Crystal Vision

SYNNER-E 3G

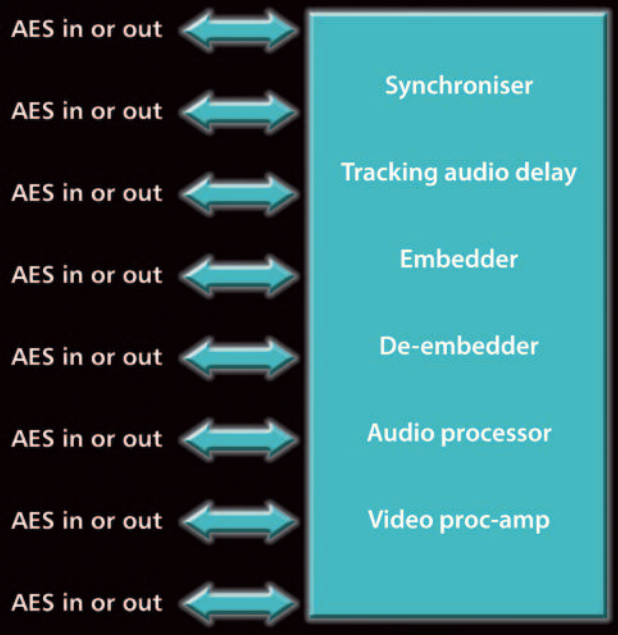
3G/HD/SD video synchroniser, tracking audio delay and embedder/de-embedder with Dolby E processing

SYNNER-E 3G simplifies system designs for those working with 3Gb/s, HD or SD sources in AES and Dolby E environments.

SYNNER-E 3G combines a video synchroniser, tracking audio delay, embedder, de-embedder, audio processor and video proc-amp, along with advanced handling of Dolby E and flexible delay compensation – all on one 100mm x 266mm board. It works with four groups of audio and can include integrated fibre input and output connectivity too.

With its combination of features making it the best solution for any embedding, de-embedding and timing requirements, SYNNER-E 3G will save you money and rack space. Powerful and cost-competitive, it's not surprising that it's been used in some of the largest projects in the world.

WHAT IS SYNNER-E 3G?



- Simplify your system design: the inclusion of a video synchroniser, tracking audio delay, embedder, de-embedder, audio processor and video proc-amp gives you multiple functionality on one board
- Use it with any source: works with 3Gb/s, HD and SD and up to four groups of digital audio
- Use it as a synchroniser or fixed delay line: synchronise incoming video signals not locked to the local reference or compensate for timing delays within the video system
- Excellent synchronising features: full vertical and horizontal timing adjustment and cross-locking
- Complete freedom when embedding and de-embedding external audio: embed or de-embed up to eight AES at the same time and in any combination
- Powerful audio routing: full shuffling and overwriting using two 32 x 16 audio routers
- Ideal for Dolby E users: synchronise video containing mixture of Dolby E and linear AES within same audio group and auto-correct timing errors with the guardband
- Easy to match all your signals: with flexible audio and video delays, including tracking audio delay and Dolby E compensation
- Optimise the audio and video: with full audio processing and video proc-amp
- Optional integrated fibre input/output connectivity means you won't be limited by cable lengths
- Saves rack space: 100mm x 266mm module allows 12 SYNNER-E 3G in 2U (24 in 4U, six in 1U and two in desk top box)
- Flexible control: select from board edge, front and remote panels, GPIs, SNMP and PC software

MULTI-FUNCTIONALITY ON A SINGLE BOARD

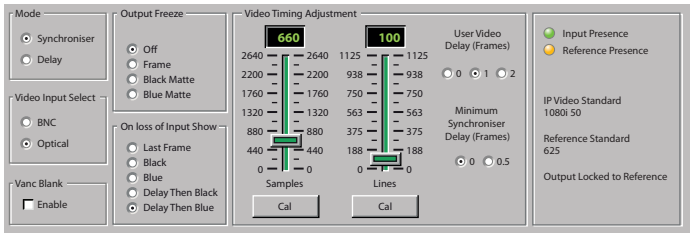
SYNNER-E 3G is one very powerful product. With the timing coming from either SD or HD analogue syncs, it can synchronise the 3Gb/s, HD or SD video, de-embed up to four audio groups, mono route the audio channels, pass the linear AES through a tracking audio delay to resample it before any audio processing while detecting, synchronising and aligning any Dolby E, and finally re-embed the four groups – outputting video and embedded audio timed to your system. It can embed and de-embed external AES and Dolby E too.

SYNCHRONISE THE VIDEO

SYNNER-E 3G can both synchronise incoming video signals which are not locked to the local reference and compensate for timing delays within the video system.

It has two operational modes: synchroniser and delay line. Synchroniser mode is ideal for external sources that are not timed to station references such as satellite or remote contribution feeds. In synchroniser mode SYNNER-E 3G takes its timing from the external analogue reference and will automatically synchronise sources between 0 and 1 frame, fixing any incorrect frame rates plus any delays. The ability to cross-lock allows it to conveniently use any existing timing signals, with a 3Gb/s, HD or SD input referenced to either HD tri-level syncs or SD Black and Burst. The reference loop-through on the RM70 rear module allows you to loop the analogue reference through a number of boards in a single frame – saving a DA and making cabling easy.

