3GDA204R and 3GDA210R

3G/HD/SD dual channel distribution amplifiers

Crystal Vision

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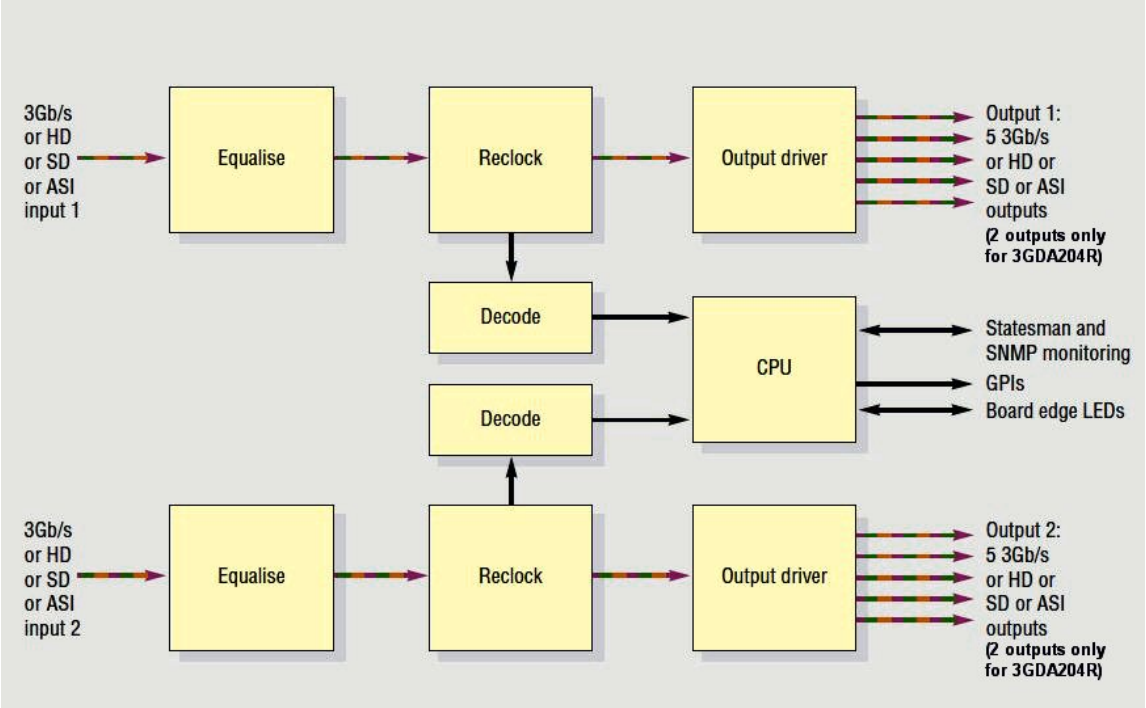
Revision 1	Corrected number of GPI outputs on pages 10 and 18.	28/01/15

1 Introduction

The 3GDA204R/210R are dual input, 3G High Definition re-clocking distribution amplifiers, which can distribute 3G, HD, SD or DVB-ASI signals with remote monitoring. The 3GDA204R provides two reclocked outputs per channel and by the addition of a sub-PCB the 3GDA210R will give five reclocked outputs per channel. Both cards can be configured to be single input with input 1 driving the outputs of both channels.

Auto input cable equalisation and output drivers ensure an SD cable length of in excess of 250 metres with Belden 8281 or equivalent and up to 140 metres for HD and 80 metres for 3G HD with Belden 1694 or equivalent is obtainable.

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 and switch positions as an indication of input present, HD/SD and PSU status when opened.



3GDA204R/210R multi-standard distribution amplifiers

The 3GDA204R can use either the RM75 or RM76 single-slot rear connector with six BNC connectors for one input and two outputs per channel. The RM76 offers relay bypass protection in addition. The 3GDA210R can use either the RM75 or RM76 in the lower slot position and additionally needs the RM34 in the slot above to increase the number of outputs to five per channel in total.

