Crystal Vision

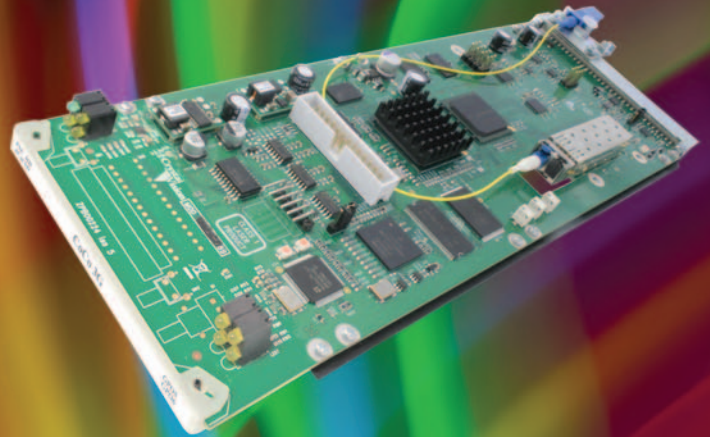## CoCo 3G

3G/HD/SD Colour Corrector and Legaliser

CoCo 3G is a colour corrector and legaliser for 25 different video standards. Designed for whole picture colour correction or for ensuring that the broadcast colour gamut is always legal, it allows flexible adjustments in both the RGB and YUV colour spaces. With control options to suit all preferences, CoCo 3G includes an impressive list of features, including numerous RGB and YUV adjustments, advanced correction for gamut errors, preview mode with illegal signal value highlighting, relay bypass protection and even optional integrated fibre input/output connectivity. As a 100mm x 266mm module, CoCo 3G will save you rack space too.

- Colour corrector and legaliser for whole picture adjustments in the RGB and YUV domains
- Use it with any source: works with 3Gb/s, HD and SD sources and 25 different video standards
- Wide range of RGB colour correction tools: with independent gain, lift and gamma
- Wide range of YUV video level tools: with independent and overall lift and gain, hue phase adjustment and Black clean up
- Legalise naturally and maintain the colour: changes YUV colours illegal in RGB to be valid in RGB by desaturating the colour without changing the hue
- Preview and perfect your adjustments: wipe horizontally or vertically between the processed and unprocessed signal for a 'before' and 'after' comparison
- Easily spot the problem areas: highlight any pixels containing illegal signal values
- Remove any unwanted picture material: with adjustable horizontal and vertical cropping
- Optional integrated fibre input/output activity means you won't be limited by cable lengths
- Use it with embedded audio sources: passes ancillary information, including embedded audio
- Save yourself time: use the 16 user memories to store regular adjustments
- Protect your programme output with relay bypass protection option
- Space-saving: 100mm x 266mm module allows 12 CoCo 3G in 2U (six in 1U and two in desk top box)
- Choice of control with easy-to-use interface: select from front and remote panels, SNMP, PC software and web browser

WHAT CAN YOU USE IT FOR?

CoCo 3G is ideal for manipulating the colours in any digital image whenever you need to correct for camera or lighting problems or standardise pictures shot at different times. Popular applications include adjusting the colours on in-shot plasma displays, being placed before an encoder to set the range of colours to be transmitted and the correction of computer-generated or post production outputs. Its small size also makes it ideal for multi-channel applications. CoCo 3G can be used with embedded audio sources, passing all ancillary data including embedded audio without modification.

WHICH VIDEO STANDARDS WILL IT WORK WITH?

CoCo 3G supports 25 different video standards, including the 23.98, 24 and 25 frames per second progressive video standards for film to HD video transfers. The video formats supported are 625, 525, 720p23.98, 720p24, 720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60, 1035i59.94, 1035i60, 1080PsF23.98, 1080PsF24, 1080i50, 1080i59.94, 1080i60, 1080p23.98, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94 and 1080p60.

WIDE RANGE OF RGB ADJUSTMENTS

There's an impressive range of colour correction tools available, with independent gain, lift and gamma in the RGB domain.

The gain and lift tools are used together to effortlessly increase or reduce the red, green or blue individually, allowing CoCo 3G to perform true colour correction. Overall gamma is used to lighten or darken the picture without crushing the blacks or the whites, while independent adjustment of red, green and blue gamma – rarely seen at this price level – allows extremely sophisticated colour manipulation.

WIDE RANGE OF YUV ADJUSTMENTS

The YUV video level adjustment tools on offer include independent lift, independent gain, overall lift and gain and hue phase adjustment. With Black clean up, Y levels below a user-defined value are forced to black which can be useful for cleaning up noise. The range of adjustment for the Black clean up threshold is 0-10% of peak white.

