Crystal Vision

LKEY-SQZ

3G/HD/SD squeeze back keyer

LKEY-SQZ is a unique product offering the highest quality picture squeeze and picture-in-picture effects combined with flexible keying – all in a low-cost modular product.

Working with 31 different video standards, this squeeze back keyer is ideal for any applications where the programme needs to be resized or repositioned for another layer of video to be displayed – such as squeezing the end credits to preview the next programme, squeezing a presenter to allow room for additional graphic material, or picture-in-picture type applications such as news interviews.

You'll get the highest quality picture squeeze from this dedicated product – perfect for those demanding applications involving moving text. It uses sub-pixel processing, an excellent de-interlacer and an advanced algorithm to ensure extremely smooth movement from one size to another. With eight example scenes included, sophisticated moves can easily be pre-built and then triggered manually or via automation systems.

- **Feature-packed squeeze back keyer:** unique way to resize or reposition programme for another layer of video to be displayed
- **Use it with any source:** works with 3Gbs/s, HD and SD (31 video standards in total)
- **Includes simple DVE:** can resize video both horizontally and vertically and reposition it on the screen
- **Easy to add additional material:** graphics or text generated by external device can be keyed on top of and around the squeezed picture
- **Provides highest quality picture squeeze:** uses sub-pixel processing, excellent de-interlacer and advanced algorithm for extremely smooth movement from one size to another
- **Flexible key sources:** choice of external key or self key methods
- **Overrule the key signal:** use the internal masks to select just part of a key or to extend the key size
- **Flexible fading:** fade the squeeze or key on and off, or fade the programme to black
- **Correct timing errors automatically:** includes line synchroniser on each input timed to an analogue reference
- **Perform a sequence of operations using full timeline control of events:** including squeeze position, size, rate of movement and key fade on/off rate
- **Protect your output:** get relay bypass protection of the squeeze video
- **Save rack space:** 100mm x 266mm module allows six LKEY-SQZ in 2U (three in 1U and one in desk top box)
- **Flexible control:** select from front and remote panels, GPIs, SNMP or web browser

SQUEEZING THE PICTURE

By including a simple DVE, LKEY-SQZ can smoothly resize the main video both horizontally and vertically, reposition it on the screen and put it inside another input or coloured border. The border is a moveable rectangle filled by a specific matte generator which lies behind the squeezed video in the layering and is most useful for picture-in-picture applications.

Graphics or text generated by an external device can then be keyed on top of and around the squeezed picture, with the option of filling the background area with a matte colour after the video has been squeezed. The video can transition back to full size or to another size or position as required.

THE HIGHEST QUALITY PICTURE SQUEEZE

It's the quality of the picture squeeze that makes LKEY-SQZ special. It uses sub-pixel processing, an excellent de-interlacer and an advanced algorithm to ensure extremely smooth movement from one size to another. This is particularly important on moving text which can be very demanding – LKEY-SQZ will ensure there is no distortion to the text during the picture squeeze.

It is also possible to adjust the filtering used on the squeezed image to optimise the effect, trading image sharpness against aliasing artefacts.

KEYING

LKEY-SQZ allows the key to be generated in two different ways. External Key mode uses the luminance of the signal on the Key/Video B input to key a graphic on the Video A input over the background, while Self Key mode uses the luminance value in the graphic on Video A input to generate the key. LKEY-SQZ offers both additive and multiplicative linear keying, allowing you to choose a method to suit the graphics.

Key gain, offset and opacity controls allow the intensity of the key to be adjusted.

Two internally-generated rectangular masks – adjustable in position and size – can be used to force areas of video which may otherwise be hidden by the key layer. Adjustable edge softness is useful for blending between masked and unmasked areas for a more natural-looking mask edge.

FLEXIBLE FADING

The key layer, squeezed video layer, bypass layer and border layer can each be faded up and down under timeline control. LKEY-SQZ can also be used to fade the complete programme to black if required.

TIMING YOUR SIGNAL

Line synchronisers will correct incoming signals up to one line apart in timing, with the output video timed to either one of the inputs or to an external SD Black and Burst or HD tri-level syncs analogue reference.