Delay mode takes its timing from the video input and is ideal for when the frame rate is correct but the source has been passed through equipment such as a chroma keyer, DVE or standards converter and therefore been delayed for a few lines. The delay is adjustable in samples, lines and whole frame steps.



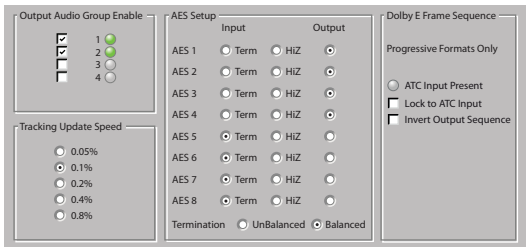
Set up your synchronising options

You can easily compensate for mistimed sources elsewhere in your system by adjusting the output timing relative to the reference through an entire frame using horizontal and vertical settings. Further fixed delays can then be added for matching purposes, meaning that the full delay can be set between four SD lines and 3.5 frames. *(See EASY TO TIME ALL YOUR SIGNALS section.)* Should the reference be removed or the board powered without a connected reference, SYNNER-E 3G will revert to delay mode. Both manual and automatic freeze are available.

EMBED AND DE-EMBED EXACTLY WHAT YOU WANT

SYNNER-E 3G offers complete freedom when embedding and de-embedding external AES or Dolby E audio.

There are eight bi-directional digital audio connections on the board which can each be independently configured as either an AES input or AES output, allowing the embedding or de-embedding of up to eight AES stereo pairs at the same time and in any combination.



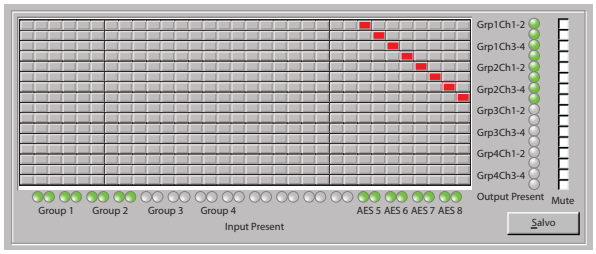
Individually select each external audio I/O to be either an input or output

This means that SYNNER-E 3G can accept an untimed feed of video and embed up to four groups of external AES or Dolby E audio, producing timed video and embedded audio with optional overwriting of audio channels. Or SYNNER-E 3G can take an untimed feed of video and embedded audio and produce video and separate AES or Dolby E audio, timed to station syncs.

ROUTING YOUR AUDIO

SYNNER-E 3G includes powerful audio routing, allowing full shuffling and overwriting of the mono channels.

At the heart of SYNNER-E 3G are two 32 input/16 output mono audio routing matrices. One is the embedder output router, with the other the AES output router. These allow up to 32 possible audio input channels (16 embedded channels from up to four groups present on the input video, plus up to eight external stereo pair AES inputs) to be routed to 16 outputs for either embedding into up to four groups on the output video, or up to eight external stereo pair AES outputs.



The Statesman PC software makes audio routing easy: simply click on the squares in the matrix

Channel shuffling allows you to rearrange the audio tracks between the four groups, while with audio replace the external audio can overwrite some of the original audio channels from the video feed.

IDEAL FOR DOLBY E USERS

SYNNER-E 3G allows very flexible handling of Dolby E, with Dolby E data automatically detected and processed appropriately – ensuring it is routed in such a way that you can't destroy the data.

SYNNER-E 3G can embed or de-embed up to 16 channels of Dolby E and will synchronise video containing Dolby E, linear audio or both – allowing a mixture of Dolby E and linear AES within the same audio group. How? It separates the Dolby E and linear audio and synchronises both types in the appropriate way before re-embedding the audio. When transporting Dolby E, any Dolby E stream must be treated as a stereo pair and no audio processing applied to ensure integrity of the audio.

It's important to ensure that when Dolby E data is embedded, the guardband is in the correct place. SYNNER-E 3G has the ability to auto-correct timing errors with the guardband, aligning it correctly with the output video switching point. SYNNER-E 3G can also use incoming Ancillary Timecode (ATC) or an interlaced reference signal to determine the field sequence of a High Definition progressive video output, which helps to ensure that Dolby E has its guardband correctly positioned. The invert output sequence control allows the Dolby E output to be timed in anti-phase to the ATC or interlaced reference, if required, to allow for subsequent processing.

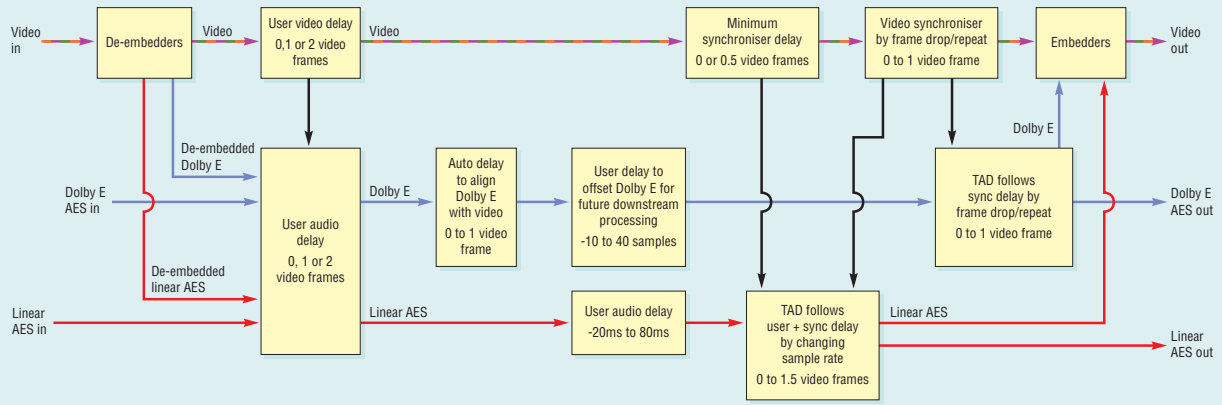
Converting to or from Dolby E delays the audio by one video frame, and SYNNER-E 3G can therefore add a compensating delay to the video and linear audio to match all the signals. *(See EASY TO TIME ALL YOUR SIGNALS section.)*

