SYN 3G and SYN-A 3G

3G/HD/SD video synchronisers

Crystal Vision

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Contents

Rev 2	Moved Statesman info to Appendix, added VisionWeb info. Combined both models into one manual.	22-08-17
Rev 3	Added note about removal of card edge control in 2018.	09-07-19

1 Introduction

SYN 3G/SYN A-3G is a range of two 3G, HD and SD video synchronisers. *SYN 3G* is the basic model that features synchronising to an external reference, has YUV and RGB proc-amp adjustment of the video gain, black level and independent YUV/RGB gains. *SYN-A 3G* has the additional features of four embedded audio group processing and routing, fixed and tracking audio delay, Dolby E handling and Active Format Description (AFD) insertion.

For the *SYN-A 3G*, full channel shuffling is provided by the 8 x 8 stereo router which will allow you to rearrange the audio tracks between the four groups. A tracking audio delay will ensure the audio will be locked to the incoming reference with an additional delay of up to 120ms to compensate for any video processing. Audio channel pairs can also be muted if desired.

SYN-A 3G will maintain the alignment of Dolby E audio with video at all times.

SYN-A 3G's Active Format Description inserter will insert picture aspect ratio data into the output video for aspect ratio correction by downstream equipment.

For both models, with the addition of the FIP optical input or FOP optical output, cable length will no longer be an issue when sending and receiving signals from beyond the local signal bay. The RM57 is the rear modules for fibre connectivity. Relay bypass protection is provided by the RM67 rear module.

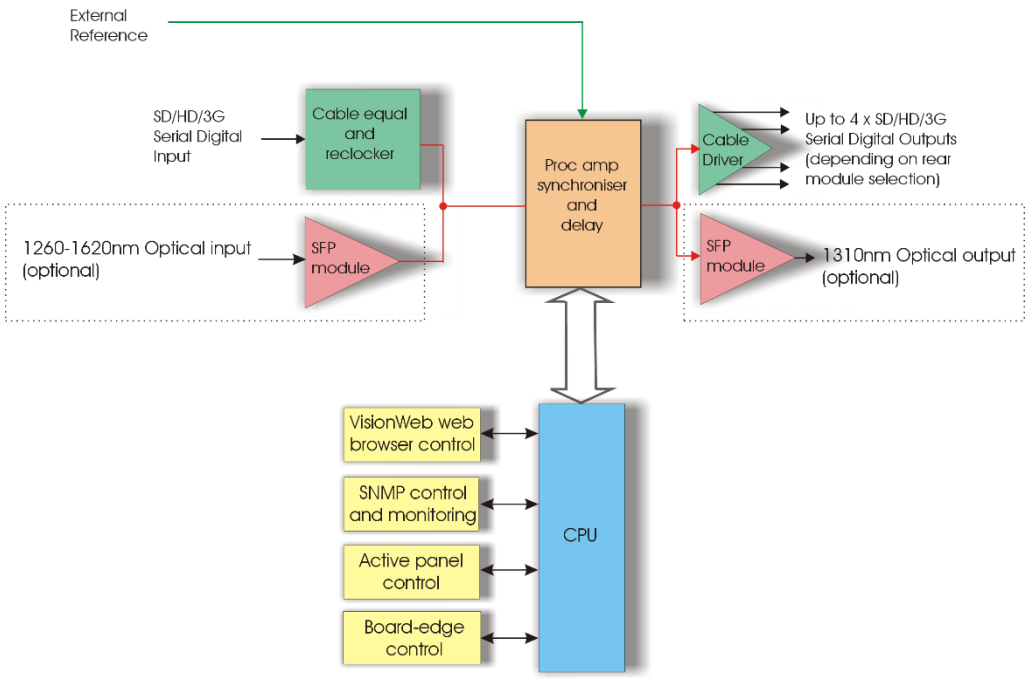
The *SYN 3G* and *SYN-A 3G* are space-saving 100mm x 266mm modules which fit in the Crystal Vision Indigo frames, with the inputs and outputs accessed by using either the RM41, RM57 or RM67 frame rear modules. Control options include an active front panel on the frame, a remote control panel, SNMP and the VisionWeb PC software. Board edge control was also available prior to 2018.

Either model in the range offers the following features:

Features	SYN 3G	SYN-A 3G
Input and output formats (50Hz and 59.94Hz)	1080p, 720p, 1080i, 625i, 525i	1080p, 720p, 1080i, 625i, 525i
Maximum video outputs (depends on rear module)	4	4
Frame store synchronisers	✔	✔
Analogue reference (SD black-burst or HD tri-level syncs)	✔	✔
Automatic freeze	✔	✔
Video delays	1, 2 or 3 frame plus one field additional user delay	1, 2 or 3 frame plus one field additional user delay
Handles 4 audio groups		✔
Linear AES tracking delay (with user control of tracking speed to trade off frequency change and settling time)		✔

Dolby E alignment delay		✔
Audio delays (in addition to tracking delays)		Linear AES: 0-120mS; Dolby E: 1,2 or 3 frames fixed delay
Audio routing in stereo pairs		✔
Audio muting in stereo pairs		✔
Audio resampling of linear AES		✔
AFD insertion of SMPTE 2016 for use by downstream equipment		✔
Video Proc-amp (RGB and YUV lift and gain controls)	✔	✔
Signal status reporting	✔	✔
Fibre I/O	✔	✔
Frame slots used	1	1
Relay bypass protection	✔	✔

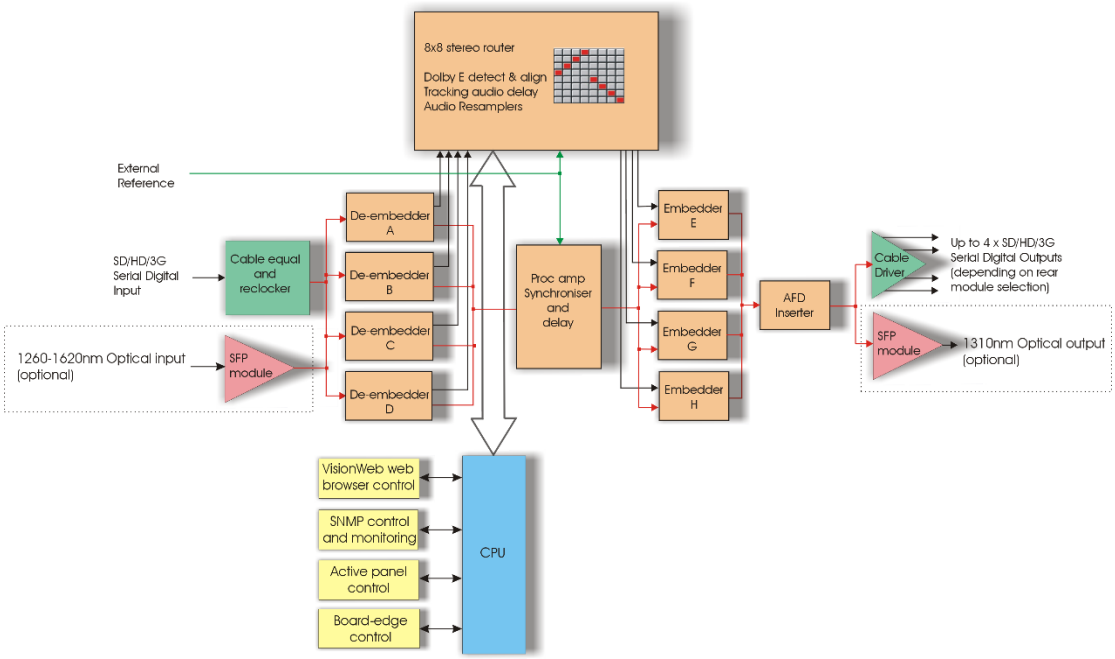
SYN 3G



The *SYN 3G* is the base model of the range and has the following features that are common to both models in the range:

- Use with variety of sources - works with 3G/s, HD and SD.
- Frame store synchroniser allows full vertical and horizontal timing adjustment and cross-locking (allowing use of either tri-level syncs or Black & Burst as the analogue reference).
- Optimise the video - video proc-amp allows adjustment of video gain, black level and independent YUV/RGB gains.
- Flexible control - select from front and remote panels, SNMP, GPIs and VisionWeb web browser control software. Board edge control was also available prior to 2018.
- Optical connectivity - send signals beyond the local equipment bay with the fibre input and output options
- Up to 3 frames of user delay plus additional field delay adjustable in line and pixel increments.
- Relay bypass protection.

SYN-A 3G



The main features of the *SYN-A 3G* are the same as the *SYN 3G* but with the following additional features:

- Versatile audio: will handle up to four audio groups, eight AES stereo pairs which can be fully shuffled with the powerful audio router.
- Passes four groups of embedded audio, including Dolby E, with delay matched to video.
- Active Format Descriptor (AFD) insertion.
- Synchronise video which contains a mixture of Dolby E and standard AES within a single audio group, and correctly align Dolby E data with the video frame to ensure guardband in exactly the right position

SYN-A 3G is ideal for those working in embedded audio environments. It de-embeds four groups of audio with the audio resamplers ensuring a smooth matching of the audio and video delay. The guardband of any embedded Dolby E will also be correctly aligned before re-embedding the audio into the outgoing SDI.

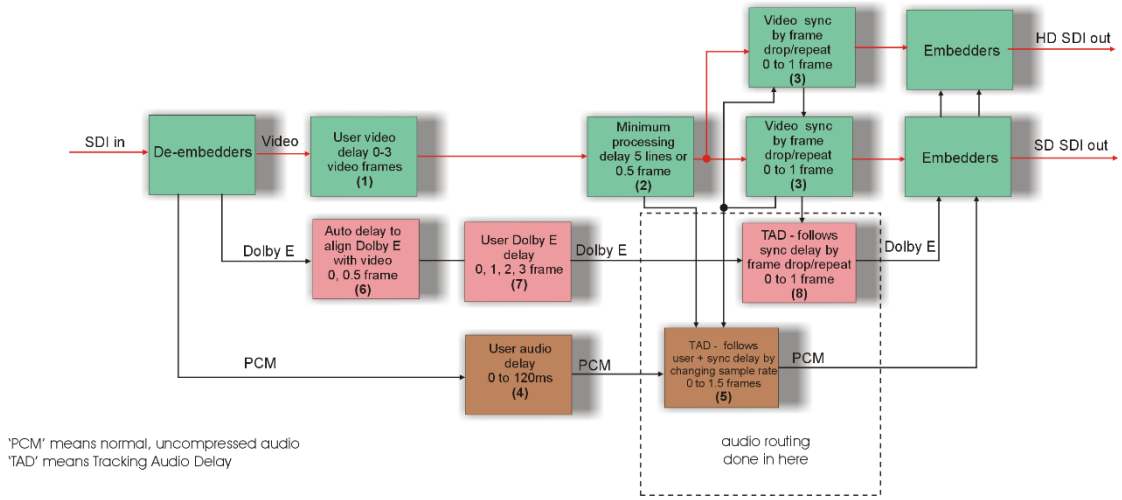
A further feature is the inclusion of an 8x8 audio router to allow audio stereo pairs to be shuffled within and between the four embedded audio groups.

2 Delays

Both models feature frame synchronisers which can use a Black and Burst or tri-level syncs external reference. Input to output delay will depend on the relative timings of the reference and input video. The synchroniser can be disabled by selecting the 'genlock' reference to be the video input. Both models have a user-selectable video delay of 0, 1, 2 or 3 frames plus an additional variable delay of up to one field and for the *SYN-A 3G* these delays can advance the audio relative to the video.

The remainder of this section is mainly relevant to the *SYN-A 3G* which provides the user with a full set of controls to set and/or bypass the various audio delays – as required. This has benefits in at least two areas:

- Maximum flexibility
- It simplifies the interaction between the different delays



Delays within *SYN-A 3G*

Video Delays

The video delay can be considered as being in three parts although the action of these delays will depend on whether the *SYN-A 3G* is set to synchronise to an external reference (synchroniser mode), or if the external reference is not present or *SYN-A 3G* is set to synchronise to the video input (delay mode).

(1) Fixed video delays of several frame lengths: 0, 1, 2 or 3. This is 'bulk' video delay for (i) matching other big video delays in the system and (ii) allowing the audio to be advanced relative to the video, to compensate for slippage elsewhere.

(2) A fixed video delay of 5 lines or 0.5 frames. This interacts differently with delays on different types of audio. PCM audio is delayed by the same amount as the video, maintaining lip-sync. Dolby E is not directly affected by this delay, so the Dolby E can be made earlier, relative to the video, prior to the alignment process. Without this delay, the alignment process will always delay the Dolby E relative to the video, by between 0 and 1 frame. With the 0.5 frame delay in the video path,

the alignment process can change the Dolby E timing by +/- 0.5 frames relative to the video. This allows repeated embed/de-embed cycles with less risk of the Dolby E getting progressively later relative to the video.