You can easily compensate for mistimed sources elsewhere in your system by adjusting the output timing relative to the reference through an entire frame using horizontal and vertical settings.

SELECT YOUR OUTPUT AUDIO

LKEY-SQZ is easy to use in a system with embedded audio. The audio selected for embedding into the output video can be taken from any of the inputs.

Alternatively all ancillary data including embedded audio can be blanked.

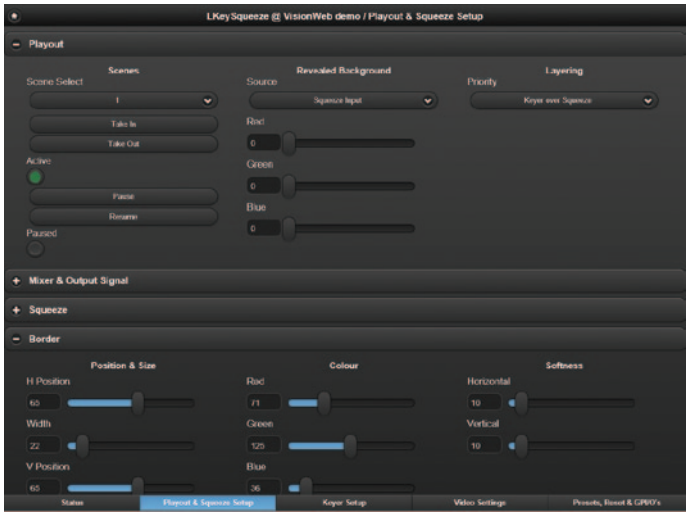
WORKING WITH SCENES AND TIMELINE CONTROL

LKEY-SQZ can perform a sequence of operations – known as a 'scene' – using full timeline control of events. Timelines are a key part of LKEY-SQZ operation, with a timeline having five segments (delay, in, dwell, out, wait) and starting when it is triggered. Events can be timed in relation to each other as well as to the start of the scene.

With eight example scenes included, sophisticated moves can easily be pre-built and then triggered manually or via automation systems. The example scenes can be changed by editing nine XML files. The files themselves are simple because each file describes only one element and they can be edited using a basic text editor. The five layers on LKEY-SQZ are background, border, squeezed video, bypass path and downstream keyer, with layer priorities set using VisionWeb (see SPECIFICATION section for full details). Squeeze position, size, rate of movement and key fade rate can all be adjusted. The timeline XML files can be uploaded directly into the LKEY-SQZ board via FTP thanks to the dedicated Ethernet connector on the RM77 rear module.

Control options for LKEY-SQZ include an integrated control panel on the front of the AE frame, the VisionPanel remote control panel, the SBB-4 smart button box, SNMP, our ASCII and JSON protocols or the VisionWeb web browser control. GPIs can be used to take a scene in or out and to trigger up to eight of the presets. 40 presets are available in total and are ideal for holding information on the static state of the device such as layering priority and key gains.

See the built-in example scenes on pages four and five and more information about timeline control in the SPECIFICATION section on pages five and six.