EASY TO TIME ALL YOUR SIGNALS

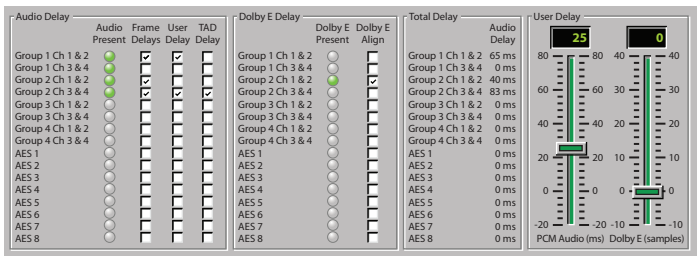
SYNNER-E 3G offers a flexible range of video and audio delays to help match all your signals and ensure Dolby E alignment. *(See the Understanding the video and audio delays diagram for more information.)*

For the video… The synchroniser delay automatically adjusts over a range of 0 to 1 frames to provide the desired output timing. A switchable one or two frames video delay, adjustable in whole frame steps, can match Dolby E or other

Understanding the video and audio delays



big system delays and bring the video and audio timing back into alignment. The Minimum synchroniser delay allows a further 0.5 frames delay to be added to the video and linear audio to ensure correct Dolby E alignment.



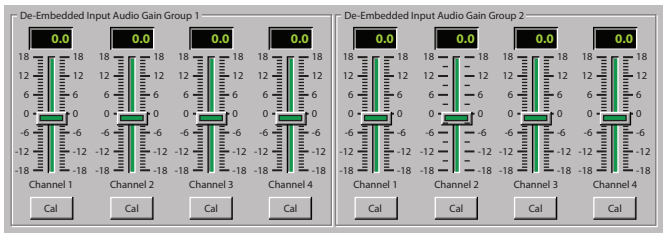
Set up flexible delays for your linear AES and Dolby E

For the audio… An internal tracking audio delay tracks the video delay, running the audio fast or slow to ensure the video and audio stay correctly timed and to avoid lip-sync errors. There are two tracking audio delays: one for the linear audio and the other for Dolby E. A fixed audio delay of one or two frames can be added to both linear AES and Dolby E to match the equivalent video delay. Up to 80ms of audio delay can be added on top of the tracking to compensate the linear AES for any small delay between the incoming video and audio signals caused by video processing. A delay of between 0 and 1 frame can be added to a Dolby E signal so that the guardband is correctly aligned with the video timing, ready for embedding into the output video. Finally, up to 40 samples of adjustable delay allows you to 'nudge' the position of the Dolby E frame relative to the video, so that you can deliberately offset the Dolby E from its correct position to compensate for processing further downstream.

SYNNER-E 3G helps you monitor exactly how much delay has been set by indicating the total audio delay in milliseconds.

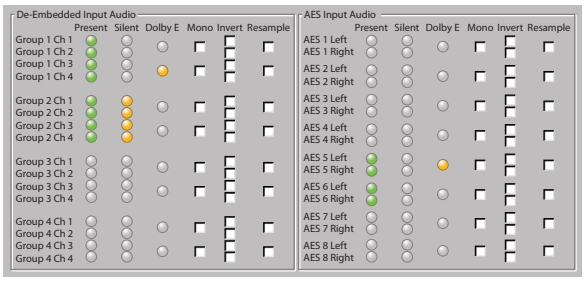
OPTIMISE THE AUDIO AND VIDEO

SYNNER-E 3G includes full audio processing of the linear AES.



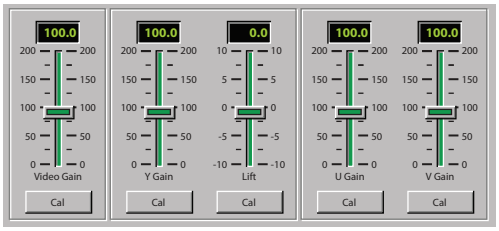
Adjust the audio levels

The audio levels can be increased or decreased to match the rest of your system, or even be muted to silence. There are a total of 32 individual audio gain controls, for the 16 channels of audio de-embedded from the video and 16 channels of external AES audio. Each gain control is independently adjustable between +18dB and -18dB in 0.1dB steps.



Invert, resample and convert from stereo to mono

Stereo to mono conversion is available to help those broadcasting a multi-language service. Each of the 32 audio input channels can also be individually inverted – allowing you to correct for any reversed wiring of differential pairs.