(3) A synchroniser delay. This automatically adjusts over a range 0 to 1 frame to provide the desired output timing.

***Note**: The 'frames' used for describing delays are Dolby E frames. For interlaced video, a Dolby E frame is the same length as a video frame. For the relevant progressive video standards, a Dolby E frame is the same length as two video frames.*

The fundamental difference in "delay" mode is that the "video synchroniser" delay is set directly by user controls rather than automatically, by the relative timing of the input and the reference.

The audio controls have the same effect in delay mode as in synchroniser mode.

Audio Delays

Two types of audio are considered – PCM and Dolby E. The *SYN-A 3G* will automatically detect Dolby E. There is a control to disable resampling of non-Dolby E data on per-stereo basis.

The audio delay can be considered in six parts, although not all delays are available for all types of audio.

(4) A continuously adjustable 0 to 120ms delay. This delay can also change either by resampling or by audio sample drop/repeat on a per-channel basis.

(5) A **T**racking **A**udio **D**elay (TAD) of between 0 and 1.5 frames that has the same value as the video synchroniser delay plus the 0.5 frame video delay i.e. this delay tracks the total delay through (2)+(3). This delay can change either by resampling or by audio sample drop/repeat, selected on a per-channel basis, using the same control as delay (5).

(6) A delay of 0 to 0.5 video frames to align the guardband of a Dolby E signal correctly with the video.

(7) A 0, 1, 2 or 3 frame Dolby E adjustable delay in the Dolby E path. As the user control for this can also select negative values, these will be provided by reducing delays elsewhere in the signal path where possible.

(8) A TAD of between 0 and 1 frame that has the same value as the video synchroniser delay. This is for Dolby E only and drops/repeats frames at the same time as the video synchroniser.

Tracking audio delay

The built-in video tracking (strictly speaking Audio Follow Video tracking) helps to ensure that the audio delay matches the video delay to maintain lip-sync, by operating dynamically in Synchronisation mode as input/output timing changes.

When video tracking is on in Synchronisation mode, the rate at which the audio delay tracks fast or abrupt changes in video delay is controlled by the tracking audio delay (TAD) rate.

The faster the TAD speed, the faster the audio delay will match the video delay, but at the expense of musical pitch.

Since the TAD speed can be audible as a pitch change, the response time needs to be chosen with care. A sports event may well benefit from a fast TAD speed but classical music with piano and violins would require the slowest speed.

For example a TAD speed of 0.1% can cause a pitch change of the same value to be heard as the audio delay catches up with the video.

To put this in perspective, imagine a piano recital is in progress and a concert pitch A above middle C is heard. This has a fundamental frequency of 440Hz. A 0.1% change would produce 440.44Hz. A sharp or B flat is 466.16Hz so in this case the audio delay slew rate only causes a pitch change of the order of one sixtieth of a semitone.

The TAD speeds are 0.8%, 0.4%, 0.2%, 0.1% and 0.05%.

TAD versus slew rate

A 40ms change in video timing only takes five seconds at the 0.8% TAD speed. Each decreasing response step takes double the time to catch up, so a 0.05% rate means that the audio would take 80 seconds to catch up with the video.

The following table relates audio tracking response time to video changes for a range of TAD values:

Video timing change	T.A.D. 0.05%	T.A.D. 0.1%	T.A.D. 0.2%	T.A.D. 0.4%	T.A.D. 0.8%
40ms	80 seconds	40 seconds	20 seconds	10 seconds	5 seconds
20ms	40 seconds	20 seconds	10 seconds	5 seconds	2.5 seconds
10ms	20 seconds	10 seconds	5 seconds	2.5 seconds	1.25 seconds
5ms	10 seconds	5 seconds	2.5 seconds	1.25 seconds	0.6 seconds
1ms	5 seconds	2.5 seconds	1.25 seconds	0.6 seconds	0.3 seconds

User Controls

Each stereo audio channel has the same set of controls, which determine whether it bypasses various delays or processes.

The TAD selection determines whether a stereo channel passes through the appropriate TAD (5) or (8), or bypasses it with minimum delay. This also affects the operation of the Dolby E alignment delay (6). If Dolby E goes through the TAD, then the output of (6) is aligned with the input video, ready to be synchronised. If Dolby E bypasses the TAD, the output of (6) is aligned with the output video, ready to be embedded.

The frame delays selection determines whether a stereo channel passes through the 0, 1, 2 or 3 frame audio delay (4), or bypasses it with minimum delay.

The user delay determines whether a stereo channel passes through the "user" audio delay, or bypasses it with minimum delay. The "user" delay for Dolby E is (7), for other audio it is (4).

The Resample enable control affects how the audio data is manipulated to change the PCM delays. On resampled channels (resample enabled) the audio will be continuously resampled allowing seamless changes in audio delay. On non-resampled channels (resample not enabled) samples will be passed unchanged through the signal path: if the delay has to change, single audio samples will be dropped or repeated as required. This control has no effect on channels containing Dolby E.

The Dolby E align control allows the user to send Dolby E through delay (6) to produce the correct relationship with the video timing, or to bypass delay (6), passing the Dolby E to the next stage with minimum delay.

The global control adjusts both the PCM Audio Delay and Dolby E Delay. The Audio Delay control has a range of 0 to 120ms and will increase the tracking delay by the required amount.

The Dolby E delay has a range of 0 to 3 frames. This delay affects timing after the alignment process and allows for Dolby E to be embedded at a fixed offset from the default guardband position. Because this delay sits between the alignment block and the synchroniser, the delay range was chosen so that the user cannot move the Dolby E so far that it gets corrupted if the synchroniser drops or repeats a frame.

3 AFD

SYN-A 3G is able to offer AFD insertion of SMPTE 2016 AFD for use by downstream equipment.

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 16 AFD codes. These controls are repeated for both SD and HD.

The HD output will have the ANC data packets containing the AFD information inserted within the active line portion on the appropriate line.

The 16 available codes defined in SMPTE 2016 are described in the following table:

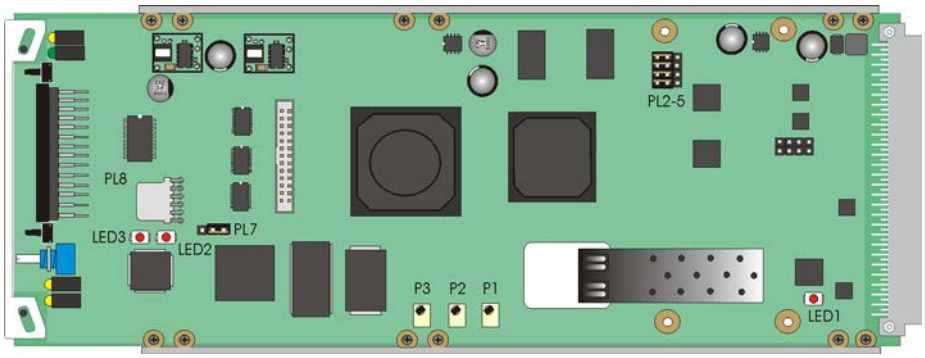
AFD code	Description	AFD code	Description
0	Undefined	8	Full Frame (as coded frame)
1	Reserved	9	4:3 Centre
2	16:9 Centre	10	16:9 Centre
3	14:9 Centre	11	14:9 Centre
4	16:9+	12	Reserved
5	Reserved	13	4:3 with shoot and protect 14:9 centre
6	Reserved	14	16:9 with shoot and protect 14:9 centre
7	Reserved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

4 Hardware installation

Module configuration

There are five user settable links on the *SYN 3G/SYN A-3G*. These are PL2, PL3, PL4, PL5 and PL7. Links PL2, PL3, PL4 and PL5 are used to select between RS422 and GPI control. Other links have been factory set and should not need to be altered. PL7 sets the *SYN 3G/SYN A-3G* IP address to default (10.0.0.201) or to a user selected IP address.



SYN 3G/SYN 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.

Engineering link and LEDs

PL7 sets the *SYN 3G/SYN A-3G* IP address to default (10.0.0.201) or to a user selected IP address

Link	Towards front of board or Up	Towards the rear of board or Down
PL7	Debug mode – forces board's IP address to be 10.0.0.201	Normal mode (factory set, do not alter)
PL2	GPI 1 Input = RS422 Rx+	GPI 1 Input = GPI 1
PL3	GPI 2 Input = RS422 Rx-	GPI 2 Input = GPI 2
PL4	GPI 3 Input = RS422 Tx+	GPI 3 Input = GPI 3
PL5	GPI 4 Input = RS422 Tx-	GPI 4 Input = GPI 4

The LEDs LED1, LED2 and LED3 are included for diagnostic purposes and are not visible from the front of the frame.

LED	Function
LED1	Input equaliser locked to valid input
LED2	Data
LED3	Link

Potentiometers

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

Potentiometer	Function
P1	3.3V rail adjustment
P2	Clock free-running frequency

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
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
Ref	Yellow	External reference detected.	No external reference present.

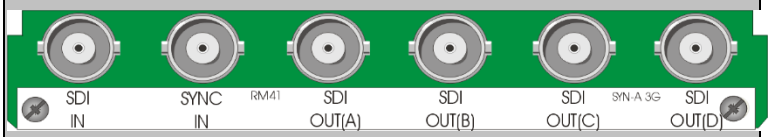
5 Rear modules and signal I/O

The 2U Indigo 2 frames will house up to 12 single height modules and dual power supplies. The 1U Indigo 1 frames 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.

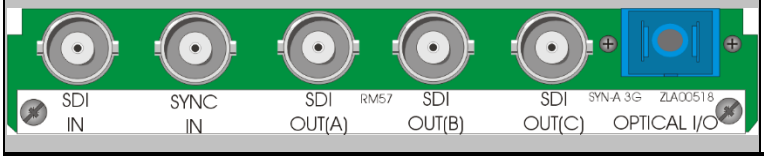
RM41 rear module connector	Description
	**RM41** • 12 per Indigo 2 frame • Six per Indigo 1 frame • 2 per Indigo DT • All frame slots can be used

BNC	I/O assignment
HD/SD OUT(D)	3G/HD/SD serial digital output
HD/SD OUT(C)	3G/HD/SD serial digital output
HD/SD OUT(B)	3G/HD/SD serial digital output
HD/SD OUT(A)	3G/HD/SD serial digital output
SYNC IN	Tri-level or Black & Burst analogue reference input
HD/SD IN	3G/HD/SD serial digital input

Note: In HD applications it is also possible to use the RM34 which has the same connections. It is possible to also use the RM34 for 3G applications but the return-loss may be compromised.

Rear module connections with RM57

The RM57 being a single height module will allow maximum packing density. Designed for applications using fibre inputs or outputs. When using fibre input, allows you to select between one fibre and one electrical 3Gb/s, HD or SD input with three output feeds. When using fibre output, gives access to one 3Gb/s, HD or SD input and three outputs, along with one copy of Output B on fibre.

RM57 rear module connector	Description
	**RM57** • 12 per Indigo 2 frame • 6 per Indigo 1 frame • 2 per Indigo DT • All frame slots can be used

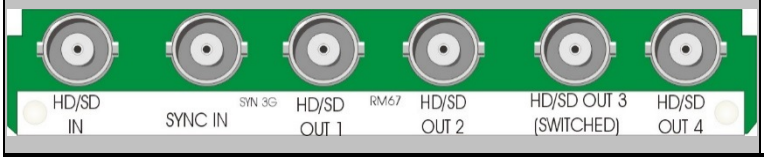
BNC	I/O assignment
OPTICAL I/O	SC optical connector. Input or output depending on optical module fitted. (group B)
HD/SD OUT(C)	3G/HD/SD serial digital output
HD/SD OUT(B)	3G/HD/SD serial digital output
HD/SD OUT(A)	3G/HD/SD serial digital output
SYNC IN	Tri-level or Black & Burst analogue reference input
HD/SD IN	3G/HD/SD serial digital input

Note: To use optical I/O it is necessary to have the *SYN 3G/SYN A-3G* fitted with either a FIP (fibre input) or FOP (fibre output) module.

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

Rear module connections with RM67

The RM67 being a single height module will allow maximum packing density. Designed for applications requiring relay bypass protection. In the event of power failure, the video input is automatically connected to 3G/HD/SD OUT 3 (SWITCHED).

