Crystal Vision

M-SAFIRE

SOFTWARE APP

IP/SDI chroma keyer

Offering Crystal Vision's best picture quality yet with a noise-free key, the M-SAFIRE real-time chroma keyer is ideal for any live virtual production – from studio to sport.

The M-SAFIRE is a software app that runs on the MARBLE-V1 media processor – purpose-built GPU/CPU hardware that fits in the Vision frame. It can be used with IP, with SDI or with both IP and SDI at the same time. Its support for multiple signal formats gives the easiest possible SDI to IP upgrade, while also making it perfect for mixed SDI and IP installations as well as fully IP or fully SDI environments. It supports both SMPTE ST 2022 and ST 2110 video over 10GbE IP networks, including ST 2022-7 redundant streaming and the protect equivalent for ST 2110. 31 video formats are supported. When used with SDI or SMPTE ST 2022, the M-SAFIRE passes all ancillary data including embedded audio without modification. If ST 2110 is used, only the video content is output.

The M-SAFIRE includes numerous tools to optimise the picture, including advanced clip processing, colour correction, Edge shrink, colour spill processing, lighting compensation and shadow processing. The key can be faded up and down, while two internal masks and the External key/mask can be used to force areas of foreground or background – making it easy to linear key a logo or add sports graphics and more.

The two quad split multiviewers make it easy to set up your chroma key – especially when dealing with any issue that really benefits from close inspection. You can view four of the processing stage signals simultaneously and zoom into any area.

The M-SAFIRE's gateway functionality can be used to integrate SDI into an IP environment or IP into an SDI environment. Its IP to IP translation functionality can be used for network address translation, protocol conversion (between any of the input formats and any of the output formats), unicast to multicast address conversion and the creation of media firewalls. The IP flows can be separated and protected across up to four bi-directional 10GbE SFP+ network interfaces.

The M-SAFIRE includes a framestore synchroniser timed to an external Black and Burst or tri-level syncs analogue reference or PTP, with user configurable options for timing source priority and redundancy. Eight frames of input video delay (in addition to the two frames of minimum processing delay) along with ten frames of video delay on the output are ideal for offsetting the delay caused by the graphics generators or for matching any other big system delays. Other features include traffic shaping and signal status monitoring.

Should you want to change the functionality of your product completely, you just need to buy a new app to run on your MARBLE-V1 hardware.

- Software app that runs on the MARBLE-V1 media processor
- Real-time chroma keyer ideal for any live chroma keying or virtual set production
- Use it with SDI, IP or both at the same time: supports 31 video formats, SMPTE ST 2022-6 and ST 2022-7 protocols and video within ST 2110 (ST 2110-10, -20 and -21 standards)
- Key on any colour, with fine control over backdrop colour selection
- Gives excellent results and generates noise-free key
- Numerous tools to optimise the picture including clip processing, colour correction, Edge shrink, colour spill processing, lighting compensation and shadow processing
- Overrule the chroma keying: use the internal masks and External key/mask to force areas to be either foreground or background
- Use it as a linear keyer: key any graphics over a video source
- Includes synchroniser and choice of multiple timing sources with fail-over (PTP, two analogue Black and Burst or tri-level syncs references via Vision frame, or video input)
- Use the input and output video delay to offset the graphic generator's delay and compensate for other big system delays
- Supports SMPTE ST 2022-7 redundant streaming and ST 2110 protect
- Fitting up to four bi-directional 10GbE network interfaces allows you to separate your IP flows as required
- Includes gateway functionality for hybrid systems, encapsulating SDI to IP and de-encapsulating SDI from IP
- Includes IP to IP translation functionality, such as network address translation, unicast to multicast address translation, setting firewall restrictions and protocol translation between any of the input formats and any of the output formats
- Tolerant of any input packet distribution, and includes output traffic shaping
- Know your signal is present and valid, with SDI and IP flow signal monitoring
- Use the quad split multiviewers to assist setup, with zoom available for fine-detail checking
- Flexible remote control and monitoring using frame integrated control panel, remote control panels, ASCII and JSON protocols, SNMP and the web browser-based VisionWeb Control
- Save rack space: MARBLE-V1 media processor is a 'double slot' 96mm x 325mm card, with up to ten MARBLE-V1 fitting in 3U

WHY M-SAFIRE IS THE PERFECT CHROMA KEYER

Works with both IP and SDI

Supporting 31 video formats including 1080p, the M-SAFIRE can work with IP, SDI or both at the same time, and gives you the easiest SDI to IP upgrade.

Easy to select the backdrop colour

With the ability to key on any colour, looking at both the hue and saturation gives the M-SAFIRE enhanced selectivity when choosing the backdrop colour.

A noise-free chroma key

MARBLE-V1's powerful GPU processor – which uses floating point precision calculations – allows the M-SAFIRE to generate a noise-free key. Combine this with the excellent clip processing for a really believable virtual reality.

Clean edges

It's easy to clean up the edges on foreground objects using the Edge shrink tool.

IP

SDI

Remove colour spill – or add some

The M-SAFIRE prevents unwanted keying by giving you precise control when dealing with colour spill from the backdrop appearing on foreground objects – while re-spill can be used to colour areas to make them look more natural.

Colour correction

You can match the look of the foreground to the background by using the foreground colour corrector and background video adjustments.

Easy to make adjustments

The quad split multiviewers make it easy to set up your chroma key. You can view four of the processing stage signals simultaneously and zoom into any area. Discover more on the next page…

Lighting compensation

The smooth quadrant backdrop lighting will compensate for unevenly lit backdrops – helping you get a uniform key signal across the image by boosting the key.