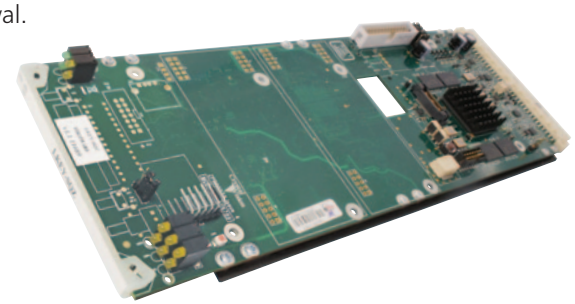


VisionWeb

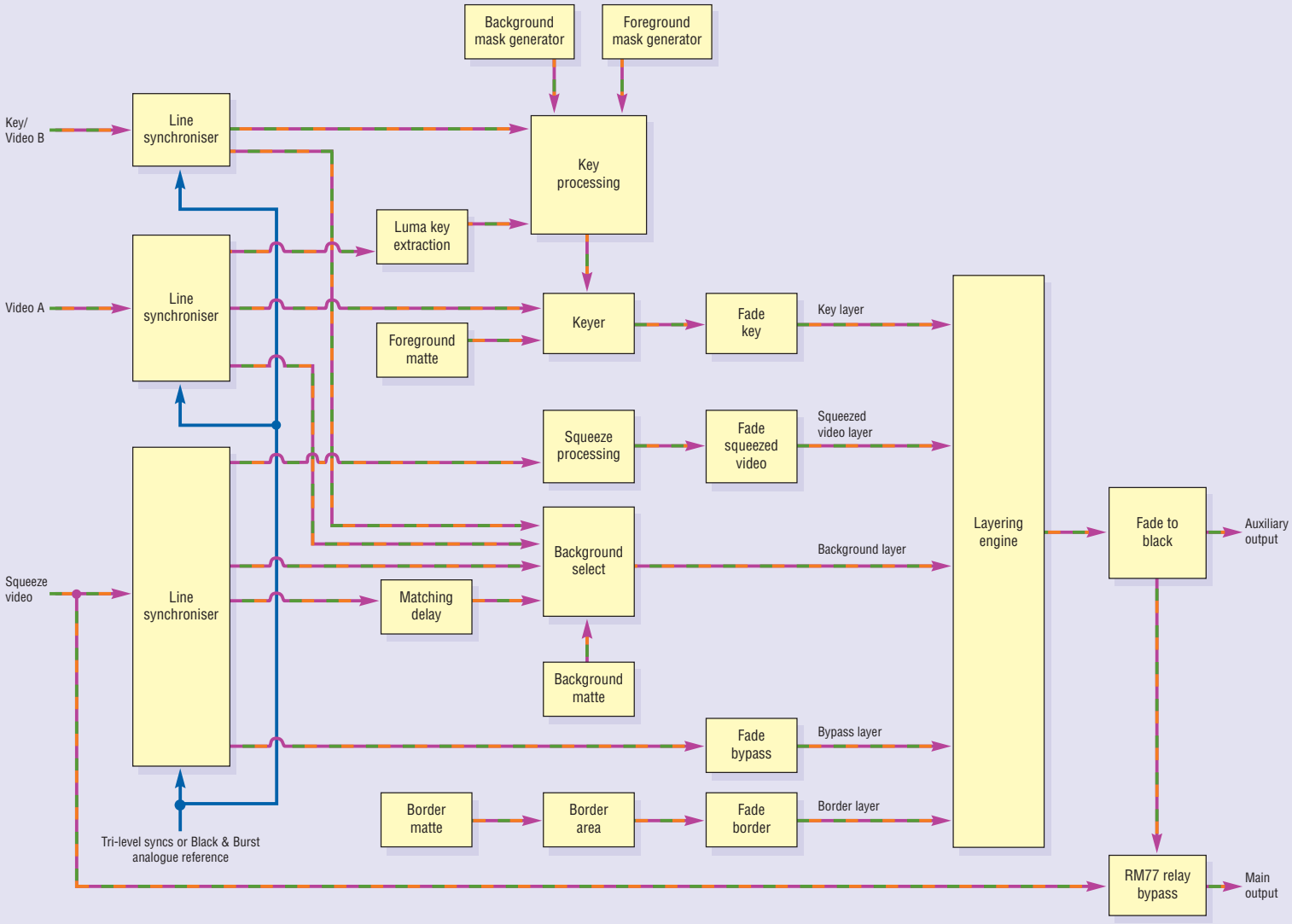
SAVE RACK SPACE – AND PROTECT YOUR OUTPUT

LKEY-SQZ is a 100mm x 266mm board which fits in the Indigo frames (available in 2U, 1U and desk top box sizes) and saves you rack space by allowing up to six squeeze back keyers to be housed in 2U.

The Video A, Key/Video B, Squeeze Video and analogue reference inputs, one main output and one auxiliary output are accessed by using the dual height RM77 frame rear module. The RM77 additionally provides relay bypass protection of the squeeze video on power failure or board malfunction or removal.



