Q-Down-A 3G

3G/HD/SD broadcast down converter and distribution amplifier for embedded audio

USER MANUAL

Crystal Vision

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Revision 1. Table SMPTE AFD codes amended. Pages 18, 34 and 49. 01-10-10

1 Introduction

Q-Down-A 3G is a short processing delay down converter with both SDI and analogue outputs with the option of integrated fibre input or output connectivity for additional flexibility.

Q-Down-A 3G can down convert 1080p 3Gb/s, 720p HD and 1080i HD at both 50Hz and 59.94Hz, with the down converter bypassed if the input is Standard Definition. Q-Down-A 3G offers extremely flexible outputs, providing both input loop-throughs and three down converted feeds. 1080p video can be converted to 1080i or 720p digital and analogue, or to 625i or 525i digital and analogue, while 720p and 1080i video can be converted to 625i or 525i digital and analogue. HD video outputs can be configured as mixtures of digital HD, RGB and YUV (with integrated tri-level syncs on the component outputs), while Standard Definition outputs can be configured as mixtures of SDI, composite, Y/C, YUV and RGB. Q-Down-A 3G additionally provides two reclocked loop-throughs of the 3Gb/s, HD or SD input, along with another six loop-throughs if a DA6 top board is fitted.

Using Crystal Vision's propriety processing, Q-Down-A 3G provides a unique level of image quality – avoiding aliasing while retaining picture sharpness. The sophisticated two dimensional filtering gives broadcast results without the complication of looking at multiple fields or movement detection – resulting in reliable, artefact-free conversion. Four vertical filter characteristics can additionally be used to optimise the performance for the material.

A short processing delay of just 16 lines eliminates the need to compensate audio or other signals for the video delay, keeping everything in sync and making a system design much simpler. There is also a fixed one frame delay and a user adjustable delay which sets the delay in pixels and lines to one frame of delay. With the one frame fixed delay set, the adjustable delay will allow delay setting of one frame plus one frame or minus one frame less 16-lines. This 16-line limit is imposed to prevent possible frame tearing at delays of less than 16-lines.

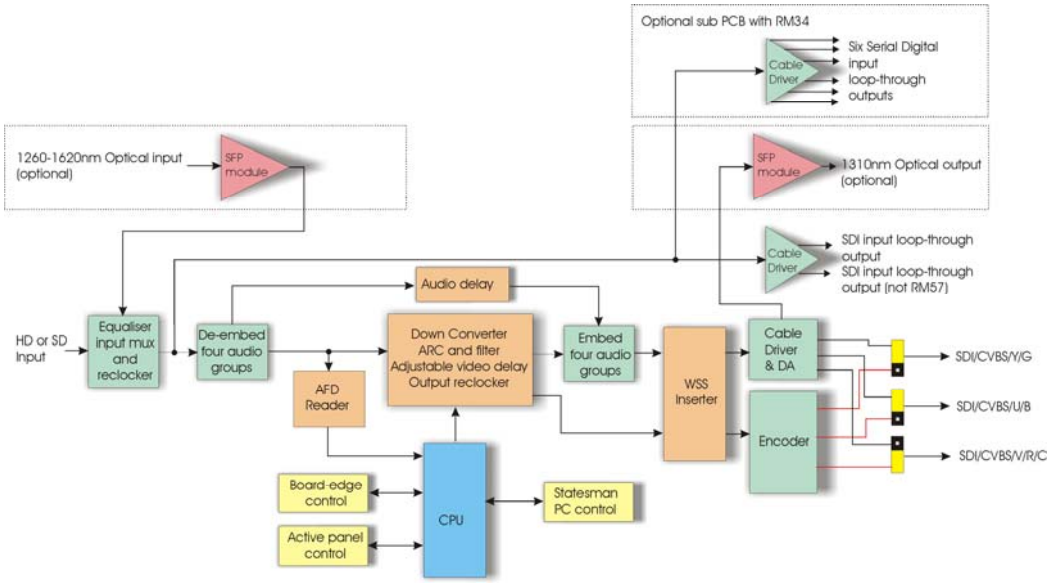
Q-Down-A 3G can be given fibre connectivity simply by fitting the FIP input or FOP output options, with the input fibre option most popular as the higher resolution input has less copper cable length capability. This allows Q-Down-A 3G to receive signals from beyond the local equipment bay – while still fitting it in a single frame slot, thereby saving rack space.

Q-Down-A 3G includes the ability to deal with any 3Gb/s or HD to SD aspect ratio conversion requirements, with the option of selecting a 16:9 Anamorphic output for 16:9 SD systems and either a 16:9 to 4:3 Letterbox or 16:9 to 4:3 Full Screen with centre cut for 4:3 SD systems. With Q-Down-A 3G it is also possible to select the output aspect ratio according to the SMPTE 2016 AFD data embedded in the 3Gb/s or HD input video, and to insert WSS into the SD output, either manually or by automatically following the incoming AFD. Output picture position is fully adjustable with the ability to crop all four sides of the picture individually.

Q-Down-A 3G is ideal as the main signal path down converter for those working with embedded audio. It can pass four groups of embedded audio, de-embedding the four groups and converting them to the appropriate format before re-embedding them. Included is signal probe functionality making it useful for flagging up faulty signals, especially in multi-channel applications. Amongst the status indications available are - video not present, video frozen, video black and both audio not present and audio silent on all four groups.

A space-saving 100mm x 266mm module, with up to 12 boards fitting in a 2U frame alongside the rest of the Crystal Vision product range. The inputs and outputs are accessed by using the RM41 and RM57 frame rear modules, with the RM34 rear module additionally used to access the optional top board outputs. Control options include board edge, an active front panel on the frame, a remote control panel, SNMP and the Statesman PC software.

Q-Down-A 3G is ideal for use in mixed 3Gb/s, HD and SD environments, or for any areas being converted to HD or 3G.



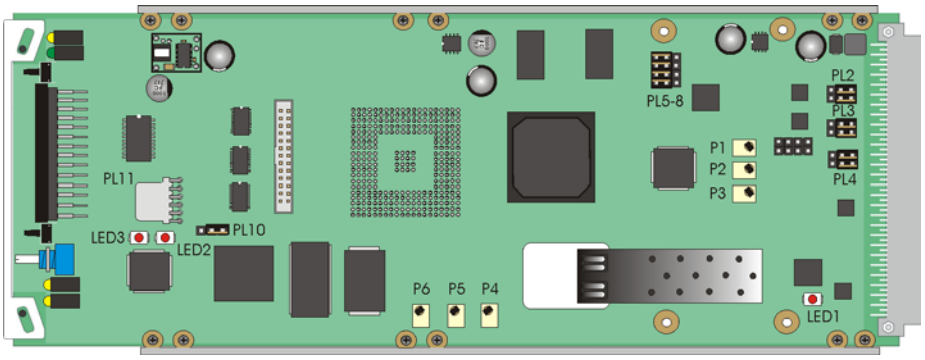
The main features are as follows:

- High quality down conversion with adjustable video delay
- Aspect ratio and vertical filter selection with a High Definition input
- Auto output aspect ratio selection using Active Format Descriptor (AFD)
- 625-line Wide Screen Signal insertion in both analogue and digital outputs
- Two input loop-throughs or eight with an addition sub PCB
- Link selectable output formats – SD/HD analogue and serial digital
- Passes four groups of embedded audio, with delay matched to video
- One fixed frame and one frame in lines and pixels of adjustable video delay
- Signal probe function
- Optical input or optical output option

2 Hardware installation

2.1 Module configuration

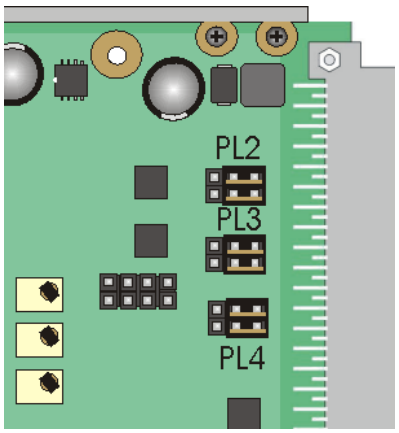
There are four user settable links on the Q-Down-A 3G. These are – PL2, PL3, PL4 and PL10. Links PL2, PL3 and PL4 are used to select between analogue and serial digital outputs. PL10 sets the Q-Down-A 3G IP address to default (10.0.0.201) or to a user selected IP address.



Q-Down-A 3G top side

The surface-mounted LEDs on the top side of the PCB are not visible from the front of the frame and are included for diagnostic purposes only.

Note: The six potentiometers have been factory set and should not require further adjustments.



SDI/analogue output selection links

Link configurations

Link	Towards board edge 2-3	Away from board edge 1-2
PL2	CVBS / Y / G output	High/Standard Definition serial digital output
PL3	CVBS / U / B / YC-Y output	High/Standard Definition serial digital output
PL4	CVBS / V / R / YC-C output	High/Standard Definition serial digital output

Note: Analogue video output formats are selected via the board edge or remotely. When the Y/C output format is selected the third output will give CVBS.

Engineering link and LEDs

PL10 sets the Q-Down-A 3G IP address to default (10.0.0.201) or to a user selected IP address. The LEDs LED1, LED2 and LED3 are included for diagnostic purposes and are not visible from the front of the frame.

Link	Towards front of board	Towards the rear of board
PL10	Default IP address 10.0.0.201	Custom set IP address

LED	Illuminated	Not Illuminated
LED1	Input equalizer locked to valid input	No input or invalid input
LED2	Data	
LED3	Link	

Potentiometers

These potentiometers have been factory set and should not require further adjustment.

Potentiometer	Function
P1	CVBS / Y / G output amplitude
P2	U / B / YC-Y output amplitude
P3	V / R / YC-C output amplitude
P4	Standard Definition free-running frequency
P5	High Definition 50Hz free-running frequency
P6	High Definition 59.94Hz free-running frequency

2.2 Rear modules and signal I/O

The 4U Indigo 4 frame will house up to 24 single height modules with up to four power supplies. The 2U Indigo 2 frame will house up to 12 single height modules and dual power supplies. The 1U Indigo 1 frame will house six single height modules and a single or dual power supply. The Indigo DT desk top boxes have a built-in power supply and will house up to two single height modules. All modules can be plugged in and removed while the frame is powered without damage.

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

Rear module connections with RM41

The RM41 being a single height module will allow maximum packing density with the maximum number of outputs available.

RM41 rear module connector	Description
	RM41 • 24 Q-Down-A 3G 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/CVBS/Y/G OUT	HD/SD SDI / CVBS, Y, G output (link PL2)
SDI/CVBS/U/B/YCY OUT	HD/SD SDI / CVBS, U, B, YC-Y output (link PL3)
SDI/CVBS/V/R/YCC OUT	HD/SD SDI / CVBS, V, R, YC-C output (link PL4)
SDI LOOP OUT	High Definition/Standard Definition serial digital input reclocked loop-through
SDI LOOP OUT	High Definition/Standard Definition serial digital input reclocked loop-through
SDI IN	High Definition/Standard Definition serial digital input

Rear module connections with RM57

The RM57 is a single height module used when the optical option is fitted.

RM57 rear module connector	Description
	RM57 • 24 Q-Down-A 3G 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
OPTICAL I/O	SC optical connector. Input or output depending on optical module fitted.
SDI/CVBS/Y/G OUT	HD/SD SDI / CVBS, Y, G output (link PL2)
SDI/CVBS/U/B/YCY OUT	HD/SD SDI / CVBS, U, B, YC-Y output (link PL3)
SDI/CVBS/V/R/YCC OUT	HD/SD SDI / CVBS, V, R, YC-C output (link PL4)
SDI LOOP OUT	High Definition/Standard Definition serial digital input reclocked loop-through
SDI IN	High Definition/Standard Definition serial digital input

Note: Ensure the internal dust-cap has been removed before mounting the RM57 into the frame.

2.3 General Purpose Interface (GPI)

Each frame slot has up to 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)
1	**'a'**	**Recall preset bit 1**	See following table for user preset control	
2	**'b'**	**Recall preset bit 2**		
3	**'c'**	**Recall preset bit4**		
4	**'d'**	**Recall preset bit 8**		
5	**'e'**	**Input missing/incompatible, Video frozen/Black, Audio silence/missing**	Selected Alarms asserted after set delay	No alarm
6	**'f'**	**Input missing/incompatible, Video frozen/Black, Audio silence/missing**	Selected Alarms asserted after set delay	No alarm

Note: Input missing and input incompatible will assert the select alarm immediately

As supplied, each GPI output has a 270Ω resistor in series with its output. This allows for an external LED to be driven, connected to a DC voltage of +5V.

Each General Purpose Input (GPI) is fitted with a 6800Ω resistor connected to the internal +5V.

The 16 user preset configurations can be recalled using binary notation.

GPI Preset	Bit 8	Bit 4	Bit 2	Bit 1	GPI Preset	Bit 8	Bit 4	Bit 2	Bit 1
1	0	0	0	0	**9**	1	0	0	0
2	0	0	0	1	**10**	1	0	0	1
3	0	0	1	0	**11**	1	0	1	0
4	0	0	1	1	**12**	1	0	1	1
5	0	1	0	0	**13**	1	1	0	0
6	0	1	0	1	**14**	1	1	0	1
7	0	1	1	0	**15**	1	1	1	0
8	0	1	1	1	**16**	1	1	1	1

4U frame GPI connections

GPI lines ‘a’ to ‘f’ of each card connect to two 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)

Upper / Lower

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 two 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 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 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)

Table shows pin number (remote number)

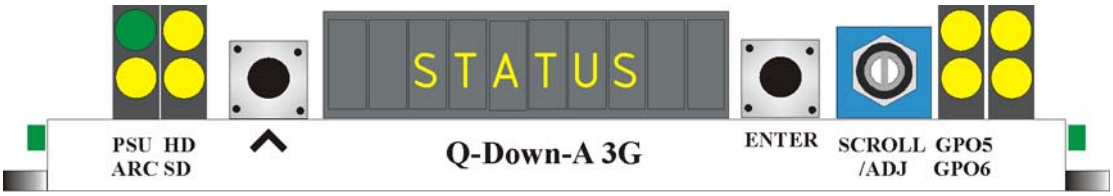
Note: Remote 1: 26-way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.

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

3.1 Card edge controls



Q-Down-A 3G board edge

3.2 Card edge buttons

The two tactile push button switches allow the operator to navigate within the menu structure.

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Button	Function	Normal state Up, Action Down
⌑	Up Menu	Push to jump up a menu level or cancel a selection
ENTER	Select/Action	Push to select a menu and to action and confirm a change

3.3 Card edge rotary control

The board edge rotary encoder is used to navigate through the menu categories and adjust parameter values.