The full list of RGB and YUV adjustments are available in the Specification section on the back page.

THE BEST WAY TO CORRECT GAMUT ERRORS

CoCo 3G is an excellent legaliser. It has advanced correction for gamut errors, changing any YUV colours that are illegal in RGB to be valid in RGB in a brilliant and subtle way. CoCo 3G legalises by reducing the colour saturation without changing the hue, processing the RGB components on each pixel at the same time and achieving a legal and natural-looking picture. When there is no RGB processing, the signal is legalised in the YUV domain to make it RGB legal, avoiding the distortion inevitable when changing colour space. Thanks to some clever processing CoCo 3G will correctly pass transients caused by the different bandwidths in the RGB and YUV colour spaces. YUV adjustable soft clipping is also available and limits the gamut to a YUV range by providing a combination of adjustable threshold and slope controls.

PREVIEW AND PERFECT YOUR ADJUSTMENTS – AND SPOT ILLEGAL VALUES

It's easy to preview and perfect any adjustments. Using Preview Mode, the auxiliary outputs can be connected to a monitor and will allow the operator to wipe horizontally or vertically between the processed and unprocessed signal for a split-screen 'before' and 'after' comparison.

The auxiliary outputs can also be used to highlight any pixels containing illegal signal values using the Gamut Error Highlighter, making it easier to locate the problem and make any adjustments to equipment in the system.

You can even remove unwanted parts of the picture by using the adjustable horizontal and vertical cropping tools – from zero to full image width left and right, and zero to full image height top and bottom.
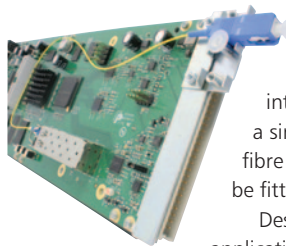

Preview and perfect your adjustments: wipe between the processed and unprocessed signal

View the illegal pixels on the auxiliary output

FIBRE CONNECTIVITY – ON THE BOARD

Should you need to colour correct or legalise signals from beyond the local equipment bay, it's easy to give CoCo 3G integrated fibre connectivity – and still only use a single frame slot. Simply request either the FIP fibre input option or FOP fibre output option to be fitted to the motherboard by Crystal Vision.

Designed for SMPTE 297-2006 short-haul applications the FIP and FOP use a Class 1 laser, with the FIP used to receive an optical input and the FOP used to transmit an optical output. If a FIP is fitted, you can select your video input source to be taken either from the input BNC or the optical input.

Having the fibre integral to the board reduces the need to use up additional rack space for separate fibre optic transmitters and receivers – and also saves you money.

CoCo 3G can also support a CWDM laser if required.

A FLEXIBLE CHOICE OF CONTROL

Hands-on control with the CoCo 3G Controller

The instinctive user interface makes CoCo 3G extremely simple to operate – with a choice of control methods to suit all preferences.

Ideal for live use, the CoCo 3G Controller is a dedicated 1U control panel for up to 12 colour correctors. Fitting easily into any control desk, it has seven dedicated shaft encoders for the most commonly used adjustments (video gain, chroma gain, black level, red gain, green gain, blue gain and gamma) with the values shown in a display, as well as quick set-up buttons to implement the common combinations.

Other control options include an integrated control panel on the AE frame, the VisionPanel remote control panel, the SBB-4 smart button box, our ASCII and JSON protocols, the Statesman Lite PC software and the VisionWeb Control web browser software. SNMP monitoring and control is also available for those that want to set alarms.

You can use the 16 presets to save yourself time: being able to store the precise adjustments for future use is ideal, for example, if you need to continually correct a feed from the same camera.

SAVE RACK SPACE

CoCo 3G will also save you rack space. The 100mm x 266mm module fits in the Indigo frames alongside any of the other Indigo products, allowing 12 boards in 2U, six in 1U or two in a desk top box.

CoCo 3G can be used with three different frame rear modules, depending on your requirements. The default rear module is the RM41 which gives access to one 3Gb/s, HD or SD input, two main outputs and three auxiliary outputs.

The RM57 rear module should be used for fibre applications and gives access to one 3Gb/s, HD or SD input (available on fibre if a FIP fibre option is fitted), one main output and three auxiliary outputs, plus one copy of the auxiliary output on fibre if a FOP fibre option is fitted.