Optimise the picture with the video proc-amp

SYNNER-E 3G additionally includes a video proc-amp for picture optimisation and to help maintain colour fidelity, with adjustment of the video gain, black level and independent YUV gains by up to 200%.

FIBRE CONNECTIVITY – ON THE BOARD

With SYNNER-E 3G you can have fibre input or output straight into the board – ideal when you need to send and receive signals beyond the local equipment bay and giving you even more functionality on a single module. You can come in on fibre, embed, de-embed, synchronise. Or you can go out on fibre once you've synchronised and embedded. Just order either the FIP fibre input option, FOP fibre output option or FIO fibre input and output option.

Designed for SMPTE 297-2006 short-haul applications, the FIP is used to receive an optical input and the FOP to transmit an optical output using a Class I laser. The FIO can do both – giving you simultaneous fibre input and output. With a FIP or FIO fitted you can select your video input source to be taken either from the input BNC or the optical input. Having the fibre integral to the board reduces the need to use up additional rack space for separate fibre optic transmitters and receivers – as well as saving you money.

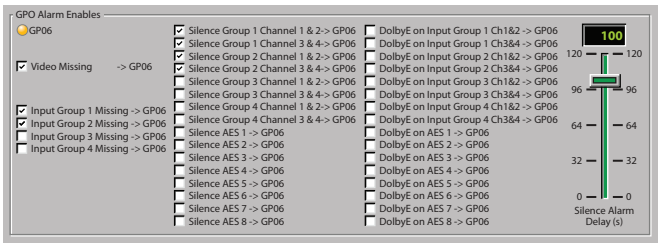
SYNNER-E 3G can also support CWDM lasers if required.

FRAMES AND CONTROL

SYNNER-E 3G is a space-saving 100mm x 266mm module which is housed alongside any other product in the standard frames – available in 4U, 2U, 1U and desk top box sizes – with up to 12 boards fitting in 2U.

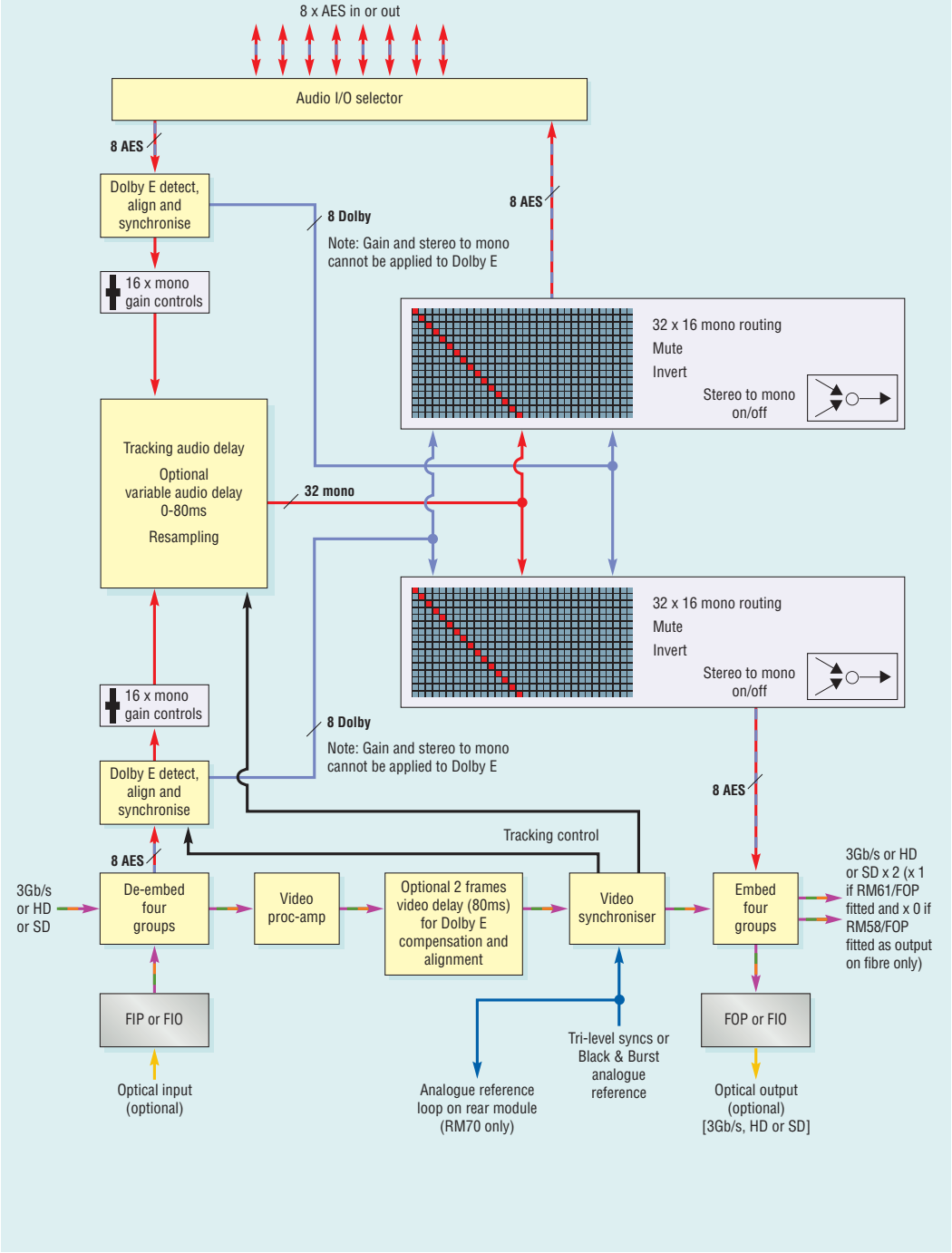
There's a choice of seven different frame rear modules (the RM47, RM49, RM58, RM59, RM61, RM62 and RM70) to access the inputs and outputs, with the rear modules chosen for their ability to be used with 110 ohm audio, 75 ohm audio and fibre input or output.

