

# Crystal Vision



## CoCo HD

### HD/SD Colour Corrector and Legaliser

If you want to do whole picture colour correction or legalising, there's no better way to do it than by using CoCo HD.

Working with all common HD formats as well as Standard Definition, CoCo HD allows flexible adjustments in both the RGB and YUV colour spaces and 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.

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 HD 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. The YUV adjustment tools on offer include independent lift, independent gain, overall lift and gain, hue phase adjustment and adjustable horizontal and vertical cropping. With Black clean up, Y levels below a user-defined value are forced to black which can be useful for cleaning up noise.

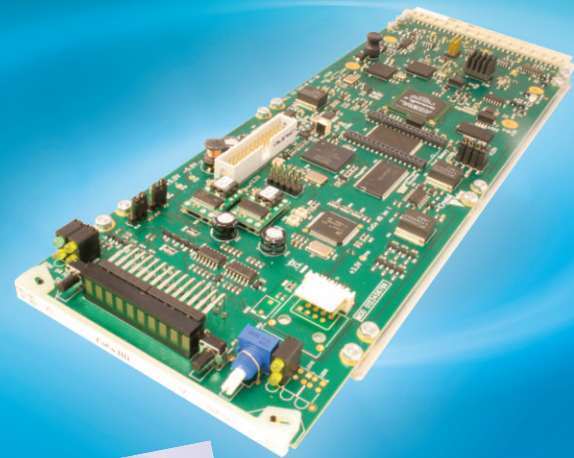
CoCo HD excels as a legaliser too. It has advanced correction for gamut errors, changing any YUV colours that are illegal in RGB to be valid in RGB in a brilliant and subtle way. CoCo HD legalises by reducing the colour saturation without changing the hue, processing the RGB components on each pixel 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 HD will correctly pass transients caused by the different bandwidths in the RGB and YUV colour spaces. CoCo HD supports 22 different video standards, including the 23.98, 24 and 25 frames per second progressive video standards for film to HD video transfers.

It's easy to preview and perfect any adjustments. Two auxiliary outputs can be connected to a monitor and will allow the operator to either wipe horizontally or vertically between the processed and unprocessed signal or switch between input and output for a 'before' and 'after' comparison. The auxiliary outputs can also 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. 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. CoCo HD can be used with embedded audio sources, passing all ancillary data including embedded audio without modification.

The instinctive user interface makes CoCo HD 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. Statesman is available for those who prefer PC control, and allows alarms to be set for out of range inputs, loss of input or loss of board. For a permanent set up, such as for legalising, a frame active front panel or Crystal Vision's general remote control panel are ideal, while there's also full board edge control.

CoCo HD will also save you rack space. The 100mm x 266mm module fits in the Crystal Vision frames alongside any of the other products, allowing 24 colour correctors in 4U, 12 in 2U, six in 1U or two in a desk top box. There are two frame rear module options. Use the RM34 to access two main outputs, two auxiliary outputs and a reclocked HD or SD input loop-through. The RM65 – which provides two main outputs and one auxiliary output – is ideal for those wishing to use the CoCo 3G Controller control panel, as it allows one-to-one RS422 wiring from the CoCo 3G Controller straight to the board. The RM65 also gives CoCo HD relay bypass protection to help maintain programme output in the event of power failure or board removal.

CoCo HD will find a place in any HD or SD broadcast environment. 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.