Add virtual objects, logos and sports graphics

It's easy to force part of the background to appear in front of the foreground subject, to linear key logos, or to restrict the chroma keying to the area that contains sports graphics.

Realistic shadows

You can use the Shadow Density control to increase or reduce the appearance of shadows.

System timing

There's input and output video delay to compensate for any big system delays, along with synchronisers for easy system timing – including reference redundancy and the option of PHP as a timing source.

Choice of control

Choose from a variety of methods, including VisionPanel for hands-on control.

USING THE QUAD SPLIT MULTIVIEWERS

To aid setup, there are two quad split multiviewers available – selectable as the Main output – which show four signals composited on to one screen. You can zoom into each of the quads – especially useful when you are dealing with shadows, spill or any other issue that really benefits from close inspection.

Output video/Output key/External key source/Suppressed foreground quad split

Use this... to check the quality of your final result

Use this... to check that the black is fully black without noise and that you have white everywhere you expect

Use this... to make it clear to the operator where you want to force foreground (External key) or force background (External mask). The External key/mask is most useful when used as a mask, to bring graphics in front of the presenter or to force graphics at the edge of the set allowing wide shots that go beyond the area of the blue or green screen

Use this... to check all the background colour – plus any background colour spill – has been removed and that you've retained the colours you want. A particularly useful tool when there are colours in the set that are close to your blue or green background colour

Output video/Output key/Keyed foreground/Keyed background quad split

Use this... to check the quality of your final result

Use this... to check that the black is fully black without noise and that you have white everywhere you expect

Use this... to check that detail has not been lost by the foreground suppression and the key and that the black isn't noisy. The suppressed colour should look natural

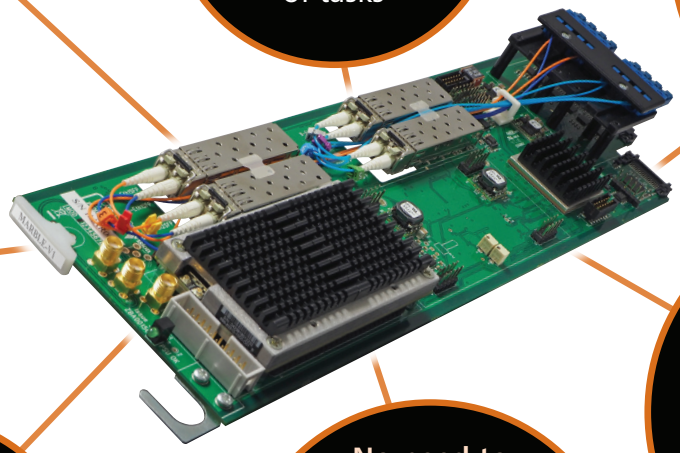
Use this... to check the graphics look correct and are in the right place – and helpful for spotting unwanted background in foreground areas

THE MARBLE-V1 MEDIA PROCESSOR

Shared hardware platform = many tasks

Powerful CPU/GPU processor = perform any task or combinations of tasks

I/O flexibility = six bi-directional SDI, four 10GbE SFP+ network interface and eight bi-directional discrete AES



Change the functionality completely = install a different app

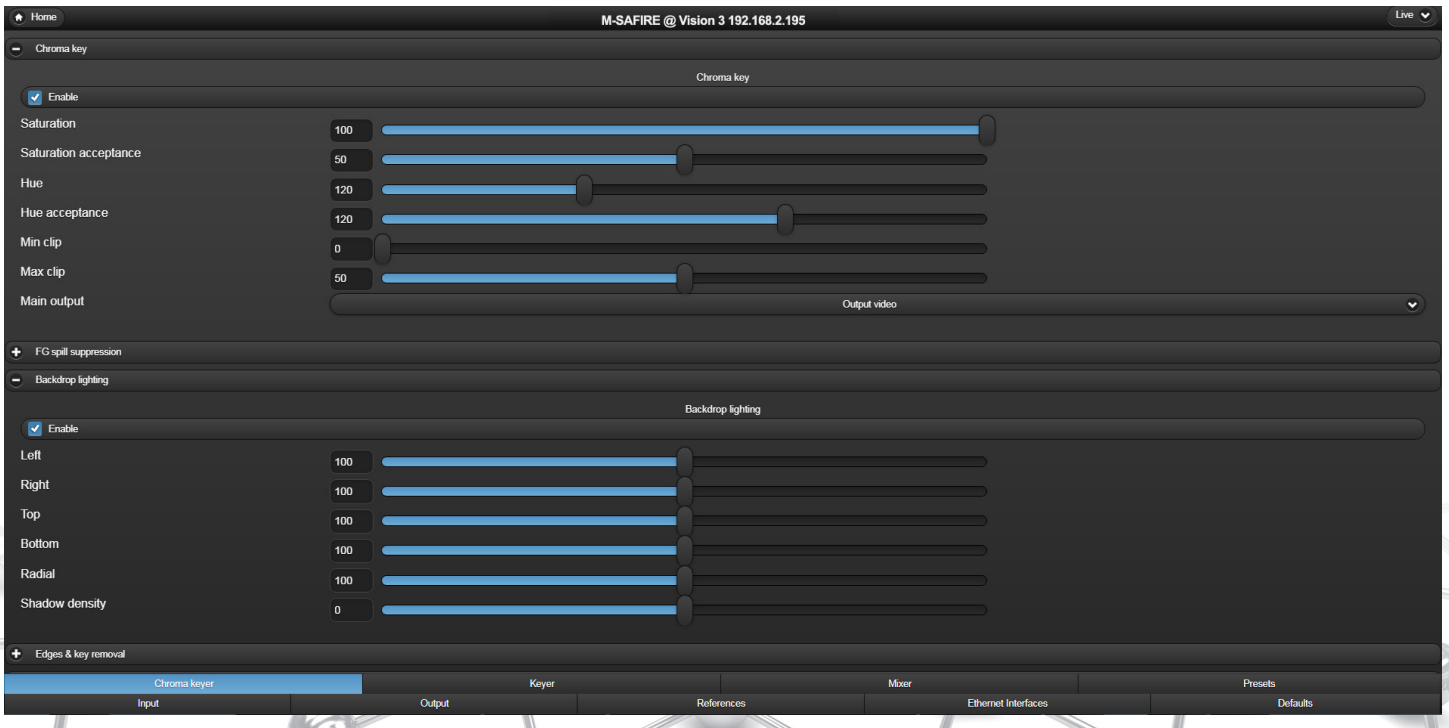
Features to help your systems work = signal monitoring, test patterns, traffic shaping, synchronisation, video delay and more

