control buttons, and covers using the TimeFrame™ Effects Editor, and creating and running timeline effects.

Effects

You can string one or more keyframes together to create a sequence, called an effect. When you run an effect, DVEOUS begins by configuring the channel(s) according to the first keyframe. It then looks ahead to the next keyframe to determine what the configuration needs to be at the time designated by that keyframe. DVEOUS interpolates smoothly from the current settings to the settings in the next keyframe. This continues until it reaches the last keyframe in the effect.

Each keyframe has its own location and duration in the effect. Keyframe durations default to one second, but you can set them to any length from one field to 1000 seconds long. You can vary the length of each keyframe independently and vary the start or end points of each keyframe relative to other keyframes. You can also vary the length of the entire effect, keeping the duration of each keyframe proportional to the others.

Effect Timelines

Each channel (1A, 1B, 2A, 2B, and global) has its own timeline. When you build an effect on a channel, you create a timeline for that channel. With a fully configured system, you can use up to five timelines to create a timeline effect. With two or more timelines in an effect, each timeline runs simultaneously with, but independently of, the other timelines in the effect. You can offset the relative start and end time of each timeline, including the global timeline, to create complex effects.

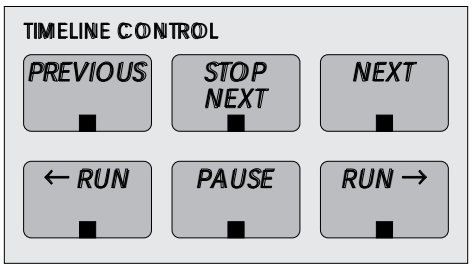
A timeline is a set of keyframes connected sequentially in time, and a timeline effect is one or more timelines running in parallel. You create a timeline effect with the buttons in the TimeFrame Effects Editor and Quick Keyframes areas of the Control Panel, and with the Timeline menu. You can save and recall entire timeline effects to and from on-line memory, and back up and restore them to and from floppy disk.

The center of the menu display shows how many keyframes are available for use in effects. It is a good idea to periodically check the number of free keyframes to avoid running out at an inopportune moment.

When you create a keyframe, you save the current settings to a part of memory called the effect workspace. The workspace is where you edit and run all timeline effects. To create a timeline effect, you create a keyframe in the workspace, where it is automatically inserted on one or more channel's timelines (depending on whether they are selected with the Channel Select buttons). The workspace is the only place where you can run or edit a timeline effect. When you save a timeline effect to memory, you save the effect workspace to a timeline effect register. When you recall a timeline effect register, it loads the contents of that register in the workspace so that you can run or edit the effect.

Timeline Control Buttons

The Timeline Control buttons let you step through keyframes in an effect, run an effect either forward or reverse, and pause a running effect. These buttons affect all five channels, whether they are active or not.



The Timeline Control Buttons

Press the **PREVIOUS** button to step the timeline to the keyframe before the current one on the master timeline. You can also use this button as part of a keyframe editing command. For example, if the timeline is on keyframe 2 of a two keyframe effect, entering **COPY — PREVIOUS — TO — 3** inserts a new keyframe 3 with the same parameters as keyframe 1. If there is currently an editing command in the keyframe edit dialog, pressing **PREVIOUS** makes it part of the command and does not move the timeline.

Press the **STOP NEXT** button to light its LED and put the effect in a special pause mode. In this mode, the effect runs until it reaches the next keyframe on the master timeline, then it pauses. You can press either **RUN** button to continue running the effect. As long as the LED in the **STOP NEXT** button is lit, the effect runs until it reaches the next keyframe on the master timeline, then pauses. If you use the ←**RUN** button to run the effect in reverse, it pauses when it reaches the end of the previous keyframe.

Press the **NEXT** button to step the timeline to the keyframe after the current one on the master timeline. You can also use this button as part of a keyframe editing command. For example, if the timeline is on keyframe 2 of a three keyframe effect, entering **COPY — NEXT — TO — 1** modifies keyframe 1 to have the same parameters as keyframe 3. If there is currently an editing command in the keyframe edit dialog, pressing **NEXT** makes it part of the command and does not move the timeline.

Use the ←**RUN** button to run the effect in reverse. If the effect is not running, pressing ←**RUN** runs the effect from the last keyframe toward the first one. If the effect is paused, pressing ←**RUN** runs the effect backward from the current location on the timeline. If the effect is running forward, pressing ←**RUN** causes the effect to immediately begin running backward from the current point on the timeline. The button's LED lights to indicate that the effect is running backward. While running in reverse, a keyframe with a programmed pause causes the effect to pause when it reaches that keyframe, i.e., at the "end" of the keyframe when viewed from the true start of the effect.

Press the **PAUSE** button to pause a running effect. You can continue running a paused effect in either direction by pressing a **RUN** button. The LED in the **PAUSE** button flashes to indicate that the effect is paused. To stop a paused effect completely, press **PAUSE** again. Pressing **PAUSE** with no effect running puts the master timeline in pause mode. This is useful when you do not want to run the effect from the beginning. Position the effect's timeline on the keyframe you want to start with, and press **PAUSE**. Pressing the **RUN**→ button starts running the effect from its current position, instead of returning to the first keyframe in the effect and running from there.

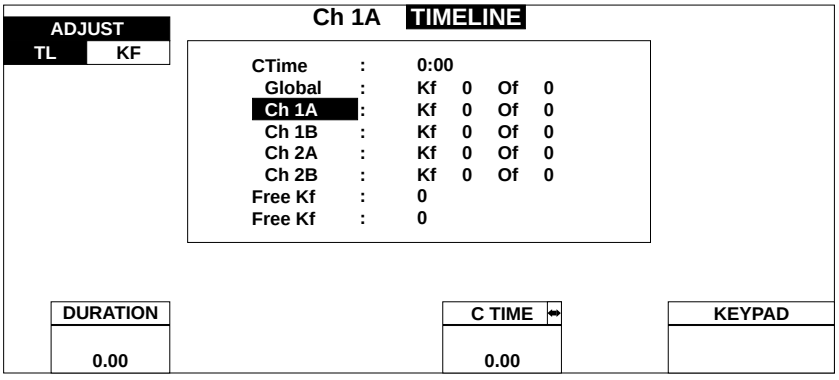
Use the **RUN**→ button to run the effect forward. If the effect is not running, pressing **RUN**→ runs the effect from the first keyframe toward the last one. If the effect is paused, pressing **RUN**→ runs the effect forward from the current location on the timeline. If the effect is running backward, pressing **RUN**→ causes the effect to immediately begin running forward from the current point on the timeline. The button's LED lights to indicate that the effect is running forward.

Besides the Timeline Control buttons, you can use the **START (REW)**, **END (FF)**, and **THIS** buttons in the TimeFrame Effects Editor area of the Control Panel to move along the timeline. To use these buttons, the keyframe edit dialog must be empty (no keyframe edit command is begun). Press **START (REW)** to move to the first keyframe in the effect, **END (FF)** to move to the last keyframe in the effect. Pressing **THIS** moves the effect to the start of the current keyframe on the master timeline.

Timeline Menu

Use the Timeline menu to set the duration for a timeline (effect) and to assign durations to each keyframe. Moving the joystick horizontally or turning the **C Time** softknob lets you run the effect timeline manually. Pressing the **JOYSTICK LOCK** button while in this menu lets you manually run the effect with the joystick while in other menus.

You can enter durations from the numeric keypad two ways: in frames or in seconds and frames. The time values always appear in seconds and frames regardless of how you entered them. To use frames, enter a number in the numeric keypad and press the softknob's keypad softkey. To use seconds and frames, enter the seconds, press the decimal point, then enter the frames. Pressing the softknob's keypad softkey enters the duration.



The Timeline Menu

Timeline Durations

Toggle the ***Adjust*** softkey to highlight ***TL***. This lets you set the duration for the currently active timelines. This alters the durations of the individual keyframes proportionately to compensate for timeline duration changes. You do not need to use any Quick Keyframes or TimeFrame Effects Editor buttons to apply the timeline duration changes; they apply to the effect immediately.

The minimum duration for a timeline is one frame. The maximum duration is 86,399:00 seconds (525) or 103,678:20 seconds(625).

Keyframe Durations

Each keyframe has a default duration of one second, displayed as 1:00. You can change each keyframe's duration independently or change all the keyframes. The last keyframe on a timeline has a defined duration of 1:00. Usually, this value has no meaning, and does not count in the overall effect length because there is no next keyframe to which to interpolate or transition. However, if you run the effect in loop mode, this value is the duration between the last keyframe and keyframe 1.

After changing a keyframe duration, you must use **MODIFY** in the Quick Keyframes or TimeFrame Effects Editor buttons to apply it to the keyframe(s).

The minimum time for a keyframe duration is one field (:00*, entered using the softknob, joystick, or by pressing **0**, then the **A** keypad softkey). The maximum time is 1,000:00 seconds.

Free Kf

The menu display has two lines that show the number of free keyframes available for use. The first line shows how many keyframes are available for the current effect. You can use a maximum of 300 keyframes in an effect's timelines. Building an effect with four keyframes in both channel 1A and 1B uses a total of eight keyframes.

The bottom line shows the number of keyframes available in the on-line effects memory. This value does not change until you either save the workspace to an effect register or recall disk effects to on-line effects registers.

Creating Effects

You can use the Quick Keyframes or TimeFrame Effects Editor buttons to add keyframes to effects, and modify, copy, delete, and remove existing keyframes. See the discussion on these buttons later in this section for more details on the editing commands.

The Workspace

The workspace is where you build and run effects, and contains the memory for all the keyframes that make up an effect. Each channel (1A, 1B, 2A, 2B, and global) has its own workspace. The total number of all keyframes in the channels cannot exceed 300 for a single effect. The workspace is battery protected. To clear the workspaces, activate the channels and press **DELETE — ALL — ENTER**. Note that this does not affect the keyframe buffer (see below). Use the **SAVE EFFECTS** and **RECALL EFFECTS** buttons to copy the contents of the workspace to and from the on-line effects registers.