RM67 rear module connector	Description
	**RM67** • 12 per Indigo 2 frame • 6 per Indigo 1 frame • 2 per Indigo DT • All frame slots can be used

BNC	I/O assignment
HD/SD OUT 4	3G/HD/SD serial digital output
HD/SD OUT 3 (SWITCHED)	Switched 3G/HD/SD serial digital output
HD/SD OUT 2	3G/HD/SD serial digital output
HD/SD OUT 1	3G/HD/SD serial digital output
SYNC IN	Tri-level or Black & Burst analogue reference input
HD/SD IN	3G/HD/SD serial digital input

6 General Purpose Interface

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 bit 4		
4	‘d’	Recall preset bit 8		
5	‘e’	Input missing, Video frozen / Black, Audio silence / missing	Selected Alarms asserted after set delay	No alarm
6	‘f’	Input missing, Video frozen / Black, Audio silence / missing	Selected Alarms asserted after set delay	No alarm

Note: Input missing will assert the selected 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	H	H	H	H	9	L	H	H	H
2	H	H	H	L	10	L	H	H	L
3	H	H	L	H	11	L	H	L	H
4	H	H	L	L	12	L	H	L	L
5	H	L	H	H	13	L	L	H	H
6	H	L	H	L	14	L	L	H	L
7	H	L	L	H	15	L	L	L	H
8	H	L	L	L	16	L	L	L	L

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.

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

7 Card edge operation

Card edge controls

SYN 3G/SYN-A 3G board edge

Board edge control was removed from SYN 3G and SYN-A 3G in 2018. Therefore the card edge control information detailed here is only relevant for older versions of the product.

Card edge buttons

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

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.

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.

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

Reading card edge LEDs

Card edge LEDs may be used in conjunction with status information from any connected remote status panel display or from VisionWeb 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
Ref	Yellow	External reference detected.	No external reference present.

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.

8 Using the front control panel

Module selection

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 its status mode showing the current software version and frame IP address. Pressing the Device key followed by the Home key will return to this screen.

Active control panel Home screen

To continue with control panel operation or configuration, press the Device key once.

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

The location number consists of the frame number plus the card position in the frame. Rotate the Shaft control to poll through the available cards.

Use the F2 soft key to toggle between the card's serial number and issue number with modification level.

The available cards menu

To select the card being displayed press the ENTER key.

Selecting a SYN 3G or SYN A-3G

Once selected the display will show the *SYN 3G/SYN A-3G* home menu and illuminate the active function keys. Press any active function key to enter the indicated sub-menu.

The SYN-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.

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 *SYN 3G/SYN 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:

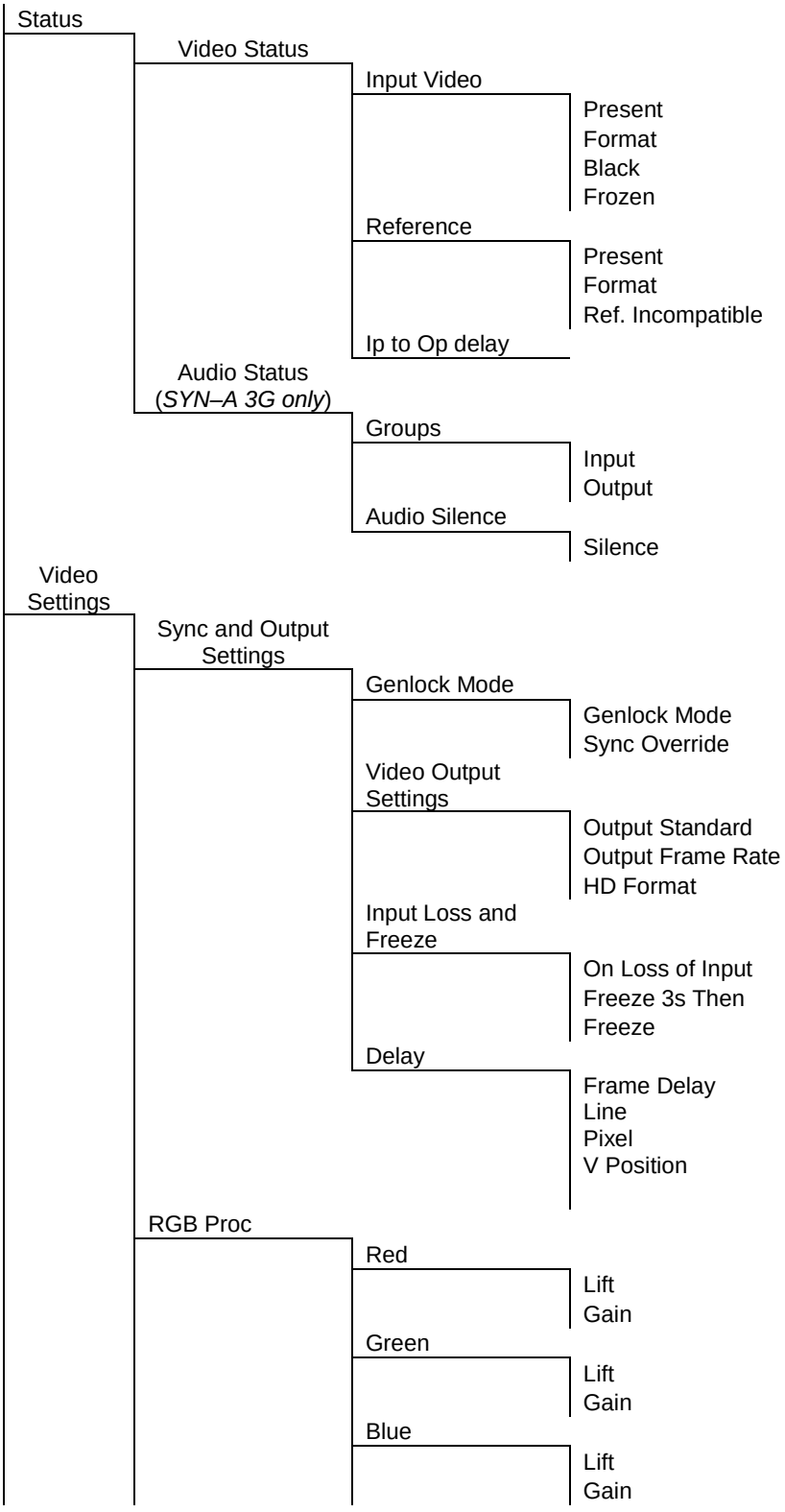
- Status – Press F1
- Synchroniser – Press F2
- Audio – Press F3 *(SYN-A 3G only)*
- More selections – Press F4
    - AFD – Press F1 *(SYN-A 3G only)*
    - Proc-amp – Press F2
    - Alarms – Press F3
    - Preset (User presets and factory reset) – Press F4

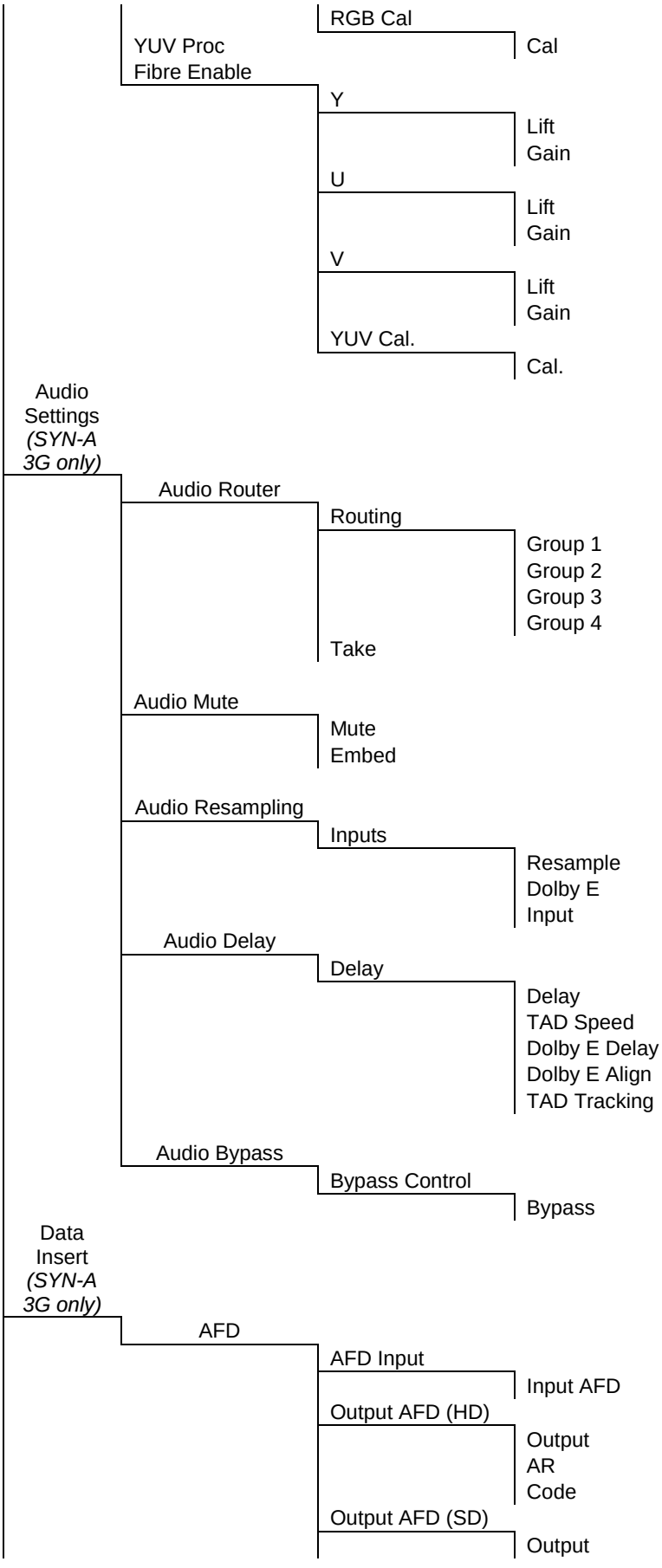
When a sub-menu has been selected, further options may be obtained by using the Shaft control to scroll through them. Once the desired option has been located a selection or value change can be made by either toggling the appropriate function key or by selecting and using the shaft control to alter a 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 [Letterbox] or if the change requires to be accepted angular brackets will be used <CVBS>. Pressing ENTER will fix the new value.

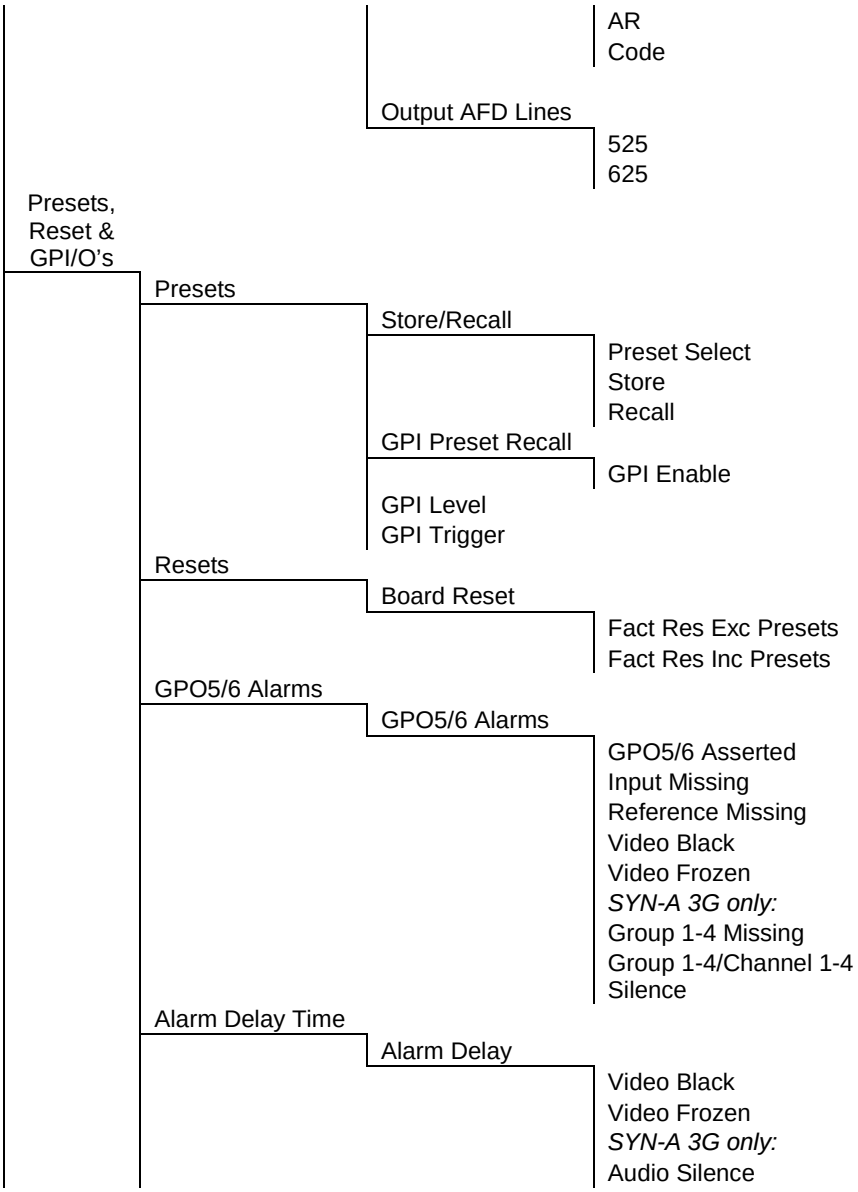
The following chart shows the available *SYN 3G/SYN A-3G* menus. The actual menus available may vary according to model and as software is updated.