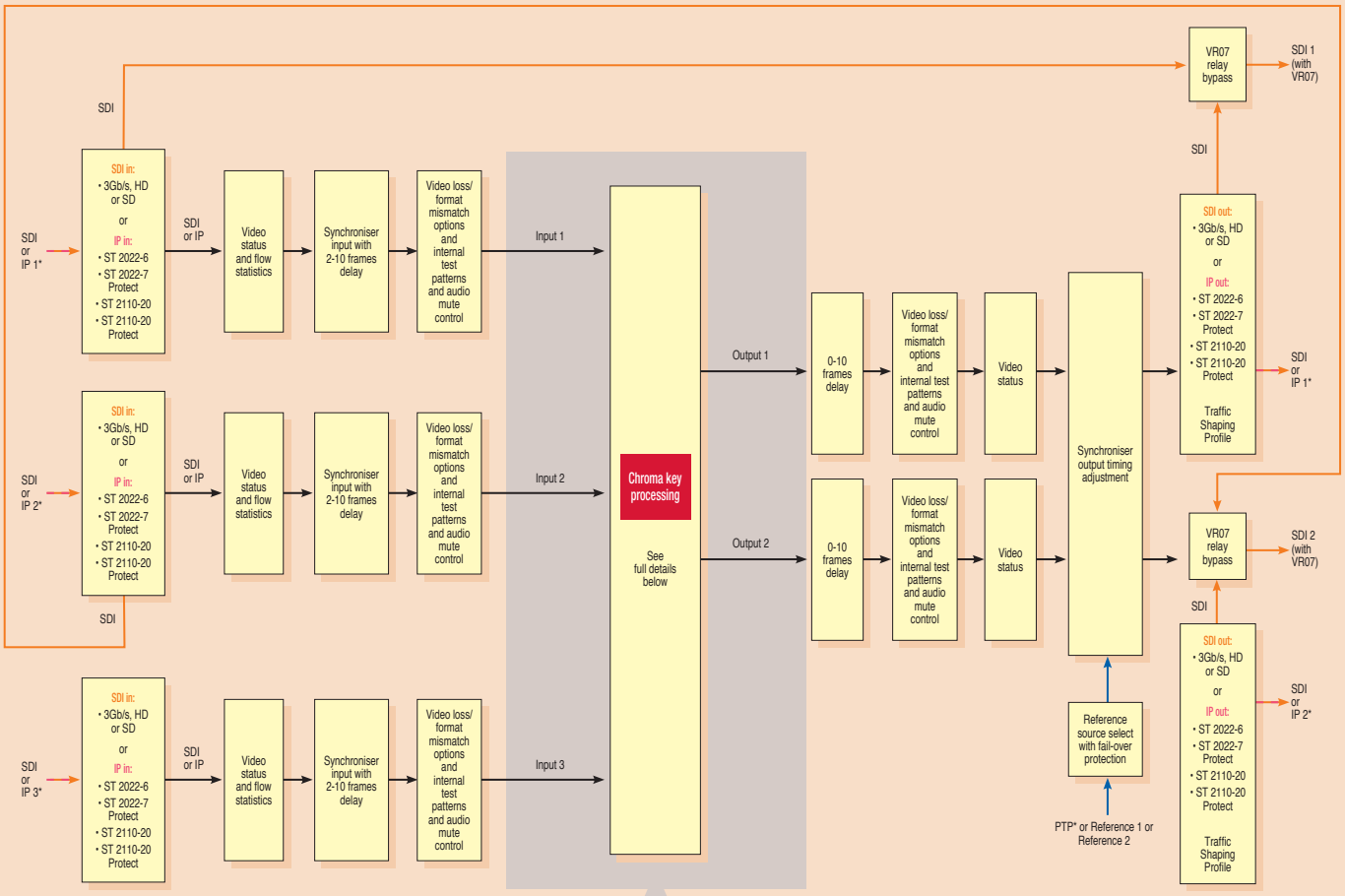
Software-based platform = easy to create custom products or add features

No need to choose between IP and SDI = apps can work with IP, SDI or both – and include IP gateway and translation functionality