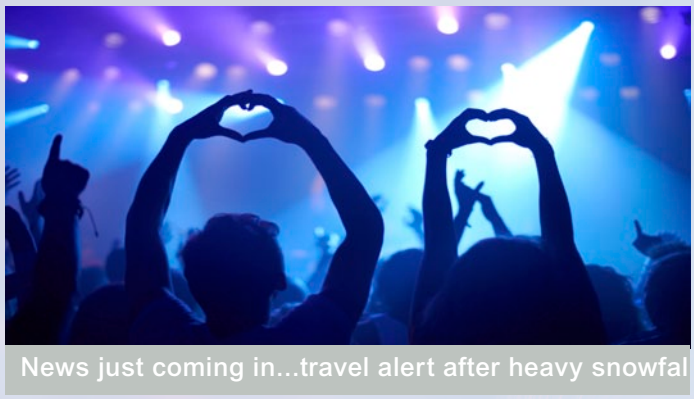
THE INPUTS AND OUTPUTS



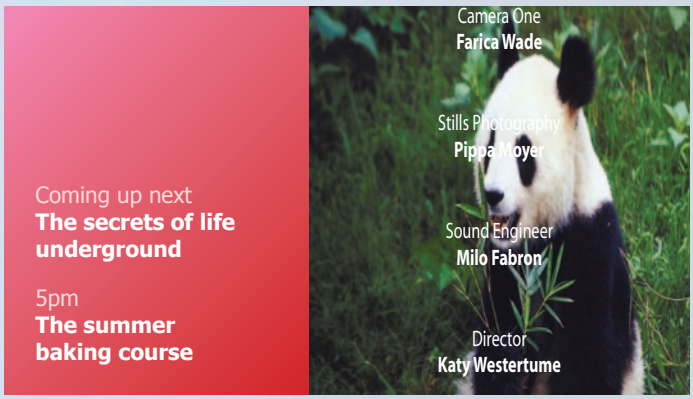
BUILT-IN SCENES

LKEY-SQZ comes with eight built-in scenes designed to provide a template for a common usage of the product. The scenes can be customised by the operator to meet the exact requirements of a particular application by editing the XML files using a simple text editor. There are 16 scenes in total, with scenes 9 to 16 a carbon copy of the original versions of 1 to 8 and intended to provide a backup copy.

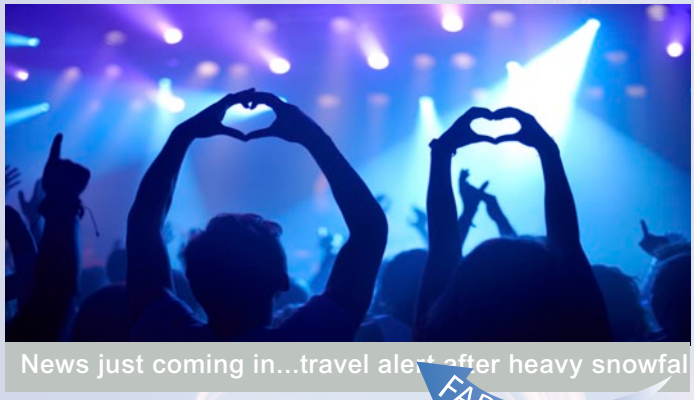
Scene 1 (duplicated as Scene 9)
Squeeze picture up from the bottom to reveal background video behind



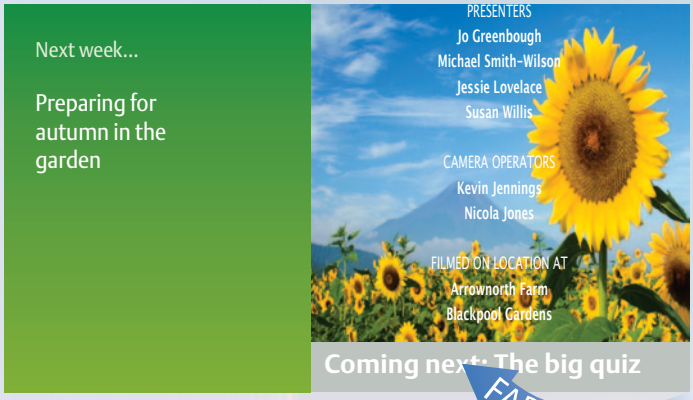
Scene 2 (duplicated as Scene 10)
Horizontal picture squeeze to reveal background video behind