Menu Tree

The basic menu structure for VisionWeb, card edge and front panel access is identical and consists of the following menus and sub-menus. Where the menu structure varies with model type, this is indicated in the chart below:




RGB Cal
Cal
YUV Proc
Fibre Enable
Y
Lift
Gain
U
Lift
Gain
V
Lift
Gain
YUV Cal.
Cal.
Audio
Settings
(SYN-A
3G only)
Audio Router
Routing
Group 1
Group 2
Group 3
Group 4
Take
Audio Mute
Mute
Embed
Audio Resampling
Inputs
Resample
Dolby E
Input
Audio Delay
Delay
Delay
TAD Speed
Dolby E Delay
Dolby E Align
TAD Tracking
Audio Bypass
Bypass Control
Bypass
Data
Insert
(SYN-A
3G only)
AFD
AFD Input
Input AFD
Output AFD (HD)
Output
AR
Code
Output AFD (SD)
Output



Controlling cards via VisionWeb

Crystal Vision cards use an XML file to create a control database that is used by the card's front-edge controller, the Indigo frame front panel controller and VisionWeb web browser software. VisionWeb software offers a full range of controls with slider controls etc. similar to that available with the older Statesman PC software.

Accessing the Indigo Home page with a PC browser via the Ethernet connector of an Ethernet-enabled frame will display a list of the cards fitted. (See Frame Manual for more details.)

Indigo home page

The example above shows a *SYN 3G* card fitted in slot one and the frame's power supply and status monitor in slots 13 and 14. Clicking on a *SYN 3G or SYN A-3G* card will bring up the card's home page, for example:

SYN-A 3G Status Page

9 Control Descriptions

The controls of *SYN 3G/SYN A-3G* are accessible from the front panel, the board edge or from Crystal Vision's 'VisionWeb' software. The description of controls used in this manual is based on VisionWeb GUI screen grabs but the path to locate controls via the front panel or board edge follows the same logic. For instance, in the VisionWeb GUI the input video 'Frozen' indicator is located in the '**Video Status/Input Video'** sub-menus of the '**Status'** menu. To find the same control using the card edge or front panel follow the path **Status->Video Status->Input Video** to the **Frozen** control.

VisionWeb GUI controls are accessed by menus at the bottom of the page which, when selected, offer sub-menus containing a number of controls. Some controls are simulated LEDs that are used to show status, others are check boxes, buttons or sliders which change various *SYN 3G/SYN A-3G* settings.

The description of the menus are in the order shown in the GUI i.e.

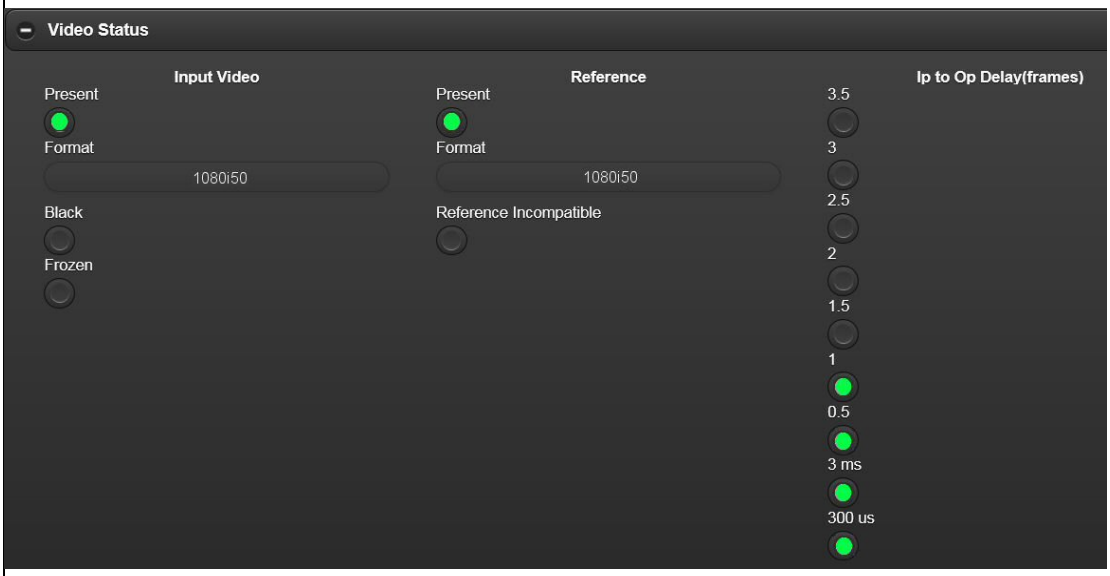
VIDEO STATUS, AUDIO STATUS, SYNC AND OUTPUT SETTINGS, RGB PROC, YUV PROC, FIBRE ENABLE, AUDIO OP ROUTER, AUDIO MUTE, AUDIO RESAMPLING, AUDIO DELAY, AUDIO BYPASS, AFD, PRESETS, RESETS, GPO ALARMS, ALARM DELAY TIME.

Each menu is shown with a screen grab and description of each control's function. Some menus and some controls are specific to specific models only, in this case the model number(s) are indicated.

Status Menu

Video Status

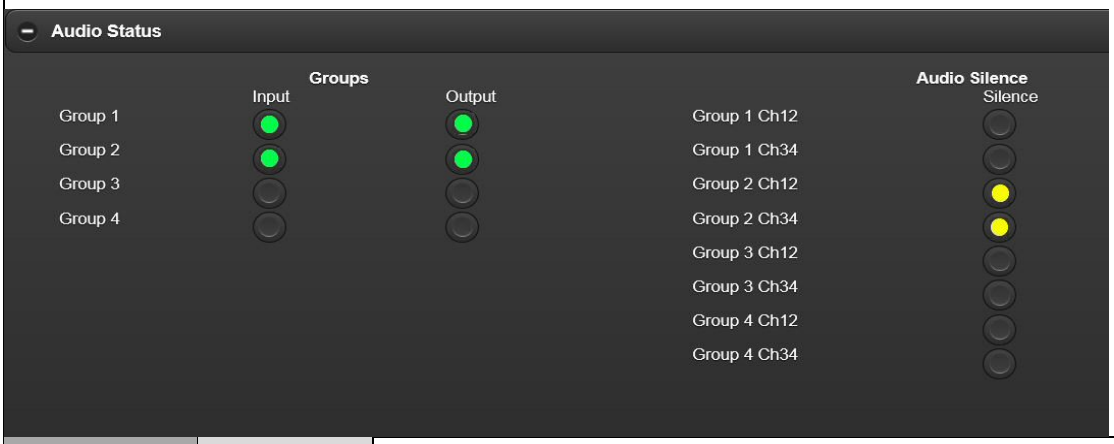
Display presence, standard and status of input and reference video signal.



Input Video	**Present**	**On if input video present.**
	Format	**The Input video standard is shown. i.e. *IP 525, IP 625, IP 720p 50/59, IP 1080i50/59, IP 1080p50/59, IP Missing, IP Unknown.***
	Black	**On if input video at constant black level.**
	Frozen	**On if input video frozen (still frame).**
Reference	**Present**	**On when valid Black and Burst or tri-level video input present.**
	Format	**The external reference input standard is shown. i.e. *1080p50/59.94, 1080i50/59.94,720p50/59.94, 525, 625, Reference Missing, Unknown.***
Ip to Op Delay	**Displays the current input to output delay.**	

Audio Status

Display presence of embedded audio signals and indicate if silent. *(SYN-A 3G only)*

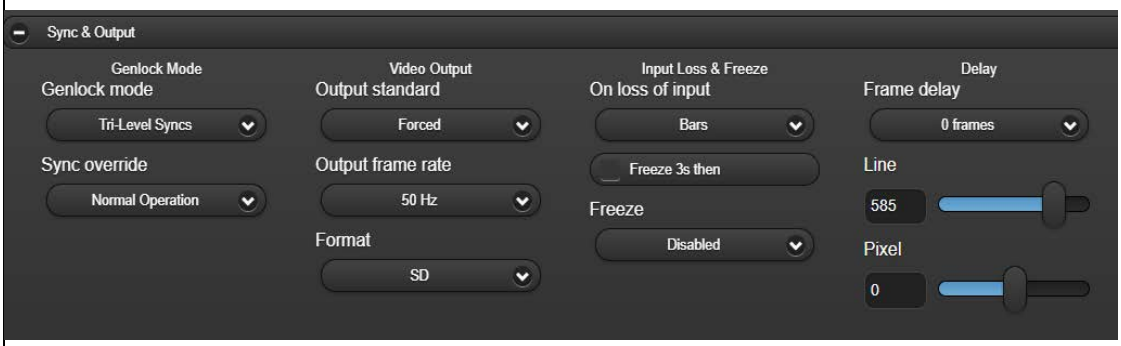


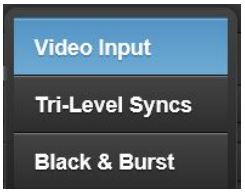
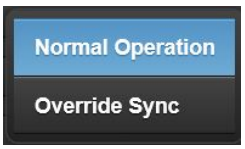
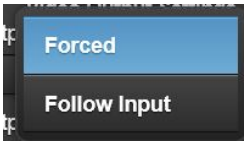
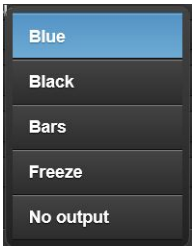
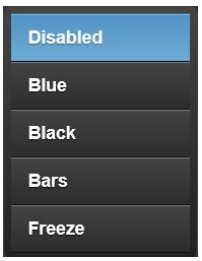
Group 1-4	**Input**	**On when the audio group is embedded into the video input.**
	Output	**On when the audio group is embedded into the video output.**
Audio Silence	**Group 1-4 Channels 1/2 & 3/4**	**On if the channel pairs are silent (<-63dbfs) for each of the four embedded audio groups.**

Video Settings Menu

Sync and Output Settings

Select genlock source, operation in the event of loss of input or syncs, and video delay.