The Keyframe Buffer

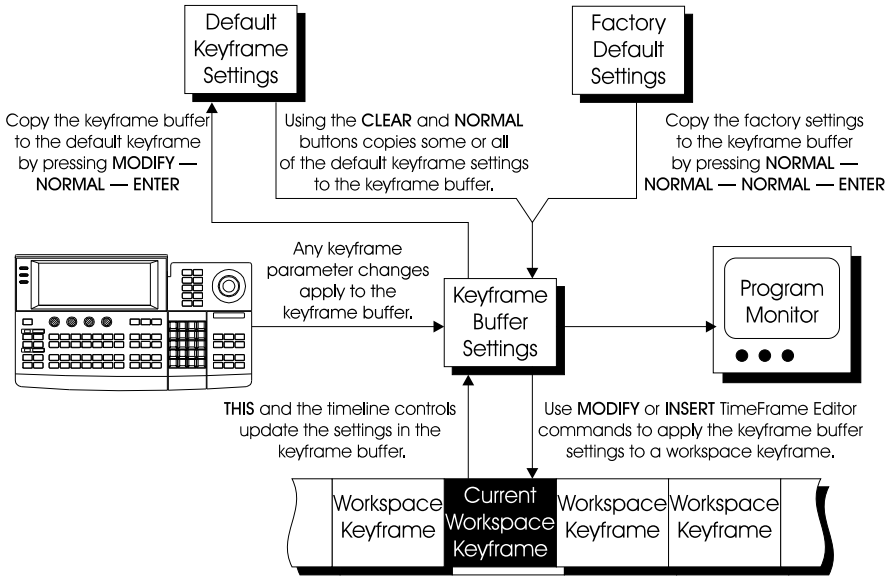
When you alter a keyframe with the position, size, or other settings, you control the contents of a keyframe buffer, and do not affect the workspace contents. Using a TimeFrame Effects Editor button lets you place the keyframe buffer information into the workspace, and therefore keep the change.

For example, suppose you are editing an existing effect. You want to alter the rotate setting on keyframe 3. You select keyframe 3, press the **3D TRANS** menu button, and start moving the joystick with ***Locate*** selected instead of ***Rotate***. The change you just accidentally made has only affected the keyframe buffer, not the

workspace effect. Press the **THIS** button to reset the keyframe buffer to match the current workspace keyframe.

Using the Normal Button

The default keyframe contains the values that apply when you use the **CLEAR** and **NORMAL** buttons. The factory default is a full screen picture with no transforms. DVEOUS lets you define the default keyframe settings. To change the default keyframe, first configure the keyframe attributes the way you want the default keyframe to be, then press **MODIFY — NORMAL — ENTER**. This copies the current keyframe buffer settings to the default keyframe. The change could be as simple as choosing different video inputs as the defaults, or as involved as setting



Keyframe Relationships

border colors, picture positions and rotations, and other keyframe attributes. This is useful if you want to start building several effects with the same settings, or to copy multiple parameters from one keyframe to another keyframe in the same or in a different effect with the **CLEAR** button.

The default keyframe retains your settings until you change them, even if you power the system down. Press **NORMAL — NORMAL — NORMAL — ENTER** to change the settings in the keyframe buffer to the factory settings. To make these the default keyframe settings, press **MODIFY — NORMAL — ENTER**.

The Undo Buffer

Changing a parameter setting and modifying a keyframe with the Quick Keyframe or TimeFrame Effects Editor buttons changes the current workspace. This also copies the existing workspace (before you made the change) into temporary memory called the undo buffer. Think of the undo buffer as backup storage in case you make a mistake in the workspace, or decide that the change is not what you want. Pressing the **UNDO KF EDIT** button exchanges the workspace, which holds the effect with the unwanted change, with the undo buffer, which holds the effect before you made the change.

Also, when you save the workspace to an effect register, it automatically copies the current contents of that effect register to the undo buffer before saving the workspace. This lets you recover the previous effect register contents in case you saved the workspace to the wrong effect register. When you recall an effect register, it automatically copies the current contents of the workspace to the undo buffer before recalling the effect register. This lets you recover what was in the workspace if you did not save it before recalling the new register. In either case, pressing

UNDO KF EDIT exchanges the workspace with the contents of the undo buffer.

Modify and Modify — Trim

Use the **MODIFY** button to change a group of keyframes in the workspace at the same time. This is useful when you need to change the border color on a 25 keyframe effect, for example, because you do not have to modify each keyframe individually. There are two important considerations: how do you know which parameters will be affected, and do you want to replace or trim them?

Affected Parameters

> **NOTE: The following examples use the command MODIFY — ALL — ENTER, but they apply to any command string that modifies more than one keyframe, e.g. START — TO — END, 1 — TO — 3, etc.**

When you select a workspace keyframe with **START (REW)**, **END (FF)**, **PREVIOUS**, **NEXT**, or **THIS**, the keyframe buffer exactly equals the contents of that keyframe. Any changes you now make, whether they are flags (e.g., changing from TCB1 to smooth motion) or numerical values (e.g., a border color), make the keyframe buffer different than the workspace keyframe. Pressing **MODIFY — ALL — ENTER** causes DVEOUS to note which parameters have changed and to apply those changes to all workspace keyframes.

For example, if each keyframe has a different rotate value, pressing **MODIFY — ALL — ENTER** does not affect the rotate values, unless you change the rotate value before entering the modify command. If you change the rotate value, even by 0.0001, that new value applies to all keyframes. To ensure that you do

not accidentally change unintended parameters, it is a good idea to press **THIS** first, then carefully make the changes, then press **MODIFY — ALL — ENTER**.

Often, people tend to make the changes and then, out of habit, press the **MODIFY** button in the Quick Keyframes group. This changes the current keyframe to match the keyframe buffer. Pressing **MODIFY — ALL — ENTER** now has no effect, since there is no difference between the settings in the keyframe buffer and the current effect keyframe.

Replacing vs. Trimming Parameters

The previous examples used the **MODIFY — ALL — ENTER** command, which replaced any changed parameter(s) with the new setting(s). You may want to trim the existing values instead of replacing them.

In this case, use **MODIFY — TRIM — ALL — ENTER**. This causes DVEOUS to determine which parameters have changed, and by how much and in which direction. DVEOUS uses the change amount (positive or negative) to trim the keyframes' existing settings. For example, in a two keyframe effect, keyframe 1 has the image H rotated 0.2500, keyframe 2 has the image H rotated 0.5000. After pressing **START** to move to keyframe 1, you change the H rotate value to 0.5000. Pressing **MODIFY — TRIM — ALL — ENTER** gives keyframe 2 an H rotate value of 0.7500.

Using the Channel Copy Button

Each channel (1A, 1B, 2A, 2B, and global) has independent effect and keyframe storage. Use the **CHANNEL COPY** button to copy the contents of one channel's keyframe buffer to another channel's keyframe buffer. To do this, think of each channel as having a number: 1A is 1, 1B is 2, 2A is 3, and 2B is 4. For example, to copy channel 1A's keyframe buffer to 1B, press **CHANNEL COPY — 1 — TO — 2 — ENTER**.

Looping an Effect

The Save and Recall Effect menus have a ***Loop*** softknob. Toggle ***Loop On*** to set the currently selected effect in an endless loop. By default the last keyframe in an effect has a duration of 1:00 and it determines the duration of the transition between the last keyframe and the first. Once running, a looped effect runs until you stop it by pressing the **START (REW), END (FF),** or **PAUSE** button.

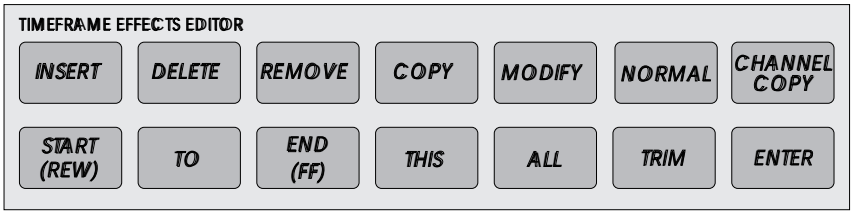
TimeFrame Editing Commands

After creating a timeline effect, you can change, or edit, it. Use the buttons in the TimeFrame Effects Editor area of the Control Panel to modify an existing timeline effect, or to create a new effect. These buttons are **INSERT**, **DELETE**, **REMOVE**, **COPY**, **MODIFY**, **NORMAL**, **CHANNEL COPY, START (REW)**, **TO**, **END (FF)**, **THIS**, **ALL**, **TRIM,** and **ENTER**.

The keyframe edit dialog in the menu display shows your editing command sequences as you enter them. Use the numeric keypad **CLEAR** button to clear entries in the keyframe edit dialog.

> **NOTE: You can only edit delegated (active) channels. To delegate a channel, press its Channel Select button to light its LED.**

The following tables list the command sequences you can create with the TimeFrame Effects Editor buttons, and their results. Examples of commands that act on specified keyframes use keyframes 3 and 12. Keyframe is shortened to "KF" in the following tables.



The TimeFrame Effects Editor Buttons

NOTE: All INSERT operations end with the current time at the beginning of the new keyframe.

Command	Condition	Result
INSERT — ENTER	No KFs on timeline.	Inserts KF 1, with default duration. Moves the current time to 0:00.
	Current time is on a KF location.	Inserts a KF, with default duration, before the current KF. Does not move the current time. Ripples KF numbers.
	Current time is between KFs.	Inserts a KF at the current time. The duration is split between the old current KF and the new KF (no time is added to the effect). Does not move current time. Ripples KF numbers.

Command	Condition	Result
	Current time is before KF 1.	Inserts a new KF 1 at current time. The duration is from current time to old KF 1 start time. Does not move current time. Ripples KF numbers.
	Current time is after last KF.	Inserts a KF, with default duration, at the current time. Changes the duration of old last KF to fit. Does not move current time.
INSERT — THIS — ENTER	Same as **INSERT — ENTER**.	Same as **INSERT — ENTER**.
INSERT — START — ENTER	No KFs on timeline.	Inserts KF 1, with default duration. Moves the current time to 0:00.
	Current time is on a KF location.	Inserts KF 1, with default duration, at location of previous KF 1. Moves old KF 1 to end of the new KF 1 and ripples KF numbers.
	Current time is between KFs.	Same as on a KF location.

Command	Condition	Result
	Current time is before KF 1.	Inserts a new KF 1 at current time. Duration is from current time to old KF 1 start time. Does not move current time and ripples KF numbers.
	Current time is after last KF.	Same as on a KF location.
INSERT — END — ENTER	No KFs on timeline.	Inserts KF 1, with default duration. Moves current time to 0.:00.
	Current time is on a KF location.	Inserts KF after the last KF, with default duration.
	Current time is between KFs.	Same as on a KF location.
	Current time is before KF 1.	Same as on a KF location.
	Current time is after last KF.	Inserts KF, with default duration, at current time. Changes the duration of old last KF to fit. Does not move current time.
INSERT — NEXT — ENTER	No KFs on timeline.	Inserts KF 1, with default duration. Moves current time to 0:00.