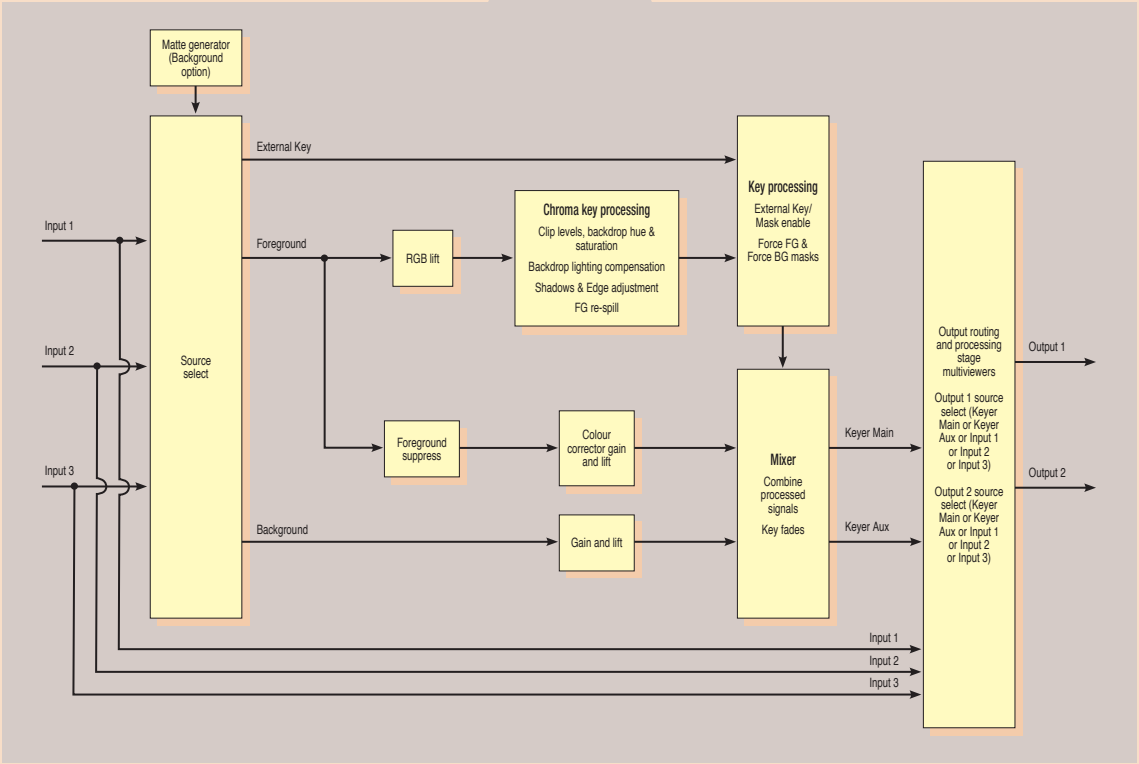
THE CONTROLS

Example of a VisionWeb Control GUI



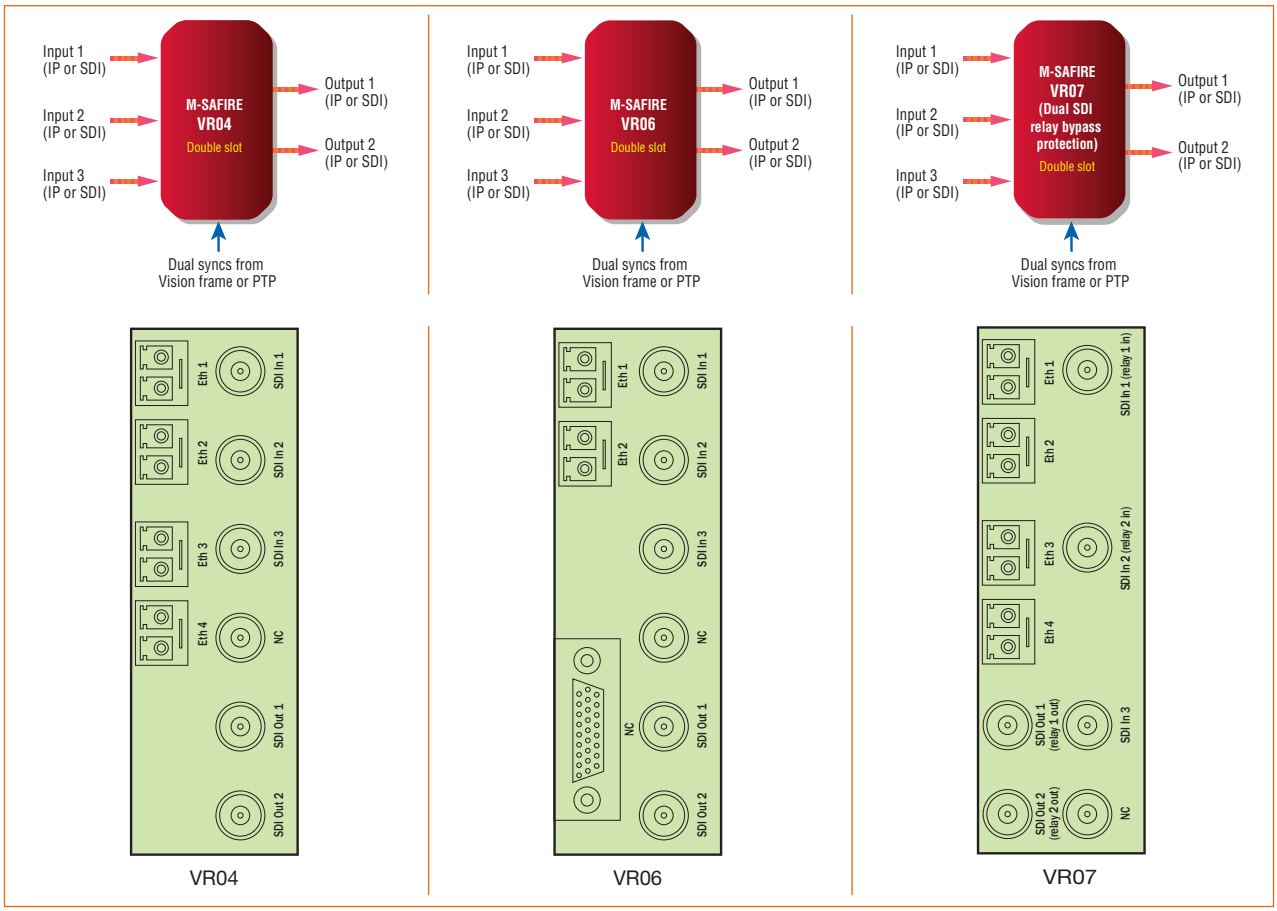


* Up to four 10GbE network interfaces are available for IP inputs and outputs. All IP inputs and outputs can be received and transmitted on a single network interface. The use of two or more interfaces is recommended for separating main and protect video flows associated with the IP input/output. Multicast and unicast addresses are supported on a single network interface or can be divided across multiple interfaces.



REAR MODULE CONNECTIONS

NB. A generic label will be supplied with purchase of the VR04, VR06 and VR07 rear modules. The labels shown below are provided to help you understand the signal connections, such as for wiring purposes.



SPECIFICATION

M-SAFIRE APP RUNNING ON MARBLE-V1 MEDIA PROCESSOR

MECHANICAL

'Double slot' Vision card 96mm x 303mm (96mm x 325mm including finger pull)

Weight: 355g

Power consumption: 25 Watts, plus 1 Watt for each SFP+ fitted to MARBLE-V1

INPUT AND OUTPUTS

Inputs can be IP and/or SDI

Outputs can be IP and/or SDI

Five BNCs for SDI and up to four fibre SFP+ 10GbE IP network interfaces. Choice of fibre modules: either 850nm multi-mode (for up to 300m) or 1310nm single-mode (for up to 10km)

Inputs and outputs can be mixture of ST 2022 and ST 2110. Video can be passed between ST 2022 and ST 2110, although audio and any other non-video data will be lost

IP only, SDI to IP and IP to SDI applications require at least one SFP+ transceiver option, up to a maximum of four. All IP inputs and outputs can be received and transmitted on a single network interface. The use of two or more interfaces is recommended for separating main and protect video flows associated with the IP input/output. Multicast and unicast addresses are supported on a single network interface or can be divided across multiple interfaces

Uses VR04, VR06 or VR07 frame rear modules. VR04 or VR07 must be used when more than two SFP+ are fitted

SDI VIDEO INPUTS

(NB. Some or all of the inputs can be IP instead)

Up to three 3Gb/s or HD or SD SDI inputs

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

3Gb/s cable equalisation up to 100m using Belden 1694A. HD cable equalisation up to 140m with Belden 1694A or equivalent (approx. 100m with Belden 8281). SD cable equalisation >250m Belden 8281 or equivalent

IP INPUTS

(NB. Some or all of the inputs can be SDI instead)

Up to three 3Gb/s or HD or SD video over IP inputs