Scene 3 (duplicated as Scene 11)
Squeeze picture up from the bottom followed by fade in of key and fill



Scene 4 (duplicated as Scene 12)
Horizontal and vertical picture squeeze to reveal background video followed by fade in of key and fill



Scene 5 (duplicated as Scene 13)
16:9 picture-in-picture with border which fades up in place

Scene 6 (duplicated as Scene 14)
16:9 picture-in-picture with border which starts as full screen and changes in size and location

LKEY-SQZ

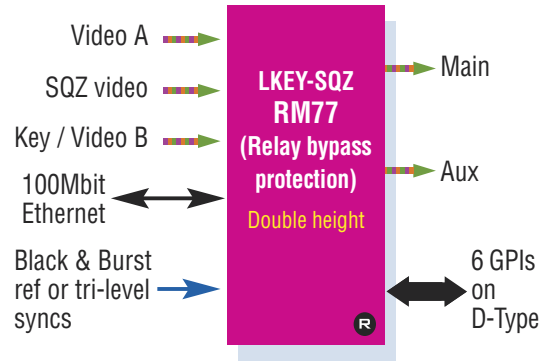
continued overleaf...

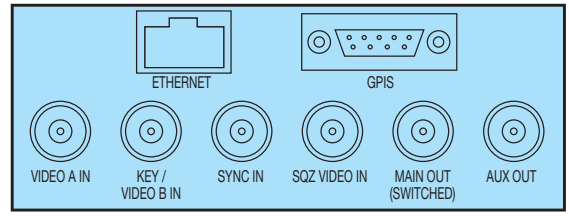
BUILT-IN SCENES continued...

Scene 7 (duplicated as Scene 15)
4:3 picture-in-picture with border (with crop applied to 16:9 source) which fades up in place

Scene 8 (duplicated as Scene 16)
Horizontal picture squeeze to reveal background video followed by fade up of key and fill on top of squeezed video

REAR MODULE CONNECTIONS





RM77

SPECIFICATION

MECHANICAL

Standard Crystal Vision module 266mm x 100mm

Weight: 200g

Power consumption: 12 Watts

VIDEO INPUTS

Three 3Gb/s, HD or SD inputs (Video A, Key/Video B and Squeeze video)

270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to EBU 3267-E, SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A

Works with the following video standards: 1080p23.98, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94, 1080p60, 1080PsF23.98, 1080PsF24, 1080PsF25, 1080PsF29.97, 1080PsF30, 720p50, 720p59.94, 720p60, 1080i50, 1080i59.94, 1080i60, 2048x1080p23.98*, 2048x1080p24*, 2048x1080p25*, 2048x1080p29.97*, 2048x1080p30*, 2048x1080PsF23.98*, 2048x1080PsF24*, 2048x1080PsF25*, 2048x1080PsF29.97*, 2048x1080PsF30*, 625i and 525i (*= YUV 4:2:2 10 bit)

3Gb/s cable equalisation up to 80m using Belden 1694A. HD cable equalisation up to 140m with Belden 1694A or equivalent (approx. 100m with Belden 8281). SD cable equalisation >200m Belden 8281 or equivalent

Input return loss: -15dB for 50MHz to 1.5GHz

VIDEO OUTPUTS

One main output and one auxiliary output accessed by using RM77 frame rear module. Relay bypass protection of squeeze video

270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to EBU 3267-E, SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A

Output frame rate same as input frame rate

Both main and auxiliary outputs can be used to show Output Video, Output Key, Squeeze Input, Video A Input, Key/Mask/Video B Input, FG Matte, BG Matte or Border Matte

DELAY THROUGH BOARD

SD: 85us min

HD: 18us min

3Gb/s: 10us min

TIMING ADJUSTMENTS

Reference timing can be selected to come from any of the video inputs or from SD Black and Burst or HD tri-level syncs. 3Gb/s, HD or SD source can use either type of reference. When cross-locking it is necessary for both the video input and reference to share the same frame rate

A line synchroniser on each input will automatically synchronise sources up to one line apart in timing for automatic correction of timing errors