Control	Function
SCROLL /ADJUST	Rotate SCROLL to identify a menu category. In combination with the ENTER button select and ADJUST to change the current level or select a further option.

Notes: The rotary control can access menus and parameter values by clockwise or anti-clockwise rotation.

3.4 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	Function when Off
PSU	Green	Good power supply (PSU) rails	One or more of the monitor supplies is out of specification
ARC	Yellow	Aspect ratio conversion selected	Full screen (anamorphic) selected
HD	Yellow	Video input standard is HD (High Definition)	Input not present
SD	Yellow	Video input standard is SD (Standard Definition)	
GPO5	Yellow	GPO5 active / low	GPO5 inactive / high
GPO6	Yellow	GPO6 active / low	GPO6 inactive / high
	Yellow	No function	
	Yellow	No function	

3.5 Navigating card edge menus

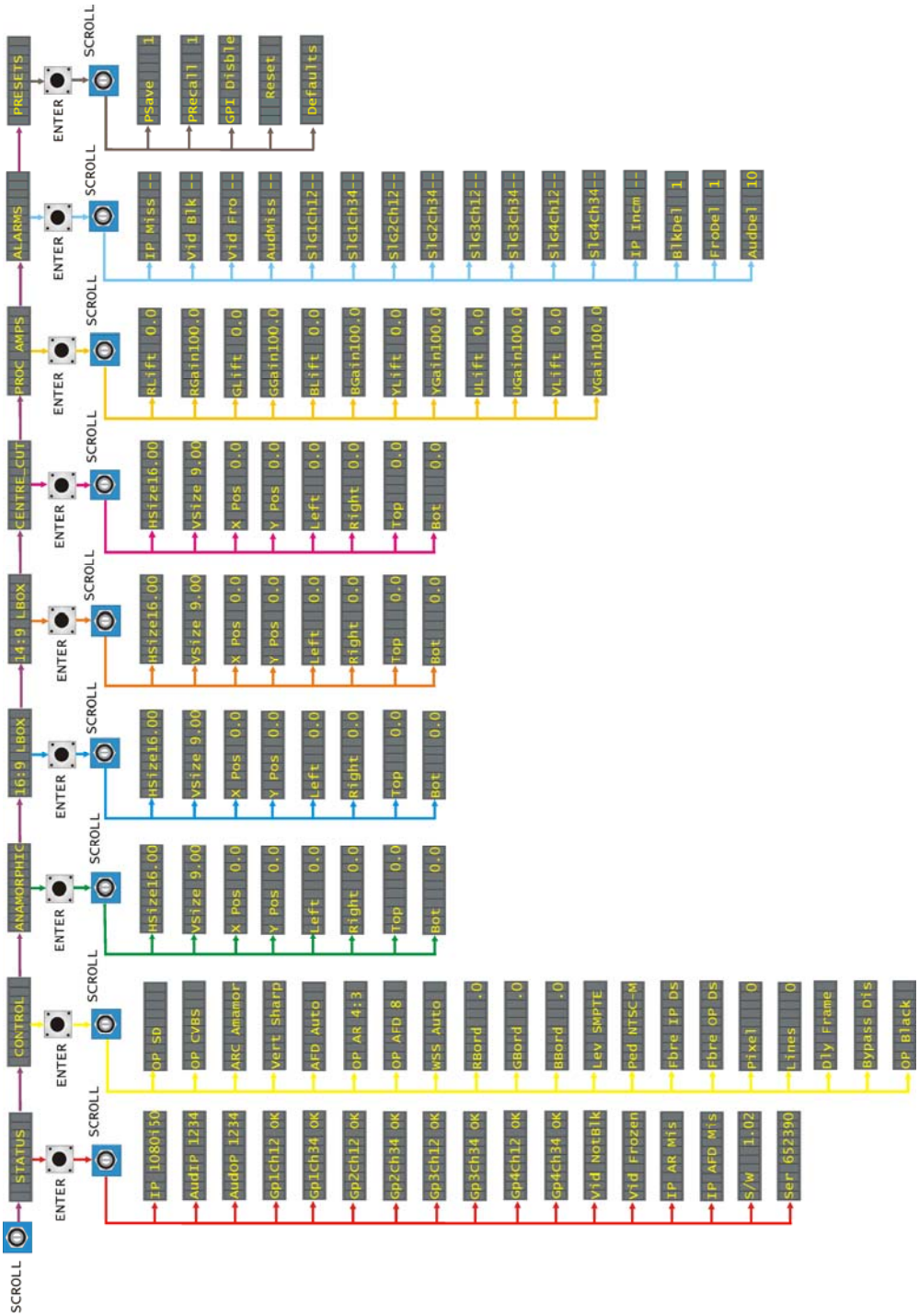
To access the card edge menu system proceed as follows:

- Press the up-arrow [⮌] until a top menu category is reached
- Rotate the SCROLL control until the desired menu category is found
- Push ENTER to enter the sub menus of that category
- Rotate SCROLL to select a sub menu
- Push ENTER to select the desired function. Selection will be indicated by the text being displayed in ***italic*** text
- Rotate ADJUST to make the desired change to the selected parameter. The display brightness flashes slowly to indicate that a change has been made and requires confirmation
- When required push ENTER to action the change. The display will cease flashing
- Use the up-arrow [⮌] and SCROLL control to navigate to further menus

Note: The displayed menu brightness will flash slowly if confirmation of a change is required.

3.6 Card edge configuration

Menu tree



Q-Down-A 3G Board edge menu structure

Tip: To reach the top menu push the ⏘ button repeatedly until a top menu is reached. Rotate the SCROLL control anti-clockwise until the STATUS menu appears.

Status menu

From the STATUS top menu press ENTER then SCROLL to access the status menu options.

Menu	Comment
STATUS	
IP 1080i50 — Input video format	The Input video line standard is shown. ***IP 525, IP 625, IP 720p 50/59, IP 1080i50/59, IP 1080p50/59, IP Missing.***
AudIP 1234 — Input Embedded audio groups	Groups containing audio data present on the input video. ***1234.*** '-' no audio group present.
AudOP 1234 — Output audio groups present	Groups containing audio data present on the output video. ***1234.*** '-' no audio group present.
Gp1Ch12 OK — Group 1 Ch1-2 Silence	Audio Group 1channel 1 and 2 active. ***Gp1Ch12 OK, Gp1Ch12Sil.***
Gp1Ch34 OK — Group 1 Ch3-4 Silence	Audio Group 1channel 3 and 4 active. ***Gp1Ch34 OK, Gp1Ch34Sil***
Gp2Ch12 OK — Group 2 Ch1-2 Silence	Audio Group 2channel 1 and 2 active. ***Gp2Ch12 OK, Gp2Ch12Sil***
Gp2Ch34 OK — Group 2 Ch3-4 Silence	Audio Group 2channel 3 and 4 active. ***Gp2Ch34 OK, Gp2Ch34Sil***
Gp3Ch12 OK — Group 3 Ch1-2 Silence	Audio Group 3channel 1 and 2 active. ***Gp3Ch12 OK, Gp3Ch12Sil***
Gp3Ch34 OK — Group 3 Ch3-4 Silence	Audio Group 3channel 3 and 4 active. ***Gp3Ch34 OK, Gp3Ch34Sil***
Gp4Ch12 OK — Group 4 Ch1-2 Silence	Audio Group 4channel 1 and 2 active. ***Gp4Ch12 OK, Gp4Ch12Sil***
Gp4Ch34 OK — Group 4 Ch3-4 Silence	Audio Group 4channel 3 and 4 active. ***Gp4Ch34 OK, Gp4Ch34Sil***
Vid NotBlk — Input video status (Black)	Status of the input video. ***Vid Not Blk, Vid Black.***
Vid Frozen — Input video status (Frozen)	Status of the input video. ***Vid NotFro, Vid Frozen.***
IP AR Mis — Input AFD aspect ratio	Aspect ratio of incoming video ***AFR AR 4:3, AFD AR16:9, AFD AR Mis***
IP AFD Mis — Input AFD code	AFD code embedded on incoming video ***IP AFD - 0 – IP AFD -15, IP AFD Mis.***
S/W 1.02 — Board software	The version number of the currently installed software.
Ser 652390 — Serial number	The electronically stored PCB serial number.

Control menu

From the STATUS top menu press ENTER then SCROLL to access the control menu options.

CONTROL	Menu	Comment
OP SD	Serial digital output format	Rotate the Scroll/Adj. control to show the serial digital output format selected. Press ENTER and rotate Scroll/Adj. to make a new selection. ***SD, 720p 1080i.***
OP CVBS	Analogue output format	Rotate the Scroll/Adj. control to show the analogue output format selected. Press ENTER and rotate Scroll/Adj. to make a new selection. ***CVBS, YUV, RGB, YC.***
ARC Amamor	Output aspect ratio selection control	Rotate the Scroll/Adj. control to show the aspect ratio selected. Press ENTER and rotate Scroll/Adj. to make a new selection. ***Anamorphic***, ***16:9LB,14:9LB, Centre Cut, Auto 16:9, Auto 4:3, Auto- Adaptive***.
Vert Sharp	Vertical bandwidth filter	Rotate the Scroll/Adj. control to show the vertical filter selected. Press ENTER and rotate Scroll/Adj. to make a new selection. ***Softest, Soft, Sharp, Sharpest.***
AFD Auto	Output AFD mode	Rotate the Scroll/Adj. control to show the output AFD mode selected. Press ENTER and rotate Scroll/Adj. to make a new selection. ***Auto, Manual, Disable, Pass.***
OP AR 4:3	Output AFD coded frame	Rotate the Scroll/Adj. control to show the output AFD coded frame selected. Press ENTER and rotate Scroll/Adj. to make a new selection. ***4:3, 16:9.***
OP AFD 8	Output AFD code	Rotate the Scroll/Adj. control to show the output AFD code selected. Press ENTER and rotate Scroll/Adj. to make a new selection. ***code - 0 – code -15.***
WSS Auto	Wide screen signalling control menu	Rotate the Scroll/Adj. control to show the wide screen signalling insertion menu. Press ENTER and rotate Adj. to set WSS option. ***WSS Auto, WSS 4:9 FF, WSS 149LB, WSS 169LB, WSS 169FF, Disable, WSS Pass .***
RBord 0.0	Picture border colour (red)	Rotate the Scroll/Adj. control to show the picture border R component adjustment. Press ENTER and rotate Scroll/Adj. to adjust. ***RBord0.0-100.0***
GBord 0.0	Picture border colour (green)	Rotate the Scroll/Adj. control to show the picture border G component adjustment. Press ENTER and rotate Scroll/Adj. to adjust. ***RBord0.0-100.0***
BBord 0.0	Picture border colour (blue)	Rotate the Scroll/Adj. control to show the picture border B component adjustment. Press ENTER and rotate Scroll/Adj. to adjust. ***RBord0.0-100.0***
Lev SMPTE	Betacam level compensation	Rotate the Scroll/Adj. control to show Betacam selection. Press ENTER and rotate Scroll/Adj. to make a new selection. ***SMPTE, Beta.***

Ped NTSC-M	NTSC pedestal selection	Rotate the Scroll/Adj. control to show NTSC pedestal selection. Press ENTER and rotate Scroll/Adj. to make a new selection. ***NTSC J, NTSC M.***
Fbre IP Ds	Optical input enable	Rotate the Scroll/Adj. control to show the optical input menu. Press ENTER and rotate Adj. to select. ***Enable, Disable.***
Fbre OP Ds	Optical output enable	Rotate the Scroll/Adj. control to show the optical output menu. Press ENTER and rotate Adj. to select. ***Enable, Disable.***
Pixel 0	Video delay pixels	Rotate the Scroll/Adj. control to show the delay in pixels menu. Press ENTER and rotate Adj. to set the delay in pixels. ***-2640-0-+2460.***
Lines 0	Video delay lines	Rotate the Scroll/Adj. control to show the delay in lines menu. Press ENTER and rotate Adj. to set the delay in lines. ***-1125-0-+1125 lines.***
Dly Frame	Video delay mode	Rotate the Scroll/Adj. control to show the video delay menu. Press ENTER and rotate Adj. to set delay option. ***Short, Frame.***
Bypass Dis	Bypass control	Rotate the Scroll/Adj. control to show the bypass menu. Press ENTER and rotate Adj. to select. ***Enable, Disable.***
OP Black	Output incompatibility mode	Rotate the Scroll/Adj. control to show the input/output incompatibility menu. Press ENTER and rotate Adj. to select. ***Black, Blue, Mute.***

Analogue video output format

As the Q-Down-A 3G supports both Standard Definition and High Definition analogue output formats, the final analogue output presented will be determined by both the analogue output format selection and digital output format selection. Setting the output format to SD will allow the analogue output format to be selected from any of the available choices. If one of the High Definition output format were to be selected the analogue outputs would be limited to either HD YUV or RGB. The analogue video line rate will be the same as that of the input video.

See the installation chapter for rear module connection details.

Note: The position of the onboard links PL2, PL3 and PL4 must also be set to give either an SDI output or analogue output as required. See section 2.1 Module Configuration for link setting details.

Serial digital video output format

The SDI output format can be selected from 1080i, 720p or SD. Although it is possible to select the output to be the same as the input format, apart from 1080p, setting the output to a higher format than the input will be flagged as incompatible and the output will be replaced with black, blue or muted as selected in the output incompatibility mode menu.

Vertical bandwidth filter

When down converting the vertical bandwidth can be optimised for a given application by selecting the most appropriate vertical bandwidth filtering. There are four filters to select from, these ranging from the highest (sharpest) to the lowest (softest).

Output aspect ratio

There are four fixed aspect ratios which are; Anamorphic, 16:9 Letterbox, 14:9 Letterbox and Centre Cut. Anamorphic will map the input picture directly to the native aspect ratio of the viewing display along with the resulting distortion associated with this. Should it be necessary to view the output on a 4:3 display, setting the aspect ratio selection to Letterbox will give the correct picture dimensions by adding black bars to the top and bottom of the picture. 14:9 Letterbox will crop the picture to 87.5%, and depending on the aspect ratio of the display will either add black bars to the top and bottom or both sides of the picture. There will be some loss of picture. Centre cut will show the central 75% of the 16:9 widescreen picture mapped to the full monitor height with the corresponding loss of the left and right picture edges.

There also three auto modes available. When any of these is selected the actual aspect ratio selected will depend on the input video AFD. The AFD reader will also automatically set the output WSS when Wide Screen Signalling is set to auto.

