MON210

SDI to composite or Y/C monitoring encoder

Crystal Vision

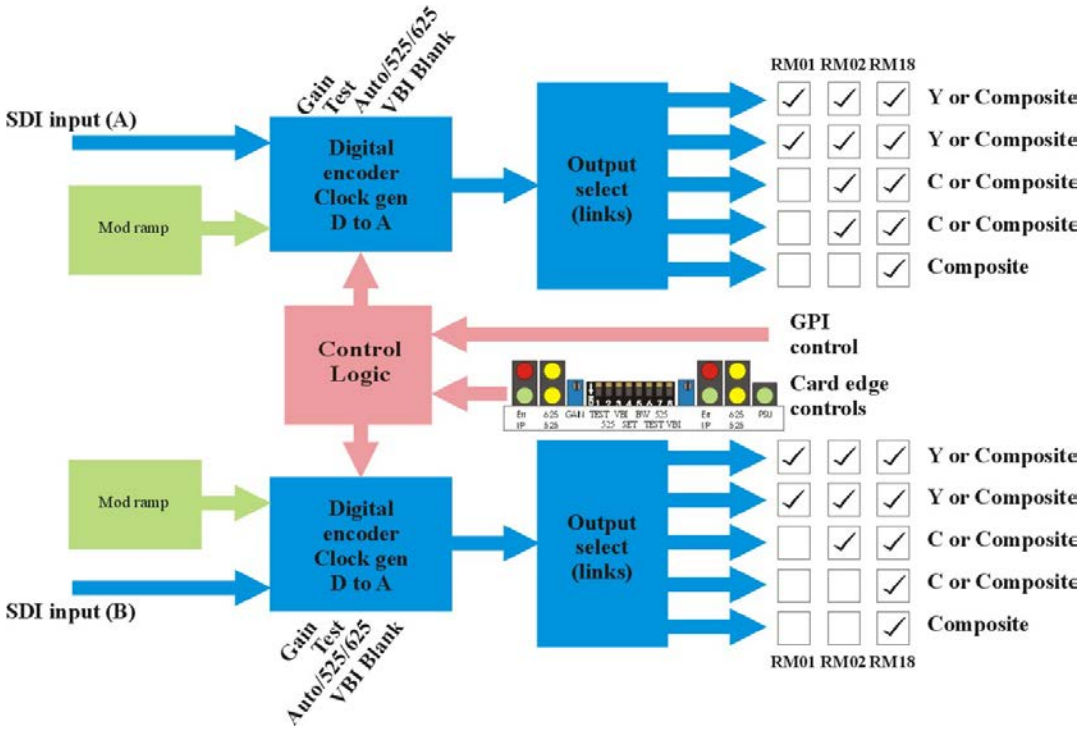
Crystal Vision Ltd., Lion Technology Park, Station Road East, Whittlesford, Cambridge, CB22 4WL, England.
Tel: +44(0) 1223 497049 Fax: +44(0) 1223 497059 sales@crystalvision.tv www.crystalvision.tv

Contents

1 Introduction

The MON210 is an dual 8-bit Serial Digital to Analogue converter with up to four selectable composite or Y/C analogue outputs and one fixed composite output per converter channel.

The universal connection system allows a mixture of Crystal Vision modules in the frame. The modules plug in the front and the rear connectors plug in the rear. Depending on frame design, a hinged or removable front panel reveals LED indication of input and PSU status when opened.



MON210 dual serial digital to analogue converter

The MON210 may be used with the RM01 single slot rear connector, the RM02 quadruple slot rear connector and the RM18 double slot rear connectors. The RM01 allows the highest frame packing density, with reduced output connections, whilst the RM18 and RM02 provide access to more outputs but with reduced packing density. Only the RM18 provides access to all outputs.

The RM01 allows 12 modules to fit in a 2U frame, the RM02 allows 9 modules to fit in a 2U frame and the RM18 allows 6 modules to fit in a 2U frame.