The rear connector details may be found in the Installation chapter.

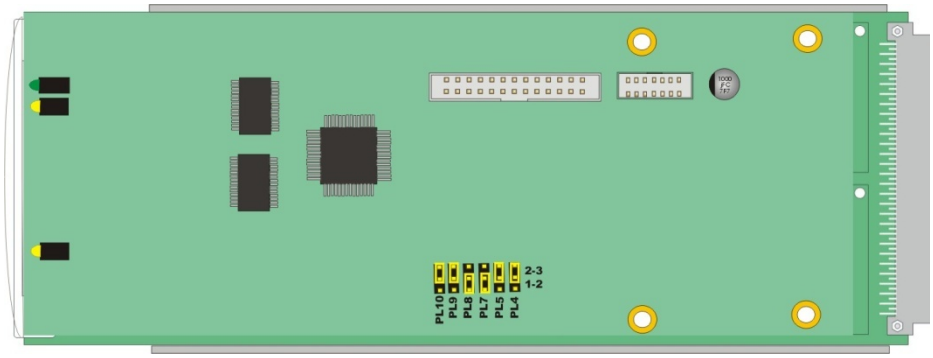
The main features are as follows:

- Up to five 3G/HD/SD/ASI reclocked outputs per channel.

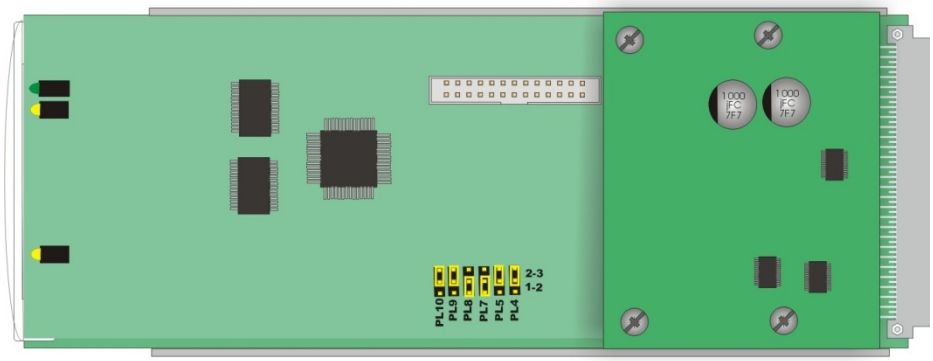
- Automatic input cable length equalisation.
- Remote monitoring via the Statesman PC control system and frame active control panel.
- Relay bypass in the event of power failure or board removal with RM76.
- DVB-ASI compatible with non-inverting outputs.
- Auto cable equalisation appropriate to the input signal type.
- Up to 12 3GDA204R or six 3GDA210R in a 2U frame.
- Less than 50nS delay

2 Hardware installation

2.1 Board Configuration



3GDA204R and 3GDA210R main board



3GDA210R with fitted top sub-board

Link Configuration

There are six user configurable links; all others should be left in their shipped position. Link position 1-2 is nearest the bottom edge of the PCB.

The following table shows the link configuration needed to set cable equalisation correctly for the video input standard. 'Auto' is the default state.

	Channel 1		Channel 2	
	PL9	PL10	PL4	PL5
Auto	2-3	2-3	2-3	2-3
270Mb/s	1-2	2-3	1-2	2-3
1.5/3G	2-3	1-2	2-3	1-2

Input standard link configuration

The following table sets the board to be single channel or dual channel. In single channel mode, video input 1 will drive all the outputs and video input 2 unused.

PL7-8	
Dual Channel	1-2
Single Channel	2-3

Channel mode link configuration

3 Rear Modules and Signal I/O

The 3GDA204R and 3GDA210R digital video distribution amplifiers fit into all Crystal Vision rack frames. All modules can be plugged in and removed while the frame is powered without damage.

