

digital keying modular
interface audio
converters analogue video

ADDEC-310

Analogue to SDI decoding converter

USER MANUAL



Contents

1	Introduction	3
1.1	Operating modes	4
	Synchroniser and Delay Modes	4
	Analogue video formats	5
	Freezing the picture	5
	Video Input loss behaviour	5
	Status and control	5
2	Hardware installation	6
2.1	Rear modules and signal I/O	6
	Rear module connections with RM01	6
	Rear module connections with RM23	7
	Rear module connections with RM24	7
	Rear module connections with RM25	8
	Rear module connections with RM27	8
	Module configuration	9
2.2	General Purpose Interface (GPI)	10
3	Card edge operation	14
3.1	Card edge switch settings	14
3.2	Card edge rotary controls	14
3.3	Reading card edge LEDs	15
3.4	Navigating card edge menus	15
3.5	Card edge configuration	16
	Main menus	16
	Status Menus	16
	Using presets	17

Set up menu	17
Video levels and gains	20
Engineering settings	21
4 Using the active front panel	23
4.1 Module selected	23
The ADDEC-310 menu structure	25
Active control panel menu tree	26
Video Configuration Menu	26
Miscellaneous menu	28
Status menu	29
5 Statesman	30
5.1 Statesman operation	30
Video properties	31
Presets	33
Gains	34
Factory Reset	35
6 Trouble shooting	36
6.1 Card edge monitoring	36
Status LEDs	36
6.2 Fault finding guide	37
7 Specification	38

Revision 1. Page 10. Links PL9 and PL11 information corrected.

06/11/07

Revision 2. Page 10. Links PL4 and PL8 information corrected.

29/11/07

1 Introduction

ADDEC-310 is a broadcast decoder. It brings together onto one PCB both the functions of a 12-bit broadcast decoder and synchroniser/delay module.

The ADDEC-310 will convert PAL/NTSC composite, Y/C or YUV/RGB component video to SDI using a high quality 12-bit decoder which can deal with any source from broadcast quality to VHS, and will accept damaged or jittery signals. The data is sampled at 54 Mbit per second (four times oversampled) allowing the highest quality digital filtering. It also offers the latest in comb technology, with a five-line comb resulting in exceptional decoding. Timing, gains and levels are also adjustable.

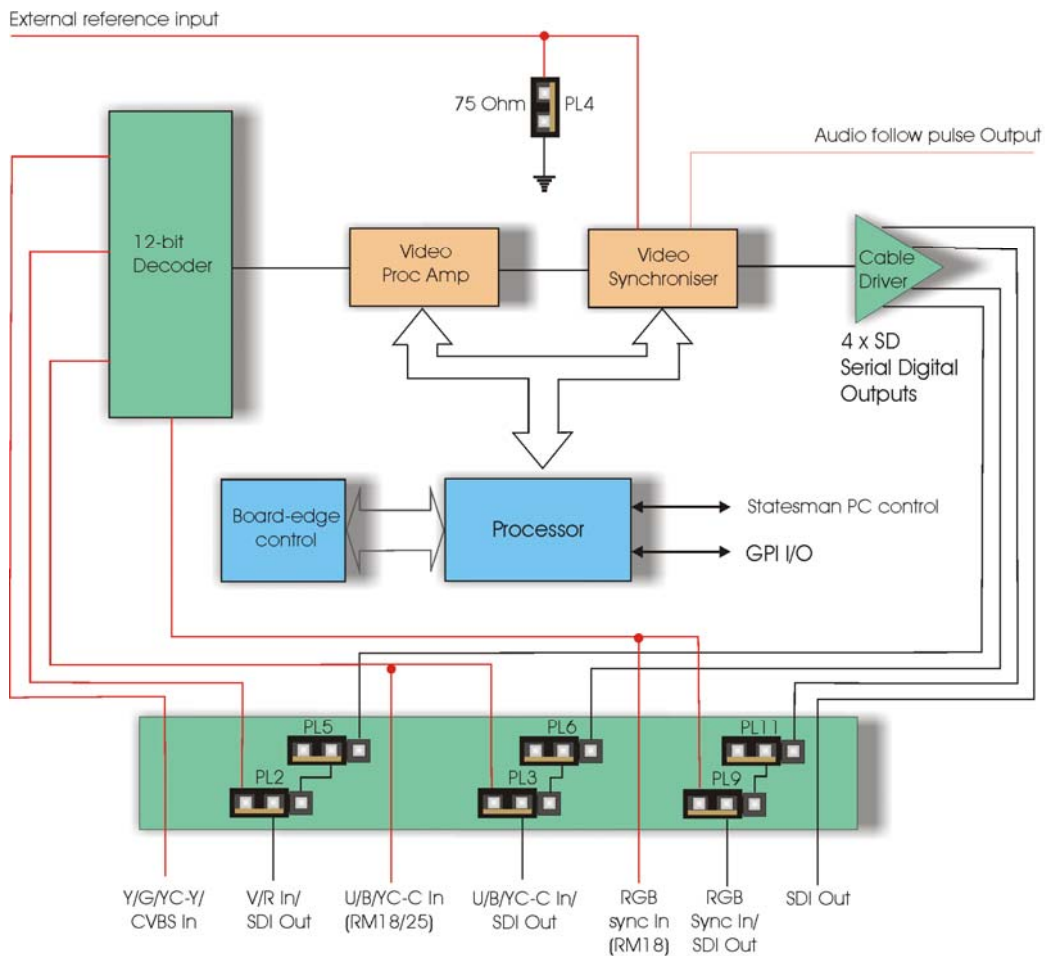
The on-board video frame synchroniser allows untimed inputs to be timed to the local syncs. It will sort out any incorrect frame rates plus any delays by taking its timing from the external analogue reference and will automatically synchronise sources between 0 and 2 fields.

An audio follow pulse is also produced which allows ADDEC-310 to be used with an external audio delay such as the TAD202

The ADDEC-310 will fully integrate with any other interface or keying product from the Crystal Vision range. Further flexibility is afforded by the large choice of control options, which include board edge control, local or remote active control panel and the Statesman PC Control System.

The main features are as follows:

- 12-bit digital decoder
- Suitable for all sources, from broadcast quality to VHS
- High quality digital filtering and 5-line comb
- Frame or line synchroniser or used as a fixed delay times input to local reference syncs
- Flexible control, including PC software.
- Up to four Serial Digital outputs.
- Internal proc amp
- Audio follow pulse output
- Compact design for high packing density
- Full range of inter-changeable rear connector modules



ADDEC-310 12-bit Synchronising Decoder

The ADDEC-310 is a 100mm x 266mm module that fits in Crystal Vision's four standard frame sizes. 24 modules fit in 4U, 12 modules fit in 2U, six in 1U or two in a desktop box. There are a range of rear connector modules available for the ADDEC-310 which offer the system builder great flexibility in frame configuration.

1.1 Operating modes

Synchroniser and Delay Modes

There are two modes of operation, Synchronisation and Delay.

In Synchronisation Mode the unit takes its timing from the analogue external reference and will automatically synchronise sources between zero and two fields. Synchronisation Mode is ideal for external sources that are not timed to station references such as satellite or remote contribution feeds.

In Delay Mode, timing is derived only from the analogue input. Typical applications are where a source passes through a processor such as a DVE, Chroma keyer or standards converter where the delay can be a few microseconds, multiple lines or up to two fields.

The video delay remains fully adjustable over two complete fields. This allows the output of the ADDEC-310 in synchronisation mode to be timed into any edit suite irrespective of the timing of the black and burst reference used.