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

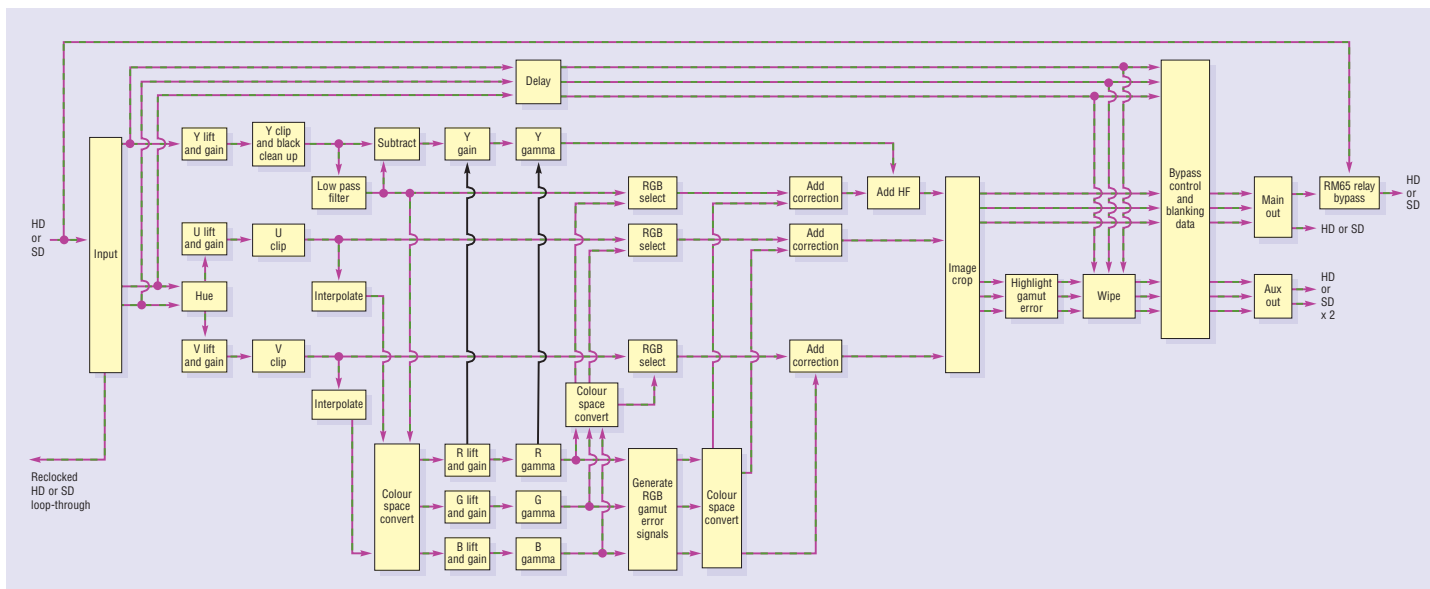


View the illegal pixels on the auxiliary output



Hands-on control with the CoCo 3G Controller

- HD or SD colour corrector and legaliser for whole picture adjustments in the RGB and YUV domains
- Wide range of tools to adjust level, gain and gamma – including individual red, blue and green gamma controls
- Legalise naturally and maintain the colour: CoCo HD changes YUV colours illegal in RGB to be valid in RGB by desaturating the colour without changing the hue
- Sophisticated processing for transient errors
- Supports 22 different video standards
- Easily spot the problem areas by highlighting the illegal pixels
- Preview your adjustments by wiping between the processed and unprocessed signal
- Bypass control
- Passes ancillary information, including embedded audio
- 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 HD in 2U (24 in 4U, six in 1U and two in desk top box)
- Easy-to-use interface with a choice of control, including board edge, front and remote panels, PC software and dedicated 1U panel



## SPECIFICATION

### MECHANICAL

Standard Crystal Vision module 266mm x 100mm  
Weight: 200g  
Power consumption: 6.6 Watts

### VIDEO INPUTS

One HD or SD input  
270Mbit or 1.485Gbit serial compliant to EBU 3267-E, SMPTE 259M and SMPTE 292M  
The 22 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 and 1080p30  
HD cable equalisation up to 140m with Belden 1694 or equivalent (approx. 100m with Belden 8281). SD cable equalisation >250m Belden 8281 or equivalent  
Input return loss: -15dB for 50MHz to 1.5GHz  
Auto 525/625 line selection  
Auto HD/SD video format selection

### VIDEO OUTPUTS

Maximum four HD or SD outputs (two main, two auxiliary) available by using the RM34 frame rear module. Active redlocked HD or SD input loop-through on RM34 - loop needs CoCo HD to be fitted  
Three HD or SD outputs (two main, one auxiliary) available by using the RM65 rear module. This 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 RM65 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: 270Mbit or 1.485Gbit serial compliant to EBU 3267-E, SMPTE 259M and SMPTE 292M. Output follows the input format

### DELAY THROUGH BOARD

15us (SD)  
5us (HD)

### 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

### ADDITIONAL FEATURES

EDH generation  
16 non-volatile user memory areas  
Adjustable wipe on auxiliary outputs, for before/after processing comparison  
Highlight illegal pixels on auxiliary outputs  
Overall board process/bypass selection

### LED INDICATION OF:

Power supplies okay  
Not cal (the signal has been changed in some way)

HD input  
SD input  
Input not present  
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  
RGB gamut error and YUV gamut error

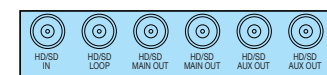
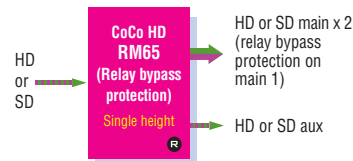
### LOCAL CONTROL

Full control using intuitive board edge interface with two select buttons, shaft encoder and 10 character alphanumeric display

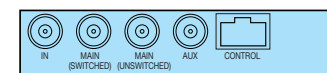
### REMOTE CONTROL

RS422/485  
19200 baud, 8 bits, 1 stop no parity  
CoCo 3G Controller 1U control panel operates up to 12 CoCo HD modules  
Control from frame active front panel and remote panel

Statesman allows control from any PC on a network SNMP monitoring and control available as a frame option



RM34



RM65

## ORDERING INFORMATION

CoCo HD	HD/SD colour corrector and legaliser
Indigo 4	4U frame with passive front panel for up to 24 Crystal Vision modules
Indigo 4SE	4U frame with passive front panel fitted with Statesman CPU for up to 24 Crystal Vision modules
Indigo 2	2U frame with passive front panel for up to 12 Crystal Vision modules
Indigo 2AE	2U frame with active front panel for up to 12 Crystal Vision modules
Indigo 2SE	2U frame with passive front panel fitted with Statesman CPU for up to 12 Crystal Vision modules
Indigo 1	1U frame with passive front panel for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1-DP
Indigo 1AE	1U frame with active front panel for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1AE-DP
Indigo 1SE	1U frame with passive front panel fitted with Statesman CPU for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1SE-DP
Indigo DT	Desk top box with passive front panel for up to two Crystal Vision modules
Indigo DTSE	Desk top box with passive front panel fitted with Statesman CPU for up to two Crystal Vision modules
RM34	Single slot frame rear module. Allows maximum number of CoCo HD in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Gives access to two main and two auxiliary outputs and a redlocked HD or SD loop-through
RM65	Single slot frame rear module. Allows maximum number of CoCo HD in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Provides relay bypass protection. Gives access to two main outputs, one auxiliary output and one-to-one RS422 wiring to the CoCo 3G Controller
REMIND	19" remote control panel
REMIND-E	19" Ethernet remote control panel
CoCo 3G Controller	1U remote control panel for up to 12 CoCo HD modules
Statesman	PC Control System
SNMP	SNMP monitoring and control

Performance and features are subject to change. Figures given are typical measured values. COCOHD0411