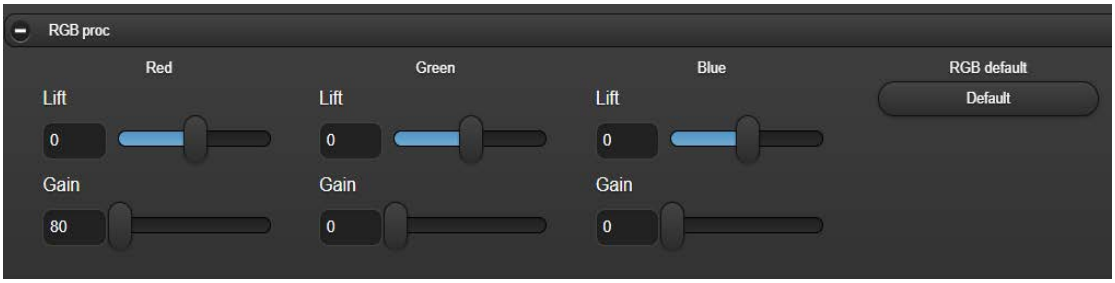


Genlock Mode		**Select source of video reference to be the video input video or reference input using either tri-level syncs or Black and Burst. When locking to 'Video Input' the synchroniser is effectively disabled.**
Sync Override		**In 'Override Sync' mode, should the input frame rate change to something other than that of the external reference, the *SYN 3G/SYN A-3G* will lock to the input. Once the reference conflict is resolved the output will relock to the external reference as with normal operation.**
Output Standard		**Select 'Forced' to force the output format when the input is not present. This ability is useful when setting up a system and checking signal paths. When in forced mode the output can then be set to any of the formats handled by the *SYN 3G/SYN A-3G* and give either a 100% colour bars or black output as selected by the 'On loss of input' control.**
Output Frame Rate		**Set output frame rate for when generating a 'forced' output.**
Format		**Select output HD standard for when generating a 'forced' output.**
On Loss of Input		**Select video output in the event of lost input.**
Freeze 3s Then	**Select to enable a three second freeze of last received input frame in the event of the video input disappearing before outputting black, blue, bars etc. as selected by the Output control below.**	
Freeze		**Select video output in the event of the video input freezing.**

Frame Delay		**Delay the video by 0 – 3 frames. For the SYN-A 3G only, this delay is bypassed by embedded audio, effectively delaying video with respect to the audio.**
Line/Pixel	**Set a variable delay in lines and pixels. The maximum amount of variable delay that can be set is one frame.**	

RGB Proc

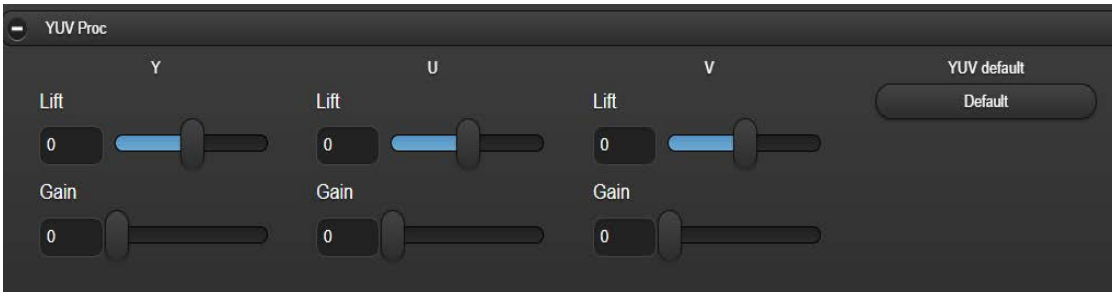
Control the lift and gain of the Red, Green and Blue components.



Lift	**Apply a positive or negative DC offset to the black level of the Red, Green and Blue components of the video path.**
Gain	**Apply 80% to 120% gain to the Red, Green and Blue components of the video path.**
Default	**Return Lift and Gain for all components to their default values of 0 lift and 100% gain.**

YUV Proc

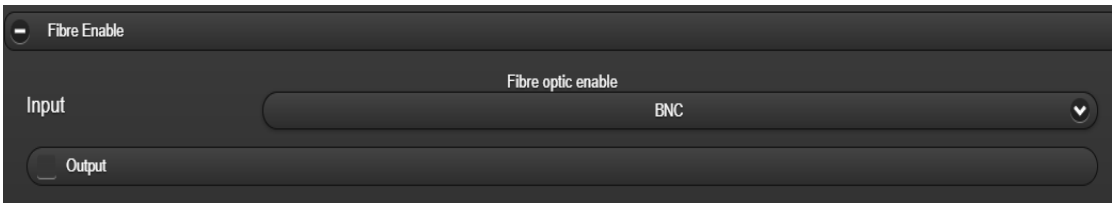
Control the lift and gain of the YUV components.



Lift	**Apply a positive or negative DC offset to the black level of the Y, U and V components of the video path.**
Gain	**Apply 0 to 200% gain to the Y, U and V components of the video path.**
Default	**Return Lift and Gain for all components to their default values of 0 lift and 100% gain.**

Fibre Enable

Select fibre-optic I/O options.

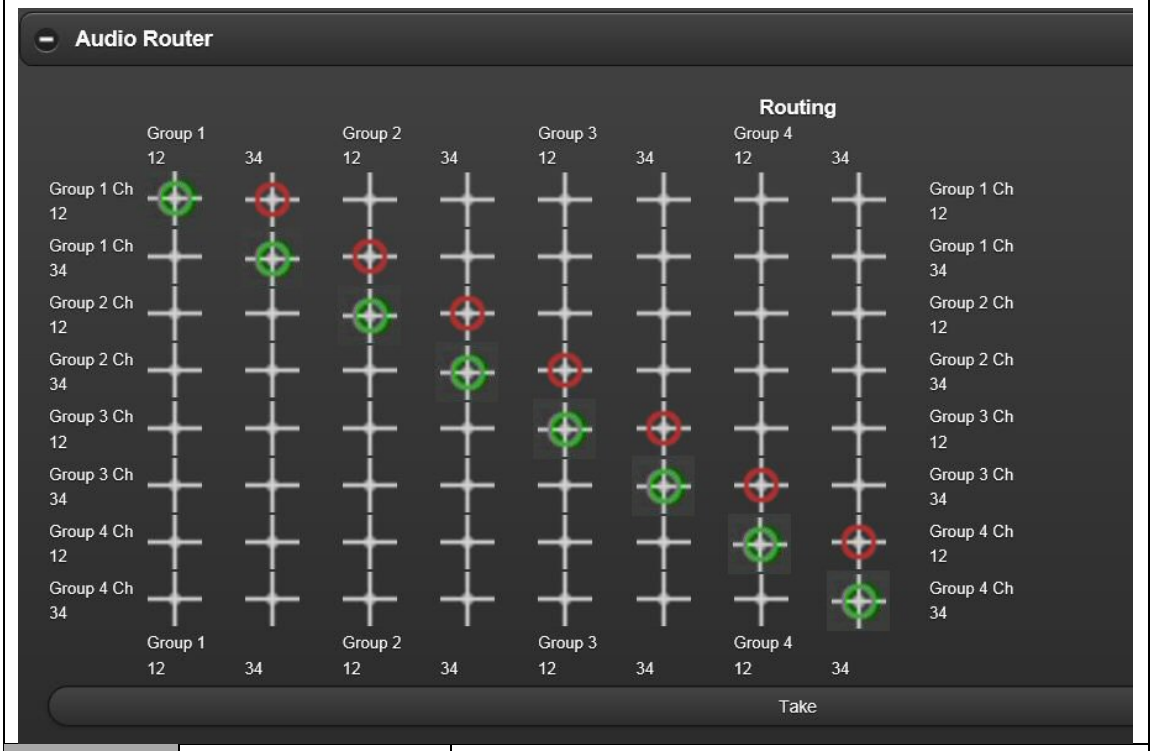


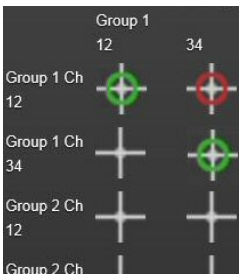
Input	**Select BNC or Fibre as the video input. The optional SPF module and correct rear module must be fitted for optical input.**
Output	**Select optical as the video output. The optional SPF module and correct rear module must be fitted for optical output.**

Audio Settings Menu

Audio Router

Select audio embedding options for video output. (*SYN-A 3G only*)



Routing		**Select which embedded audio inputs are to be re-embedded at the output. Current selections are shown as green circles, pre-selected selections (red circles) are the crosspoints to be routed when the 'Take' button is pressed. The inputs shown along the top of the matrix are, or will be, routed to the embedded output channels shown on the left hand side (use the scroll bar at the bottom of the matrix to view all 16 inputs). Clicking on the intersection of the input and output will show a red circle which will change to green when the 'Take' control is selected. All crosspoints can be pre-selected. The screen grab above shows de-embedded inputs Group 1 C3,4 and Group 2-4 C1-4 pre-selected to embedded channels Group 1-3 C1-4 and Group 4 C1,2. Embedded inputs can be routed to several outputs if required.**
Take		**Switch all pre-selected crosspoints in one go.**

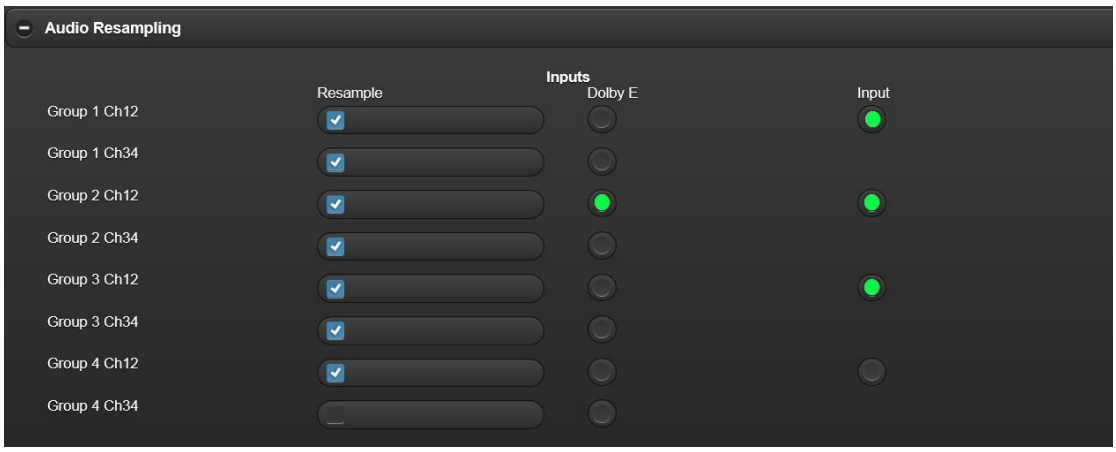
Audio Mute

Select audio muting and embedding options. *(SYN-A 3G only)*

Mute	**When selected, this control will mute the selected embedded audio channel pair.**
Embed	**Select to re-embed the audio group into the video output.**

Audio Resampling

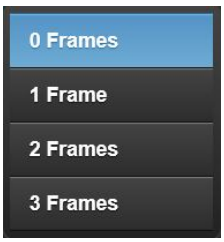
Select audio embedding options for video outputs. *(SYN-A 3G only)*



Resample	**The Resample control affects how the audio data is manipulated to change the PCM delays. On resampled channels (resample enabled) the audio will be continuously resampled allowing seamless changes in audio delay. On non-resampled channels (resample not enabled) samples will be passed unchanged through the signal path: if the delay has to change, single audio samples will be dropped or repeated as required. This control has no effect on channels containing Dolby E which is automatically detected and bypasses the resamplers.**
Dolby E	**On when an audio input pair is Dolby E encoded.**
Input	**On when an audio input group is detected.**

Audio Delay

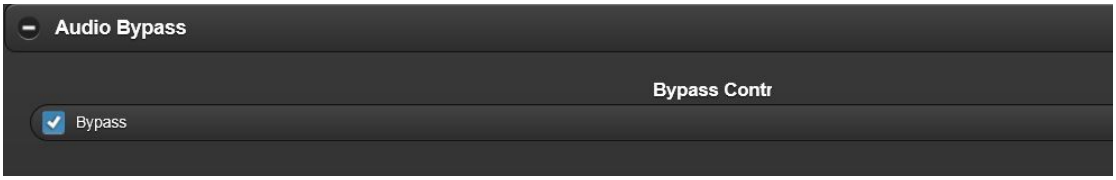
Select audio delay options. ***(SYN-A 3G only)***

Delay	**This control is used to delay the audio between 0 to 120mS with respect to the video and compensate for any small delay between the incoming video and audio signals.**	
TAD Speed		**This sets the time the audio delay takes to track fast or abrupt changes in video delay. The faster the rate of change, the quicker the audio delay will match changes in video delay so minimising lip sync errors, but at the expense of a matching change of musical pitch. Refer to the section 'Delays' for more help with TAD speed settings for different applications.**
Dolby E Delay		**Delay Dolby E encoded signals by up to three frames in one frame increments.**

Dolby E Align	**Enable Dolby E alignment to ensure correct positioning of the guardband. Dolby E Align mode will limit the minimum video delay to 0.5 frames.**

Audio Bypass

Bypass audio router and resampling. ***(SYN-A 3G only)***

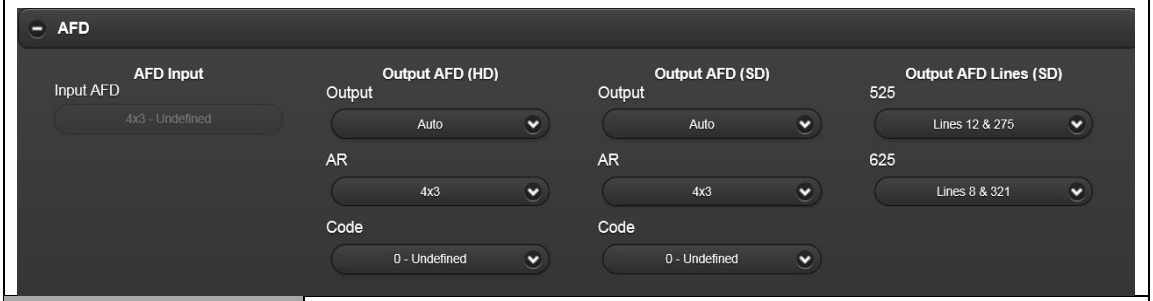


Bypass	**Selecting bypass will send any embedded audio directly to the output, bypassing the router and resamplers.**

