Crystal Vision

SYNNER HD

HD/SD Video Synchroniser, Tracking Audio Delay, Embedder/De-Embedder and Audio Processor

SYNNER HD will simplify your system design. As flexible as you need it to be, SYNNER HD combines on one board the traditional functionality of five different products - video synchroniser, tracking audio delay, embedder, de-embedder and audio processor - giving enhanced flexibility to the system designer while bringing significant cost and rack space savings.

SYNNER HD can be used in many different ways, and is ideal for any application involving untimed HD or SD video and associated audio, whether that audio is already embedded or needs to be embedded. Its first and foremost use is as a straightforward embedded audio synchroniser. SYNNER HD can both synchronise incoming video signals which are not locked to the local reference and compensate for timing delays within the video system. With timing coming from either SD or HD analogue syncs, it will synchronise the video, de-embed up to two audio groups, mono route the audio channels and pass them through a tracking audio delay resampling them to match the synchronised video, apply any audio processing and then finally re-embed the two groups - outputting video and embedded audio timed to your system.

By adding input piggybacks SYNNER HD can accept an untimed feed of video and embed up to two groups of external analogue or digital audio, producing timed video and embedded audio with optional overwriting of audio channels. Used like this, SYNNER HD offers a complete input stage for asynchronous HD or SD video and analogue or digital audio into an embedded audio system, making it ideal for audio and video lines in.

Perhaps you have an embedded feed that you want to synchronise and break into separate video and audio. With output piggybacks fitted SYNNER HD can take an untimed feed of video and embedded audio and produce video and separate analogue or digital audio timed to station syncs.

By fitting one input piggyback and one output piggyback, SYNNER HD can be used as a combined video synchroniser and tracking audio delay for independent video and audio. In this case the audio can be fully processed and delayed to match the synchronised video.

SYNNER HD - one board, so many applications!

- HD/SD synchroniser, tracking audio delay, embedder/ de-embedder and audio processor
- Ideal for a wide range of applications - whether you need a straightforward embedded audio synchroniser or something more
- Use as synchroniser or fixed delay line
- Full vertical and horizontal timing adjustment (0-1 frame)
- Cross-locking: HD or SD source can be referenced to either HD tri-level syncs or SD Black and Burst
- Fast locking after an upstream switch
- Selectable black, blue or freeze on input failure
- Tracking audio delay will automatically synchronise video and audio
- Compensate for early audio by adding up to 20ms variable audio delay
- Embed or de-embed one or two groups of AES or analogue audio
- Configure audio inputs and outputs using piggybacks
- Shuffle or overwrite existing audio
- Audio processing includes gain adjustment and stereo to mono conversion
- Synchroniser delay pulse output for audio follow
- Space-saving: 100mm x 266mm module allows 12 SYNNER HD in 2U (24 in 4U, six in 1U and two in desk top box)
- Flexible control, including PC software

SYNCHRONISER

Essentially a frame synchroniser allowing any timing difference, SYNNER HD additionally offers the advantages of a line synchroniser, with a short minimum delay of 2us and quick recovery of input timing.

SYNNER HD 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 HD 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. SYNNER HD's ability to cross-lock means that an HD or SD input can be referenced to either HD tri-level syncs or SD Black and Burst - therefore allowing it to use any existing timing signals. The output timing relative to the reference can be adjusted through an entire frame using horizontal and vertical settings. Should the reference be removed or the board powered without a connected reference SYNNER HD will run in delay mode locked to the main input.

Delay mode is ideal for when the frame rate is correct but the source has been passed through other equipment and therefore been delayed for a few lines. With full adjustment of vertical and horizontal timing available, the fixed delay can be set between 2us and one frame.

SYNNER HD offers a powerful synchronising system, synchronising at three separate points: at the start of the field or frame, just after the switching point, and at the start of the active field or frame. This allows it to avoid picture disturbances for switches on the input that are between mistimed sources and that occur in the vertical blanking.

Manual freeze allows SYNNER HD to be used as a simple still store, with the type of freeze selected from frame, field 1 or field 2. Automatic freeze is available when input fails through loss of signal, with alternative responses selectable as blue screen, black screen, delay then blue or delay then black. Indication is also given if the delay between the input video and external reference is shorter than the vertical blanking period of the input video. A TTL level pulse allows an audio delay to track the video delay through SYNNER HD, while up to 16 presets may be stored for later recall.