Command	Condition	Result
	Current time is on a KF location.	Inserts KF, with default duration, after the current KF. Moves current time to the start of the new KF and ripples KF numbers.
	Current time is between KFs.	Inserts KF at current time. Duration is split between old current KF and new KF (no time is added to the effect). Does not move current time. Ripples KF numbers.
	Current time is before KF 1.	Inserts a new KF 1 at current time. Duration is from current time to old KF 1 start time. Does not move current time. Ripples KF numbers.

Command	Condition	Result
	Current time is after last KF.	Inserts KF, with default duration, at current time. Changes the duration of old last KF to fit. Does not move current time.
INSERT — PREVIOUS — ENTER	No KFs on timeline.	Inserts KF 1, with default duration. Moves current time to 0:00.
	Current time is on a KF location.	Inserts KF, with default duration, before the current KF. Does not move current time. Ripples KF numbers.
	Current time is between KFs.	Inserts KF, with default duration, at the location of the current KF. Ripples KF numbers.
INSERT — 3 — ENTER	KF 3 exists.	Inserts new KF 3 before existing KF 3, and ripples KF numbers.
	KF 3 does not exist.	Inserts multiple copies of KF to the current effect up to KF 3, all with default durations.

Command	Condition	Result
INSERT — 3 — TO — 12 —ENTER	KF 3 exists.	Inserts nine copies of KF, with default duration, before existing KF 3.
	KF 3 does not exist.	Inserts multiple copies of KF to the current effect up to KF 12, all with default duration.
DELETE — ENTER	Current time is not on a KF location.	Error message: Must be on a KF to delete it.
	Current time is on a KF location.	Deletes current KF and moves the next KF to current time. Overall effect time is shortened by the duration of the deleted KF.
DELETE — THIS — ENTER	Same as **DELETE — ENTER**.	Same as **DELETE — ENTER**.
DELETE — START — ENTER	Any.	Deletes KF 1, moves the old KF 2 to the old KF 1 position, and ripples KF numbers. Overall effect time is shortened by the duration of the deleted KF.

Command	Condition	Result
DELETE — END — ENTER	Any.	Deletes last KF. Effect time is shortened by the duration of the deleted KF.
DELETE — NEXT — ENTER	Any.	Deletes KF after current KF. Effect time is shortened by duration of deleted KF.
DELETE — PREVIOUS — ENTER	Any.	Deletes KF before current KF. Effect time is shortened by duration of deleted KF.
DELETE — 3 — ENTER	KF 3 exists.	Deletes KF 3. Effect time is shortened by KF 3's duration.
	KF 3 does not exist.	Error message: No keyframes.
DELETE — 3 — TO — 12 — ENTER	KF 3 exists.	Deletes KF 3 through 12. Effect time is shortened.
	KF 3 does not exist.	Error message: No keyframes.
DELETE — ALL — ENTER	Any.	Deletes all KFs and their durations.
REMOVE — ENTER	Current time is not on a KF location.	Error message: Not on a keyframe.

Command	Condition	Result
	Current time is on a KF location.	If there is more than one KF in the effect, deletes the current KF and adds its duration KF. Overall effect time does not change. If there is only one KF in the effect, deletes the KF.
REMOVE — THIS — ENTER	Same as **REMOVE — ENTER**.	Same as **REMOVE — ENTER**.

Command	Condition	Result
REMOVE — START — ENTER	Any.	If KF 1 is not at zero time, or if KF 1 is at zero time and other timelines have a KF at zero time, deletes KF 1. The old KF 2 becomes KF 1, the other KF numbers are rippled, and all the KFs keep their positions on the timeline. If KF 1 is at zero time and no other timelines have a KF at zero time, this deletes the KF. The old KF 2 becomes KF 1, the other KF numbers are rippled, all the KFs keep their positions on the timeline. Moves zero time to the KF 1 on the earliest timeline.
REMOVE — END — ENTER	Any.	Deletes last KF. Effect time is shortened by duration of deleted KF.

Command	Condition	Result
REMOVE — NEXT — ENTER	Any.	Deletes KF after current KF and adds its duration to the current KF. Overall effect time does not change.
REMOVE — PREVIOUS — ENTER	Any.	Deletes KF before current KF and adds its duration to the new previous KF. Overall effect time does not change.
REMOVE — 3 — ENTER	KF 3 exists.	Deletes KF 3 and adds its duration to KF 2. Overall effect time does not change.
	KF 3 does not exist.	Error message: No keyframes.
REMOVE — 3 — TO — 12 — ENTER	KF 3 exists.	Deletes KF 3 through 12 and adds their total duration to KF 2. Overall effect time does not change.
	KF 3 does not exist.	Error message: No keyframes.
REMOVE — ALL — ENTER	Any.	Deletes all KFs.
MODIFY — ENTER	Current time is not on a KF location.	Error message: Not on keyframe.

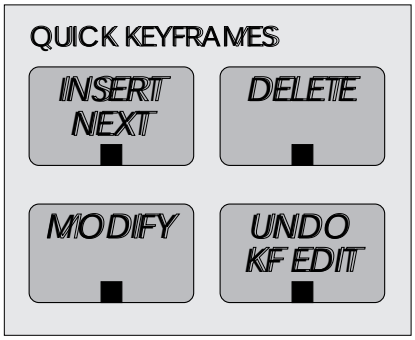
Command	Condition	Result
	Current time is on a KF location.	Replaces the current KF with the contents of the workspace.
MODIFY — THIS — ENTER	Same as **MODIFY — ENTER**.	Same as **MODIFY — ENTER**.
MODIFY — START — ENTER	Any.	Replaces KF 1 with the contents of the workspace.
MODIFY — END — ENTER	Any.	Replaces the last KF with the contents of the workspace.
MODIFY — NEXT — ENTER	Any.	Replaces the KF after the current KF with the contents of the workspace.
MODIFY — PREVIOUS — ENTER	Any.	Replaces the KF before the current KF with the contents of the workspace.
MODIFY — 3 — ENTER	KF 3 exists.	Replaces KF 3 with the contents of the workspace.
	KF 3 does not exist.	Error message: No keyframes
MODIFY — 3 — TO — 12 — ENTER	KF 3 to 12 exist.	Replaces KF 3 to KF 12 parameters with the workspace parameters that are different.

Command	Condition	Result
	KF 3 or 12 does not exist.	Error message: No keyframes.
MODIFY — ALL — ENTER	Current time is not on a KF location.	Error message: No keyframes.
	Current time is on a KF location.	Replaces all KF parameters with the workspace parameters that are different.
MODIFY — TRIM — (ALL, 3 — TO — 12, 3 — TO — END, START — TO — 3) — ENTER	Current time is not on a KF location.	Error message: No keyframes.
	Current time is on a KF location.	Trims specified KF parameters by the difference between them and the workspace parameters' values.
COPY — (START, THIS, 3, NEXT, PREVIOUS, END) — TO (START, 12, NEXT, etc.) — ENTER	Any.	Copies specified KF to specified location, overwriting the parameters in the destination KF.

Command	Condition	Result
COPY — 3 — TO — 12 — TO — 13 — ENTER	Any.	Copies KFs 3 - 12 to KF 13. A destination range is not needed. Overwrites and / or creates new KFs as needed. When you press the second **TO**, the first **TO** changes to **THRU** in the KF Edit Dialog window.
COPY — (START, THIS, 3, NEXT, PREVIOUS, END) — TO — (START, 12, NEXT, etc.) — INSERT — ENTER.	Any.	Inserts specified KF at specified location. Ripples KF numbers.
TO — 3 — ENTER	Any.	Moves current time to the start of KF 3 in the master delegated timeline.
START	Any.	Moves current time to 0:00.
END	Any.	Moves current time to the end of the effect.
THIS	Any.	Moves current time to the beginning of the current KF in the master timeline.

Quick Keyframe Buttons

The buttons in this area of the Control Panel let you modify, insert, and delete keyframes without having to enter an entire editing command.



The Quick Keyframe Buttons

The following tables list the commands you can enter with the Quick Keyframes buttons and their results. Examples of commands that act on specified keyframes use keyframes 3 and 12. Keyframe is shortened to "KF" in the following tables.

Command	Condition	Result
INSERT NEXT	No KFs on any timeline.	Inserts KF 1 at 0:00 time with default duration. Moves current time to start of KF 1.
	No KFs on the delegated timeline, but KFs exist on other timelines.	Inserts a KF at current time with default duration. Moves the current time to start of the new KF.
	Current time is on a KF location.	Inserts a new KF after the current KF with the default duration. Moves the current time to the start of the new KF. Ripples KF numbers.
	Current time is between KFs.	Inserts a new KF at the current time. Splits the time of the old current KF with new KF. Does not add time to the effect, nor move the current time. Ripples KF numbers.

Command	Condition	Result
	Current time is before KF 1.	Inserts a new KF 1 at current time, with a duration that equals the difference between the current time and the old start time. Does not move the current time. Ripples KF numbers.
	Current time is after the end of the last KF.	Inserts a new KF at the current time with default duration. Changes the duration of previous KF to fit. Does not move the current time.
DELETE	Current time is on a KF location.	Deletes the current KF, moves the next KF to the current time. Overall effect time shortened by the duration of the deleted KF.
	Current time is not on a KF location (between KFs, before start, or after end).	Error message: Must be on a KF to delete it.

Command	Condition	Result
MODIFY	Current time is on a KF location.	Replaces the current KF with the workspace.
	Current time is not on a KF location (between KFs, before start, or after end).	Error message: Must be on a KF to modify it.
UNDO KF EDIT	Any.	Undoes last keyframe edit performed.

Section 7

Motion Control

Overview

Creating keyframes defines what happens to the image when you run the effect. The motion settings covered in this section determine how DVEOUS transitions from one keyframe to the next. This often has a big impact on the look of the effect.

There are six motion path types that you can assign to parameters: ***Jump***, ***Linear***, ***S-Lin***, ***TCB 1***, ***TCB 2***, and ***Smooth***. You can assign a motion type to any parameter that you can change on a keyframe-by-keyframe basis. You can use any path type on some parameters; others use only some of the path types.