Compensate for mistimed sources elsewhere in system by adjusting output timing relative to the reference through an entire frame using horizontal and vertical settings

Amplitude of syncs 150mV to 600mV

Link on PCB selects 75 ohm termination or high impedance

The delayed squeeze input is a non-squeezed version of the squeeze input which is delayed by the same amount as the squeezed video, allowing a switch away from a full-screen squeezed image to a completely unprocessed signal without a timing jump

PICTURE SQUEEZING

LKEY-SQZ includes simple DVE that can smoothly resize video horizontally and vertically and reposition it on the screen allowing another layer of video to be displayed

Can put video inside another input or coloured border (see BORDER section)

Can transition back to full size or to another size or position as required

Top quality video squeeze using smooth sub-pixel processing, motion and edge adaptive de-interlacer and advanced re-interlacing algorithm

KEYING MODES

Graphics or text generated by external device can be keyed on top of and around the squeezed picture

External Key mode uses luminance of signal on the Key/Video B input to key a graphic on the Video A input over the background, while Self Key mode uses luminance value in the graphic on Video A input to generate the key

Key processing can be additive or multiplicative

External Key controls: Enable, Multiply/Additive, Invert, Min Clip, Max Clip

Self Key controls: Enable, Multiply/Additive, Invert, Min Clip, Max Clip

The key can be made to have a semi-transparent effect by using areas of grey in the external key signal, by using the Min and Max Clip controls or by using the fade controls

Keyer FG control selects what is used as the fill when an external or self key is enabled

Keyer crop controls define an area for which an enabled external or self key is shown

PICTURE FILTERING

It is possible to adjust the filtering used on the squeezed image to optimise the effect, trading image sharpness against aliasing artefacts

H and V controls adjust how sharp the squeezed image looks, with a softer picture causing less flickering in moving areas of fine detail

The de-interlacing filters can be used to reduce flickering in the image in areas of fine detail due to de-interlacing and re-interlacing processes, following image scaling changes

INTERNAL MASK GENERATOR

Masks can be used to force areas of

background or foreground video which may otherwise be hidden by a key layer

Two internal masks available (Foreground and Background) which can be turned on or off, inverted to force keying outside an area and adjusted in position and size. Masks have edge softness controls to prevent hard edge on mask, with each edge individually selectable

Foreground and Background mask controls: Enable, Invert, Mask Window: Left/Right/Top/Bottom edges adjustable from 0 to 100% (to set mask size and position), Mask Softness: Left/Right/Top/Bottom edges adjustable from 0 to 100%

The External Key signal can also be enabled as an External Mask, to force the background through a self key. Controls are: Enable, Multiply/Additive, Invert, Min Clip, Max Clip

INTERNAL MATTE GENERATOR

Three separate matte generators available

Background matte is one option for the background

Foreground matte is one option for the keyed foreground video source, allowing a selectable flat colour to be put in the keyed areas

Border matte defines the colour used for the border layer – a rectangle that can be moved, scaled and faded on the basis of the scene timeline

BORDER

The border is a moveable rectangle filled by a specific matte generator which lies behind the squeezed video in the layering. The typical use will be to size and move this in combination with the squeezed video to provide a border that visually separates the squeezed video from the background, such as for picture-in-picture applications

FADES

Each layer can be faded up and down under timeline control: Key layer, Squeezed video layer, Bypass layer and Border layer (NB. Background layer cannot be faded)

Fade programme to black on main and auxiliary outputs

EMBEDDED AUDIO

Embedded audio is taken from any chosen input, allowing selection of audio from either the Video A, Video B/Key or Squeeze Video input to output with the final video

All ancillary data including embedded audio can be blanked

SCENES AND TIMELINE CONTROL

Timeline control is used to perform a sequence of operations (a 'scene') relative to a start signal. Multiple scenes can be programmed, allowing quick selection of different moves. Events can be timed in relation to each other and not just the start of the scene

LKEY-SQZ has 16 built-in example scenes. Scenes 9-16 are a carbon copy of scenes 1-8 and provide a backup of the original. Scenes 9-16 will remain as default until a user changes them and will not reflect any changes made to scenes 1-8. See pages four and five for description of built-in scenes