TRACKING AUDIO DELAY

The internal 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. Up to 20ms of fixed audio delay can be added on top of the tracking to compensate for early audio. Predictive tracking can be used to minimise the offset between audio and video delay when video frames are dropped or repeated. A synchroniser delay pulse output also allows SYNNER HD to be used with an external tracking audio delay.

AUDIO EMBEDDING AND DE-EMBEDDING

Need to embed or de-embed?

No problem. When it comes to audio, SYNNER HD's flexibility allows it to be configured in many different ways. Simply by fitting piggybacks to the motherboard SYNNER HD can include an audio embedder or de-embedder for analogue or digital audio. This allows you to embed one or two groups of audio (with optional overwriting or shuffling of existing audio), or de-embed one or two groups of audio timed to your system. So which piggybacks do you need?

To embed external audio, use the HD-DIP2-RS piggyback for AES and the HD-AIP2 for analogue audio. The HD-DIP2 can be used to embed AES when you want to synchronise the video but embed external audio without delaying it. The HD-DIP2 always bypasses the tracking audio delay, and can be used for applications when you have an external video feed and you want to add local audio or Dolby E which is already timed to the synchronised feed. Although SYNNER HD can be used for Dolby E in this way, the SYNNER-E HD is more suitable for this application.

To de-embed audio, use the HD-DOP2-75 for 75 ohm AES, the HD-DOP2-110 for 110 ohm AES and the HD-AOP2 for analogue audio. One piggyback is required for one audio group and two piggybacks for two audio groups. Of course you can always embed one group and de-embed another by fitting the appropriate piggybacks. Just change the piggybacks to change the product.

The audio routing is as powerful as you need it to be. Full channel shuffling is provided by a 16 x 8 mono router which will allow you to rearrange the audio tracks between the two groups. With audio replace an input piggyback can be used to overwrite some of the original audio channels from the HD or SD feed.

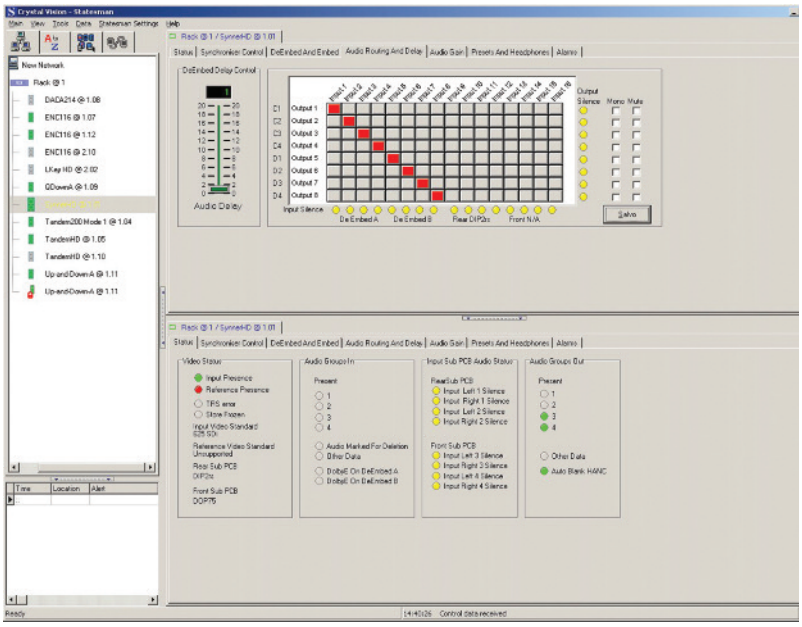
AUDIO PROCESSING

SYNNER HD also offers powerful audio processing capabilities. The audio level can be increased or decreased to match the rest of your system, with each mono audio channel offering individual gain control, adjustable between +3dB and -3dB in 0.1dB steps. Audio channels can be muted, while stereo to mono conversion helps those broadcasting a multi-language service. Forward error correction ensures audio quality is maintained, while a headphone socket on the front of the board can be used to preview the audio sources.