To assign a motion path type to a parameter, toggle the **PATH** button in the numeric keypad. The currently selected path type appears highlighted in the keypad buffer. Assign the path type to a parameter by pressing its keypad softkey (**A**, **B**, **C**, or **D**). You can assign the same path type to all the parameters for a softkey: select the path type with the **PATH** button, then hold the **PATH** button down and press the softkey. You can also assign a path type to an entire menu: select the path type with the **PATH** button, then hold the **PATH** button down and press the menu button. If you use this, note that any parameters that use only some of the path types take the "highest priority" path available to them. For example, if you try to assign ***Smooth*** to a parameter that only uses ***Jump***, ***Linear***, or ***S-Lin***, it takes ***S-Lin*** instead.

Because the path types define how DVEOUS interpolates between settings in keyframes, it does not interpolate from one

path type to another. For example, an effect has linear motion set on a parameter for keyframe 1, then TCB 1 on keyframes 2 and 3. When you run the effect, DVEOUS uses linear motion between keyframes 1 and 2, then switches to TCB 1 for the rest of the effect.

Path Types

These are the path types available, in ascending "priority" order:

Jump

This is similar to "Hold" in other DVEs. It holds the parameter value through the duration of the keyframe; there is no interpolation between keyframes. At the first field of the next keyframe, the parameter "jumps" to the setting for that keyframe. Note that even if you run an effect backward, DVEOUS looks ahead for hold flags, so the effect runs properly in reverse.

Linear

This motion type interpolates in a straight line (in both motion and time) between the parameters of the current keyframe and those in the next keyframe.

S-Lin

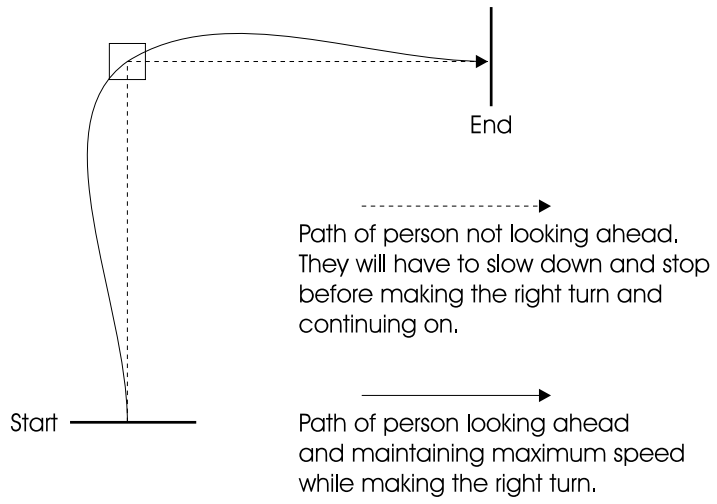
This is shorthand for "smooth-linear." It gives the parameter a linear motion path between keyframes, but adds acceleration at the start of the current keyframe and deceleration into the next. This creates a natural motion effect between keyframes, especially on border and crop settings.

TCB 1 and TCB 2

TCB is an abbreviation for Tension, Continuity, and Bias. The premise behind TCB motion is that the source image moving in 3D space has mass, which prevents it from changing direction or speed instantly. DVEOUS must "look ahead" to the next keyframe, and "look behind" to the previous keyframe, to determine how best to pass the image through the keyframes and maintain realistic looking speeds and paths.

There are two independent sets of tension, continuity, and bias values per keyframe for each channel timeline. Transitions between keyframes with different ***TCB*** settings have a linear path to prevent "popping" when changing from one value to another. The motion algorithms are based on matrix math that includes vector calculations and keyframe look aheads. It may be more intuitive to use a physical model to demonstrate the effect of ***TCB*** motion. Although the internal calculations do not work exactly as the model suggests, the results are the same.

For this example, imagine a person running from one place to another, then turning right and heading to a third position. He

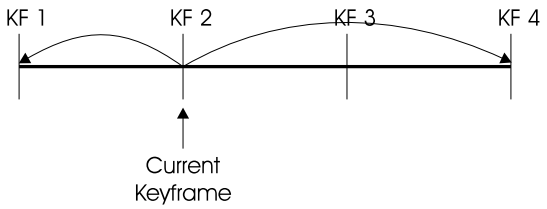


must first accelerate to his maximum speed while heading to the position where he will make the right turn. The shortest distance between two points is a straight line, but if the person is going to make a right turn, he would have to stop forward motion at the second position, change directions, then move forward again. To maintain maximum speed and avoid stopping, the person can veer a little to the left and then back to the right as he approaches the second position; in this way he is already making the right turn and does not need to slow down as much.

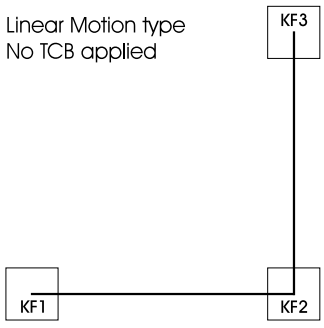
All of this means that the person must look ahead and anticipate the change in direction. In the TCB modes, DVEOUS looks past the keyframe immediately ahead to the one after it, and uses that information to determine the needed path. Also, what happened between the current keyframe and the previous one also affects the current path. This is similar to the person making the right turn not being able to follow a straight path to the third position: the right turn is not complete until sometime after he passes the second position.

DVEOUS uses a four keyframe window in the TCB modes. This is commonly known as a two keyframe "look ahead," but there is also a one keyframe "look behind." In a two keyframe effect, there is nothing to look ahead to; changing the TCB settings has no effect. Acceleration and deceleration do apply, however.

Four Keyframe TCB Window Example

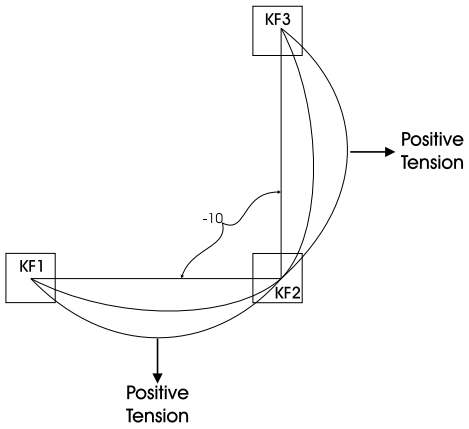


For the purposes of this discussion, we will use a simple effect with three keyframes. The image has been sized and moved as illustrated in the figure below. The TCB values are active on all keyframes. For our physical model, think of the keyframes as blocks of wood, and the path they follow as a flexible cord, such as a garden hose. The first figure shows a linear path for the keyframes.



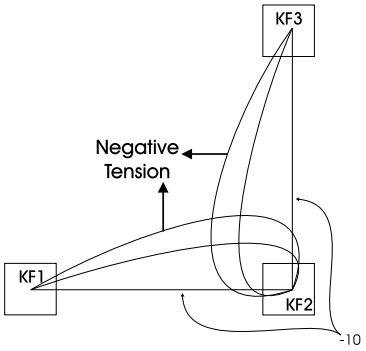
Tension

Adding tension acts like attaching strings to the hose on either side of keyframe 2. We then ask two people to each take a string and pull on it. The default tension value, 7, provides a natural looking path. Increasing the tension value exaggerates the path, and it overreacts to the look ahead. The maximum value is 100.



A value of -10 produces the same effect as the smooth-linear motion type. There is acceleration and deceleration into and out of keyframes, but the path is straight (linear). This is the equivalent of no look ahead. Note that the motion actually stops at each keyframe: with no look ahead, DVEOUS treats each keyframe as if it is the last one. A use for TCB with tension set to -10, instead of the smooth-linear mode, is that you can interpolate to this setting from a different tension value. This is very useful when you want to stop the look ahead smoothly, such as on a keyframe with a pause.

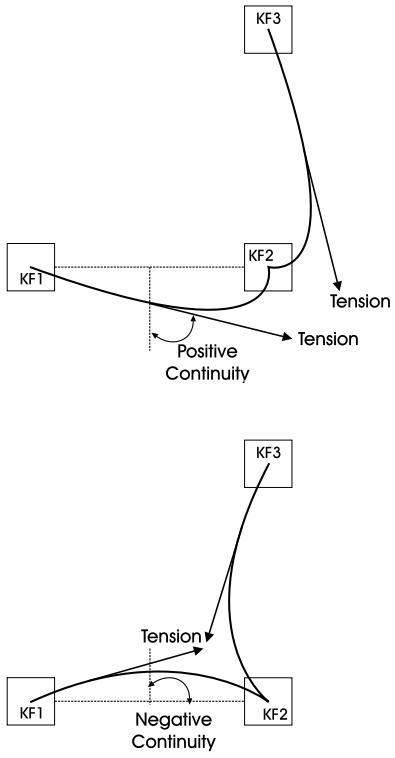
As the values increase in the negative direction, they produce a path that enters and leaves each keyframe in opposite directions than with values above -10. The end of the negative range is -100.



Continuity

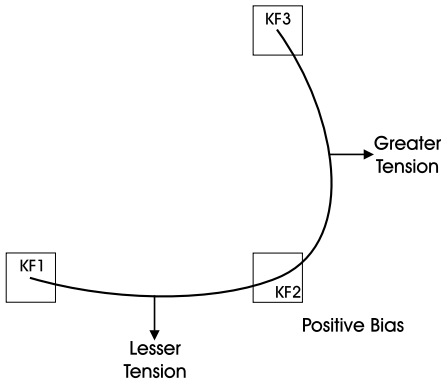
Continuity describes the angle at which we exert tension on the hose with the string. With a zero continuity setting, the string pulls the hose at right angles to the linear path, producing a symmetrical arc. For this example, only keyframe 2's continuity setting is changed. Positive continuity values angle the pulling force toward the outside of keyframe 2. Negative continuity settings angle the pulling force toward the inside of keyframe 2.

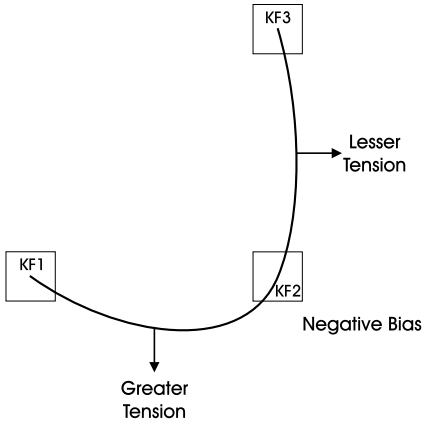
The tension setting also affects the continuity changes. Setting tension to -10 causes the continuity settings to have no effect.



