DDAA246

SDI to composite monitoring encoder with distribution amplifier

USER MANUAL

Crystal Vision

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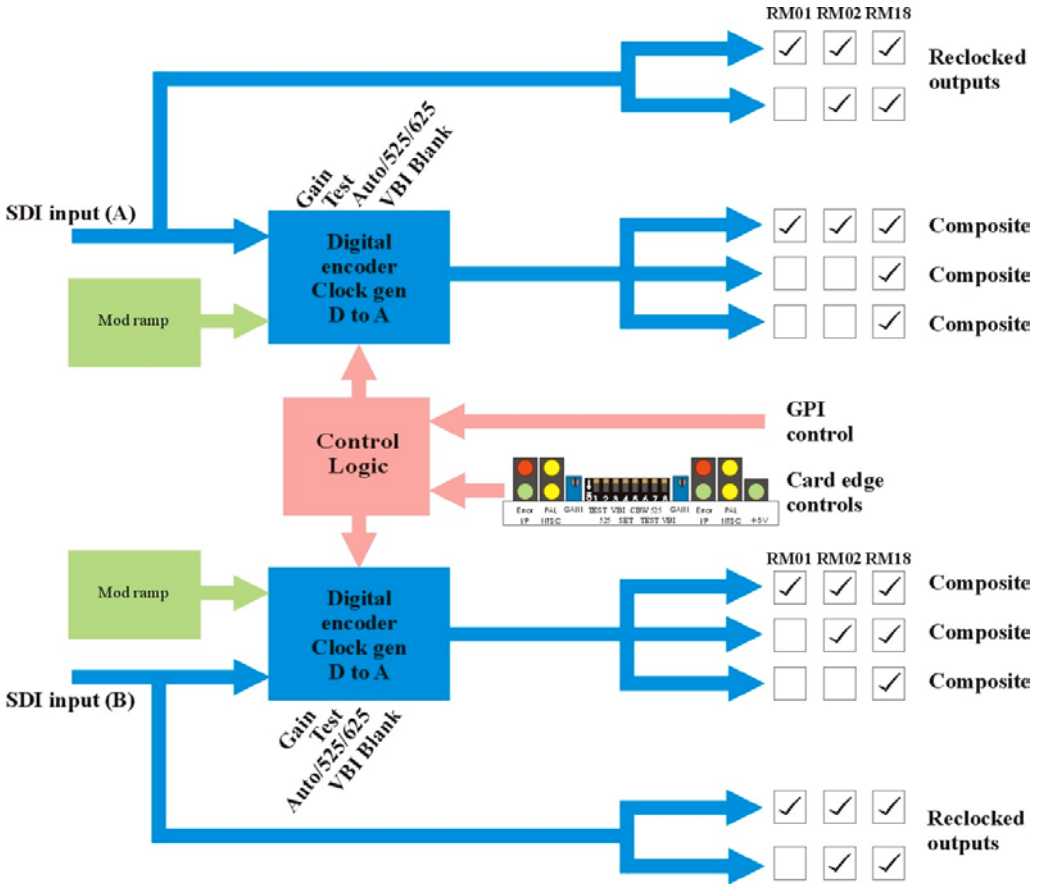
Contents

1 Introduction

The DDAA246 is a dual 8-bit Serial Digital to Analogue Composite converter with re-clocked serial and analogue outputs.

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.



DDAA246 serial digital to analogue converter

The DDAA246 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 more outputs but with reduced packing density. Only the RM18 with 12 BNCs per module allows access to all module connections.

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.

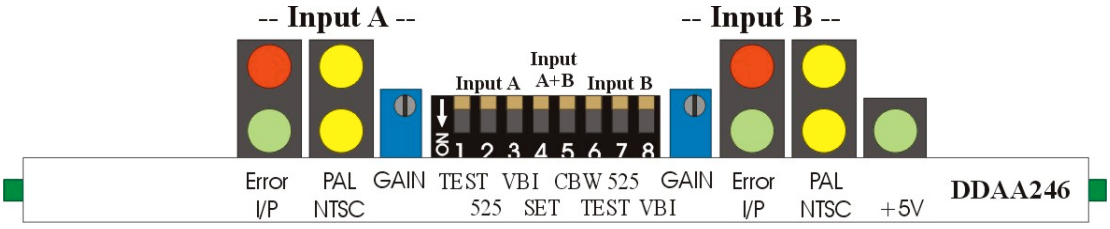
The analogue outputs can be switched between input video and an internal test pattern under local or remote (GPI) control. It accepts either 625 or 525 line input, with automatic detection.

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.
- Up to two reclocked SDI outputs and three composite outputs per 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 DDAA246 card provides power rail monitoring, signal status, gain adjustment and configuration switches.