Selecting Auto 16:9 for all AFD input codes will give an anamorphic aspect ratio conversion and for a 625-line output WSS will be set to 16:9 full frame. When set to Auto 4:3 the output aspect ratio and WSS data will depend on the input AFD. Undefined/reserved and full frame codes will produce a Letterbox aspect ratio with the output WSS set to 16:9 Letterbox. Pillarbox 4:3, Pillarbox 14:9 and Letterbox greater than 16:9 will give a centre cut conversion and set output WSS to full format 4:3.

Selecting Auto Adaptive for any full frame input will give an Anamorphic aspect ratio with WSS set to full frame 16:9. Pillarbox 4:3 will give a centre cut conversion and set output WSS to full format 4:3. Undefined/reserved, Pillarbox 14:9 and Letterbox > 16:9 will make no change so the previous conversion will remain. On power up the default conversion will be Anamorphic.

Response to SMPTE 2016 AFD codes

Incoming AFD value	Explanation	Auto 16:9 Conversion (output WSS)	Auto 4:3 conversion (output WSS)	Auto adaptive Conversion (output WSS)
0, 1, 5, 6, 7, 12	Undefined/reserved	Anamorphic (full format 16:9)	Letterbox (box 16:9 centre)	No change, as previous
2, 8, 10, 14, 15	Full frame	Anamorphic (full format 16:9)	Letterbox (box 16:9 centre)	Anamorphic (full format 16:9)
9, 13	Pillarbox 4:3	Anamorphic (full format 16:9)	Centre cut (full format 4:3)	Centre cut (full format 4:3)
3, 11	Pillarbox 14:9	Anamorphic (full format 16:9)	Letterbox (box 14:9 centre)	No change, as previous
4	Letterbox>16:9	Anamorphic (full format 16:9)	Centre cut (full format 4:3)	No change, as previous

Note: Wide Screen Signalling must be set to Auto for the output WSS to be automatically set by the incoming AFD data.

Note: These controls have no function with a Standard Definition input.

Output AFD

There are three sets of controls associated with Active Format Descriptor (AFD). These are; the inserter mode control, entire image aspect ratio selector (coded frame) and the group of sixteen AFD codes.

The ANC data packets containing the AFD information are inserted within the active line portion of the fourth line after the switching line in the vertical ancillary space line.

The sixteen available codes are described in the following table

AFD code	Description	AFD code	Description
0	Undefined	8	Full Frame (as coded frame)
1	Reserved	9	4:3 Centre
2	16:9 top	10	16:9 centre
3	14:9 top	11	16:9 centre
4	16:9+	12	Reserved for future use
5	Reserved	13	4:3 with shoot and protect 14:9 centre
6	Reserved	14	16:9 with shoot and protect 14:9 centre
7	Reserved	15	16:9 with shoot and protect 4:3 centre

Note: When inserting SMPTE 2016 data the inserter will blank any incoming SMPTE 2016 data.

Wide Screen Signalling

Output wide screen signalling can be set to automatically follow the input AFD data or be manually selected. If WSS data should be present on the input video this can either be passed to the output unchanged or substituted for a user selected code. WSS data can also be set to be blanked.

Out going WWS codes	Explanation	Conversion
0001	full format 4:3	Centre cut
1101	box 16:9 centre	Letterbox
1110	full format 16:9	Anamorphic

Border hue control

These three controls allow the colour of any picture border present to be adjusted by varying its RGB component. Pressing Cal returns all three slider controls to zero giving a black border.

Video delay

There are two video delay controls giving +/- 1 line in pixels and +/- 1 frame in lines. See video delay modes.

Video delay modes

Short delay

When short delay is selected the minimum delay available is 16 lines. This limit is imposed to prevent possible frame tearing at delays less than this minimum. If the delay is set to less than 16 lines one frame of delay will be automatically added to the output, so for delays of less than 16 lines the actual delay will be one frame plus the adjustable delay.

Note: Any negative delay dialled will be one frame less the negative delay.

Frame delay

Selecting Frame Delay will add a fixed one frame delay between input and output. The variable delay slider controls will now allow an adjustment of +/- 1 frame in lines and pixels.

Note: The maximum delay in lines for any output format is 1 frame. Any number of lines dialled greater than 1 frame will be ignored and return the maximum delay of 1 frame. Similarly the maximum delay in pixels can not exceed 1 output line.

Bypass

Enabling the bypass control will set the Q-Down-A 3G into bypass mode whenever the input and the selected output format are the same. In bypass mode the analogue output selection remains active along with the analogue RGB and YUV proc amps and the delay controls. The digital proc amps will be disabled and the SDI delay through the Q-Down-A 3G will be set to its minimum processing delay. (SD approximately 2µS delay and HD less than 1µS delay).

Note: Q-Down-A 3G does not support a 3G output so bypass with a 3G input is not possible.

Output for incompatible input

Should the video input format and output format selection become incompatible, for example in the situation where the input is a lower bit rate than the output selection, the output can be set to go to black, blue or mute to no output.

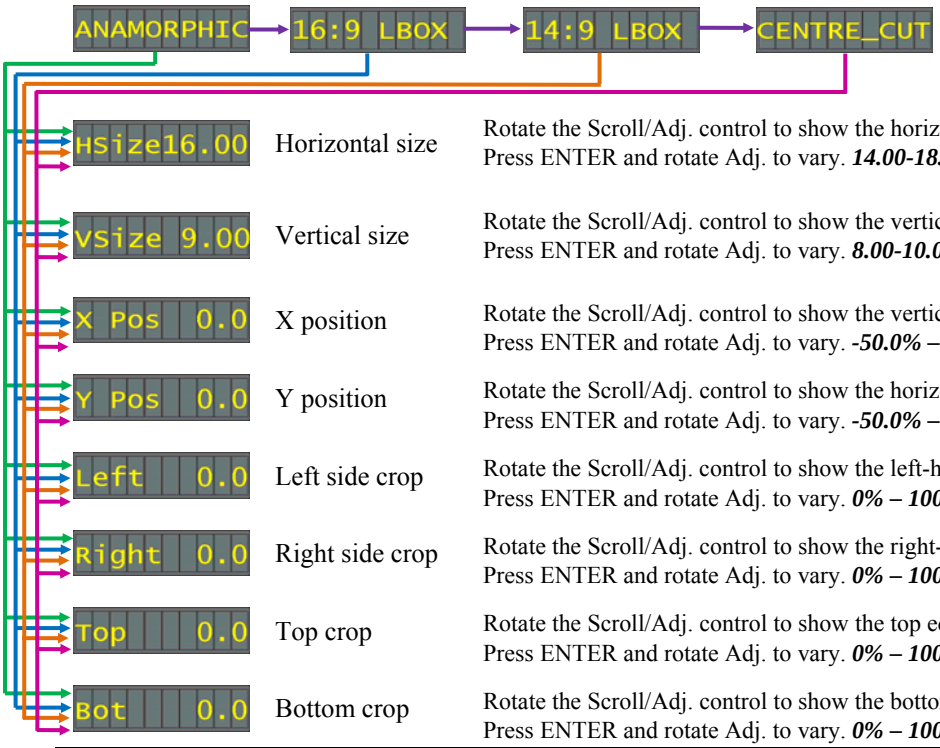
Optical I/O

The Q-Down-A 3G has the option of either receiving an optical input or transmitting an optical output once the necessary optical equipment has been fitted. If the optical receiver module is fitted the fibre optic I/O input enable will allow the video input to be selected between the input BNC and the optical input. The input loop-through will show whichever of the inputs are selected so with an optical input the input loop-through BNC will give a reclocked output of the optical input.

With the fibre transmitter module fitted the optical output can also be enabled or disabled. The output BNCs remain active when the optical output is both enabled and disabled.

Aspect ratio control

There are four fixed aspect ratio menus one each associated with the four fixed aspect ratios; these being Anamorphic, 16:9 Letterbox, 14:9 Letterbox and Centre cut. Each of these four menus when active allows the picture size to be adjusted and cropped, and the position in the screen varied individually for each fixed aspect ratio.



Menu	Comment
Horizontal size	Rotate the Scroll/Adj. control to show the horizontal size ratio control. Press ENTER and rotate Adj. to vary. ***14.00-18.00***.
Vertical size	Rotate the Scroll/Adj. control to show the vertical size ratio control. Press ENTER and rotate Adj. to vary. ***8.00-10.00***.
X position	Rotate the Scroll/Adj. control to show the vertical position control. Press ENTER and rotate Adj. to vary. ***-50.0% – +50.0%.***
Y position	Rotate the Scroll/Adj. control to show the horizontal position control. Press ENTER and rotate Adj. to vary. ***-50.0% – +50.0%.***
Left side crop	Rotate the Scroll/Adj. control to show the left-hand side crop control. Press ENTER and rotate Adj. to vary. ***0% – 100.0%.***
Right side crop	Rotate the Scroll/Adj. control to show the right-hand side crop control. Press ENTER and rotate Adj. to vary. ***0% – 100.0%.***
Top crop	Rotate the Scroll/Adj. control to show the top edge crop control. Press ENTER and rotate Adj. to vary. ***0% – 100.0%.***
Bottom crop	Rotate the Scroll/Adj. control to show the bottom edge crop control. Press ENTER and rotate Adj. to vary. ***0% – 100.0%.***

RGB and YUV lift and gain controls

Q-Down-A 3G's RGB and YUV lift and gain controls allow independent digital image adjustments in both the RGB and YUV domains, essential for maintaining colour fidelity.

In normal operation the RGB and YUV proc amps are active simultaneously on both the digital and analogue outputs. Should the Q-Down-A 3G be put into bypass mode the proc amps will only be active on the analogue output, as the digital proc amps will be disabled.

Menu	Comment
R component lift	Rotate the Scroll/Adj. control to show the R component lift control. Press ENTER and rotate Adj. to vary. ***-10.0% – +10.0%.***
R component gain	Rotate the Scroll/Adj. control to show the R component gain control. Press ENTER and rotate Adj. to vary. ***-80% – +120.0%.***
G component lift	Rotate the Scroll/Adj. control to show the G component lift control. Press ENTER and rotate Adj. to vary. ***-10.0% – 10.0%.***

GGain100.0	G component gain	Rotate the Scroll/Adj. control to show the G component gain control. Press ENTER and rotate Adj. to vary. ***-80% – +120.0%.***
BLift 0.0	B component lift	Rotate the Scroll/Adj. control to show the B component lift control. Press ENTER and rotate Adj. to vary. ***-10.0% – +10.0%.***
BGain100.0	B component gain	Rotate the Scroll/Adj. control to show the B component gain control. Press ENTER and rotate Adj. to vary. ***-80% – +120.0%.***
YLift 0.0	Y component lift	Rotate the Scroll/Adj. control to show the Y component lift control. Press ENTER and rotate Adj. to vary. ***-10.0% – +10.0%.***
YGain100.0	Y component gain	Rotate the Scroll/Adj. control to show the Y component gain control. Press ENTER and rotate Adj. to vary. ***-80% – +120.0%.***
ULift 0.0	U component lift	Rotate the Scroll/Adj. control to show the U component lift control. Press ENTER and rotate Adj. to vary. ***-10.0% – +10.0%.***
UGain100.0	U component gain	Rotate the Scroll/Adj. control to show the U component gain control. Press ENTER and rotate Adj. to vary. ***-80% – +120.0%.***
VLift 0.0	V component lift	Rotate the Scroll/Adj. control to show the V component lift control. Press ENTER and rotate Adj. to vary. ***-10.0% – +10.0%.***
VGain100.0	V component gain	Rotate the Scroll/Adj. control to show the V component gain control. Press ENTER and rotate Adj. to vary. ***-80% – +120.0%.***

Alarms menu

There are two GPI outputs reserved for alarm indication – GPO5 and GPO6, which may have assigned to them any of the thirteen video and audio alarms.

Any number of alarms may be assigned to each GPI output as the thirteen alarm conditions have been assigned a level of priority, input missing being the highest priority, and will assert an alarm immediately. The twelve subsequent conditions descend in order of priority with input incompatible given the lowest. All but input present and input incompatible can be assigned a delay timer to delay the time after which an alarm is asserted. This ability is especially useful to prevent false alarming during quiet periods in the audio or brief pauses in video program.

Where more than one alarm is flagged and an alarm condition is asserted, use the various status indicators to determine the exact cause.

Visual indication of GPO 5 and GPO6 status is provided on the board edge.

See Section 2.3 for further discussion of GPIs and pinout details.

ALARMS	Menu	Comment
IP Miss --	Input missing alarm	Rotate the Scroll/Adj. control to show the input missing alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
Vid Blk --	Video black alarm	Rotate the Scroll/Adj. control to show the video black alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted

	Video frozen alarm	Rotate the Scroll/Adj. control to show the video frozen alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Audio missing alarm	Rotate the Scroll/Adj. control to show the audio missing alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Group l channel 1-2 silent	Rotate the Scroll/Adj. control to show the group l channel 1-2 silent alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Group l channel 3-4 silent	Rotate the Scroll/Adj. control to show the group l channel 3-4 silent alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Group 2 channel 1-2 silent	Rotate the Scroll/Adj. control to show the group 2 channel 1-2 silent alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Group 2 channel 3-4 silent	Rotate the Scroll/Adj. control to show the group 2 channel 3-4 silent alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Group 3 channel 1-2 silent	Rotate the Scroll/Adj. control to show the group 3 channel 1-2 silent alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Group 3 channel 4-3 silent	Rotate the Scroll/Adj. control to show the group 3 channel 3-4 silent alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Group 4 channel 1-2 silent	Rotate the Scroll/Adj. control to show the group 4 channel 1-2 silent alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Group 4 channel 4-3 silent	Rotate the Scroll/Adj. control to show the group 4 channel 3-4 silent alarms. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Input incompatible alarm	Rotate the Scroll/Adj. control to show the input incompatible alarm. Press ENTER and rotate Scroll/Adj. to select the alarm option. ***-6, 5-, 56, --.*** '-' alarm not asserted
	Picture black delay interval	Rotate the Scroll/Adj. control to show the black delay interval control. Press ENTER and rotate Scroll/Adj. to adjust the delay in seconds. ***(0-20 seconds)***
	Picture frozen delay interval	Rotate the Scroll/Adj. control to show the frozen delay interval control. Press ENTER and rotate Scroll/Adj. to adjust the delay in seconds. ***(0-20 seconds)***
	Audio channel silence delay interval	Rotate the Scroll/Adj. control to show the audio silent delay interval control. Press ENTER and rotate Scroll/Adj. to adjust the delay in seconds. ***(0-120 seconds)***

Note: With delay controls set to their minimum there will remain a small delay to prevent false triggering.