Packet distribution is not important as variable input buffer will compensate for any timing irregularities. Any traffic shaping option from ST 2110-21 can be used, or packets can come from a device which does not meet the shaping requirement of ST 2110-21

A protect input for SMPTE ST 2022-7 seamless protection switching or the equivalent protect input in ST 2110-20 can come from any of the 10GbE IP network interfaces. This protects the video flow from lost packets by creating two streams of the same data using different routing to the destination. IP packet analyser handles the analysis and reconstruction of the protected video flow. Any IP input can come from any of the 10GbE IP network interfaces and can either be multicast or unicast

continued overleaf...

SDI VIDEO OUTPUTS

(NB. Some or all of the outputs can be IP instead)

Up to two 3Gb/s or HD or SD SDI outputs

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

IP OUTPUTS

(NB. Some or all of the outputs can be SDI instead)

Up to two 3Gb/s or HD or SD video over IP outputs

Any of the 10GbE IP network interfaces can be used to provide a protected output for SMPTE ST 2022-7 or ST 2110 seamless protection switching, which protects the stream from lost packets by creating two streams of the same data using different routing to the destination

Alternatively it is possible to have a unicast on some network interfaces and a multicast on others

RELAY BYPASS PROTECTION (SDI ONLY)

The VR07 frame rear module provides dual relay bypass protection when M-SAFIRE is used with both SDI inputs and SDI outputs

The relay bypass protection protects the video output on frame power failure or if the MARBLE-V1 card loses power or is removed

An electromechanical relay switch on the VR07 needs power to hold the switch in one state and will revert to the other state (card bypass) on loss of power. It prevents signal loss by mechanically connecting an SDI input to an SDI output: SDI In 1 is connected to SDI Out 1 and SDI In 2 is connected to SDI Out 2

NB. Use of the VR07 requires issue 5 or later of MARBLE-V1

VIDEO FORMATS SUPPORTED

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

IP PROTOCOLS

Protocols supported on network interfaces: SMPTE ST 2022-6, SMPTE ST 2022-7, SMPTE ST 2110-20 (uncompressed video), SMPTE ST 2110-10 (system architecture and synchronisation), SMPTE ST 2110-21 (traffic shaping), IGMPv3, ARP, ICMP ping, IPv4, IEEE802.1q, VLAN, IEEE802.3-2012 (10G Ethernet), LLDP