SYNNER-E 3G is very straightforward to operate, with control options including board edge switches, an active front panel on the frame, a remote control panel, GPIs, SNMP and the Statesman PC software. Up to 16 user-defined presets, containing the board setup data, may be stored and recalled. One GPI output is reserved for alarm indication and may be assigned any number of 37 video and audio alarms, allowing comprehensive signal monitoring. *(See the SPECIFICATION for full list of alarms.)* The silence alarms can be delayed before triggering to prevent false alarming during quiet periods in the audio.

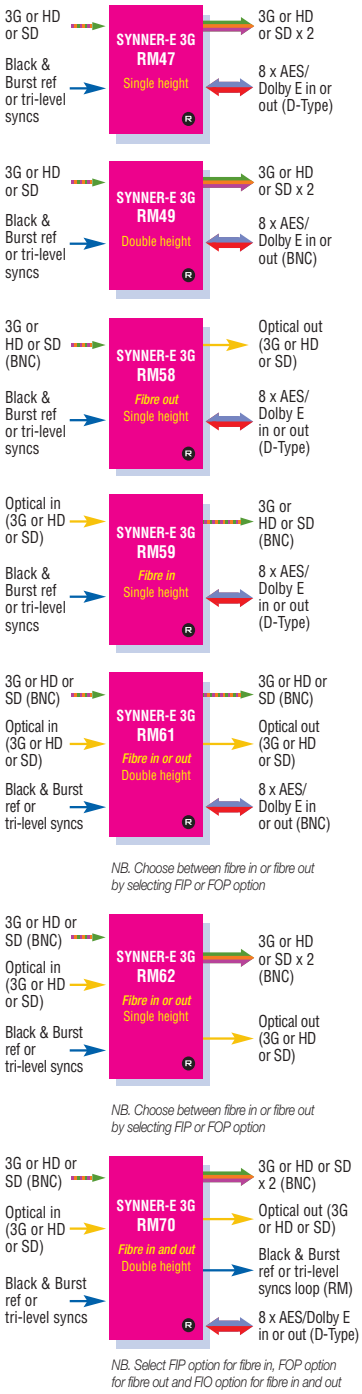


Get comprehensive signal monitoring with 37 alarms

THE INPUTS AND OUTPUTS



REAR MODULE INPUTS/OUTPUTS



NB. Choose between fibre in or fibre out by selecting FIP or FOP option

NB. Choose between fibre in or fibre out by selecting FIP or FOP option

NB. Select FIP option for fibre in, FOP option for fibre out and FIO option for fibre in and out

SPECIFICATION

MECHANICAL

Standard Crystal Vision module 266mm x 100mm

Weight: 200g

Power consumption: 11.9 Watts; 0.6 Watts (FIP and FOP); 1 Watt (FIO)

VIDEO INPUT

One 3Gb/s or HD or SD input

When using FIP or FIO fibre input options allows selection between one optical and one electrical input (NB. Fibre input only on RM59 frame rear module)

270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to EBU 3267-E, SMPTE 259M, SMPTE 292M and SMPTE 424M

The video formats supported are 625, 525, 720p50, 720p59.94, 1080i50, 1080i59.94, 1080p50 and 1080p59.94

3Gb/s cable equalisation up to 80m using Belden 1694A. HD cable equalisation up to 140m with Belden 1694A or equivalent (approx. 100m with Belden 8281). SD cable equalisation >250m Belden 8281 or equivalent

Input return loss: -15dB for 50MHz to 1.5GHz and -10dB for 1.5GHz to 3GHz

Automatic de-embedding to SMPTE 272M or SMPTE 299M

The video input can contain up to four groups of embedded audio

VIDEO OUTPUTS

Using RM47 and RM49 rear modules: Two 3Gb/s, HD or SD outputs

Using RM59 and RM61 rear modules with FIP fibre input option: One 3Gb/s, HD or SD output

Using RM62 and RM70 rear modules with FIP fibre input option: Two 3Gb/s, HD or SD outputs. NB. RM62 has no audio connections

Using RM58 rear module with FOP fibre output option: One 3Gb/s, HD or SD output on fibre only

Using RM61 rear module with FOP fibre output option: Two 3Gb/s, HD or SD outputs (one on fibre and one on BNC)

Using RM62 and RM70 rear modules with FOP fibre output option: Three 3Gb/s, HD or SD outputs (one on fibre and two on BNC). NB. RM62 has no audio connections

Using RM70 rear module with FIO fibre input and output option: Three 3Gb/s, HD or SD outputs (one on fibre and two on BNC)

Serial output: 270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to EBU 3267-E, SMPTE 259M, SMPTE 292M and SMPTE 424M. Output follows the input format

Audio is embedded to SMPTE 272M or SMPTE 299M

INTEGRATED FIBRE OPTIONS

SYNNER-E 3G can be given integrated fibre connectivity by fitting the FIP fibre input option, FOP fibre output option or FIO fibre input and output option

The chosen option should be fitted at the factory

To access the optical inputs or outputs an RM58, RM59, RM61, RM62 or RM70 frame rear module must be used

When fitted with a FIP, FOP or FIO, SYNNER-E 3G can be housed in any frame slot position but due to its extra height it is not possible to place Standard Definition or audio boards directly above it when the SYNNER-E 3G is in even numbered slot positions. 3Gb/s and HD boards do not share this restriction.