The RM64 rear module, meanwhile, is ideal for those using CoCo 3G with the CoCo 3G Controller control panel, as it allows one-to-one RS422 wiring from the CoCo 3G Controller straight to the board – allowing the same RJ45 cable to be used for any slot. It gives access to one 3Gb/s, HD or SD input, two main outputs and one auxiliary output.

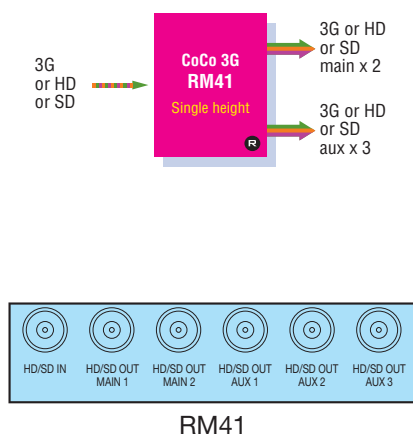## EXTRA PEACE OF MIND – WITH RELAY BYPASS PROTECTION

The RM64 rear module also gives CoCo 3G relay bypass protection – which helps maintain programme output in the event of power failure or board removal. It prevents signal loss by mechanically connecting CoCo 3G's input signal to main output 1 should the supply to the RM64 be interrupted.
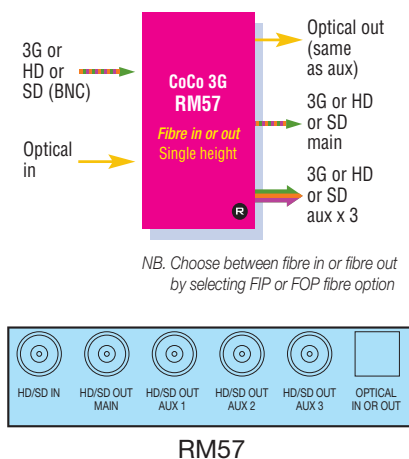
THE INPUTS AND OUTPUTS
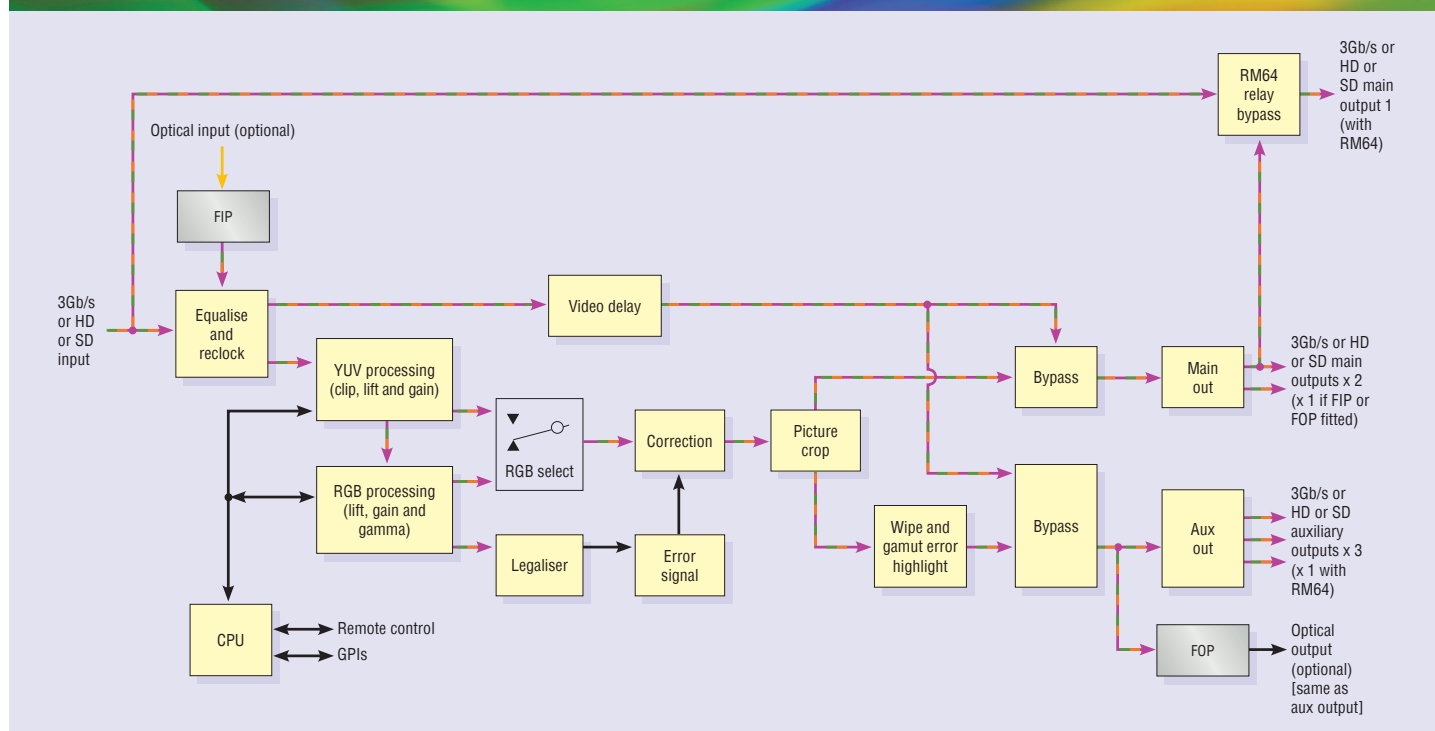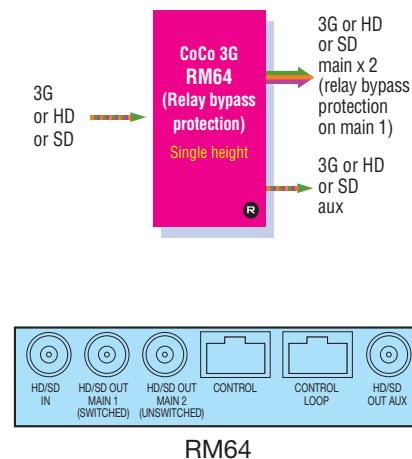