FRAMES AND CONTROL

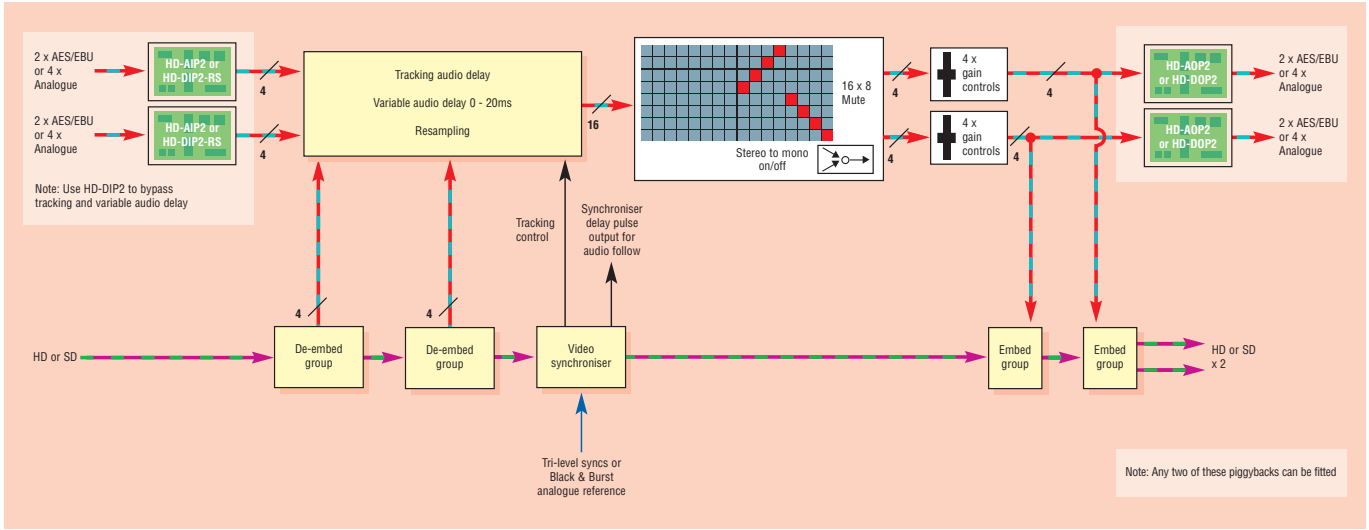
Easy to operate, SYNNER HD uses an intuitive board edge interface which, using two select buttons, a shaft encoder and a display, allows you to instinctively and quickly locate any option from menus structured in the most logical way possible. Control can additionally be from an active front panel on the frame, a remote panel located in a different room or the Statesman PC software, with Statesman's user-friendly GUI making it very easy to configure the board to your requirements.

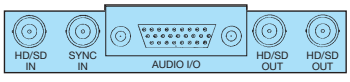
SYNNER HD fits in the standard frames (available in 4U, 2U, 1U and desk top box) and can be used with two frame rear modules to access all the inputs and outputs: select the RM33 if you're using analogue audio or 110 ohm AES and the RM39 if you're using 75 ohm AES.



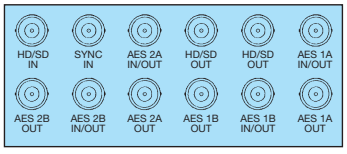
Statesman PC Control System

INPUTS AND OUTPUTS

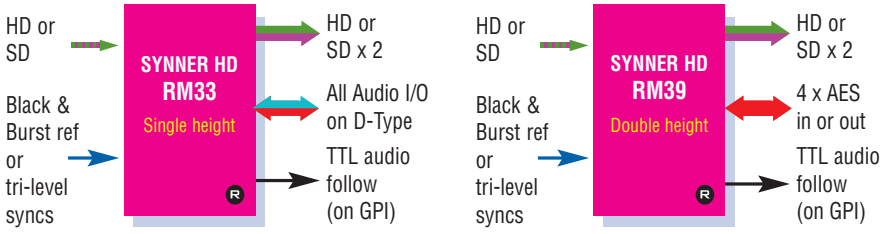




RM33



RM39



NB. All Audio I/O = 8 x analogue audio in or out, or 4 x AES in or out

SPECIFICATION

SYNNER HD MOTHERBOARD

MECHANICAL
Standard Crystal Vision module 266mm x 100mm
Weight (with two piggyback modules fitted): 260g
Power consumption (without piggybacks):
12 Watts