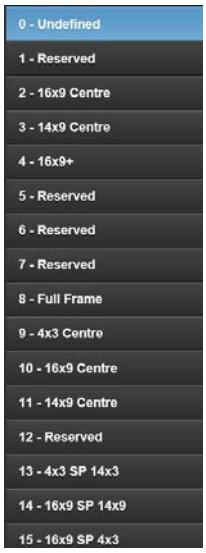
Data Insert Menu

AFD

Select AFD output options for HD and SD outputs. ***(SYN-A 3G only)***



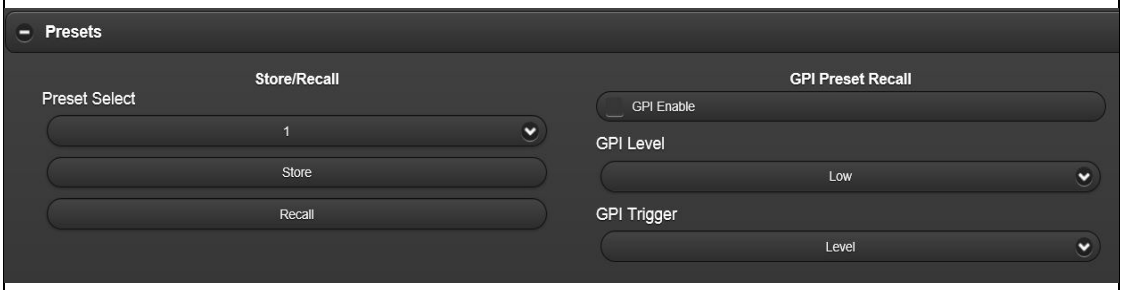
Input AFD	**Displays incoming AFD descriptor. i.e. 'undefined, full frame,16:9 Centre' etc. (See section 'AFD' for more information.)**	
Output		**Select mode control 'Auto' to automatically set the AFD output codes based on the output aspect ratio and incoming AFD codes. Select 'Pass' to use the incoming AFD code.**

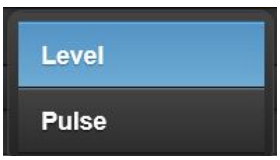
AR		**Select aspect ratio of entire image. For instance if the output is a 16:9 letterbox image within a 4:3 frame, select 4:3 for AR and Code '10'.**
Code		**Code for active image area. See section 'AFD' for more information.**
525		**Select the pair of 525 lines into which the ANC data will be inserted.**
625		**Select the pair of 625 lines into which the ANC data will be inserted.**

Presets, Resets & GPI/Os

Presets

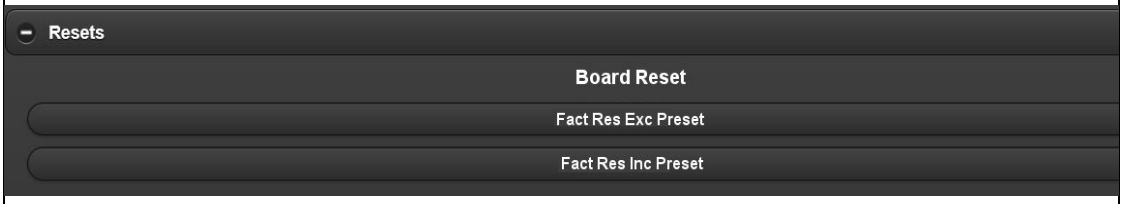
Up to 16 user-defined configurations may be stored and recalled either from VisionWeb or through the use of external GPIs. Presets store the board setup data including operating mode card status. The presets are numbered 1-16.



Preset select		**Store or recall *SYN 3G/SYN A-3G* configuration to one of 16 memory locations.**
GPI Enable	**Select to recall previously saved presets via the external GPI port. See Chapter "General Purpose Interface" for more information on GPIs.**	
GPI Level		**Select either low or high level to trigger the GPI recall.**
GPI Trigger		**Select either level or edge to trigger GPI recall.**

Resets

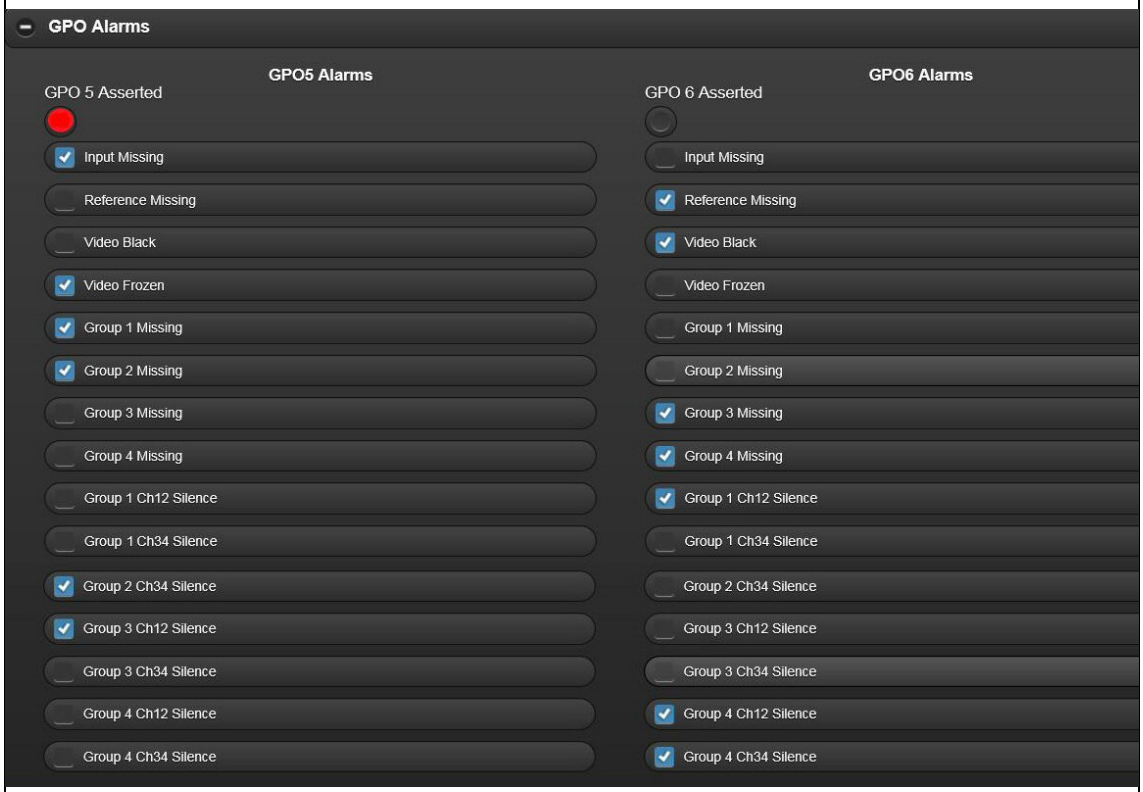
Reset the board to its default settings.



Fact. Res Exc Preset	**Reset the board to default settings but leave preset memories unaffected (see section 'Defaults'.**
Fact. Res Inc Preset	**Reset the board to default settings and erase preset memories.**

GPO Alarms

Set the conditions that trigger GPO alarms 5 and 6.

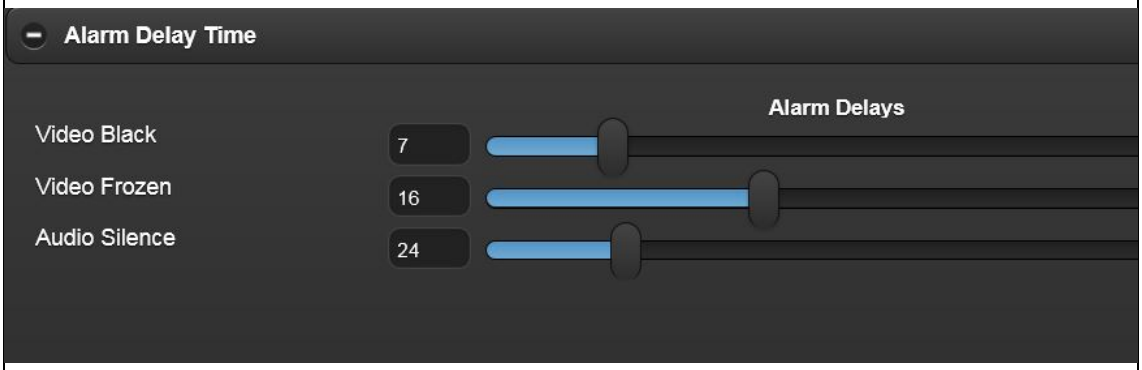


GPO 5/6 Asserted	**On when alarm conditions have been met.**

Input missing	**Select to assert alarm if video input is missing.**
Reference missing	**Select to assert alarm if synchroniser reference is missing.**
Video Black/Frozen	**Select to assert alarm if incoming video is at black level or frozen for the period set by the Alarm Delay menu.**
Group 1-4 Missing	**Select to assert alarm if any of the embedded audio groups 1-4 are missing from the video input. *(SYN-A 3G only)***
Group 1-4 Ch12/34 Silence	**Select to assert alarm if any of the embedded audio channel pairs are silent for the period set by the Alarm Delay menu. *(SYN-A 3G only)***

Alarm Delay Time

Set time that an alarm condition must be active before triggering an alarm.



Video Black	**Set the period between 0 to 40 seconds that the incoming video must be permanently at black level before asserting GPO5 or GPO6 alarms.**
Video Frozen	**Set the period between 0 to 40 seconds that the incoming video must be permanently frozen (still frame) before asserting GPO5 or GPO6 alarms.**
Audio Silence	**Set the period between 0 to 120 seconds that any embedded audio channel pair must be permanently below -63dBFS before asserting GPO5 or GPO6 alarms. *(SYN-A 3G only)***

10 Defaults

The following table lists *SYN 3G/SYN A-3G* default settings after reset. Note that not all of these settings are relevant to the base model *SYN* 3G.

Parameter	Default value
Output standard	Forced
Frame rate	50Hz
Format	Standard Definition
Fibre optic I/O	Disabled
Output AFD High definition	Manual, 16:9, code 8 (Full frame)
Output AFD Standard definition	Manual, 4:3, code 8 (Full frame)
AFD lines	525 lines 12 & 275, 625 lines 8 & 321
Video gains	100%
Video lift	0%
Audio Router	Group 1 to Group 1 – Group 4 to Group 4
Audio Router bypass	Bypassed
Audio mute	Not muted
Output embedders	All enabled
Genlock mode	Lock to Tri-level or Bi-level syncs
On loss of input show	Bars
Freeze delay	Disabled
Freeze	Disabled
Video delay	0 frames
Audio resamplers	On
Audio delay	0ms
Tracking speed	0.05%
Dolby E delay	0 frames, Alignment selected
Output video timing	0 pixels, 0 lines
Alarm delays	Black 0ms, Frozen 0ms, Audio 10sec
GPO5, GPO6 Alarms	Unselected
Preset selection	Preset 1
GPI control of Presets	Disabled

11 Troubleshooting

Card edge monitoring

The front edge of the card provides useful power rail monitoring, input status and aspect ratio information.

SYN 3G/SYN-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
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
Ref	Yellow	Valid external reference detected	No external reference

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 VisionWeb if available.

Board edge control was removed from SYN 3G and SYN-A 3G in 2018. Therefore the card edge control information is only relevant for older versions of the product.

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 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 reset the card

Resetting 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. Any previous configuration will be retained, use a factory reset to erase any configurations stored in the card.

12 Specification

General

Dimensions	100mm x 266mm module with DIN 41612 connector.
Weight	180g.
Power consumption	SYN 3G/ SYN-A 3G - 9 Watts. FIP - 0.6 Watts. FOP - 0.6 Watts.

Inputs

Video	HD or SD SDI 270 Mb/s to 2.970 Gb/s serial digital compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A. 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.