Audio follow pulse

There is also a positive going external TTL level audio follow video (AFV) pulse output, the duration of which reflects the current video delay. The AFV output can be used with external audio delay processors such as the TAD202 if required.

Analogue video formats

The analogue video input can be selected to be composite PAL/NTSC and YC or 525/625-line component YUV/RGB. ADDEC-310 can accept an RGB input with sync pulses on either all three components or Green alone. There is also an RGB external sync input should the RGB video not have syncs present. Input standard selection is automatic and will follow the input video. Data in the VBI (vertical blanking interval) of the analogue composite input can be blanked or passed. NTSC- J and NTSC-M with or without 7.5% IRE set up is also selectable when receiving an NTSC format video input. Betacam input levels are also accepted.

Freezing the picture

The picture can be frozen and the freeze mode can be selected from freeze frame, field 1 and field 2. In situations where there is movement between fields a frame freeze may show movement judder. To prevent this, a field freeze which works by repeating the same field will produce a synthetic frame of video without movement judder. However a field freeze is more likely to show jagged edges on near horizontal lines.

Video Input loss behaviour

The ADDEC-310 output will cut to blue immediately on loss of input video.

Status and control

Status and control of the ADDEC-310 is available using the board edge menu selection switches and 10-digit display. Full function control and status reporting is also available from either an active frame front or remote active control panel. PC control is also available using Crystal Visions Statesman PC controller package.

2 Hardware installation

The ADDEC-310 single height module uses the RM01, RM23, RM24, RM25 and RM27 rear connectors. The RM25 quad height module will only fit into the 2U and 4U frames, although the rest will fit into all Crystal Vision rack frames. All modules can be plugged in and removed while the frame is powered without damage.


2.1 Rear modules and signal I/O

The Indigo 4 4U frame will house up to 24 single height modules with up to three power supplies. The Indigo 2 2U frames will house up to 12 single height modules and dual power supplies. The Indigo 1 1U frames will house six single height modules and a single or dual power supply. The Indigo desk top boxes both have a built-in power supply and will house up to two single height modules.

Note: For details of fitting rear connectors please refer to the appropriate frame manual

Rear module connections with RM01


The RM01 being a single height module will allow maximum packing density with the maximum number of outputs available.

RM01 rear module connector	Description
	RM01 <ul style="list-style-type: none"> • 24 ADDEC-310 modules per Indigo 4 frame • 12 per Indigo 2 frame • Six per Indigo 1 frame • 2 per Indigo DT • All frame slots can be used

BNC	I/O assignment
SDI OUT / RGB SYNC	Serial digital output / External RGB reference input (link selectable)
SDI OUT	Serial digital output
V/R IN / SDI OUT	Component V and R input / Serial digital output (link selectable)
Y/G/YCY/CVBS IN	Component Y and G, Composite YC-Y and PAL/NTSC input
U/B/YCC IN / SDI OUT	Component U and B, Composite YC-C input / Serial digital output (link selectable)
SYNC IN	Composite sync (B & B) input

Rear module connections with RM23


The RM23 single height rear module also allows maximum packing density but substitutes one of the outputs for a loop-through for the external reference input.

RM23 modular rear connector	Description
	<ul style="list-style-type: none"> • RM23 • 24 ADDEC-310 modules per Indigo 4 frame • 12 per Indigo 2 frame • Six per Indigo 1 frame • 2 per Indigo DT <p>All frame slots can be used</p>

BNC	Function
SYNC IN LOOP	Composite sync (B & B) input loop-through (looped on rear module)
SDI OUT	Serial digital output
V/R IN / SDI OUT	Component V and R input / Serial digital output (link selectable)
Y/G/YCY/CVBS IN	Component Y and G, Composite YC-Y and PAL/NTSC input
U/B/YCC IN / SDI OUT	Component U and B, Composite YC-C input / Serial digital output (link selectable)
SYNC IN	Composite sync (B & B) input

Rear module connections with RM24

The RM24 is a single height rear module, which although has fewer outputs gives the user the benefit of a sync and composite input loop-through.

RM24 rear module connector	Description
	<ul style="list-style-type: none"> • RM24 • 24 ADDEC-310 modules per Indigo 4 frame • Six per Indigo 2 frame • Three per Indigo 1 frame • 1 per Indigo DT • Every other slot can be used

BNC	Function
SYNC IN LOOP	Composite sync (B & B) input loop-through (looped on rear module)
SDI OUT	Serial digital output
SDI OUT	Serial digital output (link to be set to SDI out)
CVBS IN	Composite PAL/NTSC input
CVBS IN LOOP	Composite PAL/NTSC input loop through. (looped on rear module)
SYNC IN	Composite sync (B & B) input

Rear module connections with RM25

The RM25 quad height module will only fit the 2U and 4U frames. With this rear module, cards can be inserted in the top two and bottom slots.

RM25 rear module connector	Description
	<p>RM25</p> <ul style="list-style-type: none"> • 18 ADDEC-310 modules per Indigo 4 frame • 9 per Indigo 2 frame • Slots 1, 2 & 4 of each bay can be used. • The Indigo 1 and Indigo DT will not accept the RM25 rear module

BNC	I/O assignment
SDI OUT	Serial digital output
V/R IN / SDI OUT	Component V and R input / Serial digital output (link selectable)
Y/G/YCY/CVBS IN	Component Y and G, Composite YC-Y and PAL/NTSC input
Y/G/YCY/CVBS IN LOOP	Component Y and G, Composite YC-Y and PAL/NTSC input (looped on rear module)
U/B/YCC IN / SDI OUT	Component U and B, Composite YC-C input / Serial digital output (link selectable)
SDI OUT / RGB SYNC	Serial digital output / External RGB reference input (link selectable)
U/B/YCC IN	Component U and B, Composite YC-C input
SYNC IN LOOP	Composite sync (B & B) input loop-through (looped on rear module)
SYNC IN	Composite sync (B & B) input

Rear module connections with RM27

The RM27 is a dual height rear module. This module also has the benefit of a BNC connection for the audio follow pulse.

RM27 rear module connector	Description
	<p>RM27</p> <ul style="list-style-type: none"> • 12 ADDEC-310 modules per Indigo 4 frame • Six per Indigo 2 frame • Three per Indigo 1 frame • 1 per Indigo DT • Every other slot can be used

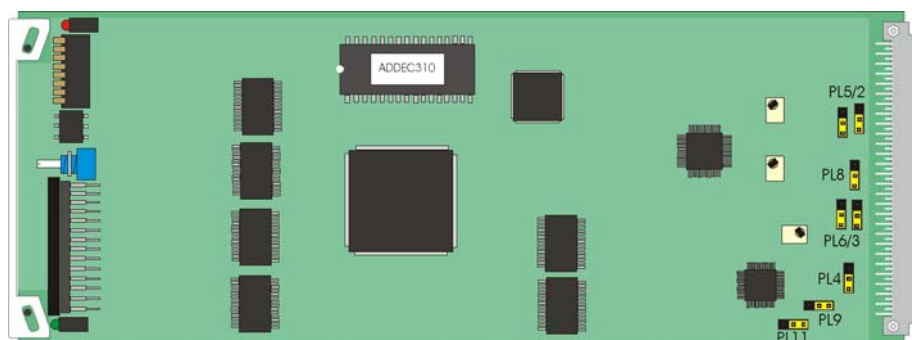
Channel A	I/O assignment
TP	TTL level positive going Audio follow pulse.
SDI OUT	Serial digital output
V/R IN / SDI OUT	Component V and R input / serial digital output (link selectable)
RGB SYNC IN	External RGB reference input
SYNC	Composite sync (B & B) input
SYNC LOOP	Composite sync (B & B) input loop-through (looped on rear module)
N/C	No user connection
Y/G/YCY/CVBS IN	Component Y and G, Composite YC-Y and PAL/NTSC input
Y/G/YCY/CVBS IN LOOP	Component Y and G, Composite YC-Y and PAL/NTSC input (looped on rear module)
SDI OUT	Serial digital output (set PL3 and PL6 to SDI)
U/B/YCC IN	Component U and B, Composite YC-C input
SDI OUT	Serial digital output (set PL9 SDI)

Module configuration

The ADDEC-310 has eight user selectable jumper links, which configure the Component U / YC-C / Serial digital output, the Component V / SDI OUT, the RGB / SDI OUT and the RGB sync input and the external reference input termination impedance.