Bias

The bias setting determines how much tension (pulling force) applies to each hose, as though the people pulling the strings had unequal strengths. A zero bias setting distributes the pulling force equally between both hoses. Positive bias settings increase the pulling force after keyframe 2, with a corresponding decrease before the keyframe. Negative bias settings increase the pulling force before keyframe 2, with a corresponding decrease after the keyframe.





In the example of the person running through a right turn, bias settings effectively determine how much of the turn is complete by the second point. With bias at 0, half the turn is complete. With a positive bias, less than half the turn is complete at the second point. With a negative bias, more than half the turn is complete.

The tension setting also affects bias changes. Setting tension to -10 causes the bias settings to have no effect. You can use bias and continuity independently of each other.

Using TCB 1 and TCB 2

The previous discussions dealt with a very simple effect that used position changes only. In building effects that use position, rotate, and size changes at the same time, you will find achieving the exact motion path you need is a little more complex.

Rotate parameters are notorious for causing unwanted movement in an effect. Setting tension to -10 removes the unwanted motion, but also affects position and size changes. Normally, only the rotate look ahead is incorrect, and is the only parameter that needs the -10 tension setting.

All parameters that can use the TCB 1 mode have it enabled by default. TCB 2 lets you use two TCB settings in an effect at the same time: one TCB setting on some parameters, the other TCB setting on others. In the above example, setting the tension on TCB 2 to -10 and assigning it to the rotate parameters eliminates the rotate look aheads, but lets the position and size operate in the normal TCB 1 tension, 7.

Smooth

The smooth path mode uses a look ahead over the entire effect to calculate the motion path, and creates the smoothest path possible for both motion and time.

For example, when using TCB, a Z rotate in keyframe 3 of a six keyframe effect affects the path from keyframes 2 through 5 (the four keyframe window). In smooth mode, the rotate affects the paths of all six keyframes, with less impact on the keyframes further from the actual rotate.

Section 8

Saving and Recalling Effects

Overview

You can store effects in DVEOUS' on-line memory, and archive and restore effects to and from floppy disk. This section discusses both the on-line effect memory and the floppy disk.

The battery backed up memory lets you store 100 effects on-line, using a pool of approximately 900 keyframes with the standard 1MB memory, or about 2200 keyframes with the optional 2MB memory. In either case, the maximum number of keyframes per effect is 300.

> **NOTE: Each keyframe in each channel uses a keyframe from the system pool. This means that when you create an effect by inserting four keyframes into five channels (1A, 1B, 2A, 2B, and global), you actually use 20 keyframes from the pool.**

Use the Disk menu to save and recall files to and from floppy disk. DVEOUS has a built-in 3.5" floppy disk, located on the right side of the Control Panel. You can also add an optional external floppy drive, which is useful if your Control Panel is mounted in a console that covers the integral disk drive. You can store effects and engineering setup files to floppy disk.

The floppy drive supports 1.44MB and 720KB floppy disks. Floppy disks are in the MS-DOS format, letting you manage files off-line on a personal computer. Because you can save engineering setups and effects to disk, you can precisely recreate DVEOUS setups easily. Also note that you should always back up setup and effect files to disk before performing a system update or removing the main board from the Main Chassis.

> **NOTE: If you connect an external floppy drive to the Control Panel, you must reboot the Control Panel for it to recognize the new drive. Also, if you disconnect an external drive, you must reboot the Control Panel so that it does not default to the external drive when you access the Disk menu.**

On-Line Memory

Saving and Recalling Effects

After you create an effect, you can save it for later use. When you create an effect, it sets aside part of the system keyframe pool for that effect. You can save up to 100 effects in on-line effect registers, with a maximum of 300 keyframes per effect.

Save the effect in the workspace to an on-line register as follows:

STEP 1: Enter an effect register number (0 - 99) in the numeric keypad.

STEP 2: Press the **SAVE EFFECT** button in the Effect area of the Control Panel.

If you enter an effect register number that already contains an effect, one of two things happens. If the existing effect does not have the protect flag enabled, the workspace effect overwrites the one in the register. If the existing effect does have the protect flag enabled, DVEOUS does not save the workspace effect, and does not overwrite the existing effect. A prompt tells you that the register is protected.

Recall an effect from an on-line register to the workspace as follows:

STEP 1: Enter an effect register number (0 - 99) in the numeric keypad.

STEP 2: Press the **RECALL EFFECT** button in the Effect area of the Control Panel.

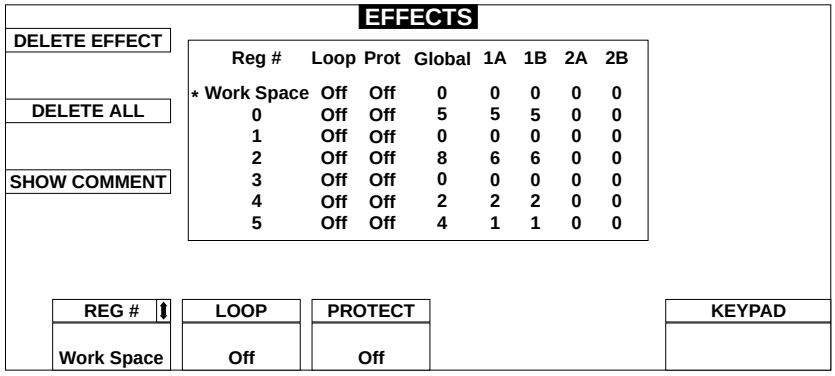
The effect is now in the workspace, where you can run and edit it.

The Effects Menu

You can use the Effects menu to browse the on-line effects registers, enable/disable the loop and protect flags, add comments to the effects, and delete effects. Bring up this menu by pressing the **SAVE EFFECT** or **RECALL EFFECT** button in the Effect area of the Control Panel. Note that if there is a number in the keypad buffer, DVEOUS saves or recalls that effect register number, and the menu does not appear. Be sure the keypad buffer is empty before trying to bring up this menu.

The display in the Effects menu shows information about the workspace effect and the on-line register effects. The first column lists the register numbers, and the asterisk (*) pointer indicates the current effect register in the list. The softknobs also indicate the status of the current effect register.

The second column indicates whether the loop flag is on or off for the effect. With it on, when you recall and run the effect, it runs from the first keyframe to the last, then returns to the first keyframe, runs again, and so on until you press the **PAUSE** button to stop it.



The Effects Menu

The third column indicates whether the protect flag is on or off for the effect. If on, DVEOUS does not overwrite the effect if you try to save the workspace effect to the register, and does not delete the effect if you use ***Delete Effect*** or ***Delete All***.

The other columns indicate how many keyframes there are in the effect on each channel.

The Loop and Protect Flags

You can enable / disable the loop and protect flags for an effect in an on-line register as follows. Note that you can set the workspace effect to loop, but you cannot enable the protect flag for it.

STEP 1: Bring up the Effects menu.

STEP 2: Move the pointer to an effect register. You can do this three ways:
Use the **Reg #** softknob to scroll the list and move the pointer.
Enter a register number in the numeric keypad and press the **A** keypad softkey (the workspace register number is -1).
Move the joystick up and down to scroll the list and move the pointer.

STEP 3: The **Loop** and **Protect** softknobs indicate the flag status for the currently select effect register. Use the softknobs to change the flag settings. Both toggle ***On*** and ***Off***.

Deleting On-Line Effects

You can delete the current (unprotected) effect, or all (unprotected) effects from the register(s) as follows. This is a handy way to to free up keyframes for building new effects, and to perform general housekeeping.

STEP 1: To delete one effect, move the pointer to its register. You can do this three ways:
Use the **Reg #** softknob to scroll the list and move the pointer.
Enter a register number in the numeric keypad and press the **A** keypad softkey.
Move the joystick up and down to scroll the list and move the pointer.

STEP 2: Press ***Delete Effect*** to delete the effect in the currently selected register, or ***Delete All*** to delete all effects in unprotected registers.

STEP 3: DVEOUS prompts you to confirm the deletion by holding down the **CLEAR** button and pressing the softkey again. Press and hold **CLEAR**, then press the softkey used in step 2. DVEOUS deletes the unprotected register(s), and prompts that protected registers were not deleted. To delete an effect in a protected register, first use the **Protect** softknob to turn the register's flag **Off**.

Effect Comments

DVEOUS lets you add comments to on-line effects registers to make identifying them easier. You can add your own comment to an on-line effect, or let DVEOUS add the default comment. If the register has no keyframes, the default comment is "no keyframes." Otherwise, the comment is the register number and the date and time you first saved the effect. When you save a register to floppy disk, you can save it with the same comment, or change it before saving. You can use the Effect menu or the Disk menu to change an effect register's comment. You can use any character for a comment, and comments can be up to 80 characters long.

STEP 1: Bring up either the Effect Menu or the Disk menu. If you are using the Disk menu, toggle the ***Disk*** softkey to ***Save*** (***Recall*** mode lets you view comments on disk files, but you cannot change them).

STEP 2: Use the **Reg#** softkey to select the register you want to change the comment for.

STEP 3: Press the ***Show Comment*** softkey. It changes to ***Set Comment***, and the **Letter** softknob appears. The register's existing comment also appears.

STEP 4: Use the **Letter** softknob or a PC/AT compatible keyboard connected to the Control Panel Keyboard port to change the comment. If you do not have a keyboard, select the character with the softknob, then press the **D** keypad softkey to enter the letter at the current cursor location. Move the cursor with the joystick to insert characters between existing ones. You do not have to use the **D** keypad softkey when entering numbers in a comment. The first time you press **D**, it erases the existing comment so that you can enter the

new comment. You can also erase the existing comment by pressing **CLEAR**.

STEP 5: Press **Set Comment** again to add the comment to the effects register.

> **NOTE: When you use the Disk menu, DVEOUS writes the existing register comment to the disk when it saves the disk file. Set the comment before saving the register to disk.**

You can view disk file comments on a DOS compatible PC by inserting the disk in the PC floppy disk drive and entering the command

```
type filename.ext
```

at the prompt. Be sure to use the actual file name and extension when entering this command, which displays the comment saved with the file.

The Disk Menu

Press the **DISK** button to bring up this menu, which controls all floppy disk functions, including naming, saving, recalling, copying, and deleting files, and formatting disks.