FIP, FOP and FIO meet the SMPTE 297-2006 short-haul specification, allowing operation with single-mode and multi-mode fibre

Connector type: SC/PC

FIP or FIO input:

Optical wavelength: 1260-1620nm

Input level maximum: 0dBm

Input level minimum: Typical -20dBm (-18dBm 3Gb/s pathological)

FOP or FIO output:

Optical power: Max 0dBm, min -5.0dBm (typical -2.0dBm or 630uW)

Fibre pigtail: Single-mode 8/125uM

Optical wavelength: 1290-1330nm (1310 typical)

Extinction ratio: 7.5dB

Laser safety classification: Class 1 (EN 60825), Class I (21CFR1040.10)

ANALOGUE REFERENCE

Tri-level syncs or analogue Black and Burst or video

3Gb/s, HD or SD source can use either type of reference

When cross-locking it is necessary for both the video input and reference to share the same frame rate

Amplitude of syncs 150mV to 600mV

Link on PCB selects 75 ohm termination or high impedance

Reference rear module loop-through available on RM70 – loop does not need SYNNER-E 3G to be fitted as rear module has passive circuitry required

SYNCHRONISER TIMING ADJUSTMENTS

In synchroniser mode SYNNER-E 3G takes its timing from the external analogue reference and will automatically synchronise sources between 0 and 1 frame. Further fixed delays can be added for matching purposes. Should the reference be removed, SYNNER-E 3G will revert to delay mode

In delay mode timing is derived from the 3Gb/s, HD or SD input, with the video delay adjusted in samples, lines and whole frame steps up to a maximum of 3.5 video frames

In both synchroniser and delay modes the timing can be fully adjusted using horizontal and vertical settings. Increasing the vertical setting will delay the output relative to the reference in increments of one line. Increasing the horizontal setting will increase this delay in increments of approx. 74ns for SD and 13.5ns for HD. With maximum adjustment of vertical and horizontal timing, the delay can be set between four SD lines and 3.5 frames

FREEZE FUNCTIONS

Manual freeze allows SYNNER-E 3G to be used as a simple still store. Automatic freeze is available when input fails through loss of signal. The user can specify to show the whole frame in which failure happened or alternatively a black or blue screen (with or without an initial delay of two seconds)

AUDIO INPUTS AND OUTPUTS

Eight bi-directional digital audio I/O ports on the board can each be independently configured to be either an AES input or AES output 24 bit stereo pair. This allows the embedding or de-embedding of up to eight AES at the same time and in any combination

SYNNER-E 3G can embed or de-embed synchronous 48kHz AES, asynchronous 48kHz AES and Dolby E. Linear AES can be resampled. Dolby E cannot be resampled. A manual resampler on/off control allows SYNNER-E 3G to embed synchronous compressed audio such as AC3

110 ohm or HiZ (balanced) via D-Type, or AES3-id (unbalanced) via 75 ohm BNC

DOLBY E HANDLING

Dolby E data will be automatically detected and processed appropriately

Any of the audio sources can contain Dolby E

SYNNER-E 3G allows a mixture of Dolby E and linear AES within the same audio group, separating the Dolby E and linear audio and synchronising both types in the appropriate way before re-embedding the audio

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

SYNNER-E 3G can auto-correct timing errors with the guardband. Dolby E will be delayed by the same amount as the video, except for any change required to align it correctly with the output video switching point

SYNNER-E 3G can use incoming Ancillary Timecode (ATC) or an interlaced reference signal to determine the field sequence of a High Definition progressive video output, which helps to ensure that Dolby E has its guardband correctly positioned

The invert output sequence control allows the Dolby E output to be timed in anti-phase to the ATC or interlaced reference, if required, to allow for subsequent processing

DELAY THROUGH BOARD

Minimum video in to out delay: 4 lines

Minimum audio delay: 2.5ms

VIDEO DELAYS

0 to 1 frame video synchroniser delay

Optional one frame (33.3ms or 40ms) or two frames (66.6ms or 80ms) video delay allows compensation for Dolby E encoding and decoding, or can match other big video delays in the system

Fixed Minimum Synchroniser delay of 0 or 0.5 video frames can change the Dolby E timing by +/- 0.5 frames relative to the video and allows repeated embed/de-embed cycles with less risk of the Dolby E getting progressively later relative to the video

AUDIO TIMING ADJUSTMENTS

Audio can be routed through a tracking audio delay (TAD). It tracks the video delay, running the audio fast or slow to ensure the video and linear audio stay correctly timed and to avoid lip-sync errors. The linear audio TAD will be between 0 and 1.5 frames and have the same value as the video synchroniser delay plus the 0.5 frame video delay. The Dolby E TAD will be between 0 and 1 frame and have the same value as the video synchroniser delay. A control sets the time the TAD takes to track fast or abrupt changes in video delay