There are also three preset potentiometers. These are factory set and should not require any adjustment.

Note: Not all input/output combinations are available with all rear modules.



ADDEC-310 moveable links

V/R / SDI OUT port configuration

The Component V/R / SDI OUT port can be configured by setting the position of link PL2 & PL5 (to be found just above the middle right hand edge of the module). When a component input is required set jumper link PL2 & PL5 to their upper position. Set jumper PL2 & PL5 to their lower position when a further SDI output is required.

Note: Links PL2 & PL5 must be moved together as a pair.

U /G/YC-C / SDI OUT port configuration

The Component U / YC-C / SDI OUT port can be configured by setting the position of link PL3 & PL6 (to be found just below the middle right hand edge of the module). When a Component U or C input is required set jumper link PL3 & PL6 to their upper position. Set jumper PL3 & PL6 to their lower position when a further SDI output is required.

Note: Links PL3 & PL6 must be moved together as a pair.

RGB sync / SDI OUT port configuration

When using the RM01 and RM25 rear module it is possible to substitute one of the SDI outputs for an RGB sync input should it be required. This is achieved by setting the position of link PL9 & PL11 (to be found at the bottom right hand edge of the module). If an external RGB sync is required set PL9 right towards the rear board connector and PL11 towards the board front (left, away from the board connector). With PL9 set to its left position and PL11 right an SDI output is present.

Note: Links PL9 & PL11 must be moved together as a pair.
Setting PL9 & PL11 to external RGB syncs will disable the input format selection.

Loop or terminate the composite input

The composite (CVBS) input may be terminated with 75Ω or left unterminated when looping through. Set jumper link PL8 (to be found at the middle right hand edge of the module) to its lower position to terminate the external sync input. Set jumper PL8 to its upper position to unterminate the external sync input.

Loop or terminate the external reference

The external analogue reference may be terminated with 75Ω or left unterminated when using the loop through output. Set jumper link PL4 (to be found at the lower right hand edge of the module) to its lower position to terminate the external reference. Set jumper PL4 to its upper position to unterminate the reference input.

2.2 General Purpose Interface (GPI)

Each frame slot has six connections 'a-f' for GPI control and monitoring. These connections are available at the rear of the frame on the 26-way D-type remote connectors.

GPI			Low (<1V)	High (+5V)
0	'a'	Bit 1		
1	'b'	Bit 2		GPI recall of Presets
2	'c'	Bit 3		a,b,c,d high = Preset1, a,b,c,d low = Preset16
3	'd'	Bit4		
4	'e'	Audio follow pulse		Pulse width equal to audio delay
5	'f'	I/P, Ref missing, O/P frozen	Alarm set	No Alarm

As supplied, each GPI output has a 220Ω resistor in series with its output. This allows for an external LED to be driven, connected to a DC voltage of +5V.

4U frame GPI connections

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

Table shows pin number (Remote number)

Note: Remote 1, Remote 3, Remote 5 and Remote 7 are 26 way high-density D-Type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case.
Remote 2, Remote 4, Remote 6 and Remote 8 are 26 way high-density D-Type male plugs and frame ground is pin 6 in each case and +5V @500mA is pin 15 on Remote 2 and Remote 6.

Note: The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-4 to approximately 1A. Remotes 5-8 are similarly protected.

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. 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 in each case and +5V @500mA is pin 15 on Remote 2.

Note: The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-4 to approximately 1A.

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 female socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26 way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15

Note: The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.

Indigo DT desk top box 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	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)

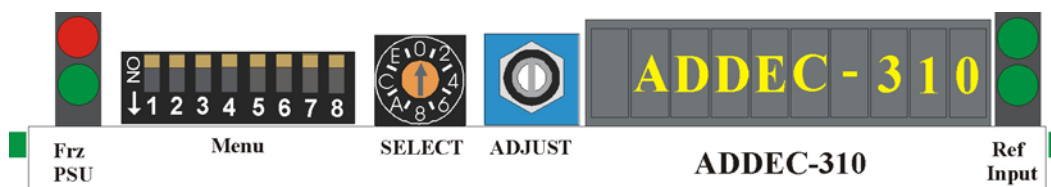
Table shows pin number (remote number)

Note: Remote 1: 26 way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26 way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15

Note: The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.

3 Card edge operation

The hinged front panel of the case reveals the card user controls, LED indication of status and controls.



ADDEC-310 front view showing controls and LEDs

3.1 Card edge switch settings

The 8-way piano switch allows the operating modes and status options to be selected.

Lever	Function	Normal state Up, Action Down
0	Status	All levers up, SELECT selects status
1	Action	Normally UP, Set DOWN & back UP to action adjustments
2	Preset selection	Selects which preset 1-16 to be saved or recalled
3	Video configuration	Allows the selection of the various video controls
4	Not assigned	Normally UP, No customer functions
5	Video Gains and levels	Allows the adjustment of the various video gains and levels
6	Engineering	Allows access to factory reset, defaults and GPI enable
7	Not assigned	Normally UP, No customer functions
8	Recall	Normally UP, Set DOWN & back UP to recall presets

8 way DIL switch functions

3.2 Card edge rotary controls

Control	Function
SELECT	Rotary menu control. Rotate to select the various menus available. Initially shows the current status of that parameter or setting.
ADJUST	Used in conjunction with the SELECT control. When the SELECT control has selected the required menu, the ADJUST control is rotated to change the current level or select further options.

Rotary control functions

Note: Rotary controls can access menus and parameter values by clockwise or anti-clockwise rotation.

3.3 Reading card edge LEDs

Card edge LEDs may be used in conjunction with status information from any connected remote status panel display or from Statesman if available.

Refer also to the trouble-shooting chapter for more help with solving problems and monitoring status information.

The following table summarises the card edge LED functions and colours:

Name	Led Colour	Function when ON
Freeze	Red	Illuminates if picture freeze is selected.
PSU	Green	Good power supply (PSU) rails. (Bottom LED)
Ref	Green	External reference present (not RGB sync)
Input	Green	Video input present

3.4 Navigating card edge menus

To access the card edge menu system proceed as follows:

- Start with all of the DIL switch levers in the UP position
- Scroll through and select desired menu by rotating the SELECT control
- The current value assigned will be displayed
- To change the assigned value, rotate the ADJUST control
- Assign new value with DIL switch lever 1 if required (operational changes only)

In general the Menu switch is used to select one of four main menus, whilst the SELECT rotary hex switch selects sub-menus or internal variables. The ADJUST shaft encoder is used to assign values to variables (such as delays or gain/offset assignments).