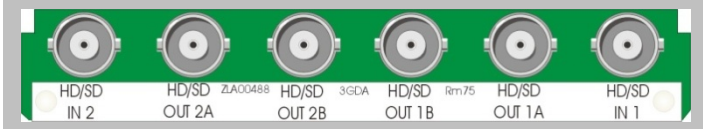
3.1 Universal rear connectors

The 3GDA204R uses a single height rear connector. This will allow the 2U Indigo frame to house 12 modules with dual power supplies and the 1U Indigo frame to house six modules with a single power supply. The Indigo DT desk top box has a built-in power supply and will house up to two modules.

The 2U and 1U frames all have a hinged front panel that gives access to the PSUs and all modules. The desk top box also has a removable front to gain access to the modules. 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 3GDA210R uses a second single slot rear connector to obtain the full number of outputs; this will result in fewer boards per frame type.

3GDA204R - Rear module connections with RM75

RM75 fits in all frames	Description
	**RM75** • 12 modules in 2U • Six in 1U • Two in DTB • All frame slots can be used

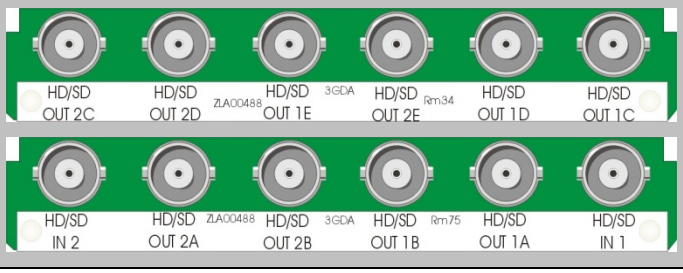
BNC	I/O assignment
HD/SDI IN 2	HD/SD serial digital input channel 2
HD/SD OUT 2A	HD/SD serial digital channel 2 output A
HD/SD OUT 2B	HD/SD serial digital channel 2 output B
HD/SD OUT 1B	HD/SD serial digital channel 1 output B
HD/SD OUT 1A	HD/SD serial digital channel 1 output A
HD/SD IN 1	HD/SD serial digital input channel 1

3GDA204R - Rear module connections with RM76

RM76 fits in all frames	Description
	**RM76** • 12 modules in 2U • Six in 1U • Two in DTB • All frame slots can be used

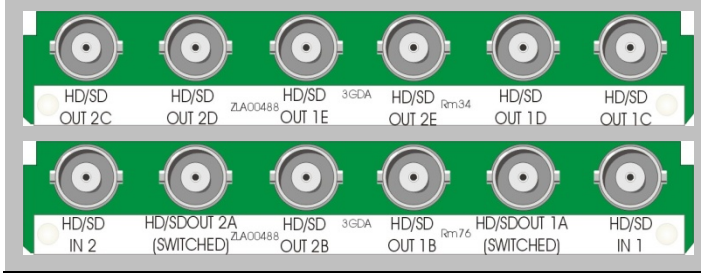
BNC	I/O assignment
HD/SDI IN 2	HD/SD serial digital input channel 2
HD/SD OUT 2A (SWITCHED)	Switched HD/SD serial digital channel 2 output A
HD/SD OUT 2B	HD/SD serial digital channel 2 output B
HD/SD OUT 1B	HD/SD serial digital channel 1 output B
HD/SD OUT 1A (SWITCHED)	Switched HD/SD serial digital channel 1 output A
HD/SD IN 1	HD/SD serial digital input channel 1

3GDA210R - Rear module connections with RM75 + RM34

RM75 + RM34 fits in all frames	Description
	**RM75 + RM34** • Six in 2U • Three in 1U • One in DTB • Two slots used for each card

BNC	I/O assignment
HD/SD OUT 2C	HD/SD serial digital channel 2 output C
HD/SD OUT 2D	HD/SD serial digital channel 2 output D
HD/SD OUT 1E	HD/SD serial digital channel 1 output E
HD/SD OUT 2E	HD/SD serial digital channel 2 output E
HD/SD OUT 1D	HD/SD serial digital channel 1 output D
HD/SD OUT 2C	HD/SD serial digital channel 2 output C
HD/SDI IN 2	HD/SD serial digital input channel 2
HD/SD OUT 2A	HD/SD serial digital channel 2 output A
HD/SD OUT 2B	HD/SD serial digital channel 2 output B
HD/SD OUT 1B	HD/SD serial digital channel 1 output B
HD/SD OUT 1A	HD/SD serial digital channel 1 output A
HD/SD IN 1	HD/SD serial digital input channel 1