The audio is normally delayed by the same amount as the video but an adjustable audio delay from -20ms up to 80ms on each stereo pair of linear AES will compensate for any small delay between the incoming video and audio signals. Delay is either on or off for any given stereo pair. Adjustments in the negative range will only have an effect up to the maximum value of other delays in the chain

A fixed audio delay for both linear AES and Dolby E of 0, 1 or 2 frames is available to match the equivalent video delay

If a Dolby E channel is set for automatic alignment an audio delay of 0 to 1 video frame automatically delays the Dolby E signal so that the guardband is correctly aligned with the video timing

The -10 to +40 Dolby E samples adjustable delay in the Dolby E path allows the position of the Dolby E frame relative to the video to be nudged, deliberately offsetting the Dolby E from its correct position to compensate for processing further downstream

AUDIO REPLACE

SYNNER-E 3G has two 32 input/16 output mono audio routing matrices. One is the embedder output router, with the other the AES output router

These allow up to 32 audio channels (16 embedded channels from up to four groups present on the input video, plus up to eight external stereo pair AES inputs) to be routed to 16 outputs for either embedding into up to four groups on the output video, or up to eight external stereo pair AES outputs

HANC cleaning removes the original version of old groups

AUDIO PROCESSING

Audio processing can be applied to linear AES only. It cannot be applied to Dolby E

Gain level adjustment on each channel between +18dB and -18dB in 0.1dB steps with 0dB calibration. There are a total of 32 audio gain controls, for the 16 channels of audio de-embedded from the video and 16 channels of external AES audio

Mute

Inversion

Stereo to mono conversion

VIDEO PROCESSING

Video proc-amp for picture optimisation and to help maintain colour fidelity, with adjustment of the video gain, black level and independent YUV gains, with a maximum increase of 200%

ANCILLARY DATA

Ancillary data passed unless set to blank (by enabling VANC blanking)

LED INDICATION OF:

Power supplies on board

Video input HD/SD

Input audio groups present

Gains not calibrated

GPI output 6 active

PRESETS

The current board settings can be saved in one of 16 locations to be recalled as required

GPI INPUT LEVELS

Active: pull to ground, pulled up to +5V through 10 kohm

GPI OUTPUT LEVELS

Electrically: Open collector transistors 30V, 270 ohm current limit resistors. Pulled up to +5V through 6800 ohm

GPI INPUTS

Four GPI inputs can be used to recall stored presets

GPI OUTPUTS

One GPI output (GPI 6) is reserved for alarm indication. It may be assigned any number of 37 video and audio alarms:

- Video missing
- Input group 1 missing
- Input group 2 missing
- Input group 3 missing
- Input group 4 missing
- Silence group 1 channels 1 and 2
- Silence group 1 channels 3 and 4
- Silence group 2 channels 1 and 2
- Silence group 2 channels 3 and 4
- Silence group 3 channels 1 and 2
- Silence group 3 channels 3 and 4
- Silence group 4 channels 1 and 2
- Silence group 4 channels 3 and 4
- Silence AES 1
- Silence AES 2
- Silence AES 3
- Silence AES 4
- Silence AES 5
- Silence AES 6
- Silence AES 7
- Silence AES 8
- Dolby E on input group 1 channels 1 and 2
- Dolby E on input group 1 channels 3 and 4
- Dolby E on input group 2 channels 1 and 2
- Dolby E on input group 2 channels 3 and 4
- Dolby E on input group 3 channels 1 and 2
- Dolby E on input group 3 channels 3 and 4
- Dolby E on input group 4 channels 1 and 2
- Dolby E on input group 4 channels 3 and 4
- Dolby E on AES 1
- Dolby E on AES 2
- Dolby E on AES 3
- Dolby E on AES 4
- Dolby E on AES 5
- Dolby E on AES 6
- Dolby E on AES 7
- Dolby E on AES 8

Video missing and input groups missing will assert an alarm immediately. The silence alarms can be delayed by up to 120 seconds before an alarm is asserted to prevent false alarming during quiet audio periods

LOCAL CONTROL

Intuitive board edge interface with two select buttons, shaft encoder and ten character alphanumeric display

REMOTE CONTROL

RS422/485

19200 baud, 8 bits, 1 stop no parity

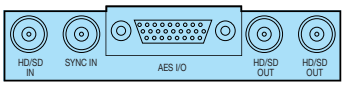
Control from frame active front panel and remote panel