Changes made using the shaft encoder are generally not implemented immediately. The display will normally flash alternately between bright and dim to indicate that the displayed value may no longer be current when the ADJUST shaft encoder is turned. To save a new value simply toggle MENU switch 1 down and then up again.


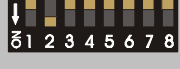
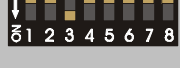

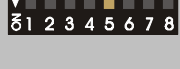
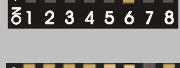
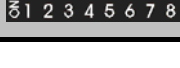
If a setting is adjusted by mistake, changing the menu (piano MENU or SELECT switches) will discard the unwanted setting.

3.5 Card edge configuration

Menu order assumes clockwise rotation from the initial 0 (12 O'clock) position of the SELECT rotary hex switch.

Main menus



Select main menus with MENU switch levers as follows:

Menu switch	Menu
	Status/Config menus – all levers OFF (UP). This should be the default setting if card edge controls are not in use
	Preset menu – lever 2 ON (DOWN) all others OFF (UP)
	Set up menu – lever 3 ON (DOWN) all others OFF (UP)
	Not used – lever 4 normally UP
	Gains, offset and phase menu – lever 5 ON (DOWN) all others OFF (UP)
	Engineering menu – lever 6 ON (DOWN) all others OFF (UP)
	Not used – lever 7 normally UP

Note: To save an adjustment toggle DIP switch 1 down then up.



Status Menus

The SEL hex switch provides access to a range of status displays when the MENU DIP levers are all OFF (UP). The available status-only displays (SELECT positions 0-4) are summarised in the following table:

		Description	Examples and comments	ADJ funct
0		Input Status	<i>Vid Ip Ok, Vid Ip Ads</i>	N/A
1		External Reference Status	<i>Ref Ip Ok, Ref Ip Abs</i>	N/A
2		Input line rate	<i>Ip 625 Ok, Ip 525 Ok, Vid Ip Abs</i>	N/A
3		Software version	Example: <i>Sware 2.01</i>	N/A
4		Serial number	Example: <i>Ser 640877</i>	N/A

Using presets

To enter the preset menu set DIL switch lever 2 DOWN.

		Description	Examples and comments	ADJ funct
Save, 1↓↑ Recall, 8↓↑	0-F	Presets 1-16	These menus allow the saving and recall of user presets To save the current ADDEC-310 set up as a preset proceed as follows: <ul style="list-style-type: none"> Select the required pre-set 1 to 16 with the SELECT switch. Press Menu lever 1 DOWN then UP to save the preset To recall a preset proceed as follows: <ul style="list-style-type: none"> Select the required pre-set 1 to 16 with the SELECT control (SW 3) Press Menu lever 8 DOWN then UP to recall the preset	N/A

Set up menu

To enter the set up menu set DIL switch lever 3 DOWN.

Selecting the video delay or offset

This sets the number of lines or pixels to be delayed in Delay Mode, or the vertical timing offset with respect to the reference input in Synchronisation Mode.

Setting the video delay in lines

To select the video frame synchroniser video delay or vertical offset in lines turn the SELECT control to display [**Line F 'nnn'**] or for a courser control [**Line C 'nnn'**], and then turn the ADJUST control to select the desired delay.

Setting the fine video delay

This sets the number of pixels to be delayed by in the Delay Mode, or the horizontal timing offset with respect to the reference input in Synchronisation Mode.

To select the video frame synchroniser video fine delay or horizontal offset, turn the SELECT control to display [**Smpl F 'nnnn'**] or for a courser control [**Smpl C 'nnnn'**], and then turn the ADJUST control to select the desired delay.

Selecting Freeze output and the Freeze Mode

The type of freeze used when the freeze command is given may be selected from; Frame, Field 1 or Field 2.

In frame mode any movement between fields may show movement judder. This can be prevented by selecting a field freeze. This works by repeating the same field to produce a synthetic frame of video, without movement judder. However a field freeze is more likely to show jagged edges on near horizontal lines.

Freeze output picture

To freeze the output picture turn the SELECT control to display [**Freeze ‘option’**] then turn the ADJUST control to select the desired option.

Toggle DIL switch 1 to confirm new selection.

Selecting freeze mode

To select the forced video picture Freeze Mode, turn the SELECT control to display [**frz ‘option’**], then turn the ADJUST control to select the desired option.

Selecting the operating Mode

The ADDEC-310 has two modes of operation, synchronisation mode and delay line. In Synchronisation mode the unit takes its timing from the analogue external reference and will automatically synchronise sources between 0 and 2 fields. In Delay mode, timing is derived only from the analogue input.

To set the ADDEC-310 to video frame synchroniser operation or variable delay mode turn the SELECT control to display [**‘option’ Mode**], turn the ADJUST control to select the desired option and then confirm the new value.

Toggle DIL switch 1 to confirm new selection.

Suppressing NTSC set up (pedestal)

The ADDEC-300 can cater for the two common 525 composite signal formats, NTSC-M and NTSC-J (Japan). Before conversion to a SDI signal the 7.5% IRE set up (pedestal) applied to NTSC-M waveform will require removing. Turn the SELECT control to display [**NTSC ‘option’**], then turn the ADJUST control to select the desired option.

Enabling blanking of the vertical interval

The information in the vertical blanking period of the analogue input video picture may be blanked or passed unaltered. Turn the SELECT control to display [**VBI ‘option’**], then turn the ADJUST control to select the desired option. Toggle DIL switch 1 to confirm new selection.

Input Video format

Selecting the Input video format

The ADDEC-310 can be configured to accept four analogue video input formats, PAL/NTSC composite or YC and Component YUV or RGB, turn the SELECT control to display [**IP = 'option'**], then turn the ADJUST control to select the desired option. The position of links PL2/5, 3/6 and 9/11 will also be affected. Toggle DIL switch 1 to confirm new selection.

When selecting RGB the final selection will depend on the format of the RGB signals available. The ADDEC-310 can accept RGB with syncs on all three components, on green only or no syncs. The latter requiring a sync supplied separately. Provision is made for connecting an external RGB sync but at the sacrifice of an SDI output.

Betacam Video format

Selecting the Betacam Input video format

The Betacam YPrPb 525-line format input where the PrPb components have been boosted by 1.333 can be selected. Toggle DIL switch 1 to confirm new selection.

The following table shows the set up menu options.

		Description	Examples and comments	ADJ funct
		0 Delay in lines (coarse adjustment)	Example: <i>Line C140</i> (range 0-624 at 50Hz, 0-524 at 59.94Hz in 10-line increments)	Adjust lines x 10
		1 Delay in lines (fine adjustment)	Example: <i>Line F572</i> (range 0-624 at 50Hz, 0-524 at 59.94Hz)	Adjust lines
		2 Delay in samples (coarse adjustment)	Example: <i>Smpl C 490</i> (range 0-1727 at 50Hz, 0-1715 at 59.94Hz in 10-line increments)	Adjust samples x 10
		3 Delay in samples (fine adjustment)	Example: <i>Smpl F 132</i> (range 0-1727 at 50Hz, 0-1715 at 59.94Hz)	Adjust samples
1↓↑		4 Freeze output	<i>Freeze On, Freeze Off</i>	Select
		5 Freeze mode	<i>Frz Frame, Frz Field1, Frz Field2</i>	Select
1↓↑		6 Mode	<i>Delay Mode, Synch Mode</i>	Select
		7 Pedestal	<i>NTSC - M, NTSC - J, NTSC N/A</i>	Select
		8 VBI blanking	<i>VBI Blank, VBI UnBlkd</i>	Select
1↓↑		9 Input format	<i>IP = COMP, IP = YC, IP = YUV, IP = RGSB, IP = RsGsBs, IP = RGRS</i>	Select
		A Betacam mode	<i>norm lvls, beta lvls, beta N/A</i>	Select
		B-F Not used		N/A

Video levels and gains

To enter the video levels and gains menu set DIL switch lever 5 DOWN.