Silence detect delay

The silence detect delay can be set from 0 to 120 seconds for the amount of time a signal is allowed to remain below -56dB, with respect to Full Scale, before a silence error is flagged. To prevent false alarms during quiet passages there is a minimum delay period of approximately four seconds in which silence must be maintained before the delay timer is initiated.

Note: The minimum delay will become significant at short delay settings.

Video frozen and black delay

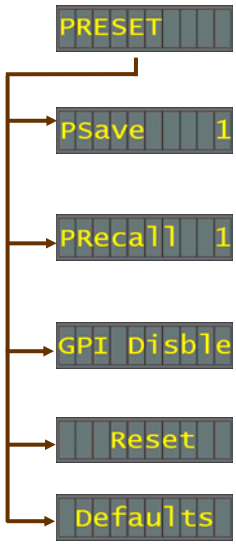
A picture is considered frozen when a frame is identical to the previous frame. If this condition is met consistently for the period of time set by the video frozen delay control, a video frozen error will be flagged.

Video black is defined as values in the range of 58 to 70 around digital black (approx +/- 5mV). If digital black is present for longer than the delay time set by the video black delay control, a video black error will be flagged.

Note: Press the cal button at anytime to reset the timer delays to their default values.

Preset menu and factory reset

Up to 16-user defined configurations may be stored and recalled either from the board control, active front panel, Statesman or through the use of external GPIs. Presets store the board setup data including operating mode card status. The presets are numbered 1-16.



Menu	Comment
Save preset control	Rotate the Scroll/Adj. control to show the preset save menu. Press ENTER and rotate Scroll/Adj. to select the location to save to. Press ENTER to action. ***1-16.***
Recall preset control	Rotate the Scroll/Adj. control to show the preset recall menu. Press ENTER and rotate Scroll/Adj. to select the location to recall from. Press ENTER to action. ***1-16.***
Enable GPI control of presets	Selecting ENABLE allows the recall of previously saved user configurations via GPI inputs 1-4. ***Enable, Disable***
Factory reset	Rotate the Scroll/Adj. control to show the factory reset menu. Press ENTER to action.
Factory defaults	Rotate the Scroll/Adj. control to show the defaults menu. Press ENTER to action.

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

Saving and recalling presets

The current board settings can be saved in one of 16 locations to be recalled as desired. This allows the user to store and recall up to 16 different configurations for later use.

To save the current settings, select the preset location and press enter. This will write the current settings into this location.

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

To recall previously stored setting information, again select the selected location and press enter to recall the stored configuration.

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

Factory reset

The user has the choice of performing a total factory reset or a partial reset. Factory Reset will return all parameters to their factory default values and erase all user stored configuration presets. Selecting the Defaults option will perform the same reset to factory defaults values but will leave any user stored configurations unaffected.

Note: Factory reset will erase all user stored presets

Parameter	Default value
Output Format	SD
Analogue output	CVBS, SMPTE and NJSC M
Fibre Optic I/O	Unchanged
Aspect ratio	Anamorphic
Vertical bandwidth	sharp
Output AFD	Auto, 8-Full Frame
Coded Frame	4:3
Wide Screen Signalling	Auto
H Size (all)	16
V Size (all)	9
Position and Crop	0
Border Hue	0 (Black)
Proc-amp lift (all)	0
Proc-amp gain (all)	100
GPO alarms	unchecked
Alarm delay video black	1
Alarm delay video frozen	1
Alarm delay audio silence	10 seconds
Video delay	Frame delay, Pixels 0, Lines 0
Bypass	unchecked
Presets	Set to Preset 1 and all contents erased
GPI Enable	Not enabled

4 Using the front control panel

4.1 Module selected

This operational guide assumes that the panel has been set up according to the panel setup 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 all eight control panel keys LEDs will illuminate briefly. Once the panel has completed its power up and configuration sequence the panel will enter Statesman mode and the message 'Press Cal to Exit' will be displayed.

Statesman mode is entered by default

To continue with control panel operation or configuration, press the CAL key once. 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 Setup, Lock Panel and Diagnostic menus.

Selecting a Q-Down-A 3G

To select a particular card in a frame, press the DEVICE key to go to the Device menu.

Note: There may be a delay whilst the frame is interrogated during which time the 'No cards Found' could be displayed.

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 a Q-Down-A 3G has been selected.

The Q-Down-A 3G 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 changes occur through the use of card edge controls or other remote control, the text displayed on the active front panel will not be updated immediately. If necessary, use the upward arrow to leave and then re-enter a menu to update the display.

4.2 The Q-Down-A 3G active panel 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 be made. Active function keys are indicated by illuminated, integrated LEDs.

The main top-level menus for the Q-Down-A 3G are obtained by pressing the F1- F4 keys from the Home menu. Menu keys are illuminated when active and when further menus are available.

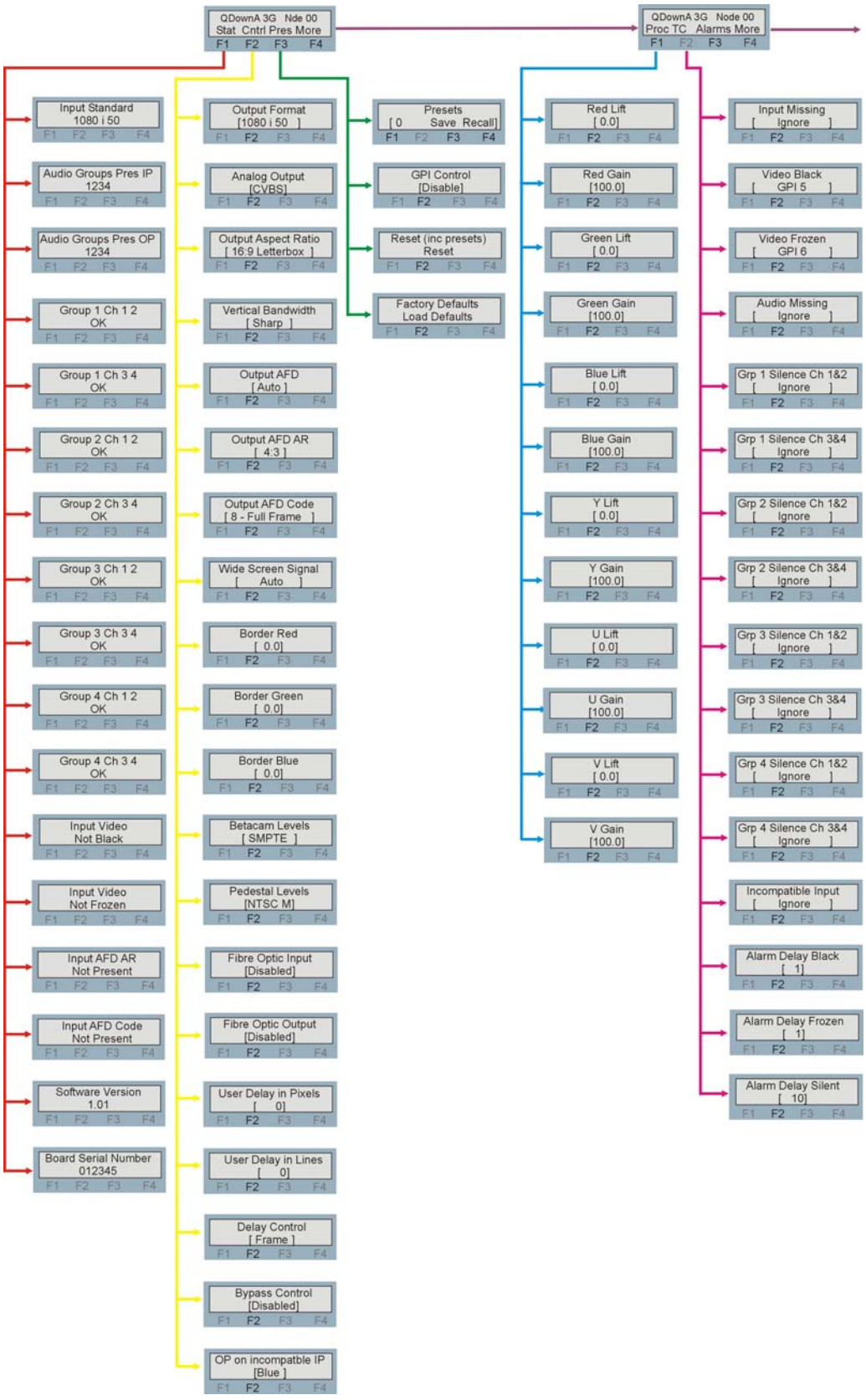
The top-level menus are:

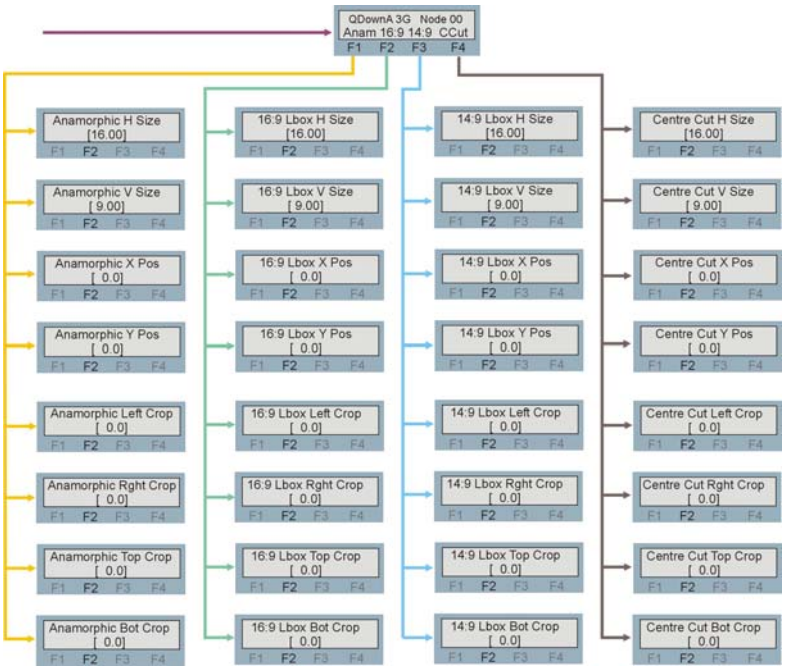
- Status – Press F1
- Control – Press F2
- Presets (User presets and factory reset) – Press F3
- More selections – Press F4
    - Proc-amp – Press F1
    -
    - Alarms – Press F3
    - More selections – Press F4
        - Anamorphic – Press F1
        - 16:9 (Letterbox) – Press F2
        - 14:9 (Letterbox) – Press F3
        - Centre Cut – Press F4

When a sub menu has been selected, further options may be obtained by using the Shaft control to scroll through them. Once the desired option has been located a selection or value change can be made by either toggling the appropriate function key or by selecting and using the shaft control to alter a numerical value. A configuration change or value will be activated as the shaft control is rotated or function button is toggled. The variable being adjusted will appear in brackets. If the variable updates in real time it will be contained within square brackets [letter box] or if the change requires to be accepted angular brackets will be used <CVBS>. Pressing Enter will fix the new value.

The following chart shows the available Q-Down-A 3G menus. The actual menus available may vary slightly as software is updated.

Active control panel menus



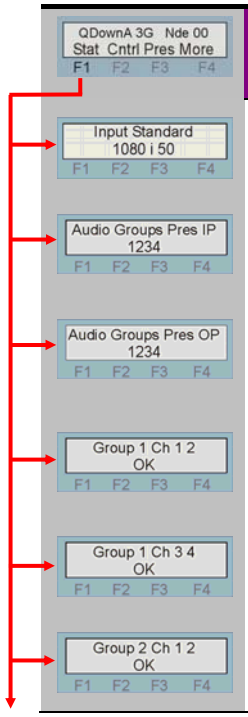


Note: Function key LEDs are illuminated when active.

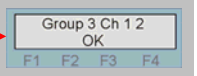
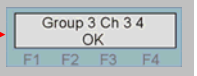
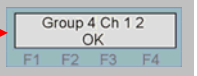
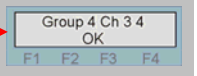
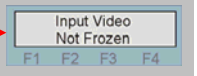
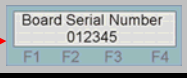
The Status menu

Pressing button F1 from the Home menu will enter the Status menu. This menu is traversed by rotating the shaft control. No changes can be made from this read only menu.

Note: Not all status information will be updated in real time. If necessary press the * button to cause the display to update.

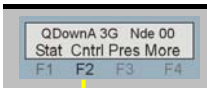
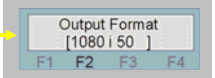
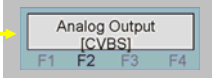
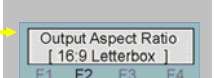
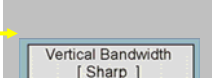


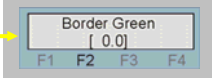
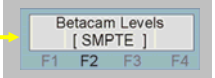
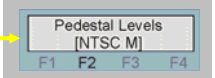
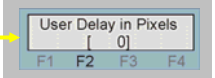
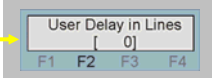
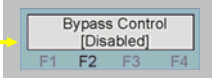
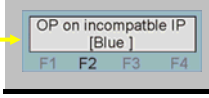
Menu	Description
Input standard	Rotate the shaft control to view the input standard. ***PAL, NTSC, 720p 50, 720p 59.94, 1080i 50, 1080i 59.94. 1080p 50, 1080p 59.94, Input Missing.***
Audio groups available on video input	Rotate the shaft control to view the embedded audio groups present on the input video. Groups = ***1,2,3,4, Input Missing. '-'*** group not present.
Audio groups re-embedded at the output	Rotate the shaft control to view the embedded audio groups present on the output video. Groups = ***1,2,3,4, Input Missing. '-'*** group not present.
Audio groups 1 channel 1 & 2 status	Rotate the shaft control to view the audio group 1 channel 1 & 2 status. ***OK, Silent, Input Missing.***
Audio groups 1 channel 3 & 4 status	Rotate the shaft control to view the audio group 1 channel 3 & 4 status. ***OK, Silent, Input Missing.***
Audio groups 2 channel 1 & 2 status	Rotate the shaft control to view the audio group 2 channel 1 & 2 status. ***OK, Silent, Input Missing.***

	Audio groups 2 channel 3 & 4 status	Rotate the shaft control to view the audio group 2 channel 3 & 4 status. ***OK, Silent, Input Missing.***
	Audio groups 3 channel 1 & 2 status	Rotate the shaft control to view the audio group 3 channel 1 & 2 status. ***OK, Silent, Input Missing..***
	Audio groups 3 channel 3 & 4 status	Rotate the shaft control to view the audio group 3 channel 3 & 4 status. ***OK, Silent, Input Missing.***
	Audio groups 4 channel 1 & 2 status	Rotate the shaft control to view the audio group 4 channel 1 & 2 status. ***OK, Silent, Input Missing.***.
	Audio groups 4 channel 3 & 4 status	Rotate the shaft control to view the audio group 4 channel 3 & 4 status. ***OK, Silent, Input Missing.***
	Input video status (Black)	Rotate the shaft control to view the input video status. ***Active, Black.***
	Input video status (Frozen)	Rotate the shaft control to view the input video status. ***Active, Frozen.***
	Input ARD aspect ratio	Rotate the shaft control to view the input video aspect ratio. ***4:3, 16:9, Not Present.***
	Input AFD code	Rotate the shaft control to view the input video AFD code. ***IP AFD - 0 – IP AFD -15, IP AFDMiss.***
	Software version	Fitted software level.
	PCB serial number	Electronically stored board serial number.

