K2-H Application White Paper:
Grass Valley K2™ Servers with Editware Fastrack™

Hybrid Linear / Non-linear GUI based editing for Post & Live Production, News, Sports and Broadcast applications and Fast or Real-time Turnaround.

INTRODUCTION

Since the days of the first non-linear editing system, the CMX-600, the distinction between linear and non-linear editing has been defined by the employed media; that is, did you record on videotape or did you record onto a disk drive.

Linear editing is characterized by an interconnected collection of devices including an edit controller, VTRs, mixer and switcher, and the building of a show from beginning to end, while ***non-linear editing*** is a self-contained system requiring that all source media be ingested to local desktop or central storage, with the advantage of being able to immediately access any shot and place it on a timeline, in any sequence.

The ***K2-H Hybrid Application*** is the best of these two worlds … a true merging of the two technologies that allow users to employ linear peripheral equipment for real-time effects and speed of completion, or to perform non-linear virtual insert edits into a program, both using a Grass Valley K2 server in place of a record VTR – even if that Program is being aired live or delayed. It is a true hybrid control system.

This paper covers the truly unique hybrid capabilities of the Fastrack K2-H Application, enabled by Editware's Fastrack control engine, Grass Valley's dedicated K2 API, and the implementation of AMP and .NET protocols.

CONTROL

Control of the K2 is via Ethernet, allowing Fastrack to control any K2 channel on the network, even when those K2 servers are already being used with automation and playout systems or other applications, and even when channels are allocated to the K2 AppCenter!

Multiple K2 servers can be connected to one Fastrack … directly or as part of a SAN, and multiple Fastracks can be connected to the same SAN and simultaneously share the same clips.

The Fastrack K2-H comes with 8 (eight) GPIs, plus unlimited "PEGS™" to specify and frame accurately trigger almost any combination of switcher effects, and "STRINGS", which give the user additional flexibility to send out any protocol command string to a device connected through an RS-422 port.

As many as 80 (eighty) server channels can be controlled simultaneously and frame accurately, and the K2-H can be optioned to control and synchronize up to 16 (sixteen) serial devices.

EDITING

There are two types of edits that can be performed with the K2-H application; Linear and Virtual. The resulting "edit master" Clip is referred to by the K2 as a "Program", and this Clip can be viewed, imported and exported by most other applications.

LINEAR EDITS recorded directly to the K2 that include: mixer and switcher transitions, audio or video pre-read, vari-speeds, audio or video key-framing and other effects, are performed in real-time as they are encountered on the Timeline. Sources can be all K2 or a mixture of K2, VTR, other supported

peripheral devices and switcher crosspoints. There is no additional rendering required for VTR, peripheral devices or crosspoint sources.

VIRTUAL EDITS are cuts-only, and are inserted directly and instantly from the Fastrack Timeline into the Record Event with a single keystroke. Once the Virtual edit is performed, that edit is an integral part of the "Program", and no further preparation is required to play, transfer or archive this Master Clip.

The Fastrack K2-H incorporates a full Graphic User Interface. The use of this GUI obsoletes the need to deal with timecode numbers, and makes the editing process a more non-linear "see & hear" process, while still giving the user the proven speed and flexibility of a linear edit system.

The K2-H Application supports an analog or SD/HD preview window on the GUI, dual monitor display, and a text-based Work Bin are provided with a text representation of the entire graphical Timeline. Ten active EDL Bins are also available, selectable with the click of a mouse.

The Fastrack Timeline works by "encounter", left to right. When you preview or record and edit, the Timeline scrolls along. Cuts, transitions and effects are triggered as they are encountered. Edited "programs" can be used at any time as sources, allowing the user to create extensive and complex layering while maintaining dominion over each level.

Editing is performed on the Fastrack by placing Events (clips) on Tracks, similar to an audio sequencer. A Track is a logical device, a means of controlling and displaying a source and related metadata on the Fastrack Timeline, such as a video server channel or VTR, a character generator, switcher crosspoints, etc. Below is an example of an Event and its components.
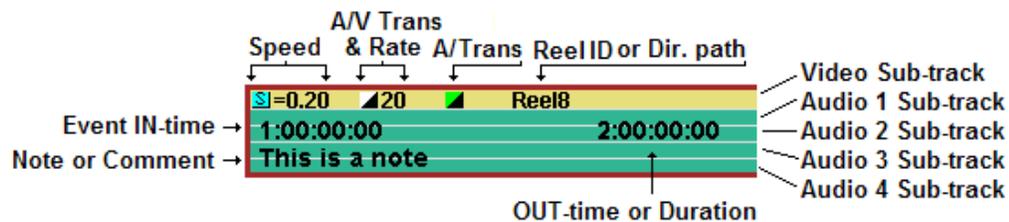
The "Record Event" is basically a graphic representation of a record videotape, and gives the user the ability to visualize insert, assemble and pre-read edits, as well as know at a glance where any edit took place, and find it in the EDL with a click of the mouse.