REAR MODULE CONNECTIONS

MECHANICAL

Standard Crystal Vision module 266mm x 100mm
Weight: 180g
Power consumption: 11 Watts; 0.6 Watts (FIP and FOP)

VIDEO INPUT

One 3Gb/s or HD or SD input with reclocking

When using FIP fibre input option allows selection between one optical and one electrical input

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

The 25 video formats supported are 625, 525, 720p23.98, 720p24, 720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60, 1035i59.94, 1035i60, 1080PsF23.98, 1080PsF24, 1080i50, 1080i59.94, 1080i60, 1080p23.98, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94 and 1080p60

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

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

Auto data rate and video format selection

VIDEO OUTPUTS

Using RM41 rear module: Five 3Gb/s or HD or SD outputs (two main, three auxiliary)

Using RM57 rear module with FIP fibre input option: Four 3Gb/s or HD or SD outputs (one main, three auxiliary). Select between one fibre and one electrical input

Using RM57 rear module with FOP fibre output option: Four 3Gb/s or HD or SD outputs (one main, three auxiliary), plus one copy of the auxiliary output on fibre

Using RM64 rear module: Three 3Gb/s or HD or SD outputs (two main, one auxiliary). Allows one-to-one RS422 wiring from the CoCo 3G Controller straight to the board meaning the same RJ45 cable can be used for any frame slot. The RM64 provides relay bypass protection to help maintain programme output. An electromechanical relay switch needs power to hold the switch in one state and will revert to the other state (board bypass) on loss of power. It prevents signal loss by mechanically connecting the input to main output 1 on complete frame power failure or board removal

Serial output: 270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A. Output follows the input format

INTEGRATED FIBRE OPTIONS

CoCo 3G can be given integrated fibre connectivity by fitting either the FIP fibre input option or FOP fibre output option. The chosen option should be fitted at the factory

To access the optical inputs or outputs an RM57 frame rear module must be used

When fitted with a FIP or FOP, CoCo 3G can be housed in any frame slot position but due to its extra height it is not possible to place Standard Definition or audio boards directly above it when the CoCo 3G is in even numbered slot positions. 3Gb/s and HD boards do not share this restriction

FIP and FOP meet the SMPTE 297-2006 short-haul specification, allowing operation with single-mode and multi-mode fibre

Connector type: SC/PC

FIP:

Optical wavelength: 1260-1620nm

Input level maximum: -1dBm

Input level minimum: Typical -20dBm (-18dBm 3Gb/s pathological)

FOP:

Optical power: Max -0.0dBm, min -5.0dBm

Fibre pigtail: Single-mode 9/125uM

Optical wavelength: 1290-1330nm (1310 typical)