Packing options of the ST 2110-20 video flow are selectable per IP output between BPM and GPM (Block Packing Mode or General Packing Mode)

Packet shaping and distribution of the video flow (compulsory in ST 2110 and optional in ST 2022) is selectable per IP output between TPNL and TPN (narrow linear or narrow gapped packet distribution). There is also a mode for burst packet distribution with a control for the burst rate limit. This is for connecting between Crystal Vision and other compatible devices that allow for a reduced transmission delay

SMPTE ST 2022-7 and ST 2110 video flow protection facilitates the dual stream output

KEYER SOURCES AND OUTPUTS

Background source can be set to Input 1 or Input 2 or Input 3 or Matte

Foreground source can be set to Input 1 or Input 2 or Input 3 or Matte

External key/mask source can be set to Input 1 or Input 2 or Input 3 or Matte

Keyer Aux Output shows processed Output video only

Keyer Main Output can be set to show processed Output video, Output key, External key source, Output key inverted, Foreground source, Background source, Keyed foreground, Keyed background, Suppressed Foreground, Output video/ Output key/External key source/Suppressed foreground quad split or Output video/ Output key/Keyed foreground/Keyed background quad split

The quad split options are useful for checking details during configuration and allow close inspection of the adjustments to the key across the picture. Controls are Quad zoom (0-100%), Quad H position and Quad V position. The single set of controls are applied to all four quads. Zoom of 0% shows the entire images in the quads and zoom of 100% expands a single pixel to fill each quad. When the image is expanded, the position controls define the area of the image to be displayed

INTERNAL MATTE GENERATOR

The keyer background source can be a colour produced by an internal matte generator

CHROMA KEY ADJUSTMENTS

The Chroma key menu is used to set up the chroma keyer functions

M-SAFIRE allows the user to set both the colour and saturation range of the area to be suppressed and background inserted

Enable: Enables/disables chroma key processing

Saturation: Sets the saturation level of the foreground area to create the key. Range is 0-100

Saturation acceptance: Sets a range of saturation that will be used to create the final key and can be used to fine-tune adjustments. Range is 0-100

Hue: Sets the colour in the foreground to be used to create the key signal. Range is 0-360

Hue acceptance: Sets the range of colours that the Hue colour will use to create the key signal and can be used to fine-tune adjustments. Range is 0-180

Min clip: Increase to force lower key levels to zero for when small amounts of key level remain in foreground object areas causing breakthrough of the new background. Range is 0-100. Does not affect Max clip levels

Max clip: Reduce the Max clip level value to force variations in key level to full key value by amplifying and clipping. Range is 0-100. Does not affect Min clip levels

Main output: The source for the Main output can also be selected from the Chroma key menu (see KEYER SOURCES AND OUTPUTS for full details)

FOREGROUND SPILL SUPPRESSION

The FG spill suppression menu assists in removing any areas where colour spill from the backdrop on foreground objects is causing unwanted keying of the background or is causing backdrop colour tints on foreground objects

Mode: Use Chroma key settings (default) uses the same settings from the Chroma key menu to set all the spill suppression parameters. Enabled activates the Saturation, Saturation acceptance, Hue and Hue acceptance settings set in the Spill suppression menu

BACKDROP LIGHTING AND SHADOW PROCESSING

The Backdrop lighting control provides quadrant gain control to assist in poorly lit or variably lit backdrops

Enable: Enables/disables all controls in this menu

There are four quadrant gain controls – Left, Right, Top and Bottom – which can be adjusted to produce an even key in the left, right, top and bottom areas of the image

Radial is an overall lighting spotlight control. Increasing lowers overall gain, decreasing increases overall gain

The Backdrop lighting menu also contains the Shadow density control for enhancing or rejecting natural occurring shadows on the backdrop. Range -100 to 100.

continued overleaf...

Increasing enhances shadows, decreasing rejects shadows

EDGES AND KEY REMOVAL

Edge shrink control is used for softening and cleaning up edges on foreground objects. Range is 0-100. Increasing value reduces created key while simultaneously softening the edge

Chroma key removal controls can attenuate the created key signals in areas of foreground in dark and light luminance levels. 'Dark FG areas' control (range 0-100) is available for low luminance objects in the foreground that are suffering from unwanted background keying. 'Light FG areas' control (range 0-100) is available for high luminance objects in the foreground that are suffering from unwanted background keying. Enable the 'Add contrast' control to add additional contrast into the areas forced by Dark and Light FG areas controls

FOREGROUND RE-SPILL

Foreground re-spill can be used to throw a new spill colour back on to the suppressed foreground in situations requiring a false spill effect for a more natural composite picture

Percentages (0-100%) of red, green and blue in re-spill colour can be set, while Gain setting controls amount of re-spill applied to composited image

COLOUR CORRECTION

Pre-key FG colour allows correction to the RGB lift of the foreground signal before keying. These red, green and blue controls (each with a range of -20 to 20) can be used to compensate for any colour loss from high levels of spill suppression

Post-key FG colour allows correction to the RGB lift and gain colour correction of the foreground signal after keying. Controls are Red gain (range 80-120%), Green gain (range 80-120%), Blue gain (range 80-120%), Red lift (range -20 to 20%), Green lift (range -20 to 20%) and Blue lift (range -20 to 20%)