Each Event placed on a Source Track represents video and up to 8 channels of audio. Record Events on the Record Track represents video and up to 12 channels of audio (device dependent). Only activated sub-Tracks contribute to the end result of the edit. For example, if you are editing to a device with 2 audio channel capabilities, the Record Event might look like the following example.

**AN EXAMPLE OF A RECORD EVENT BEFORE EDITING:**
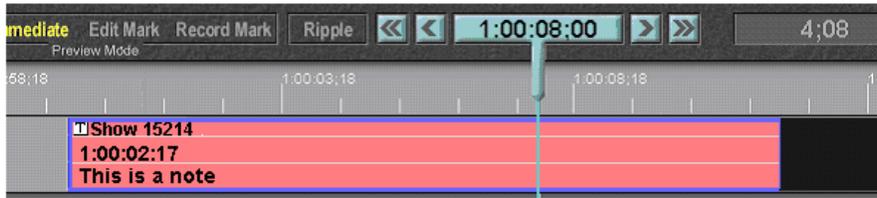
AN EXAMPLE OF A RECORD EVENT WITH MULTIPLE EDITS AND THEIR DESCRIPTIONS:
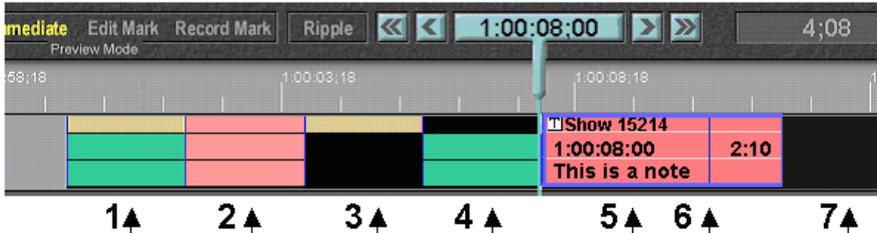
1: A completed edit of video and channels 1 & 2 of audio
2: A "dummy edit" left as a marker to be inserted at a later time
3: A video only edit
4: An audio only edit with channels 1 & 2
5: The Record Event defining the next edit
6: An Edit Mark showing where a previous edit has been performed under the Record Event
7: All black areas show portions of the clip where no media has yet been recorded

For both Linear and Virtual edits, the boundaries of the Record Event define what source material will be included in the edit. Within the Record Event boundaries, standard Fastrack rules apply. In the following examples, only the material within the Record Event (the red area) and the striped lines will be inserted into the Program.

Multiple Events on the same Track
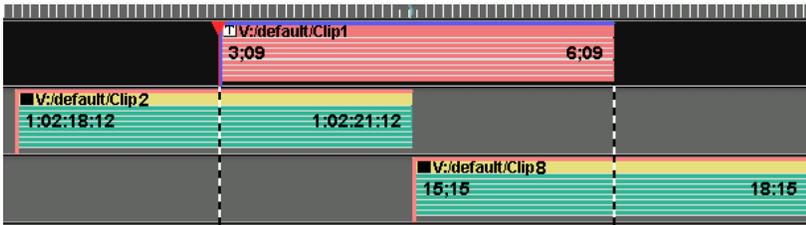
Multiple Events on the separate Tracks
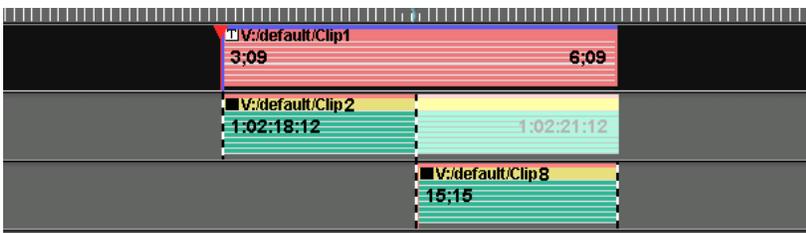
Multiple Events overlapping

In the following example of source Events, when using an external audio mixer only audio playback sub-channels 1-2 will be heard during the first Event, only channels 3-4 will be heard during the second Event, and only channels 2-3 will be heard during the third Event for this edit.

| ■INT1:/default/planes-mu | | ■INT1:/default/an | | ■INT1:/default/sailboatdu | |
| 2:18 | 11:03 | 0 | 5:27 | 3:07 | 11:21 |

Any VTRs involved in the edit must pre-roll, but the user has the option of whether the server will pre-roll or not while using the frame accurate real-time playout of Events on the Timeline.