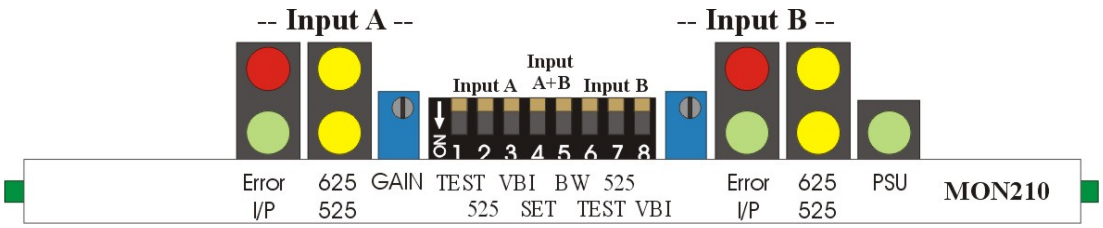
The analogue outputs can be switched between input video and an internal test pattern under local or remote (GPI) control. It accepts either 625 or 525 line input, with automatic detection.

The main features are:

- Dual 8-bit Serial Digital to Analogue Composite converter
- Variable gain
- Automatic equalisation for up to 200 metres of coaxial cable.
- One composite and up to four composite or two Y/C outputs per converter channel
- GPI/LED input presence indication
- Auto or manual PAL 625/NTSC 525 line selection
- VBI blanked or unblanked
- Modulated ramp test pattern or serial input
- NTSC setup on/off and chroma bandwidth select
- Card edge control

2 Card edge operation

The front edge of the MON210 card provides power rail monitoring, signal status, gain adjustment and configuration switches.



MON210 front edge view

The 8-way front edge switch provides access to the following:

- Test – set output as test pattern or SDI input, independently for channel A or B
- 525 – force standard (if NOT in AUTO) independently for channel A or B
- VBI – blank or unblank VBI data, independently for channel A or B
- SET – apply 7.5 IRE in NTSC, for both channels 1 and 2 together
- BW – change chroma bandwidth, for both channels 1 and 2 together

Lever		Up	Down
1	TEST A	Composite output is incoming SDI data	Composite output is modulated ramp test pattern
2	525 A	625-line if manual selected on jumper PL8	525-line if manual selected on jumper PL8
3	VBI A	Blank PAL lines 7 to 22 & 320 to 335, NTSC lines 10 to 20 & 273 to 282	Unblank PAL lines 7 to 22 & 320 to 335, NTSC lines 10 to 20 & 273 to 282.
4	SETUP	No setup	Adds 7.5 IRE of setup to Y & reduces Y gain as required. Only affects 525-line output
5	BW	Chroma Bandwidth 1.3MHz	Chroma Bandwidth 650kHz.
6	TEST B	Composite output is incoming SDI data	Composite output is modulated ramp test pattern
7	525 B	625-line if manual selected on jumper PL8	525-line if manual selected on jumper PL8
8	VBI B	Blank PAL lines 7 to 22 & 320 to 335, NTSC lines 10 to 20 & 273 to 282	Unblank PAL lines 7 to 22 & 320 to 335, NTSC lines 10 to 20 & 273 to 282

LED indicator assignments

LED	Colour	Meaning when lit
INPUT A	Green (bottom)	Valid serial digital input detected channel A
ERROR A	Red (top)	Serial digital input lock error channel A
625 A	Yellow (top)	625-line output channel A
525 A	Yellow (bottom)	525-line output channel A
INPUT B	Green (bottom)	Valid serial digital input detected channel B
ERROR B	Red (top)	Serial digital input lock error channel B
625 B	Yellow (top)	625-line output channel B
525 B	Yellow (bottom)	525-line output channel B
PSU	Green (top)	Power supply voltage present

Cable equalisation

Cable equalisation is adjusted automatically for up to 200 meters of Belden 8281 or equivalent.

Adjusting input gain

Gain is continuously variable by ± 10% using the GAIN control. The MON210 is supplied with a factory-set gain of 0dB.

On-board jumper link settings

Please refer to section 3.4 Configuration to set the following options when using card edge control:

- Changing the standard selection – PL8,9 AUTO/Manual
- Changing the output selection – PL2, 3, 4 and 5

3 Hardware installation

The MON210 Dual Serial Digital to Analogue converter fits into all Crystal Vision rack frames. All modules can be plugged in and removed while the frame is powered without damage.