Post-key gain & lift adjusts the keyed foreground and background signals to achieve a more realistic composite. Controls are Foreground chroma gain (range 80-120%), Foreground video gain (range 80-120%,), Foreground Y lift (range -20 to 20%), Background chroma gain (range 80-120%,), Background video gain (range 80-120%) and Background Y lift (range -20 to 20%)

KEY AND MASK CONTROL

The Key/mask control menu is used to force either foreground objects or background into the composite chroma key

In Key mode, objects in the foreground will be forced using the key signal luminance and will not be subject to the chroma key suppression. 'On (External)' uses the external key input to generate the key. 'On (Foreground)' uses the luminance in the foreground input to generate the key

When Mask mode is set to "On (External)", objects in the background will be forced based upon the luminance of the external source selected as the key/mask

The key and mask can be inverted

Key processing is multiplicative by default. For additive keying, untick the External key multiply FG box

The Min Clip and Max Clip controls can be used to increase or reduce transparency in the key or mask

INTERNAL MASKS

Two internal masks can be turned on or off to force areas of foreground and background

The masks can be inverted and adjusted in position and size

Edge softness controls prevent hard edge on mask, with each edge individually selectable

The internal masks are independent of the external mask and can be used at the same time if required

MIXER

Chroma keyed foreground and keyed foreground can be faded up or down as a timed transition, with fade time set from 0-10 seconds

Fade level can be manually adjusted between 0% and 100%

ROUTING

The keyer processing block provides a Keyer Main and Keyer Aux output. The aux output shows the final result of the keyer processing (output video), whereas the main output can show different stages of processing (see KEYER SOURCES AND OUTPUTS section)

The output routing allows selection between Keyer Main and Keyer Aux for each of the two outputs. For example, Output 1 could be set to Keyer Aux and therefore display the final output video of the keyer processing, whereas setting Output 2 to Keyer Main allows this output to be used to preview different stages of the keyer processing. Additionally the output routing can be set to any of the three inputs

VIDEO LOSS CONTROLS

The video loss/format mismatch controls – available at both the input and output stages – allow the user to select what will happen to an input or output in the event that the video is lost or the video format does not match the specified format. The user can specify to freeze the last good frame or show a black or blue screen or 100% colour bars (with or without an initial delay of three seconds). No output can also be selected. This is independently adjustable on each input/output

TEST PATTERNS

The test pattern controls allow the user to override each individual input or force the output to output a test pattern including Colour Bars, Blue, Black, EqCheck, PllCheck, Pluge, Checkfield, Grey Horizontal Steps, Grey Vertical Steps, Luma Horizontal Ramp, Luma Vertical Ramp, Cycle Colour, Checker Board or Colour Square, or to freeze the picture. This is independently adjustable on each input/output

AUDIO MUTE CONTROL

The input and output audio mute controls allow the user to mute the audio embedded within any of the SDI or ST 2022 inputs or outputs

SYNCHRONISER AND TIMING ADJUSTMENTS

Video sources are synchronised to common reference timing source

- Choice of timing options:
- PTP (SMPTE ST 2059-2) master and backup, via 10GbE IP network interface
- Two tri-level syncs or analogue Black and Burst references (Reference 1 and Reference 2), connected via the Vision 3 frame
- SDI video input, where available (defaults to SDI 1)

Chosen reference is the global reference source for all inputs and outputs

There are up to ten options for the reference selection, selectable via VisionWeb. The hierarchy runs from left to right – should the timing source at the top of the list become missing or invalid, the app will move down the list until it finds a valid timing reference source. When used with IP inputs, the SDI reference option is not applicable and therefore the reference will move to the next valid timing source:

- PTP>Ref1>Ref2>Hold
- PTP>Ref1>Hold
- PTP>Ref2>Ref1>Hold
- PTP>Ref2>Hold
- PTP>Hold
- PTP>Ref1>Ref2>SDI>Hold
- PTP>Ref1>SDI>Hold
- PTP>Ref2>Ref1>SDI>Hold
- PTP>Ref2>SDI>Hold
- PTP>SDI>Hold

("PTP" means PTP Master>PTP Backup. "SDI" means SDI1>SDI2>SDI3>SDI4>SDI5>SDI6, dependent on number of SDI available. "Hold" means it will hold the

continued overleaf...

timing of the last good reference)

When using video reference, video inputs can be different formats but only inputs with the same frame rate as reference video will be locked to that reference. Input signals of same frame rate as reference will be locked together and locked to external reference. Inputs with a differing frame rate will be locked and maintain timing with no drift, but their sync point will be undefined (all same frame rate signals will, however, be locked to each other)

When using PTP reference, input sources of different format and/or frame rate will all be correctly locked to the PTP reference

PTP timing reference should be used when there is a ST 2110-20 output to ensure the RTP timestamp is related to the time of day. However without a PTP reference, a valid ST 2110-20 signal will still be generated using a free running RTP timestamp

When Auto relock enable is selected, the card will automatically relock when a lost reference is restored. Selecting Force lock (with Auto relock disabled) will force the synchroniser to relock after a reference is restored, and can be activated at a non-critical time to avoid video disturbance

Minimum input delay is two frames which equates to the minimum processing delay. Eight additional frames of input video delay (adjustable in one frame steps) allows delay compensation between the input sources

Output timing can be fully adjusted with respect to the reference using three time-based controls: 0 - 42ms adjustable in 0.1ms steps, 0 - 100us adjustable in 1us steps and 0 - 1us adjustable in 5ns steps. Sub frame timing alignment to chosen reference is global to all outputs