The Preview functions allow you to preview the edit from any position on the Timeline. You may work with as few as one Track for cuts-only editing from a K2, or a minimum of two Tracks if transitions or effects are involved or if you are editing tape-to-tape.   Up to 80 Tracks are supported, and displayed in groups of 8.

When working with video servers, material already digitized is not re-recorded. Only those parts of the edit that are modified by transitions or effects, or material that has not yet been digitized, will be recorded onto the server during an "optimized" recording. This means that whole tapes need not be pre-digitized just to utilize a small portion.

WORKFLOW EXAMPLES
FASTRACK AND K2 USERS work with many different types of workflows. The K2 media server and the Fastrack controller were designed to be adaptable to many different environments and applications. Here are a few examples:

Workflow # 1 uses the K2-H to record six "iso" feeds of their sports entertainment program. In post, which can begin while the recording is still in progress, they edit directly onto the K2 playing all channels in sync, in real-time, through their switcher in order to add effects.

For sections that do not require effects or fixes, they take advantage of the Virtual edit capability of the K2-H and insert these edits virtually into the Program to save valuable time. For lengthy edits that enter with a transition or effect, the transition is executed in real-time and the rest of the clip is inserted virtually.

The finished Program containing a combination of linear edits with cuts, linear edits with effects and transitions, and cuts-only Virtual edits, are then transferred to an Aurora system using GV Media Frame, which creates a Bin in the Aurora that included the Fastrack Timeline (sequence) and all its associated media and metadata.

The Program is then sent from Aurora back to the K2 as a flattened clip.

In audio sweetening, their Fairlight Audio system has immediate visibility of this new clip, and it is imported from the K2 as a .MXF file.   They sweeten the edited master in the Fairlight, and the new mix is exported back to the K2 as a broadcast .WAV file, where AppCenter Pro re-associates the .WAV file with the flattened clip by creating a new clip, all in perfect lip-sync.

Fastrack can now re-load this Clip as a new Record Event and make additional insert edit and pre-read fixes directly into this new clip.

Workflow # 2 creates two 30 minute shows per day, six days per week, and uploads them to satellite at the same time each day for their hundreds of syndicators to receive.

They record their studio material directly to the K2 servers. Many individual segments of the show are recorded in the field and then transferred and pre-edited on Avid NLE and Fastrack. The finished "clean" pieces that were edited on Avid are then transferred back to the K2 SAN.

The shows are edited directly onto the K2 using the Fastrack K2-H Application. Studio and pre-edited segments are controlled by the Fastrack editor as well as an operator simultaneously rolling segments and clips via the K2 AppCenter. When the director adds one of these manually rolled segments into the

show, the Fastrack editor simply "marks" the location where it is rolled, and if a "fix" or re-start is required, the editor can stop the recording and with a keystroke has all the elements controlled at the editor and in sync.

Sometimes the shows are not always ready for air in time. When this happens, the Program being edited is still sent to the satellite at the scheduled time while the crews continue to edit it. They can be within 50 seconds behind the satellite feed while still working on the show.

Workflow # 3 uses the Fastrack for real-time editing of a live event being delayed. The football (soccer) match starts at 17:30, goes on-air at 18:30, and must end at 20:00 in time for the News.

They start recording the Program Clip at 17:30. Anytime the director or TD make a mistake, they simply edit the mistake out. These edits can be either cuts or transitions, as the Fastrack also has control of one of the 4 M/E buses on the remote truck (OB Van) switcher. Based on elapsed time, injury time or other interruptions may or may not be removed. At 18:30 the K2 plays out the Program to Air. As Fastrack is keeping track of the show time, they know exactly when the show closing, which is also on the K2, needs to be inserted into the show. This closing is made up of highlights of the game that have been placed into a K2 AppCenter play-list throughout the game. This sequence of clips, complete with pre-built transition effects between each of them, is back-timed with the Fastrack Fit-to-Fill feature to bring the show out on time.