VIDEO INPUT
One HD or SD input with reclocking
270Mbit to 1.485Gbit serial compliant to EBU 3267-E, SMPTE 259M and SMPTE 292M
HD cable equalisation up to 140m with Belden 1694 or equivalent (approx. 100m with Belden 8281). Cable lengths are for new HD version of frames. SD cable equalisation >250m Belden 8281 or equivalent
Input return loss: -15dB for 50MHz to 1.5GHz
Auto 525/625 line selection
Automatic de-embedding to SMPTE 272M or SMPTE 299M

VIDEO OUTPUTS
Two HD or SD outputs using RM33 or RM39 frame rear modules
Serial output: 270Mbit to 1.485Gbit serial compliant to EBU 3267-E, SMPTE 259M and SMPTE 292M
Output follows the input format
Audio is embedded to SMPTE 272M or SMPTE 299M

ANALOGUE REFERENCE
Tri-level syncs or analogue Black and Burst or video
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

TIMING ADJUSTMENTS
SYNNER HD synchronises at three separate points within each field or frame: at the start of the field/frame, just after the switching point and at the start of the active field/frame
In synchroniser mode SYNNER HD takes its timing from the analogue external reference and will automatically synchronise sources between 0 and 1 frame. Should the reference be removed SYNNER HD will run in delay mode locked to the main input
In delay mode timing is derived from the HD or SD input
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. The maximum setting of both controls will provide a delay of one frame plus approx. 2us

FREEZE FUNCTIONS
Manual freeze allows the SYNNER HD to be used as a simple still store. Selecting single field output can counteract any flicker caused by the interlacing of the two fields on a picture with significant movement. Either field can be selected. The single field is output only when the picture is frozen. Automatic freeze is available when input fails through loss of signal. The user can specify to show the whole frame in which failure happened, field 1 or 2 of the last frame or alternatively a black or blue screen (with or without an initial delay)

VIDEO DELAY THROUGH BOARD
2us min - 1 frame plus 2us max

AUDIO INPUTS AND OUTPUTS (OPTIONAL)
Piggybacks can be added to the main board to enable either input or output of 2 x AES or 2 x analogue stereo pairs. Fit one piggyback for one audio group or two piggybacks for two audio groups
Use HD-AIP2 to input analogue audio. Use HD-DIP2-RS to input AES audio. Use HD-DIP2 to input AES audio only when there is a requirement to bypass the tracking audio delay
Use HD-AOP2 to output analogue audio. Use HD-DOP2-75 to output 75 ohm AES. Use HD-DOP2-110 to output 110 ohm AES audio

AUDIO TIMING ADJUSTMENTS
The audio is normally delayed by the same amount as the video but an additional delay can be added to the audio of up to 20ms
Tracking delay auto or off

AUDIO REPLACE
Routing of input piggyback audio together with audio from up to two de-embedded groups present on video input to any channel of up to two output embedder groups

AUDIO PROTECTION IN DE-EMBEDDERS
Full support for data recovery using SMPTE 299M error correction codes

EMBEDDER TIMING PERFORMANCE
Interchannel: <1 clock cycle
Audio to video: embed and de-embed delays approximately 800us in SD and 90us in HD
De-embedder automatically handles asynchronous and synchronous audio

AUDIO MONITORING
One miniature front mounted audio jack and switch selects individual stereo analogue audio monitoring on both embedder and de-embedder

EDH
EDH insertion on SD output

SYNCHRONISER DELAY PULSE OUTPUT
TTL output on GPI
Pulse length shows delay through store
Can provide control signal for audio delay systems

AUDIO PROCESSING
Gain level adjustment on each channel between +3dB and -3dB in 0.1dB steps with 0dB calibration
Mute
Stereo to mono conversion

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

GPI OUTPUT LEVELS
Electrically: Open drain transistors 48V, 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 has programmable alarm output.
Eight output silence alarms and three video alarms: video missing, reference missing and video frozen.
Can set the silence detect delay from 0 to 128 seconds for the amount of time a signal is allowed to remain below -50dB with respect to Full Scale before a silence error is flagged

LED INDICATION OF:
Power supplies on board
Video input absent
HD input present
SD input present
Flagged audio channel contains silence
Audio levels calibrated

LOCAL CONTROL
Intuitive board edge interface with two select buttons, shaft encoder and 10 character alphanumeric display

REMOTE CONTROL
RS422/485
19200 baud, 8 bits, 1 stop no parity
Control from frame active panel and remote panel
Statesman allows control from any PC on a network

HD-AIP2 DUAL ANALOGUE AUDIO INPUT PIGGYBACK

AUDIO INPUTS
Two analogue stereo pairs or four mono channels. 24 bit quantising A to Ds. High input impedance (20 kohm) balanced

INPUT LEVEL RANGE
0dBFS = +28dBu max / 0dBFS = +12dBu min
Factory set default: 0dBFS = +18dBu or +24dBu by on board link

SIGNAL TO NOISE
99dB (+18dBu) rms., 22Hz to 22kHz typ.