The control menu

Press F2 from the Home menu and rotate the shaft control to view the control menu.

	Menu	Description
		
	Digital output format	Rotate the shaft control to view the SDI output menu. Press F2 and rotate the shaft control to make the selection. ***SD, 720p, 1080i.***
	Analogue output format	Rotate the shaft control to view the analogue output format menu. Press F2 and rotate the shaft control to make a selection. ***CVBS, YUV, RGB, YC.***
	Output aspect ratio selection control	Rotate the shaft control to view the output aspect ratio menu. Press F2 and rotate the shaft control to make the selection. ***Anamorphic, 16:9 Letterbox, 14:9 Letterbox, Centre Cut, Auto 16:9, Auto 4:3, Auto Adaptive.***
	Vertical bandwidth filter	Rotate the shaft control to view the vertical bandwidth filter menu. Press F2 and rotate the shaft control to make the selection. ***Softest, Soft, Sharp, Sharpest.***

	Output AFD mode	Rotate the shaft control to view the output AFD menu. Press F2 and rotate the shaft control to make the selection. ***Auto, Manual, Disable, Pass.***
	Output AFD aspect ratio (coded frame)	Rotate the shaft control to view the AFD aspect ratio (coded frame) menu. Press F2 and rotate the shaft control to make the selection. ***4:3, 16:9.***
	Output AFD code	Rotate the shaft control to view the output AFD code menu. Press F2 and rotate the shaft control to make the selection. ***See table on page 36.***
	Wide screen signalling control	Rotate the shaft control to view the wide screen signalling menu. Press F2 and rotate the shaft control to make the selection. ***Auto, Full Frame 4:3, Letterbox 14:9, Letterbox 16:9, Full Frame 16:9, Disable, Pass.***
	Picture border colour (red)	Rotate the shaft control to view the border red component menu. Press F2 and rotate the shaft control to adjust. ***0-100%.***
	Picture border colour (green)	Rotate the shaft control to view the border green component menu. Press F2 and rotate the shaft control to adjust. ***0-100%.***
	Picture border colour (blue)	Rotate the shaft control to view the border blue component menu. Press F2 and rotate the shaft control to adjust. ***0-100%.***
	Betacam level compensation	Rotate the shaft control to view the Betacam level compensation menu. Press F2 and rotate the shaft control to make the selection. ***SMPTE, Betacam.***
	NTSC pedestal selection	Rotate the shaft control to view the NTSC pedestal menu. Press F2 and rotate the shaft control to make the selection. ***NTSC J, NTSC M.***
	Optical input enable	Rotate the shaft control to view the fibre input select menu. Press F2 and rotate the shaft control to make the selection. ***Enable, Disable.***
	Optical output enable	Rotate the shaft control to view the fibre output select menu. Press F2 and rotate the shaft control to make the selection. ***Enable, Disable..***
	Video delay in pixels	Rotate the shaft control to view the video delay in pixels menu. Press F2 and rotate the shaft control to adjust. ***-2640-0-+2460.***
	Video delay in lines	Rotate the shaft control to view the video delay in lines menu. Press F2 and rotate the shaft control to adjust. ***-1125-0-+1125.***
	Video delay mode selection	Rotate the shaft control to view the video delay mode menu. Press F2 and rotate the shaft control to make the selection. ***Frame, Short.***
	Bypass control	Rotate the shaft control to view the bypass control menu. Press F2 and rotate the shaft control to make the selection. ***Enable, Disable.***
	Output incompatibility mode selection	Rotate the shaft control to view the output incompatibility menu. Press F2 and rotate the shaft control to make the selection. ***Black, Blue, Mute.***

Analogue video output format

As the Q-Down-A 3G supports both Standard Definition and High Definition analogue output formats, the final analogue output presented will be determined by both the analogue output

format selection and digital output format selection. Setting the output format to SD will allow the analogue output format to be selected from any of the available choices. If one of the High Definition output formats were to be selected the analogue outputs would be limited to either HD YUV or HD RGB. The analogue video line rate will be the same as that of the input video.

See the installation chapter for rear module connection details.

Note: The position of the onboard links PL2, PL3 and PL4 must also be set to give either an SDI output or analogue output as required. See section 2.1 Module Configuration for link setting details.

Serial digital video output format

The SDI output format can be selected from 1080i, 720p or SD. Although it is possible to select the output to be the same as the input format, apart from 1080p, setting the output to a higher format than the input will be flagged as incompatible and the output will be replaced with black, blue or muted as selected in the output incompatibility mode menu.

Vertical bandwidth filter

When down converting, the vertical bandwidth can be optimised for a given application by selecting the most appropriate vertical bandwidth filtering. There are four filters to select from, these ranging from the highest (sharpest) to the lowest (softest).

Output aspect ratio

There are four fixed aspect ratios which are; Anamorphic, 16:9 Letterbox, 14:9 Letterbox and centre cut. Anamorphic will map the input picture directly to the native aspect ratio of the viewing display along with the resulting distortion associated with this. Should it be necessary to view the output on a 4:3 display, setting the aspect ratio selection to Letterbox will give the correct picture dimensions by adding black bars to the top and bottom of the picture. 14:9 Letterbox will crop the picture to 87.5%, and depending on the aspect ratio of the display will either add black bars to the top and bottom or both sides of the picture. There will be some loss of picture. Centre cut will show the central 75% of the 16:9 widescreen picture mapped to the full monitor height with the corresponding loss of the left and right picture edges.

There also three auto modes available. When any of these is selected the actual aspect ratio selected will depend on the input video AFD. The AFD reader will also automatically set the output WSS when Wide Screen Signalling is set to auto.

Selecting Auto 16:9 for all AFD input codes will give an Anamorphic aspect ratio conversion and for a 625-line output WSS will be set to 16:9 full frame. When set to Auto 4:3 the output aspect ratio and WSS data will depend on the input AFD. Undefined/reserved and full frame codes will produce a Letterbox aspect ratio with the output WSS set to 16:9 Letterbox. Pillarbox 4:3, Pillarbox 14:9 and Letterbox greater than 16:9 will give a centre cut conversion and set output WSS to full format 4:3.

Selecting Auto Adaptive for any full frame input will give an Anamorphic aspect ratio with WSS set to full frame 16:9. Pillarbox 4:3 will give a centre cut conversion and set output WSS to full format 4:3. Undefined/reserved, Pillarbox 14:9 and Letterbox > 16:9 will make no

change so the previous conversion will remain. On power up the default conversion will be Anamorphic.

Response to SMPTE 2016 AFD codes

Incoming AFD value	Explanation	Auto 16:9 Conversion (output WSS)	Auto 4:3 conversion (output WSS)	Auto adaptive Conversion (output WSS)
0, 1, 5, 6, 7, 12	Undefined/reserved	Anamorphic (full format 16:9)	Letterbox (box 16:9 centre)	No change, as previous
2, 8, 10, 14, 15	Full frame	Anamorphic (full format 16:9)	Letterbox (box 16:9 centre)	Anamorphic (full format 16:9)
9, 13	Pillarbox 4:3	Anamorphic (full format 16:9)	Centre cut (full format 4:3)	Centre cut (full format 4:3)
3, 11	Pillarbox 14:9	Anamorphic (full format 16:9)	Letterbox (box 14:9 centre)	No change, as previous
4	Letterbox>16:9	Anamorphic (full format 16:9)	Centre cut (full format 4:3)	No change, as previous

Note: Wide Screen Signalling must be set to Auto for the output WSS to be automatically set by the incoming AFD data.

Note: These controls have no function with a Standard Definition input.

Output AFD

There are three sets of controls associated with Active Format Descriptor (AFD). These are; the inserter mode control, entire image aspect ratio selector (coded frame) and the group of sixteen AFD codes.

The ANC data packets containing the AFD information are inserted within the active line portion of the fourth line after the switching line in the vertical ancillary space line.

The sixteen available codes are described in the following table

AFD code	Description	AFD code	Description
0	Undefined	8	Full Frame (as coded frame)
1	Reserved	9	4:3 Centre
2	16:9 top	10	16:9 centre
3	14:9 top	11	16:9 centre
4	16:9+	12	Reserved for future use
5	Reserved	13	4:3 with shoot and protect 14:9 centre
6	Reserved	14	16:9 with shoot and protect 14:9 centre
7	Reserved	15	16:9 with shoot and protect 4:3 centre

Note: When inserting SMPTE 2016 data the inserter will blank any incoming SMPTE 2016 data.

Wide Screen Signalling

Output wide screen signalling can be set to automatically follow the input AFD data or be manually selected. If WSS data should be present on the input video this can either be passed to the output unchanged or substituted for a user selected code. WSS data can also be set to be blanked.

Out going WWS codes	Explanation	Conversion
0001	full format 4:3	Centre cut
1101	box 16:9 centre	Letterbox
1110	full format 16:9	Anamorphic

Border hue control

These three controls allow the colour of any picture border present to be adjusted by varying its RGB component. Pressing Cal returns all three slider controls to zero giving a black border.

Video delay

There are two video delay controls giving +/- 1 line in pixels and +/- 1 frame in lines. See video delay modes.

Video delay modes

Short delay

When short delay is selected the minimum delay available is 16 lines. This limit is imposed to prevent possible frame tearing at delays less than this minimum. If the delay is set to less than 16 lines, one frame of delay will be automatically added to the output, so for delays of less than 16 lines the actual delay will be one frame plus the adjustable delay.

Note: Any negative delay dialled will be one frame less the negative delay.

Frame delay

Selecting Frame Delay will add a fixed one frame delay between input and output. The variable delay slider controls will now allow an adjustment of +/- 1 frame in lines and pixels.

Note: The maximum delay in lines for any output format is 1frame. Any number of lines dialled greater than 1 frame will be ignored and return the maximum delay of 1 frame. Similarly the maximum delay in pixels can not exceed 1 output line.

Bypass

Enabling the bypass control will set the Q-Down-A 3G into bypass mode whenever the input and the selected output format are the same. In bypass mode the analogue output selection remains active along with the analogue RGB and YUV proc amps and the delay controls. The digital proc amps will be disabled and the SDI delay through the Q-Down-A 3G will be set to its minimum processing delay. (SD approximately 2µS delay and HD less than 1µS delay).

Note: Q-Down-A 3G does not support a 3G output so bypass with a 3G input is not possible.

Output for incompatible input

Should the video input format and output format selection become incompatible, for example in the situation where the input is a lower bit rate than the output selection, the output can be set to go to black, blue or mute to no output.

Optical I/O

The Q-Down-A 3G has the option of either receiving an optical input or transmit an optical output once the necessary optical equipment has been fitted. If the optical receiver module is fitted the fibre optic I/O input enable will allow the video input to be selected between the input BNC and the optical input. The input loop-through will show whichever of the inputs are selected so with an optical input the input loop-through BNC will give a reclocked output of the optical input.

With the fibre transmitter module fitted the optical output can also be enabled or disabled. The output BNCs remain active when the optical output is both enabled and disabled.

Preset menu and factory reset

Up to 16 user-defined configurations may be stored and recalled either from the board control, active front panel, Statesman or through the use of external GPIs. Presets store the board setup data including operating mode card status. The presets are numbered 1-16.

Press F3 from the Home menu and rotate the shaft control to view the preset menu

	Menu	Comment
QDownA 3G Nde 00 Stat Cntrl Pres More F1 F2 F3 F4		
Presets [0 Save Recall] F1 F2 F3 F4	Save and recall Presets 1-16	Rotate the shaft control to view the presets menu. Press F1 and rotate the shaft control to find the required preset location. Press F3 the save the current board set up. Press F4 to recall a previously save board set up.
GPI Control [Disable] F1 F2 F3 F4	Enable GPI control of presets	Rotate the shaft control to view the GPI control menu. To enable GPI control press F2 rotate the shaft control to toggle. ***Enable, Disable.***
Reset (inc presets) Reset F1 F2 F3 F4	Save and recall Presets 1-16	Rotate the shaft control to show factory reset. Press F2 to select and press F3 to confirm.
Factory Defaults Load Defaults F1 F2 F3 F4	Factory reset	Rotate the shaft control to show factory defaults. Press F2 to select and press F3 to confirm.

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

Saving and recalling presets

The current board settings can be saved in one of 16 locations to be recalled as desired. This allows the user to store and recall up to 16 different configurations for later use.

To save the current settings, select the preset location and press enter. This will write the current settings into this location.

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

To recall previously stored setting information, again select the selected preset location and press enter to recall the stored configuration. The recalling of previously stored presets can also be implemented externally via the GPI port. To sanction this facility, enable the GPI controls preset recall box. See Chapter 2.3 – 'Installation general purpose interface' for the GPI connection information.

Factory reset

The user has the choice of performing a total factory reset or a partial reset. Factory Reset will return all parameters to their factory default values and erase all user stored configuration presets. Selecting the Defaults option will perform the same reset to factory defaults values but will leave any user stored configurations unaffected.