Statesman allows control from any PC on a network

SNMP monitoring and control available as a frame option

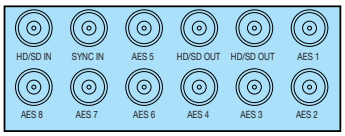
REAR MODULE CONNECTIONS

For standard applications using 110 ohm AES audio



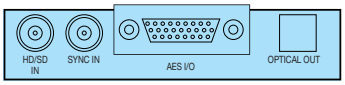
RM47

For standard applications using 75 ohm AES audio



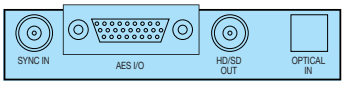
RM49

For fibre output applications using 110 ohm AES audio



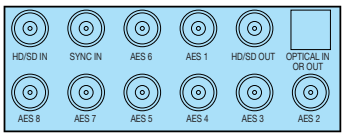
RM58

For fibre input applications using 110 ohm AES audio



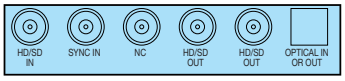
RM59

For fibre input or output applications using 75 ohm AES audio



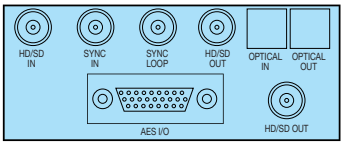
RM61

For fibre input or output applications with no audio connections



RM62

For fibre input and output applications using 110 ohm AES audio



RM70

ORDERING INFORMATION

SYNNER-E 3G	3G/HD/SD video synchroniser, tracking audio delay, embedder/de-embedder, audio processor and video proc-amp for up to four groups of audio, with special Dolby E processing
FIP	Fibre input option for SYNNER-E 3G motherboard providing integrated fibre input connectivity
FOP	Fibre output option for SYNNER-E 3G motherboard providing integrated fibre output connectivity
FIO	Fibre input and output option for SYNNER-E 3G motherboard providing both integrated fibre input and output connectivity
	For CWDM laser output options, contact Crystal Vision
Indigo 4	4U frame with passive front panel for up to 24 Crystal Vision modules
Indigo 4SE	4U frame with passive front panel fitted with Statesman CPU for up to 24 Crystal Vision modules
Indigo 2	2U frame with passive front panel for up to 12 Crystal Vision modules
Indigo 2AE	2U frame with active front panel for up to 12 Crystal Vision modules
Indigo 2SE	2U frame with passive front panel fitted with Statesman CPU for up to 12 Crystal Vision modules
Indigo 1	1U frame with passive front panel for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1-DP
Indigo 1AE	1U frame with active front panel for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1AE-DP
Indigo 1SE	1U frame with passive front panel fitted with Statesman CPU for up to six Crystal Vision modules. Power supply redundancy available with Indigo 1SE-DP
Indigo DT	Desk top box with passive front panel for up to two Crystal Vision modules
Indigo DTSE	Desk top box with passive front panel fitted with Statesman CPU for up to two Crystal Vision modules
RM47	Single slot frame rear module. Allows maximum number of boards in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Suitable for 110 ohm digital audio. Gives access to one 3Gb/s, HD or SD input, two 3Gb/s, HD or SD outputs and eight AES inputs or outputs
RM49	Two slot frame rear module. Allows 12 boards in 4U, six in 2U, three in 1U and one in desk top box. Suitable for 75 ohm digital audio. Gives access to one 3Gb/s, HD or SD input, two 3Gb/s, HD or SD outputs and eight AES inputs or outputs
RM58	Single slot frame rear module. Allows maximum number of boards in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Designed for applications using fibre outputs. Suitable for 110 ohm digital audio. Gives access to one 3Gb/s, HD or SD input, one 3Gb/s, HD or SD output (on fibre only) and eight AES inputs or outputs
RM59	Single slot frame rear module. Allows maximum number of boards in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Designed for applications using fibre inputs. Suitable for 110 ohm digital audio. Gives access to one 3Gb/s, HD or SD input (on fibre only) and gives out one 3Gb/s, HD or SD output and eight AES inputs or outputs
RM61	Two slot frame rear module. Allows 12 boards in 4U, six in 2U, three in 1U and one in desk top box. Designed for applications using fibre inputs or outputs. Suitable for 75 ohm digital audio. **When using fibre input**, allows you to select between one fibre and one electrical 3Gb/s, HD or SD input and gives out one 3Gb/s, HD or SD output and eight AES inputs or outputs. **When using fibre output**, gives access to one 3Gb/s, HD or SD input, two 3Gb/s, HD or SD outputs (one on fibre and one on BNC) and eight AES inputs or outputs
RM62	Single slot frame rear module. Allows maximum number of boards in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Designed for applications using fibre inputs or outputs and for video-only applications (does not have any audio connections). **When using fibre input**, allows you to select between one fibre and one electrical 3Gb/s, HD or SD input and gives out two 3Gb/s, HD or SD outputs. **When using fibre output**, gives access to one 3Gb/s, HD or SD input and three 3Gb/s, HD or SD outputs (one on fibre and two on BNC)
RM70	Two slot frame rear module. Allows 12 boards in 4U, six in 2U, three in 1U and one in desk top box. Suitable for 110 ohm digital audio. Designed for applications using both fibre inputs and outputs. **When using fibre input**, allows you to select between one fibre and one electrical 3Gb/s, HD or SD input and gives out two 3Gb/s, HD or SD outputs, a rear module reference loop-through and eight AES inputs or outputs. **When using fibre output**, gives access to one 3Gb/s, HD or SD input, three 3Gb/s, HD or SD outputs (one on fibre and two on BNC), a rear module reference loop-through and eight AES inputs or outputs. **When using both fibre input and output**, allows you to select between one fibre and one electrical 3Gb/s, HD or SD input and gives out three 3Gb/s, HD or SD outputs (one on fibre and two on BNC), a rear module reference loop-through and eight AES inputs or outputs
REMIND	19" remote control panel
REMIND-E	19" Ethernet remote control panel
Statesman	PC Control System
SNMP	SNMP monitoring and control

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