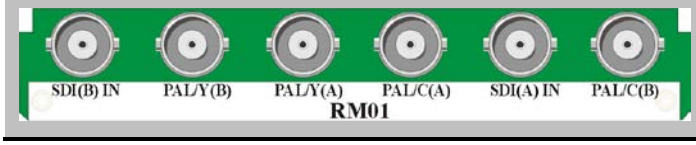
3.1 Universal rear connectors

When used with a single height rear connector, the 2U Indigo or FR2AV frame will house up to 12 modules and dual power supplies, the 1U Indigo or FR1AV frame will house 6 modules and a single power supply. The 1U DeskTop Box has a built-in power supply and will house up to 2 modules with a single height rear connector.

The 2U and 1U frames have a hinged front panel that gives access to the PSU and all modules. The DeskTop Box has a removable front. The universal frame wiring system allows any of the interface range of modules to be fitted in any position with the use of removable rear modules.

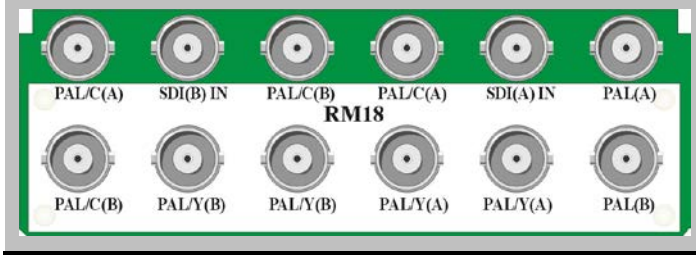
The MON210 may be used with the RM01 single slot rear connector, the RM02 quadruple slot rear connector and the RM18 double slot rear connectors.

Rear module connections with RM01

RM01 fits in all frames	Description
	**RM01** • 12 modules in 2U, 6 in 1U & 2 in a DTB • All frame slots can be used

BNC	Connection
PAL/C(B)	Channel B Composite or C (set by PL4)
SDI(A) IN	Channel A Serial Digital Input
PAL/C(A)	Channel A Composite Video or C (set by PL2)
PAL/Y(A)	Channel A Composite Video or Y (set by PL3)
PAL/Y(B)	Channel B Composite Video or Y (set by PL5)
SDI(B) IN	Channel B Serial Digital Input

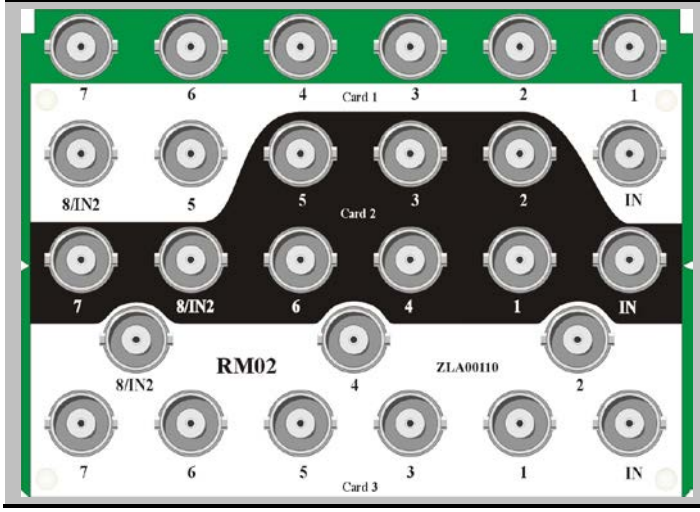
Rear module connections with RM18

RM18 fits in all frames	Description
	**RM18** • 6 modules in 2U , 3 in 1U, 1 in a DTB • 1 module per rear connector • 6 connections available • Card fits in upper slot • No card fits in lower slot

BNC	Connection
SDI(A) IN	Channel A Serial Digital Input
PAL/Y(A)	Channel A Composite Video or Y (set by PL3)
PAL/Y(A)	Channel A Composite Video or Y (set by PL3)
PAL/C(A)	Channel A Composite Video or C (set by PL2)
PAL/C(A)	Channel A Composite Video or C (set by PL2)
PAL/Y(B)	Channel B Composite Video or Y (set by PL5)
PAL/Y(B)	Channel B Composite Video or Y (set by PL5)
PAL/C(B)	Channel B Composite Video or C (set by PL4)
PAL/C(B)	Channel B Composite Video or C (set by PL4)
SDI(B) IN	Channel B Serial Digital Input
PAL(A)	Channel A Composite Video
PAL(B)	Channel B Composite Video

Note: Only the RM18 provides access to all outputs.