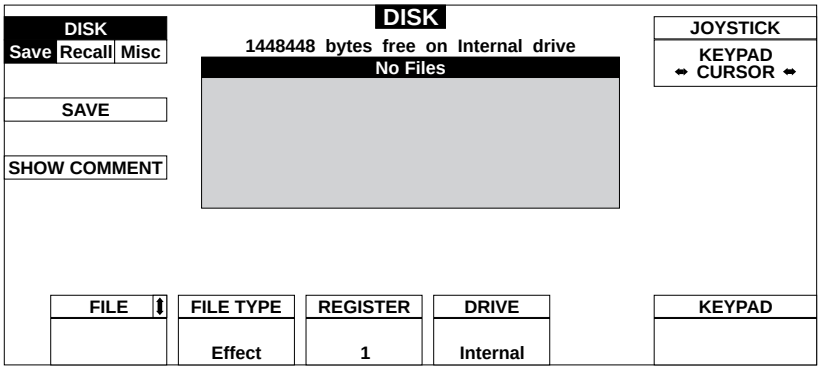
Formatting a Floppy Disk

If you have a new or unformatted floppy disk, you must format it before DVEOUS can save files to it. You can use a DOS compatible PC or the DVEOUS Control Panel. The floppy drive supports 1.44MB and 720KB DOS format floppy disks. Format a floppy disk with DVEOUS as follows:

STEP 1: Insert the floppy disk you want to format into the Control Panel or (optional) external floppy drive.

STEP 2: Press the **DISK** menu button, then toggle the ***Disk*** softkey to select ***Misc***. This brings up new softkey labels.

STEP 3: Toggle the ***Action*** softkey to select ***Frmt***.



The Disk Menu

STEP 4: Use the **Drive** softknob to select the drive with the floppy. (It defaults to the internal drive unless there is an external drive connected, in which case it defaults to the external drive.)

> **NOTE: Formatting a disk erases any information stored on it. Be sure the floppy does not contain files you want to keep, and that you have selected the correct drive, before formatting a floppy disk.**

STEP 5: Press the ***Confirm Format*** softkey. DVEOUS formats the floppy disk, and a meter indicates the progress. There is an ***Abort*** softkey you can use to stop the formatting before it is complete. When it is finished, DVEOUS prompts "***Successfully Formatted Disk***."

Saving Files to Disk

You can save effects and setup files to floppy disk. When DVEOUS saves an effect register to disk, it saves the current effect comment. You can use the Disk menu or the Effect menu to change a register comment before saving it. See the discussion on effect comments earlier in this section for more details. Also, DVEOUS stamps disk files with the current time and date. If your DVEOUS is new, you may want to set the time and date before saving files to disk. See the discussion on setting the time and date at the end of this section.

This example shows how to save an effect register to a formatted floppy disk:

STEP 1: Press the **DISK** menu button, then toggle the ***Disk*** softkey to ***Save***.

STEP 2: Insert a formatted floppy disk in the drive.

STEP 3: Use the **Drive** softknob to select the disk drive with the floppy.

STEP 4: Use the **File Type** softknob to select **Effect**. There are two types of files you can save to disk:
Effect: Saves an effect from on-line memory to the floppy disk.
Setup: Saves the current setup parameters to floppy disk. This includes the Input Setup, and Output Setup, Remote Setup, Engineering, and Remote Enable menu settings. The only exception is panel setups in the Engineering menu. These are saved to a flash EEPROM in the Control Panel itself.

STEP 5: Use the **Register** softknob to select the effects register you want to save to disk. Note that you can save the workspace effect (register -1).

STEP 6: Press the ***Save*** softkey.

STEP 7: DVEOUS prompts for a file name, which you must enter before DVEOUS can save the file to disk. The keypad buffer is now a naming box, with a cursor, you can use to enter the file name. The file name can be up to eight characters long. You can use an (optional) external AT type PC keyboard to name the file, or the DVEOUS menu. Use the menu to name the file as follows:

Use the **Letter** softknob to select a character , then press the **D** keypad softkey to enter the letter at the current cursor position. You can use the letters A-Z, the _ (underscore) and - (dash) symbols, and any number in the numeric keypad. (Note that you do not have to press the **D** softkey when entering numbers in the keypad.)

The **Letter** softkey also has a **Backspace** setting. Select this and press the **D** keypad softkey to back up through the name and delete characters. Also, you can move the joystick right and left to position the cursor in the file name. This lets you insert or delete characters in the existing name.

Note that when DVEOUS is in file naming mode, the **PATH**, **ALIGN**, and **TRIM** buttons have no function. DVEOUS prompts you to clear the keypad buffer if you try to name a file with one of these functions in the buffer.

Also, the keypad buffer displays the file name currently selected in the file list. When you press the ***Save*** softkey, the current file name appears in the keypad buffer, and DVEOUS prompts to confirm that you want to overwrite it. Entering a new name in the buffer clears it and the overwrite prompt.

Do not enter extensions in file names. DVEOUS automatically adds the extension EFF to effects files and ENG to setup files, and only recognizes files with those extensions.

STEP 8: Press the ***Confirm Save*** softkey. DVEOUS saves the file to the floppy disk, and a meter indicates the progress. There is an ***Abort*** softkey you can use to stop the save before it is complete. When it is finished, DVEOUS prompts "***Successfully Saved File***."

Recalling Files from Disk

After saving them to disk, you can recall effect and engineering setup files. This example shows how to recall an effect from the floppy disk to an on-line effects register:

STEP 1: Insert the floppy disk with the effect file in the floppy drive.

STEP 2: Press the **DISK** menu button, then toggle the ***Disk*** softkey to select ***Recall***. This brings up new softkey labels.

STEP 3: Use the **Drive** softknob to select the disk drive with the floppy. A list of the files on the floppy disk appears in the menu.

STEP 4: Use the **File Type** softknob to select **Effect**. In this mode, the display only lists effect files on the floppy (those with the EFF extension). Selecting **Setup** lists only the setup files on the floppy (those with the ENG extension). To view all the files on the floppy, select **All** with the **File Type** softknob.

STEP 5: Use the **File** softknob to move the highlight in the file list and select the file you want to restore. The softknob label also indicates the currently selected file. You can use the ***Show Comment*** softkey to read the comment attached to the currently selected file.

STEP 6: By default, the **Register** softknob reads **Original**. You can restore the effect to the register you saved it from, or use the softknob to select another register or the workspace. If you select register with a protected effect, DVEOUS does not restore the file, and prompts you that the register is protected.

STEP 7: Press the ***Recall*** softkey, then the ***Confirm Recall*** softkey. DVEOUS recalls the file to the selected register, and a meter indicates the progress. There is an ***Abort*** softkey you can use to stop the recall before it is complete. When it is finished, DVEOUS prompts "***Successfully Recalled File***."

Copying and Moving Files

You can use DVEOUS' floppy drive to manage effect and setup files on floppy disk. Because DVEOUS writes files in the DOS format, you can also use a personal computer for managing files.

The following example shows how to copy a file on the floppy disk. The difference between copying and moving a file is that copying makes a copy of the source file, and moving it simply renames the source file. Also, you can copy files between two floppy drives, but moves work only on a single floppy drive.

STEP 1: Insert the floppy disk with the file you want to copy into the Control Panel or (optional) external floppy drive.

STEP 2: Press the **DISK** menu button, then toggle the ***Disk*** softkey to select ***Misc***. This brings up new softkey labels.

STEP 3: Toggle the ***Action*** softkey to select ***Copy***.

STEP 4: Use the **File Type** softknob to select the type of file list. Setting it to **Effect** lists only the effect files on the floppy (those with the EFF extension). Setting it to **Setup** lists only the setup files on the floppy (those with the ENG extension). Set the softknob to **All** to list all the files on the floppy, regardless of their extension.

STEP 5: Use the **File** softknob to move the highlight in the file list and select the file you want to copy. The softknob label also indicates the currently selected source file name.

STEP 6: Use the **DEST DRIVE** softknob to select the target drive for the copy. (With ***Move*** highlighted, this softknob does not appear; moves rename the file on the same floppy disk.)

STEP 7: If you want to give the new file a different name, use an external keyboard or the DVEOUS menu, as outlined in the example of saving files to disk earlier in this section.

STEP 8: Press the ***Confirm Copy*** softkey. DVEOUS copies the file from the source to the target drive, and confirms when it is finished.

Note that if you use ***Move*** instead of ***Copy***, DVEOUS prompts for the new file name.

Deleting Files from Disk

This example shows how to delete an effect file from a floppy disk using the DVEOUS Control Panel.

STEP 1: Insert the floppy disk with the file you want to delete into the Control Panel or (optional) external floppy drive.

STEP 2: Press the **DISK** menu button, then toggle the ***Disk*** softkey to select ***Misc***. This brings up new softkey labels.

STEP 3: Toggle the ***Action*** softkey to select ***Del***.

STEP 4: Use the **Drive** softknob to select the drive with the floppy. A list of the files on the floppy disk appears in the menu.

STEP 5: Use the **File Type** softknob to select the type of file list. Setting it to **Effect** lists only the effect files on the floppy (those with the EFF extension). Setting it to **Setup** lists only the setup files on the floppy (those with the ENG extension). Set the softknob to **All** to list all the files on the floppy, regardless of their extension.

STEP 6: Use the **File** softknob to move the highlight in the file list and select the file you want to delete. The softknob label also indicates the currently selected file name.

STEP 7: Press the ***Confirm Delete*** softkey. DVEOUS deletes the file, and a meter indicates the progress. There is an ***Abort*** softkey you can use to stop the deletion before it is complete. When it is finished, DVEOUS prompts "***Successfully Deleted File***."

Setting the Date and Time

DVEOUS uses an internal battery backed up clock to stamp files when you save them to floppy disk, and to set the default comments for on-line effects registers. If your unit is new, it is a good idea to check that the system clock is set to the current date and time. Set the system clock as follows:

STEP 1: Press the **DISK** menu button, then toggle the ***Disk*** softkey to select ***Misc***. If ***Misc*** is already highlighted, be sure the ***Disk*** softkey is also highlighted; the clock settings do not appear if ***Action*** is highlighted.

STEP 2: Toggle the ***Set Clock*** softkey to select ***Time***. This brings up the **Hour**, **Minute**, and **AM_PM** softknobs.

STEP 3: Use the softknobs or the numeric keypad to set the current time.

STEP 4: Toggle the ***Set Clock*** softkey to select ***Date***. This brings up the **Month**, **Day**, and **Year** softknobs.