3GDA210R - Rear module connections with RM76 + RM34

RM76 + RM34 fits in all frames	Description
	**RM75 + RM34** • Six in 2U • Three in 1U • One in DTB • Two slots used for each card

BNC	I/O assignment
HD/SD OUT 2C	HD/SD serial digital channel 2 output C
HD/SD OUT 2D	HD/SD serial digital channel 2 output D
HD/SD OUT 1E	HD/SD serial digital channel 1 output E
HD/SD OUT 2E	HD/SD serial digital channel 2 output E
HD/SD OUT 1D	HD/SD serial digital channel 1 output D
HD/SD OUT 2C	HD/SD serial digital channel 2 output C
HD/SDI IN 2	HD/SD serial digital input channel 2
HD/SD OUT 2A (SWITCHED)	Switched HD/SD serial digital channel 2 output A
HD/SD OUT 2B	HD/SD serial digital channel 2 output B
HD/SD OUT 1B	HD/SD serial digital channel 1 output B
HD/SD OUT 1A (SWITCHED)	Switched HD/SD serial digital channel 1 output A
HD/SD IN 1	HD/SD serial digital input channel 1

4 General purpose interface

The external GPI control lines 'a' to 'f' at the frame remote connectors are provided to allow remote control and/or remote status indication. Line 'a' is assigned as a GPI output to provide remote indication of input presence.

The GPI output is fitted with 6800 ohm pull-up to +5V and 270 ohm series resistor so it can drive an LED directly. If the series resistor is shorted out, it can drive a bulb at +45V 500mA max.

GPI Connections

	Not asserted (nominally 5Vdc)	Asserted (<0.5Vdc)
'a'	No input 1	Input 1 present
'b'		Input 1 SD
'c'		Input 1 3G/HD
'd'	No input 2	Input 2 present
'e'		Input 2 SD
'f'		Input 2 3G/HD

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.

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.

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

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

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

5 Card edge LEDs

3GDA204R/3GDA210R

The front card-edge of the 3GDA204R/3GDA210R provides power rail monitoring and signal status for both channels.

3GDA204R/3GDA210R front edge view

LED	Location/colour	Meaning when lit
HD	Yellow	Valid 3G or HD input detected.
SD	Yellow	Valid SD input detected.
PSU OK	Green	Power supply voltages present.

The 3GDA204R/3GDA210R will auto detect the input standard and illuminate the appropriate LED accordingly.

Note: **Input missing is indicated by both HD and SD LED being unlit**

6 Using the front control panel

3GDA204R/3GDA210R status can be accessed most easily by Statesman PC software or rack front panel controls.

6.1 Using the front control panel

At power up, the LEDs of all eight control panel keys will illuminate briefly. Once the panel has completed its power up and configuration sequence the panel will enter its status mode and display the current software version and frame IP address.

'Status' menu showing current software version and IP address

Selecting a 3GDA204R/3GDA210R

To continue with control panel operation or configuration, press the 'Device' key once. 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. Rotate the Shaft control to poll through the available cards. Use the F2 soft key to toggle between the card's serial number and issue number with modification level.

'Device' menu showing 3GDA204R in slot 1.01

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.

3GDA204R home menu

Rotate the shaft control to scroll through the menu structure and press ENTER to select the sub-menus. Press HOME at any time to return to the home menu.

Control Panel keys overview

The functions assigned to the control panel keys are:

- DEVICE – enters 'device' menu to select a card or show available cards.
- ASTERISK (*) – selects 'network configuration' menu.
- F1 to F4 – soft keys not currently used by 3GDA204R.
- HOME – returns to top of 3GDA204R menu structure.
- ENTER – accept current selection.
- Up arrow – used to move up through the menu structure.
- Rotary control – shaft encoder used to select sub-menus or variable data.