Rear module connections with RM02

RM02 fits in a 2U Indigo or FR2AV frame	Description
	**RM02** • 9 modules per 2U frame • 3 modules per rear connector • 9 connections available • Card 1 fits in slots 1, 5 and 9 • Card 2 fits in slots 2, 6 and 10 • Card 3 fits in slots 4, 8 and 12 • No card fits in 3, 7 or 11

BNC	Connection
IN	Channel A Serial Digital Input
1	Channel A Composite Video or C (set by PL2)
2	Channel A Composite Video or Y (set by PL3)
3	Channel A Composite Video or Y (set by PL3)
4	Channel B Composite Video or Y (set by PL5)
5	Channel B Composite Video or C (set by PL4)
6	Channel B Composite Video or C (set by PL4)
7	Channel A Composite Video or C (set by PL2)
8/IN2	Channel B Serial Digital Input

3.2 General purpose interface

The external GPI control lines 'a' to 'f' at the frame remote connectors may be used to control the MON210 remotely with remote switches emulating some of the front panel switches. The GPI lines are normally pulled up on-board to +5V via 10kΩ and will withstand up to +35V.

GPI Connections

	OPEN	CONNECT TO GROUND
'a'	Channel A 625-line if manual standard selected on jumper PL8	Channel A 525-line if manual standard selected on jumper PL8
'b'	Blank channel A PAL lines 7 to 22 & 320 to 335, NTSC lines 10 to 20 & 273 to 282	Unblank channel A PAL lines 7 to 22 & 320 to 335, NTSC lines 10 to 20 & 273 to 282
'c'	Channel B 625-line if manual standard selected on jumper PL9	Channel B 525-line if manual standard selected on jumper PL9
'd'	Blank channel B PAL lines 7 to 22 & 320 to 335, NTSC lines 10 to 20 & 273 to 282	Unblank channel B PAL lines 7 to 22 & 320 to 335, NTSC lines 10 to 20 & 273 to 282
'e'	Channel A input present	Channel A input absent
'f'	Channel B input present	Channel B input absent

The following tables show the GPI pinout for each frame:

2U frame GPI Connections

GPI lines 'a' to 'f' of each card connect to one of four rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4	7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7	5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8	4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11	3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12	10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)

Table shows Pin number (Remote number)

Note: Remote 1 and Remote 3 are 26 way high density 'D' type female sockets and frame ground is pin 2 and +5V @500mA is pin 1 in each case.
Remote 2 and Remote 4 are 26 way high density 'D' type male plugs and frame ground is pin 6 and +5V @500mA is pin 15 in each case.

1U frame GPI connections

GPI lines 'a' to 'f' of each card connect to one of two rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
4	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
5	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
6	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)

Table shows Pin number (Remote number)

Note: Remote 1: 26 way high-density D-type socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26 way high-density D-type plug. Frame ground is pin 6 and +5V @500mA is pin 15.

DTB GPI connections

GPI lines 'a' to 'f' of each card connect to the rear remote connector as follows:

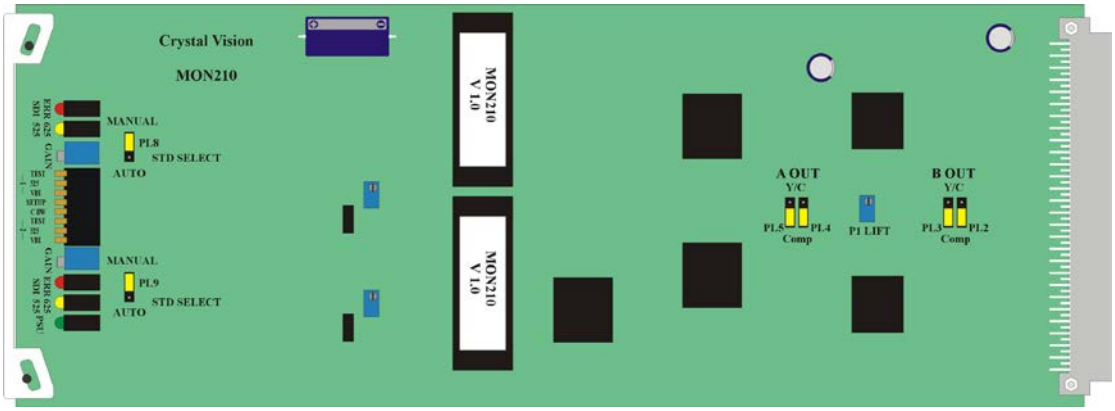
Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	1	2	3	4	5	6
2	9	10	11	12	13	14

Note: Remote connector is 15 way normal density D-type socket. Frame ground is pin 15.