Extinction ratio: 7.5dB

Laser safety classification: Class 1 FDA and IEC60825-1 Laser Safety compliant

CWDM laser can be fitted on request. The 18 output wavelengths defined by the ITU are 1271, 1291, 1311, 1331, 1351, 1371, 1391, 1411, 1431, 1451, 1471, 1491, 1511, 1531, 1551, 1571, 1591 and 1611nm. For CWDM, order the FOP-CWDM and specify the wavelength required

DELAY THROUGH BOARD

<16us (SD)
<3us (HD)
<2us (3Gb/s)

ANCILLARY DATA/EMBEDDED AUDIO

All data in the vertical and horizontal blanking interval is passed through unprocessed with full 20 bits. The unit will pass through embedded audio and any ancillary data with a delay that matches the default processing delay

COLOUR CORRECTIONS

Increase/decrease overall lift and gain
Increase/decrease Y channel lift and gain
Increase/decrease U channel lift and gain
Increase/decrease V channel lift and gain
Hue shift U/V channels
Black clean up (Y levels below a user-defined value are forced to black)
Increase/decrease R channel lift and gain
Increase/decrease G channel lift and gain
Increase/decrease B channel lift and gain
Increase/decrease overall gamma
Increase/decrease R gamma
Increase/decrease G gamma
Increase/decrease B gamma

LEGALISING

Set and soft limit Y channel positive and negative excursions independently
Set and soft limit U channel positive and negative excursions symmetrically
Set and soft limit V channel positive and negative excursions symmetrically
Set and limit R, G, B channel positive and negative excursions
Includes sophisticated processing to deal with transient errors
RGB gamut errors are corrected without changing the hue of the affected area
Set horizontal and vertical active picture area cropping region on final output (0 to full image width left and right and 0 to full image height top and bottom)

PREVIEW MODE

The preview mode allows the unprocessed input and processed output to be seen side by side to facilitate adjustments using either a vertical or horizontal wipe. The split-screen preview is only available via the auxiliary outputs

GAMUT ERROR HIGHLIGHTER

The auxiliary outputs can be used to highlight any pixels containing illegal signal values, making it easier to locate the problem and make any adjustments to equipment in the system

BYPASS MODE

Bypass mode allows all the processing and legalising functions to be turned off so the input is passed unchanged. The signal is put through a matching delay so that the board can be switched between bypass and processing while continuing to output valid video

PRESETS

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

LED INDICATION OF:

Power supplies okay
Not cal (gains or levels not at their default values)
HD input
SD input
GPI 5 active
GPI 6 active

GPI INPUT LEVELS

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

GPI INPUTS

Four GPI inputs select one of 16 presets
Connections are also used for RS422 link to dedicated control panel

GPI OUTPUT LEVELS

Electrically: Open collector transistors 30V, 270 ohm current limit resistors. Pulled up to +5V through 6800 ohm

GPI OUTPUTS

Two GPI outputs
YUV clip status/RGB clip status

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
Statesman Lite allows control from any PC on a network
SNMP monitoring and control available as a frame option
Control using ASCII and JSON protocols
Hardware:
CoCo 3G Controller 1U control panel operates up to 12 CoCo 3G modules
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

CoCo 3G	3G/HD/SD colour corrector and legaliser
FIP	Fibre input option for CoCo 3G motherboard providing integrated fibre input connectivity
FOP	Fibre output option for CoCo 3G motherboard providing integrated fibre output connectivity. For CWDM laser options, contact Crystal Vision
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
RM41	Single slot frame rear module. Allows maximum number of CoCo 3G in frame (12 in 2U, six in 1U, two in desk top box). Gives access to one 3Gb/s, HD or SD input and two main and three auxiliary outputs
RM57	Single slot frame rear module. Allows maximum number of CoCo 3G in frame (12 in 2U, six in 1U, two in desk top box). Designed for applications using fibre inputs or outputs. When using fibre input, allows you to select between one fibre and one electrical 3Gb/s, HD or SD input, and gives access to one main and three auxiliary outputs. When using fibre output, gives access to one 3Gb/s, HD or SD input and one main and three auxiliary outputs, along with one copy of the auxiliary output on fibre
RM64	Single slot frame rear module. Allows maximum number of CoCo 3G in frame (12 in 2U, six in 1U, two in desk top box). Provides relay bypass protection. Gives access to one 3Gb/s, HD or SD input and two main outputs, one auxiliary output and RS422 control connection
CoCo 3G Controller	Dedicated 1U remote control panel for up to 12 CoCo 3G
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
Statesman Lite	PC Control System
SNMP	SNMP monitoring and control

Performance and features are subject to change. Figures given are typical measured values. COCO3G1220

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