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 necessary, use the upward arrow to leave and then re-enter a menu to update the display.

Menu Structure

The basic menu structure for front panel access and Statesman is identical and consists of the following groups and sub-groups (tabs and panels in Statesman).

- Status
  - Input
  - Board Mode

7 Statesman

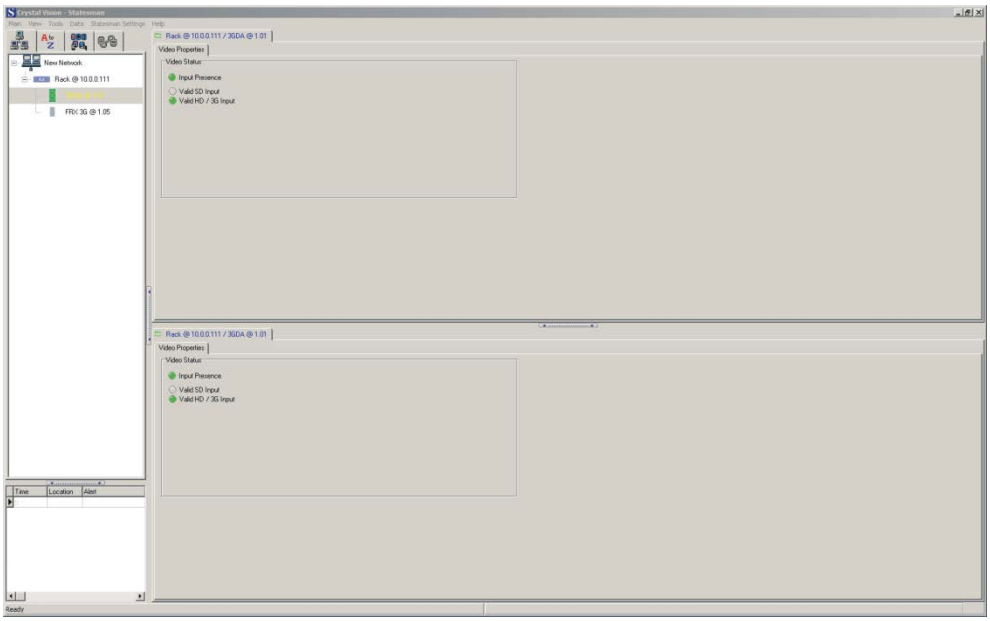
7.1 Statesman introduction

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 Crystal Vision modules with the benefit of 'see-at-a-glance' status monitoring.

The main Statesman application communicates with each module in a frame through a Statesman capable or active control panel.

7.2 Statesman operation

The initial view will show an Explorer style view of the connected frames and modules. Double clicking on a module will enable the display of the main application menus.