DDAA246 front edge view

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

- Test – for each channel, composite output is test pattern or SDI input
- 525 – for each channel, force standard if board is NOT in AUTO
- VBI – for each channel, blank or unblank VBI data
- SET – for both channels, apply 7.5 IRE in NTSC
- CBW – for both channels, change chroma bandwidth

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 PL4	525-line if manual selected on jumper PL4
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	C 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 PL5	525-line if manual selected on jumper PL5
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

Adjusting input gain

Composite gain is continuously variable by ± 10% using the GAIN control. The DDAA246 is supplied with a factory-set gain of 0dB.

Cable equalisation

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

On-board jumper link settings

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

- Changing the standard selection – PL8, AUTO/Manual

3 Hardware installation

The DDAA246 Serial Digital to Analogue Composite 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 Desk Top 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 which gives access to the PSU and all modules. The Desk Top 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.

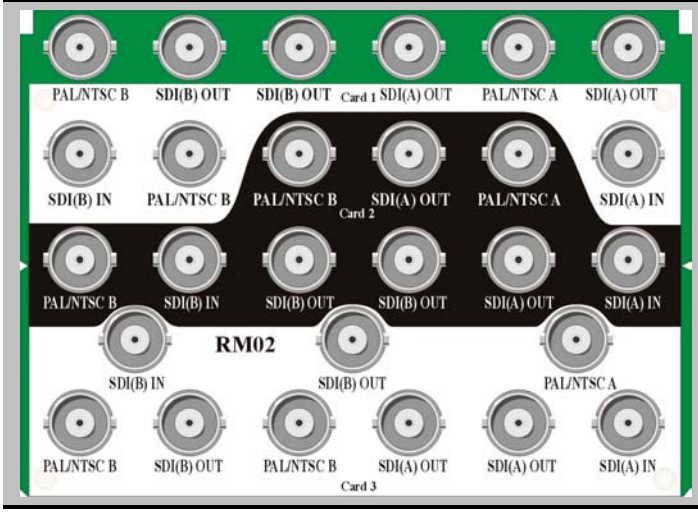
The DDAA246 may be used with the RM01 single slot rear connector, the RM02 quadruple slot rear connector and the 18 double slot rear connectors.

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 • 12 connections per module available • Card fits in upper slot • No card fits in lower slot

BNC	Connection
SDI(A) IN	Channel A Serial Digital Input
SDI(A) OUT	Channel A Serial Digital Output
PAL/NTSC(A)	Channel A Composite Video Output
PAL/NTSC(B)	Channel B Composite Video Output
SDI(B) OUT	Channel B Serial Digital Output
SDI(B) IN	Channel B Serial Digital Input

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 per module 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	Single-channel configuration
SDI(A) IN	Serial Digital Input channel A
SDI(A) OUT	Reclocked Serial Digital Output channel A
PAL/NTSC(A)	Composite Video Output channel A
SDI(A) OUT	Reclocked Serial Digital Output channel A
SDI(B) OUT	Reclocked Serial Digital Output channel B
PAL/NTSC(B)	Composite Video Output channel B
SDI(B) OUT	Reclocked Serial Digital Output channel B
PAL/NTSC(B)	Composite Video Output channel B
SDI(B) IN	Serial Digital Input channel B

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 • 6 connections available

BNC	Connection
NTSC/PAL B	Composite Video Output channel B
SDI(A) IN	Serial Digital Input channel A
SDI(A) OUT	Re-clocked Serial Digital Output channel A
NTSC/PAL A	Composite Video Output channel A
SDI(B) OUT	Re-clocked Serial Digital Output channel B
SDI(B) IN	Serial Digital Input channel B

3.2 General purpose interface

The external GPI control lines 'a' to 'f' at the frame remote connectors may be used to control the DDAA246 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 PL4	Channel A 525-line if manual standard selected on jumper PL4
'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 PL5	Channel B 525-line if manual standard selected on jumper PL5
'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:

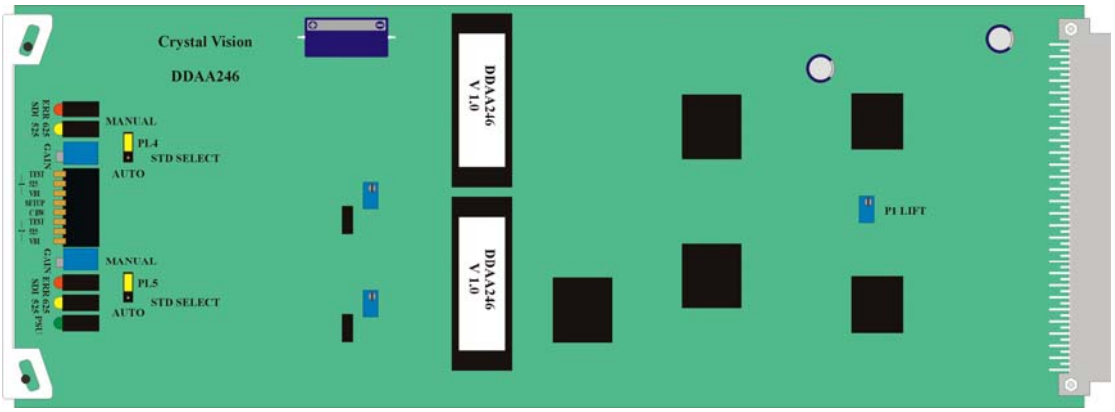
Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	1	2	3	4	5	6
2	9	10	11	12	13	14