All other DIL switches in the UP position: -

Video levels and gains

Luma, Chroma, Black offset gain and Burst to Chroma Phase (NTSC Hue) can be adjusted to correct for input signal variations.

Luma gain

Turn the SELECT control to display [**lGain 'nnn'**], turn the ADJUST control to set the Luma gain to the desired level.

Chroma gain

Turn the SELECT control to display [**cGain 'nnn'**], turn the ADJUST control to set the Chroma gain to the desired level.

U gain

Turn the SELECT control to display [**uGain 'nnn'**], turn the ADJUST control to set the U gain to the desired level.

V gain

Turn the SELECT control to display [**vGain 'nnn'**], turn the ADJUST control to set the V gain to the desired level.

Black level

The black offset level may be adjusted by 200mV in steps of approximately 6mV. The final range will be affected by the input video format. I.e. PAL will vary from -50mV to +150mV, NTSC-M will vary from -100mV to +100mV due to its 7.5 IRE set up.

Turn the SELECT control to display [**loff 'nn'**], turn the ADJUST control to set the Black offset to the desired level.



Burst to Chroma phase and NTSC Hue

The PAL Burst to Chroma phase, or NTSC Hue, may be adjusted by ± 90 deg in steps of 1deg.

Turn the SELECT control to display [**Phase 'nn'**], turn the ADJUST control to set the phase/hue to the desired angle.

Note: Gain and offset setting do not require adjustment conformation.

The following table shows the set up menu options.

		Description	Examples and comments	ADJ funct
0		Luma gain	Example: <i>IGain 100</i> (range 80-119%)	Adjust gain
1		Chroma gain	Example: <i>CGain 100</i> (range 76-122%)	Adjust gain
2		U gain	Example: <i>UGain 100</i> (range 76-122%)	Adjust gain
3		V gain	Example: <i>VGain 100</i> (range 76-122%)	Adjust gain
4		Luma offset	Example: <i>loff 0</i> (display range -25 – 0 – 25, actual range will depend on input video format)	Adjust offset
5		Phase rotate (hue)	Example: <i>Phase 0</i> (range ± 90deg)	Adjust rotation
6-F		Not used		N/A

Engineering settings

There are two engineering settings - Factory Default and Factory Reset. (DIL6)

Factory Defaults

This control when actioned will return all adjustable values to their default value.

Note: Any configuration stored as presets will remain unaffected.

Turn the SELECT control to display [**Default**], set switch 1 down then up to confirm this action. The display will then confirm that a factory default has been actioned.

Factory Reset

This control when actioned will return all adjustable values to their default value.



Note: Any configuration stored as presets will also be erased.

Turn the SELECT control to display [**Reset**], set switch 1 down then up to confirm this action. The display will then confirm that a factory reset has been actioned.

GPI recall of presets

GPI inputs 1 - 4 can be used to recall previously stored user configurations (presets). To prevent inadvertent triggering of presets whilst under active control by statesman or active front panel the GPI lines can be disabled using the GPI control.

The following table shows the Reset menu options.

		Description	Examples and comments	ADJ funct
1↓↑	0	Default	<i>Default, Dfalt Done</i>	N/A
1↓↑	1	Reset	<i>Reset, Reset Done</i>	N/A
	2	GPI enable	Selecting ENABLE allows the recall of previously saved user configurations via GPI inputs 0-3. <i>Enable, Disable</i>	N/A
	3-F	No used		N/A

The following table shows the default values for each parameter affected:

Parameter	Default value
Gains and levels	0 or 100% as applicable.
Synchronisation Mode	Synchronisation
Freeze	Off
Freeze Mode	Field 1
Delay in lines	0
Delay in samples	0 - minimum through board
VBI	Unblanked
Pedestal (NTSC)	NTSC-M
Input selection	Composite
Betacam	Normal

4 Using the active front panel

4.1 Module selected

This operational guide assumes that the panel has been set up according to the Panel set up procedure described in the Crystal Vision Control Panel manual.

Note: It is **ESSENTIAL** that the panel set up procedure is followed and any old or unknown passwords cleared prior to using the panel for the first time.

At power up, the two line, 20-character screen will display 'Crystal Vision' followed by the firmware version number for the control panel. All eight control panel keys LEDs will illuminate.



The Crystal Vision control panel start up display

'Control Panel' then briefly replaces the version number display.



If the control panel firmware has been updated for Statesman control (version 1.5.0 or higher), Statesman Mode will be entered and the message, 'Press CAL to Exit' will be displayed and the CAL LED will light.



Statesman mode is entered by default

To continue with control panel operation or configuration, press the CAL key once.
Warning: A second press of the CAL key will return to Statesman control.

The control panel will display the name of the card that first responds to the polling request together with its location number.

The location number consists of the frame number plus the card position in the frame.

Navigating the display

The functions assigned to control panel keys are:

- DEVICE – enters Device menu to select a card or show cards available / enters panel set up when held down during power up / shows frame status when pressed from Statesman mode
- CAL – enters or leaves Statesman mode / enters panel diagnostics mode when held down during power up / updates the display
- Asterisk – enters board rename menu from the Device menu
- F1 to F4 – soft keys, function assigned within each menu
- HOME – moves the display to the home menu
- ENTER – accept current selection
- Upward arrow – used to move up the menu structure / enter lock panel menu from the Device menu
- Rotary control – shaft encoder used to select options or variable data

Note: Please refer to the Crystal Vision Control Panel manual for details of the Panel Set up, Lock Panel and Diagnostic menus.

Selecting ADDEC-310

To select a particular card in a frame, press the DEVICE key to go to the Device menu. The top line of the display will show 'Available Cards X', where X is the number of cards that have responded so far to the polling request.



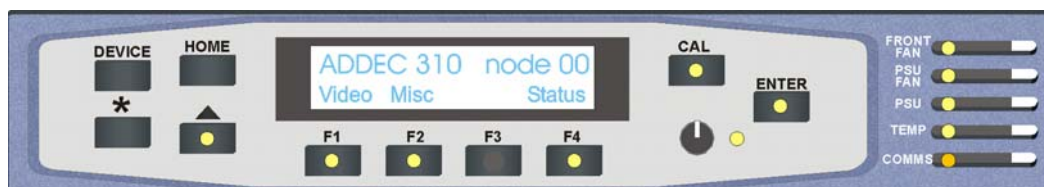
The available cards menu

Rotate the shaft encoder and the bottom row will display the successfully polled cards by name and location or slot number.

In the example above, the card displayed is located in the first frame in slot number 1.

When the desired card is selected press the ENTER key to access that card's HOME menu.

The message shows that an ADDEC-310 has been selected and is showing its top level home menu.



The ADDEC-310 home menu

Updating the display

The values displayed on an active front panel are only updated when an adjustment is made and when changing menu level. If mode changes occur through the use of Statesman, card edge controls or through automatic response to the input video signal, the text displayed on the active front panel will not be updated immediately. If necessary, press CAL to update the display.