Statesman main application window

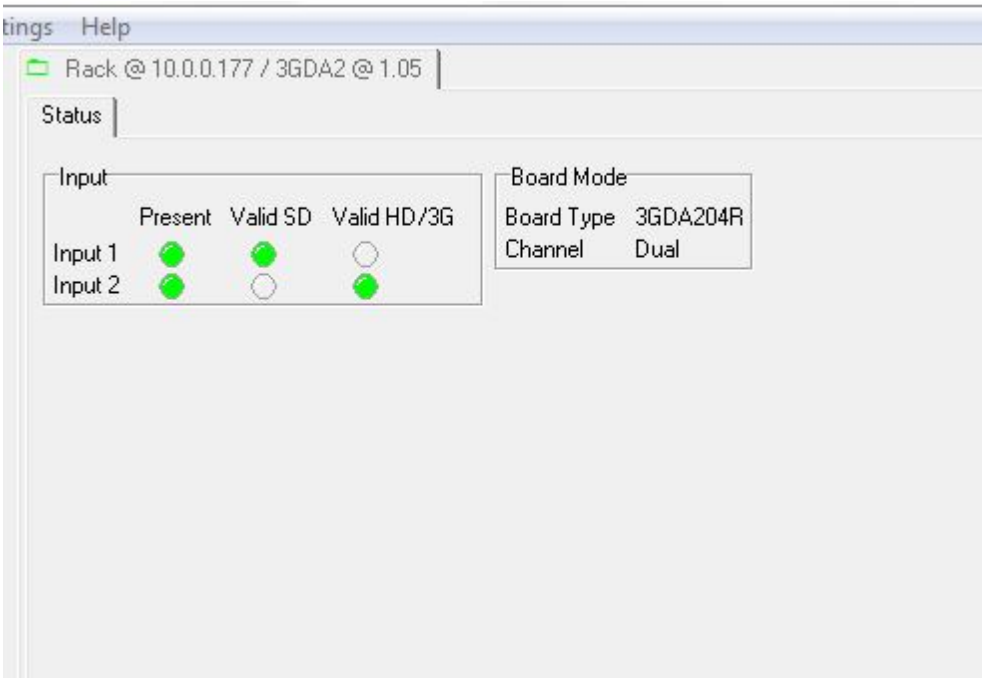
The two large control panes shown in the upper and lower halves of the window may display different menus for the same card, or controls for different cards. Click on the horizontal button-bar between the two panes to close the lower pane or drag the button to vary the size of the panes.

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

Status tab

The board status is shown using a mixture of simulated LEDs and text information. As a general rule a green LED shows a good condition such as input present. An amber LED will give a warning. If an LED turns red this is a fault condition. A greyed LED will indicate an absence such as non-alarm or non-warning status.

Text is used where more information is required than can be inferred by a simple LED, such as video standards.



Status monitoring

Status		
Input	Present	LED on indicates a valid input present.
	Valid SD	LED on indicates standard definition (SD) video input present.
	Valid HD/3G	LED on when high definition (HD or 3G) video input present.
Board Mode	Board Type	Displays board type 3GDA204R or 3GDA210R.
	Channel	Indicates board set to Dual or Single channel mode.

8 Trouble shooting

Card edge monitoring

The card edge provides simple monitoring of the board status. This can be used as an initial aid to trouble shooting.

3GDA204R front edge view

LED	Location/colour	Meaning when lit
HD	Yellow	Valid 3G or HD input detected.
SD	Yellow	Valid SD input detected.
PSU OK	Green	Power supply voltages present.

Fault finding guide

The Power OK 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 (input present LED illuminated) and that any cabling is intact

The video output is low quality

Check that the maximum length has not been exceeded and the links are in the correct position for the input standard used

9 Specification

General

Dimensions	100mm x 266mm module with DIN 41612 connector.
Weight	
3GDA204R	140g.
3GDA210R	200g.
Power consumption	
3GDA204R	3.5W.
3GDA210R	4.5W.

Inputs

Video	HD or SD SDI 270 Mb/s to 2.970 Gb/s serial digital compliant to EBU 3267-E, SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A. Cable equalisation: 3G (2.970Gb/s) – 80 metres, Belden 1694A or equivalent. HD (1.485Gb/s) – 140 metres, Belden 1694A or equivalent. SD (270Mb/s) >250 metres, Belden 8281 or equivalent.

Outputs

3GDA204R	2 per channel off HD or SD SDI 270 Mb/s to 2.970 Gb/s serial digital compliant to EBU 3267-E, SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A.
3GDA210R	5 per channel off HD or SD SDI 270 Mb/s to 2.970 Gb/s serial digital compliant to EBU 3267-E, SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A.

Control and status

Indicators	Board edge LEDs for PSU OK and signal present.
GPI outputs	Six: Input 1 present, Input 1 SD, Input 1 3G/HD, Input 2 present, Input 2 SD, Input 2 3G/HD. Open collector transistors, 30V, 270 ohm current limit resistors. Pulled up to +5V via 6800 ohm.