3.3 Configuration

Jumper links are provided for the following settings:

- PL8/9 – manual/AUTO standard selection
- PL 2/3 and PL 4/5 – Y/C or Composite selection for certain outputs

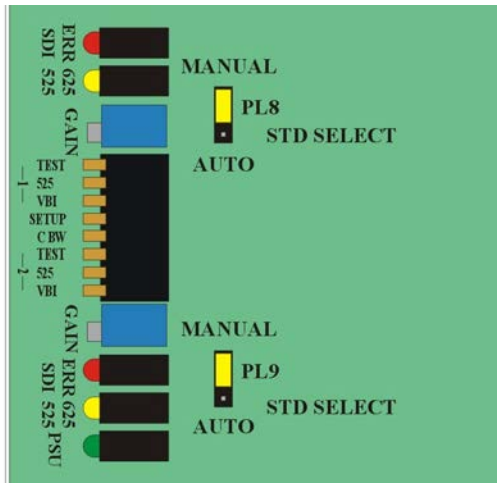


MON210 showing configuration jumpers

Changing the standard selection mode

With PL8 (Ch A) or PL9 (Ch B) in the AUTO position the board will automatically adjust to the 525- or 625-line video standard of the incoming Serial Digital data.

With PL8 (Ch A) or PL9 (Ch B) in the MANUAL position the video standard used will be set by the front panel DIL switch or GPI control.

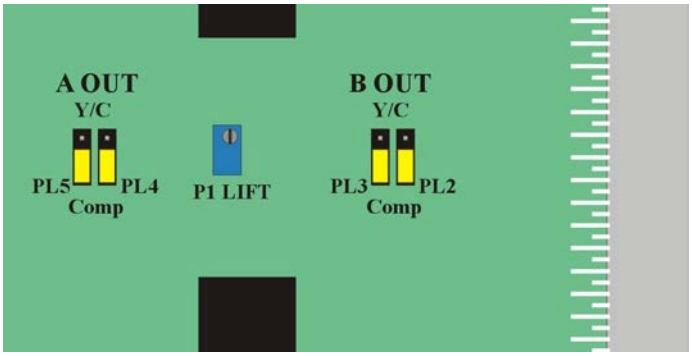


MON210 showing configuration jumpers

Note: The AUTO mode may slightly extend the time required to synchronize a new signal.

Changing output signal formats

The following table shows the link position required to select composite or Y/C video for the RM01, RM02, RM18 rear connectors and older frames.



MON210 showing configuration jumpers

Channel A I/O	Link Position	RM01	RM18	RM02
SDI Input	N/A	SDI(A) IN	SDI(A) IN	IN
Composite Video or C	PL2 Comp PL2 Y/C	PAL/C(A)	PAL/C(A)	1
Composite Video or Y	PL3 Comp PL3 Y/C	-	PAL/Y(A)	2
Composite Video or Y	PL3 Comp PL3 Y/C	PAL/Y(A)	PAL/Y(A)	3
Composite Video or C	PL2 Comp PL2 Y/C	-	PAL/C(A)	7
Composite Video	N/A	-	PAL(A)	-