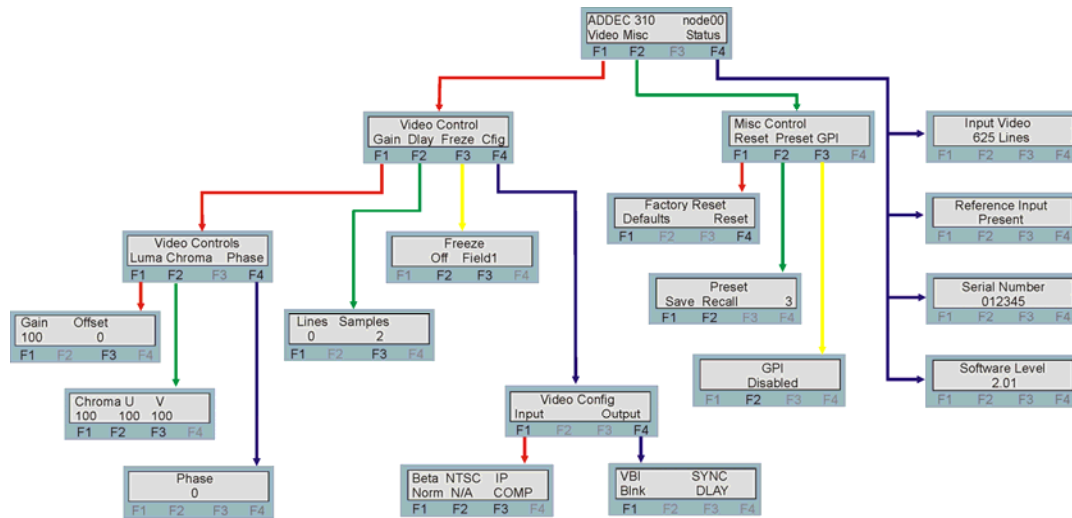
The ADDEC-310 menu structure

At any time the main top-level menu (Home) is obtained by pressing the HOME key. From the home menu further selections can then be made. Their adjacent LEDs illuminating will indicate active function keys.

When a sub menu has been selected, further options may be displayed which can then be accessed by further use of the function keys. Once the desired option has been located a selection or value change can be made by pressing the appropriate function key or by using the shaft control. A configuration change or value will be activated as the shaft control is rotated or function button is toggled.

The following chart shows the available ADDEC-310 menus. The actual menus available may vary slightly as software is updated.

Active control panel menu tree

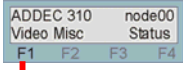

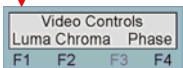
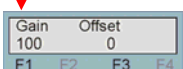
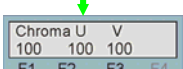



Note: Function keys LEDs are illuminated when active.



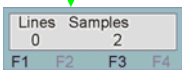
Video Configuration Menu

The video configuration menu allows the user to tailor the various video functions of the ADDEC-310 to suit their specific application.

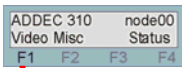


Gains and offsets menu

Menu	Comment
	
	Gain and Offset menu Pressing function key F1 in the home menu selects the video control menus. Pressing function key F1 again gives access to the video gain and offset menus
	Video control Press a function key to make adjustments to the selected attribute.
	Lima gain and offset Rotate the shaft control to adjust either Luma gain or Offset once selected. Luma gain 80-120% in 1% steps. Offset ± 100mV in 6mV steps depending on input format.
	Chroma gain and UV component gains Rotate the shaft control to adjust the Chroma gain or U & V levels once selected. Adjustment 80-120% in 1% steps
	Phase / hue control Allows phase (NTSC Hue) correction in the analogue input video. ± 90 deg in 1deg steps. Rotate the shaft control to adjust.

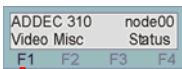


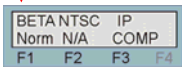

Delay menu

Menu	Comment
	Delay menu
	Delay in lines and samples
	<p>Press a function key to make adjustments to the selected attribute. Delay in lines, 0-624 in 625-line standard and 0-524 in 525-line standard. Delay in samples, 0-1727 in 625-line standard, 0-1715 in 525-line standard. Rotate shaft to adjust value once selected.</p>

Freeze menu

Menu	Comment
	Freeze menu
	Freeze and freeze mode
	<p>Selecting F2 will force the output to frozen. Toggle F3 to select Frame freeze, Field 1 freeze or Field 2 freeze.</p>

Configuration menu

Menu	Comment
	Configuration menu
	Video input and output config
	Input configurations
	Output configurations
	

Pressing function key F1 in the home menu selects the video control menus. Pressing function key F4 gives access to the configuration menus.

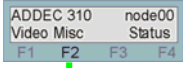

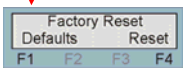
Press a function key to make adjustments to the selected attribute.

Toggle **F1** to accept Betacam levels in 525-line YUV input mode. Toggle **F2** to remove the NTSC 7.5% IRE black level pedestal. M removed, J not removed. (NTSC only). Toggle **F3** to select the video input format. PAL/NTSC composite or YC and Component YUV or RGB with sync options.

Note: Links PL2/5, PL3/6 and PL9/11 are affected by selection. Toggle **F1** to blank and unblank data in the vertical interval. Toggle **F3** to select synchronisation or Delay mode.

Miscellaneous menu

Factory Reset

	Menu	Comment
		
	Misc control menu	Pressing function key F4 in the home menu selects the miscellaneous menus. Pressing function key F1 gives access to the Factory Defaults and Factory Reset menus.
	Factory reset menu	Press F1 to select Factory Defaults. Note: Selecting Factory Defaults will return all values to their defaults and any stored presets will be retained. Press F4 to select Factory Reset. Note selecting factory reset will return all values to their defaults. Any stored presets will also be erased.

See table below.

The following table shows the default values for each parameter affected:

Parameter	Default value
Gains and levels	0 or 100% as applicable.
Synchronisation Mode	Synchronisation
Freeze	Off
Freeze Mode	Field 1
Delay in lines	0
Delay in samples	0 - minimum through board
VBI	Unblanked
Pedestal (NTSC)	NTSC-M
Input selection	Composite
Betacam	Normal

Presets menu

Up to 16 board set-ups may be stored and recalled either from the board control, active front panel, Statesman or through the use of external GPIs. The presets will store board set up data including operating mode and board configuration. The presets are numbered 1-16.

The GPI lines used to recall user saved presets can be disabled to prevent inadvertent triggering whilst under active control by Statesman or a front panel.

Note: Care should be taken when storing presets that the desired configuration is not changed by any external input prior to saving.

	Menu	Comment
	Misc control menu	Pressing function key F2 in the home menu selects the miscellaneous menus. Pressing function key F2 gives access to the presets menu.
	Presets menu	Press F1 to select the Save function. Rotate the shaft control to select memory location 1-16. Press Enter to action. Press F2 to select the Recall function. Rotate the shaft control to action a recall of board setting from the selected memory location.
	GPI recall	Recall of presets via GPIs can be enabled and disabled by toggling function switch F2

Status menu

The status menu will give a quick overview of the board operation and engineering information

	Menu	Comment
	Input video present	Pressing function key F4 in the home menu selects the status menus. Rotate the shaft control to show that a valid input is present. 625 Lines, 525 Lines, Absent
	External reference present	Rotate the shaft control to show if an external reference is present. (not RGB reference). Present, Absent
	Board serial number	Rotate the shaft control to show the electronically stored six digit serial number.
	Current software fitted	Rotate the shaft control to show the version number of the currently fitted software.