STEP 5: Use the softknobs to set the current date. Note that you can set any year from 1980 to 2079.

Once you set the system clock, it automatically keeps time from that point on.

Appendix A

Glossary

The following is an alphabetized list of terms commonly used with DVEs in general, and DVEOUS specifically.

3D (Three-Dimensional) Space

The space in which a DVE locates and rotates the source plane. The horizontal axis is indicated by an H value, the vertical axis is indicated by a V value, and the depth axis is indicated by a Z value.

4:2:2

An abbreviated way of noting the sampling rate ratios of a standard component digital video signal. The numbers refer to the three component channels (Y, P_b, and P_r), and specify the Y (luminance) channel is sampled four times in a given time period, and the P_b and P_r channels are sampled twice each.

Sometimes noted as 4:2:2:4, which includes a monochrome key (also known as matte or alpha) channel sampled at the same rate as the Y channel.

4:4:4

An abbreviated way of noting the sampling rate ratios of a high-resolution component digital video signal used in the graphics environment. The numbers refer to three component

channels (either Y, P_b, and P_r, or R, G, and B), and specify that the three channels are sampled at the same rate.

Sometimes noted as 4:4:4:4 or 4x4, which includes a monochrome key (also known as matte or alpha) channel sampled at the same rate.

ASIC

Application **S**pecific **I**ntegrated **C**ircuit. Using ASICs in DVEOUS makes for a lot of processing power in a small space with relatively few discrete electronic components.

ASPIK™

Adaptive **S**ub **P**ixel **I**ntelligent **K**eying (a trademark of Abekas Video Systems). A key edge shaping process developed by Abekas to reduce the stair stepping and ringing sometimes encountered in digital keyers.

Border

A "frame" that you can apply to the edges of the transformed image. The border starts at the outer image edges and can be set to any width, including full field. In Video / Video mode, you can apply a border on the outside of the image by setting the crop values outside the image. A color matte generator provides the border fill.

Buffer, Undo

Memory that stores a copy of the current effect before the last change made. DVEOUS saves changes you make to the current setup in the undo buffer. Pressing the **UNDO KF EDIT** button swaps the undo buffer with the workspace. Also, saving the workspace to an on-line effect memory register saves the

previous on-line register contents to the undo buffer. The undo buffer protects you from accidentally editing a workspace keyframe or overwriting an on-line effect register that you wanted to save.

Channel

In digital effects devices, "channel" has traditionally meant a combination of the video and key processing paths, including inputs and outputs. The key processing path, although it processed a second image that was different from the video path, was taken for granted. However, because of the way that DVEOUS processes its inputs, the term "channel" refers to each video path, key path, or shadow path individually. The standard DVEOUS can transform two video channels, a video and a key channel, or a video-key channel plus a shadow channel, and is referred to as a "two channel system" in each case.

Chroma

The part of a modulated (not baseband) video signal that carries only color information. Although technically different from "chrominance" (see below), the terms are generally used interchangeably.

Chrominance

The part of a baseband (unmodulated) video signal that carries only color information. Although technically different from "chroma" (see above), the terms are generally used interchangeably.

Clip

(*noun*) (1) Key Clip: The luminance level in a key signal above which the foreground or key fill video becomes visible over the background video, and below which the background video becomes visible. (2) White or Black Clip: the thresholds between which a video signal passes transparently, but above or below which they are limited, or "clipped."

(*verb*) (1) Key Clip: to set the level at which the foreground becomes visible over the background. Also refers to removing unwanted portions of the key signal by "clipping in" the key. (2) White or Black Clip: to limit the highest or lowest level of a signal to a set threshold; levels in between clip points are unaffected.

Component Video

A generic term for a video format that keeps the luminance and chrominance components of the video signal separate, whether analog or digital. Component video usually delivers a higher quality picture than composite video. Examples of component video are 601, RGB, Y/R-Y/B-Y, YUV, and Y/C. ("D1" is sometimes [incorrectly] used to denote component digital video; D1 is strictly a tape format that was the first of many that record a component digital video signal.)

Composite Video

A generic term for a video format that combines the luminance and chrominance components of the video signal into one video signal, whether analog or digital. Examples of composite video are NTSC, PAL, SECAM, and D2, although D2 is technically a tape format; both D2 and D3 VTRs input and output the same video signals.

Coring

Replacing a specific video level with an internally generated (noise free) signal of the same level. Coring (also called noise coring) is useful when performing a key in matte mode. The video level usually replaced is black, as noise resulting from the matte process tends to be most visible in the black portions of the image.

Corner Pinning

The ability to position each corner of an image independently from the others, usually to cover or replace a similarly shaped object in the background. This means that you can “tack” an image in a four-cornered position that does not conform to the standard 4x3 television picture, such as a parallelogram, trapezoid, or other four sided object.

Crop

To trim the width or height of an image’s key signal to eliminate parts of the image. The unkeyed image itself is not affected; only the key signal is changed, resulting in a change in the keyed image.

Depth Keying

See **Z-Axis Keying**.

Diffraction

Changes in the brightness and color saturation of an image to simulate viewing the image through an aperture or obscuring the image with an object.

DVE

Digital **V**ideo **E**ffects. A device that digitally manipulates video and key signals to create special effects, such as image sizing, moving, and rotating.

Decoder

An electronic device or circuitry that separates luminance and chrominance information from a composite color video signal.

Drop Shadow

A signal derived from the transformed image's key signal that simulates the shadow seen beneath the image if it were actually suspended over a background. By giving the drop shadow transparency and softness, you can create a realistic drop shadow for the transformed image. DVEOUS has controls for manipulating a full bandwidth drop shadow channel independently from the video / key channel.

Effect

A series of keyframes connected sequentially. A DVEOUS effect must have at least one keyframe before you can save or recall it. Each effect keyframe includes source selections, DVE motion parameters, color corrector settings, etc.

Encoder

An electronic device or circuitry that combines luminance and chrominance information to create a composite color video signal.

Field

The series of television lines that make up one vertical scan of a television image. Because a field contains only half the vertical resolution of the original image, two fields are interlaced to produce one television frame. In the 525 line standard, there are 262.5 lines per field, of which nominally 242.5 comprise the active picture; in the 625 line standard, there are 312.5 lines per field, of which nominally 287.5 comprise the active picture.

This also refers to the amount of time required to display a field of video: 16.7 milliseconds in 525, 20 milliseconds in 625. DVEOUS timeline effects recalculate each keyframe parameter once per field.

Flag

A function setting that toggles on and off, or an indicator that shows that a function has been toggled on or off.

Frame

A full vertical resolution television image made up of two fields. There are nominally 485 active lines in a 525 line frame, and 575 active lines in a 625 line frame.

This also refers to the amount of time required to display a frame of video: 33.3 milliseconds in 525, 40 milliseconds in 625.

Framestore

Memory ICs and related circuitry that store one frame of video. DVEOUS' standard Pattern Framestore can store textures and test patterns. The optional Target Framestore is used for recursive effects such as trails, sparkles, and montages. It has both video

and key inputs, and stores depth information: the live inputs can be over or under the recursive effect.

Gain

(1) In general, the intensity or level of a video signal, either luminance, chrominance, or both. In component video, gain is usually measured in millivolts (mV). The gain of a 100 percent color bar signal (either YUV or RGB) is defined as 700 mV peak-to-peak for all three channels.

(2) In a keyer, "gain" refers to the hardness of the edges of the processed key signal; the higher the gain, the harder and more unnatural the key edge.

Gamma

A correction signal applied in television cameras to compensate for non-linearities in television receiver picture tubes. In the DVEOUS color corrector option, it is an adjustment that gives lighter or darker areas of an image more contrast. A gamma of less than one "stretches" the darker portions of the image and "compresses" the lighter portions of the image, using the knee point as the dividing line between light and dark. A gamma of greater than one "stretches" the lighter portions and "compresses" the darker portions as determined by the knee point. The reTouch™ color corrector option lets you adjust the red, green, and blue gamma (or luminance and chrominance gamma) of an image independently. See **Knee**.

Global

The ability to apply "downstream" motion parameters to one or more channels simultaneously. As a simple analogy, think of two connected DVEs where the output of the first feeds the input of

the second: the first DVE controls the local motion, the second DVE controls the global motion.

GPI

General **P**urpose **I**nterface. An electrical pulse used to trigger a specific function in another device. DVEOUS has input GPIs to let an external device trigger an internal function, and output GPIs to trigger a function in an external device. You can select input GPI functions in a setup menu; output GPIs are programmable as keyframe flags.

Key

A multiplicative and additive process that superimposes, or layers, a foreground image over a background image. A monochrome key signal effectively "cuts a hole" in the foreground and background images so that the two fit together when combined. The key signal can be derived from the luminance portion of the foreground (self-key or luminance key), from the chrominance portion of the foreground (chroma key), or it can be an independently generated signal specifically intended to be a key signal (external key, sometimes known as a linear key).

The luminance level of the derived key signal determines what is visible in the combined foreground and background image. Where the key signal is white, the foreground appears fully opaque; where the key signal is black, the background appears fully opaque. Where the key signal is a shade of gray, the foreground and background images mix in direct proportion to the gray scale level of the key signal.

(*verb*) To set up and perform a key effect.

Key, Linear

In general, a high quality keying process that faithfully reproduces all the subtle gray scale levels of a key signal, instead of distinguishing only between black and white. Both luminance keys and chroma keys can be linear keys.

Key, Luminance (Luma)

A type of key that uses the luminance (brightness) portions of a foreground image to derive a key signal. Usually, the brightest portions of the foreground are used to "cut a hole" in portions of the background and the foreground so that the two fit together when combined.

Key, Self

A type of key that uses the foreground image as both the key source and fill. A chroma key is almost always a self key, while a luma key is usually performed as a self key only when a linear key signal is not available.

Keyframe

A "snapshot" of all DVE parameter values, flag settings, and source selections.

Keyframe, Current

The keyframe that defines all the current parameter values and flags. When you press **START (REW)** to rewind an effect, the current keyframe is keyframe 1. If you pause an effect between keyframes 3 and 4, for example, keyframe 3 is the current keyframe. At the end of an effect, the last keyframe is the current keyframe.

Keyframe, Default

A user-defined keyframe with parameter values, flag settings, and source selections that you set as defaults.

Keyframe, Factory Default

A keyframe with all parameters set to the factory default (normal) values. If you enter your own default keyframe setting and later clear it, the factory default keyframe replaces it. Pressing **NORMAL — NORMAL — NORMAL — ENTER** erases the keyframe buffer and replaces it with the factory default keyframe.