Workflow # 4 is a News organization that uses their K2 SAN as a Media Bank, and the K2-H to edit stories for their broadcasts. They have 4 Fastrack connected to this SAN of 14 servers. Two of these systems are K2 cuts-only systems, using the K2 for both record and playback. One of these systems is cuts-only, but also has access to a VTR to avoid the necessity of having to digitize last minute material. The last system uses K2-H as a recorder, with K2, Profiles, VTRs and other servers as sources, a 2.5 M/E switcher and an 8 output bus audio mixer…a full blown hybrid edit suite. This room is also used for editing full length programming. Once material is edited in any of these rooms, the Programs can be transferred to any of 5 different Applications for additional work.

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Fastrack employs many special tools and features to make the K2-H Application as powerful and flexible as it is. Here are a few examples…

All K2 directories and clips are directly accessible from the incorporated Fastrack K2 clip viewer.
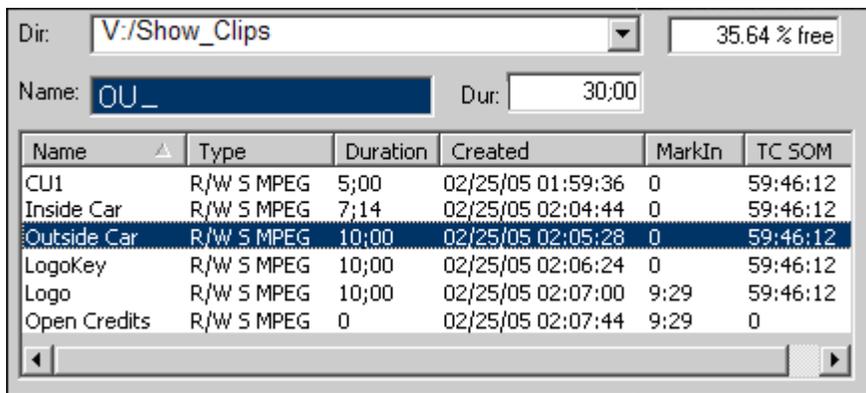
Search for a K2 clip alphabetically, by type, duration, date or by timecode. It is automatically loaded onto its respective Track so you can: reposition, set, mark, trim, shorten, lengthen, modify, copy, paste, add, delete, slip, slide, enable, disable, link, split or separate as desired.

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Powerful features like "Fit & Fill" can be utilized to force a specified clip to automatically "Fit" within a specified time frame, or to fill gaps in the Timeline.

Here are two Events with a gap between them.

Here, the speed of the Event has automatically been modified so that the Event fills the gap.

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The K2 play and record timing can be adjusted on a Track-by-Track (channel-by-channel) basis. These settings are deterministic, assuring that all edits and playouts are frame accurate.

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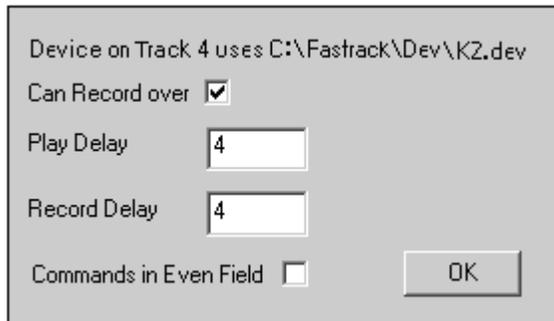
If you are using a video switcher, Fastrack provides for superb control over dissolves, wipes, keys and switcher memories on most standard A/SD/HD video switchers. The details of an effect are usually set in a switcher dialog (see below), but the transition time and type may also be defined directly through keystrokes or a shortcut key.
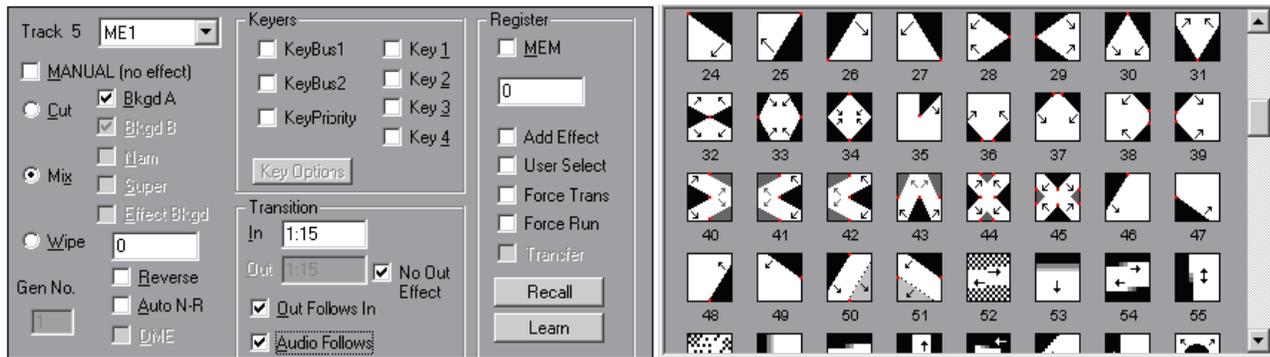
When performing a wipe, depending on the switcher you have assigned, a "WIPE & DVE" Dialog will appear to allow you to directly select the effect you desire.