5 Statesman

The Crystal Vision Statesman PC control software is designed to control a range of Crystal Vision modules via serial control from a PC. Statesman provides a user-friendly means of configuring and operating the ADDEC-310 with the benefit of see-at-a-glance status monitoring.

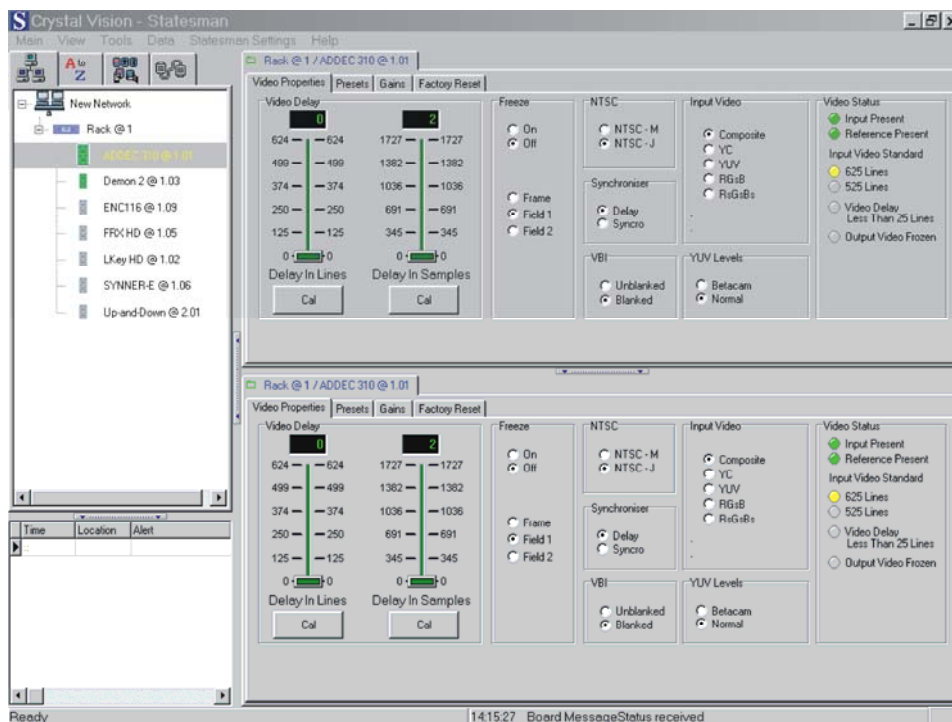
The main Statesman application communicates with each module in a frame through an active front panel. A frame or frame pair must have an active panel fitted to allow for Statesman control.

For details on installing Statesman on your PC refer to the Statesman installation manual.

5.1 Statesman operation

The initial view will show an Explorer style view of the connected frames and modules. Double-click on a module to display the main application control panes.

Initially two views of the first pane will be shown. Clicking any of the menu tabs will cause an alternate pane to appear.



Statesman main application window

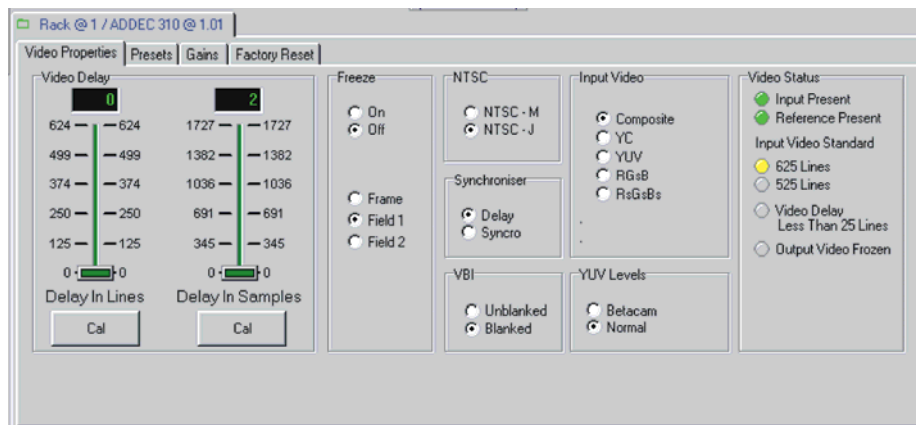
The two large control panes shown in the upper and lower halves of the window may display different menus for the same card, or controls for different cards. Click on the horizontal button-bar between the two panes to close the lower plane or drag the button to vary the size of the panes.

Note: For further details of Statesman configuration and operation please refer to the Statesman manual.

ADDEC-310 has four Statesman menu tabs that provide: Status information and video properties, Presets controls, gains and offsets and reset controls.

Video properties

The video properties menu pane is made up of eight group boxes. These group boxes allow the various formats and modes of operation to be set and give an overview of the ADDEC-310 status.



ADDEC-310 video properties

Selecting Synchronisation or Delay Mode

The ADDEC-310 may be used in either Synchronisation or Delay Mode.

To select the desired mode click either Syncro for synchronisation or Delay for delay Mode.

In Synchronisation Mode the unit takes its timing from the analogue external reference and will automatically synchronise sources with or without embedded audio between zero and two fields.

In Delay Mode, timing is derived only from the analogue input.

Adjusting the video delay

The video delay may be adjusted from zero to two fields for both 525 and 625 inputs in either Synchronisation or Delay Mode. Use the Delay in Lines and Delay in Samples sliders to control the delay.

Delay control	625 range	525 range	Description
Delay in Lines	0 to 624	0 to 524	Number of lines of delay in Delay Mode or vertical timing offset with respect to reference in Synchronisation Mode.
Delay in Samples	0 to 1727	0 to 1715	Fine delay or horizontal offset in pixels in Delay Mode or fine vertical timing offset with respect to reference in Synchronisation Mode.

Freezing the video

The video signal may be frozen as a full frame (two fields) or single field. The field used may be field 1 or field 2. Make the selection by checking the Frame; Field 1 or Field 2 box then check the Freeze ON box to freeze the input.

NTSC format

The 7.5% IRE set up present on the NTSC-M format can be removed by checking the NTSC-M box.

Auxiliary data

Data in the VBI (vertical blanking interval) of the analogue composite input can be blanked or passed. Click the VBI blanked or unblanked box as required.

Input format selection

Composite PAL/NTSC and YC or component YUV/RGB input formats can be selected.

When selecting RGB the final selection will depend on the format of the RGB signals available. The ADDEC-310 can accept RGB with syncs on all three components, on green only or no syncs. The latter requiring a sync supplied separately. Provision is made for connecting an external RGB sync at the sacrifice of an SDI output by moving links PL9/11 to their alternate position. This action will cause the input format selection to be disabled and controls to be greyed out.



The input can also be configured to accept 525-line component Betacam level signals.

Video status

The Video Status panel allows the user a quick appraisal of parameters such as line rate, Input and Reference presence, Output frozen and an indication of when the difference between input video and output video is less than 25 lines.

Note: Video delay being less than 25-lines is mostly applicable in synchro mode where the relationship between the input video timing and reference/output video is likely to vary due to any upstream changes.

Presets

The Preset tab allows the user to store or recall any of the possible 16 presets that are available.



Storing and recalling Presets

Saving and recalling presets

The current board settings (i.e. routing and delay) can be saved in one of 16 locations to be recalled as desired. Therefore this allows the user to store and recall up to 16 different configurations for later use.

To save the current settings, tick the selected preset location and click on Store. This will write the current settings into this location.