Knee

The luminance level that defines the light and dark areas of an image for gamma correction. Parts of the image brighter than the knee point are considered the light areas; parts of the image darker than the knee point are considered the dark areas. DVEOUS' reTouch color corrector lets you change the gamma correction knee point for red, green, and blue (or luminance and chrominance) independently. See **Gamma**.

Light Source Modeling

This is part of DVEOUS' SurfaceFX feature. It has three-dimensional control of a light source to create lighting for images. Each channel can have separate light effects. The light source positions are in 3D space, and you can select a spot, bar, or flood light effect. You can also adjust the highlight and lowlight color and opacity. When used with warp patterns, the light source casts a true 3D light onto the warped surfaces, creating both highlight and lowlight effects on the shapes. All lighting effects also interact with texture mapping. See also **Diffraction** and **Specular**.

LINC™

Locally **I**ntegrated **N**ode **C**ontrol (a trademark of Abekas Video Systems). This Abekas control protocol uses RS-422 serial communications to let you control DVEOUS as part of a switcher (ASWR8100, A83, etc.) timeline effect.

Line

A single horizontal scan of a television image. In component digital video, there are 858 pixels per line in the 525 line standard, and 864 pixels per line in the 625 line standard; 720 pixels comprise the active picture line length in both line standards.

This also refers to the amount of time required to display a line of video: 63.556 microseconds in 525 and 64.000 microseconds in 625.

Luma

The part of a modulated (not baseband) video signal that carries only brightness or gray scale information. Although technically different from "luminance" (see below), the terms are generally used interchangeably.

Luminance (Luma)

The part of a baseband (unmodulated) video signal that carries only brightness or gray scale information. Although technically different from "luma" (see above), the terms are generally used interchangeably.

Matte Mode

A process similar to keying, except that only the background image is processed by "cutting a hole" out of it; the foreground

image is not processed before combining it with the background. This mode creates more realistic looking foreground edges, but requires a preprocessed or "shaped" foreground image to work properly. When DVEOUS is set to unshaped mode, its video output is intended for use in normal keyer. When set to shaped mode, its video output is already shaped, and should be used in matte mode to avoid key edge artifacts introduced by the "double keying" process. DVEOUS' optional channel outputs are always in unshaped mode.

Mosaic

A type of image processing that reduces image resolution by artificially enlarging a single pixel and discarding all surrounding pixels. The larger the remaining pixels are, the more original pixels are discarded, and the lower the image resolution.

Multichannel

Multichannel systems in the past always referred to the video channels, with the key channels implied. Thus, a four channel system had four video paths and four key paths. DVEOUS can be considered a multichannel system in its standard configuration, because both channels can process video, though input key signals are not supported in this mode. However, this same configuration can support one video and one key channel or one video-key combination channel and one shadow channel.

Offset (Color Corrector)

Similar to black offset or DC offset in an analog color corrector. DVEOUS' reTouch color corrector option has individual red, green, and blue, or luminance and chrominance, offsets that you can adjust independently or simultaneously.

Offset (Timeline)

The timing of the timeline for one channel relative to another. Adjusting a timeline's offset moves its start and end times relative to other timelines in the same effect.

Oversampling

A process that effectively increases the video bandwidth by synthesizing new pixels between existing ones. DVEOUS uses 2x oversampling in some key and color corrector modes.

Parallel Digital

The physical interface between digital video devices that uses a 25 pin cable to carry the signal. Its advantages over serial digital video are simplicity and lower design costs. Its biggest disadvantages are its 165 foot (50 meter) cable length limit and the cost of parallel cable versus coaxial cable. Longer cable runs may require additional hardware to equalize the digital video signal. All else being equal, however, there is no image quality difference between parallel digital video and serial digital video. The CCIR 601 and SMPTE 125M documents describe the component digital video standard. Also see CCIR 656 for the parallel digital interface.

Parameter

A control with a numeric value. Each parameter has a range of values. Parameters typically change or interpolate values from one keyframe to the next on a field-by-field basis.

Pixel

PIcture **EL**ement. The basic unit of a television image. In component digital video, there are 720 pixels in an active television line, yielding roughly 700,000 active pixels per frame in 525, and roughly 830,000 active pixels per frame in 625.

In 8-bit digital video, each pixel is represented by one 8-bit data "byte"; in 10-bit digital video, each pixel is represented by a 10-bit data "word." Because a pixel is, in reality, just a number, it can be processed, copied, manipulated, or stored, just like any other computer data.

Planar, 3D

Linear transformations applied to a two-dimensional image in three-dimensional space that keep the image itself two-dimensional.

Priority

Indicates which DVE channel is "on top of," or has priority over, the other. One channel always has priority over the other, even if neither is visible in the combined output.

RGB

Red **G**reen **B**lue, the three primary colors in television images. RGB video consists of three separate signals that can be transcoded to luminance and color difference (Y/R-Y/B-Y) or encoded to composite video.

Register, Effect

Memory that stores a previously built effect. Recalling an effect register clears the workspace and loads the contents of the register into the workspace, where you can run or edit the effect.

Rounding

In general, a process in which digital signal data is "rounded off" to decrease the number of bits. DVEOUS, which maintains full 10-bit digital video throughout, lets you "round off" its digital outputs to 8-bit video to accommodate 8-bit recording or processing devices.

reTouch™

Abekas Video Systems' trademarked color corrector option, with which you can simultaneously color correct up to four independent sources.

Sample Rate

The rate at which a video signal has been sampled for digitization, normally stated in Megahertz (MHz). DVEOUS processes component digital video where the luminance component has been sampled at 13.5 MHz and the chrominance components have each been sampled at 6.75 MHz.

Serial Digital

The physical interface between digital video devices that uses a standard 75-ohm coaxial cable to carry the signal. The main advantage of serial digital over parallel digital is that it can handle long cable lengths with less expensive cable. Its main disadvantage is the higher cost of converting digital video from serial to parallel or vice versa, since most digital video equipment

processes video internally in parallel form. All else being equal, however, there is no image quality difference between serial digital video and parallel digital video. The CCIR 601 and SMPTE 125M documents describe the component digital video standard. Also see SMPTE 259M for the serial digital interface.

Shot Box

A small Control Panel used on-air for recalling and running effects. Its buttons duplicate those in the On-Air and Timeline Control areas on the main Control Panel. It lets you directly access any effect and any keyframe in an effect.

Skew

A DVE transformation that slants the image along its horizontal or vertical axis.

Source Image

The image that DVEOUS manipulates on the source plane.

Source Plane

A theoretical two-dimensional plane of virtually infinite horizontal and vertical proportions onto which DVEOUS positions and sizes the source image.

Specular

A reflected highlight, usually a small bright spot that reflects the actual light source. DVEOUS' lighting model can create specular highlights that simulate a light source shining on the image.

Spline

Originally from the graphics industry, a spline is a flexible tool used to draw curves. DVEOUS calculates its own "spline" to make curved motion paths for its transformed images.

SuperMatte

A standard DVEOUS feature that lets you create a two color wash with a dedicated pattern generator that transitions from one color to the other. The SuperMatte generator is available as a source just like an input.

Target Framestore

An optional recursive (recirculating) framestore over or under which you can key the "live" image. Target Framestore effects include trails with variable decay, sparkles with variable size and intensity, motion blur, and montage (drops) with selectable priority for live video over or under existing drops.

Target Space

A two-dimensional window with the same 4:3 aspect ratio as a television monitor, through which you view the three-dimensional source space. The window limits the overall space that you can view, causing the source image to be repositioned horizontally or vertically. DVEOUS can also expand or shrink the image within the television screen. Target is often used as a final image sizing or moving function.

TCB (Tension, Continuity, Bias)

The motion parameters for an image moving along a path defined by keyframes. Tension controls the tension vector length, continuity controls the path angle, and bias controls the image movement between keyframes.

Texture

The process of applying the look of a three-dimensional surface to a two-dimensional planar or warped image. DVEOUS uses the Texture Framestore or a live video input, which contains the 3D surface, and applies it to the 2D image.

Time, Current

The elapsed time from the start of the effect to the current keyframe. For example, a current time of 01:23:12 indicates an effect is currently one minute, twenty-three seconds, twelve frames away from the start point of 00:00:00 (zero minutes, seconds, and frames). There is only one current time for all timelines.

TimeFrame™

Abekas Video Systems' trademarked effects editing software.

Timeline

A graphic indication of a keyframe sequence as they occur in time, from the first keyframe to the last keyframe. A timeline by itself can be an effect, or a group of timelines can be combined into a single effect. You can run a timeline effect from the Control Panel, remotely from the RS-422 serial communications ports, or by GPI input.

Transcode

To convert component video from RGB format to luminance and color difference (Y / R-Y / B-Y) format, or vice versa.

Transform

To change the spatial orientation of an image, or the space containing that image, in reference to a fixed point of view.

Warp

To bend, turn, twist, or split an image in a non-linear (curved) fashion.

Workspace

The current status of the DVEOUS system, updated every field. Any change to a parameter, flag, or source selection on the Control Panel changes the workspace. You can think of the workspace as a palette where you create a keyframe before making it part of an effect. Pressing the **INSERT NEXT** or **INSERT** button inserts the workspace into an effect. Pressing the **START (REW)**, **END (FF)**, **PREV**, **NEXT**, **REV**, or **RUN** button updates the workspace. For example, pressing the **START (REW)** button copies an effect's first keyframe to the workspace, making it the current keyframe. Pressing **RUN** runs an effect and copies the "in between" current keyframes to the workspace every field.

YUV

The native format of component video; also known as YP_bP_r or Y/B-Y/R-Y. "Y" represents the brightness or luminance component of the video signal; "U" represents the B-Y axis of the chrominance component; "V" represents the R-Y axis of the chrominance component. YUV video consists of three separate signals that can be transcoded to RGB or encoded to composite video. In the Betacam®, Betacam® SP, and MII® videotape formats, the three component video input/output connections are labeled "Y," "R-Y" (the V component), and "B-Y" (the U component).

Z-Axis Keying

A keying process that defines layering priority. The layer closest to the viewer covers, or has a higher priority than, the other layers. Depth or Z information is similar to a key signal: the higher the luminance level of the Z data, the higher the priority of the image. This data is used to simulate intersecting planes and objects by assigning different priority values to different parts of the images.