Events automatically compensate to allow for the transition time. Fastrack determines the 'FROM' source for a transition automatically, providing you with more flexibility when shifting Events around to test different effects placement and transitions.

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Auto Cache allows you auto-digitize a selected section of a videotape or server clip to the K2 as a separate entity while maintaining the timecode integrity of the original material. Additional head and tail "handles" can also be added.

Auto Cache Rec
☑ Enabled
☐ Temp Disable LRT
☐ Temp Disable Swr
Head/Tail   1:00
Auto Cache Rec Track
3. K2-5 R2 ▼

1. K2-5 P2
2. K2-3 P2
3. K2-5 R2
4. VTR 1
5. VTR 2

*
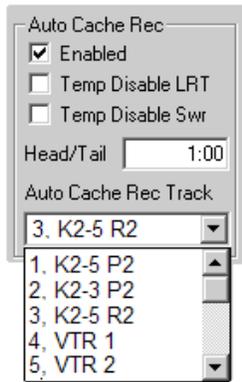
Unlimited Macros can be programmed, stored, recalled, modified and run directly from the Fastrack GUI, *even during an edit or playout!*

File   Edit   Help
Macro Name   Looping   Learn   AutoMac

Loop
2

From   Thru

Delay (ms)
30

Set

<Loop-A Start (5)>
NextSignifTime - RIGHT
Add - 7
<Loop-B Start (2)>
CBCopy - <Ctrl>C
SelNextTrack - DOWN
CBPaste - <Ctrl>V
F5 - F5
<Loop-B End>
SelPrevTrack - UP
SelPrevTrack - UP

Clear All   Load

Run   Save

             Undo

Cancel   Done

*
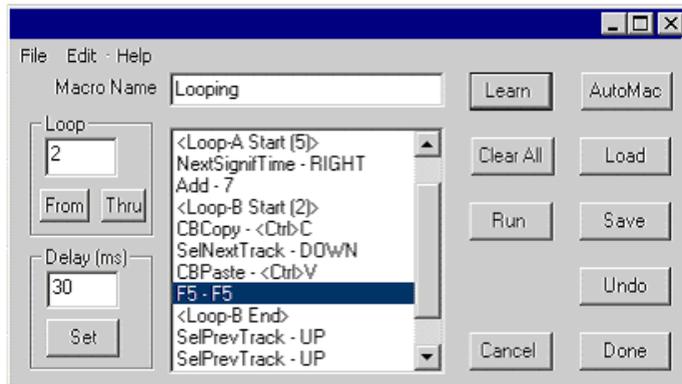
The user has complete control over modifications to the EDLs.

CUT   COPY   PASTE   RIPPLE   R MARKS

From   Thru   After   R Marks
○ Beginning   ○ End   ○ End   ⊙ Clear
○ Current   ○ Current   ⊙ Current   ○ Set
⊙ 1   ⊙ 15   ○ 5   ○ Toggle

⊙ All edits in a block   Edit Reel ID   UNDO
○ By edit number in a block   Old: RVTR
○ By edit number, whole list   New: Gary   REDO
                                         Edit Reel ID
○ Ripple afterwards   OK
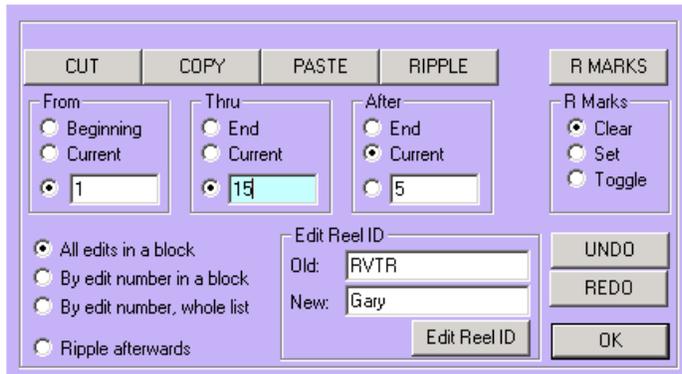
… individual audio transition rates for each audio channel (mixer dependent) …