Outputs

RM41 RM57 RM67	The RM41 has four video outputs. RM57 has three video outputs and an optical I/O. RM67 has four outputs, one switched.
Serial digital	HD or SD SDI 270 Mb/s to 2.970 Gb/s serial digital compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A.
Delay through board	Selectable 3 frames video delay. For SYN-A 3G can be used to compensate for audio delays from Dolby E encoding or decoding.
Audio Delay (SYN-A 3G)	Tracking audio delay following the synchroniser video delay. Adjustable audio delay of up to 120ms on each channel. Delay is either on or off for any given channel.
Audio Replace (SYN-A 3G)	Audio shuffling of up to four de-embedded groups present on video input to any stereo channel of up to four output embedded groups. HANC cleaning means

		that there is no remnant of the original version of old groups. If group 1 is replaced there is not an old group 1 with the “mark for deletion” flag set. Instead there is just the new modified group 1.
	Auxiliary data	All VANC data is passed, together with all non-audio HANC data that is received as a contiguous input from the HANC start.
Status monitoring		
	LEDs	Front of card edge LED indicators to indicate: PSU rails present SDI input HD/SD GPI Out 5 & GPI Out 6 active
GPI inputs		
	Number and type:	4 x GPI inputs. Recall of presets. Pulse or level asserted. Active pull to ground, pulled up to +5V through 7 kohm.
GPI outputs		
	Number and type:	2 x GPI outputs, selectable from loss of input, video black and frozen reference missing and (for SYN-A 3G only) audio missing, audio channel silence. Electrically: Open collector transistors 30V, 270 ohm current limit resistors. Pulled up to +5V through 7k ohm.
Input fail output		
	Type:	Blue, black, bars, freeze frame, no output, with optional 3 second freeze before applying.

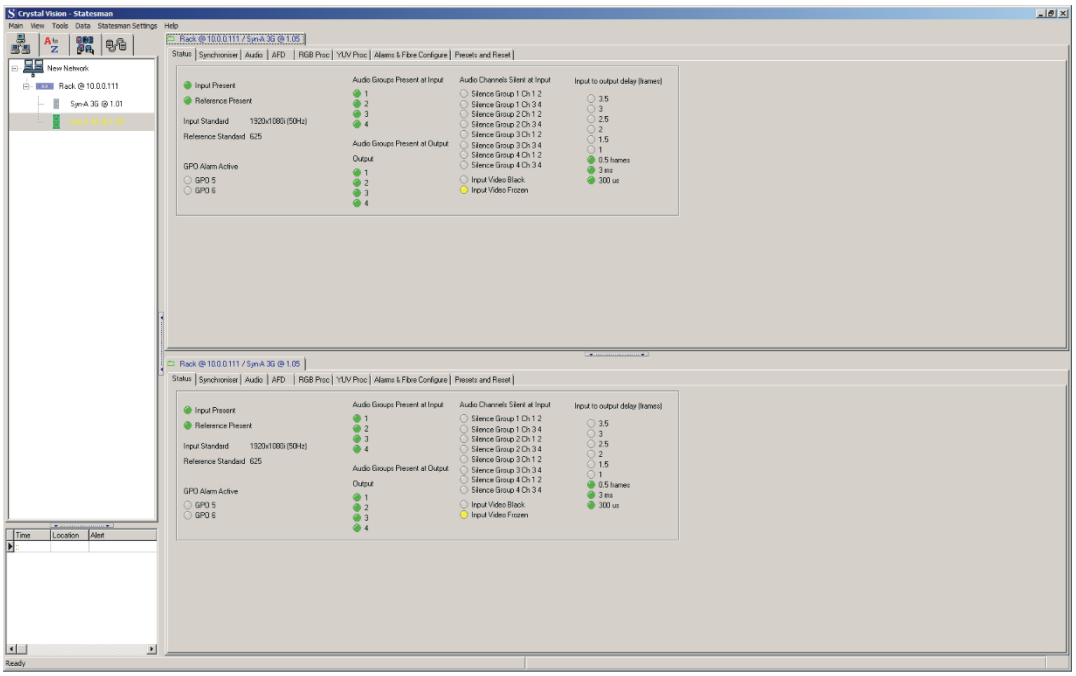
13 Appendix 1

Statesman

In July 2014, Statesman control of **SYN 3G** *models was superseded by VisionWeb control. Statesman is no longer supported after this date, but information for existing users is included in this appendix. The following is an extract from the SYN-A 3G manual:*

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.

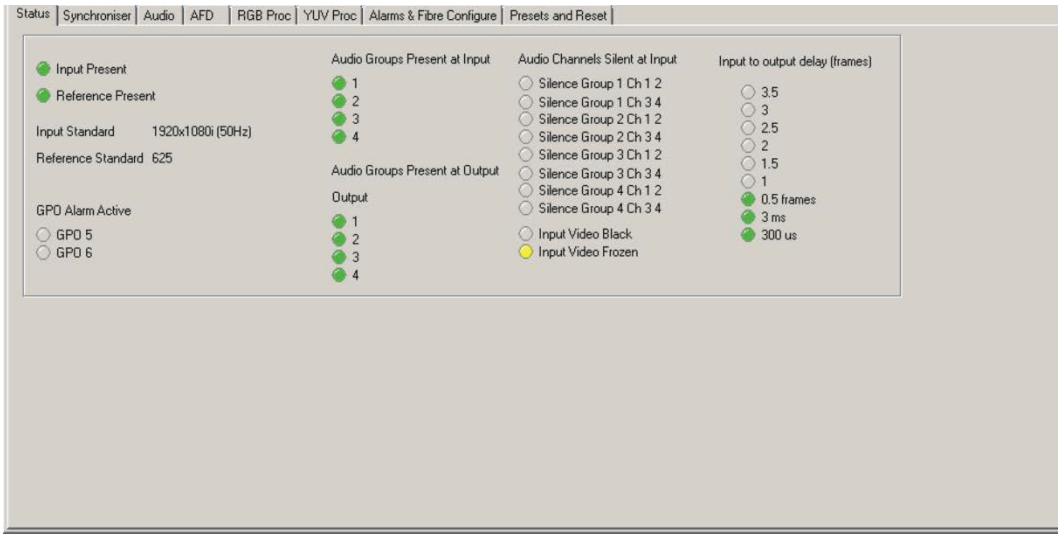
Note: For further details of Statesman configuration and operation please refer to the Statesman manual.

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. An amber LED will

give a warning as with video black or video frozen. If a LED turns red this is a fault condition so input present will turn red if the input should go away. 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

Input Video and audio status

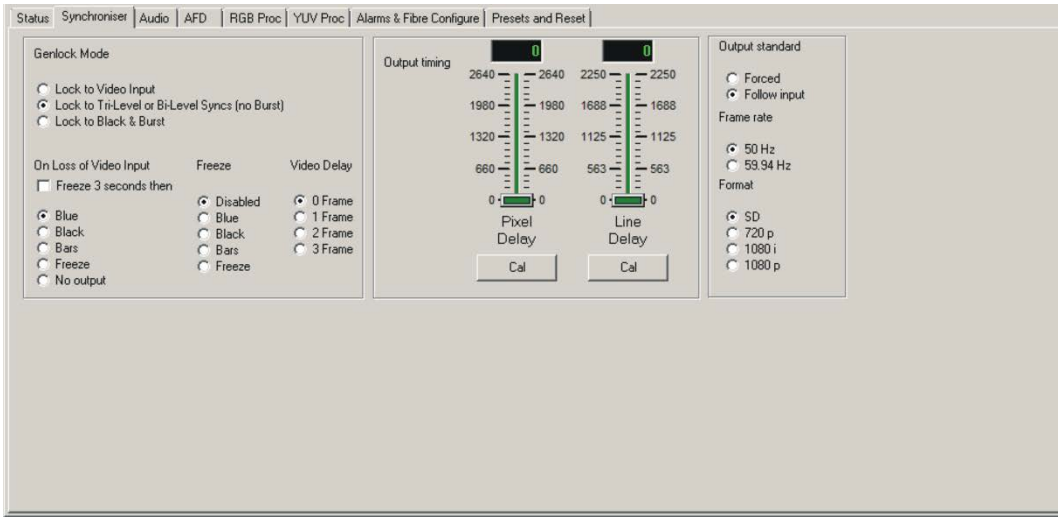
Input present and external reference is indicated by a simulated LED; green will indicate that the input is present, red for no input. The video standard of the incoming video and external reference is also given in text.

Audio present on the input video and output video is indicated by green LEDs, one for each of the four available audio groups. Should an audio group be missing the corresponding LED will be greyed out. Silence on any pair of channels is indicated as well as the total delay between the input and output video.

Synchroniser Control

The synchroniser control tab contains the various controls associated with the board mode and video timing.

Lose of input and forced out are amongst the available controls. The forced out function is particularly useful when setting up a system prior to programme availability.



Synchroniser controls

Genlock mode

The SYN-A 3G has two modes of operation, as a synchroniser or as a user set fixed delay. In synchroniser mode the external reference can be either Black and Burst or a Tri-level/Bi-level sync containing no burst. Delay mode is achieved by locking the SYN-A 3G to the incoming video rather than the external reference.

On loss of video input

Should the input video be lost due an up-line fault such as an equipment failure, the SYN-A 3G can be set to give a selection of responses. This response can be chosen from the following list: 100% colour bars, Blue, Black, Freeze last good frame. A three second delay can also be introduced where the picture will freeze for three seconds before reverting to the mode selected.

Selecting no output will remove the carrier from the output.

Freeze function

Selecting the freeze function will freeze the output again according to the user selection. When selecting freeze choose between 100% colour bars, Black, or the last good frame. Whilst frozen the output will remain timed to the external reference but any audio will mute.

Video delay and output timing

There are two user controls available to set the input to output video delay. The first control gives a coarse setting of delay in whole frames up to three frames of delay and the second set of controls gives a variable delay in lines and pixels. The maximum amount of variable delay that can be set is one field; dialling in any number of lines or pixels that exceed one field will result in the delay being limited to the number of lines per field of any input format.

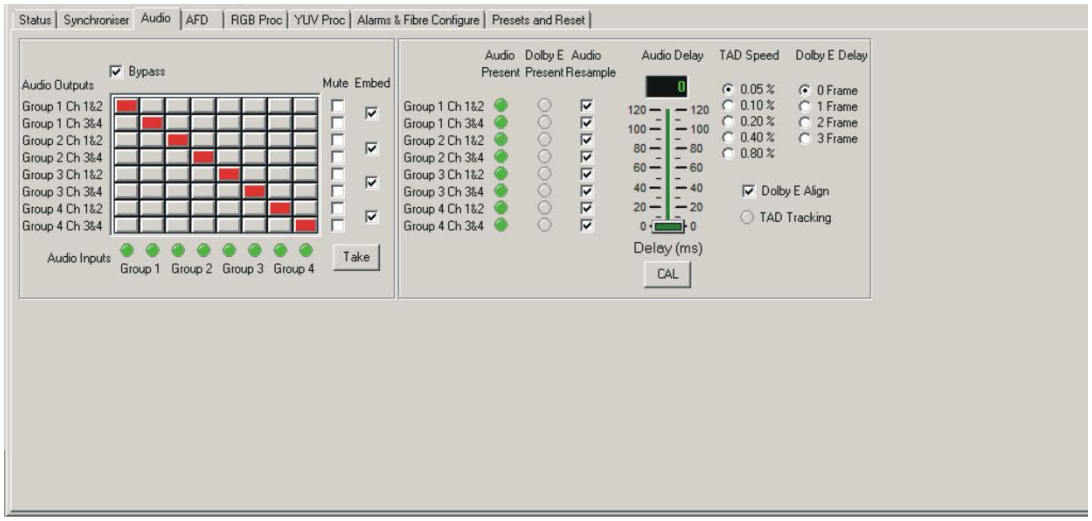
Note: The final input to output delay will be reliant on several factors such as synchroniser delay, audio resampling and Dolby E alignment.

Force output

The SYN-A 3G has the ability to have its output format forced without an input present. This ability is useful when setting up a system and checking signal paths. When in forced mode the output can then be set to any of the formats handled by the SYN-A 3G and give either a 100% colour bars or black output as selected by the ‘On loss of input’ control.

Audio controls

The audio controls tab contains the audio configuration controls. Audio routing, configuration and tracking audio delay speed are assigned in this tab.



Audio controls menu

Audio bypass

Selecting bypass will send any embedded audio directly to the output, bypassing the router and resamplers.

Routing matrix

At the heart of SYN-A 3G is the 16 input/16 output routing matrix. This will allow any of the up to eight possible stereo pairs embedded in the input video to be routed to any of the four groups on the output video.

Changes in the audio routing are implemented by clicking on the crosspoint tiles which will highlight in a dark red colour. Once the required routing is set up it can be actioned by clicking on the TAKE button. Until this time no changes to the routing matrix will have any effect on the audio routing.

Mute

Each of the stereo input pairs can be individually muted by selecting mute.

Note: When routing Dolby E, to ensure integrity of the audio any Dolby E stream must be treated as a stereo pair and no audio processing such as mute, mono and gain is applied.

Output Group Enable

The four output embedders can be individually enabled or disabled. This allows for any other data already present on the input video to be retained for downstream use.