Note: Factory reset will erase all user stored presets

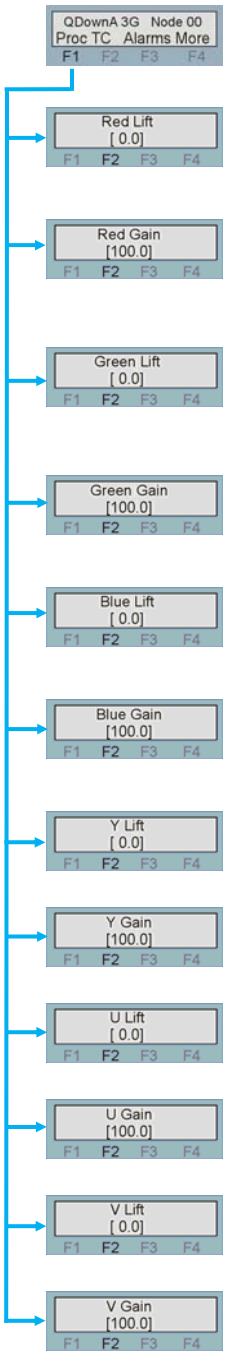
Parameter	Default value
Output Format	SD
Analogue output	CVBS, SMPTE and NJSC M
Fibre Optic I/O	Unchanged
Aspect ratio	Anamorphic
Vertical bandwidth	sharp
Output AFD	Auto, 8-Full Frame
Coded Frame	4:3
Wide Screen Signalling	Auto
H Size (all)	16
V Size (all)	9
Position and Crop	0
Border Hue	0 (Black)
Proc-amp lift (all)	0
Proc-amp gain (all)	100
GPO alarms	unchecked
Alarm delay video black	1
Alarm delay video frozen	1
Alarm delay audio silence	10 seconds
Video delay	Frame delay, Pixels 0, Lines 0
Bypass	unchecked
Presets	Set to Preset 1 and all contents erased
GPI Enable	Not enabled

RGB and YUV lift and gain controls

Q-Down-A 3G's RGB and YUV lift and gain controls allow independent digital image adjustments in both the RGB and YUV domains, essential for maintaining colour fidelity.

In normal operation the RGB and YUV proc amps are active simultaneously on both the digital and analogue outputs. Should the Q-Down-A 3G be put into bypass mode the proc amps will only be active on the analogue output, as the digital proc amps will be disabled.

Press F4 (More) then F1 from the Home menu and rotate the shaft control to view the proc amp controls menu.



Menu	Comment
R component lift	Rotate the shaft control to view the red component lift control menu. Press F2 and rotate the shaft control to adjust. ***-10.0% – +10.0%.***
R component gain	Rotate the shaft control to view the red component gain control menu. Press F2 and rotate the shaft control to adjust. ***-80% – +120.0%.***
G component lift	Rotate the shaft control to view the green component lift control menu. Press F2 and rotate the shaft control to adjust. ***-10.0% – +10.0%.***
G component gain	Rotate the shaft control to view the green component gain control menu. Press F2 and rotate the shaft control to adjust. ***-80% – +120.0%.***
B component lift	Rotate the shaft control to view the blue component lift control menu. Press F2 and rotate the shaft control to adjust. ***-10.0% – +10.0%.***
B component gain	Rotate the shaft control to view the blue component gain control menu. Press F2 and rotate the shaft control to adjust. ***-80% – +120.0%.***
Y component lift	Rotate the shaft control to view the Y component lift control menu. Press F2 and rotate the shaft control to adjust. ***-10.0% – +10.0%.***
Y component gain	Rotate the shaft control to view the Y component gain control menu. Press F2 and rotate the shaft control to adjust. ***-80% – +120.0%.***
U component lift	Rotate the shaft control to view the U component lift control menu. Press F2 and rotate the shaft control to adjust. ***-10.0% – +10.0%.***
U component gain	Rotate the shaft control to view the U component gain control menu. Press F2 and rotate the shaft control to adjust. ***-80% – +120.0%.***
V component lift	Rotate the shaft control to view the V component lift control menu. Press F2 and rotate the shaft control to adjust. ***-10.0% – +10.0%.***
V component gain	Rotate the shaft control to view the V component gain control menu. Press F2 and rotate the shaft control to adjust. ***-80% – +120.0%.***

The alarm menu

There are two GPI outputs reserved for alarm indication – GPO5 and GPO6, which may have assigned to them any of the thirteen video and audio alarms.

Any number of alarms may be assigned to each GPI output as the thirteen alarm conditions have been assigned a level of priority, input missing being the highest priority, and will assert an alarm immediately. The twelve subsequent conditions descend in order of priority with input incompatible given the lowest. All but input present and input incompatible can also be assigned a delay timer to delay the time after which an alarm is asserted. This ability is especially useful to prevent false alarming during quiet periods in the audio or brief pauses in video program.

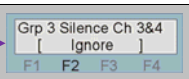
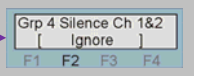
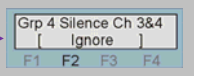
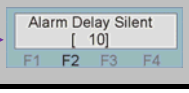
Where more than one alarm is flagged and an alarm condition is asserted, use the various status indicators to determine the exact cause.

Visual indication of GPO 5 and GPO6 status is provided on the board edge.

See Section 2.3 for further discussion of GPIs and pinout details.

Press F4 (More) then F3 from the Home menu and rotate the shaft control to view the alarms configurations menu.

	Menu	Description
QDownA 3G Node 00 Proc TC Alarms More F1 F2 F3 F4		
Input Missing [Ignore] F1 F2 F3 F4	Input present alarm	Press F2 to select and rotate the shaft control to select alarm option. – ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
Video Black [GPI 5] F1 F2 F3 F4	Input video black	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
Video Frozen [GPI 6] F1 F2 F3 F4	Input video frozen	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
Audio Missing [Ignore] F1 F2 F3 F4	Audio on input missing	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
Grp 1 Silence Ch 1&2 [Ignore] F1 F2 F3 F4	Group l channel 1-2 silent	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
Grp 1 Silence Ch 3&4 [Ignore] F1 F2 F3 F4	Group l channel 3-4 silent	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
Grp 2 Silence Ch 1&2 [Ignore] F1 F2 F3 F4	Group 2 channel 1-2 silent	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6..***
Grp 2 Silence Ch 3&4 [Ignore] F1 F2 F3 F4	Group 2 channel 3-4 silent	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
Grp 3 Silence Ch 1&2 [Ignore] F1 F2 F3 F4	Group 3 channel 1-2 silent	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***

	Group 3 channel 3-4 silent	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
	Group 4 channel 1-2 silent	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
	Group 4 channel 3-4 silent	Press F2 to select and rotate the shaft control to select alarm option. - ***Ignore, GPI5, GPI6, GPI5 & GPI6.***
	Video black delay setting	Press F2 to select and rotate the shaft control to set the delay time. ***0-20sec.***
	Video frozen delay setting	Press F2 to select and rotate the shaft control to set the delay time. ***0-20sec.***
	Audio silence delay setting	Press F2 to select and rotate the shaft control to set the delay time. ***0-120sec.***

Note: Pressing CAL whilst setting a delay interval will return the time to 0 sec.

Silence detect delay

The silence detect delay can be set from 0 to 120 seconds for the amount of time a signal is allowed to remain below -56dB, with respect to Full Scale, before a silence error is flagged. To prevent false alarms during quiet passages there is a minimum delay period of approximately four seconds in which silence must be maintained before the delay timer is initiated.

Note: The minimum delay will become significant at short delay settings.

Video frozen and black delay

A picture is considered frozen when a frame is identical to the previous frame. If this condition is met consistently for the period of time set by the video frozen delay control, a video frozen error will be flagged.

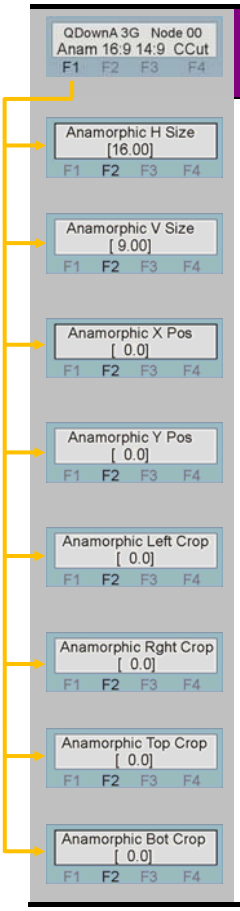
Video black is defined as values in the range of 58 to 70 around digital black (approx +/- 5mV). If digital black is present for longer than the delay time set by the video black delay control, a video black error will be flagged.

Note: Press the cal button at anytime to reset the timer delays to their default values.

Aspect ratio controls

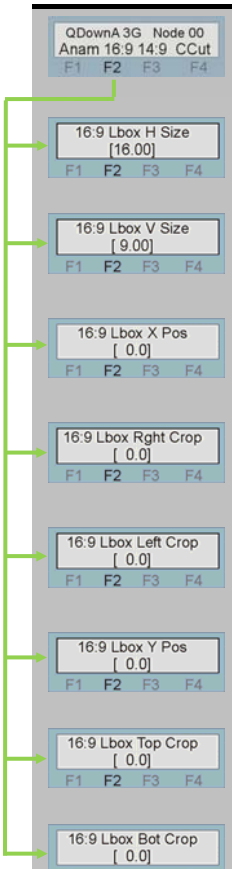
There are four fixed aspect ratio menus one each associated with the four fixed aspect ratios; these being Anamorphic, 16:9 Letterbox, 14:9 Letterbox and Centre cut. Each of these four menus when active allows the picture size to be adjusted and cropped, and the position in the screen varied individually for each fixed aspect ratio.

Press F4 (More) twice from the Home menu then F1and rotate the shaft control to view the anamorphic picture controls menu.



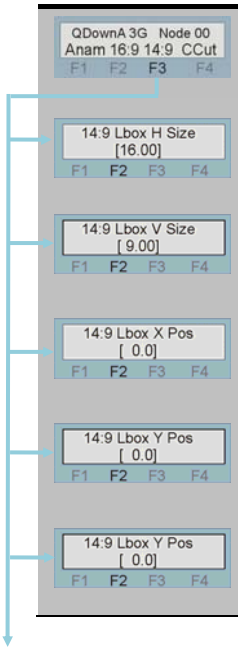
Menu	Description
Anamorphic horizontal size	Press F2 to select and rotate the shaft control to adjust the pictures horizontal size. ***14.00-18.00***.
Anamorphic vertical size	Press F2 to select and rotate the shaft control to adjust the pictures vertical size. ***8.00-10.00***.
Anamorphic X position adjustment	Press F2 to select and rotate the shaft control to adjust the pictures horizontal position. ***-50.0% – +50.0%.***
Anamorphic Y position adjustment	Press F2 to select and rotate the shaft control to adjust the pictures vertical position. ***-50.0% – +50.0%.***
Anamorphic left side crop	Press F2 to select and rotate the shaft control to crop the left edge of the picture. ***0-100%.***
Anamorphic right side crop	Press F2 to select and rotate the shaft control to crop the right edge of the picture. ***0-100%.***
Anamorphic top edge crop	Press F2 to select and rotate the shaft control to crop the top edge of the picture. ***0-100%.***
Anamorphic bottom edge crop	Press F2 to select and rotate the shaft control to crop the bottom edge of the picture. ***0-100%.***

Press F4 (More) twice from the Home menu then F2and rotate the shaft control to view the 16:9 letterbox picture controls menu.

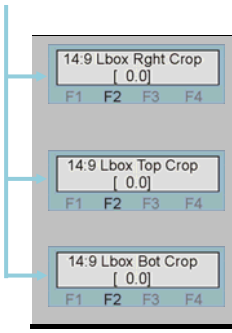


Menu	Description
16:9 Letterbox horizontal size	Press F2 to select and rotate the shaft control to adjust the pictures horizontal size. ***14.00-18.00***.
16:9 Letterbox vertical size	Press F2 to select and rotate the shaft control to adjust the pictures vertical size. ***8.00-10.00***.
16:9 Letterbox X position adjustment	Press F2 to select and rotate the shaft control to adjust the pictures horizontal position. ***-50.0% – +50.0%.***
16:9 Letterbox Y position adjustment	Press F2 to select and rotate the shaft control to adjust the pictures vertical position. ***-50.0% – +50.0%.***
16:9 Letterbox left side crop	Press F2 to select and rotate the shaft control to crop the left edge of the picture. ***0-100%.***
16:9 Letterbox right side crop	Press F2 to select and rotate the shaft control to crop the right edge of the picture. ***0-100%.***
16:9 Letterbox top edge crop	Press F2 to select and rotate the shaft control to crop the top edge of the picture. ***0-100%.***
16:9 Letterbox bottom edge crop	Press F2 to select and rotate the shaft control to crop the bottom edge of the picture. ***0-100%.***

Press F4 (More) twice from the Home menu then F3and rotate the shaft control to view the 14:9 letterbox picture controls menu.

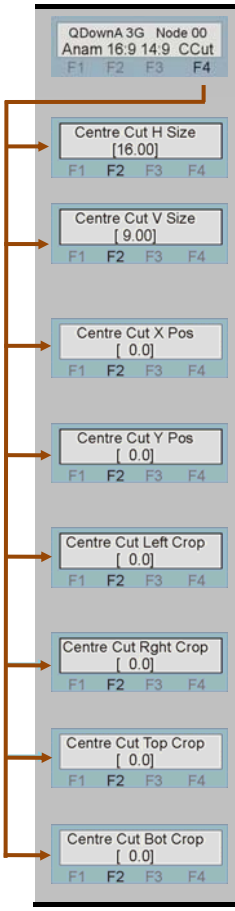


Menu	Description
14:9 Letterbox horizontal size	Press F2 to select and rotate the shaft control to adjust the pictures horizontal size. ***14.00-18.00***.
14:9 Letterbox vertical size	Press F2 to select and rotate the shaft control to adjust the pictures vertical size. ***8.00-10.00***.
14:9 Letterbox X position adjustment	Press F2 to select and rotate the shaft control to adjust the pictures horizontal position. ***-50.0% – +50.0%.***
14:9 Letterbox Y position adjustment	Press F2 to select and rotate the shaft control to adjust the pictures vertical position. ***-50.0% – +50.0%.***
14:9 Letterbox left side crop	Press F2 to select and rotate the shaft control to crop the left edge of the picture. ***0-100%.***



14:9 Letterbox right side crop	Press F2 to select and rotate the shaft control to crop the right edge of the picture. ***0-100%.***
14:9 Letterbox top edge crop	Press F2 to select and rotate the shaft control to crop the top edge of the picture. ***0-100%.***
14:9 Letterbox bottom edge crop	Press F2 to select and rotate the shaft control to crop the bottom edge of the picture. ***0-100%.***

Press F4 (More) twice from the Home menu then F4and rotate the shaft control to view the centre-cut picture controls menu.