A1
Ch 1 -120.0 dB

A2
Ch 2 -120.0 dB

A3
Ch 3 -120.0 dB

A4
Ch 4 -120.0 dB
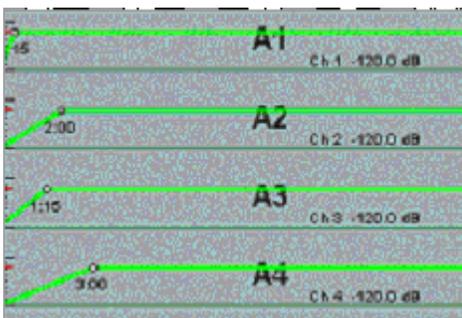
… graphic control of vari-speed with frame-by-frame calculated ramping …
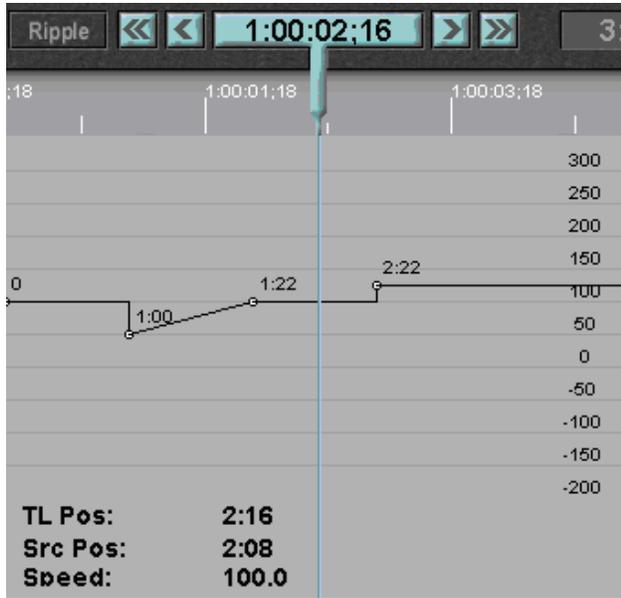
… as well as real-time, keyframed, audio level changes, using the Fastrack Jog Panel or manually mixing while Fastrack learns the fader moves of the mixer console (mixer dependent).
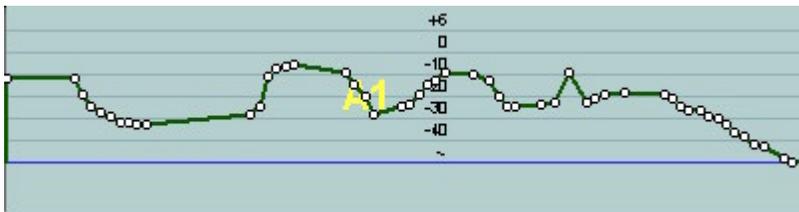
FAQ…

Q: How does the K2-H Application deal with Closed Captioning?
A: The K2-H has a "shortcut" setting that either enables or disables CC data for any or all edits.

Q: How many K2 encoder and decoder channels are required for the K2-H Application?
A: Two are required as a minimum. One encoder channel to record the edit and one decoder channel to playback the edited Program during play, preview and pre-read.

Standard audio mixer protocols include the Yamaha O3D, O2R, O2R96, O2R96V2, M1000 and O1V, controlled using a serial or USB Midi-Host protocol that allows for two-way communication from and to the mixer. Also available are the Renegade Labs and Graham-Patten D/ESAM4 and ESAM2 protocols.

Standard video switcher protocols include Echolab, Evertz, For-A, GV Thomson, Ross Video, Snell & Wilcox, Sony DVS, BVS and DFS switchers, and many more.

Protocols for source control of VDCP controlled servers include those from 360 Systems, Abekas, Doremi, EVS, GeeVS, Omneon, Profile PDR / XP, SeaChange, Sony MAV, and others. Many more device drivers are constantly under construction.

For additional information on the Fastrack K2-H Application from Editware, please contact your Grass Valley or Editware dealer, or Bob Lefcovich at 530-477-4300 - bobl@editware.com.

Also visit our websites at http://www.editware.com and www.thomsongrassvalley.com

Closed Captioning

Router Control

VTRs

Fastrack K2-H

K2 Media Servers

Switchers, Isolated M/Es & AUX Buses