Resamplers

The Resample Enable control affects how the audio data is manipulated to change the PCM delays. On resampled channels (resample enabled) the audio will be continuously resampled allowing seamless changes in audio delay. On non-resampled channels (resample not enabled) samples will be passed unchanged through the signal path: if the delay has to change, single

audio samples will be dropped or repeated as required. This control has no effect on channels containing Dolby E, which is automatically detected and bypasses the resamplers.

Audio delay

This control can be used to delay the audio with respect to the video and compensate for any small delay between the incoming video and audio signals.

Tracking audio delay speed

This sets the time the audio delay takes to track fast or abrupt changes in video delay, when video tracking is on. The faster the rate of change, the quicker the audio delay will match changes in video delay so minimising lip-sync errors, but at the expense of a matching change of musical pitch.

Refer to the Introduction chapter for more help with TAD speed settings for different applications.

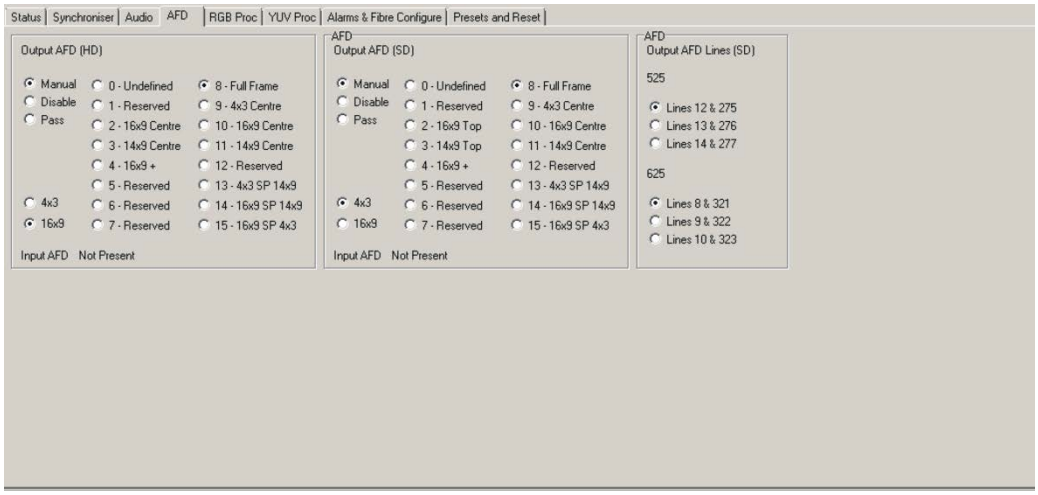
Dolby E delay and alignment

Dolby E can be delayed up to three frames of delay in one frame increments, and to ensure the correct positioning of the guardband the Dolby E alignment control can be enabled.

Note: Dolby E Align mode will limit the minimum video delay to 0.5 frames.

Output AFD

There are three sets of controls associated with Active Format Description (AFD). These are: the inserter mode control, entire image aspect ratio selector (coded frame) and the group of 16 AFD codes. These controls are repeated for both SD and HD.



Output AFD selection

The HD output will have the ANC data packets containing the AFD information inserted within the active line portion on the appropriate line. The SD output has further controls to select the line to be inserted. There are separate controls for both 525-line and 625-line.

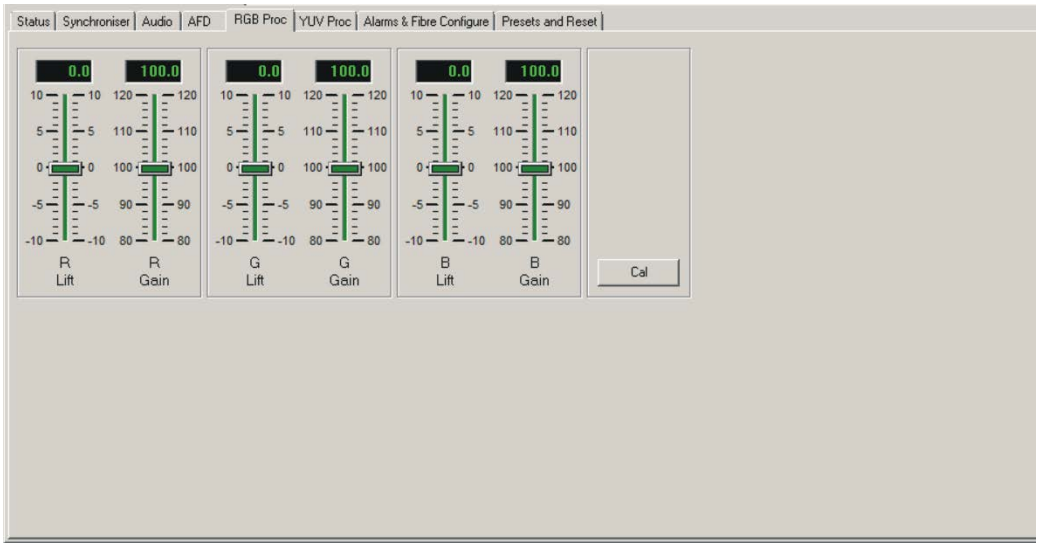
The 16 available codes are described in the following table.

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

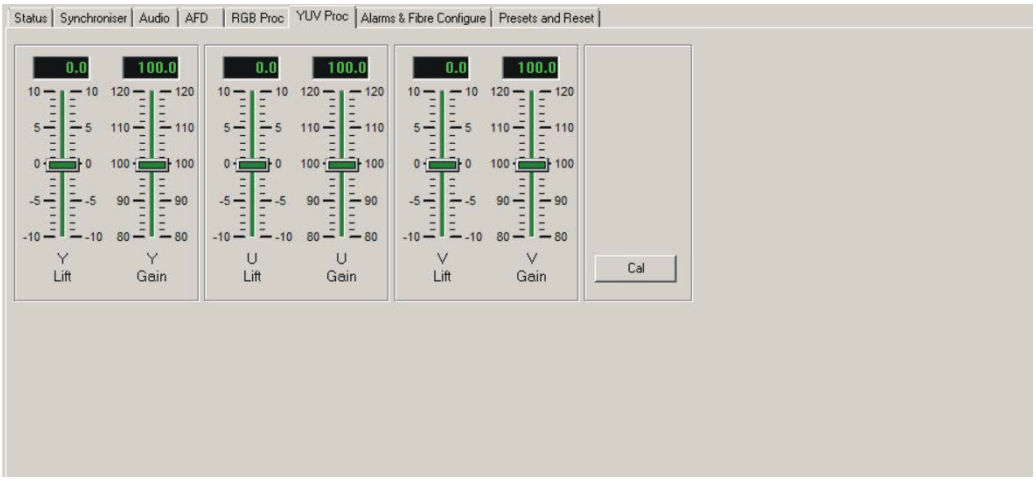
Note: When inserting SMPTE 2016 data the inserter will blank any incoming SMPTE 2016 data.

Video gain controls

SYN-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.



RGB lift and gain controls



YUV lift and gain controls

Video gains

The video proc-amp allows adjustment of video gain, black level and independent YUV gains. The maximum increase in overall gain allowed is 200%. Should any combination of controls be set where this maximum would be exceeded, the gain will be limited to 200%

Note: It is possible to set the gain controls so that their combined indicated gain will exceed 200%. In these circumstances the indicated values will not be valid.

GPO Alarms menu

The GPO5 and GPO6 output is reserved for alarm indication and may have assigned any of the 16 video and audio alarms.

Any number of alarms may be assigned to the GPI output: input missing, reference missing and input groups missing will assert an alarm immediately whereas the silence alarms 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.

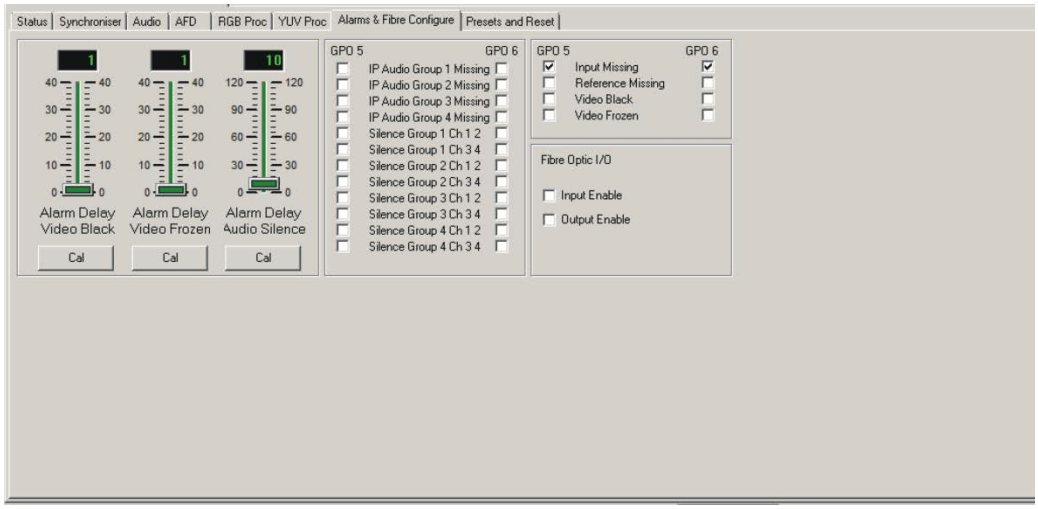
Where more than one alarm is flagged and an alarm condition is asserted, use the various status indicators to determine the exact cause.

Visual indication of GPO5 and GPO6 status is provided on the board edge.

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

Optical I/O

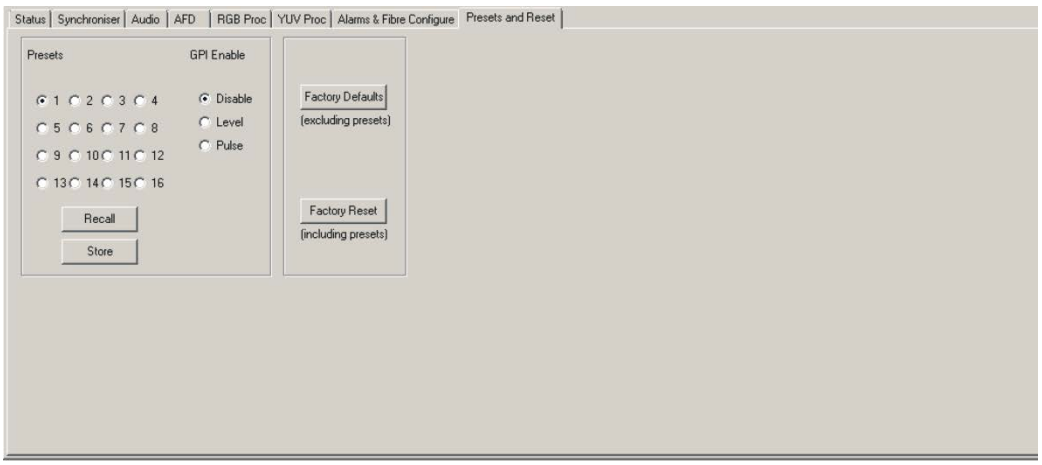
SYN-A 3G has long haul ability when fitted with an SFP single mode fibre optical module. The SFP module can be enabled using the Fibre IP/OP controls. Note that the cable input is disabled whilst the fibre input is enabled.



Alarms and Fibre configuration

Presets 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.



Presets and factory reset

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 overwritten by the new setting data. When pasting a board setup from Statesman, GPI enable will be set to disabled.

To recall previously stored setting information, again choose 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 standard	Forced
Frame rate	50Hz
Format	Standard Definition
Fibre optic I/O	Disabled
Output AFD High definition	Manual, 16:9, code 8 (Full frame)
Output AFD Standard definition	Manual, 4:3, code 8 (Full frame)
AFD lines	525 lines 12 & 275, 625 lines 8 & 321
Video gains	100%
Video lift	0%
Audio Router	Group 1 to Group 1 – Group 4 to Group 4
Audio Router bypass	Bypassed
Audio mute	Not muted
Output embedders	All enabled
Genlock mode	Lock to Tri-level or Bi-level syncs
On loss of input show	Bars
Freeze delay	Disabled
Freeze	Disabled
Video delay	0 frames
Audio resamplers	On
Audio delay	0ms
Tracking speed	0.05%
Dolby E delay	0 frames, Alignment selected
Output video timing	0 pixels, 0 lines
Alarm delays	Black 0ms, Frozen 0ms, Audio 10sec
GPO5, GPO6 Alarms	Unselected
Preset selection	Preset 1
GPI control of Presets	Disabled

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.