Menu	Description
Centre-cut horizontal size	Press F2 to select and rotate the shaft control to adjust the pictures horizontal size. ***14.00-18.00***.
Centre-cut vertical size	Press F2 to select and rotate the shaft control to adjust the pictures vertical size. ***8.00-10.00***.
Centre-cut X position adjustment	Press F2 to select and rotate the shaft control to adjust the pictures horizontal position. ***-50.0% – +50.0%.***
Centre-cut Y position adjustment	Press F2 to select and rotate the shaft control to adjust the pictures vertical position. ***-50.0% – +50.0%.***
Centre-cut left side crop	Press F2 to select and rotate the shaft control to crop the left edge of the picture. ***0-100%.***
Centre-cut right side crop	Press F2 to select and rotate the shaft control to crop the right edge of the picture. ***0-100%.***
Centre-cut top edge crop	Press F2 to select and rotate the shaft control to crop the top edge of the picture. ***0-100%.***
Centre-cut bottom edge crop	Press F2 to select and rotate the shaft control to crop the bottom edge of the picture. ***0-100%.***

5 Statesman

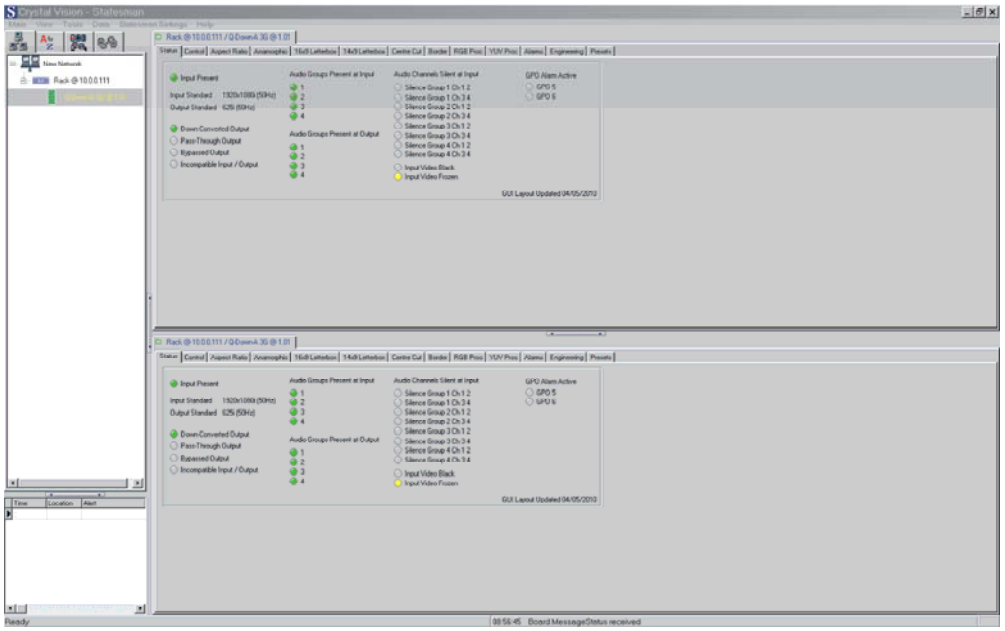
5.1 Statesman operation

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. An active panel or REMIND remote control panel must be fitted to allow Statesman control.

5.2 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

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 or audio groups present. An amber LED will give a warning as with channel silence, video black or video frozen. If an LED turns red this is a fault condition so input present will turn red if the input should go away. The GPO alarms will also show red when active. 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

Video status LEDs

Down-converted Output

This LED will be illuminated when the Q-Down-A 3G is down converting.

Pass-Though Output

Whenever the input format is the same as the selected output format this LED will be illuminated. When in bypass mode all aspect ratio controls will be disabled along with the vertical filtering. The analogue output selection remains active along with the analogue and digital RGB and YUV proc amps and the delay controls.

Bypassed Output

This LED will be illuminated when the Q-Down-A 3G has been set to bypass by checking the Bypass box in the engineering section. For the Q-Down-A 3G to entre bypass mode both the input and output selection must be the same otherwise the bypass command will be ignored. As it's not possible to select a 3G output, selecting bypass will also be ignored with a 3G input present. In bypass mode the analogue output selection remains active along with the analogue RGB and YUV proc amps and the delay controls. The digital proc amps will be disabled and the SDI delay through the Q-Down-A 3G will be set to its minimum processing delay. (SD approximately 2µS delay and HD less than 1µS delay).

Control

The control tab is where the digital and analogue output formats are configured. The vertical bandwidth filtering is also selected here; the vertical bandwidth control is common to both the digital and analogue outputs.

Note: The position of the onboard links PL2, PL3 and PL4 must also be set to give either an SDI output or analogue output as required. See section 2.1 Module Configuration for link setting details.

Video output format selection

Analogue video output format

As the Q-Down-A 3G supports both Standard Definition and High Definition analogue output formats, the final analogue output presented will be determined by both the 'Analogue Output' format selection and the 'Output Format' selection. Setting the 'Output Format' to SD selected by checking the appropriate radio button, will allow the 'Analogue Output' format to be selected from any of the available choices. If one of the High Definition output formats were to be selected, the 'Analogue Output' would be limited to either YUV or RGB.

See the installation chapter for rear module connection details.

Optical I/O

The Q-Down-A 3G has the option of either receiving an optical input or transmitting an optical output once the necessary optical equipment has been fitted. If the optical receiver module is fitted the fibre optic I/O input enable will allow the video input to be selected between the input BNC and the optical input.

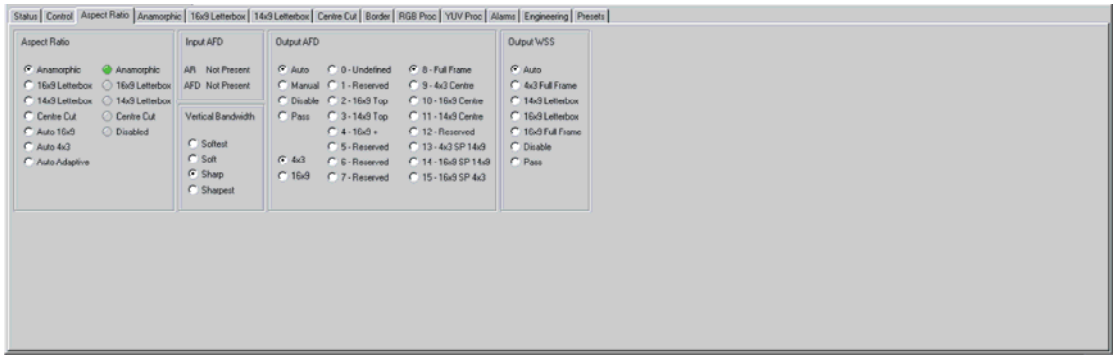
Note: The input loop-though will show whichever of the inputs are selected.

With the fibre transmitter fitted the optical output can also be enabled or disabled by checking or un-checking the output enable check box.

Note: The output BNCs remain active when the optical output is either enabled or disabled.

Aspect Ratio

This tab contains the output aspect ratio, active format descriptor (AFD) and output wide screen signalling (WSS) controls



Output aspect ratio, Vertical bandwidth, AFD and WSS controls

Output aspect ratio

There are four fixed aspect ratios which are; Anamorphic, 16:9 Letterbox, 14:9 Letterbox and centre cut. Anamorphic will map the input picture directly to the native aspect ratio of the viewing display along with the resulting distortion associated with this. Should it be necessary to view the output on a 4:3 display, setting the aspect ratio selection to Letterbox will give the correct picture dimensions by adding black bars to the top and bottom of the picture. 14:9 Letterbox will crop the picture to 87.5%, and depending on the aspect ratio of the display will either add black bars to the top and bottom or both sides of the picture. There will be some loss of picture. Centre cut will show the central 75% of the 16:9 widescreen picture mapped to the full monitor height with the corresponding loss of the left and right picture edges.

The LEDs beside the aspect ratio selector radio buttons will show the actual aspect ratio selected when any of the auto modes are selected. These three auto selections are also associated with the AFD reader and will automatically set the output WSS when Wide Screen Signalling is set to auto.

Selecting Auto 16:9 for all AFD input codes will give an anamorphic aspect ratio conversion and for a 625-line output WSS will be set to 16:9 full frame . When set to Auto 4:3 the output aspect ratio and WSS data will depend on the input AFD. Undefined/reserved and full frame codes will produce a Letterbox aspect ratio with the output WSS set to 16:9 Letterbox. Pillarbox 4:3, Pillarbox 14:9 and Letterbox greater than 16:9 will give a centre cut conversion and set output WSS to full format 4:3.

Selecting Auto Adaptive for any full frame input will give an Anamorphic aspect ratio with WSS set to full frame 16:9. Pillarbox 4:3 will give a centre cut conversion and set output WSS to full format 4:3. Undefined/reserved, Pillarbox 14:9 and Letterbox > 16:9 will make no change so the previous conversion will remain. On power up the default conversion will be Anamorphic.

Response to SMPTE 2016 AFD codes

Incoming AFD value	Explanation	Auto 16:9 Conversion (output WSS)	Auto 4:3 conversion (output WSS)	Auto adaptive Conversion (output WSS)
0, 1, 5, 6, 7, 12	Undefined/reserved	Anamorphic (full format 16:9)	Letterbox (box 16:9 centre)	No change, as previous
2, 8, 10, 14, 15	Full frame	Anamorphic (full format 16:9)	Letterbox (box 16:9 centre)	Anamorphic (full format 16:9)
9, 13	Pillarbox 4:3	Anamorphic (full format 16:9)	Centre cut (full format 4:3)	Centre cut (full format 4:3)
3, 11	Pillarbox 14:9	Anamorphic (full format 16:9)	Letterbox (box 14:9 centre)	No change, as previous
4	Letterbox>16:9	Anamorphic (full format 16:9)	Centre cut (full format 4:3)	No change, as previous

Note: Wide Screen Signalling must be set to Auto for the output WSS to be automatically set by the incoming AFD data.

Note: These controls have no function with a Standard Definition input.

Output AFD

There are three sets of controls associated with Active Format Descriptor (AFD). The inserter mode controls, entire image aspect ratio selector (coded frame) and the group of sixteen AFD codes.

The ANC data packets containing the AFD information are inserted within the active line portion of the fourth line after the switching line in the vertical ancillary space line.

The sixteen available codes are described in the following table

AFD code	Description	AFD code	Description
0	Undefined	8	Full Frame (as coded frame)
1	Reserved	9	4:3 Centre
2	16:9 top	10	16:9 centre
3	14:9 top	11	16:9 centre
4	16:9+	12	Reserved for future use
5	Reserved	13	4:3 with shoot and protect 14:9 centre
6	Reserved	14	16:9 with shoot and protect 14:9 centre
7	Reserved	15	16:9 with shoot and protect 4:3 centre

Note: When inserting SMPTE 2016 data the inserter will blank any incoming SMPTE 2016 data.

Wide Screen Signalling

Output wide screen signalling can be set to automatically follow the input AFD data or be manually selected. If WSS data should be present on the input video this can either be passed to the output unchanged or substituted for a user selectable code. WSS data can also be set to be blanked.

Out going WWS codes	Explanation	Conversion
0001	full format 4:3	Centre cut
1101	box 16:9 centre	Letterbox
1110	full format 16:9	Anamorphic

Vertical bandwidth

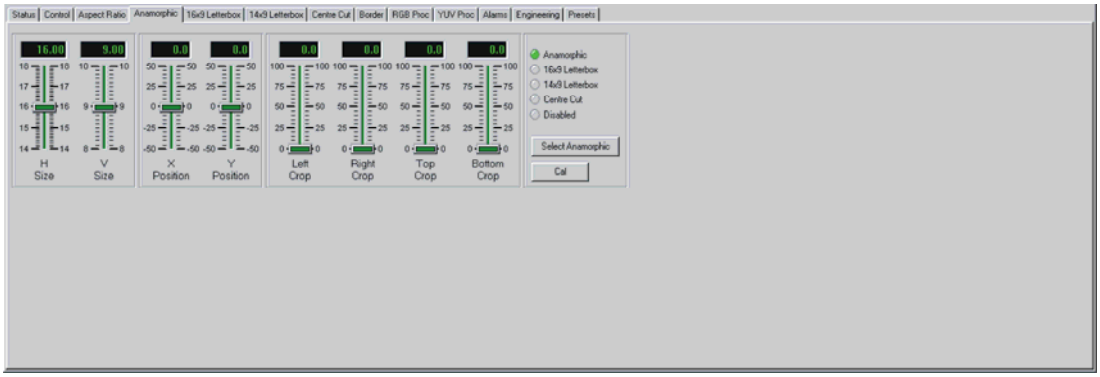
When down converting the vertical bandwidth can be optimised for a given application by selecting the most appropriate vertical bandwidth filtering. There are four filters to select from, these ranging from the highest (sharpest) to the lowest (softest). Check the radio button to select the chosen filter characteristics.

Aspect ratio control

There are four tabs one associated with each of the four fixed aspect ratios; these being Anamorphic, 16:9 Letterbox, 14:9 Letterbox and Centre cut. Each of these four tabs when active allows the picture size to be adjusted and cropped, and the position on the screen varied.

Aspect ratio status information is given to the right of each set of controls. An illuminated LED indicates which aspect ratio selection is active, green being the opened tab and yellow a tab other than the open one. If a status LED is showing yellow pressing Select will cause the open tab to become the selected aspect ratio. Should the disable LED be illuminated red aspect ratio conversion is prohibited.

Pressing the Cal button will return all slider control to their default value.



Aspect ratio size, position and crop controls

Border hue control

These three controls allow the colour of any picture border present to be adjusted by varying its RGB component. Pressing Cal returns all three slider controls to zero giving a black border.