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:

- PL4/5– manual/AUTO standard selection

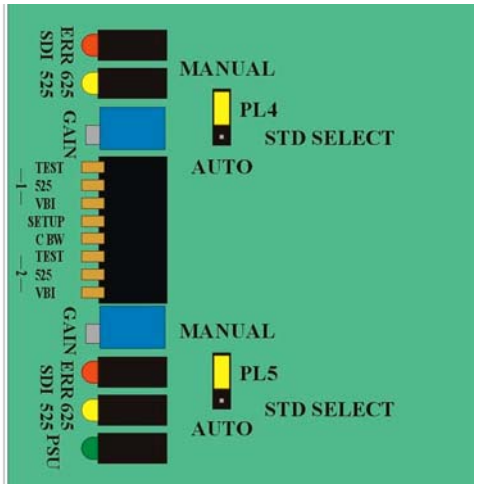


DDAA246 showing configuration jumpers

Changing the standard selection mode

With PL4 in the AUTO position, SDI A will automatically adjust to the 525- or 625-line video standard of the incoming Serial Digital data. With PL4 in the MANUAL position the video standard for SDI A will be set by the front panel DIL switch or GPI control.

With PL5 in the AUTO position, SDI B will automatically adjust to the 525- or 625-line video standard of the incoming Serial Digital data. With PL5 in the MANUAL position the video standard for SDI B will be set by the front panel DIL switch or GPI control.

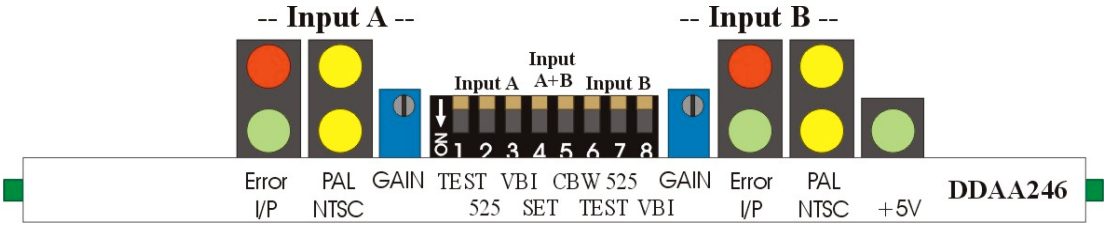


DDAA246 showing configuration jumpers

Note: The AUTO mode may slightly extend the time required to synchronize a new signal. The three potentiometers on the board are factory set and should not need re-adjustment.

4 Problem solving

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



DDAA246 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 +5V/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	168g
Power consumption	8 W

Inputs

Video	2 x 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:	2+2 reclocked serial digital loop through 3+3 composite analogue outputs; PAL-I/NTSC-M 1V into 75Ω Each will drive >200m Belden 8281 or equivalent.

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:	6 (D-type on frame) 4 inputs: SDI 1: Standard select, VBI blank/unblank SDI 2: Standard select, VBI blank/unblank 2 outputs: SDI1 input present, SDI2 input present

Status monitoring

LED display	Front of card edge visual monitoring with LED indicators to indicate: PSU +5V rail present Input present, I/P error and standard for each SDI input

Ordering information

DDAA246	Dual 8-bit Serial Digital to Analogue Composite converter
Indigo 2	2U frame without active control panel for up to 12 modules
Indigo 1	1U frame without active control panel for up to 6 modules
Indigo DT	1U Desk top box without active control panel for up to 2 modules
Indigo 2A	2U frame with active control panel for up to 12 modules
Indigo 1A	1U frame with active control panel for up to 6 modules
Indigo DTA	1U Desk top box with active control panel for up to 2 modules
Indigo 2S	Statesman enabled only 2U frame for up to 12 modules
Indigo 1S	Statesman enabled only 1U frame for up to 6 modules
Indigo DTS	Statesman enabled only 1U Desk top box for up to 2 modules
RM01	Single slot rear module with 6 BNCs
RM02	Quad slot rear module with 27 BNCs for 3 boards
RM18	Dual slot rear module for 1 board with 12 BNCs