Possible objects in each scene are bypass (top, hides everything else if faded up), squeezed video, border, keyed video and background (anything appears on top of this)

Layering control is set using VisionWeb, with layer 1 appearing in front. When set to 'Squeeze over keyer', object priorities are:
(1) Bypass
(2) Squeeze
(3) Border
(4) Keyed video
(5) Background.
When set to 'Keyer over squeeze', object priorities are:
(1) Keyed video
(2) Bypass
(3) Squeeze
(4) Border
(5) Background

Example scenes can be changed by editing nine XML files. The files themselves are simple because each file describes only one element and they can be edited using a basic text editor. The XML files define the priority and triggering relationships between the layers, the timeline for each layer (in, dwell and out times and the size, position and alpha parameters for each object at each static state) and the colour, size and default position of the unprocessed object

A timeline consists of five segments: delay, in, dwell, out, wait. Each segment can have a time, defined in milliseconds from zero to one hour. If dwell time is not defined it is treated as infinite and timeline will stay in dwell state until scene is taken out or until a triggerout event occurs

There are parameter values (scale, position and alpha) at each static segment (delay, dwell and wait), with the position and scaling of the object defined in percentages of the screen size for position and default size for scaling. The value of parameters during 'in' and 'out' is linear ramp between the relevant static values

Squeeze setup on VisionWeb allows the effect to be previewed in a static way, allowing settings to be tested before they are added to the XML files

FTP timeline files directly into LKEY-SQZ board using dedicated Ethernet connector on RM77 rear module

PRESETS

The current board settings can be saved in one of 40 locations to be recalled as required

Presets store the entire state, including the selected scene, and are ideal for holding information on the static state of the device such as layering priority and key gains

GPI INPUT LEVELS

Active: pull to ground, pulled up to +5V through 10 kohm

GPI INPUTS

Six GPI inputs

Three are used for the recall of up to eight presets

One is used to take the scene in

One is used to take the scene out

One acts as a tally when the scene is in

REMOTE CONTROL

Software:

VisionWeb Control is available via the web server on the frame and allows operation using a standard web browser on a computer, tablet or phone

SNMP monitoring and control available as a frame option

Control using ASCII and JSON protocols

Hardware:

Control from integrated control panel on Indigo 1AE-DP frame

Control from VisionPanel 3U remote panel

SBB-4 smart button box connects to the frame via Ethernet and provides four programmable LCD switches (which are configured for each order). The SBB-4 uses information from VisionWeb for settings. Uses Power over Ethernet so must be used with PoE enabled switch

ORDERING INFORMATION

LKEY-SQZ	3G/HD/SD squeeze back keyer
Indigo 2SE	2U frame with active front panel featuring smart CPU for up to 12 Crystal Vision modules
Indigo 1AE-DP	1U frame with active front panel featuring smart CPU and integrated control panel for up to six Crystal Vision modules, with included power supply redundancy
Indigo 1SE-DP	1U frame with active front panel featuring smart CPU for up to six Crystal Vision modules, with included power supply redundancy
Indigo DT	Desk top box with passive front panel for up to two Crystal Vision modules
Indigo DTSE	Desk top box with active front panel featuring smart CPU for up to two Crystal Vision modules
RM77	Two slot frame rear module. Allows six boards in 2U, three in 1U and one in desk top box. Provides relay bypass protection of the squeeze video. Gives access to Video A, Key/Video B and Squeeze Video inputs with one main output and one auxiliary output
VisionPanel	3U Ethernet remote control panel with touch screen
SBB-4	Smart button box with four programmable LCD switches. It is powered by PoE (Power over Ethernet) and therefore needs to be connected to a PoE enabled switch
VisionWeb Control	VisionWeb web browser control included within frame software
SNMP	SNMP monitoring and control

Crystal Vision

Crystal Vision Ltd. Lion Technology Park, Station Road East, Whittlesford, Cambridge CB22 4WL, England.
Tel: +44 (0)1223 497049 E-mail: sales@crystalvision.tv @crystalvisionuk www.crystalvision.tv