Ten frames of output video delay (adjustable in one frame steps) allows compensation for any big system delays. This delay can be configured individually for each SDI or IP output

ANCILLARY DATA

All ancillary data (including audio and locked Dolby E) is passed from SDI or ST 2022 input to SDI or ST 2022 output. When ST 2110 input or output is selected, all ancillary data is discarded

LED INDICATION OF:

Power okay

PRESETS

The current app settings can be saved in one of 16 locations to be recalled as required

App settings and Input/Output configuration settings can be stored and recalled independently

SIGNAL MONITORING

Comprehensive SDI, IP and PTP monitoring information is available and can be used to generate SNMP traps

Checks can be performed on the following video and audio parameters:

- Video present and time present
- Video format
- Video black
- Video frozen
- Video error
- Audio group 1 present
- Audio group 2 present
- Audio group 3 present
- Audio group 4 present
- Audio present on group 1 channel 1
- Audio present on group 1 channel 2
- Audio present on group 1 channel 3
- Audio present on group 1 channel 4
- Audio present on group 2 channel 5
- Audio present on group 2 channel 6
- Audio present on group 2 channel 7
- Audio present on group 2 channel 8
- Audio present on group 3 channel 9
- Audio present on group 3 channel 10
- Audio present on group 3 channel 11
- Audio present on group 3 channel 12
- Audio present on group 4 channel 13
- Audio present on group 4 channel 14
- Audio present on group 4 channel 15
- Audio present on group 4 channel 16
- Silence group 1 channel 1
- Silence group 1 channel 2
- Silence group 1 channel 3
- Silence group 1 channel 4
- Silence group 2 channel 5
- Silence group 2 channel 6
- Silence group 2 channel 7
- Silence group 2 channel 8
- Silence group 3 channel 9
- Silence group 3 channel 10
- Silence group 3 channel 11
- Silence group 3 channel 12
- Silence group 4 channel 13
- Silence group 4 channel 14
- Silence group 4 channel 15
- Silence group 4 channel 16

Black or frozen video will be indicated by an amber LED. This alert can be delayed by 1-120 seconds to prevent false warnings during brief video pauses

The audio silence alert is triggered at an audio level of -93dbFS and can be delayed by 1-120 seconds to prevent false warnings during quiet audio periods

The following IP parameters are monitored for input flows:

- Network error
- Packet loss
- Duplicated packets
- Packet delay variation. Shown as the skew (difference in time of packet arrival) between the main and protected input, and also as the min and max nano second gap between the packets on each input

The Ethernet interfaces are monitored for:

- Count of packets ignored by the app (general network traffic non-media packets, which do not require processing by the app). Jumps in 100 step increments indicate network traffic flood
- Ignored multicast packets. LED indicates multicast traffic not requested by the app is present on the Ethernet Interface, indicating incorrectly configured IGMP at the network switch

References are monitored for:

- Reference 1 and 2 present and time present
- Reference 1 and 2 format
- PTP master and backup clock present and time present
- PTP statistics – network delay, delay variation, reference offset and sync period

REMOTE CONTROL

Software:

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

SNMP monitoring and control available as standard

Control using ASCII and JSON protocols

Hardware:

Control from integrated control panel on Vision 3 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

M-SAFIRE	IP/SDI chroma keyer. Supports 3G/HD/SD and ST 2022-6, ST 2022-7 and ST 2110-20 protocols. Software app which runs on the MARBLE-V1 media processor
MARBLE-V1	Media processor hardware which runs Crystal Vision's software apps. Housed in the Vision frames, with up to ten MARBLE-V1 in 3U. Requires between one and four 850nm or 1310nm SFP+ transceiver modules when used with M-SAFIRE app and IP signals
SFP+10G-850MM	Multi-mode 850nm 10GbE SFP+ transceiver module for MARBLE-V1 media processor – fit between one and four SFP+10G-850MM (or SFP+10G-1310SM) when M-SAFIRE app used with IP signals
SFP+10G-1310SM	Single-mode 1310nm 10GbE SFP+ transceiver module for MARBLE-V1 media processor – fit between one and four SFP+10G-1310SM (or SFP+10G-850MM) when M-SAFIRE app used with IP signals
App support	Purchase with M-SAFIRE app to get software upgrades for changes in standards, new features and bug fixes plus telephone and e-mail operational support (with support for the first year included for free)
Vision 3	3U frame with integrated control panel and smart CPU for up to 20 Crystal Vision cards from the Vision range
VR04	Two slot frame rear module. Allows ten M-SAFIRE in 3U. Inputs and outputs can be any mixture of SDI via BNCs and IP via up to four 10GbE network interfaces on dual LC. Gives access to three SDI (3G/HD/SD) or IP inputs and two SDI or IP outputs
VR06	Two slot frame rear module. Allows ten M-SAFIRE in 3U. Inputs and outputs can be any mixture of SDI via BNCs and IP via up to two 10GbE network interfaces on dual LC. Gives access to two SDI (3G/HD/SD) or IP inputs and two SDI or IP outputs
VR07	Two slot frame rear module. Allows ten M-SAFIRE in 3U. Inputs and outputs can be any mixture of SDI via BNCs and IP via up to four 10GbE network interfaces on dual LC. Provides dual relay bypass protection for up to two inputs when used with SDI inputs and outputs. Gives access to three SDI (3G/HD/SD) or IP inputs and two SDI or IP outputs. NB. Use of the VR07 requires issue 5 or later of MARBLE-V1
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 included in frame

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