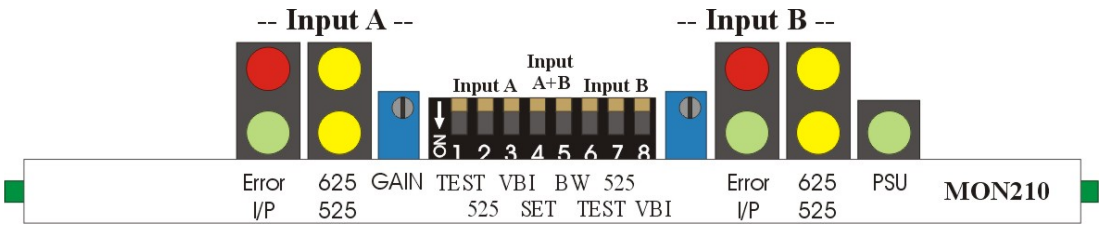
Channel B I/O	Link Position	RM01	RM18	RM02
Composite Video or Y	PL5 Comp PL5 Y/C	PAL/Y(B)	PAL/Y(B)	4
Composite Video or Y	PL5 Comp PL5 Y/C	-	PAL/Y(B)	-
Composite Video or C	PL4 Comp PL4 Y/C	PAL/C(B)	PAL/C(B)	5
Composite Video or C	PL4 Comp PL4 Y/C	-	PAL/C(B)	6
SDI Input	N/A	SDI(B) IN	SDI(B) IN	8/IN2
Composite Video	N/A	-	PAL(B)	-

Factory adjustments

The three potentiometers within the board are factory set and should not need re-adjustment. Only adjust card-edge gain potentiometers.

4 Problem solving

The front edge of the card provides useful power rail monitoring in addition to card-edge controls and status LEDs.



MON210 front edge view

LED indicator assignments

LED	Colour	Meaning when lit
INPUT A	Green (bottom)	Valid serial digital input detected channel A
ERROR A	Red (top)	Serial digital input lock error channel A
625 A	Yellow (top)	625-line output channel A
525 A	Yellow (bottom)	525-line output channel A
INPUT B	Green (bottom)	Valid serial digital input detected channel B
ERROR B	Red (top)	Serial digital input lock error channel B
625 B	Yellow (top)	625-line output channel B
525 B	Yellow (bottom)	525-line output channel B
PSU	Green (top)	Power supply voltage present

Basic fault finding guide

The PSU LED is not illuminated

Check that the frame PSU is functioning – refer to the appropriate frame manual for detailed information

Check that the card is seated correctly in the frame

There is no video output

Check that a valid video input is present and that any cabling is intact

Try using the built-in modulated ramp test signal to check output cabling and monitoring

The video output is low quality

Check that the maximum cable length has not been exceeded

Check the card-edge chroma bandwidth setting

Why can I not have 7.5% IRE setup on one channel and 0% on the other?

The NTSC setup controls act on both channels at once

Why can I not have high Chroma bandwidth one channel and low bandwidth on the other?

The chroma bandwidth controls act on both channels at once

I can only see a modulated ramp signal on one or more channels, where's the input video?

Check that the channel's TEST switch is in the UP position to view the input video

The card no longer responds to card edge control

Check that the card is seated correctly and that the Power OK LEDs are lit

If necessary re-set the card

Re-setting the card

If required, the card may be reset by simply removing the rack power and re-applying power after a few seconds or by removing the card from the rack and then re-inserting the card

It is safe to re-insert the card whilst the rack is powered

5 Specification

General

Dimensions	100mm x 266 mm module with DIN 41612 connector
Weight	170g
Power consumption	7 W

Inputs

Video	270Mb/s serial digital to EBU Tech 3267-E and SMPTE-259M. Cable equalisation >200m Belden 8281 or equivalent. Auto or manual 525/625 selection.

Outputs

Number and type:	Selectable from 4 composite outputs or 2 Y/C analogue output pairs per channel in addition to 1 fixed composite output per channel PAL-I/NTSC-M 1V into 75Ω Y plus sync 1V, C 300mv burst into 75Ω

Gain adjustment

Continuous adjustment:	± 10% per channel

Performance

Frequency response:	± 0.2dB 0 to 3.5MHz. ± 0.3dB 0 to 5MHz
Blanking:	To PAL/NTSC specification horizontally and vertically with selectable VBI blanking - PAL lines 7-22 & 320-335 and NTSC lines 10-20 & 273-282.
Signal to noise ratio:	< -54dB weighted

Test functions

Internal test pattern:	Modulated ramp

GPI lines

Inputs:	4 (D-type on frame) Ch A standard select, VBI blank/unblank, Ch B standard select, VBI blank/unblank
Outputs:	2 (D-type on frame) Ch A input presence, Ch B input presence

Status monitoring

LED display	Front of card edge visual monitoring with LED indicators to indicate: PSU rail present CH A: Input present, I/P error, input standard CH B: Input present, I/P error, input standard