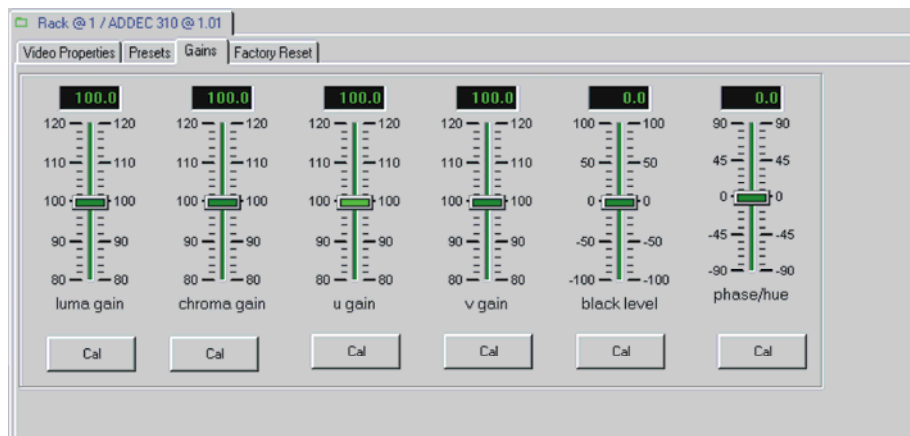
Note: If the selected location contains previously saved setting information it will be overwritten by the new setting data.

To recall previously stored setting information, again tick the selected location and click Recall.

The recalling of previously stored presets can also be implemented externally via the GPI port. To sanction this facility, tick the GPI controls preset recall box.

Gains

The Gains tab gives control over the various gains and levels. This allows the user to compensate for any minor irregularities in the analogue video input.



Gain control

Luma gain

Slider varies Y gain from 80% to 120% in 0.3% steps. CAL button clears the current setting to 100%.

Chroma gain

Slider varies CbCr gain from 80% to 120% in 0.3% steps. Cal button clears the current setting to 100%

U/V Gain

U slider varies Cb gain from 80% to 120% in 0.3% steps. V slider varies Cr gain from 80% to 120% in 0.3% steps. CAL button clears the current setting to 100%.

Black Level

The black level can be adjusted between $\pm 100\text{mV}$ in 6mV steps. Cal button clears the current setting to its zero off-set.

Note: Offset range will depending on input format

Phase/Hue

The Burst to subcarrier phase or Hue (NTSC) can be adjusted between $\pm 90\text{deg}$. The Cal button clears the current setting to its zero off-set.

Note: Pressing a CAL button can take several seconds before its action is reflected on the Statesman control panel. The board value will be updated immediately.

Factory Reset

There are two controls for restoring the ADDEC-310 to its Default State - Reset and Defaults.



Factory Reset controls

Factory Defaults

This control when actioned will return all adjustable values to their default value. Its action can be likened to a CAL All function.

Note: Any configuration stored, as presets will remain unaffected.

Factory Reset

This control when actioned will return all adjustable values to their default value.

Note: Any configuration stored as presets will also be erased.

This control can be used to restore a board from a previously unknown state before integration into a new system set-up

The following table shows the default values for each parameter affected:

Parameter	Default value
Gains and levels	0 or 100% as applicable.
Synchronisation Mode	Synchronisation
Freeze	Off
Freeze Mode	Field 1
Delay in lines	0
Delay in samples	0 - minimum through board
VBI	Unblanked
Pedestal (NTSC)	NTSC-M
Input selection	Composite
Betacam	Normal

6 Trouble shooting

6.1 Card edge monitoring

Status LEDs

Board edge LEDs provide status reporting and may be useful when fault finding.



ADDEC-310 front view showing controls and LEDs

The following table summarises the card edge LED functions and colours:

LED Colour	Position	Description
Red	Freeze	Illuminates when output is frozen
Green	PSU	Illuminates when the board is powered
Green	Ref	Illuminates when an external reference is present
Green	Input	Illuminates when an analogue input is present (Y,G or Comp input only)

Using the card edge display to interrogate an error condition

[option]		Set DIP1-8 to UP, Rotate SELECT to show Error status (0)
Option:	Vid Ip Abs	No Video input present
Option:	Ref Ip Abs	No external reference input present. Syncro mode only.

6.2 Fault finding guide

The Power OK LED is not illuminated

Check that the frame PSU is functioning and ensure the ADDEC-310 is fully inserted into its slot.
Refer to the appropriate frame manual for detailed information.

The Freeze LED is illuminated

This LED will illuminate when the picture is set to frozen. This condition may have been set from a remote control panel or Statesman PC controller. Un-set this condition or carry out a Defaults reset to remove this condition.

There is no video output

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

The video output exhibits jitter

Check that the input video stability is within normal limits and that the maximum cable length has not been exceeded.

Ensure that the external reference input is stable

The video output is not synchronous with other station sources

If the input analogue video is not synchronous with station sources, ensure that the ADDEC-310 is in Synchronisation Mode and that an appropriate analogue composite video signal such as station Black and Burst is used as a reference.

Check the video offset timing (delay) is correct for your application.

The card no longer responds to Statesman or front panel control

Check that the card is seated correctly and that the PSU LED is lit.

Check any active control panel cabling.

Check if the control panel can control another card in the same rack.

If necessary reset the card by simply removing the card from the rack and then re-inserting.

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

Re-setting the card

Use the Factory Default/Reset facility accessible from the board edge, active control panel or Statesman PC control system.

7 Specification

General

Dimensions	100 mm x 266 mm module with DIN 41612 connector
Weight	200 g
Power consumption	6.5 W

Inputs

Analogue video input	YUV/RGB Component, Composite or Y/C video input, 1 volt with syncs 625 line PAL or 525 line NTSC
Analogue references	Analogue Black and Burst, mixed syncs or video. Amplitude of syncs 150mV to 4V. Link on PCB selects 75Ω termination or high impedance for loop through.

Outputs

Video output	<p>Digital video</p> <p>Up to 3 times 270Mb/s serial digital to EBU Tech 3267-E and SMPTE-259M with EDH checksum insertion as per SMPTE RP165.</p> <p>Less than 500ps 1kHz jitter and less than 800ps broadband jitter from a stable 300mV Black and Burst reference.</p> <p>Less than 500ps 1 kHz jitter in Delay Mode.</p> <p>(Low frequency jitter follows SDI input in Delay Mode only.)</p>
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Timing

Video timing	<p>Synchronisation Mode</p> <p>The timing of the output (with respect to Ref in) may be adjusted by any number of lines up to a whole video frame. Horizontal timing adjustment is also possible in 37ns steps.</p> <p>Delay Mode</p> <p>When in Delay Mode the video delay through the card is set by the same timing adjustments.</p>
Audio follow output	<p>A positive going TTL level output is available from a frame D-Type GPI output. This pulse is output every frame and the length of the pulse (the time between the rising and falling edge) is the same as the delay through the synchroniser.</p> <p>Note: The output signal has a greater drive capability than normal TTL in order to drive low impedance loads.</p>

Control and status

Control	Board edge control using 10 character alphanumeric display or active front panel or Statesman PC control software.
GPI control	GPI inputs: 4 off 1, 2, 3 & 4. Recall presets 1 to 16. GPI outputs 5 Audio follow output pulse. 6 Error. Input absent, Ref absent. (Not available at present) Electrically: Open drain FET 30V, 220 Ω current limit resistors. Pulled up to +5V through 10k Ω .
LEDs	PSU okay, Output frozen, Input present, External reference present.