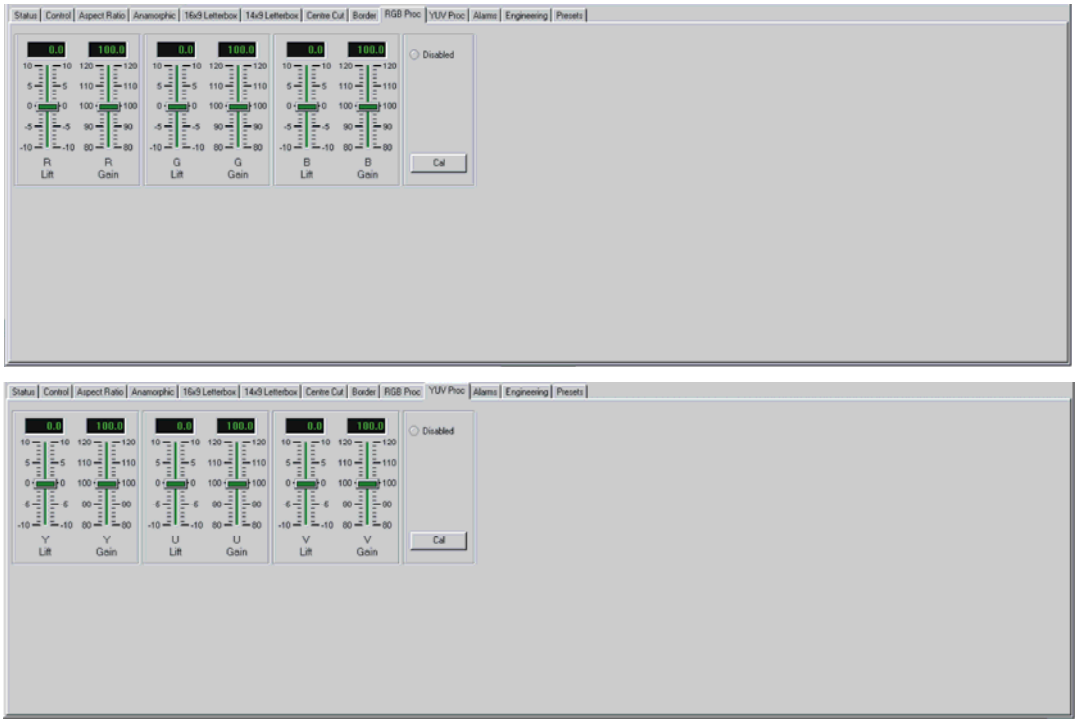
Aspect ratio selection status is also given.

Border hue controls

RGB and YUV lift and gain controls

Q-Down-A 3G's RGB and YUV lift and gain controls allow independent digital image adjustments in both the RGB and YUV domains, essential for maintaining colour fidelity.

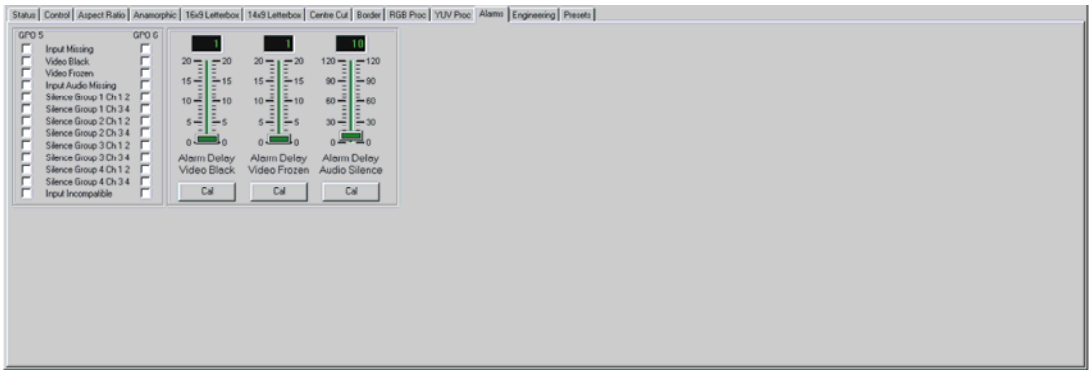
In normal operation the RGB and YUV proc amps are active simultaneously on both the digital and analogue outputs. Should the Q-Down-A 3G be put into bypass mode the proc amps will only effect the analogue output, as the digital proc amps will be disabled as shown by the Disabled status LED.



RGB and YUV Proc amps

Using the GPI alarm outputs

The alarms tab contains the GPI output alarm configuration menu and alarm delay controls.



GPI alarm configuration

There are two GPI outputs reserved for alarm indication – GPO5 and GPO6, which may have assigned to them any of the thirteen video and audio alarms. An alarm is enabled when its associated check box is ticked. Any number of alarms may be flagged.

The thirteen alarm conditions have been assigned a level of priority, input missing being the highest priority, and will assert an alarm immediately. The twelve subsequent conditions descend in order of priority with input incompatible given the lowest. All but input present and input incompatible can also be assigned a delay timer to delay the time after which an alarm is asserted. This ability is especially useful to prevent false alarming during quiet periods in the audio or brief pauses in video program.

Where more than one alarm is flagged and an alarm condition is asserted, use the various status indicators to determine the exact cause

Visual indication of GPO 5 and GPO6 status is provided in the status tab.

See Section 2.3 for further discussion of GPIs and pinout details.

Silence detect delay

The control slider sets the silence detect delay from 0 to 120 seconds for the amount of time a signal is allowed to remain below -56dB, with respect to Full Scale, before a silence error is flagged. To prevent false alarms during quiet passages there is a minimum delay period of approximately four seconds in which silence must be maintained before the delay timer is initiated.

Note: The minimum delay will become significant at short delay settings.

Video frozen and black delay

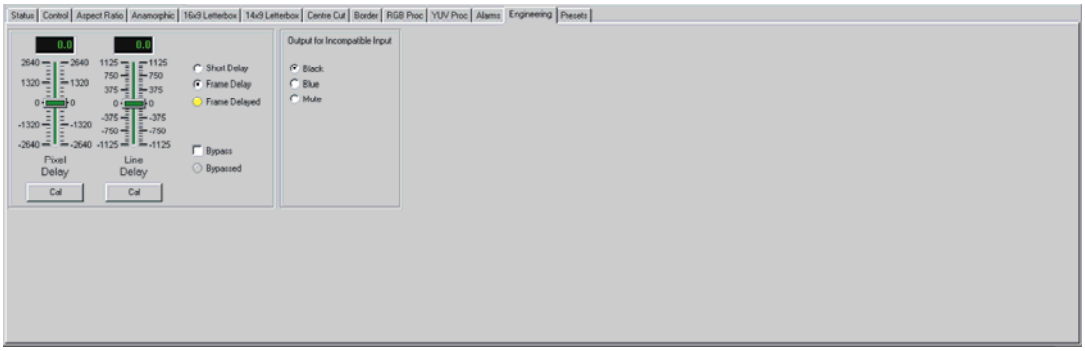
A picture is considered frozen when a frame is identical to the previous frame. If this condition is met consistently for the period of time set by the video frozen delay slider control, a video frozen error will be flagged.

Video black is defined as digital black. If digital black is present for longer than the delay time set by the video black delay slider control, a video black error will be flagged.

Note: Press the cal button at anytime to reset the timer delays to their default values.

Engineering

Video delay and output error mode is configured in the engineering menu.



Video delay, Bypass and Output error mode selection

Video delay

The video delay controls are made up of two mode controls and two variable sliders giving +/- 1 line in pixels and +/- 1 frame in lines.

Short delay

When short delay is selected the minimum delay available is 16 lines. This limit is imposed to prevent possible frame tearing at delays less than this minimum. If the delay is set to less than 16 lines one frame of delay will be automatically added to the output, so for delays of less than 16 lines the actual delay will be one frame plus the adjustable delay. The Frame Delayed LED will illuminate whenever the one frame delay is added.

Note: Any negative delay dialled will be one frame less the negative delay.

Frame delay

Selecting Frame Delay will add a fixed one frame delay between input and output. The variable delay slider controls will now allow an adjustment of +/- 1 frame in lines and pixels.

Note: The maximum delay in lines for any output format is 1frame. Any number of lines dialled greater than 1 frame will be ignored and return the maximum delay of 1 frame. Similarly the maximum delay in pixels can not exceed 1 output line.

Bypass

Checking the Bypass control will set the Q-Down-A 3G into bypass mode whenever the input and the selected output format are the same. In bypass mode the analogue output selection remains active along with the analogue RGB and YUV proc amps and the delay controls. The digital proc amps will be disabled and the SDI delay through the Q-Down-A 3G will be set to its minimum processing delay. (SD approximately 2uS delay and HD less than 1uS delay). The Bypassed LED will illuminate when bypass mode is active.

Note: Q-Down-A 3G does not support a 3G output so bypass with a 3G input is not possible.

Output for incompatible input

Should the video input format and output format selection become incompatible, for example in the situation where the input is a lower bit rate than the output selection, the output can be set to go to black, blue or mute to no output.

Presets

Up to 16 user configurations may be stored and recalled via Statesman or recalled using the Q-Down-A 3Gs GPI inputs. The Preset tab also gives access to the factory reset controls.

Presets and factory reset

Saving and recalling presets

The current board settings can be saved in one of 16 locations to be recalled as desired. 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 over-written 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.

See Section 2.3 for further discussion of GPIs and pinout details.

Resets

The user has the choice of performing a total factory reset or a partial reset. Pushing the Erase Presets button will return all parameters to their factory default values and erase all user stored configuration presets. Selecting the Load Defaults option will perform the same reset to factory defaults values but will leave any user stored configurations unaffected.

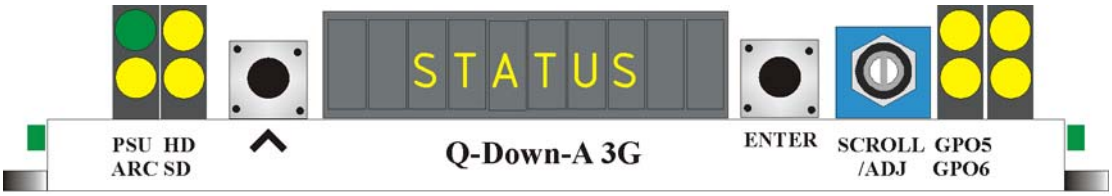
Note: Factory reset will erase all user stored presets

Parameter	Default value
Output Format	SD
Analogue output	CVBS, SMPTE and NJSC M
Fibre Optic I/O	Unchanged
Aspect ratio	Anamorphic
Vertical bandwidth	Sharp
Output AFD	Auto, 8-Full Frame
Coded Frame	4:3
Wide Screen Signalling	Auto
H Size (all)	16
V Size (all)	9
Position and Crop	0
Border Hue	0 (Black)
Proc-amp lift (all)	0
Proc-amp gain (all)	100
GPO alarms	Unchecked
Alarm delay video black	1
Alarm delay video frozen	1
Alarm delay audio silence	10 seconds
Video delay	Frame delay, Pixels 0, Lines 0
Bypass	unchecked
Presets	Set to Preset 1 and all contents erased
GPI Enable	Not enabled

6 Trouble shooting

Card edge monitoring

The front edge of the card provides useful power rail monitoring, input status, vertical filter and analogue output format.



Q-Down-A 3G front edge view

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

Name	LED Colour	Function when ON	Function when Off
PSU	Green	Good power supply (PSU) rails	One or more of the monitor supplies is out of specification
ARC	Yellow	Letterbox aspect ratio selected	Full screen (anamorphic) selected
HD	Yellow	Video input standard is HD (High Definition)	Input not present
SD	Yellow	Video input standard is SD (Standard Definition)	
GPO5	Yellow	GPO5 active / low	GPO5 inactive / high
GPO6	Yellow	GPO6 active / low	GPO6 inactive / high
	Yellow	No function	
	Yellow	No function	

The card edge LEDs and 10-digit display may be used in conjunction with status information from any connected remote status panel display or from Statesman if available.

Basic fault finding guide

The Power OK LEDs are not illuminated

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

There is no video output

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

The video output is SDI when an analogue video output is expected

Check that the link jumper settings are correct for the rear connector in use as explained in the Installation Chapter

The video output exhibits jitter

Check that the input SDI stability is within normal limits

The card no longer responds to card edge or front panel control

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

Check any active control panel cabling

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

If necessary re-set the card

Re-setting the card

If required, the card may be reset by removing the card from the rack and then re-inserting it

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

7 Specification

General

Dimensions	100mm x 266mm module with DIN 41612 connector.
Weight	180g.
Power consumption	Q-Down-A 3G - 11 Watts.
	DA6 - 3 Watts.
	FIP - 0.6 Watts.
	FOP - 0.6 Watts.

Inputs

Video	HD or SD SDI 270Mb/s to 2.970Gb/s serial digital compliant to EBU 3267-E, SMPTE-259M, SMPTE-292M and SMPTE-424M.
	Cable equalisation;
	3G (2.970Gb/s) – 80 metres, Belden 1694 or equivalent.
	HD (1.485Gb/s) – 140 metres, Belden 1694 or equivalent.
	SD (270Mb/s) >250 metres, Belden 8281 or equivalent.
Video standards supported	1080p 50/59.94, 1080i 50/59.94, 720p 50/59.94, PAL, NTSC.
	Input format auto selected.
Return loss	50Mhz to 1.5GHz -15dB, 1.5GHz to 2.97GHz -10dB.

Outputs

RM41	The Q-Down-A 3G has two input loop-throughs and configurable three video outputs.
RM41 + RM34	The Q-Down-A 3G plus DA6 has eight input loop-throughs and three configurable video outputs.
	The video outputs can be a selection of analogue or SDI
RM57	The Q-Down-A 3G with optical I/O has one optical input or optical output plus one input loop-through and three configurable video outputs.
RM57 + RM34	The Q-Down-A 3G plus DA6 has one optical input or optical output plus seven input loop-throughs and three configurable video outputs.
	The video outputs can be a selection of analogue or SDI.
Serial digital	Three HD or SD SDI 270Mb/s to 1.5Gb/s serial digital outputs compliant to EBU 3267-E, SMPTE-259M and SMPTE-292M.
Delay through board	Adjustable. Minimum delay 2uS.
Component:	SD/HD. YUV and GBR 1 Volt ± 2% into 75ohm. Sync on G, B & R
	(Betacam levels selectable)
Composite:	SD only. 1V ± 2% with sync into 75ohm

Auxiliary data	Passed.

Component performance

Processing:	Video input is 10 bit processed for 12 bit output DACs
Frequency response:	Luminance: +/- 0.3dB to 5.5 MHz.
	Chrominance: +/- 0.4dB to 2.5 MHz
Noise:	<-67dB weighted luminance or chrominance
Gain error:	< 1%

Composite performance

Processing:	Video input is 10 bit processed for 12 bit output DACs
Frequency response:	Luminance: +/- 0.3dB to 5 MHz
	Chrominance: +/- 0.4dB to 2.5 MHz
Noise:	< -67dB weighted luminance or chrominance
Differential gain:	< 2% typ
Differential phase:	± 1° typ

Status monitoring

LEDs	Front of card edge LED indicators to indicate:
	PSU rails present
	SDI input HD/SD
	Aspect ratio selection
	Vertical filter / Output format selected

GPI inputs

Number and type:	4 x GPI inputs. Recall of presets

GPI outputs

Number and type:	2 x GPI outputs, selectable from loss of input, video black and frozen, audio missing, audio channel silence and input incompatible.

Input fail output

Type:	Black, Blue, Mute