TOTAL HARMONIC DISTORTION
0.004% THD+N rms., 22Hz to 22kHz typ.

INTERCHANNEL CROSSTALK
-110dB at 1kHz, -90dB at 20kHz, rms., typ.

HD-DIP2-RS AND HD-DIP2 DUAL DIGITAL AUDIO INPUT PIGGYBACKS

AUDIO INPUTS
Two 24 bit stereo pairs. AES3 110 ohm or HiZ (balanced) D-Type, or AES3-id (unbalanced) 75 ohm BNC. Set by on board jumper links
Synchronous audio to video 48kHz
Asynchronous audio to video 48kHz + or - 50ppm
HD-DIP2-RS is used for most applications. HD-DIP2 is only used when there is a requirement to bypass the tracking audio delay

TOTAL HARMONIC DISTORTION
0.0002%

HD-AOP2 DUAL ANALOGUE AUDIO OUTPUT PIGGYBACK

AUDIO OUTPUTS
Two analogue stereo pairs or four mono channels. 24 bit quantising D to As. Low output impedance (66 ohm) balanced

INPUT LEVEL RANGE
0dBFS = +28dBu max / 0dBFS = +12dBu min
Factory set default: 0dBFS = +18dBu or +24dBu by on board link

SIGNAL TO NOISE
99dB (+18dBu) rms., 22Hz to 22kHz typ.

TOTAL HARMONIC DISTORTION
0.002% THD+N rms., 22Hz to 22kHz typ.

INTERCHANNEL CROSSTALK
-110dB at 1kHz, -90dB at 20kHz, rms., typ.

HD-DOP2-110 AND HD-DOP2-75 DUAL DIGITAL AUDIO OUTPUT PIGGYBACKS

AUDIO OUTPUTS
Two 24 bit AES/EBU stereo pairs
AES: HD-DOP2-110 110 ohm balanced D-Type or HD-DOP2-75 75 ohm unbalanced BNC

ORDERING INFORMATION

SYNNER HD	HD/SD video synchroniser, tracking audio delay, embedder/de-embedder and audio processor for one or two groups of analogue or digital audio (allows fitting of one or two audio piggybacks)
HD-AIP2	Analogue audio (two stereo pairs) input piggyback
HD-DIP2-RS	75 ohm, 110 ohm, HiZ AES/EBU (two stereo pairs) resampling input piggyback. 30-108kHz AES/EBU. Used for most digital audio embedding applications
HD-DIP2	75 ohm, 110 ohm, HiZ AES/EBU (two stereo pairs) input piggyback. 48kHz only, synchronous to video input. NB: Only use for applications where you wish to bypass the tracking audio delay
HD-AOP2	Analogue audio (two stereo pairs) output piggyback
HD-DOP2-110	110 ohm AES/EBU balanced (two stereo pairs) output piggyback
HD-DOP2-75	75 ohm AES/EBU unbalanced (two stereo pairs) output piggyback
HD-DCDCV18	18 Volt regulator for analogue audio configurations (one required if analogue audio piggyback fitted)
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 DTAE	Desk top box with active 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
RM33	Single slot frame rear module. Allows maximum number of SYNNER HD in frame (24 in 4U, 12 in 2U, six in 1U, two in desk top box). Suitable for analogue or 110 ohm digital audio. Allows all audio connections and two HD or SD outputs
RM39	Two slot frame rear module. Allows 12 SYNNER HD in 4U, six in 2U, three in 1U and one in desk top box. Suitable for 75 ohm digital audio. Allows all audio connections and two HD or SD outputs
REMIND	19" remote control panel
REMIND-E	19" Ethernet remote control panel
Statesman	PC Control System

Performance and features are subject to change. Figures given are typical measured values. SYNNERHD1207

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